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 June 30, 2014

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 guality 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 guantification 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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PRIMARY AUTHORS:

Kate Longley, Project Scientist, SeaPlan Andrew Lipsky, Senior Partner, SeaPlan

CONTRIBUTING AUTHORS

Kelly Knee, Water Resources Engineer, RPS ASA Dean Audet, Senior Vice President, Fuss & O'Neill





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> SeaPlan 89 South Street, Suite 202 Boston, MA 02111

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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 <u>ArcGIS Online Story Map</u> application to visually compare flooding scenarios and identify vulnerable infrastructure, while the <u>risk communication tool</u> 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 visual-ization 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 <u>seaplan.buzzardsbay.org</u> 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.

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.

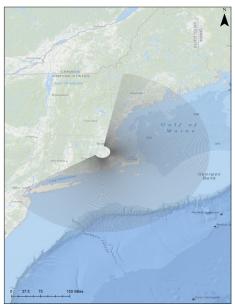


Figure 1. Boston Providence depth grid used as SLOSH model input



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, Rl (8452660)	New Bedford, MA (8447584) Offset = Newport*1.05	New Bedford, MA (8447584) with SLR		SLR
	F	eet Relative to NAVD88	1 ft	2 ft	4 ft
МННЖ	1.81	1.81 1.9005		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 geodatabase² associated with the project available at http://climatechange.buzzardsbay.org/seaplan-study.html.

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 Man- agement & 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

Table 3. Data processing summary

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 model-ing, 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.

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 vulner-abilities. 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 <u>Buzzards</u> <u>Bay NEP website</u>, 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	eville Ave West Acushnet River		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.

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

Table 5. Summary of meetings and objectives.

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.

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

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

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

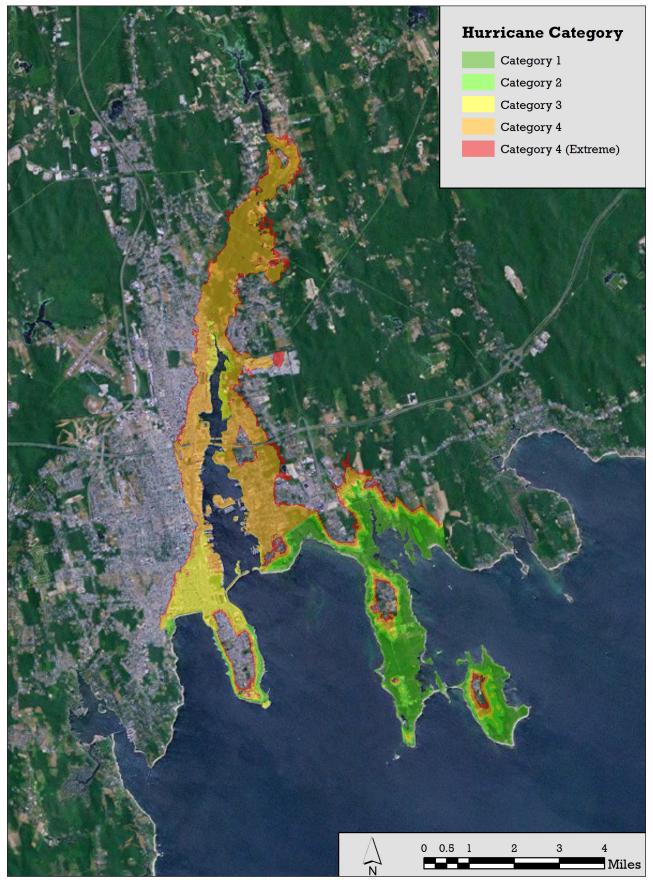


Figure 4. Summary inundation extents for hurricane scenarios modeled using baseline (no SLR) water levels.

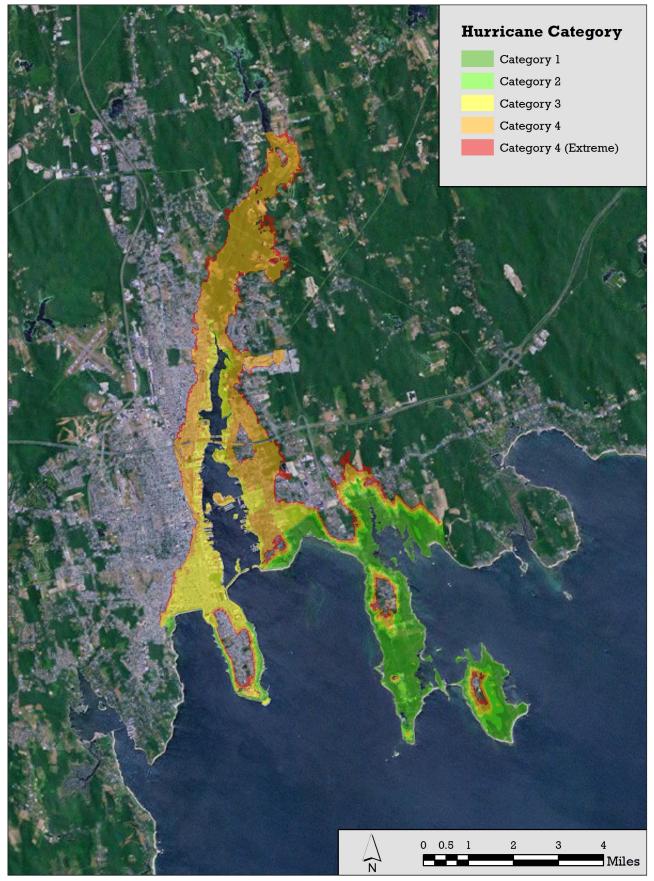


Figure 5. Summary inundation extents for hurricane scenarios modeled using 1-foot SLR water levels

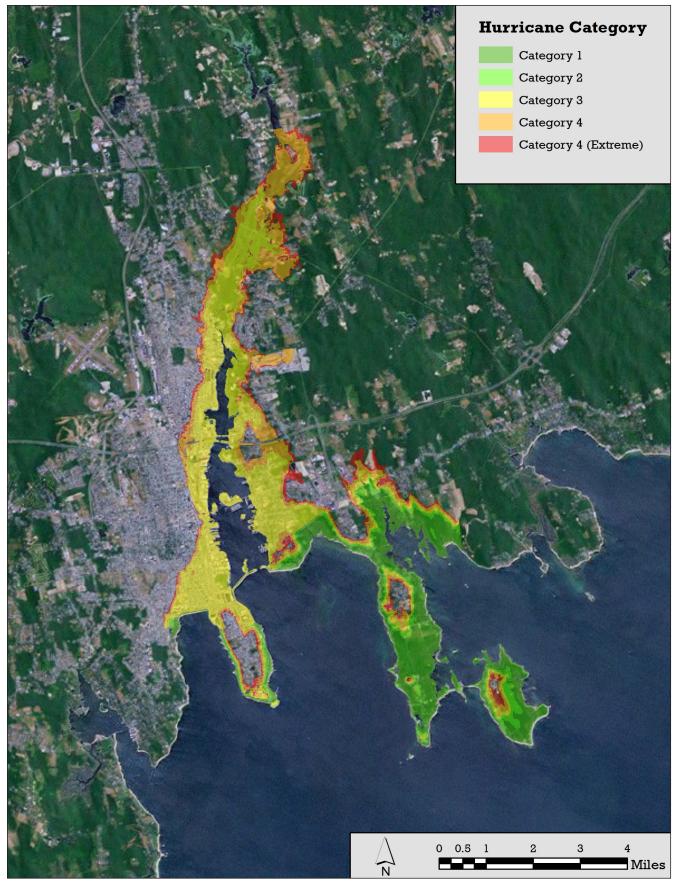


Figure 6. Summary inundation extents for hurricane scenarios modeled using 2-foot SLR water levels

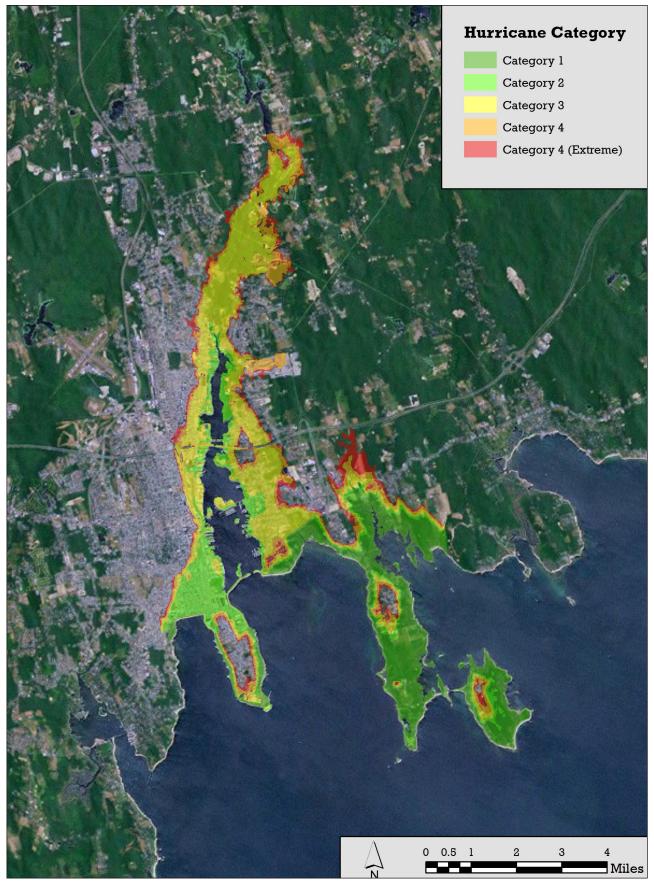


Figure 7. Summary inundation extents for hurricane scenarios modeled using 4-foot SLR water levels

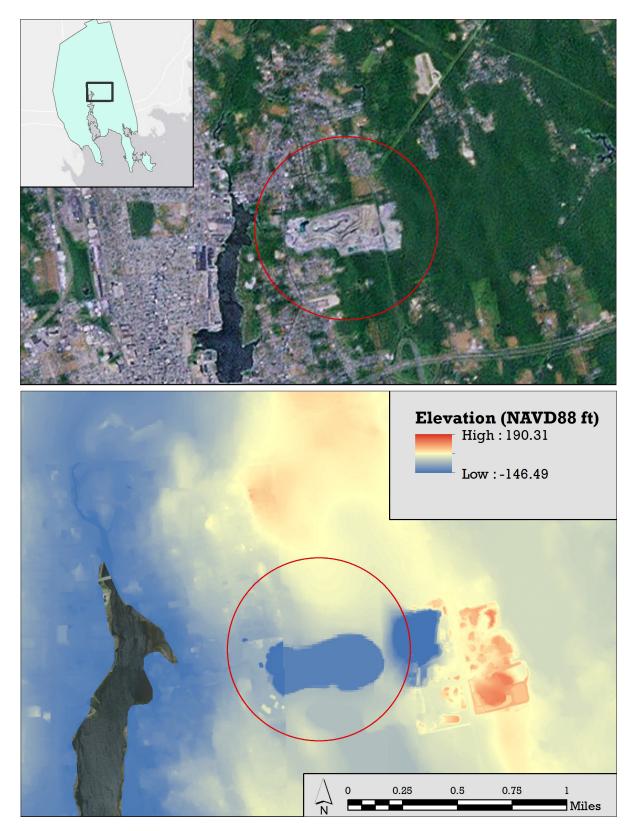


Figure 8. Tilcon Quarry and DEM showing negative (below sea level) elevations at that location

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.

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, o' 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

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

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 Fair-haven and Clarks Cove dikes. Points that are more than 1.5 standard deviations away from the mean are highlight-ed 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

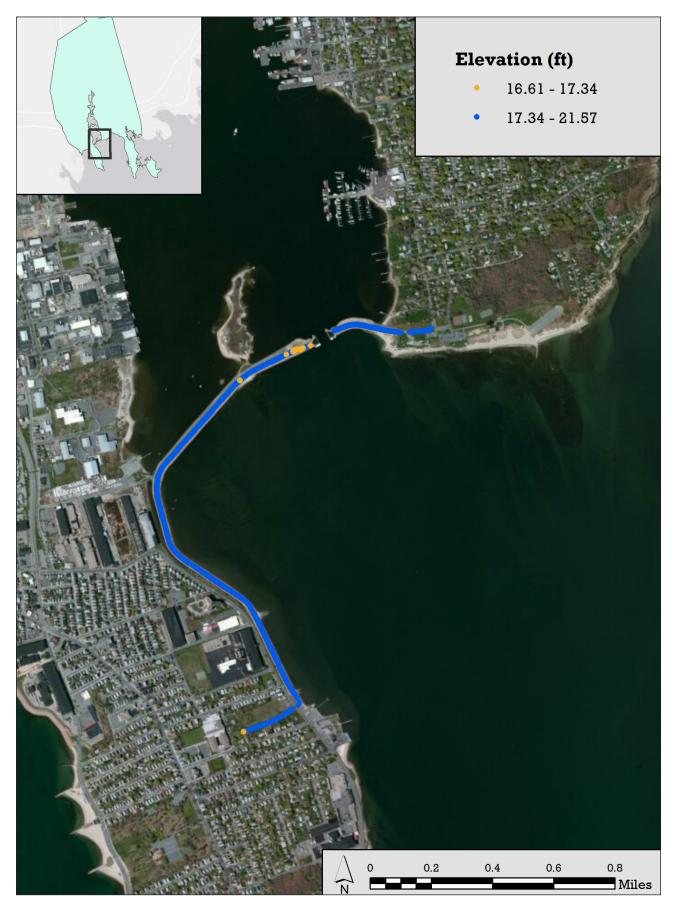


Figure 9. New Bedford Hurricane Barrier elevations.



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 <u>seaplan.buzzardsbay.org</u> 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.

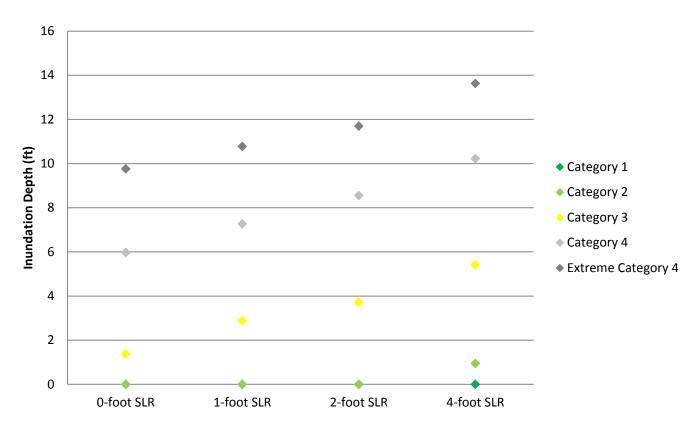


Figure 12. Inundation Depths at New Bedford Wastewater Treatment Facility.

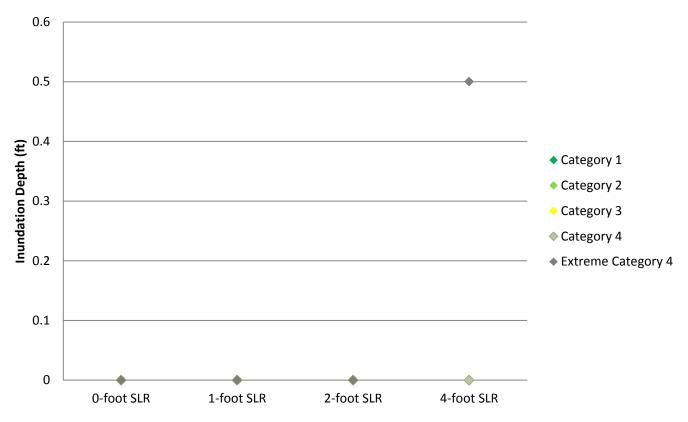


Figure 13. Inundation Depths at Fairhaven Wastewater Treatment Facility.

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

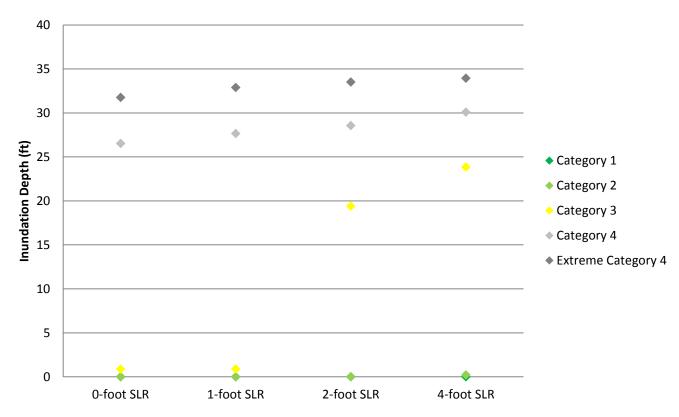


Figure 14. Inundation Depths at Slocum Street Pump Station, Acushnet.

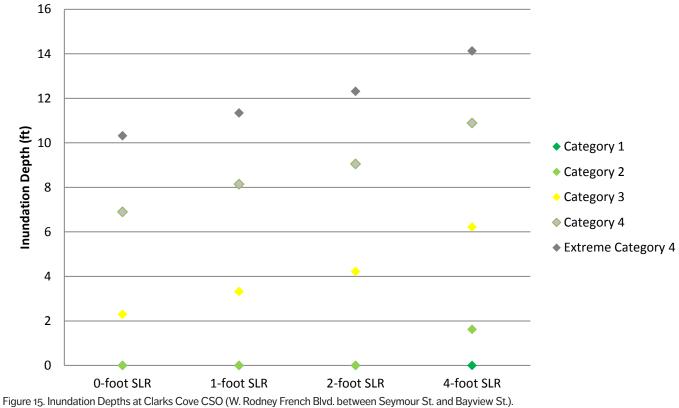


Figure 15. Inundation Depths at Clarks Cove CSO (W. Rodney French Blvd. between Seymour St. and Bayview St.). More information is needed to assess the vulnerability of individual CSOs; however, this figure illustrates the potential vulnerability of water quality infrastructure in this representative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

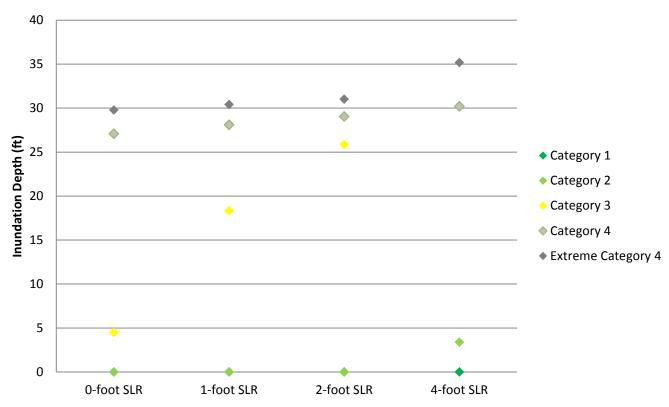


Figure 16. Inundation Depths at New Bedford Harbor CSO (corner of Purchase St. and Wamsutta St.). More information is needed to assess the vulnerability of individual CSOs; however, this figure illustrates the potential vulnerability of water quality infrastructure in this representative location.

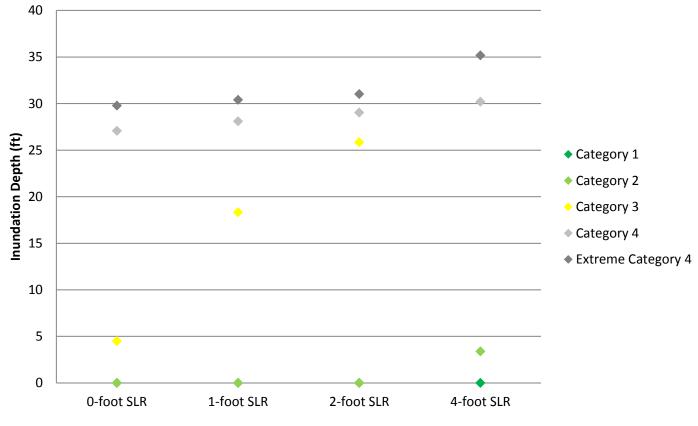


Figure 17. Inundation Depths at Popes Island Marina Pump Station.

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 <u>climate.buzzardsbay.org/seaplan-study.html</u>. The <u>online</u> <u>risk visualization</u> 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

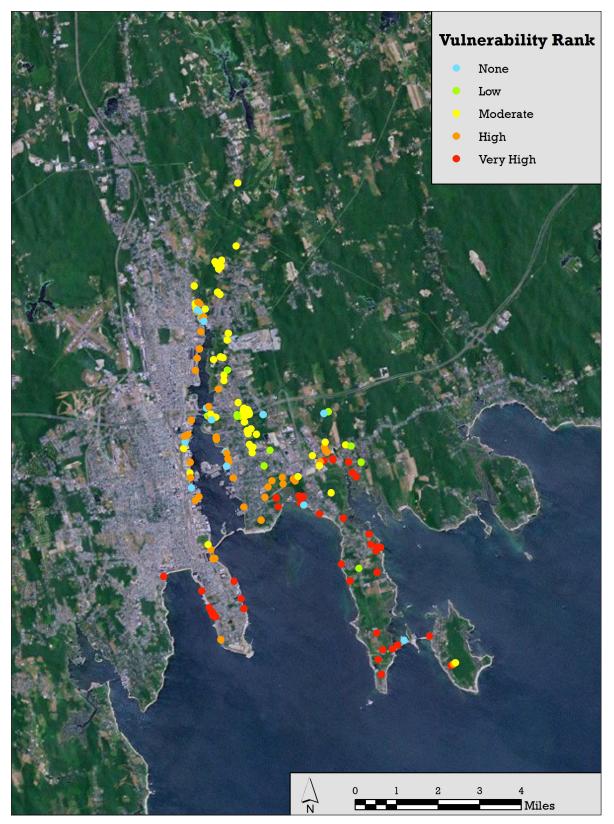


Figure 18. Water quality infrastructure features (pump stations and treatment plants) by vulnerability rank.

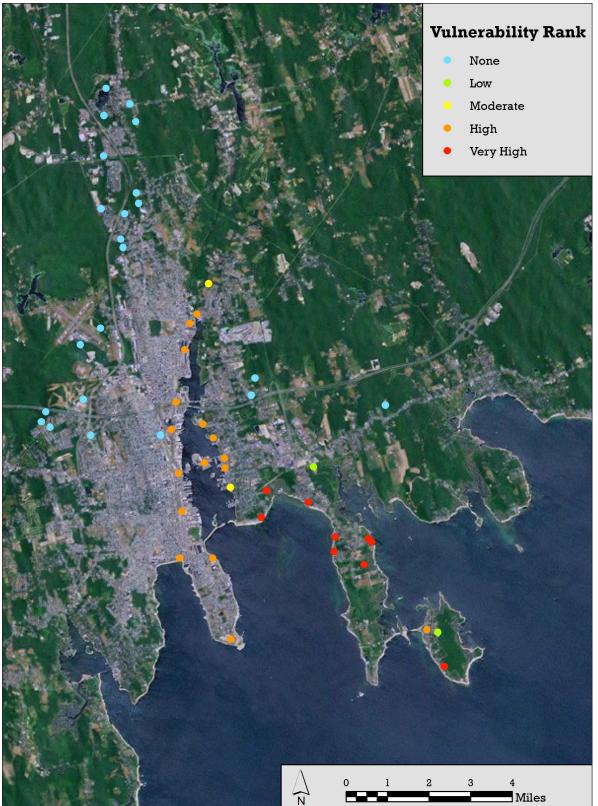


Figure 19. **Outfalls** by vulnerability rank. If the outfall is vulnerable in 1-5 storm scenarios, it is given a risk ranking of low and colored green. If the outfall is vulnerable in 6-10 storm scenarios, it is given a risk ranking of moderate and colored yellow.

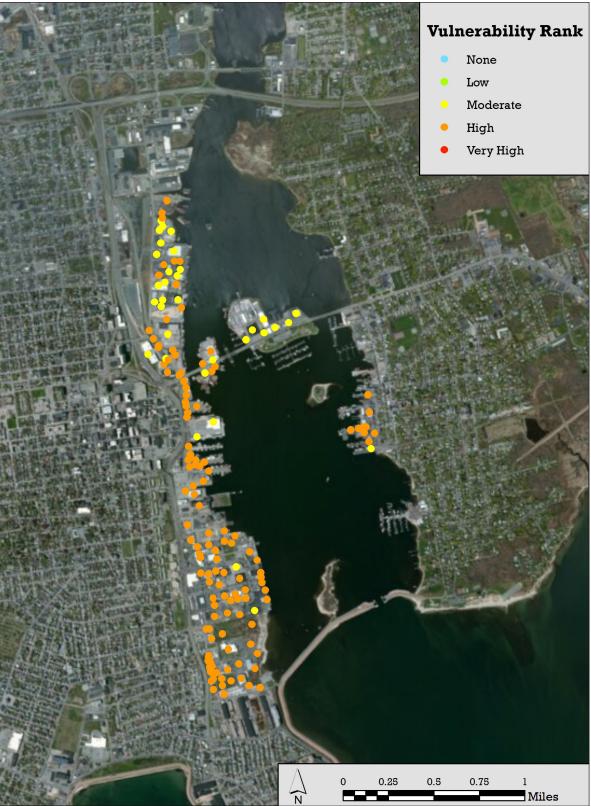


Figure 20. Designated port areas by vulnerability rank.

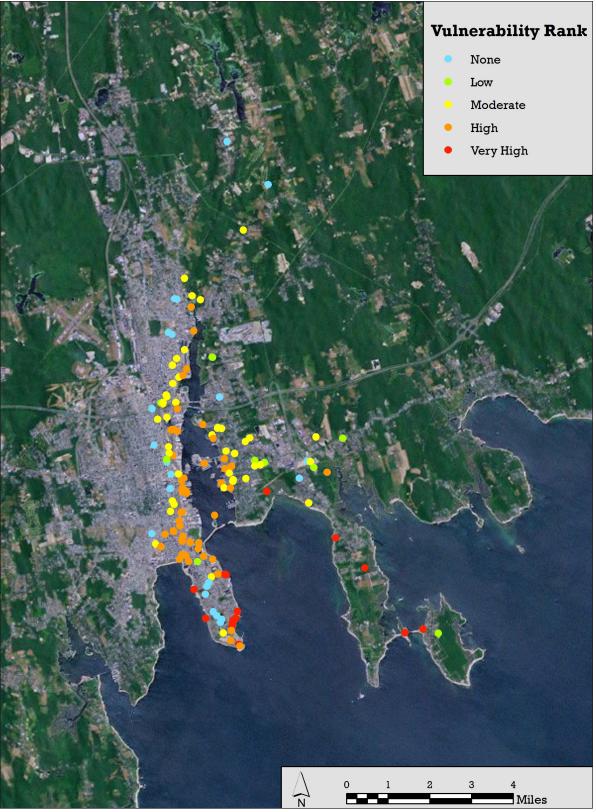


Figure 21. Built public structures by vulnerability rank.

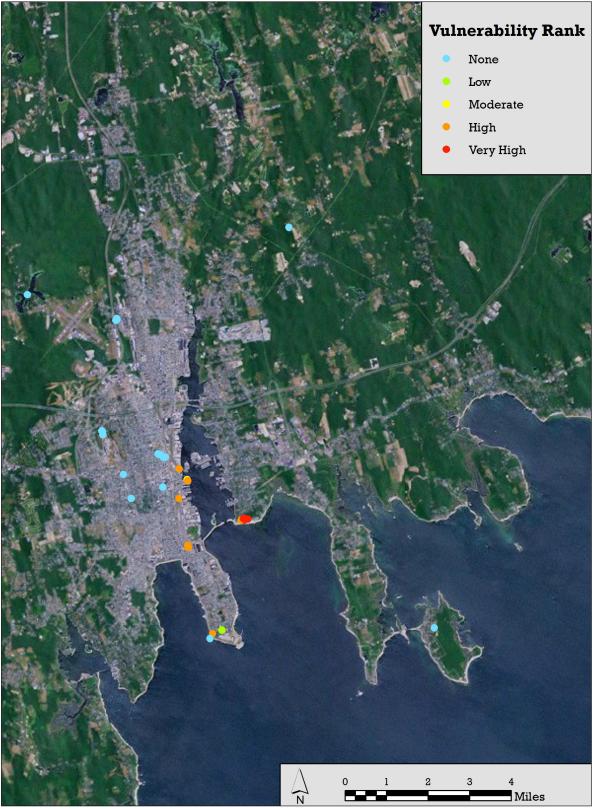


Figure 22. State-owned buildings by vulnerability rank.

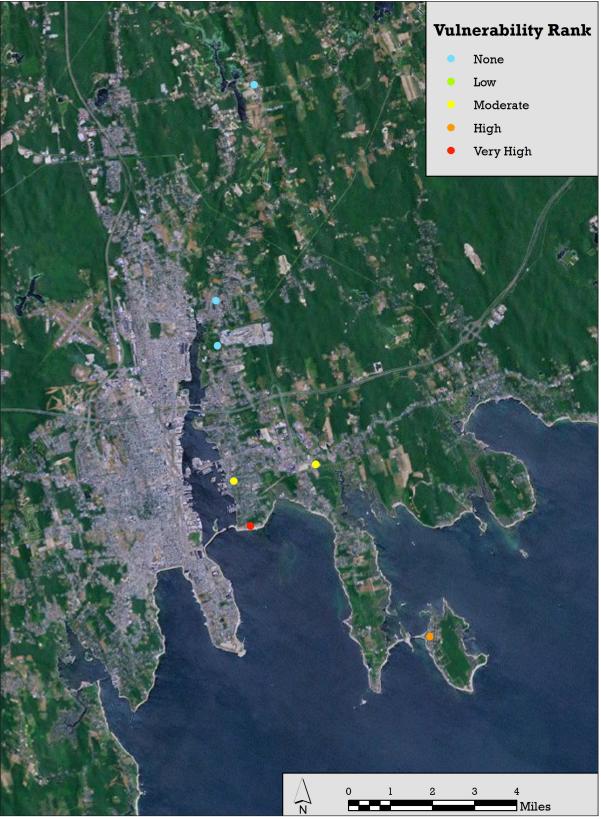


Figure 23. **Government buildings** by vulnerability rank.

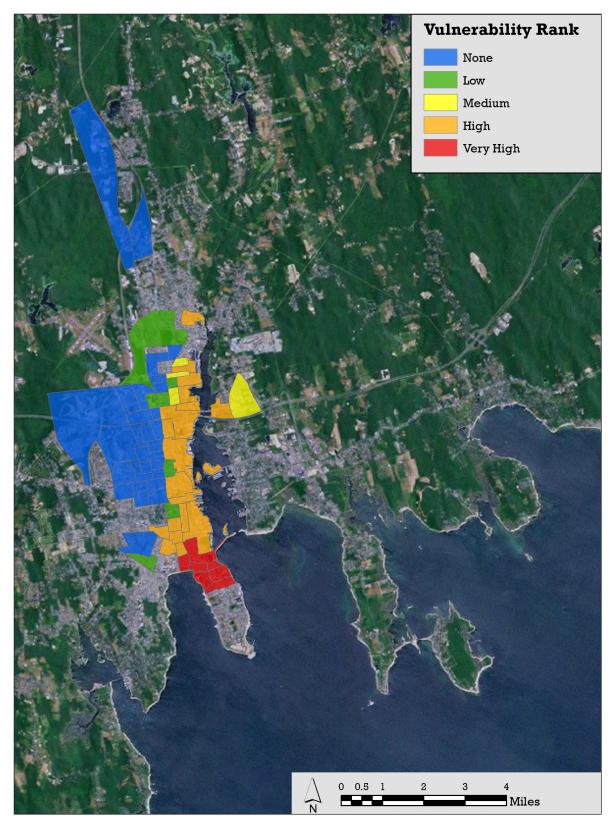


Figure 24. Environmental justice communities by vulnerability rank.

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.

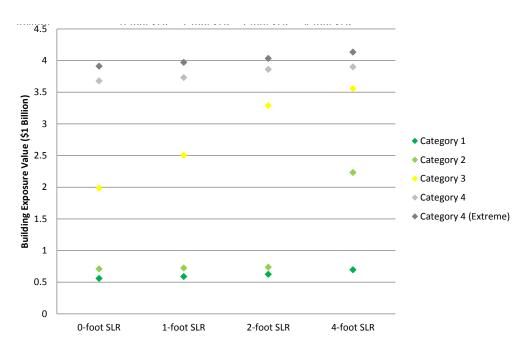
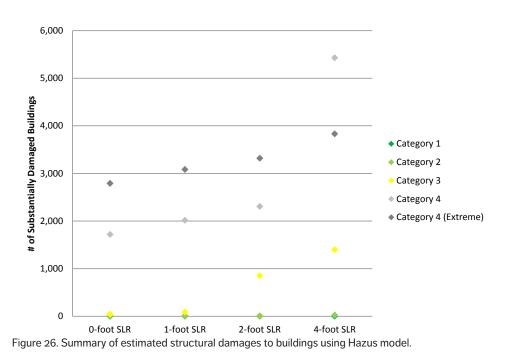


Figure 25. Summary of estimated building exposure values from the Hazus model. This estimate includes not only the cost of the buildings themselves (substantially damaged or otherwise), but also the engineering cost to replace or repair a damaged building.

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 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.



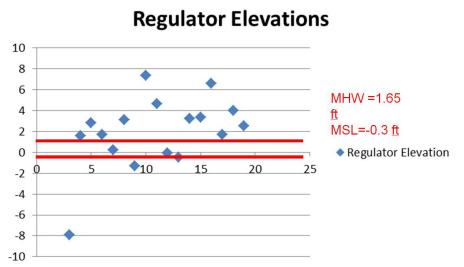


Figure 27. CSO Regulator Elevations. Regulator elevations (ft) are shown on the y-axis. Red lines on the chart depict mean high water (MHW) and mean sea level (MSL) at baseline (no SLR) scenarios.

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 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 C	verflows (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 St	ations			
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.

Climate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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 trans- fer 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 transform- er 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 pro- viding 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.	6
						E alla		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."	
					Wastewater Treat	iment Facilities			
South Rodney French Boulevard		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

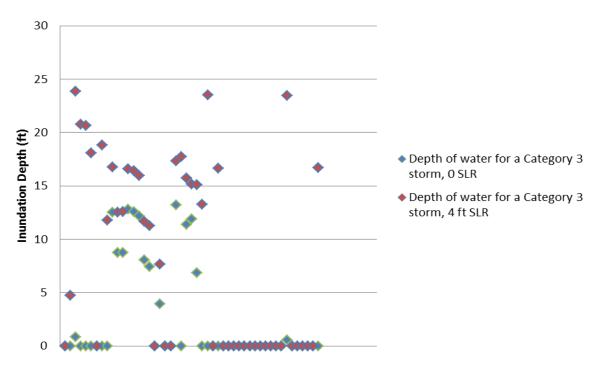


Figure 28. Inundation depths for pump stations. Depths reflect the inundation above sea level at the location of each pump station

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 <u>http://seaplan.buzzardsbay.org/</u>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).

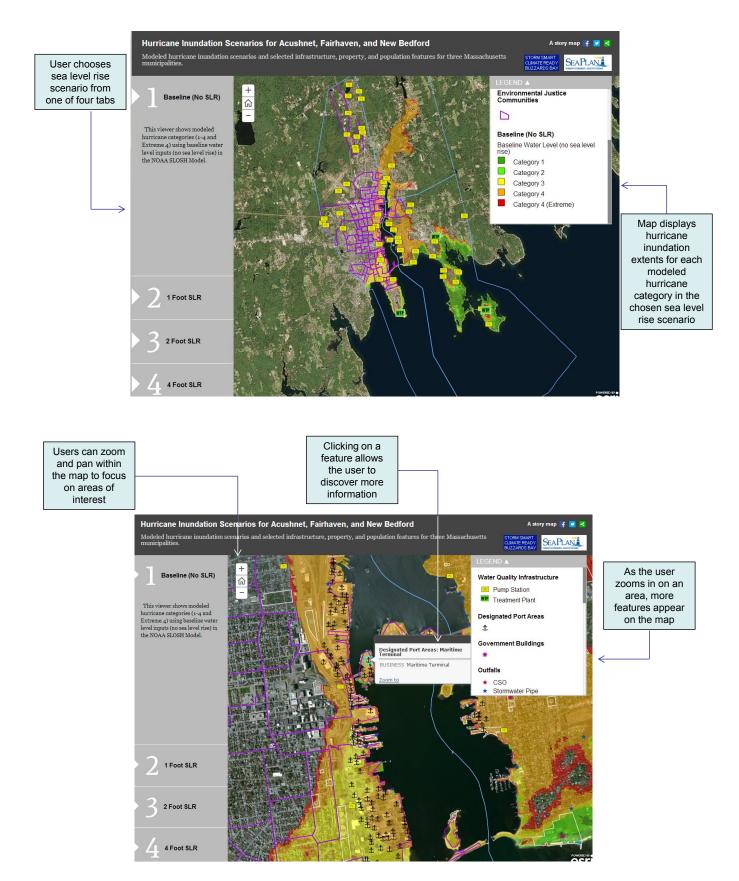


Figure 29. Online mapping tool available at seaplan.buzzardsbay.org.

Risk Visualization Tool

The interactive risk visualization tool found at <u>http://seaplan.buzzardsbay.org/risk.html</u> 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.

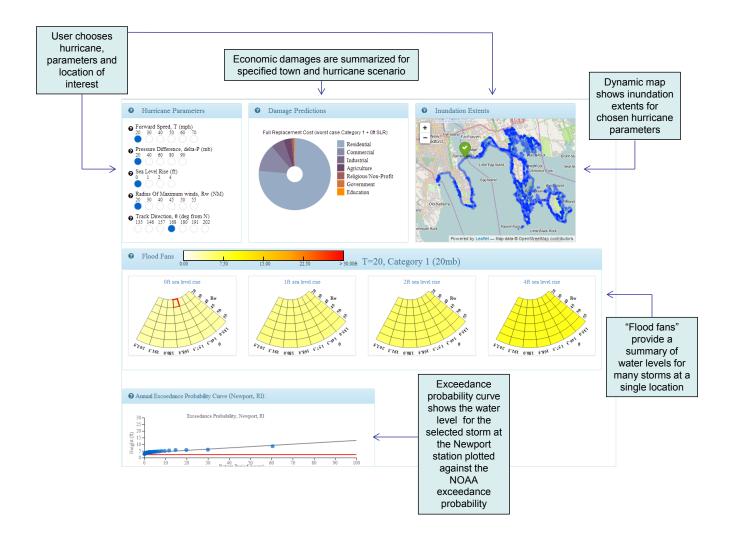


Figure 30. Online risk visualization tool available at http://seaplan.buzzardsbay.org/risk.html

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.

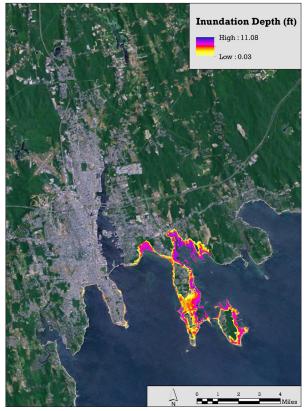


Figure A-1: Summary depth grid depicting inundation for a Category 1 Storm with no SLR

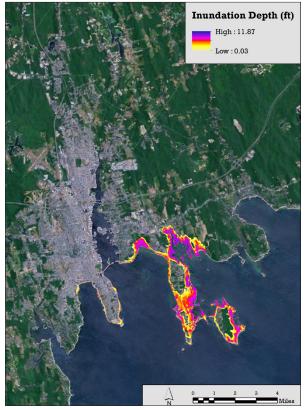


Figure A-2: Summary depth grid depicting inundation for a Category 1 storm with 1-foot SLR

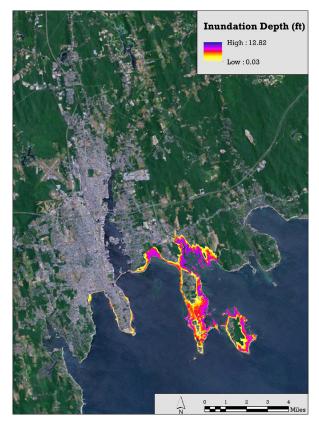


Figure A-3: Summary depth grid depicting inundation for a Category 1 storm with 2-foot SLR



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

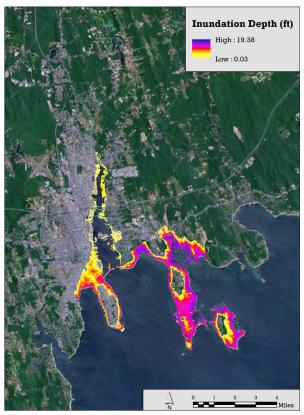


Figure A-8: Summary depth grid depicting inundation for a Category 2 storm with 4-foot SLR

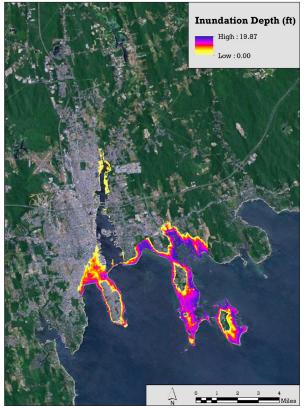


Figure A-9: Summary depth grid depicting inundation for a Category 3 storm with no SLR

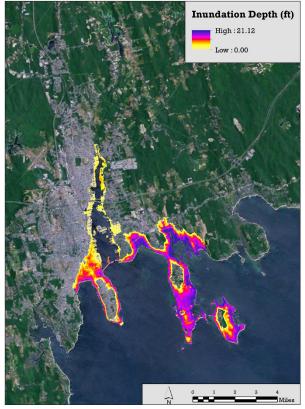


Figure A-10: Summary depth grid depicting inundation for a Category 3 storm with 1-foot SLR

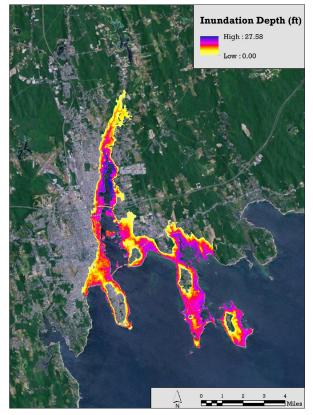


Figure A-11: Summary depth grid depicting inundation for a Category 3 storm with 2-foot SLR

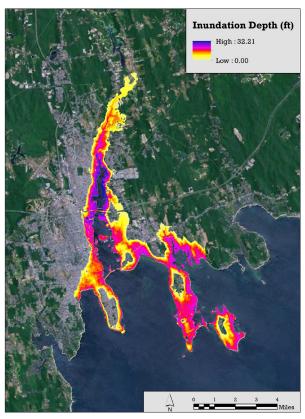


Figure A-12: Summary depth grid depicting inundation for a Category 3 storm with 4-foot SLR

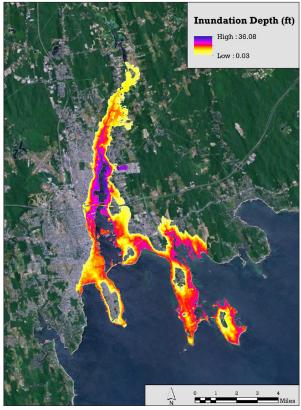


Figure A-13: Summary depth grid depicting inundation for a Category 4 storm with no SLR

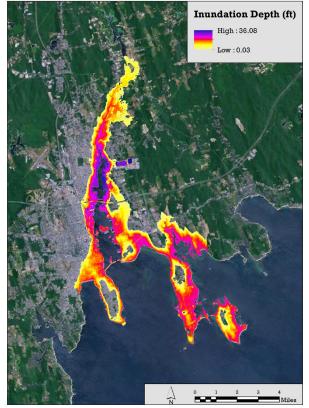


Figure A-14: Summary depth grid depicting inundation for a Category 4 storm with 1-foot SLR

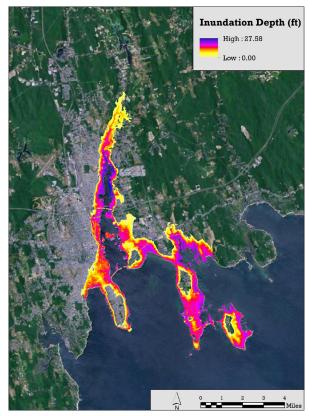


Figure A-15: Summary depth grid depicting inundation for a Category 4 storm with 2-foot SLR

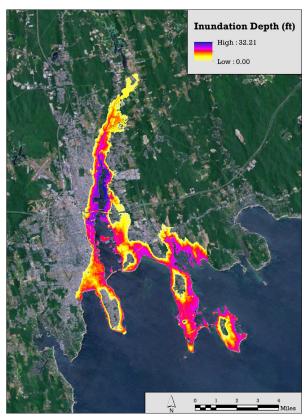


Figure A-16: Summary depth grid depicting inundation for a Category 4 storm with 4-foot SLR

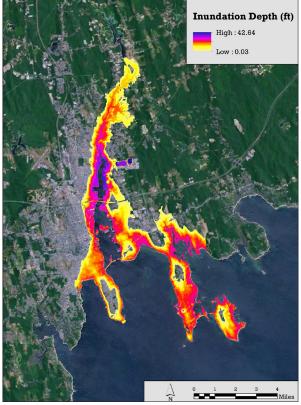


Figure A-17: Summary depth grid depicting inundation for an Extreme Category 4 storm with no SLR

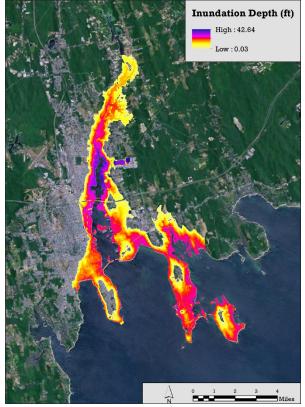


Figure A-18: Summary depth grid depicting inundation for an Extreme Category 4 storm with 1-foot SLR

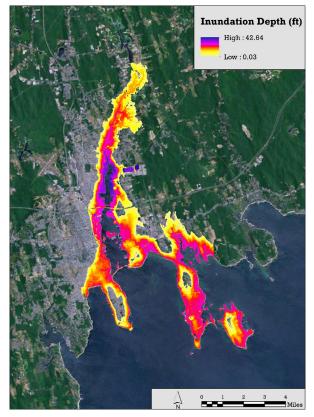


Figure A-19: Summary depth grid depicting inundation for an Extreme Category 4 storm with 2-foot SLR

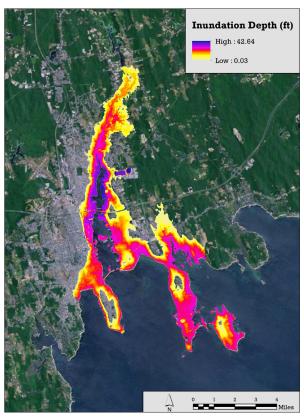


Figure A-20: Summary depth grid depicting inundation for an Extreme Category 4 storm with 4-foot SLR

APPENDIX B: MEETING AGENDAS AND SUMMARIES

AGENDA



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 Objective

- · 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? [optio 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 Nation 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 xtend 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
 - 0 Designated port area coverage
 - Structure and pump stations with assessed value

- · 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

MFMA-

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

AGENDA



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

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, vided 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 stakeho 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



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

The following breakout sessions will occur concurrently

- 1. Data Visualization Tools
- Analysis and Results
 Recommendations

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

SEAPLAN

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 Oolas (Fairhaven Shiyard), 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

Loe 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

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

- 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 exacution planning, including outreach to environmental justice communities and mapping evacuation routes, critical supplies, and concerned for development projects used to accound be used in exacution to the site of the data evaluation to the second between the second 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.

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

aPlan/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

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:

AGENDA

- 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

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), Meri 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 Introductio

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, lidentified high-risk wastwater 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, systemwide 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 <u>seaplan.buzzardsbay.org</u>. 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	Туре	Comments		Cat.1 Hu	ırricane	;		Cat.2 H	lurricane	•		Cat.3 H	urricane			Cat.4	Hurricane)	Cat	t.4 Extrem	ne Hurrica	ine
	Water Leve	l Rise		o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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
Pllgrim 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	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	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
Coggeshall Street	New Bedford	Pump Station		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
Sassaguin 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
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
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
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
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
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
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
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
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
Howard Avenue	New Bedford	Pump Station		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.53	0.53	19.03	23.44		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
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
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
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
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
	New Bedford	Pump Station		0.00	0.00	0.00		0.00	0.00	0.00	1.00	0.00	0.00	14.10	16.69	0.00	0.00 19.19	20.31	23.35	22.08	0.00 23.06	24.78	26.72
Popes Island										()()()	1.00				10.04	1/0	I I MI M				23.00	24.70	20.72

Outfalls

Municipality	Comments		Cat	egory 1			Cate	gory 2			Cate	gory 3			Cate	egory 4		(Category 4	Extreme	
	Water Level Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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	29.7
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	28.3
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	28.0
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	34.3
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	24.6
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	20.7
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	18.6
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	27.9
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	33.5
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	39.3
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	10.8
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	16.6;
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	16.8
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	18.0
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	29.0
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	21.3
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	24.7
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	20.6
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	14.2
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	27.4
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	24.1
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	15.0
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	13.6
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	14.9
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	13.1
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	15.9
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		28.79	30.42	30.18	30.84	31.25	34.0
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	15.5
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	10.0

Outfalls

Municipality	Comments		Cat	egory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	e
	Water Level Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4
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.
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	6.8
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
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.
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	5.0
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.:
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.
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.
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
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	3
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	3
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	2
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	3
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	2
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
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	1
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	1
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	2
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	
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	2
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	2
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	(
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	2
Fairhaven	DMF survey; 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	2
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	2
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	(
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	3
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	(
Fairhaven	regularly sampled by DMF DMF Survey; app 40gpm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Fairhaven Fairhaven	Divir 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	2
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	2
Fairhaven		0.00	0.00 2.08	0.00	0.00 5.18	0.00 6.05	0.00 6.91	0.00 7.70	0.00 9.67	0.00	0.00	0.00	0.00	0.00	0.00	0.45 17.62	2.01 19.10	1.55 18.61	2.69 19.84	3.57 20.68	2
Fairhaven		0.00	0.00	0.00	0.00	0.00	0.91	0.00	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		3.97	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	12
Fairhaven		0.00	0.00	0.00	0.25	0.94	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	
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	1
Fairhaven	12 1 10	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	-
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	3
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	3
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	_
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	
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		20.74	22.55	22.52	23.28	24.01	:
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	-	23.30	23.25	25.19	25.90	26.51	1
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	-	24.89	26.73	26.73	27.46	28.20	3
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		22.80	24.64	24.69	25.39	26.03	
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	
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		22.44	24.34	23.74	24.84	25.82	:
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		23.53	25.33	24.73	25.86	26.83	
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	2
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	1
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	:
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	· ·
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	+
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	- ·
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		21.20	23.10	22.41	23.65	24.46	
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	
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	3
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	2

Outfalls

Municipality	Comments		Cate	egory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	
	Water Level Rise	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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	5.73	11.24	14.50	16.15	17.24	18.22	20.28	21.43	22.11	22.44
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	26.4
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	26.8
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	15.9
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	24.2
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	28.3
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

Appendix C: continued

Designated Port Areas

Area		Cate	egory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		C	Category 4	Extreme	
Water Level Rise	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o 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 Sea Gold Seafood Prods	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
Fleet Fisheries Inc	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
Vacant-South Terminal Expansion	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 21.08	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 18.07	18.67	19.51	20.94	21.08	21.97 22.82	22.72	24.51
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	6.20 10.36	3.68 10.59	7.47 11.96	15.02 14.58	17.10 16.29	17.21	19.44 18.52	20.35 19.43	21.96 21.04	20.95	22.02	23.56 22.64	25.35 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	19.43	17.72	17.63	18.53	19.32	24.43
Field/Club	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.02	6.76	7.43	9.06	12.97	11.69	13.01	13.82	15.44	17.03	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
Ouality 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
Seatrade international Corp.		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
Parking Lot for Northern Wind	0.00																			-
	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
Parking Lot for Northern Wind			0.00	0.00 0.00	0.00	0.00	0.00	3.20 1.07	0.48 0.00	4.40 2.25	13.43 10.70	15.61 12.79	16.59 13.79	17.97 15.18	18.88 16.09	20.96 17.71	20.47 17.67	21.37 18.57	22.09 19.29	23.88 21.09
Parking Lot for Northern Wind Vacant-South Terminal Expansion	0.00	0.00	-			_														
Parking Lot for Northern Wind Vacant-South Terminal Expansion 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

Appendix C: continued

Designated Port Areas

Area		Cate	gory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		q	Category 4	Extreme
Water Level Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft 4 f
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.
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.
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 21.6
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.
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 23.3
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.
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 23.9
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.
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.
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.
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 21.1
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.
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.
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.
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.
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.
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.
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.
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 24.3
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.
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 24.3
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 20.0
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.
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.
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.
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 26.9
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 24.9
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.
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.;
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.
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 24.9
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.
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.
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.
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.
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.
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 24.9
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.
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.
Fishermans Wharf DEM State Pier	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.
	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 21.7
Crystal Ice NB Seafood Coalition	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 25.0
NB Searood 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.
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.
Lawkeymenter Duilding	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.
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.
Access to Crystal Ice Global Fuel Coop & Sea Fuels Marine	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.
Maritime Terminal	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 25.0
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.
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 24.4
Infrastructure	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 24.68	21.41 24.18	22.30	22.89 25. 25.69 28.
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			25.06	
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		21.07	22.10 18.42	24.64	24.15	25.03	25.66 28.3
	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.
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 27.5
	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 20.04	21.18	20.80	21.69	22.33 24. 23.65 26.
Maritime Terminal	0.00	0.00																	
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		22.59	22.12	23.01	
Maritime Terminal 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 25.9
Maritime Terminal														-					

Appendix C: continued

Designated Port Areas

Area		Cate	gory 1			Cate	egory 2			Cate	gory 3			Cate	egory 4		C	Category 4	Extreme	
Water Level Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4		C	Category 4	Extreme	
	Water Le	vel Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o 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 1095 COVE RD	New Bedford 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	45 COVE ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.90	11.89	12.51	13.41 18.08	15.12	16.01	17.11	18.11 22.86	19.68	19.59 24.38	20.49 25.28	21.31 26.07	23.09 27.86
30 31	RIVET ST	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.24 0.00	15.91 0.00	16.73 0.00	0.00	19.75 1.80	20.41 2.95	21.71 3.93	4.80	24.57 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		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		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	
	Water Le	evel Rise	0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 MACARTHUR DR	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 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 70	MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.19 1.66	0.00	4.13	14.98 13.82	18.32	18.24	19.45	20.55	22.56 21.67	22.35 21.26	23.25 22.16	23.76 22.67	26.25
70	249 MACARTHUR DR	New Bedford	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58 0.00	9.23	17.39 13.27	17.13 12.82	18.52 14.20	19.44 15.15	17.48	17.04	17.94	18.50	25.17 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
72	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
73	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		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 88	352 HERMAN MELVILLE BLVD	New Bedford 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 14.56	26.27	26.90	30.88
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	3.15 0.00	10.89 0.00	12.09 0.00	13.09 1.18	14.01 2.11	14.96 3.10	2.81	15.16 3.43	15.76 4.04	20.03 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
90	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 MAIN STREET	Fairhaven 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		24.99	26.61	26.47	27.07	27.53	31.09
104	MAIN STREET 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
105 106	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	0.00	0.09	1.22	2.10 7.23	2.98 8.74	2.84 7.97	3.44 8.58	3.67 8.85	5.98 11.13
100	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	5.21 0.00	6.31 0.00	0.31	2.72	2.13	2.83	4.82	6.26
107	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
100	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		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	-	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

121 A 122 R 123 S 124 M 125 M 126 S 127 P 128 C 129 M 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	Water Lev WASHINGTON STREET ARSENE STREET RAILROAD WAY SPRING STREET MIDDLE STREET WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET DIAMOND STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	FairhavenFairhavenNew BedfordFairhaven	O ft 0.00 1.81 0.00	1 ft 0.00 0.36 0.48 0.00 0.567 2.72	2 ft 0.00	4 ft 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 7.56 3.52 3.72 4.45	0 ft 0.00	1 ft 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	2 ft 0.00 0.41 0.00 0.00 0.00 0.00 0.00 0.00	4 ft 0.00 2.27 2.05 3.54 0.00 0.00 0.00 0.00 0.00 2.33 0.00 0.00 11.93 7.89	0 ft 0.00 0.00 3.11 0.00	1 ft 0.00 4.41 2.66 3.96 0.00 0.00 0.00 0.00 0.00 2.80 0.00 0.00	2 ft 0.00 5.21 15.04 16.52 11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	4 ft 0.95 0.00 7.02 17.35 18.82 13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74 16.75	0 ft 2.35 0.00 7.97 18.48 20.84 14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98 18.04	1 ft 3.64 0.00 8.97 19.79 22.18 16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28 19.27	2 ft 4.56 0.00 10.31 20.95 22.42 17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18 20.11	4 ft 6.40 0.00 11.72 23.38 24.59 19.57 0.00 10.59 9.74 12.62 23.42 20.06 17.26	0 ft 6.45 0.00 11.21 22.73 24.15 18.90 0.00 10.63 9.47 12.36 22.74 19.76 16.97	1 ft 7.15 0.00 12.51 23.50 24.98 19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	2 ft 7.86 0.00 13.32 25.13 26.70 21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41 23.38	4 ft 9.81 0.50 14.92 26.83 28.42 22.89 0.00 13.16 16.03 26.78 23.45 20.55 25.13
121 A 122 R 123 S 124 M 125 M 126 S 127 P 128 C 129 M 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	WASHINGTON STREET ARSENE STREET RAILROAD WAY SPRING STREET MIDDLE STREET WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET ABBEY STREET DIAMOND STREET CAUSE WAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	FairhavenFairhavenNew BedfordFairhaven	0.00 1.81	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.41 0.00 0.00 0.00 0.00 0.00	0.00 0.00 2.27 2.05 3.54 0.00 0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 3.11 0.00 0.00 0.00 0.00 0.00	0.00 0.00 4.41 2.66 3.96 0.00 0.00 0.00 0.00 2.80 0.00 0.00 13.66	0.00 5.21 15.04 16.52 11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	0.95 0.00 7.02 17.35 18.82 13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74	2.35 0.00 7.97 18.48 20.84 14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98	3.64 0.00 8.97 19.79 22.18 16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28	4.56 0.00 10.31 20.95 22.42 17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18	6.40 0.00 11.72 23.38 24.59 19.57 0.00 10.59 9.74 12.62 23.42 20.06	6.45 0.00 11.21 22.73 24.15 18.90 0.000 10.63 9.47 12.36 22.74 19.76	7.15 0.00 12.51 23.50 24.98 19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	7.86 0.00 13.32 25.13 26.70 21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41	9.81 0.50 14.92 26.83 28.42 22.89 0.00 14.00 13.16 16.03 26.78 23.45 20.55
122 R 123 S 124 M 125 W 126 S 127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	RAILROAD WAY SPRING STREET MIDDLE STREET WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	New Bedford Fairhaven Fairhaven	0.00 1.81	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.41 0.00 0.00 0.00 0.00 0.00 0.00 0.00	2.27 2.05 3.54 0.00 0.00 0.00 2.33 0.00 0.00 11.93	3.11 0.00 0.00 0.00 0.00 0.00 0.00 0.00	4.41 2.66 3.96 0.00 0.00 0.00 0.00 2.80 0.00 0.00 0.00	5.21 15.04 16.52 11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	7.02 17.35 18.82 13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74	7.97 18.48 20.84 14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98	8.97 19.79 22.18 16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28	10.31 20.95 22.42 17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18	11.72 23.38 24.59 19.57 0.00 10.59 9.74 12.62 23.42 20.06	11.21 22.73 24.15 18.90 0.00 10.63 9.47 12.36 22.74 19.76	12.51 23.50 24.98 19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	13.32 25.13 26.70 21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41	14.92 26.83 28.42 22.89 0.00 14.00 13.16 16.03 26.78 23.45 20.55
123 S 124 M 125 W 126 S 127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	SPRING STREET MIDDLE STREET WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	FairhavenFairhavenFairhavenFairhavenFairhavenFairhavenFairhavenFairhavenVew BedfordWOOD'S HOLEFairhaven	0.00 1.81	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	2.05 3.54 0.00 0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	2.66 3.96 0.00 0.00 0.00 2.80 0.00 2.80 0.00 13.66	15.04 16.52 11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	17.35 18.82 13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74	18.48 20.84 14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98	19.79 22.18 16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28	20.95 22.42 17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18	23.38 24.59 19.57 0.00 10.59 9.74 12.62 23.42 20.06	22.73 24.15 18.90 0.00 10.63 9.47 12.36 22.74 19.76	23.50 24.98 19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	25.13 26.70 21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41	26.83 28.42 22.89 0.00 14.00 13.16 16.03 26.78 23.45 20.55
124 M 125 W 126 S 127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	MIDDLE STREET WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	FairhavenFairhavenFairhavenFairhavenFairhavenFairhavenFairhavenVew BedfordWOOD'S HOLEFairhaven	0.00 1.81	0.00 0.00 0.00 0.00 0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	3.54 0.00 0.00 0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	3.96 0.00 0.00 0.00 0.00 2.80 0.00 0.00 13.66	16.52 11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	18.82 13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74	20.84 14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98	22.18 16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28	22.42 17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18	24.59 19.57 0.00 10.59 9.74 12.62 23.42 20.06	24.15 18.90 0.00 10.63 9.47 12.36 22.74 19.76	24.98 19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	26.70 21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41	28.42 22.89 0.00 14.00 13.16 16.03 26.78 23.45 20.55
125 W 126 S 127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	WASHINGTON STREET SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven New Bedford WOOD'S HOLE Fairhaven	0.00 1.81	0.00 0.00 0.00 0.00 0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 0.00 0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 0.00 0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 0.00 0.00 0.00 9.86	0.00 0.00 0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 0.00 0.00 0.00 12.50	0.00 0.00 0.00 0.00 2.80 0.00 0.00 13.66	11.24 0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	13.55 0.00 5.19 4.15 7.06 17.55 14.56 11.74	14.91 0.00 6.53 5.37 8.26 18.64 15.67 12.98	16.44 0.00 7.83 6.67 9.56 19.98 16.97 14.28	17.11 0.00 8.74 7.67 10.56 21.03 17.99 15.18	19.57 0.00 10.59 9.74 12.62 23.42 20.06	18.90 0.00 10.63 9.47 12.36 22.74 19.76	19.65 0.00 11.33 10.20 13.08 23.57 20.51 17.68	21.09 0.00 12.03 11.15 14.00 24.79 21.33 18.41	22.89 0.00 14.00 13.16 16.03 26.78 23.45 20.55
126 S 127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	SCONTICUT NECK ROAD PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven Fairhaven New Bedford WOOD'S HOLE Fairhaven	0.00 0.00 0.00 0.00 0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 0.00 0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 0.00 0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 0.00 0.00 0.00 9.86	0.00 0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 0.00 0.00 12.50	0.00 0.00 0.00 2.80 0.00 0.00 13.66	0.00 2.85 1.86 4.76 15.28 12.27 9.44 14.35	0.00 5.19 4.15 7.06 17.55 14.56 11.74	0.00 6.53 5.37 8.26 18.64 15.67 12.98	0.00 7.83 6.67 9.56 19.98 16.97 14.28	0.00 8.74 7.67 10.56 21.03 17.99 15.18	0.00 10.59 9.74 12.62 23.42 20.06	0.00 10.63 9.47 12.36 22.74 19.76	0.00 11.33 10.20 13.08 23.57 20.51 17.68	0.00 12.03 11.15 14.00 24.79 21.33 18.41	0.00 14.00 13.16 16.03 26.78 23.45 20.55
127 P 128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A 142 A	PLEASANT STREET CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven New Bedford WOOD'S HOLE Fairhaven	0.00 0.00 0.00 0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 0.00 0.00 9.86	0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 0.00 0.00 12.50	0.00 0.00 2.80 0.00 0.00 13.66	2.85 1.86 4.76 15.28 12.27 9.44 14.35	5.19 4.15 7.06 17.55 14.56 11.74	6.53 5.37 8.26 18.64 15.67 12.98	7.83 6.67 9.56 19.98 16.97 14.28	8.74 7.67 10.56 21.03 17.99 15.18	10.59 9.74 12.62 23.42 20.06	10.63 9.47 12.36 22.74 19.76	11.33 10.20 13.08 23.57 20.51 17.68	12.03 11.15 14.00 24.79 21.33 18.41	14.00 13.16 16.03 26.78 23.45 20.55
128 C 129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	CENTER STREET WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven New Bedford WOOD'S HOLE Fairhaven	0.00 0.00 0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 0.00 9.86	0.00 0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 12.50	0.00 0.00 2.80 0.00 0.00 13.66	1.86 4.76 15.28 12.27 9.44 14.35	4.15 7.06 17.55 14.56 11.74	5.37 8.26 18.64 15.67 12.98	6.67 9.56 19.98 16.97 14.28	7.67 10.56 21.03 17.99 15.18	9.74 12.62 23.42 20.06	9.47 12.36 22.74 19.76	10.20 13.08 23.57 20.51 17.68	11.15 14.00 24.79 21.33 18.41	13.16 16.03 26.78 23.45 20.55
129 W 130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	WILLIAM STREET UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven New Bedford WOOD'S HOLE Fairhaven	0.00 0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 0.00 9.86	0.00 2.33 0.00 0.00 11.93	0.00 0.00 0.00 0.00 12.50	0.00 2.80 0.00 0.00 13.66	4.76 15.28 12.27 9.44 14.35	7.06 17.55 14.56 11.74	8.26 18.64 15.67 12.98	9.56 19.98 16.97 14.28	10.56 21.03 17.99 15.18	12.62 23.42 20.06	12.36 22.74 19.76	13.08 23.57 20.51 17.68	14.00 24.79 21.33 18.41	16.03 26.78 23.45 20.55
130 U 131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	UNION WHARF MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	New Bedford WOOD'S HOLE Fairhaven	0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 7.56 3.52 3.72	0.00 0.00 0.00 8.16 4.19	0.00 0.00 0.00 8.93 4.89	0.00 0.00 0.00 9.86	2.33 0.00 0.00 11.93	0.00 0.00 0.00 12.50	2.80 0.00 0.00 13.66	15.28 12.27 9.44 14.35	17.55 14.56 11.74	18.64 15.67 12.98	19.98 16.97 14.28	21.03 17.99 15.18	23.42 20.06	22.74 19.76	23.57 20.51 17.68	24.79 21.33 18.41	26.78 23.45 20.55
131 M 132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A	MAIN STREET SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	WOOD'S HOLE Fairhaven	0.00 0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 0.00 4.23 0.36 0.48 0.00 5.67	0.00 0.00 5.23 1.22 1.43 0.00	0.00 0.00 7.56 3.52 3.72	0.00 0.00 8.16 4.19	0.00 0.00 8.93 4.89	0.00 0.00 9.86	0.00 0.00 11.93	0.00 0.00 12.50	0.00 0.00 13.66	12.27 9.44 14.35	14.56 11.74	15.67 12.98	16.97 14.28	17.99 15.18	20.06	19.76	20.51 17.68	21.33 18.41	23.45 20.55
132 S 133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A 142 A	SOUTH STREET ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven	0.00 3.26 0.00 0.00 0.00 4.73 1.81	0.00 4.23 0.36 0.48 0.00 5.67	0.00 5.23 1.22 1.43 0.00	0.00 7.56 3.52 3.72	0.00 8.16 4.19	0.00 8.93 4.89	0.00 9.86	0.00	0.00 12.50	0.00 13.66	9.44 14.35	11.74	12.98	14.28	15.18			17.68	18.41	20.55
133 A 134 M 135 B 136 D 137 C 138 G 139 F 140 A 141 A 142 A	ABBEY STREET MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven	3.26 0.00 0.00 0.00 4.73 1.81	4.23 0.36 0.48 0.00 5.67	5.23 1.22 1.43 0.00	7.56 3.52 3.72	8.16 4.19	8.93 4.89	9.86	11.93	12.50	13.66	14.35	-	-		-	17.26	16.97			
134 M 135 B 135 D 136 D 137 C 138 G 139 F 140 A 141 A 142 A	MANHATTAN AVENUE BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven	0.00 0.00 0.00 4.73 1.81	0.36 0.48 0.00 5.67	1.22 1.43 0.00	3.52 3.72	4.19	4.89						16.75	18.04	19.27	20.11			-	23.38	25.13
135 B 135 B 136 D 137 C 138 G 139 F 140 A 141 A 142 A	BERNESE STREET DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven	0.00 0.00 4.73 1.81	0.48 0.00 5.67	1.43 0.00	3.72			5.70	7.89	8.71							21.95	21.88	22.65	-0.01	
136 D 137 C 138 G 139 F 140 A 141 A 142 A	DIAMOND STREET CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven Fairhaven	0.00 4.73 1.81	0.00 5.67	0.00		4.38	= = 0				9.79	10.48	12.49	13.53	14.72	15.60	17.39	17.08	17.91	18.89	20.58
137 C 138 G 139 F 140 A 141 A 142 A	CAUSEWAY ROAD GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven Fairhaven	4.73 1.81	5.67		4.40		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
138 G 139 F 140 A 141 A 142 A	GOULART MEMORIAL DRIVE FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven Fairhaven	1.81		6.67	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
139 F 140 A 141 A 142 A	FIR STREET ARSENE WAY ARSENE WAY	Fairhaven Fairhaven		2.72	0.07	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
140 A 141 A 142 A	ARSENE WAY ARSENE WAY	Fairhaven	0.00		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
141 A 142 A	ARSENE WAY			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41
142 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	0.66	2.10	1.65	2.87	3.69	5.29
· ·	A DCENIE M/AV	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 A	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
	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
	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
	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
	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
	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
· ·	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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	ARSENE WAY 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
•••		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
	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
	ARSENE WAY 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
	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
	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
	ARSENE WAY	Fairhaven 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
-	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
	ARSENE WAY		0.00	0.00	0.00	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 A		Fairhaven 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	0.66	2.10	1.65 0.00	2.87 0.00	3.69 0.00	5.29
		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
169		Acushnet	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 11.86	5.21	6.35 12.80	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	-		13.26	13.89	15.07	15.76 26.16	16.92
171		Acushnet	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	13.98 8.11	18.55	20.77		22.09	23.58	24.31	25.49 20.84		27.21
		Acushnet	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00		12.70	15.21	16.14	16.94	18.40	19.70	-	21.49	22.21 1.88
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	
174 175		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	1.20 0.00	1.90 0.00	1.92 0.00

State Owned Structures

Object ID	Structure Name	Municipality		Cate	gory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	
	Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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

Municipality	Location	Primary Type	Property Type		Cate	egory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4			Category 4	Extreme	
	Water Lev	vel Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 Fisherman's Wharf	Bulkhead/ Seawall Bulkhead/ Seawall	Public 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	State Pier	Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 1.98	3.56 0.00	7.71 2.88	19.01 13.73	22.33 16.64	22.31 17.07	23.70 18.47	24.61 19.37	0.00 21.57	20.41	27.31 22.08	27.83 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	22.59	23.00
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	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
	Wharf												0/		.,								
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 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 West Rodney French Boulevard	Revetment Bulkhead/ Seawall	Public	0.00	0.00	0.00	0.00	0.00	0.00	0.00 6.38	10.97 8.59	10.50	12.45	16.29 11.16	18.29	19.22	20.54	21.45	23.09 17.66	23.01 17.36	23.91 18.34	24.68	26.45
New Bedford	East Rodney French Boulevard	Groin/ Jetty	Public		9.02	1.90	4.17		5.44		0.59 16.62	9.46 16.89	10.30 18.40		13.30	14.09	15.02 22.98	15.97 24.01				19.23	20.97
New Bedford	West Rodney French Boulevard	Groin/ Jetty	Public	8.04	0.00	9.98	0.00	12.91 0.00	13.52 0.00	14.40 0.00	0.00	0.00	0.00	19.00 0.00	21.03 0.00	21.83 0.00	0.00	0.00	25.49 0.00	25.27 0.00	26.34 0.00	27.24 0.00	29.04 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 Fort Rodman	Revetment	Public 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 28.81
New Bedford New Bedford		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	
New Bedford	Merchant Mariner Memorial Walkway Fort Rodman	Groin/ Jetty Groin/ Jetty	Public	0.00 6.14	0.00 7.48	0.00 8.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00 16.24	0.00	0.00 18.75	0.00 20.13	0.00 21.46	0.00 21.89	0.00 23.78	0.00 23.10	0.00 24.12	0.00 25.02	0.00 26.98
New Bedford	West Rodney French Boulevard	Revetment	Public	0.14	1.37	1.97	4.68	5.07	5.77	6.48	14.54 8.38	8.88	10.24	11.37	13.44	13.98	15.21	16.22	18.09	17.50	18.52	19.49	20.90
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 FAIRHAVEN		Revetment Bulkhead/Seawall	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 18.82	17.89	17.29	18.34	19.34	21.10
FAIRHAVEN		Revetment	Private Private	3.28	4.27	5.22 3.62	7.53 6.06	7.83 6.36	8.79 6.96	9.69 7.86	11.58	12.34	13.33	14.18	15.92	16.49	17.73 16.11	18.83	20.68	20.03 18.55	21.08 19.60	22.08	23.83
FAIRHAVEN		Revetment	Private	2.74	3.72	4.70	7.00	7.28	8.03	7.00 8.93	10.02 11.04	10.51 11.57	11.85 12.77	12.71 13.64	14.44 15.36	14.86 15.91	10.11	17.35 18.27	19.12 20.14	10.55	20.50	20.59 21.50	22.35 23.28
			1 11000	<u>~·/4</u>	J-1 -2	4.70	7.00	1.20	0.05	0.95	11.04	11.57		13.04	13.30	13.91	17.10	10.27	20.14	13.47	20.90	21.90	23.20

Municipality	Location	Primary Type	Property Type		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4			Category 4	Extreme	
	Water Le	evel Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 FAIRHAVEN		Bulkhead/Seawall Bulkhead/Seawall	Private Private	1.42	0.00 2.16	0.36	5.68	5.97 5.78	6.72	7.61	6.71	7.25	11.46	12.32 12.11	14.06 13.87	11.62 14.47	12.90	16.99 16.82	15.84 18.66	18.19 18.02	19.23	20.23 20.07	21.99 21.82
FAIRHAVEN		Groin/Jetty	Private	0.00	0.00	3.15 0.00	5.46 0.00	0.00	8.33 0.00	7.41 0.00	9.51 0.00	10.07 0.00	0.00	0.00	0.00	0.00	15.76 0.00	0.00	0.00	0.00	19.07 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 FAIRHAVEN		Bulkhead/Seawall	Private 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 Revetment	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64 4.22	0.00	3.89	16.59	18.87 19.63	20.17	21.53	22.49	25.39 26.19	24.17 25.04	25.06	26.95	28.66
FAIRHAVEN		Bulkhead/Seawall	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	4.57 6.59	17.31 19.31	21.60	20.45 0.00	22.32 0.00	23.39 25.26	0.00	25.04	25.95 27.83	27.79 29.70	29.55 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 BED-		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
FORD NEW BED-		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
FORD 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	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 BED-		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
FORD NEW BED-		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
FORD 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 FAIRHAVEN		Revetment Bulkhead/Seawall	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		Groin/Jetty	Private 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 9.46	0.00	0.00	0.00	0.00	0.00	0.00 23.81	0.00	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	0.00	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	21.73	25.56	23.33	24.23	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

Municipality	Location Primary Type	Property Type		Cate	gory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	
	Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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-	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
FORD NEW BED-	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
FORD NEW BED-			0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.30	0.00	5.52	14.90	10.02	10.50	19.90	20.92	23.30	22.05	23.75	24.32	20.04
	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
FORD NEW BED-	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
	Buiknead/Seawaii	Tivate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.75	0.72	4.00	14.00	17.02	10.49	19.02	20.35	22.07	22.12	23.02	23.90	25.90
FORD NEW BED-	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
FORD NEW BED-	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
FORD NEW BED-	Buikiteda/ Sedwaii	Thvate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.22	0.00	4.55	14.00	17.12	10.19	19.00	20.49	22.30	22.17	23.07	23.71	23.79
	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
FORD NEW BED-	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
FORD	Buikhead, ocawaii	1 mate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	0.00	5.52	13.57	10.25	17.20	10.04	13.31	21.25	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
ELIBILITY (ELI	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	Grown Setty				1 1																	

	Location Primary Type	Property Type		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4			Category 4	Extreme	e
	Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o 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-	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
FORD NEW BED-	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
FORD					-								-	_								
NEW BED-	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
FORD NEW BED-	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
FORD											-											
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-	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
FORD 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
	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						0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Groin/Jetty	Private	0.00	0.00	0.00	0.00	0.00	0.00		0.00											0.00	0.00
FAIRHAVEN	Groin/Jetty Groin/Jetty	Private 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 FAIRHAVEN	-												0.00									

Municipality	Location Primary Type	Property Type		Cate	gory 1			Cate	gory 2	1		Cate	gory 3			Cat	egory 4			Category 4	Extreme	2
	Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 BED-	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
FORD NEW BED-		- Invato	5.05	4.00	5.50	0.00	0.00	5.25	.0.04			.4.04	.4.55	,5	.,	.0.52		2	2		-5	-4.5.
	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
FORD NEW BED-	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
	Grown setty	1 mate	/./4	0.05	0.00	12.07	12.00	13.51	14.21	10.45	17.01	10.12	10.77	2	21.55	2.3.21	24.15	0.00	23.03	20.00	27.45	29.15
FORD NEW BED-	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
FORD NEW BED-	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
	Clours Setty	Thvate	7.91	0.50	9.43	12.31	12.00	13.40	13.04	10.75	17.34	10.30	10.00	20.90	21.34	22.51	23.93	25.00	2:5.21	20.25	27.15	20.94
FORD NEW BED-	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
FORD NEW BED-	Bulkhead/Seawall	Drivete	4.9.4	4.68	767	0.00	0.70	10.00	10.00	44.00	44.97	45 49	45.90	47.04	40.04	00.67	00.90	00.49	00.04	00.40	04.00	05.90
	Buiki leau, Seawali	Private	4.84	4.00	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
FORD NEW BED-	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
FORD NEW BED-	Produced.	Dist				0	6.6-	0.10	0 = 0										10.00			
	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
FORD NEW BED-	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
FORD NEW BED-																						
	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
FORD NEW BED-	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
FORD NEW BED-			,	5.00	5.50							.,5	.,					, o		-34		
	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
			1		1																	
FORD NEW BED-	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

Municipality	Location	Primary Type	Property Type		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4		C	Category 4	Extreme	
	Water	r Level Rise		0 ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft
NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-		-		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		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
FORD NEW BED-		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
FORD NEW BED-		Revetment	Private	3.50	4.4.4	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
FORD NEW BED-		Revenient	Flivate	3.50	4.44	5.07	7.00	0.14	0.01	9.54	11.04	n.gr	13.54	14.41	10.10	10.53	17.70	19.19	20.73	20.40	21.43	22.39	24.27
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-														-									
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-		Revetment	Private	1 2 2	2.96	3.46	5.63	6.13	7.86	7.77		10.74	11.73	12.64	15.42	16.72	16.73	17.74	19.47	19.13	20.04	20.94	22.64
FORD NEW BED-				1.33	2.90	3.40	5.05	0.13	7.00		9.94	10.74	11.7.5	12.04	13.42	10.72	10.75	17.74	13.47	19.13	20.04	20.94	22.04
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-																							
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-		-			-							-		_									
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD NEW BED-		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		
FORD NEW BED-		Gioin/Jetty		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		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
FORD NEW BED-		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
FORD NEW BED-		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
FORD																							
NEW BED- FORD		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 BED-		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
FORD		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 FAIRHAVEN		Revetment Groin/Jetty	Private Private	3.12 8.61	4.01 9.51	4.92 10.41	7.02 12.51	7.72 13.21	7.38 14.48	9.13 14.61	11.42 16.91	10.46 18.02	13.31 18.81	14.02 19.51	16.00 21.51	16.07 22.37	18.01 23.50	19.02 24.51	19.18 27.15	20.42 25.91	21.41 26.91	22.41 27.91	24.11 29.61
FAIRHAVEN		Revetment	Private	7.37	8.45	9.17	12.51	11.97	12.67	13.38	15.85	16.65	17.57	18.27	20.27	22.37	23.50	23.27	27.15	25.91	25.67	27.91	29.01
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

Municipality	Location	Primary Type	Property Type		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cate	egory 4		(Category 4	Extreme	
	Water L	Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 Bulkbood/Soowall	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 FAIRHAVEN		Bulkhead/Seawall 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 Private	0.00	0.32	1.33	3.57 5.64	4.02	4.83	5.68	7.69	8.46	9.60 11.66	10.41	12.20	12.97	14.01 16.08	15.09	16.96	16.32 18.38	17.49	18.40 20.46	20.08
FAIRHAVEN		Groin/Jetty	Private	1.36 0.00	0.00	3.73 0.00	0.00	6.09 0.00	7.23 0.00	7.75 0.00	9.75 0.00	10.27 0.00	0.00	12.47 0.00	14.26 0.00	15.37 0.00	0.00	17.15 0.00	19.36 0.00	0.00	19.55 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 FAIRHAVEN		Revetment Bulkhead/Seawall	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 Private	0.00	0.04	0.93	3.31	3.73 6.13	4.43 6.83	5.31	7.43	7.96	9.25 11.64	10.06 12.44	11.83	12.44 14.85	13.71 16.10	14.81	16.54 18.96	16.01 18.39	17.14	18.11	19.82 22.19
FAIRHAVEN		Groin/Jetty	Private	1.53 0.00	0.00	3.23 0.00	5.72 0.00	0.13	0.03	7.72 0.00	9.64 0.00	10.35 0.00	0.00	0.00	14.23 0.00	0.00	0.00	17.19 0.00	0.00	0.00	19.50 0.00	20.49 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	20.50	23.77	24.76	24.30
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	20.40	21.40	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
		Groin/Jetty	Private	0.00	0.00	0.00	0.00	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Municipality	Location Primary Type	Property Type		Cate	egory 1			Cate	egory 2			Cate	gory 3			Cat	egory 4			Category 4	Extreme	
	Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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	22.35	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	20.20	23.37	24.77	24.57	25.66	26.66	28.37
FAIRHAVEN	Bulkhead/Seawall	Private	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	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					7.81						14.12			17.18	18.84	20.64	20.04	21.13		23.84
FAIRHAVEN	Revetment	Private	3.22	3.63 2.02	4.56	7.43	5.63	7.97	8.85 7.23	11.52	11.57	13.32	-	15.91	15.96	15.56	16.65	18.45	17.85	18.94	22.13	23.04
FAIRHAVEN	Bulkhead/Seawall	Private	0.00	0.36	2.94 1.28	5.24 4.12		6.33 5.21	6.11	9.34	9.78 8.26	11.13 10.00	11.94 10.81	13.73 12.60	14.34 12.66		-	16.78	17.03	17.80	19.94 18.80	20.51
FAIRHAVEN	Bulkhead/Seawall	Private	_	1.86			4.50	-		7.67	-					13.87	15.51 16.64	18.45	17.84	17.00		20.31
FAIRHAVEN	Bulkhead/Seawall	Private	1.04 0.00	0.00	2.79 0.00	5.24 0.00	5.63 0.00	8.47 0.00	7.24 0.00	9.34	12.06 0.00	11.13 0.00	11.94 0.00	13.73 0.00	14.34 0.00	15.39 0.00	0.00	0.00	0.00	0.00	19.94 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
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
FAIRHAVEN	Groin/Jetty	Private			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
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
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	
FAIRHAVEN		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		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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
	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

Obje	t Municipality	Owner	Location		Cate	gory 1			Cate	gory 2			Cate	gory 3			Cate	egory 4		C	ategory 4	Extreme	
		Water Level Rise		o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	0 ft	1 ft	2 ft	4 ft	o 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		Cate	egory 1			Cate	gory 2			Cate	gory 3			Cat	egory 4		(Category 4	Extreme	
Water Le	evel Rise	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o ft	1 ft	2 ft	4 ft	o 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 650900	960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.48	11.64 0.00	14.65 0.00	16.50 0.00	17.54 0.00	18.24 0.00	18.71 0.00	18.91 0.00	19.23 0.00	19.57 0.00	19.93 0.00
650900	923 795	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	0.00	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 651800	780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00 1.48	0.00 11.43	0.00	0.00 17.65	0.00 18.58	0.00 19.27	0.00	0.00	0.00	0.00	0.00 24.54
651900	683	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98	5.13	5.72	11.43	17.00	14.48	15.85	19.27	18.50	18.36	19.26	19.97	24.54
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 650900	687	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45 0.00	2.72 0.00	3.85 0.00	4.18 0.00	4.48 0.00	4.71 0.00	4.90 0.00	5.04 0.00	5.03 0.00	5.09 0.00
650900	1325 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 650900	917 935	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	0.00
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 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
651500 651200	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 3.26	0.00 3.52	0.00	0.00 4.27	0.00	0.00 4.58	0.00 4.83	0.00 5.07	0.00 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	3.20 6.90	3.52 7.37	3.03 7.92	4.27 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
	,,,,	5.54		5.55		1., 🧉	0.00	0.20				5.5.				1	0.04	0.24	0.20	1.04	

APPENDIX D: HAZUS SUMMARY REPORTS

Haz	us-MH: Flood Event Report	Table of Contents	
		Section	Pag
ame:	New Bedford, Fairhaven and Acushnet	General Description of the Region	
enario:	Category 1, 0-foot SLR	Building Inventory	
enano.		General Building Stock	
e:	Thursday, June 05, 2014	Essential Facility Inventory	
е.		Flood Scenario Parameters	
		Building Damage	
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	
		Debris Generation	
		Social Impact	
		Shelter Requirements	
		Economic Loss	
		Building-Related Losses	
		Appendix A: County Listing for the Region	
		Appendix A: Soundy Listing for the Region	
flect data for those census i	tracts/blocks included in the user's study region.		
	pacts contained in this report were produced using Hazus loss estimation methodology		
h is based on current scien erefore, there may be signi	tific and engineering knowledge. There are uncertainties inherent in any loss estimation ificant differences between the modeled results contained in this report and the actual social		
us Global Summary F	Report Category 1, 0-foot SLR	Hazus Global Summary Report Category 1, 0-foot SLR	
		Flood Event Summary Report	

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 2,287 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.

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 Courtly.

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

Flood Event Summary Report

Hazus Global Summary Report

Flood Event Summary Report

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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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Residential	6,754,711	72.9%	
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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%	

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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

155 49.52

155

Table 4: Expected Building Damage by Building Type

21-30

Count (%)

0 0.00 0 0.00 1 50.00

154 49.52

0.00

31-40

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

72 23.00

72

31-40

Count (%)

0 0.00 0 0.00 1 50.00

71 22.83

0.00

41-50

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

44 14.06

44

41-50

Count (%)

0 0.00 0 0.00 0 0.00

0 0.00

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, 2-foot SLR

Flood Event Summary Report

General Building Stock Damage

Occupancy

Agriculture

Commercial Education

Governmen

Industrial

Religion

Total

Residential

Building

Type

Concrete ManufHousing Masonry Steel Wood

Flood Event Summary Report

1-10

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0

0 0.00

0 0.00

0

1-10

0 0 0 0.00 0.00 0.00 0.00

0

0.00

Count (%)

0.00

11-20

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

40 12.78

40

11-20

Count

0 0 0.00

0

(%)

0.00

0 0.00

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Substantially Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

2 0.64

2

Substantially

Count (%)

0 0 0.00

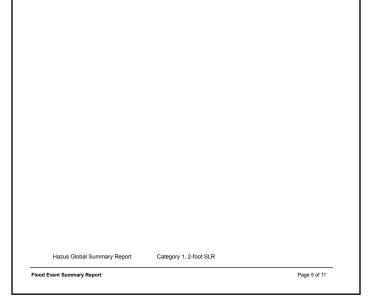
0

2 0.64

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0.00

0.00



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

Category 1, 2-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

Essential Facility Damage

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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 At Least At Least Loss of Use Classification Tota Substantia Fire Stations Hospitals Police Stations Schools If this report displays all zeros or is blank, two possibilities can explain this.

	t Summary Report		Page 7 of 11
н	azus Global Summary Report	Category 1, 2-foot SLR	
	ox asks you to replace the existing results.		-
	2) The analysis was not run. This can be tested b		

Hazus Global Summary Report	Category 1, 2-foot SLR	

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 12,460 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 tormage 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 shefters. 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 120,086) will seek temporary shefter in public shefters.

Hazus Global Summary Report

Category 1, 2-foot SLR

Flood Event Summary Report

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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

ALL	Total	44.71	6.95	3.27	2.55	57.4
	Subtotal	0.04	0.05	0.00	0.01	0.1
	Wage	0.00	0.03	0.00	0.01	0.04
	Rental Income	0.00	0.00	0.00	0.00	0.0
	Relocation	0.04	0.00	0.00	0.00	0.04
	Income	0.00	0.03	0.00	0.00	0.03
Business	Interruption					
	Subtotal	44.67	6.89	3.27	2.54	57.3
	Inventory	0.00	0.11	0.37	0.18	0.6
	Content	18.18	5.08	1.96	1.72	26.94
	Building	26.49	1.70	0.94	0.64	29.70

Flood Event Summary Report

Hazus Global Summary Report

Category 1, 2-foot SLR

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Others

Total

pendix A: County Listing for the Region	Appendix B: Regional Population	n and Building Valu	e Data		
Massachusetts - Bristol			Building	Value (thousands of dolla	rs)
		Population	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 Global Summary Report Category 1, 2-foot SLR	Hazus Global Summary R		ry 1, 2-foot SLR		
Hazus Global Summary Report Category 1, 2-foot SLR	 	epon Calego	19 1, 2-1001 SLR		

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Denien Nemer	New Bedford, Fairhaven and Acushnet	Section	Page #
Region Name:	New Bedrord, Fairnaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 1, 4-foot SLR	Building Inventory	4
		General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	_
		Flood Scenario Parameters	5
		Building Damage General Building Stock	6
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	-
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
			10
		Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	11
		Appendix B. Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census	s tracts/blocks included in the user's study region.		
The estimates of social and economic in software which is based on current scie	mpacts contained in this report were produced using Hazus loss estimation methodology ntific and engineering knowledge. There are uncertainties inherent in any loss estimation		
technique. Therefore, there may be sign	nificant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 1, 4-foot SLR	Hazus Global Summary Report Category 1, 4-foot SLR	
		Flood Event Summary Report	Page 2 of 1

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 9,286 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

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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	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.

Hazus Global Summary Report Category 1, 4-foot SLR

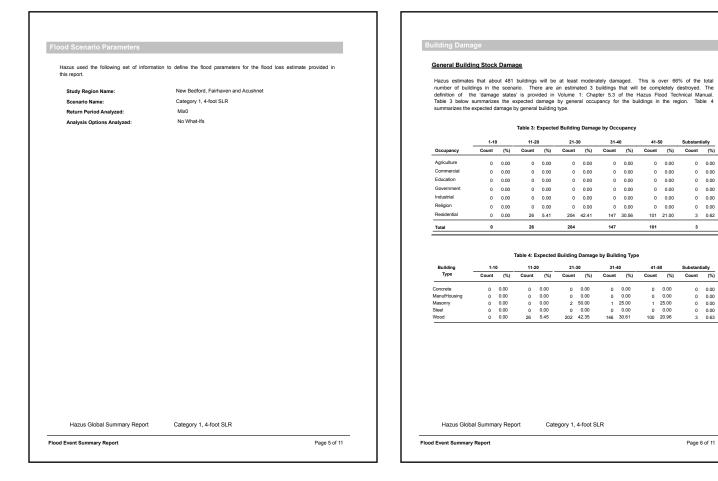
Hazus Global Summary Report

Category 1, 4-foot SLR

Flood Event Summary Report

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Re

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Flood Event Summary Report

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
	were flooded. This can be run. This can be tested b	checked by mapping the inv	entory data on the depth grid. Analysis Menu and seeing if a mes	sage

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.

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 shefters. 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 shefter in public shefters.

Hazus Global Summary Report

Category 1, 4-foot SLR

Flood Event Summary Report

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Substantially

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

3 0.62

0 0.00 0 0.00 0 0.00 0 0.00 3 0.63

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3

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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Flood Event Summary Report

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) Residential Commercial Category Area Industrial Others Total Building Loss Building Content Inventory Subtotal 43.39 30.06 0.00 **73.44** 2.92 7.80 0.18 **10.90** 48.97 43.81 1.13 93.91 0.98 2.36 0.24 **3.58** 1.68 3.59 0.72 **5.99** Business Interruption 0.00 0.06 0.01 0.00 **0.07** 73.51 0.03 0.00 0.00 0.04 **0.07** 10.98 0.00 0.00 0.00 0.00 0.00 5.99 0.04 0.07 0.01 0.05 0.16 94.07 0.00 0.00 0.01 0.02 3.60 Income Relocation Rental Income Wage Subtotal Total ALL Hazus Global Summary Report Category 1, 4-foot SLR

Massachusetts		
- Bristol		
Hazus Global Summary Report	Category 1, 4-foot SLR	

		Building	/alue (thousands of dolla	ars)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and A
husetts					Flood Scenario:	Category 2, 0-foot SLR
stol	120,088	6,754,711	2,513,478	9,268,189		
	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
udy Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer:	
					Totals only reflect data for those	ensus tracts/blocks included in the user's study regio
					software which is based on curre	omic impacts contained in this report were produced un nt scientific and engineering knowledge. There are un be significant differences between the modeled results

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Appendix D: continued

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od Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 2, 0-foot SLR		Hazus Global Summary Report Category 2, 0-foot SLR	
Appendix D. Aegional Population and Summing Value Data	'n		
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10		
Shelter Requirements Economic Loss Building-Related Losses	9	3,206 million doulars (2006 doulars). Approximately 90.49% or the buildings (and 72.65% or the associated with residential housing.	www.ig varue) an
Social Impact	8	There are an estimated 38,601 buildings in the region with a total building replacement value (exc 9,268 million collars (2006 doilars). Approximately 90.49% of the buildings (and 72.88% of the	
Induced Flood Damage Debris Generation	8	The geographical size of the region is 51 square miles and contains 2,267 census blocks. The re 49 thouseholds and has a total population of 120,088 people (2000 Census Bureau dat of population by State and County for the study region is provided in Appendix B.	
Building Damage General Building Stock Essential Facilities Damage	6	Note: Appendix A contains a complete listing of the counties contained in the region .	
General Building Stock Essential Facility Inventory Flood Scenario Parameters	5	The flood loss estimates provided in this report were based on a region that included 1 coun following state(s): . Massachusetts	y(ies) from the
Section General Description of the Region Building Inventory	Page # 3 4	Hazus is a regional multi-hazard loss estimation model that was developed by the Fede Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The prin Hazus is to provide a methodology and software application to develop multi-hazard losses at a These loss estimates would be used primarily by local, state and regional officials to plan and to reduce risks from multi-hazards and to prepare for emergency response and recovery.	regional scale.
Table of Contents		General Description of the Region	

ling Inventory			Flood Scenario Pa	arameters		
eneral Building Stock	e 38,601 buildings in the region which hav	e an annrenate total renlacemer	this report.	owing set of information	on to define the flood parameters for the flood loss estimate prov	vided in
268 million (2006 dollars).	Table 1 and Table 2 present the relative d r Region and Scenario respectively. Appe	distribution of the value with resp	pect to the	ne:	New Bedford, Fairhaven and Acushnet	
e building value by State and C		unax o provideo a general alte	Scenario Name:		Category 2, 0-foot SLR	
	Table 1		Return Period Ana	alyzed:	Mix0	
Buildi	Table 1 ng Exposure by Occupancy Type for the Stu	udy Region	Analysis Options	Analyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total				
Residential	6,754,711	72.9%	_			
Commercial	1,606,696	17.3%	-			
Industrial	661,541	7.1%	-			
Agricultural Religion	<u>31.872</u> 115,972	0.3%	-			
Government	47,795	0.5%	-			
Education	49,602	0.5%	-			
Total	9.268.189	100.00%	-			
Totai	3,200,103	100.00 /8				
	Table 2 ilding Exposure by Occupancy Type for the Exposure (\$100)		-			
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total	-			
	ilding Exposure by Occupancy Type for the		-			
Occupancy Residential	ilding Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 58,845	Percent of Total 75.1% 13.9% 8.3%				
Occupancy Residential Commercial Industrial Agricultural	ilding Exposure by Occupancy Type for the Exposure (\$1000) 532.068 98.355 58.845 9.126	Percent of Total 75.1% 13.9% 8.3% 1.3%				
Occupancy Residential Commercial Industrial Agricultural Religion	lilding Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,335 58,845 9,126 4,843	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 58,845 9,126 4,843 2,142	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 52.058 98.355 58.845 9.126 4.843 2.142 3.196	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 58,845 9,126 4,843 2,142	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 52.058 98.355 58.845 9.126 4.843 2.142 3.196	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 532.058 98.355 58.845 9.128 4.843 2.142 3.195 708,564	Percent of Total 75.1% 13.9% 8.3% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total	lilding Exposure by Occupancy Type for the Exposure (\$1000) 532,056 98,355 9,126 4,843 2,142 3,195 708,554 X	Percent of Total 75.1% 13.9% 8.3% 0.7% 0.3% 0.5% 100.00%				
Occupancy Residential Commercial Jodustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressential facilities, there are re	lilding Exposure by Occupancy Type for the Exposure (\$1000) 532.058 98.355 58.845 9.128 4.843 2.142 3.195 708,564	Percent of Total 75.1% 13.9% 8.3% 0.3% 0.7% 0.3% 100.00% 100.00%				
Occupancy Residential Commercial Jodustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 98,355 4,843 2,142 3,195 708,564	Percent of Total 75.1% 13.9% 8.3% 0.3% 0.7% 0.3% 100.00% 100.00%				
Occupancy Residential Commercial Jodustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 98,355 4,843 2,142 3,195 708,564	Percent of Total 75.1% 13.9% 8.3% 0.3% 0.7% 0.3% 100.00% 100.00%				
Occupancy Residential Commercial Jodustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 532,058 98,355 98,355 4,843 2,142 3,195 708,564	Percent of Total 75.1% 13.9% 8.3% 0.3% 0.7% 0.3% 100.00% 100.00%				
Occupancy Residential Commercial Jodustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressential facilities, there are re	Application Control Exposure (\$1000) 532.058 58.845 98.355 58.845 9.126 4.843 2.142 3.196 708,564	Percent of Total 75.1% 13.9% 8.3% 0.3% 0.7% 0.3% 100.00% 100.00%		Summary Report	Category 2, 0-foot SLR	

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)	21-3	80	31-4	10	41-5	60	Substant	ially
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	1-1	1-10		0	21-	30	31-40 41-50		Substantially			
Туре	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

Category 2, 0-foot SLR

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, retear, 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.

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 shefters. 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.

		cilit\		

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
	64		0	0

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

Hazus Global Summary Report

Flood Event Summary Report

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Flood Event Summary Report

Induced Flood Damage

Shelter Requirements

Debris Generation

Hazus Global Summary Report

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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.

Category 2, 0-foot SLR

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 accolated with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Tota
Building Los	s					
	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 In	terruption					
	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
				6.89	4.06	104.51

Hazus Global Summary Report	
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Category 2, 0-foot SLR

Flood Event Summary Report

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Category 2, 0-foot SLR

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Repo

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dix A: County Listing for the Region Massachusets - Bristol	Appendix B: Regional Population				
			Building V	/alue (thousands of dolla	rs)
		Population	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
port Category 2, 0-foot SLR					
gory 2, 0-foot SLR	Hazus Global Summary Re	port Catego	ry 2, 0-foot SLR		

Hazus-MH: Flood Event Report	Table of Contents	
Region Name: New Bedford, Fairhaven and Acushnet	Section General Description of the Region	Page #
	Building Inventory	4
Flood Scenario: Category 2, 1-foot SLR	General Building Stock	
Print Date: Thursday, June 05, 2014	Essential Facility Inventory	
	Flood Scenario Parameters	5
	Building Damage General Building Stock	6
	Essential Facilities Damage	
	Induced Flood Damage	8
	Debris Generation	Ū.
	Social Impact	
	Social impact Shelter Requirements	8
	Economic Loss	9
	Economic Loss Building-Related Losses	9
	Dunding Holded 20000	
		10
	Appendix A: County Listing for the Region	
	Appendix B: Regional Population and Building Value Data	11
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		
Hazus Global Summary Report Category 2, 1-foot SLR	Hazus Global Summary Report Category 2, 1-foot SLR	
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	Flood Event Summary Report	Page 2 of 11

General Description of the Region

Hazus Global Summary Report

Flood Event Summary Report

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.

Category 2, 1-foot SLR

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.

Build	ing Exposure by Occupancy Type for the Stu	idy Region
Occupancy	Exposure (\$1000)	Percent of Tota
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661.541	7.19

Table 1

Religion 115,972	100.00%
Religion 115,972	0.5%
	0.5%
Agricultural 31,872	1.3%
	0.3%

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.

Hazus Global Summary Report

Category 2, 1-foot SLR

Flood Event Summary Report

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Building Damage Flood Scenario Parameters General Building Stock Damage 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 Category 2, 1-foot SLR Scenario Name: Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs Hazus Global Summary Report Category 2, 1-foot SLR Hazus Global Summary Report Category 2, 1-foot SLR Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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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		11-2	5	21-3	80	31-4	10	41-5	50	Substant	ially
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	1-1	0	11-2	0	21-	-30	31-	40	41-	50	Substar	ntially
Туре	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

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		the region had 0 hospital		e. On the day of the	Induced Flood Damage
cenario flood event, the r	model estimates that	0 hospital beds are available	e in the region.		Debris Generation
	Table 5:	Expected Damage to Esser	ntial Facilities		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.
			# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	The model estimates that a total of 32,522 tons of debris will be generated. Of the total amount, Finishes
Fire Stations	3	0	0	0	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
Hospitals	0	0	0	0	generated by the flood.
Police Stations Schools	54	0	0	0	
					Social Impact
f this report displays all zeros o (1) None of your facilities		s can explain this. e checked by mapping the inventor	v data on the depth grid.		oostar mipust
(2) The analysis was not	t run. This can be tested	by checking the run box on the Anal		age	Shelter Requirements
box asks you to replace t	the existing results.				
					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
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
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					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in
Hazus Global Sum	mary Benort	Category 2, 1-foot SL	R		inundated area. Of these, 1,632 people (out of a total population of 120,088) will seek temporary shelter in

nomic Lo		nated for the flood is	117.23 million dol	llars, which repres	ents 16.21 % c	of the total	Dendix A: County Listing for the Region Massachusetts - Bristol	
eplacement	value of the scenari elated Losses							
						_		
ntents. T cause of t	g losses are the The business inte he damage sustair	n into two categories: estimated costs to re erruption losses are t ned during the flood. ced from their homes be	pair or replace th he losses associa Business interrupti	ne damage caused ated with inability	to the building to operate a	g and its business		
usiness inte	erruption of the re	ses were 117.03 milli gion. The residential as associated with the bu	occupancies made					
		Table 6: Building-Rela (Millio	ted Economic Los	s Estimates				
ategory	Area	Residential	Commercial	Industrial	Others	Total		
uilding Loss	Building Content Inventory Subtotal	53.72 37.15 0.00 90.87	3.79 9.48 0.22 13.48	2.23 4.93 1.00 8.16	1.33 2.91 0.28 4.52	61.07 54.46 1.50 117.03		
usiness Inte		0.00 0.08 0.01	0.04 0.00 0.00	0.00 0.00 0.00	0.01 0.00 0.00	0.05 0.08 0.01		
ш	Wage Subtotal	0.00 0.08 90.95	0.04 0.09 13.57	0.00 0.00 8.16	0.02 0.03 4.55	0.06 0.20 117.23		
Hazus G	Blobal Summary R	Report Categ	ory 2, 1-foot SLR				Hazus Global Summary Report Category 2	2, 1-foot SLR

					на	zus-MH: Flood Event Report
			lue (thousands of dolla			
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
assachusetts					Flood Scenario:	Category 2, 2-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189		Thursday, June 05, 2014
Total Total Study Region	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
					Disclaimer: Totals only reflect data for those censu	s tracts/blocks included in the user's study region.
					software which is based on current sci	ingada contained in this report ene produced using Hazus loss estimation methodology estills and engineeing involvingle. There are uncertainties inherent in any loss estimation unficant differences between the modeled results contained in this report and the actual social
Hazus Global Summary Repo	rt Categor	y 2, 1-foot SLR			Hazus Global Summary	Report Category 2, 2-foot SLR

Section Page # Management Age General Description of the Region 3 These loss estin to reduce risks for the club esting Building Inventory 4 The factor is to reduce risks for to reduce risks for t	tion of the Re
Baction Page # Management Age General Description of the Region 3 There ioss eating to reduce risks for the Region Building Inventory 4 The food loss of following state(s): General Building Stock Social Inspect The food loss of following state(s): Building Damage 6 Note: General Building Stock Social Inspect Agpendix A: contail Induced Flood Damage 8 The geographical Social Impact 8 There are an east 9.2000 associated with reside of public of the Region Appendix A: County Listing for the Region 10 Social KA: County Listing for the Region	
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Building Inventory 4 General Building Stock The flood loss of following state(s): Essential Facility Inventory 6 Building Damage 6 General Building Stock Note: General Building Stock Appendix A contain General Building Stock Note: General Building Stock Appendix A contain General Building Stock The geographical General Building Stock The geographical Social Impact 8 There are an estimated in a stocial in pact Social Impact 8 There are an estimated in a stociated with rest Building-Related Losses 9 Sociated with rest Appendix A: County Listing for the Region 10 10	ates would be use
Essential Facility Inventory following state(s): Flood Scenario Parameters 5 Assachuse Building Damage 6 Assachuse General Building Stock Appendix A contail Essential Facilities Damage 8 4 Induced Flood Damage 8 4 Debris Generation 9 9 Social Impact 8 There are an est of population by St Shelter Requirements 9 9 Building-Related Losses 10 associated with res	
Essential Facility inventory 5 Assachuse Flood Scenario Parameters 5 Assachuse Building Damage 6 Note: General Building Stock Note: Appendix Ac contain Essential Facilities Damage 8 The geographical 49 thousand hou of population by St Induced Flood Damage 8 There are an est Social Impact 8 There are an est Shelter Requirements 5,268 million dallion associated with rest 5,268 million dallion associated with rest Building-Related Losses 9 9 10	stimates provided
Flood Schelarly ad anticers 5 Building Damage 6 General Building Stock Appendix A contain Essential Facilities Damage 8 Induced Flood Damage 8 Debris Generation 7 Social Impact 8 Shelter Requirements 9 Building-Related Losses 9	
General Building Stock Note: Essential Facilities Damage Appendix A contain Induced Flood Damage 8 The geographical 49 thousand hou of population by Si Debris Generation 8 There are an est 5,268 million doil associated with rest 5,268 million doil associated with res	lts
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Essential Facilities Damage 8 The geographical 49 thousand ho of population by St Induced Flood Damage 8 49 thousand ho of population by St Debris Generation 8 Three are an est 9,268 million oils associated with res Social impact 8 Three are an est 9,268 million oils associated with res Economic Loss 9 9 Building-Related Losses 10	o o complete listing
Appendix A: County Listing for the Region	
Social Impact 8 There are an est Shelter Requirements 9.268 million doll 3.268 million doll associated with res Economic Loss 9 Building-Related Losses 10	size of the region seholds and has a ate and County for the
Shelter Requirements 9,268 million doli associated with res Economic Loss 9 Building-Related Losses 9 Appendix A: County Listing for the Region 10	
Economic Loss 9 Building-Related Losses Appendix A: County Listing for the Region	irs (2006 dollars).
Appendix A: County Listing for the Region 10	
Appendix A: County Listing for the Region	5
Appendix B: Regional Population and Building Value Data 11	5
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	-
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Hazus Global Summary Report Category 2, 2-foot SLR Hazus Globa	-
Flood Event Summary Report Page 2 of 11 Flood Event Summary	Summary Report

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Category 2, 2-foot SLR

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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	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%
fotal	736,715	100.00%

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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

184 27.96

184

Table 4: Expected Building Damage by Building Type

21-30

Count (%)

0 0.00 0 0.00 1 14.29

0 0.00 183 28.15

Category 2, 2-foot SLR

31-40

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

207 31.46

207

31-40

Count (%)

0 0.00 0 0.00 2 28.57

0 0.00 205 31.54

Essential Facility Inventory

General Building Stock Damage

1-10

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0

1-10

0 0 0

0 0.00

Hazus Global Summary Report

Count (%)

0.00

0.00

Occupancy

Agriculture

Commercial Education

Government

Industrial

Religion

Total

Residential

Building

Type

Concrete ManufHousing Masonry Steel Wood

11-20

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

21 3.19

21

11-20

Count (%)

0.00 0

3.23

0 0 0.00

0 0.00

21 0.00

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 Event Summary Report

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41-50 Substantially Count (%) Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

7_____

Substantially

0 0.00

0 0.00

6 0.92

Count (%) Count (%)

7 1.06

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

239 36.32

239

41-50

0 0.00 0 0.00 4 57.14

0 0.00 235 36.15

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 Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs Hazus Global Summary Report Category 2, 2-foot SLR Flood Event Summary Report Page 5 of 11

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 At Least At Least Loss of Use Classification Tota Substantia Fire Stations Hospitals Police Stations Schools If this report displays all zeros or is blank, two possibilities can explain this.

Hz	azus Global Summary F	Report	Category 2, 2-foo	t SLR		
	 The analysis was not run. Th ox asks you to replace the existi 		checking the full box of the	renaryais mena ana a	cong na mosage	

Flood Event Summary Report	Page 6 of 11	Flood Event Summary Report	

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 tone 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 tonstruck) to remove the debris generated by the food.

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 shefters. 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.

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t Category 2, 2-foot SLR

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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	Tota	
Building Los	s						
	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 In	terruption						
	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	

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Category 2, 2-foot SLR

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ix A: County Listing for the Region	ppendix B: Regional Population a	na Building Valu	<u>a Data</u>		
achusetts Bristol			Building \	/alue (thousands of dolla	rs)
		Population	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
Summary Report Category 2, 2-foot SLR	Hazus Global Summary Report	t Catego	ry 2, 2-foot SLR		

Hazus-MH: Flood Event Report	Table of Contents	
gion Name: New Bedford. Fairhaven and Acushnet	Section	Page #
gion Name: New Bedford, Fairhaven and Acushnet	General Description of the Region	3
od Scenario: Category 2, 4-foot SLR	Building Inventory	4
	General Building Stock	
nt Date: Thursday, June 05, 2014	Essential Facility Inventory	
	Flood Scenario Parameters	5
	Building Damage	6
	General Building Stock Essential Facilities Damage	
	Induced Flood Damage	8
	Debris Generation	
	Social Impact	8
	Shelter Requirements	
	Economic Loss	9
	Building-Related Losses	
		10
	Appendix A: County Listing for the Region	10
	Appendix B: Regional Population and Building Value Data	11
laimer:		
s only reflect data for those census tracts/blocks included in the user's study region.		
stimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology		
are which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation ique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary Report Category 2, 4-foot SLR	Hazus Global Summary Report Category 2, 4-foot SLR	
	Flood Event Summary Report	Page 2 of 11

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.

Hazus Global Summary Report

Category 2, 4-foot SLR

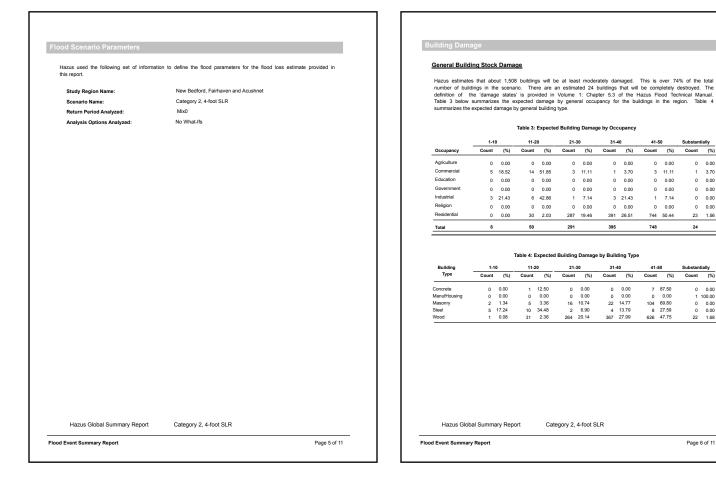
Flood Event Summary Report

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Flood Event Summary Report

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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41-50 Substantially Count (%) Count (%)

41-50 Substantially Count (%) Count (%)

0 0.00

1 3.70

0 0.00

0 0.00

0 0.00

0 0.00

23 1.56

0 0.00 1 100.00 0 0.00 0 0.00 22 1.68

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24

0 0.00

3 11.11

0 0.00

0 0.00

1 7.14

0 0.00

744 50.44

748

7 87.50 0 0.00 104 69.80 8 27.59 626 47.75

sential Facility Dar					
	mage				Induced Flood Damage
Before the flood analyzed scenario flood event, the mo			ital beds available for use. ble in the region.	On the day of the	Debris Generation
	Table 5:	: Expected Damage to Esse	ential Facilities		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 siab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.
			# Facilities		gipes of material harvang equipment required to harvare the debits.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals	3	0	0	0	estimated number of truckloads, it will require 3,045 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Police Stations Schools	5	0 4	0	0 4	
If this report displays all zeros or is					Social Impact
	un. This can be tested	be checked by mapping the inventor I by checking the run box on the An	tory data on the depth grid. nalysis Menu and seeing if a message		Shelter Requirements
Hazus Global Summ	ary Report	Category 2, 4-foot S	ЗLR		Hazus Global Summary Report Category 2, 4-foot SLR

Flood Event Summary Report

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) Residential Commercial Category Area Industrial Others Total Building Loss Building Content Inventory Subtotal 204.38 135.04 0.00 **339.43** 72.20 157.06 5.28 234.53 306.62 374.37 17.19 698.18 26.34 68.47 11.44 106.24 3.71 13.80 0.48 **17.98** Business Interruption 0.01 0.15 0.11 0.02 **0.28** 0.78 0.26 0.19 0.78 **2.01** 236.54 0.01 0.01 0.00 0.01 **0.04** 0.02 0.01 0.00 0.13 0.16 18.14 0.81 0.43 0.30 0.94 2.48 700.66 Income Relocation Rental Income Wage Subtotal 339.71 106.28 Total ALL Hazus Global Summary Report Category 2, 4-foot SLR

Massachusetts - Bristol		
_ Bristol		
Hazus Global Summary Report	Category 2, 4-foot SLR	

dix B: Regional Population	on and Building Value	e Data			На	zus-MH: Flood Event Report
		Building	Value (thousands of dolla	ars)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
assachusetts	Ì				Flood Scenario:	Category 3, 0-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189		
otal	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
otal Study Region	120,088	6,754,711	2,513,478	9,268,189		
					The estimates of social and economic software which is based on current sc	us tractablocks included in the user's study region. Impacts contained in this regort were produced using Natus loss astimution methodology milliant differences between the modeled results contained in this regort and the actual social
Hazus Global Summary R	Report Categor	y 2, 4-foot SLR			Hazus Global Summar	y Report Category 3, 0-foot SLR

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Appendix D: continued

ood Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 3, 0-foot SLR		Hazus Global Summary Report Category 3, 0-foot SLR	
Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Building-Related Losses			
Economic Loss	9		
Shelter Requirements	ÿ	There are an estimated 38,601 buildings in the region with a total building replaceme 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72. associated with residential housing.	
Social Impact	8		at which fourthallow and the
Induced Flood Damage Debris Generation	8	49 thousand households and has a total population of 120,088 people (2000 Census of population by State and County for the study region is provided in Appendix B.	
Essential Facilities Damage		The geographical size of the region is 51 square miles and contains 2,267 census bit	ocke. The region contains and
General Building Stock		Note: Appendix A contains a complete listing of the counties contained in the region.	
Building Damage	6		
Flood Scenario Parameters	5	- Massachusetts	
Essential Facility Inventory		following state(s):	
General Building Stock		The flood loss estimates provided in this report were based on a region that inclu-	uded 1 county(ies) from the
Building Inventory	4	to reduce risks from multi-hazards and to prepare for emergency response and recovery.	
Section General Description of the Region	Page #	Hazus is a regional multi-hazard loss estimation model that was developed Management Agency (FEMA) and the National Institute of Building Sciences (NIBS Hazus is to provide a methodology and software application to develop multi-hazar These loss estimates would be used primarily by local, state and regional official set	 The primary purpose of losses at a regional scale.

ding Inventory				Flood Scenario Parameters	
General Building Stock				Hazus used the following set of inform this report.	nation to define the flood parameters for the flood loss estimate provided in
9,268 million (2006 dollars).	e 38,601 buildings in the region which hav Table 1 and Table 2 present the relative d y Region and Scenario respectively. App	distribution of the value with res	pect to the	Study Region Name:	New Bedford, Fairhaven and Acushnet
he building value by State and (endix is provides a general di		Scenario Name:	Category 3, 0-foot SLR
				Return Period Analyzed:	MixO
Buildi	Table 1 ing Exposure by Occupancy Type for the Stu	udv Region		Analysis Options Analyzed:	
Occupancy	Exposure (\$1000)	Percent of Total	-		No What-Ifs
Residential	6,754,711	72.9%	-		
Commercial	1,606,696	17.3%			
Industrial	661,541	7.1%	-		
Agricultural	31,872	0.3%	-		
Religion Government	<u>115,972</u> 47,795	1.3%	-		
Education	47,795 49,602	0.5%	-		
Total	9,268,189	100.00%			
	Table 2 Vocupancy Type for the		-		
Occupancy	uilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total	-		
	uilding Exposure by Occupancy Type for the		-		
Occupancy Residential Commercial Industrial	illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 430,036 216,644	Percent of Total 65.2% 21.6% 10.9%	-		
Occupancy Residential Commercial Industrial Agricultural	illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 430,036 216,844 12,765	Percent of Total 65.2% 21.6% 10.9% 0.6%	-		
Occupancy Residential Commercial Industrial Agricultural Religion	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 430,036 216,644 12,765 15,954	Percent of Total 65.2% 21.6% 10.9% 0.6% 0.8%	-		
Occupancy Residential Commercial Industrial Agricultural	illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 430,036 216,844 12,765	Percent of Total 65.2% 21.6% 10.9% 0.6%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1,295,657 430,036 216,644 12,765 15,954 4,241	Percent of Total 65.2% 21.6% 10.9% 0.6% 0.8% 0.2%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Application Application 1,295,657 430,036 4,30,036 216,644 12,775 15,954 15,954 4,241 1,2,646 11,266	Percent of Total 65.2% 21.6% 0.6% 0.6% 0.8% 0.2% 0.2%			
Occupancy Residential Commercial Industrial Agricultural Agricultural Comment Education Total Essential Facility Invento	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,057 216,844 12,775 15,854 4,224 11,846 1,987,143	Percent of Total 65.2% 21.0% 10.9% 0.6% 0.8% 0.2% 100.00%			
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Essential Facility Invento or essential facilities, there are to	Application Application 1,295,657 430,036 1,295,657 430,036 216,644 12,775 11,5954 15,954 11,246 1,987,143	Percent of Total 65.2% 21.6% 10.9% 0.8% 0.2% 0.6% 100.00% vicity of no beds.			
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Essential Facility Invento or essential facilities, there are to	Illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 4.30,036 216,644 12,765 4.241 11,846 1,987,143	Percent of Total 65.2% 21.6% 10.9% 0.8% 0.2% 0.6% 100.00% vicity of no beds.			
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Essential Facility Invento or essential facilities, there are to	Illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 4.30,036 216,644 12,765 4.241 11,846 1,987,143	Percent of Total 65.2% 21.6% 10.9% 0.8% 0.2% 0.6% 100.00% vicity of no beds.			
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Essential Facility Invento or essential facilities, there are to	Illding Exposure by Occupancy Type for the Exposure (\$1000) 1.295,657 4.30,036 216,644 12,765 4.241 11,846 1,987,143	Percent of Total 65.2% 21.6% 10.9% 0.8% 0.2% 0.6% 100.00% vicity of no beds.			
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Essential Facility Invento or essential facilities, there are to	Additional state Additional state Exposure (\$1000) 1.295,657 1.205,657 4.30,036 216,644 12,776 15,954 4,241 1,1,846 1,987,143	Percent of Total 65.2% 21.6% 10.9% 0.8% 0.2% 0.6% 100.00% vicity of no beds.		Hazus Global Summary Report	Category 3, 0-foot SLR

Building Damage

General Building Stock Damage

Hazus estimates that about 1,835 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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-1	0	11-2	:0	21-3	80	31-4	10	41-5	60	Substant	tially
Occupancy	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	1-1	0	11-3	20	21-	30	31-	40	41-	50	Substar	tially
Туре	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

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
Cabaala	54	4	0	4

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

or upon usayars as acros un o tarm, nor possionies dati extraîn 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.

Hazus Global Summary Report

Flood Event Summary Report

Category 3, 0-foot SLR

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Hazus Global Summary Report Category 3, 0-foot SLR
Flood Event Summary Report Page 6 of 11
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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, retear, 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.

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 shefters. 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 acocided with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Los	s					
	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 In	terruption					
	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

Hazus Global Summary Report	
Flood Event Summary Report	

Induced Flood Damage

Debris Generation

Shelter Requirements

Category 3, 0-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

Category 3, 0-foot SLR

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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Masachuada Bradd	Massachusetts Bristol Total Total Study Region	Population 120.088 120,088 120,088	Building Residential 6,754,711 6,754,711 6,754,711	Value (thousands of dolla Non-Residential 2,513,478 2,513,478 2,513,478	ars) Total 9,268,169 9,268,169 9,268,169
	Bristol	120,088 120,088	Residential 6,754,711 6,754,711	Non-Residential 2,513,478 2,513,478	Total 9,268,189 9,268,189
	Bristol	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 Global Summary Report Category 3, 0-foot SLR	Hazus Global Summary R	Report Catego	ory 3, 0-foot SLR		
Vent Summary Report Page 10 of 11	Flood Event Summary Report	Calego	ory o, o root derv		Page 11 of 11

Ha	zus-MH: Flood Event Report	Table of Contents	
		Section	Page #
Region Name:	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
-lood Scenario:	Category 3, 1-foot SLR	Building Inventory	4
loou Scenario:	Category 3, 1-toot SLR	General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
Thit Dute.		Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
		· · · · · · · · · · · · · · · · · · ·	
Disclaimer:			
Totals only reflect data for those censu	s tracts/blocks included in the user's study region.		
	impacts contained in this report were produced using Hazus loss estimation methodology entific and engineering knowledge. There are uncertainties inherent in any loss estimation		
	entific and engineering knowledge. There are uncertainties inherent in any loss estimation inificant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 3, 1-foot SLR	Hazus Global Summary Report Category 3, 1-foot SLR	
		Flood Event Summary Report	Page 2

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General Description of the Region

Hazus Global Summary Report

Flood Event Summary Report

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.

Category 3, 1-foot SLR

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.

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 1

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.

Hazus Global Summary Report

Category 3, 1-foot SLR

Flood Event Summary Report

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Building Damage Flood Scenario Parameters General Building Stock Damage 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 Category 3, 1-foot SLR Scenario Name: Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs Hazus Global Summary Report Category 3, 1-foot SLR Hazus Global Summary Report Category 3, 1-foot SLR Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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

	1-1	0	11-2	:0	21-3	80	31-4	10	41-5	50	Substant	ially
Occupancy	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	1-10		11-20		21-30		31-40		41-50		Substantially	
Туре	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

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afore the flood architer	mage	the region had 0 hospita	al hade available for use	On the day of the	Induced Flood Damage
		0 hospital beds are availabl		. On the day of the	Debris Generation
	Table 5: F	Expected Damage to Esse			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 handing equipment required to handle the debris.
			# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals Police Stations	3 0 5	0	0 0	0	estimated number of truckloads, it will require 4,349 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Schools	54	4	0	4	
If this report displays all zeros or	is blank, two possibilities	can explain this.			Social Impact
	un. This can be tested by	e checked by mapping the inventor by checking the run box on the Ana		age	Shelter Requirements
					displaced due to the flood. Displacement includes households evacuated from within or very near to the innundated area. Of these, 13,240 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

nomic Lo	oss						Appendix A: County Listing for the Region		
							Massachusetts		
		ated for the flood is	873.34 million dol	llars, which represe	ents 34.87 % d	of the total	- Bristol		
	value of the scenario	o buildings.							
Building-Re	elated Losses								
		into two categories:							
		estimated costs to re rruption losses are ti							
ecause of the	he damage sustair	ed during the flood.	Business interrupti						
xpenses for t	those people displac	ed from their homes be	cause of the flood.						
The total b	uilding-related loss	es were 870.45 milli	on dollars. 0% o	of the estimated l	osses were rel	lated to the			
business inte	erruption of the reg	gion. The residential	occupancies made						
provides a su	immary of the losses	s associated with the bu	ilding damage.						
		Table 6: Building-Rela	ited Economic Los ons of dollars)	s Estimates					
Category Building Loss	Area	Residential	Commercial	Industrial	Others	Total			
Duilding LOSS	Building	256.81	90.60	33.69	5.03	386.13			
	Content Inventory	167.76 0.00 424.67	190.44 6.54 287.58	86.48 14.42 134.59	18.10 0.58 23.71	462.78 21.54			
Business Inte	Subtotal	424.57	287.58	134.59	23.71	870.45			
Sources IIIte	Income Relocation	0.01	0.89	0.01	0.03	0.94			
	Relocation Rental Income Wage	0.19 0.13 0.02	0.29 0.22 0.91	0.02 0.00 0.02	0.01 0.00 0.16	0.35			
	Subtotal	0.34	2.31	0.04	0.19	2.89			
ALL	Total	424.91	289.89	134.63	23.91	873.34			
Hazus G	Global Summary R	eport Categ	ory 3, 1-foot SLR				Hazus Global Summary Report C	Category 3, 1-foot SLR	
	nary Report								
Event Sumr						Page 9 of 11	lood Event Summary Report		Page 10 of 11

		Building V	lue (thousands of dolla	are)		zus-MH: Flood Event Report
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
lassachusetts	l				Flood Scenario:	Category 3, 2-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189		
Total	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
					Disclaimer:	
					The estimates of social and economi software which is based on current s	us tractablocks included in the user's study region. I impacts contained in this report were produced using Hazus loss estimation methodology identific and engineering knowledge. There are uncertainties interest it any loss estimation ignificant differences between the modeled results contained in this report and the actual social
Hazus Global Summary F		ry 3, 1-foot SLR			Hazus Global Summar	y Report Category 3, 2-foot SLR

ood Event Summary Report	Page 2 of 11	Flood Event Summary Report
Hazus Global Summary Report Category 3, 2-foot SLR		Hazus Global Summary Report Category 3, 2-foot SL
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10 11	
Shelter Requirements Economic Loss Building-Related Losses	9	There are an estimated 38,601 buildings in the region with a total b 9,288 million dollars (2006 dollars). Approximately 90.49% of the b associated with residential housing.
Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact	8	Appendix A contains a complete listing of the counties contained in the reg The geographical size of the region is 51 square miles and contains 49 thousand households and has a total population of 120.088 peo of population by State and County for the study region is provided in Appen
Flood Scenario Parameters Building Damage General Building Stock	5	- Massachusetts Note:
Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory	<u>Page #</u> 3 4	Hazus is to provide a methodology and software application to dev These loss estimates would be used primarily by local; state and r to reduce risks from multi-hazards and to prepare for emergency respons The flood loss estimates provided in this report were based on a following state(s):
Table of Contents		General Description of the Region Hazus is a regional multi-hazard loss estimation model that w Management Agency (FEMA) and the National institute of Building

tion model that was developed by the Federal Emergency institute of Building Sciences (NIBS). The primary purpose of application to develop multi-hazard losses at a regional scale. y local, state and regional officials to plan and stimulate efforts emergency response and recovery. were based on a region that included 1 county(ies) from the s contained in the region. miles and contains 2,267 census blocks. The region contains over ion of 120,088 people (2000 Census Bureau data). The distribution n is provided in Appendix B. gion with a total building replacement value (excluding contents) of y 90.49% of the buildings (and 72.88% of the building value) are

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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	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

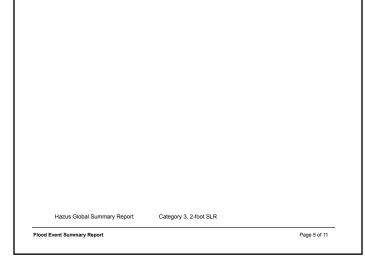
For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 54 schools, 3 fire stations, 5 police stations and 3 emergency operation centers.

Hazus Global Summary Report Category 3, 2-foot SLR

Flood Event Summary Report

Building Damage

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

Category 3, 2-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

Hazus Global Summary Report

Flood Event Summary Report

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		11-3	20	21-3	0	31-4	10	41-5	50	Substan	tially
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	1-1	0	11-2	0	21-3	80	31-	40	41-	50	Substar	ntially
Туре	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

Category 3, 2-foot SLR

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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

Classification Fire Stations Hosoibila Police Stations Schools (1) None of your bacifies were floor (2) The analysis was for turn. This box asks you to replace the existing	ded. This can be can be tested b	checked by mapping the inve		Loss of Use
Hospitals Police Stations Schools this report displays all zeros or is blank, (1) None of your facilities were floor (2) The analysis was not run. This	0 5 54 two possibilities ded. This can be can be tested b	0 0 9 can explain this.	0 0 0 entory data on the depth grid.	0 9
Police Stations Schools this report displays all zeros or is blank, (1) None of your facilities were floor (2) The analysis was not run. This	5 54 two possibilities ded. This can be can be tested b	0 9 can explain this. checked by mapping the inve	0 0 entory data on the depth grid.	0 9
Schools this report displays all zeros or is blank, (1) None of your facilities were floor (2) The analysis was not run. This	54 two possibilities ded. This can be can be tested b	9 can explain this. checked by mapping the inve	0 entory data on the depth grid.	9
this report displays all zeros or is blank, (1) None of your facilities were floor (2) The analysis was not run. This	two possibilities ded. This can be can be tested b	can explain this. checked by mapping the inve	entory data on the depth grid.	
 None of your facilities were floor The analysis was not run. This 	ded. This can be can be tested b	checked by mapping the inve		ssane

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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 11,881 truckloads (@25 tons/truck) to remove the debris generated by the flood.

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 therporary public shefters. The model estimates 0.808 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 shefter in public shelters.

Hazus Global Summary Report

Category 3, 2-foot SLR

Flood Event Summary Report

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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-Rel	ated Economic Loss	s Estimates		
		(Mill	ions of dollars)			
Category	Area	Residential	Commercial	Industrial	Others	Tota
Building Los	55					
	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	1,832.6
Business In	terruption					
	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	5.2
ALL	Total	835.29	578.12	369.32	55.20	1,837.92

Hazus Global Summary Report

Flood Event Summary Report

Category 3, 2-foot SLR

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ndix A: County Listing for the Region	Appendix B: Regional Population	n and Building Valu	e Data		
Massachusetts - Bristol			Building	Value (thousands of dolla	rs)
		Population	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 Global Summary Report Category 3, 2-foot SLR	 Hazus Global Summary R	sport Calego	ry 3, 2-foot SLR		

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Region Name:	New Bedford, Fairhaven and Acushnet	Section	Page #
itegion numer	New Beuloru, Paintaven allu Acusimet	General Description of the Region	3
Flood Scenario:	Category 3, 4-foot SLR	Building Inventory General Building Stock	4
		Essential Facility Inventory	
Print Date:	Thursday, June 05, 2014	Flood Scenario Parameters	5
		Building Damage	5
		General Building Stock	ů
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Social Impact Shelter Requirements	0
		Economic Loss	9
		Building-Related Losses	9
		Dunung-Velated Losses	
			10
		Appendix A: County Listing for the Region	
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
	pacts contained in this report were produced using Hazus loss estimation methodology		
	tific and engineering knowledge. There are uncertainties inherent in any loss estimation ficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary I	Report Category 3, 4-foot SLR	Hazus Global Summary Report Category 3, 4-foot SLR	
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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 9,286 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.

Hazus Global Summary Report Category 3, 4-foot SLR Flood Event Summary Report

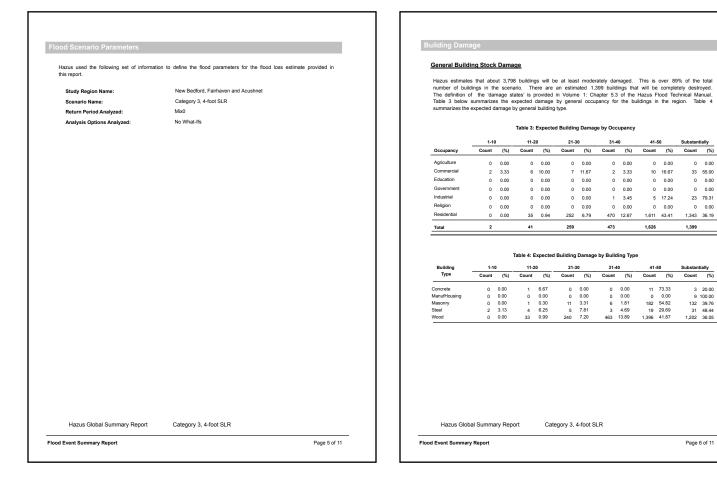
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Flood Event Summary Report

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

	-				
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	
	were flooded. This can be run. This can be tested by	checked by mapping the inve	entory data on the depth grid. Analysis Menu and seeing if a me	ssage	

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.

41-50

0 0.00

10 16.67

0 0.00

0 0.00

5 17.24

0 0.00

Substantially

0 0.00

33 55.00

0 0.00

0 0.00

0 0.00

23 79.31

1,399

3 20.00 9 100.00 132 39.76 31 48.44 1,202 36.05

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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 food.

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.

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Category 3, 4-foot SLR

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Flood Event Summary Report

Flood

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

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	Tota
Building Los	s					
	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 In	terruption					
	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

Hazus Global Summary Report Category 3, 4-foot SLR	

Massachusetts		
- Bristol		
Hazus Global Summary Report	Category 3, 4-foot SLR	

andix B: Regional Population a	nd Building Valu	ie Data		
		Building \	Value (thousands of dolla	ars)
	Population	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
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Appendix D: continued

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Hazus Global Summary Report Category 4, 0-foot SLR		Hazus Global Summary Report Category 4, 0-foot SLR	
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10		
Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact Shelter Requirements Economic Loss Building-Related Losses	8 8 9	The geographical size of the region is 51 square miles and contains 2.287 census blocks. 40 thousand households and has a total population of 120.088 people (2000 Census Bur 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 va 9,288 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% associated with residential housing.	reau data). The distribution
Flood Scenario Parameters Building Damage General Building Stock	5 6	. Massachusetts Note: Appendix A contains a complete listing of the counties contained in the region .	
Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory	Paga # 3 4	Hazus is a regional multi-hazard loss estimation model that was developed by th Management Agency (FEMA) and the National institute of Building Sciences (NIBS). T Hazus is to provide a methodology and software application to develop multi-hazard loss These loss estimates would be used primarily by local, state and regional officials to pla 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 following state(s):	The primary purpose of ses at a regional scale. an and stimulate efforts
Table of Contents		General Description of the Region	

			Flood Scenario Paran	meters	
eneral Building Stock	e 38,601 buildings in the region which hav	ve an aggregate total replacement	this report.	g set of information to define the flood parameters for the flood loss estimate provided in	ı
268 million (2006 dollars).	Table 1 and Table 2 present the relative d Region and Scenario respectively. Appe	distribution of the value with respe	pect to the	New Bedford, Fairhaven and Acushnet	
e building value by State and C			Scenario Name:	Category 4, 0-foot SLR	
	Table 1		Return Period Analyzed	ad: Mix0	
Buildi	ing Exposure by Occupancy Type for the Stu	udy Region	Analysis Options Analy	lyzed: No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total	_		
Residential	6,754,711	72.9%	_		
Commercial	1,606,696	17.3%	-		
Industrial	661,541	7.1%	-		
Agricultural Religion	31.872 115.972	0.3%	-		
Government	47,795	0.5%	-		
Education	49,602	0.5%	-		
Total	9,268,189	100.00%	-		
Total	-,,				
	Table 2 ilding Exposure by Occupancy Type for the		-		
Occupancy		Scenario Percent of Total 66.4%	-		
	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total	-		
Occupancy Residential Commercial Industrial	illding Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326	Percent of Total 66.4% 19.1% 11.9%			
Occupancy Residential Commercial Industrial Agricultural	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 18,285	Percent of Total 66.4% 19.1% 11.9% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2.443,528 702,480 408,326 18,285 45,724	Percent of Total 66.4% 19.1% 11.9% 0.5% 1.2%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 18,285 45,724 10,618	Percent of Total 66.4% 19.1% 11.9% 0.5% 1.2% 0.3%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 18,226 45,724 10,618 20,072	Percent of Total 66.4% 19.1% 1.9% 0.5% 1.2% 0.3% 0.6%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 18,285 45,724 10,618	Percent of Total 66.4% 19.1% 11.9% 0.5% 1.2% 0.3%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 18,226 45,724 10,618 20,072	Percent of Total 66.4% 19.1% 1.9% 0.5% 1.2% 0.3% 0.6%			
Occupancy Residential Commercial Industrial Addressing Addressing Covernment Education Total	Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,440 439,326 18,225 45,724 10,018 20,072 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.5% 1.2% 0.3% 0.6%			
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total	lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,480 436,326 48,225 46,5724 10,618 20,972 3,677,933	Percent of Total 66.4% 19.1% 0.5% 1.2% 0.5% 0.5% 100.00%			
Occupancy Residential Commercial Judustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressentia facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2,443,528 702,440 439,326 18,225 45,724 10,018 20,072 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.6% 1.2% 0.3% 0.6% 100.00% 100.00%			
Occupancy Residential Commercial Judustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressentia facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2.443.528 702.480 436.326 18,285 0.072 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.6% 1.2% 0.3% 0.6% 100.00% 100.00%			
Occupancy Residential Commercial Judustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressentia facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2.443.528 702.480 436.326 18,285 0.072 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.6% 1.2% 0.3% 0.6% 100.00% 100.00%			
Occupancy Residential Commercial Judustrial Agricultural Reliaton Government Education Total Essential Facility Inventor ressentia facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2.443.528 702.480 436.326 18,285 0.072 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.6% 1.2% 0.3% 0.6% 100.00% 100.00%			
Occupancy Residential Commercial Jodustrial Agricultural Reliation Education Total Essential Facility Inventor ressential facilities, there are re	Additional state Additional state Exposure (\$1000) 2,443,528 2,443,528 702,440 403,326 18,226 45,724 10,618 20,972 3,677,933	Percent of Total 66.4% 19.1% 1.9% 0.6% 1.2% 0.3% 0.6% 100.00% 100.00%		mary Report Category 4, 0-foot SLR	

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 accupancy 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		11-2)	21-3	0	31-4	10	41-5	60	Substan	tially
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	1-1	0	11-2	0	21-3	80	31-	40	41-	50	Substar	ntially
Туре	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

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, retear, 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 food.

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 shefters. The model estimates 9,735 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 shefter in public shefters.

Essential Facility Damage

Cla

Po Schools

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

Classification			# Facilities	
	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

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

None of your facilities were flooder. This can be checked by mapping the inventory data on the depth grid.
 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.

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Hazus Global Summary Report Category 4, 0-foot SLR

Flood Event Summary Report

Induced Flood Damage

Shelter Requirements

Debris Generation

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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.

Category 4, 0-foot SLR

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 losse accolated with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Tota
Building Los	s					
	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 In	terruption					
	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

	Hazus Global Summary Report
Flood E	vent Summary Report

Category 4, 0-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

Category 4, 0-foot SLR

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dix A: County Listing for the Region Massachusetts Bristol	Appendix B: Regional Population	, , , , , , , , , , , , , , , , , , ,			
			Building \	/alue (thousands of dolla	rs)
		Population	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
port Category 4, 0-foot SLR	Hazie Gobal Summon Pr	nord Colors	ny 4 Octoort SI P		
Category 4, 0-foot SLR	Hazus Global Summary Re	port Catego	ry 4, 0-foot SLR		

Hazus-MH: Flood Event Report	Table of Contents
Region Name: mom_80mb1	Section Page # General Description of the Region 3
Category 4, 1-foot SLR	Building Inventory 4
Flood Scenario:	General Building Stock
Print Date: Thursday, June 05, 2014	Essential Facility Inventory
	Flood Scenario Parameters 5
	Building Damage 6
	General Building Stock Essential Facilities Damage
	Induced Flood Damage 8
	Debris Generation
	Social Impact 8
	Shelter Requirements
	Economic Loss 9
	Building-Related Losses
	Appendix A: County Listing for the Region
	Appendix B: Regional Population and Building Value Data 11
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	
Hazus Global Summary Report Category 4, 1-foot SLR	Hazus Global Summary Report Category 4, 1-foot SLR
	Flood Event Summary Report Page 2 of 11

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 iosses at a regional scale. These loss estimates would be used primarily biccal, 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 120,085 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. uilding 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 Countly.

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 1

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.

Hazus Global Summary Report

Category 4, 1-foot SLR

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Flood Event Summary Report

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Flood Scenario Parameters

Hazus Global Summary Report

Flood Event Summary Report

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

Category 4, 1-foot SLR

Category 4, 1-foot SLR

Study Region Name: Scenario Name: Return Period Analyzed: Analysis Options Analyzed:

Hazus Global Summary Report

Flood Event Summary Report

New Bedford, Fairhaven and Acushnet Category 4, 1-foot SLR Mix0 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 destroyant. 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 accupancy 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		11-2)	21-3	0	31-4	0	41-5	50	Substan	tially
Occupancy	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	

Building	1-1	0	11-2	10	21-3	80	31-	40	41-	50	Substar	ntially
Туре	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	100.0
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	63.2
Wood	0	0.00	29	0.77	207	5.48	394	10.44	1.416	37.52	1.728	45.79

Hazus Global Summary Report

Category 4, 1-foot SLR

Flood Event Summary Report

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical

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adams the flood another d to this a				Induced Flood Damage
scenario flood event, the model estimation	cenario, the region had 0 hosp ites that 0 hospital beds are avail		On the day of the	Debris Generation
1	Fable 5: Expected Damage to Es	ssential Facilities		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
		# Facilities		types of material handling equipment required to handle the debris.
01	At Least	At Least	Loss of Use	The model estimates that a total of 542,153 tons of debris will be generated. Of the total amount, Finishes
Classification To Fire Stations	3 Moderate	Substantial 0	1	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
Hospitals	0 0	0	0	generated by the flood.
Police Stations	5 1	0	1	
Schools	54 10	1	11	
If this report displays all zeros or is blank, two p (1) None of your facilities were flooded. (2) The analysis was not run. This can box asks you to replace the existing resu	This can be checked by mapping the inve be tested by checking the run box on the			Social Impact <u>Shelter Requirements</u>
				displaced due to the flood. Displacement includes households evacuated from within or very near to the inurdated area. Of these, 28,219 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

nomic Lo	oss						ppendix A: County Listing for the Region		
'he total ec	onomic loss estim	ated for the flood is 2	2 473 23 million do	llars which repres	ents 66.30 %	of the total	Massachusetts _ Bristol		
	value of the scenar								
uilding-Re	elated Losses								
rect building ontents. T ecause of the	g losses are the The business inte he damage sustai	n into two categories: estimated costs to re rruption losses are ti ned during the flood. ced from their homes be	pair or replace th ne losses associa Business interrupti	e damage caused ated with inability	to the buildin to operate a	ng and its a business			
usiness inte	erruption of the re	es were 2,466.58 mil gion. The residential is associated with the bu	occupancies made						
		Table 6: Building-Rela (Millio	ted Economic Los	s Estimates					
ategory	Area	Residential	Commercial	Industrial	Others	Total			
Building Loss	Building Content Inventory	768.46 434.17 0.00	287.67 448.85 14.55 751.06	126.35 270.39 40.02 436.76	23.82 51.14 1.18 76.13	1,208.30 1,204.54 55.74			
Business Inte	Subtotal erruption	1,202.63	2.00	436.76	0.10	2,466.58 2.16			
	Relocation Rental Income Wage	0.46 0.33 0.08	0.54 0.38 2.09	0.04 0.00 0.04	0.03 0.00 0.49	1.07 0.72 2.71			
	Subtotal Total	0.91 1,203.54	5.01 756.07	0.11 436.87	0.62 76.75	6.65 2,473.23			
Hazus G	Global Summary F	Report Categ	ory 4, 1-foot SLR				Hazus Global Summary Report C	Category 4, 1-foot SLR	
	nary Report					Page 9 of 11	ood Event Summary Report		Page 10 of 11

		Building Val	ue (thousands of dolla	irs)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
sachusetts					Flood Scenario:	Category 4, 2-foot SLR
istol	120,088	6,754,711	2,513,478	9,268,189		
1	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
					The estimates of social and economic software which is based on current sci	s tracts/blocks included in the user's study region. mpacts contained in this mpoor were produced using feasul loss estimation methodology untils and engineering knowledge. There are uncertainties inherent in any loss estimation inflicant differences between the modeled results contained in this report and the actual so
					Hazus Global Summary	

Bettion Service Region Service Regi			
Notion Page I General Description of the Region 3 Building Winnsbry 4 General Description of the Region 3 Building Winnsbry 6 General Building Winnsbry 6 Building Winnsbry 6 Building Winnsbry 6 Building Damage 6 General Building Book 6 Building Winnsbry 6 General Building Book 6 Building Winnsbry 6 General Building Book 6 Beneral Building Book 7 Booland House Generation 8 Booland Facilities Damage 6 Booland Regineering Alego IP 8 Booland Facilities Damage 7 Booland Facilities Damage 7 Booland House Generation 8 Booland Facilities Loss 9 Building Related Losses 9 Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11	Table of Contents		General Description of the Region
Induced Flood Damage 8 The geographical size of the region is 51 square miles and 0 square publication of 12 of population by State and County for the study region is provid Social Impact 8 9 Shelter Requirements 9 Building-Related Losses 9 Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11	General Description of the Region Building Inventory General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock	3 4 5	. Massachusetts
Shelter Requirements 9.288 million dollars (2006 dollars). Approximately 90.499 associated with residential housing. Building-Related Losses 0 Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11	Induced Flood Damage	8	The geographical size of the region is 51 square miles and contains 49 thousand households and has a total population of 120,088 peop of population by State and County for the study region is provided in Apper
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data 1 Hazus Global Summary Report Category 4, 2-foot SLR Hazus Global Summary Report Category 4,	Shelter Requirements Economic Loss	-	There are an estimated 38,601 buildings in the region with a total bu 9,268 million dollars (2006 dollars). Approximately 90.49% of the b associated with residential housing.
	Hazus Global Summary Report Category 4, 2-foot SLR		Hazus Global Summary Report Category 4, 2-foot SLI
Flood Event Summary Report Page 2 of 11 Flood Event Summary Report	Flood Event Summary Report	Page 2 of 11	Flood Event Summary Report

Hazus i	s a regional multi-hazard loss estimation model that was developed by the Federal Emergency
Managen Hazus is These lo	hert Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of to provide a methodology and software application to develop muli-hazard losses at a regional scale. ss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts risks from multi-hazards and to prepare for emergency response and recovery.
The floo following	d loss estimates provided in this report were based on a region that included 1 county(ies) from the state(s):
. Mas	sachusetts
Note: Appendix	A contains a complete listing of the counties contained in the region .
49 thous	raphical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over and households and has a total population of 120,088 people (2000 Census Bureau data). The distribution on by State and County for the study region is provided in Appendix B.
9,268 mil	an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of ion dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are with residential housing.

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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%

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%	

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

 Count
 (%)
 Count
 (%)
 Count
 (%)
 Count
 (%)

0 0.00

2 2.90

0 0.00

0 0.00

0 0.00

211 4.81

Table 4: Expected Building Damage by Building Type

 1-10
 11-20
 21-30
 31-40
 41-50
 Substantially

 Count
 (%)
 Count
 (%)
 Count
 (%)
 Count
 (%)

213

0 0.00 4 5.80

0 0.00

0 0.00

1 2.94

0 0.00

369 8.41

374

0 0.00

5 7.25

0 0.00

0 0.00

1,555 35.43

1,563

3 8.82 30 88.24 0 0.00 0 0.00

0 0.00

50 72.46

0 0.00

0 0.00

2,228 50.76

2,308

0 0.00 6 8.70

0 0.00

0 0.00

0 0.00

26 0.59

32

0 0.00

2 2.90 0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

2

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.

Category 4, 2-foot SLR Hazus Global Summary Report

Flood Event Summary Report

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Building Damage

Occupancy

Agriculture

Commercial Education

Government

Industrial

Religion

Total

Residential

Building Type

General Building Stock Damage

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

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

Event Summary Re	eport										Page 6	of 11
Hazus Global S	Summ	ary Rep	ort	с	ategory 4	4, 2-foot	SLR					
Nood	0	0.00	28	0.71	201	5.09	360	9.12	1,392	35.26	1,967 4	19.82
Masonry Steel	0	2.90	2				10 4	2.56 5.80		36.67 15.94	225 5 47 6	57.69 58.12
ManufHousing		0.00		0.00			0			0.00	16 10	
Concrete		0.00		0.00				0.00		44.44	9 5	

Flood Event Summary Report

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Table 2 Building Exposure by Occupancy Type for the Scenario

Cirpoto Chongo Vulnorobilita	Accorrent And Adaption D	Jonning Study for Motor Oug	ity Infractruicture in New Padfard	Fairhaven and Acushnet Technical Report

Flood Event Summary Report

Hazus Global Summary Report

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

Category 4, 2-foot SLR

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

Category 4, 2-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

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.

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 shefters. The model estimates 10.0131 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the invadiated area. Of these, 23.120 people (out of a total population of 120.088) will seek temporary shefter in public shelters.

Hazus Global Summary Report

Category 4, 2-foot SLR

Flood Event Summary Report

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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

ALL	Total	1,263.75	784.44	448.13	80.70	2,577.01
	Subtotal	0.94	5.16	0.11	0.65	6.8
	Wage	0.09	2.14	0.04	0.51	2.79
	Rental Income	0.34	0.40	0.00	0.00	0.74
	Relocation	0.48	0.55	0.04	0.03	1.10
	Income	0.03	2.07	0.03	0.10	2.2
Business	Interruption					
	Subtotal	1,262.81	779.28	448.02	80.05	2,570.1
	Inventory	0.00	14.88	41.04	1.22	57.13
	Content	452.40	461.04	276.95	52.75	1,243.13
	Building	810.41	303.37	130.03	26.09	1,269.90

Hazus Global Summary Report

Flood Event Summary Report

Category 4, 2-foot SLR

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Total

endix A: County Listing for the Region	Appendix B: Regional Popula	tion and Building Valu	e Data		
Massachusetts - Bristol			Building V	alue (thousands of dolla	rs)
		Population	Residential	Non-Residential	Total
	Massachusetts	7			
	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 Global Summary Report Category 4, 2-foot SLR	Hazus Global Summary	Report Catego	ry 4, 2-foot SLR		

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	outogoly 4, 4 lot out	General Building Stock	
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		Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
			10
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census i	racts/blocks included in the user's study region.		
	pacts contained in this report were produced using Hazus loss estimation methodology		
	tific and engineering knowledge. There are uncertainties inherent in any loss estimation ficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary F	Report Category 4, 4-foot SLR	Hazus Global Summary Report Category 4, 4-foot SLR	
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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 dificatis 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 9,286 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
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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	2,632,545	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.

Hazus Global Summary Report Category 4, 4-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

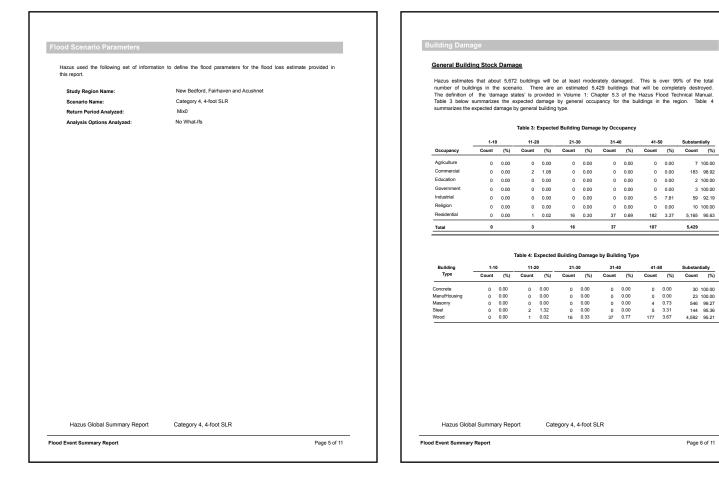
Category 4, 4-foot SLR

Flood Event Summary Report

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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Substantially

0 0.00

0 0.00

0 0.00

7 100.00

183 98.92 2 100.00

3 100.00

59 92.19 10 100.00

5,429

30 100.00 23 100.00 546 99.27 144 95.36 4,592 95.21

Page 6 of 11

Scenario flood event, the model estimates that 0 Table 5: Er Classification Total Fire Station 3 Honotalia 0 Police Station 5 Schools 64 If the report displays all zeros or is blank, two possibilies (1) None dyour facilies were flooder. This an be-	xpected Damage to Essential Facilities # Facilities At Least At Least Moderate Substantial 0 0 1 0 1 1 10	Loss of Use 1 0 1 1 1	Induced Flood Damage Data set interest the amount of debris that will be generated by the flood. The model breaks debris into foundations concrete black, reach, reach, This distinction is made because of the different by end distinction is made because by end distinction is made because of the different by end distinction is made because by end distinction
Scenario flood event, the model estimates that 0 Table 5: Er Classification Total Prior Stations 3 Hostialia 0 Police Stations 5 Schools 54	hospital beds are available in the region. xpocted Damage to Essential Facilities # Facilities At Least At Least O 0 1 0 0 1 0 0 1 1 0 an explain this. theaked by mapping the inventory data on the depth grid.	Loss of Use 1 0 1 1 1	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 siab, concrete block, rehar, 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 20% of the total. Structure comprises 20% of the total. Structure comprises 20% of the total structure comprises 20% of the total. Social Impact Hazus estimates the number of households that are expected to be displaced from their homes due to the
Classification Total Fire Stations 3 HosoItalis 0 Police Stations 5 Schools 54 This report displays all zeros or is blank, two possibilities (1) None of your facilities were flooded. This can be (2) The analysis ons not in. This can be tested by	# Facilities At Least At Least O O O O O O O O O O O O O O O O O O O	1 0 1 11	three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, incik, etc.) and 3) Foundations (concrete siab, concrete block, retar, 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 Hazus estimates the number of households that are expected to be displaced from their homes due to the
Fire Stations 3 Hospitalis 0 Police Stations 5 Schools 54 If this report displays all zeros or is blank, hwo possibilities of (1) None of your facilities were flooded. This can be tested by (2) The analysis was not run. This can be tested by	At Least At Least 0 1 0 0 0 1 1 10 an explain this. thexetory by explang the inventory data on the depth grid.	1 0 1 11	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 Hazus estimates the number of households that are expected to be displaced from their homes due to the
Fire Stations 3 Hospitalis 0 Police Stations 5 Schools 54 If this report displays all zeros or is blank, two possibilities or (1) None of your facilities were flooded. This can be tested by (2) The analysis was not run. This can be tested by	Moderate Substantial 0 1 0 0 0 1 1 10 an explain this. these by meshong the inventory data on the depth grid.	1 0 1 11	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 Hazus estimates the number of households that are expected to be displaced from their homes due to the
If this report displays all zeros or is blank, two possibilities of (1) None of your facilities were flooded. This can be (2) The analysis was not run. This can be tested by	an explain this. checked by mapping the inventory data on the depth grid.		Shelter Requirements Hazus estimates the number of households that are expected to be displaced from their homes due to the
 None of your facilities were flooded. This can be (2) The analysis was not run. This can be tested by 	checked by mapping the inventory data on the depth grid.	age	Shelter Requirements Hazus estimates the number of households that are expected to be displaced from their homes due to the
			require accommodations in temporary public shelters. The model estimates 11.013 households will be displaced due to the flood. Displacement includes households executed 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.
Hazus Global Summary Report	Category 4, 4-foot SLR	Page 7 of 11	Hazus Global Summary Report Category 4, 4-foot SLR

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

Hazus Global Summary Report

Flood Event Summary Report

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	Tota
Building Los	s					
	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 In	terruption					
	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

Category 4, 4-foot SLR

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 Marsa Global Summary Report
 Category 4-Mont SLR

Appendix A: County Listing for the Region

Massachuse - Bristol

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Appendix B: Regional Population and Building Value Data
                                                              Building Value (thousands of dollars)
                                                           Residential
                                                                          Non-Residential
                                                                                                   Total
                                       Population
     Massachusetts
                               120,088
                                                                                                  9,268,189
        Bristol
                                                              6,754,711
                                                                                 2,513,478
                                                                                2,513,478
                                                                                                 9,268,189
                                           120,088
                                                             6,754,711
      Total
      Total Study Region
                                            120,088
                                                              6,754,711
                                                                                 2,513,478
                                                                                                  9,268,189
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Category 4, 4-foot SLR

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Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Building-Related Losses			
Economic Loss	9		
Shelter Requirements	ů	There are an estimated 38,601 buildings in the region with a total building replacement val 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% associated with residential housing.	
Debris Generation Social Impact	8	of population by State and County for the study region is provided in Appendix B .	
Induced Flood Damage	8	The geographical size of the region is 51 square miles and contains 2,267 census blocks. 49 thousand households and has a total population of 120,088 people (2000 Census Bur	
Essential Facilities Damage		Appendix A contains a complete listing of the counties contained in the region.	
Building Damage General Building Stock	6	Note:	
Flood Scenario Parameters	5	- Massachusetts	
Essential Facility Inventory		following state(s):	
General Building Stock		The flood loss estimates provided in this report were based on a region that included	1 county(ies) from the
General Description of the Region Building Inventory	3	to reduce risks from multi-hazards and to prepare for emergency response and recovery.	n and sumulate endrts
Section	Page #	Hazus is a regional multi-hazard iose setimation model that was developed by the Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). Hazus is to provide a methodology and software application to develop multi-hazard lose These loss estimates would be used primarily by local, state and regional officials to pla	he primary purpose of es at a regional scale.
		General Description of the Region	

ding Inventory			Flood Scenario Parameters	
eneral Building Stock	e 38,601 buildings in the region which hav		Hazus used the following set of in this report.	nformation to define the flood parameters for the flood loss estimate provided in
,268 million (2006 dollars).	Table 1 and Table 2 present the relative d	istribution of the value with respect	Study Region Name:	New Bedford, Fairhaven and Acushnet
eneral occupancies by Stud the building value by State and	y Region and Scenario respectively. Appe County	endix B provides a general distribu	Scenario Name:	Category 4 (Extreme), 0-foot SLR
			Return Period Analyzed:	MixO
D. 114	Table 1		Analysis Options Analyzed:	No What-Ifs
Build	ing Exposure by Occupancy Type for the Stu		Analysis Options Analyzed.	
Occupancy	Exposure (\$1000)	Percent of Total		
Residential	6,754,711	72.9%		
Commercial	1,606,696	17.3%		
Industrial	661,541	7.1%		
Agricultural	<u>31,872</u> 115,972	0.3%		
Religion	47,795	0.5%		
Government Education	47,795 49,602	0.5%		
Total	9,268,189	100.00%		
	Table 2 uilding Exposure by Occupancy Type for the Exposure (\$1000)			
Occupancy		Scenario Percent of Total		
	uilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471	Percent of Total 67.6%		
Occupancy Residential Commercial	uilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026	Percent of Total 67.6% 18.5%		
Occupancy Residential Commercial Industrial	uliding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473	Percent of Total 67.6% 18.5% 11.5%		
Occupancy Residential Commercial Industrial Agricultural	uilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 449,473 18,520	Percent of Total 67.6% 18.5% 11.5% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Religion	uliding Exposure by Occupancy Type for the Exposure (\$1000) 2.641.471 722.026 448,473 18.520 47.564	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2%		
Occupancy Residential Commercial Industrial Agricultural Religion Government	uilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,564 11,023	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,584 11,023 20,072	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Religion Government	uilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,564 11,023	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,584 11,023 20,072	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,584 11,023 20,072	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	uliding Exposure by Occupancy Type for the Exposure (\$1000) 2.641.471 722.026 448.473 18.520 47.554 11023 20.972 3.910,049	Percent of Total 67.6% 18.5% 11.5% 0.5% 1.2% 0.3% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Agricultural Government Education Total	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,564 11,023 20,972 3,910,049	Percent of Total 67.6% 18.5% 0.5% 0.5% 0.3% 0.5% 100.00%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Exposure by Occupancy Type for the Exposure (\$1000) 2.641.471 722.026 448.473 18.520 47.564 11.023 20.972 3,910,049	Percent of Total 67.6% 16.5% 11.5% 0.5% 0.3% 0.5% 100.00% atty of no beds.		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,564 11,023 20,972 3,910,049	Percent of Total 67.6% 16.5% 11.5% 0.5% 0.3% 0.5% 100.00% atty of no beds.		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Additional state Additional state Exposure (\$1000) 2.641.471 722.026 722.026 448.473 18.520 47.564 11.023 10.037 20.972 3.910,049 3.910,049	Percent of Total 67.6% 16.5% 11.5% 0.5% 0.3% 0.5% 100.00% atty of no beds.		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Additional state Additional state Exposure (\$1000) 2.641.471 722.026 722.026 448.473 18.520 47.564 11.023 10.037 20.972 3.910,049 3.910,049	Percent of Total 67.6% 16.5% 11.5% 0.5% 0.3% 0.5% 100.00% atty of no beds.		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Additional state Additional state Exposure (\$1000) 2.641.471 722.026 722.026 448.473 18.520 47.564 11.023 10.037 20.972 3.910,049 3.910,049	Percent of Total 67.6% 16.5% 11.5% 0.5% 0.3% 0.5% 100.00% atty of no beds.		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total Secontial Facility Inventor or essential facilities, there are	Attach Attach Exposure (\$1000) 2,641,471 722,026 448,473 18,520 47,564 11,023 20,972 3,910,049 3,910,049	Percent of Total 67.6% 18.5% 0.5% 0.5% 0.3% 0.5% 100.00%	Hazus Giobal Summary Rep	ort Calegory 4 (Extreme), 0-foot SLR

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 2,782 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 accupancy 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		11-2	5	21-3	0	31-4	0	41-5	50	Substan	tially
Occupancy	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	1-10		11-2	0	21-3	80	31-40 41-50		50	Substantially		
Туре	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

od Event Summary Report		Page 6 of 11
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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, retear, 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 lons 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 food.

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 shefters. The model estimates 11.048 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inurdated area. Of these, 30,692 people (out of a total population of 120,089) will seek temporary shefter in public shefters.

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.

• None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid. (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid. (2) The analysis are of nat. This can be leasted by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR

Flood Event Summary Report

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Flood Event Summary Report

Induced Flood Damage

Debris Generation

Shelter Requirements

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 accidated with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Los	55					
	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 In	terruption					
	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

Hazus Global Summary Report	Category 4 (Extreme), 0-foot SLR

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Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR

Flood Event Summary Report

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Flood Event Summary Report

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ix A: County Listing for the Region	ppendix B: Regional Population	and Building Valu	e Data		
lessachusetts Bristol			Building	Value (thousands of dolla	rs)
		Population	Residential	Non-Residential	Total
	Massachusetts Bristol	120,088			9,268,189
			6,754,711	2,513,478	
	Total Total Study Region	120,088	6,754,711	2,513,478	9,268,189
Category 4 (Extreme), 0-foot SLR	Hazus Global Summary Rep	ort Category 4 (Extreme), 0-foot SL	R	

Haz	zus-MH: Flood Event Report	Table of Contents	
Region Name:	New Redford Foldence and Associate	Section	Page #
Region Name.	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 4 (Extreme), 1-foot SLR	Building Inventory General Building Stock	4
		Essential Facility Inventory	
Print Date:	Friday, June 06, 2014	Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Annendir A. County Listing for the Benjam	10
		Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	11
		Appendix D. Regional Population and Building value bata	
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
	npacts contained in this report were produced using Hazus loss estimation methodology tillic and engineering knowledge. There are uncertainties inherent in any loss estimation		
	initic and engineering informations the and an antibation of the antibation of the actual social ificant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 4 (Extreme), 1-foot SLR	Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR	
		Flood Event Summary Report	Page 2 of 11
		riou zvent Summary Report	Fage 2 01 11

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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 iosses at a regional scale. These loss estimates would be used primarily bical, 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

Flood Event Summary Report

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

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

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 38,801 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. ilding 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.

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 1

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.

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

Flood Event Summary Report

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Building Damage General Building Stock Damage 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 Category 4 (Extreme), 1-foot SLR Scenario Name: Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs Building Туре Count (%) Concrete 0.00 0 ManufHousing 0.00 Masonry Steel Wood 0.00 0.00 Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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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

Occupancy	1-10		11-2)	21-3	0	31-4	0	41-50		Substantially	
	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 11-20 21-30 31-40 41-50 Substantiall (%) Count Count (%) Count (%) Count (%) Count (%) 12 92.31 20 100.00 320 75.47 65 74.71 2,616 60.10 0 0 2 0 0.00 0 0.00 7 1.65 0 0.00 0 0.00 5 1.18 0.00 1 7.69 0 0.00 0.00 1.65 3.45 4.34 0.00 21.23 90 11 6 6.90 0.55 2.30 12.64 24 189 313 7.19 1.211 27.82

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

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sential Facility Da	amage				Induced Flood Damage
		the region had 0 hospit 0 hospital beds are availab	tal beds available for use ble in the region.	e. On the day of the	Debris Generation
	Table 5: E	Expected Damage to Ess	ential Facilities		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
			# Facilities		types of material handling equipment required to handle the debris.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations	3	1 Noderate	O	1	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
Hospitals	0	0	0	0	generated by the flood.
Police Stations	5	1	0	1	
Schools	54	ь	6	11	
If this report displays all zeros or	r is blank, two possibilities	can explain this.			Social Impact
		checked by mapping the invent			
(2) The analysis was not box asks you to replace the		y checking the run box on the Ar	nalysis Menu and seeing if a mes	sage	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 remain accommongnations in termorary unitic stellers. The model estimates 11 359 households will be
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in
					flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelfers. The model estimates 11.39 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 (aut of a total appoulation of 120.088) will seek temporary shelter in

nomic L	.055						Appendix A: County Listing for the Region Massachusetts	
	conomic loss estima value of the scenario	ted for the flood is a buildings.	2,843.91 million do	ollars, which repres	sents 71.65 %	of the total	wasiku ludena Bratol	
Building-R	telated Losses							
lirect buildir contents. because of	ng losses are the e The business intern the damage sustaine	into two categories: estimated costs to re- uption losses are t ad during the flood. ad from their homes be	pair or replace the he losses associa Business interrupt	ne damage caused ated with inability	d to the buildin to operate a	ng and its a business		
business int	terruption of the regi	s were 2,836.53 mi ion. The residential associated with the bu	occupancies made					
		Table 6: Building-Rela (Millio	ted Economic Los	s Estimates				
Category	Area	Residential	Commercial	Industrial	Others	Total		
Building Los	Building Content Inventory	920.41 498.11 0.00	341.90 489.43 15.47 846.80	140.46 295.78 43.89 480.13	32.55 57.23 1.32	1,435.32 1,340.54 60.67		
Business Int	Subtotal	1,418.52	846.80	480.13	91.09	2,836.53		
	Income Relocation Rental Income Wage	0.04 0.54 0.37 0.09 1.04	2.22 0.58 0.42 2.28 5.50	0.03 0.04 0.00 0.05 0.12	0.11 0.04 0.00 0.57 0.72	2.40 1.20 0.79 2.99 7.38		
ALL	Total	1,419.55	852.30	480.25	91.81	2,843.91		
Hazus (Global Summary Re	port Category 4	(Extreme), 1-foot	SLR			Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR	

		Building	Value (thousands of dolla	rs)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
ssachusetts					Flood Scenario:	Category 4 (Extreme), 2-foot SLR
Iristol	120,088	6,754,711	2,513,478	9,268,189		
al al Study Region	120,088	6,754,711	2,513,478	9,268,189 9,268,189	Print Date:	Friday, June 06, 2014
					The estimates of social and economic in software which is based on current scie.	tradisblocks included in the user's study region. Ingadis combined in this report weep produced using Hazus loss estimation methodology reliate and engineering modelyes. There are uncertainties inherent in any loss estimation ificant differences between the modeled results contained in this report and the actual soci
Hazus Global Summary Repo	rt Category 4 (E	Extreme), 1-foot SL	R		Hazus Global Summary	Report Category 4 (Extreme), 2-foot SLR

Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	11	
	10	
Building-Related Losses		
Economic Loss	9	associated with residentia
	8	There are an estimated 9,268 million dollars (20
Debris Generation		of population by State and
Induced Flood Damage	8	The geographical size of 49 thousand household
Essential Facilities Damage		Appendix A contains a con
General Building Stock	,	Note:
		- Massachusetts
General Building Stock		The flood loss estimate following state(s):
Building Inventory	4	to reduce risks from mult
Section General Description of the Region	<u>Page #</u> 3	Hazus is to provide a These loss estimates of
		Hazus is a regional Management Agency (I
Table of Contents		General Description
	Section General Description of the Region Building Inventory General Building Stock Scottial Facility Inventory Food Scenario Parameters Building Damage General Building Stock Scenarial Facilities Damage Building Building Stock Scenarial Facilities Damage Bubries Generation Social Impact Scotter Requirements Building-Related Losses Appendix A: County Listing for the Region	Serion Page # General Description of the Region 3 Building Inventory 4 General Building Stock 5 Eisential Facility Inventory 6 General Building Stock 6 General Building Stock 6 General Building Stock 7 General Building Stock 7 General Building Stock 7 General Building Stock 7 Debris Generation 8 Debris Generation 8 Stocial Impact 8 Shelter Requirements 9 Building-Related Losses 9 Appendix A: County Listing for the Region 10

	Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency
1	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 o 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 ollowing state(s):
	. Massachusetts
	ote: ppendix A contains a complete listing of the counties contained in the region .
4	he geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over 9 thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution fopulation by State and County for the study region is provided in Appendix B.
9	here are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are sociated with residential housing.
	······································

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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	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%

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 destroyable. 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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

Count (%)

0 0.00

2 2.50

0 0.00

0 0.00

0 0.00

193 3.89

195

Table 4: Expected Building Damage by Building Type

21-30

Count (%)

0 0.00 0 0.00 5 1.15

186

2.35 4.17

31-40

Count (%)

0 0.00

0 0.00

0 0.00

1 2.27

0 0.00

311 6.27

313

31-40

Count (%)

0 0.00 0 0.00 6 1.38 2 2.35 304 6.82

41-50 Substantially Count (%) Count (%)

2 100.00

67 83.75

0 0.00

0 0.00

0 0.00

34 77.27

3,216 64.88

3,319

Count (%)

14 93.33 19 100.00 350 80.65 67 78.82

2,813 63.07

Page 6 of 11

0 0.00 4 5.00

0 0.00

0 0.00

5 11.36 0 0.00

1,213 24.47

1,222

41-50

Count (%)

1 6.67 0 0.00 71 16.36 8 9.41

1,131 25.36

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 Event Summary Report

General Building Stock Damage

Occupancy

Agriculture

Commercial

Government

Industrial

Religion

Total

Residential

Building

Type

Concrete ManufHousing Masonry Steel Wood

Education

1-10

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0

1-10

0.00

0.00

0.00

0 0 0

0 0.00 11-20

Count (%)

0 0.00

6 7.50

0 0.00

0 0.00

4 9.09

0 0.00

24 0.48

34

11-20

0 0.00 0.00 0.46 7.06 0.58

2

6 26

Count (%) Count (%)

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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 Mix0 Return Period Analyzed: No What-Ifs Analysis Options Analyzed: Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR Flood Event Summary Report Page 5 of 11

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 AtLeast At Least Loss of Use Classification Tota Substantia Fire Stations Hospitals Police Stations Schools

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

Event Summary Report		Page 7 of 1
Hazus Global Summary Report	Category 4 (Extreme), 2-foot SLR	
box asks you to replace the existing results.		

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Flood Event Summary Report

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 725,714 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 tornage is converted into an estimated number of truckloads, it will require 29,069 truckloads (@25 tons/truck) to remove the debris generated by the food.

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 11.336 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 92,330 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Flood Event Summary Report

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	Tota
Building Los	is					
	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
	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	0.38	2.32	0.05	0.61	3.07
	Subtotal	1.08	5.58	0.13	0.76	7.54

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Flood Event Summary Report

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Indix A: County Listing for the Region	Append	ix B: Regional Population ar	nd Building Value	e Data		
- Bristol				Building	Value (thousands of dolla	rs)
			Population	Residential	Non-Residential	Total
		Bristol	120,088	6,754,711	2,513,478	9,268,189
	Tot	al	120,088	6,754,711	2,513,478	9,268,189
		al Study Region	120,088	6,754,711	2,513,478	9,268,189
Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR		Hazus Global Summary Report	Colorest d (Extreme), 2-foot SL		
	 I			,		

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Haz	us-MH: Flood Event Report	Table of Contents	
Region Name:	New Bedford, Fairhaven and Acushnet	Section	Page #
•		General Description of the Region Building Inventory	4
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		Essential Facility Inventory	
Print Date:	Friday, June 06, 2014	Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix A: Soundy Easing for the Region	11
		······································	
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
	pacts contained in this report were produced using Hazus loss estimation methodology tific and engineering knowledge. There are uncertainties inherent in any loss estimation		
	ficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary F	Report Category 4 (Extreme), 4-foot SLR	Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR	
		Flood Event Summary Report	Page 2 of 11

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 dificatis 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 .

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

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 9,286 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.

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

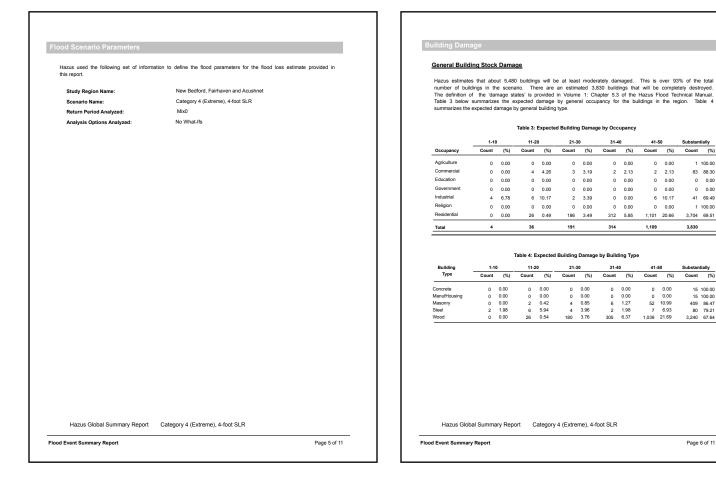
Flood Event Summary Report

Flood Event Summary Report

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Rep

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41-50

0 0.00

2 2.13

0 0.00

0 0.00

6 10.17

1,109

0 0.00 0 0.00 52 10.99 7 6.93 1,039 21.69

0 0.00

1,101 20.66 3,704 69.51

41-50 Substantially Count (%) Count (%)

Substantially Count (%) Count (%)

1 100.00

83 88.30

0 0.00

0 0.00

41 69.49

1 100.00

3,830

15 100.00 15 100.00 409 86.47 80 79.21 3,240 67.64

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ssential Facility Dama	ge				Induced Flood Damage	
Before the flood analyzed in scenario flood event, the model				e. On the day of the	Debris Generation	
	Table 5	: Expected Damage to Es	sential Facilities		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 equiromet required to handle the debris.	
			# Facilities		types of material narioning equipment required to nariole the debris.	
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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	
Fire Stations Hospitals	3	1	0	1	estimated number of truckloads, it will require 31,616 truckloads (@25 tons/truck) to remove the debris generated by the flood.	
Police Stations Schools	5 54	2	0 8	13		
If this report displays all zeros or is bla	nk, two possibiliti	es can explain this.			Social Impact	
	This can be tested	be checked by mapping the inver d by checking the run box on the A	ntory data on the depth grid. Analysis Menu and seeing if a mess	sage	Shelter Requirements	
					public shefters.	
Hazus Global Summary	Report	Category 4 (Extreme), 4	-foot SLR		Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR	

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 Los	55					
	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 In	terruption					
	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

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

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Appendix A: County Listing for the Region

Massachuse - Bristol

Flood Event Summary Report

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

Population

120,088

120,088

120,088

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

Appendix B: Regional Population and Building Value Data

Flood Event Summary Report

Massachusetts

Bristol

Total Total Study Region Page 9 of 11

Total

9,268,189

9,268,189

9,268,189

Page 11 of 11

Building Value (thousands of dollars)

Non-Residential

2,513,478 2,513,478

2,513,478

Residential

6,754,711

6,754,711

6,754,711

Hazus-MH: Flood Event Report Region Name: New Bedford, Fairhaven and Acushnet Flood Scenario: Category 1, 0-foot SLR Thursday, June 05, 2014 Print Date: 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 The have which is based on current scientific and engineering incomédge. 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 s

Hazus Global Summary Report

Category 1, 0-foot SLR

Flood Event Summary Report

Appendix D: continued

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pod Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 1, 0-foot SLR		Hazus Global Summary Report Category 1, 0-foot SLR	
Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact Shelter Requirements Economic Loss Building-Related Losses	5 6 8 8 9	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 2,287 census block 49 thousand households and has a total population of 120,086 people (2000 Census E of population by State and County for the study region is provided in Appendix B. There are an estimated 38,801 buildings in the region with a total building replacement 9,266 million doins (2006 doins). Approximately 90.49% of the buildings (and 72.88° associated with residential housing.	Bureau data). The distribution value (excluding contents) of
Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory	Page #3	Management Agency (FEMA) and the National Institute of Building Sciences (NBS). Hazus is to provide a nethodology and software application to develop multi-hazard lo These loss estimates would be used primarily by local, state and regional officials to 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 include following state(s): Masachusetts	The primary purpose of osses at a regional scale. plan and stimulate efforts
Table of Contents		General Description of the Region Hazus is a regional multi-hazard loss estimation model that was developed by	the Federal Emergency

ling Inventory			Flood Scenario Para	ameters		
eneral Building Stock	e 38,601 buildings in the region which hav	ua an annonata tatal rankaamaa	this report.	ng set of information	to define the flood parameters for the flood loss estimate provid	ted in
268 million (2006 dollars).	Table 1 and Table 2 present the relative d r Region and Scenario respectively. Appe	distribution of the value with respe	ect to the	:	New Bedford, Fairhaven and Acushnet	
ne building value by State and (Scenario Name:		Category 1, 0-foot SLR	
			Return Period Analyze	zed:	Mix0	
Buildi	Table 1 ng Exposure by Occupancy Type for the Stu	udy Region	Analysis Options Ana	alyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total	-			
Residential	6,754,711	72.9%				
Commercial	1,606,696	17.3%	.			
Industrial	661,541	7.1%	-			
Agricultural	31,872 115,972	0.3%	-			
Religion Government	47,795	0.5%	·			
Education	47,795 49,602	0.5%	-			
	9.268.189	100.00%	·			
Total	9,268,189	100.00%				
	Table 2 ilding Exposure by Occupancy Type for the		-			
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total	-			
	ilding Exposure by Occupancy Type for the		-			
Occupancy Residential	ilding Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647	Percent of Total 70.9% 16.1% 10.3%	-			
Occupancy Residential Commercial Industrial Agricultural	ilding Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824	Percent of Total 70.9% 16.1% 10.3% 1.8%				
Occupancy Residential Commercial Industrial Agricultural Religion	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,624 4,335	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8%	-			
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824 4.335 764	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,824 4,335 764 1,666	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824 4.335 764	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1%	- 			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,824 4,335 764 1,666	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,824 4,335 7764 1,665 559,834	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,824 4,335 7764 1,665 559,834	Percent of Total 70.9% 16.1% 10.3% 1.6% 0.8% 0.1% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Agricultural Government Education Total	lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,647 8,824 4,335 7764 1,665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.9% 0.1% 0.5% 100.00%				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento pressential facilities, there are re	Lilding Exposure by Occupancy Type for the Exposure (\$1000) 396,672 57,647 8,824 4,335 764 1,665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.3% 0.3% 0.3% 100.00% 100.00% scly of no beds.				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento pressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824 4.335 764 1.0665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.3% 0.3% 0.3% 100.00% 100.00% scly of no beds.				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento pressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824 4.335 764 1.0665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.3% 0.3% 0.3% 100.00% 100.00% scly of no beds.				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento pressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 396.672 89.927 57.647 8.824 4.335 764 1.0665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.3% 0.3% 0.3% 100.00% 100.00% scly of no beds.				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento pressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 396,672 89,927 57,947 8,824 4,335 764 1,665 559,834	Percent of Total 70.9% 16.1% 10.3% 0.3% 0.3% 0.3% 100.00% 100.00% scly of no beds.		nmarv Report	Category 1, 0-foot SLR	

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 accupancy 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		11-2	0	21-3	80	31-4	D	41-5	D	Substant	ially
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	1-1	0	11-3	20	21-	30	31-4	0	41-5	0	Substant	ially
Туре	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

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	
At Least	At Least	

Classification	Total	Moderate	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.

None of your facilities were flooder. This can be checked by mapping the inventory data on the depth grid.
 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.

Flood Event Summary Report

Category 1, 0-foot SLR

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Hazus Global Summary Report	Category 1, 0-foot SLR	
Flood Event Summary Report		Page 6 of 11

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	Tota
Building Los	is.					
	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 In	terruption					
	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

Hazus Global Summary Report	Category 1, 0-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

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Debris Generation

Induced Flood Damage

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, retear, 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.

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 shefters. 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 shefter in public shefters.

Flood Event Summary Report

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Matters . Building Water (Housands of dollar). Pactor Restore it Using Region 2.512.71 2.512.71 2.512.71 1.51 1.52.81 <th>pendix A: County Listing for the Region</th> <th>Appendix B: Regional Population a</th> <th>nd Building Valu</th> <th>ue Data</th> <th></th> <th></th>	pendix A: County Listing for the Region	Appendix B: Regional Population a	nd Building Valu	ue Data		
Population Readeration Readeration Readeration Branch 100.008 0.705/171 2.051.047 0.2085.109 Branch 100.008 0.705/171 2.051.047 0.2085.109 Total Branch 100.008 0.4764.711 2.051.047 0.2085.109 Total Branch 100.008 0.4764.711 2.051.047 0.2085.109				Building	Value (thousands of doila	urs)
Bread 120.08 0.76.711 2.51.078 0.200,100 Total 120.08 0.756.711 2.51.078 0.200,100 Total 120.08 0.756.711 2.51.078 0.200,100 Total Shory Region 120.08 0.756.711 2.51.078 0.200,100			Population			
Total Story Region 120,088 4,784,711 2,513,478 9,284,189			120,088	6,754,711	2,513,478	9,268,189
		Total	120,088	6,754,711	2,513,478	9,268,189
zus Global Summary Report Category 1, 0-foot SLR			120,088	6,754,711	2,513,478	9,268,189
	Hazus Global Summary Report Category 1, 0-foot SLR	Hazus Global Summary Repo	rt Catego	bry 1, 0-foot SLR		
	Gategory 1, 0-1001 SER		n calego	77 1, 0-1001 OLK		

Region Name: Flood Scenario: Print Date:	New Bedford, Fairhaven and Acushnet Category 1, 0-foot SLR Thursday, June 05, 2014	Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage	Page # 3 4 5
Flood Scenario:	Category 1, 0-foot SLR	Building Inventory General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock	4
		General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock	
		Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock	5
Print Date:	Thursday, June 05, 2014	Flood Scenario Parameters Building Damage General Building Stock	5
		Building Damage General Building Stock	5
		General Building Stock	
			6
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census tracts	/blocks included in the user's study region.		
software which is based on current scientific a	contained in this report were produced using Hazus loss estimation methodology of engineering knowledge. There are uncertainties initiarent in any loss estimation differences between the modeled results contained in this report and the actual accual		
Hazus Global Summary Repo	ort Category 1, 0-foot SLR	Hazus Global Summary Report Category 1, 0-foot SLR	

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Hazus Global Summary Report

Flood Event Summary Report

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.

Category 1, 0-foot SLR

Total

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.

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%

Table 1

49,602	0.5%
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

Flood Event Summary Report

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0.00 0.00 0.00 0.00 0.00

0

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Building Damage General Building Stock Damage 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 Category 1, 0-foot SLR Scenario Name: Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs 11-20 Building 1-10 (%) Туре Count (%) Count 0 0 0 0.00 0.00 0.00 Concrete 0.00 0 0.00 ManufHousing Masonn Steel Wood 0.00 0 0.00 0.00 48 24.87 Hazus Global Summary Report Category 1, 0-foot SLR Hazus Global Summary Report Category 1, 0-foot SLR Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Category 1, 0-foot SLR

Table 3: Expected Building Damage by Occupancy

	1-10		11-2	:0	21-3	80	31-4	0	41-5	0	Substant	ially
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 21-30 31-40 41-50 Substantially Count (%) Count (%) Count (%) Count (%) 0 0.00 0 0.00 1 100.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0 0.00

0.00 4.15

0 19 0.00 9.84

lefore the flood analyzed cenario flood event, the m			ital beds available for use. able in the region.	. On the day of the	Debris Generation
	Table 5: E	Expected Damage to Est	sential Facilities		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
			# Facilities		types of material handling equipment required to handle the debris.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals Police Stations	3 0 5	0 0 0	0 0 0	0 0 0	estimated number of truckloads, it will require 247 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Schools f this report displays all zeros or	54 is blank, two possibilities	0 can explain this.	0	0	Social Impact
	un. This can be tested b	e checked by mapping the inver by checking the run box on the A	ntory data on the depth grid. Analysis Menu and seeing if a messa	age	Shelter Requirements
					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.

	conomic loss estin	nated for the flood is	s 34.18 million do	llars, which repres	sents 6.11 % o	f the total
	value of the scenari elated Losses	o buildings.				
direct buildin contents.	g losses are the The business inte he damage sustair	i into two categories: estimated costs to re rruption losses are to red during the flood. ced from their homes be	epair or replace the the losses associated Business interrupt	e damage caused ated with inability	to the building to operate a	and its business
interruption of	of the region. The	s were 34.11 million of residential occupancie d with the building dama	es made up 76.44			
		Table 6: Building-Rela (Milli	ated Economic Los	s Estimates		
Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Building Content Inventory Subtotal	15.61 10.50 0.00 26.11	0.97 3.22 0.06 4.25	0.57 1.23 0.22 2.03	0.40 1.20 0.13 1.73	17.54 16.15 0.42 34.11
Business Inte	Income Relocation Rental Income	0.00 0.02 0.00	0.02 0.00 0.00	0.00 0.00 0.00	0.00	0.02 0.02 0.00
ALL	Wage Subtotal Total	0.00 0.02 26.13	0.02 0.04 4.29	0.00 0.00 2.03	0.01 0.01 1.74	0.03 0.07 34.18
Harus	olobal Summary R	eport Cated	ory 1, 0-foot SLR			

			ue (thousands of dolla	ars)
	Population	Residential	Non-Residential	Total
sachusetts]			
stol	120,088	6,754,711	2,513,478	9,268,189
	120,088	6,754,711	2,513,478	9,268,189
Study Region	120,088	6,754,711	2,513,478	9,268,189
Hazus Global Summary	Report Cologo	y 1, 0-foot SLR		

Table of Contents		General Description of the Region
Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage Induced Flood Damage	Page # 3 4 5 6 8	Hazus is a regional multi-hazard loss estimation model that w Management Agency (FEMA) and the National Institute of Building Hazus is to provide a methodology and software application to dev These loss estimates would be used primarily by local, state and r to reduce risks from multi-hazards and to prepare for emergency response The flood loss estimates provided in this report were based on a 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 . 9 thousand households and has a total population of 120,088 peop
Debris Generation Social Impact Shelter Requirements Economic Loss Building-Related Losses	8 9	of population by State and County for the study region is provided in Appen There are an estimated 38 601 huildings in the region with a total bu 9,268 million doltars (2006 doltars). Approximately 90.49% of the bu associated with residential housing.
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10 11	
Hazus Global Summary Report Category 1, 1-foot SLR		Hazus Global Summary Report Category 1, 1-foot SLF
lood Event Summary Report	Page 2 of 11	Flood Event Summary Report

nodel that was developed by the Federal Emergency e of Building Sciences (NIBS). The primary purpose of cation to develop multi-hazard losses at a regional scale. state and regional officials to plan and stimulate efforts ency response and recovery. based on a region that included 1 county(ies) from the

and contains 2,267 census blocks. The region contains over 120,088 people (2000 Census Bureau data). The distribution vided in Appendix B.

vith a total building replacement value (excluding contents) of 19% of the buildings (and 72.88% of the building value) are

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%

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 3.3 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

142 57.49

142

31-40

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

28 11.34

28

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.

Category 1, 1-foot SLR Hazus Global Summary Report

Flood Event Summary Report

General Building Stock Damage

1-10

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0

Occupancy

Agriculture

Commercial Education

Government

Industrial

Religion

Total

Residential

Flood Event Summary Report

11-20

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

47 19.03

47

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41-50 Substantially Count (%) Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

2 0.81

2

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0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

28 11.34

28

Hazus Global Summary Report Category 1, 1-foot SLR Flood Event Summary Report Page 5 of 11

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

Category 1, 1-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

Essential Facility Damage

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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 At Least At Least Loss of Use Classification Tota Substantia Fire Stations Hospitals Police Stations Schools If this report displays all zeros or is blank, two possibilities can explain this.

Hazus Global Summary Report Ca	ategory 1, 1-foot SLR	
box asks you to replace the existing results.		

Building	1-10		11-20	20 21-30	31-40 4	41-	41-50	Substantially	ally				
Туре	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	
lasonry	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	
Vood	0	0.00	47	19.11	141	57.32	28	11.38	28	11.38	2	0.81	

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 shefters. 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 shefter in public shefters.

Hazus Global Summary Report

Category 1, 1-foot SLR

Flood Event Summary Report

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Table 6: Building-Related Economic Loss Estimates

Economic Loss

Building-Related Losses

replacement value of the scenario buildings.

Category	Area	Residential	Commercial	Industrial	Others	Tota
Building Los	55					
	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 In	terruption					
	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

The total economic loss estimated for the flood is 44.47 million dollars, which represents 7.55 % of the total

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.

Hazus Global Summary Report

Flood Event Summary Report

Category 1, 1-foot SLR

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Appendix A: County Listing for the Region						
Massashusatta		Appendix B: Regional Population	on and Building Value	e Data		
_ Bristol				Building	alue (thousands of dollar	s)
			Population	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
		1				
		1				
		1				
		1				
		1				
Hazus Global Summary Report Category 1, 1-foot SLR		Hazus Global Summary R	eport Catego	y 1, 1-foot SLR		
ood Event Summary Report	Page 10 of 11	Flood Event Summary Report				Page 11 of 11

Haz	us-MH: Flood Event Report	Table of Contents	
Region Name:		Section	Page #
Region Name.	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 1, 2-foot SLR	Building Inventory	4
		General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
		Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock Essential Facilities Damage	
		Induced Flood Damage	8
			8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
			10
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
The estimates of social and economic in	spacts contained in this report were produced using Hazus loss estimation methodology		
software which is based on current scien	tilic and engineering knowledge. There are uncertainties inherent in any loss estimation ficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary F	Report Category 1, 2-foot SLR	Hazus Global Summary Report Category 1, 2-foot SLR	
			Page 2 of 11

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 9,286 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.

Category 1, 2-foot SLR Hazus Global Summary Report

Hazus Global Summary Report

Category 1, 2-foot SLR

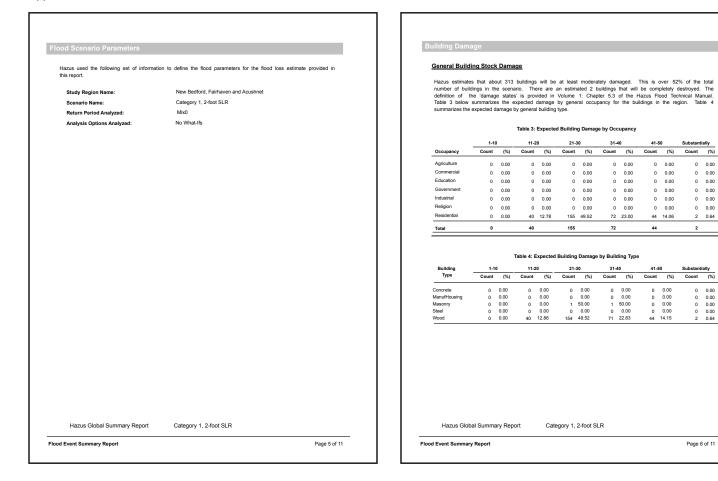
Flood Event Summary Report

Flood Event Summary Report

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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Flood Event Summary Report

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
this report displays all zeros or (1) None of your facilities		s can explain this. be checked by mapping the inve	entory data on the depth grid.	
			Analysis Menu and seeing if a mes	sage
box asks you to replace the	e existing results.			

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.

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 shefters. The model estimates 553 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.

Hazus Global Summary Report

Category 1, 2-foot SLR

Flood Event Summary Report

Substantially

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

2 0.64

2

Count (%)

0 0.00 0 0.00 0 0.00 0 0.00 2 0.64

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Flood Event Summary Report

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) Residential Commercial Category Area Industrial Others Total Building Loss Building Content Inventory Subtotal 26.49 18.18 0.00 **44.67** 1.70 5.08 0.11 6.89 29.76 26.94 0.66 **57.36** 0.94 1.96 0.37 **3.27** 0.64 1.72 0.18 **2.54** Business Interruption 0.00 0.04 0.00 0.00 **0.04** 44.71 0.03 0.00 0.03 0.05 6.95 0.00 0.00 0.00 0.00 0.00 3.27 0.03 0.04 0.00 0.04 0.11 57.47 0.00 0.00 0.01 0.01 0.01 2.55 Income Relocation Rental Income Wage Subtotal Total ALL Hazus Global Summary Report Category 1, 2-foot SLR Page 9 of 11

Massachusetts _ Bristol		
Hazus Global Summary Report	Category 1, 2-foot SLR	

		Building	Value (thousands of dolla	rs)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
lassachusetts	1				Flood Scenario:	Category 1, 4-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189	rioou occinario.	
otal	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
otal Study Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer	
						tracts/blocks included in the user's study region.
					software which is based on current scie	npacts contained in this report were produced using Hazus loss estimation nific and engineering knowledge. There are uncertainties inherent in any ice afficient differences between the modeled results contained in this report an

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Appendix D: continued

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	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 1, 4-foot SLR		Hazus Global Summary Report Category 1, 4-foot SLR	
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10 11		
Building-Related Losses			
Economic Loss	9		
Shelter Requirements		9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the build associated with residential housing.	ding value) are
Social Impact	8	There are an estimated 38,601 buildings in the region with a total building replacement value (excludi	ng contents) o
Debris Generation		49 thousand households and has a total population of 120,086 people (2000 Census Bureau data), of population by State and County for the study region is provided in Appendix B.	me uisuibullion
Induced Flood Damage	8	The geographical size of the region is 51 square miles and contains 2,267 census blocks. The region 49 thousand households and has a total population of 120,088 people (2000 Census Bureau data).	
Essential Facilities Damage		Appendix A contains a complete listing of the counties contained in the region.	
General Building Stock	·	Note:	
Building Damage	6		
Essential Facility Inventory Flood Scenario Parameters	5	following state(s): - Massachusetts	
General Building Stock		The flood loss estimates provided in this report were based on a region that included 1 county(ie	s) from the
Building Inventory	4	to reduce risks from multi-hazards and to prepare for emergency response and recovery.	
Section General Description of the Region	Page #	Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Management Agency (FEMA) and the National institute of Building Sciences (NIBS). The primary Hazus is to provide a methodology and software application to develop multi-hazard losses at a reg These loss estimates would be used primarily by local, state and regional officials to plan and stim	purpose of gional scale.
·			

ling Inventory			Flood Scenario Pa	rameters		
eneral Building Stock	e 38,601 buildings in the region which have	ve an annenate total replacemen	this report.	wing set of informatio	in to define the flood parameters for the flood loss estimate provid	ided in
,268 million (2006 dollars).	Table 1 and Table 2 present the relative di (Region and Scenario respectively. Appe	listribution of the value with respe	ect to the	e:	New Bedford, Fairhaven and Acushnet	
e building value by State and			Scenario Name:		Category 1, 4-foot SLR	
	Table 1		Return Period Ana	lyzed:	Mix0	
Build	ing Exposure by Occupancy Type for the Stu	ıdy Region	Analysis Options A	Analyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total				
Residential	6,754,711	72.9%	.			
Commercial	1,606,696	17.3%	.			
Industrial	661,541	7.1%	.			
Agricultural	31,872 115,972	0.3%	.			
Religion Government	47,795	0.5%				
Education	47,795 49,602	0.5%				
	9.268.189	100.00%	·			
Total	9,260,169	100.00%				
	Table 2 ilding Exposure by Occupancy Type for the : Exposure (\$1000)		-			
Occupancy		Scenario Percent of Total 74.7%	-			
	illding Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884	Percent of Total 74.7% 14.1%				
Occupancy Residential Commercial Industrial	illding Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845	Percent of Total 74.7% 14.1% 8.5%				
Occupancy Residential Commercial Industrial Agricultural	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045	Percent of Total 74.7% 14.1% 8.5% 1.3%				
Occupancy Residential Commercial Industrial Agricultural Religion	ilding Exposure by Occupancy Type for the Exposure (\$1000) 519.768 97.884 58.845 9.045 4.843	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 519.768 97.884 58.845 9.045 4.843 2.142	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	iliding Exposure by Occupancy Type for the Exposure (\$1000) 519,788 97,884 58,845 9,045 4,045 4,045 2,142 3,165	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 519.768 97.884 58.845 9.045 4.843 2.142	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7% 0.3%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	iliding Exposure by Occupancy Type for the Exposure (\$1000) 519,788 97,884 58,845 9,045 4,045 4,045 2,142 3,165	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Adjoutural Reliation Government Education Total	iliding Exposure by Occupancy Type for the Exposure (\$1000) 519,788 97,884 58,845 9,045 4,843 2,142 3,195 695,722	Percent of Total 74.7% 14.1% 8.5% 1.3% 0.7% 0.3% 0.5%				
Occupancy Residential Commercial Industrial Agricultural Agricultural Government Education Total	Liking Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 9,045 4,843 2,142 3,195 695,722 EX	Percent of Total 74,7% 14,1% 8,5% 0,3% 0,3% 0,3% 0,5% 100,00%				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 4,843 2,142 3,195 696,722	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Liking Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 9,045 4,843 2,142 3,195 695,722 EX	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 4,843 2,142 3,195 696,722	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 4,843 2,142 3,195 696,722	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Exposure by Occupancy Type for the Exposure (\$1000) 519,768 97,884 58,845 9,045 4,843 2,142 3,195 696,722	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution				
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total Essential Facility Invento ressential facilities, there are	Exposure by Occupancy Type for the constraints Exposure (\$1000) 519,788 97,884 98,845 9,045 4,843 2,142 3,165 695,722	Percent of Total 74.7% 14.1% 8.5% 0.5% 0.3% 0.5% 100.00% solution	- 	ummary Report	Category 1, 4-foot SLR	

Building Damage

General Building Stock Damage

Hazus estimates that about 481 buildings will be at least moderately damaged. This is over 68% 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		11-2	5	21-3	80	31-4	10	41-4	60	Substant	ially
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	1-1	0	11-2	0	21-	30	31-	40	41-	50	Substant	ially
Туре	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

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	
At Least	At Least	

Classification	Total	Moderate	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 tealed by checking the run box on the Analysis Menu and seeing if a message box asks you regrade the existing result.

Flood Event Summary Report

Category 1, 4-foot SLR

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Hazus Global Summary Report Category 1, 4-foot SLR

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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, retear, 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 shefters. 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 75.14% 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 Los	55					
	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 In	terruption					
	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

Hazus Global Summary Report	Category 1, 4-foot SLR

Flood Event Summary Report

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y Report Category 1, 4-foot SLR

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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pendix A: County Listing for the Region		Appendix B: Regional Population	and Building Valu	ie Data		
Massachusetts - Bristol				Building	Value (thousands of dolla	urs)
			Population	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 Global Summary Report Category 1, 4-foot SLR		Hazus Global Summary Reg	ort Catego	ny 1, 4-foot SLR		
Hazas Giobai Guillillary Report Gategory 1, 4-1001 SER			on calego	"y 1, 4-1001 OLK		
Event Summary Report	Page 10 of 11	Flood Event Summary Report				Page 11 of 11

Haz	zus-MH: Flood Event Report	Table of Contents	
		Section	Page #
Region Name:	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
lood Scenario:	Category 2, 0-foot SLR	Building Inventory	4
loou ocenano.	Category 2, 01001 CER	General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
		Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
lisclaimer:			
	tracts/blocks included in the user's study region.		
oftware which is based on current scier	npasts contained in this report were produced using leasan loss astimation methodology infinite and engineering homolege. There are uncertainties inheren in any icsa estimation ilicant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 2, 0-foot SLR	Hazus Global Summary Report Category 2, 0-foot SLR	
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General Description of the Region

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Flood Event Summary Report

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 120,085 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.

Category 2, 0-foot SLR

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%				
Commorpial	1 606 696	17 3%				

Total	9,268,189	100.00%
Education	49,602	0.5%
Government	47,795	0.5%
Religion	115,972	1.3%
Agricultural	31,872	0.3%
Industrial	661,541	7.1%
Commercial	1,000,090	17.3%

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%

Category 2, 0-foot SLR

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

Flood Event Summary Report

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subset the following set of information is define the flood parameters for the flood loss estimate provided in dyd Region Name: Category 2, 0-foot SLR turn Period Analyzed: Mixo atysis Options Analyzed: No What ifs 1000000000000000000000000000000000000	od Scenario Parameters			Building Dam	nage			_					_	
ady Region Name: New Bedford, Fairhaven and Acushnet number of buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the scenario. There are a estimated 6 buildings in the region. Table 3 below summarizes the expected damage by general building type. ady Stopion Analyzed: No What Hs No What Hs No What Hs Stopion 1 the scenario. The are are astimated 6 buildings in the region. Stopion 1 the scenario. Stopion 1 the scenaris astimatescenario. Stopion 1 the scenarise astima		tion to define the flood parameters for the flood	loss estimate provided in	-			will be at k	aet mode	arataly dam	aged	This is ou	or 60°	% of the	total
turn Period Analyzed: Mu0 summarizes the expected damage by general building type. atysis Options Analyzed: No What-Ifs atysis Options Analyzed: No What-Ifs Cocupancy 110 11.20 21.30 31.40 41.50 Substantiality Agriculture 0 0.00 0	Study Region Name:			number of bui definition of	ildings in the scen the 'damage state	ario. There s' is provid	e are an es ded in Volur	timated 6 ne 1: Ch	buildings t hapter 5.3 d	that will of the I	l be comple Hazus Floo	etely d od Tech	estroyed. nnical Mi	The anual.
atysis Options Analyzed: No What ifs atysis Options Analyzed: No What ifs														
Table 3: Expected Building Jamage by Occupancy Table 3: Expected Building Jamage by Occupancy Coccupancy 11-0 11-20 21-30 31-40 41-50 Substantialy Apriculture 00 <th>•</th> <th></th>	•													
Occupancy Count (%) Count	Analysis Options Analyzed:	NO What-IIS				Table 3: E	xpected Buil	ding Dam	age by Occu	upancy				
Agriculture 0 0.00					1-10	11-20		21-30	31-40	0	41-50		Substan	tially
Commercial 0 0.00				Occupancy	Count (%)	Count	(%) Cor	unt (%)	Count	(%)	Count	(%)	Count	(%)
Commercial 0 0.00				Agriculture	0 0.00	0	0.00	0 0.00	0	0.00	0	0.00	0	0.00
Education 0 0.00 0				-										
Government 0 0.00														
Industrial 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0				Government	0 0.00	0	0.00		0	0.00	0	0.00	0	0.00
Building 1-10 11-20 21-30 21-40 124 21-50 50-00 <th< td=""><td></td><td></td><td></td><td>Industrial</td><td>0 0.00</td><td>0</td><td>0.00</td><td>0 0.00</td><td></td><td></td><td>0</td><td>0.00</td><td>0</td><td>0.00</td></th<>				Industrial	0 0.00	0	0.00	0 0.00			0	0.00	0	0.00
Total 0 23 195 11.4 12.5 6 Total 0 23 196 11.4 12.5 6 Table 4: Expected Building Damage by Building Type Building 11.2 21.30 21.40 41.50 Substantially Type Count (%) Count				Religion	0 0.00	0	0.00	0 0.00	0	0.00	0	0.00	0	
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Table 4: Expected Building Damage by Building Type Building Type 1-10 Count 11-20 (%) 21-30 Count 31-40 (%) 41-50 Count Substantially (%) Concrete 0 0.00				Residential	0 0.00	23	4.39 1	96 37.40	174	33.21	125 2	23.85		
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MeanufHousing 0 0.00 0 0.00 0 0.00 0 0.00 1 100 Masonry 0 0.00 0 0.00 1 25.00 1 25.00 1 25.00 0 0.00 0				Total	0	23 Table 4: Ex 11-20	1 pected Build	96 ing Dama 21-30	174 Ige by Buildi 31-40	ing Type	125 e 41-50		6 6 Substan	1.15
Steel 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0 0.00 0 0 0.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				Total Building Type	0 	23 Table 4: Exp 	1 pected Build (%) Con	96 ing Dama 21-30 int (%)	174 ige by Buildi 31-40 Count	ing Type 0	125 e 41-50 Count	(%)	6 6 Substan Count	1.15 tially (%)
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				Total Building Type Concrete ManufHousing Masorry Siteel	0 	23 Table 4: Ex 11-20 Count 0 0 0 0 0 0	1 pected Build (%) Con 0.00 0.00 0.00	96 ing Dama 21-30 0 0.00 0 0.00 1 25.00 0 0.00	174 174 174 174 174 174 174 174	ing Type 0 (%) 0.00 0.00 50.00 0.00	e 41-50 Count 0 0 1 25 0 0	(%) 0.00 0.00 5.00 0.00	6 6 Substan Count 0 1 0 0	1.15 tially (%) 0.00 100.00 0.00 0.00
us Global Summary Report Category 2, 0-foot SLR Hazus Global Summary Report Category 2, 0-foot SLR	JS Global Summary Report	Category 2, 0-foot SLR		Building Type Concrete Maundroung Masonry Steel Wood	0 	23 Table 4: Ex 0 (0 (0 (0 (23 ()	(%) Cor (%) Cor 0.00 0.00 0.00 0.00 0.00 1.00 1.00 1.0	96 ing Dama 21-30 0 0.00 0 0.00 0 0.00 1 25.00 0 0.00 5 37.57	174 174 174 174 174 174 177 177	ing Type 0 (%) 0.00 0.00 50.00 0.00	e 41-50 Count 0 0 1 25 0 0	(%) 0.00 0.00 5.00 0.00	6 6 Substan Count 0 1 0 0	1.15 tially (%) 0.00 100.00 0.00 0.00

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	amage				Induced Flood Damage
		the region had 0 hospita 0 hospital beds are available		e. On the day of the	Debris Generation
	Table 5: E	Expected Damage to Essen	ntial Facilities		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
			# Facilities		types of material handling equipment required to handle the debris.
		At Least	At Least	Loss of Use	The model estimates that a total of 28,128 tons of debris will be generated. Of the total amount, Finishes
Classification	Total 3	Moderate 0	Substantial	0	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
Fire Stations Hospitals	0	0	0	0	estimated number of truckloads, it will require 1,125 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Police Stations	5	0	0	0	· · · · · · · · · · · · · · · · · · ·
Schools	54	0	0	0	
	s were flooded. This can be it run. This can be tested b	can explain this. e checked by mapping the inventor ny checking the run box on the Ana		sage	Social Impact Shelter Requirements
					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.

nomic Lo	oss						opendix A: County Listing for the Region Massachusetts Bridol	
	onomic loss estin value of the scenar	nated for the flood is io buildings.	104.51 million do	llars, which repres	ents 14.75 % c	of the total	- DISU	
uilding-Re	elated Losses							
ect building ntents. T cause of th	g losses are the "he business inte he damage sustai	n into two categories: estimated costs to re erruption losses are t ined during the flood. uced from their homes be	pair or replace the he losses associa Business interrupt	ne damage caused ated with inability	to the building to operate a	g and its business		
usiness inte	erruption of the re	ses were 104.33 milli egion. The residential as associated with the bu	occupancies made					
		Table 6: Building-Rela (Millio	ited Economic Los	s Estimates				
ategory	Area	Residential	Commercial	Industrial	Others	Total		
uilding Loss	Building Content Inventory Subtotal	48.07 33.29 0.00 81.36	3.30 8.55 0.20 12.05	1.91 4.14 0.83 6.89	1.15 2.63 0.26 4.04	54.44 48.61 1.29 104.33		
usiness Inte	Income Relocation Rental Income	0.00 0.07 0.01	0.04 0.00 0.00	0.00 0.00 0.00	0.01 0.00 0.00	0.04 0.07 0.01		
Ŧ	Wage Subtotal Total	0.00 0.07 81.43	0.04 0.08 12.13	0.00 0.00 6.89	0.02 0.02 4.06	0.05 0.18 104.51		
Hazus G	ilobal Summary F	Report Categ	ory 2, 0-foot SLR				Hazus Global Summary Report Category 2, 0-foot SLR	

		Building V	alue (thousands of dolla	ars)		zus-MH: Flood Event Report
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
lassachusetts					Flood Scenario:	Category 2, 1-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189		
al	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
otal Study Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer:	
						is tracts/blocks included in the user's study region.
					software which is based on current sci	impacts contained in this report were produced using Hazus loss estimation methodology entific and engineering knowledge. There are uncertainties inherent in any loss estimation prificant differences between the modeled results contained in this report and the actual social social social soci
Hazus Global Summary Repo	rt Categor	ry 2, 0-foot SLR			Hazus Global Summary	Report Category 2, 1-foot SLR

Table of Contents		General Description of the Re
Section	Page #	Hazus is a regional multi-hazard Management Agency (FEMA) and Hazus is to provide a methodology
General Description of the Region	3	These loss estimates would be use
Building Inventory	4	to reduce risks from multi-hazards and
General Building Stock		The flood loss estimates provided
Essential Facility Inventory		following state(s):
Flood Scenario Parameters	5	. Massachusetts
Building Damage	6	
General Building Stock		Note:
Essential Facilities Damage		Appendix A contains a complete listing
Induced Flood Damage	8	The geographical size of the region 49 thousand households and has a
Debris Generation		of population by State and County for the
Social Impact	8	There are an estimated 38,601 build
Shelter Requirements		9,268 million dollars (2006 dollars). associated with residential housing.
Economic Loss	9	associated with residential nousing.
Building-Related Losses		
	10	
Appendix A: County Listing for the Region	-	
Appendix B: Regional Population and Building Value	Data 11	
Hazus Global Summary Report Category 2, 1-foot SLR		Hazus Global Summary Report

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Category 2, 1-foot SLR

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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	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.

Hazus Global Summary Report Category 2, 1-foot SLR

Flood Event Summary Report

General Building Stock Damage

Occupancy

Aariculture

Commercial

1-10

0 0.00

11-20

0 0.00

Count (%) Count (%) Count (%)

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41-50 Substantially Count (%) Count (%)

0 0.00

0 0.00

 Hazus Global Summary Report
 Category 2, 1-foot SLR

 Flood Event Summary Report
 Page 5 of 11

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

40mb_1_meters Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

Essential Facility Damage

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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

 Eclassification
 Total
 At Least Moderate
 At Least Substantial
 Loss of Use

 Fire Stations
 3
 0
 0
 0

 Honoitals
 0
 0
 0
 0

 Policio Stations
 5
 0
 0
 0

 Schools
 54
 0
 0
 0

 White sets or Is black how possibilities can explain by the investory data on the depth grid.
 (1) Nore of yor facilities were flooder. This can be checking the run box on the Analysis Meru and seeing if a message box saks you to replace the existing results.

d Event Summary Report		Page 7 of 11
Hazus Global Summary Report	Category 2, 1-foot SLR	
box asks you to replace the existing results.		

0 0 0 0 0	0.00 0.00 0.00 0.00	0 0 21	0.00 0.00 0.00 3.60	0 0 198	0.00	0 0 0	0.00 0.00 0.00	0 0 0	0.00 0.00 0.00	0 0 0	
0	0.00	0 21	0.00	0	0.00	0	0.00	0	0.00		0.0
0		21						-		0	0.0
	0.00		3.60	198	22.06	100					
0					33.90	183	31.39	175	30.02	6	1.0
		21		198		183		175		6	
		Table 4: E	Expected	Building	g Damage	by Build	ding Type				
1-1	10	11-2	20	21-	-30	31-4	10	41-	50	Substan	tially
Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(*
0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.0
0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.
0	0.00	0	0.00	1	20.00	2	40.00	2	40.00	0	0.
0		0		0		0		0		0	0.
0	0.00	21	3.64	197	34.14	181	31.37	173	29.98	5	0.
0	0.00	21	3.64	197	34.14	181	31.37	173	29.98	5	0
	0 0 0 0	0 0.00 0 0.00 0 0.00 0 0.00 0 0.00	Count (%) Count 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0 0 0.00 0	Count (%) Count (%) 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00	Count (%) Count (%) Count 0 0.00 0 0.00 0 0 0.00 0 0.00 0 0 0.00 0 0.00 0 0 0.00 0 0.00 1 0 0.00 0 0.00 1	Count (%) Count (%) Count (%) 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00	Count (%) Count (%) Count (%) Count 0 0.00 0 0.00 0 0.00 0 0 0.00 0 0.00 0 0.00 0 0 0.00 0 0.00 0 0.00 0 0 0.00 0 0.00 1 20.00 2 0 0.00 0 0.00 0 0.00 0	Count (%) Count (%) Count (%) Count (%) 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 1 20.00 2 40.00 0 0.00 0 0.00 0 0.00 0 0.00	Count (%) Count (%) <th< td=""><td>Count (%) Count (%) Count (%) Count (%) Count (%) 0 0.00 0</td><td>Count (%) Count (%) <th< td=""></th<></td></th<>	Count (%) Count (%) Count (%) Count (%) Count (%) 0 0.00 0	Count (%) Count (%) <th< td=""></th<>

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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

0 0.00

31-40

0 0.00

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 tonstruck) to remove the debris generated by the food.

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 heters. 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.

Hazus Global Summary Report

Category 2, 1-foot SLR

Flood Event Summary Report

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.

(Millions of dollars)								
Category	Area	Residential	Commercial	Industrial	Others	Tota		
Building Los	55							
	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 In	terruption							
	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		

Hazus Global Summary Report

Category 2, 1-foot SLR

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Flood Event Summary Report

Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data ssachus Bristol Building Value (thousands of dollars) Population Residential Non-Residential Total Massachusetts Bristol 120,088 6,754,711 2,513,478 9,268,189 9,268,189 120,088 6,754,711 2,513,478 Total Total Study Region 120,088 6,754,711 2,513,478 9,268,189 Hazus Global Summary Report Category 2, 1-foot SLR Hazus Global Summary Report Category 2, 1-foot SLR Flood Event Summary Report Page 10 of 11 Flood Event Summary Report Page 11 of 11

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Ha	zus-MH: Flood Event Report	Table of Contents	
		Section	Page #
Region Name:	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
Flood Scenario:	40mb_2_meters	Building Inventory	4
FIOOU Scenario.	40mb_2_meters	General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
Thin Bute.		Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
	s tracts/blocks included in the user's study region.		
software which is based on current scie	mpacts contained in this report were produced using Hazus loss estimation methodology ntific and engineering knowledge. There are uncertainties inherent in any loss estimation inficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 2, 2-foot SLR	Hazus Global Summary Report Category 2, 2-foot SLR	
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	he Reaion

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 9,286 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.

Category 2, 2-foot SLR Hazus Global Summary Report

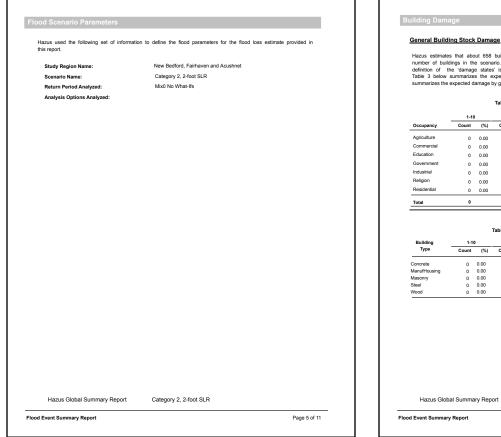
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Category 2, 2-foot SLR

Flood Event Summary Report

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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		11-2	2	21-3	80	31-4	10	41-5	60	Substant	ially
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	1-1	1-10		1-10 11-20		21-	21-30 31-40		41-50		Substantially	
Туре	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

Category 2, 2-foot SLR

Essential Facility Damage

Flood Event Summary Report

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	
Hospitals	0	0	0	
Police Stations	5	0	0	
Schools	54	0	0	
	were flooded. This can b run. This can be tested t	e checked by mapping the inv	entory data on the depth grid. e Analysis Menu and seeing if a mes	sage
Hazus Global Sum	man/ Penort	Category 2, 2-foo	t SI R	

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.

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 shefters. 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.

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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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) Residential Commercial Category Area Industrial Others Total Building Loss Building Content Inventory Subtotal 60.50 41.71 0.00 **102.22** 69.13 61.63 1.81 **132.58** 4.40 10.59 0.26 **15.25** 2.70 6.09 1.25 **10.05** 1.53 3.24 0.30 **5.06** Business Interruption 0.00 0.08 0.01 0.00 **0.09** 0.04 0.00 0.04 0.09 15.34 0.00 0.00 0.00 0.00 0.00 10.05 0.01 0.00 0.02 0.03 5.09 0.05 0.09 0.01 0.06 **0.22** Income Relocation Rental Income Wage Subtotal 102.31 132.79 Total ALL Hazus Global Summary Report Category 2, 2-foot SLR Page 9 of 11 Flood Event Summary Report

Massachusetts - Bristol		
_ Bristol		
Hazus Global Summary Report	Category 2, 2-foot SLR	

		Building	Value (thousands of dolla	are)
	Population	Residential	Non-Residential	Total
chusetts	120,088	6,754,711	2,513,478	9,268,189
•	120,088	6,754,711	2,513,478	9,268,189
udy Region	120,088	6,754,711	2,513,478	9,268,189

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Appendix D: continued

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Hazus Global Summary Report Category 2, 4-foot SLR		Hazus Global Summary Report Category 2, 4-foot SLR	
Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Economic Loss Building-Related Losses	9		
Social Impact Shelter Requirements	8	There are an estimated 38,601 buildings in the region with a total building replacement valu 9,288 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of associated with residential housing.	
Induced Flood Damage Debris Generation	8	The geographical size of the region is 51 square miles and contains 2,267 census blocks. 49 thousand households and has a total population of 120.088 people (2000 Census Bure of population by State and County for the study region is provided in Appendix B.	eau data). The distribution
Building Damage General Building Stock Essential Facilities Damage	6	Note: Appendix A contains a complete listing of the counties contained in the region .	
General Building Stock Essential Facility Inventory Flood Scenario Parameters	5	The flood loss estimates provided in this report were based on a region that included 1 following state(s): . Massachusetts	I county(ies) from the
Section General Description of the Region Building Inventory	Page # 3 4	Hazus is a regional multi-hazard iose setimation model that was developed by the Management Agency (FEMA) and the National institute of Building Sciences (NIBS). The Hazus is to provide a methodology and software application to develop multi-hazard loses These loss estimates would be used primarily by local, state and regional officials to plan to reduce risks from multi-hazards and to prepare for emergency response and recovery.	he primary purpose of as at a regional scale.
Table of Contents		General Description of the Region	

ling Inventory			Flood Scenario Parameters	5	
eneral Building Stock	38,601 buildings in the region which hav	ve an aggregate total replacement	this report.	information to define the flood parameters for the flood loss estimate provided in	ı
268 million (2006 dollars). 7	Table 1 and Table 2 present the relative d Region and Scenario respectively. Appe	distribution of the value with respe	ct to the Study Barley Names	New Bedford, Fairhaven and Acushnet	
e building value by State and C			Scenario Name:	Category 2, 4-foot SLR	
	Table 1		Return Period Analyzed:	MixO	
Buildir	Table 1 ng Exposure by Occupancy Type for the Stu	udy Region	Analysis Options Analyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total			
Residential	6,754,711	72.9%			
Commercial	1,606,696	17.3%			
Industrial	661,541	7.1%			
Agricultural	<u>31,872</u> 115,972	0.3%			
Religion Government	47,795	0.5%			
Education	49,602	0.5%			
Total	9,268,189	100.00%			
IVIAI	3,200,103	100.00 %	1 1		
	Table 2 ilding Exposure by Occupancy Type for the Exposure (\$1000)	Scenario Percent of Total			
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total			
	ilding Exposure by Occupancy Type for the				
Occupancy Residential Commercial Industrial	ilding Exposure by Occupancy Type for the Exposure (\$1000) 1,409,507 513,925 254,935	Percent of Total 63.2% 23.0% 11.4%			
Occupancy Residential Commercial Industrial Agricultural	ilding Exposure by Occupancy Type for the Exposure (\$1000) 1,409,507 513,925 254,935 14,435	Percent of Total 63.2% 23.0% 11.4% 0.6%			
Occupancy Residential Commercial Industrial Agricultural Religion	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.409.507 513.925 254.935 14.435 21.979	Percent of Total 63.2% 23.0% 11.4% 0.6% 1.0%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	liding Exposure by Occupancy Type for the Exposure (\$1000) 1,409,507 513,825 284,935 14,435 21,979 4,241	Percent of Total 63.2% 23.0% 11.4% 0.6% 1.0% 0.2%			
Occupancy Residential Commercial Industrial Agricultural Relicion Education Education	liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 1513,925 264,935 14.435 14.435 21.979 4.241 12.162	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	liding Exposure by Occupancy Type for the Exposure (\$1000) 1,409,507 513,825 284,935 14,435 21,979 4,241	Percent of Total 63.2% 23.0% 11.4% 0.6% 1.0% 0.2%			
Occupancy Residential Commercial Industrial Agricultural Relicion Education Education	liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 1513,925 264,935 14.435 14.435 21.979 4.241 12.162	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5%			
Occupancy Residential Commercial Industrial Addruktral Reliation Government Education Total	liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 1513,925 264,935 14.435 21.979 4.241 12.182 2,231,204	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Relicion Education Education	liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 1513,925 264,935 14.435 21.979 4.241 12.182 2,231,204	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5%			
Occupancy Residential Commercial industrial Adricultural Relicion Education Total Security Inventor essential Facility Inventor essential facilities, there are on	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 513,325 264,935 14,435 21,579 4,241 12,182 2,231,204 ¥ to hospitals in the region with a total bed capa	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%			
Occupancy Residential Commercial industrial Adricultural Relicion Education Total Security Inventor essential Facility Inventor essential facilities, there are on	liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 1513,925 2254,935 244,935 21,979 4,241 12,182 2,231,204 ¥	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%			
Occupancy Residential Commercial industrial Adricultural Relicion Education Total Security Inventor essential Facility Inventor essential facilities, there are on	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 513,325 264,935 14,435 21,579 4,241 12,182 2,231,204 ¥ to hospitals in the region with a total bed capa	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%			
Occupancy Residential Commercial industrial Adricultural Relicion Education Total Security Inventor essential Facility Inventor essential facilities, there are on	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 513,325 264,935 14,435 21,579 4,241 12,182 2,231,204 ¥ to hospitals in the region with a total bed capa	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%			
Occupancy Residential Commercial industrial Adricultural Relicion Education Total Security Inventor essential Facility Inventor essential facilities, there are on	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 513,325 264,935 14,435 21,579 4,241 12,182 2,231,204 ¥ to hospitals in the region with a total bed capa	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%			
Occupancy Residential Commercial Industrial Apricultural Relicion Education Total Seminal Facility Inventor essential Facility Inventor	Liding Exposure by Occupancy Type for the Exposure (\$1000) 1.409,507 213,325 224,935 214,435 21,973 4,241 12,182 2,231,204	Percent of Total 63.2% 23.0% 11.4% 0.6% 0.2% 0.5% 100.00% 100.00%		port Category 2, 4-foot SLR	

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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-1	0	11-2	:0	21-3	80	31-4	10	41-5	50	Substant	ially
Occupancy	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	1-1	10	11-3	20	21-	30	31-	40	41-	50	Substar	ntially
Туре	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

Polic Schools

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

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

None of your facilities were flooder. This can be checked by mapping the inventory data on the depth grid.
 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.

Hazus Global Summary Report	
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Flood Event Summary Report

Category 2, 4-foot SLR

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Hazus Global Summary Report Category 2, 4-foot SLR Flood Event Summary Report Page 6 of 11

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, retear, 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.

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 shefters. 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 shefter in public shefters.

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 638.18 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 accidated with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Los	<u>ss</u>					
	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 In	terruption					
	Income	0.01	0.78	0.01	0.02	0.81
	Relocation	0.15	0.26	0.01	0.01	0.43
			0.19	0.00	0.00	0.30
	Rental Income	0.11				
	Rental Income Wage	0.11 0.02	0.19	0.00	0.13	0.30

Category 2, 4-foot SLR

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Flood Event Summary Report	

Hazus Global Summary Report

Induced Flood Damage

Shelter Requirements

Debris Generation

Category 2, 4-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

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pendix A: County Listing for the Region		Appendix B: Regional Population a	and Building Valu	ie Data		
Massachusetts - Bristol				Building	Value (thousands of dolla	ırs)
			Population	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 Global Summary Report Category 2, 4-foot SLR		Hazus Global Summary Repc	ort Catego	ory 2, 4-foot SLR		
			on Calego	JIY 2, 4-1001 3EK		
Event Summary Report	Page 10 of 11	Flood Event Summary Report				Page 11 of 11

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		Section	Page #
egion Name:	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
lood Scenario:	Category 3, 0-foot SLR	Building Inventory	4
loou ocenano.	Gategory 3, 0-1001 GLIV	General Building Stock	
rint Date:	Thursday, June 05, 2014	Essential Facility Inventory	
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		Essential Facilities Damage	
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		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
isclaimer:			
e estimates of social and economic in ftware which is based on current scie.	t racts/blocks included in the user's study region. mpacts contained in this report were produced using Hazus loss estimation methodology ntific and engineering knowledge. There are uncertainties inherent in any loss estimation		
chnique. Therefore, there may be sigr	ilicant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 3, 0-foot SLR	Hazus Global Summary Report Category 3, 0-foot SLR	
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		Flood Event Summary Report	Page

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Hazus Global Summary Report

Flood Event Summary Report

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.

Category 3, 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 dolars). 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

Build	Building Exposure by Occupancy Type for the Study Region							
Occupancy	Exposure (\$1000)	Percent of Tota						
Residential	6,754,711	72.9						
Commercial	1,606,696	17.3						

Table 1

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

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.

Hazus Global Summary Report

Category 3, 0-foot SLR

21-30

4 22.22

0 0.00

0 0.00

1 12.50

0 0.00

21-30

31-40

0 0.00

2 11.11

0 0.00

0 0.00

1 12.50

0 0.00

386 23.98

389

31-40

0 0.00

0 0.00 23 13.69 3 11.54

362 25.51

Count (%)

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41-50 Substantially Count (%) Count (%)

0 0.00

2 11.11

0 0.00

0 0.00

0 0.00

0 0.00

42 2.61

44

Substantially

39 2.75

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Count (%)

0 0.00 1 100.00 2 1.19 1 3.85

0 0.00

4 22.22

0 0.00

0 0.00

3 37.50

0 0.00

904 56.15

911

41-50

Count (%)

10 100.00

0 0.00 129 76.79 11 42.31 753 53.07

Building Damage General Building Stock Damage Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report. 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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type. Study Region Name: New Bedford, Fairhaven and Acushnet Category 3, 0-foot SLR Scenario Name: Mix0 Return Period Analyzed: Analysis Options Analyzed: No What-Ifs Table 3: Expected Building Damage by Occupancy 1-10 11-20 Count (%) Count (%) Count (%) Count (%) Occupancy Agriculture 0 0.00 0 0.00 0 0.00 Commercial 0 0.00 6 33.33 Education 0 0.00 0 0.00 Government 0 0.00 0 0.00 Industrial 1 12.50 2 25.00 Religion 0 0.00 0 0.00 Residential 0 0.00 24 1.49 254 15.78 1 32 259 Total Table 4: Expected Building Damage by Building Type Building 11-20 1-10 (%) Туре Count (%) Count Count (%) 0 0.00 0 0.00 1 0.60 0 0.00 0 0.00 13 7.74 3 11.54 Concrete 0.00 0 ManufHousing 0.00 Masonry Steel Wood 3.85 26.92 0.00 24 1.69 241 16.98 Category 3, 0-foot SLR Hazus Global Summary Report Category 3, 0-foot SLR Hazus Global Summary Report Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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Before the flood analyzed	mage	the region had 0 hospital	beds available for use	On the day of the	Induced Flood Damage
		0 hospital beds are available		on the day of the	Debris Generation
	Table 5: I	Expected Damage to Essent	ial Facilities		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 siab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required b handle the debris.
		-	# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals Police Stations	3 0 5	0 0 0	0 0 0	0 0 0	estimated number of truckloads, it will require 3,491 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Schools If this report displays all zeros or	54	4	0	4	Social Impact
(1) None of your facilities	were flooded. This can be run. This can be tested b	e checked by mapping the inventory of checking the run box on the Analy		ge	Shelter Requirements
					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.

nomic Lo	oss						pendix A: County Listing for the Rec	lion	
							Massachusetts - Bristol		
	conomic loss estin value of the scenar	nated for the flood is to buildings.	699.46 million dol	llars, which represe	ents 35.20 % d	of the total	- Langer		
	elated Losses								
ntents. T cause of t	g losses are the The business inte he damage sustai	n into two categories: estimated costs to re erruption losses are the ined during the flood. aced from their homes be	pair or replace th he losses associa Business interrupti	e damage caused ated with inability	to the building to operate a	g and its business			
usiness inte	erruption of the re	ses were 697.28 milli egion. The residential of es associated with the bui	occupancies made						
		Table 6: Building-Rela (Millio	ted Economic Los	s Estimates					
ategory	Area	Residential	Commercial	Industrial	Others	Total			
Building Loss	Building	223.56	73.30	22.46	3.79	323.11			
	Content Inventory	145.49	146.38	55.31 8.61	12.77	359.94 14.23			
	Subtotal	369.04	224.81	86.38	17.05	697.28			
Business Inte	Income	0.00	0.71	0.00	0.02	0.73			
	Relocation Rental Income	0.16	0.23	0.01	0.00	0.41			
	Wage Subtotal	0.00	0.65	0.01	0.11 0.13	0.76 2.19			
	Total	369.32	226.57	86.39	17.19	699.46			
Hazus G	Global Summary F	Report Categ	ory 3, 0-foot SLR				Hazus Global Summary Report	Category 3, 0-foot SLR	
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	Building Value (thousands of dollar					Hazus-MH: Flood Event Report			
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet			
assachusetts					Flood Scenario:	Category 3, 1-foot SLR			
ristol	120,088	6,754,711	2,513,478	9,268,189					
otal	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014			
otal Study Region	120,088	6,754,711	2,513,478	9,268,189					
					Disclaimer:	s tractsribocks included in the user's study region.			
					The estimates of social and economic software which is based on current sci	mpats contained in this report were produced using Hazus loss estimation methodology nific and engineering inculedge. There are uncertainties inhered in any loss estimation nificant differences between the modeled results contained in this report and the actual accu			
Hazus Global Summary Repo	rt Categor	y 3, 0-foot SLR			Hazus Global Summary	Report Category 3, 1-foot SLR			

Table of Contents		General Description of the R
Section	Page #	Hazus is a regional multi-hazard Management Agency (FEMA) and
General Description of the Region	3	Hazus is to provide a methodology These loss estimates would be us
Building Inventory	4	to reduce risks from multi-hazards and
General Building Stock		The flood loss estimates provided
Essential Facility Inventory		following state(s):
Flood Scenario Parameters	5	- Massachusetts
Building Damage	6	
General Building Stock		Note:
Essential Facilities Damage		Appendix A contains a complete listing
Induced Flood Damage	8	The geographical size of the region
Debris Generation		49 thousand households and has a of population by State and County for the double of the state and double of the double of double of
Social Impact	8	
	8	There are an estimated 38,601 build 9,268 million dollars (2006 dollars).
Shelter Requirements		associated with residential housing.
Economic Loss	9	
Building-Related Losses		
	10	
Appendix A: County Listing for the Region	10	
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ood Event Summary Report	Page 2 of 11	Flood Event Summary Report

Management Agency (FEMA) and Hazus is to provide a methodology These loss estimates would be use	J loss estimation model that was developed by the Federal Emergency the National Institute of Building Sciences (NIBS). The primary purpose of and software application to develop multi-hazard losses at a regional scale. ed primarily by local, state and regional officials to plan and stimulate efforts d to prepare for emergency response and recovery.
The flood loss estimates provided following state(s):	in this report were based on a region that included 1 county(ies) from the
. Massachusetts	
Note:	
Appendix A contains a complete listing	of the counties contained in the region .
49 thousand households and has a	is 51 square miles and contains 2,267 census blocks. The region contains over a total population of 120,088 people (2000 Census Bureau data). The distribution the study region is provided in Appendix B.
	dings in the region with a total building replacement value (excluding contents) of Approximately 90.49% of the buildings (and 72.88% of the building value) are

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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	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.

Hazus Global Summary Report Category 3, 1-foot SLR

Flood Event Summary Report

Building Damage

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

Category 3, 1-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

General Building Stock Damage

Hazus Global Summary Report

Flood Event Summary Report

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	(%)								
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	1-10		11-20		21-30		31-40		41-50		Substantially	
Туре	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

Category 3, 1-foot SLR

	Facilit	v Dan	

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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

Classification Total Moderate Substantial Loss of Use Fire Stations 3 0			At Least	At Least	Loss of Use
Hossibility 0 0 Police Stations 5 0 0 Schoots 54 4 0 Ins report displays at zeros or is blank, two possibilities can explain this. (1) None of your facilities were flooded. This can be checked by mapping the riverstory data on the desemp of a message (2) The analysis are on fun. This can be checked by mapping the run box on the Analysis Menu and seeing of a message	Classification	Total	Moderate	Substantial	Loss of Use
Schools 5 0 0 Schools 54 4 0	Fire Stations	3	0	0	C
Schools 54 4 D his report displays al zeros or is blank, two possibilities can explain this. (1) None of your facilities were floaded. This can be checked by mapping the inventory data on the depth grid. (2) The analysis was or Ioun. This can be checked by mapping the inventory data on the depth grid. (2) The analysis area or Ioun. (2) The analysis area or Ioun. (2) The analysis area or Ioun. (3) The analysis area or Ioun. <t< td=""><td>Hospitals</td><td>0</td><td>0</td><td>0</td><td>0</td></t<>	Hospitals	0	0	0	0
become his record displays all zeros or is blank, two possibilities can exclain 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	Police Stations	5	0	0	C
 None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid. The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message 	o	54	4	0	4
			een evelein Ibie		

vent Summary Report		Page 7 of 11
Hazus Global Summary Report	Category 3, 1-foot SLR	

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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 168,718 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 tonshruck) to remove the debris generated by the flood.

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 shefters. 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, 1.324 0 people (unit of a total population of 120,088) will seek temporary shefter in public shelters.

Hazus Global Summary Report

Category 3, 1-foot SLR

Flood Event Summary Report

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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

ALL	Total	424.91	289.89	134.63	23.91	873.3
	Subtotal	0.34	2.31	0.04	0.19	2.8
	Wage	0.02	0.91	0.02	0.16	1.1
	Rental Income	0.13	0.22	0.00	0.00	0.3
	Relocation	0.19	0.29	0.02	0.01	0.5
	Income	0.01	0.89	0.01	0.03	0.9
Business	Interruption					
	Subtotal	424.57	287.58	134.59	23.71	870.4
	Inventory	0.00	6.54	14.42	0.58	21.5
	Content	167.76	190.44	86.48	18.10	462.7
	Building	256.81	90.60	33.69	5.03	386.1

Hazus Global Summary Report

Flood Event Summary Report

Category 3, 1-foot SLR

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Others

Total

ix A: County Listing for the Region	Appendix B: Regional Populati	on and Building Valu	e Data		
Bristol			Building	Value (thousands of dolla	rs)
		Population	Residential	Non-Residential	Total
	Massachusetts	1			
	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
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Region Name:		Section	Page #
Region Name.	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 3, 2-foot SLR	Building Inventory	4
		General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	_
		Flood Scenario Parameters	5
		Building Damage General Building Stock	6
		Essential Facilities Damage	
		Induced Flood Damage	8
			0
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
			10
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census t	racts/blocks included in the user's study region.		
The estimates of social and economic im	pacts contained in this report were produced using Hazus loss estimation methodology		
	If in and engineering knowledge. There are uncertainties inherent in any loss estimation ficant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary F	Report Category 3, 2-foot SLR	Hazus Global Summary Report Category 3, 2-foot SLR	
		Flood Event Summary Report	Page 2 of 11

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 dificatis 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.

Hazus Global Summary Report Category 3, 2-foot SLR

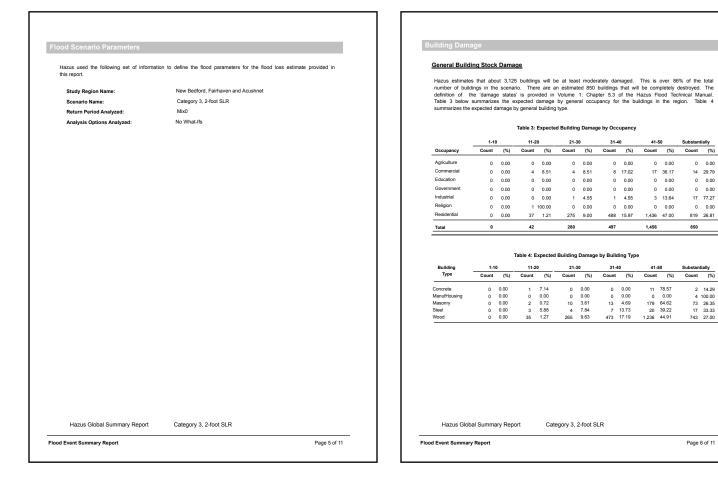
Hazus Global Summary Report

Category 3, 2-foot SLR

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Essential Facility Damage	

Flood Event Summary Report

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
	were flooded. This can b run. This can be tested	e checked by mapping the inve	entory data on the depth grid. Analysis Menu and seeing if a mes	isage

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 11,881 truckloads (@25 tons/truck) to remove the debris generated by the food.

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.

Hazus Global Summary Report

Category 3, 2-foot SLR

Flood Event Summary Report

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Substantially

0 0.00

14 29.79

0 0.00

0 0.00

17 77.27

0 0.00

819 26.81

2 14.29 4 100.00 73 26.35 17 33.33 743 27.00

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850

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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

Hazus Global Summary Report

Flood Event Summary Report

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	Tota
Building Los	s					
	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 In	terruption					
	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

Category 3, 2-foot SLR

Massachuse Hazus Global Summary Report Category 3, 2-foot SLR Page 10 of 11 Flood Event Summary Report

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Appendix A: County Listing for the Region

Appendix D: continued

pod Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 3, 4-foot SLR		Hazus Global Summary Report Category 3, 4-foot SLR	
Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact Shelter Requirements Economic Loss Building-Related Losses	5 6 8 8 9	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 blo 49 thousand households and has a total population of 120,088 people (2000 Census 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 replacemen 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.8 associated with residential housing.	Bureau data). The distribution
Section General Description of the Region Building Inventory General Building Stock	<u>Радо #</u> 3 4	Hazus is a regional multi-hazard loss estimation model that was developed by Management Agency (FEMA) and the National Institut of Building Sciences (NIBS) Hazus is to provide a methodology and software application to develop multi-hazard These loss estimates would be used primarily by local, state and regional officials to to reduce risks from multi-hazards and to prepare for emergency response and recovery. The food loss estimates provided in this report were based on a region that inclu-	The primary purpose of losses at a regional scale. plan and stimulate efforts
Table of Contents		General Description of the Region	

ding Inventory				Flood Scenario Parameters		
eneral Building Stock	e 38,601 buildings in the region which hav	a an accremate total replacement	value of	Hazus used the following set of inform this report.	ation to define the flood parameters for the flood loss	s estimate provided in
,268 million (2006 dollars).	Table 1 and Table 2 present the relative d	istribution of the value with respec	t to the	Study Region Name:	New Bedford, Fairhaven and Acushnet	
ne building value by State and C		nux o provides a general distrib		Scenario Name:	Category 3, 4-foot SLR	
				Return Period Analyzed:	Mix0	
Buildi	Table 1 ing Exposure by Occupancy Type for the Stu	dy Region		Analysis Options Analyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total				
Residential	6,754,711	72.9%				
Commercial	1,606,696	17.3%				
Industrial	<u>661,541</u> 31,872	7.1%				
Agricultural Religion	31,872 115,972	1.3%				
Government	47,795	0.5%				
Education	49,602	0.5%				
Total	9,268,189	100.00%				
	Table 2 illding Exposure by Occupancy Type for the					
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total				
Occupancy Residential	iliding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595	Percent of Total 65.8%				
Occupancy Residential Commercial	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 691,946	Percent of Total 65.8% 19.5%				
Occupancy Residential	iliding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595	Percent of Total 65.8%				
Occupancy Residential Commercial Industrial	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2.339.595 061 1946 435.062 18,205 41,333	Percent of Total 65.8% 19.5% 12.2% 0.5% 1.2%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 601,946 435,062 18,205 41,933 8,244	Percent of Total 65.8% 19.5% 12.2% 0.5% 1.2% 0.2%				
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 061,946 435,062 18,205 41,933 8,244 20,651	Percent of Total 65.8% 19.5% 12.2% 0.5% 1.2% 0.2% 0.8%				
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 601,946 435,062 18,205 41,933 8,244	Percent of Total 65.8% 19.5% 12.2% 0.5% 1.2% 0.2%				
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 691,946 435,092 18,205 41,933 8,244 20,851 3,595,836	Percent of Total 65.8% 19.5% 12.2% 0.5% 1.2% 0.2% 0.8%				
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Ssential Facility Inventor or essential facilities, there are no	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 691,946 435,092 18,205 41,933 8,244 20,851 3,595,836	Percent of Total 65.8% 19.5% 12.2% 0.5% 0.2% 0.6% 100.00% sty of no beds.				
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Ssential Facility Inventor or essential facilities, there are no	Exposure by Occupancy Type for the Exposure (\$1000) 2,339,595 691,946 435,062 18,205 41,933 8,244 20,851 3,555,836	Percent of Total 65.8% 19.5% 12.2% 0.5% 0.2% 0.6% 100.00% sty of no beds.				
Occupancy Residential Commercial Industrial Agricultural Relicion Government Education Total Ssential Facility Inventor or essential facilities, there are no	Access Access<	Percent of Total 65.8% 19.5% 12.2% 0.5% 0.2% 0.6% 100.00% sty of no beds.		Hazus Global Summary Report	Category 3, 4-foot SLR	

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 accupancy 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		21-3	21-30		31-40		60	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	1-1	0	11-20		21-3	21-30		40	41-	50	Substantially		
Туре	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

Schools

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 Hostinita 0 0 0 0 Police Stations 5 1 0 1

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

(c) Non of your faillies were fooded. This can be checked by mapping the inventory data on the depth grid.
 (c) The analysis was not run. This can be tasked by checking the run box on the Analysis Menu and seeing if a message box asks you or regrade the existing result.

Flood Event Summary Report

Category 3, 4-foot SLR

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Hazus Global Summary Report Category 3, 4-foot SLR
Flood Event Summary Report Page 6 of 11
Page

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, retear, 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 food.

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 shefters. The model estimates 9,286 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 shefter in public shefters.

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 Los	s					
	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 In	terruption					
	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

Hazus Global Summary Report	
Flood Event Summary Report	

Category 3, 4-foot SLR

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Hazus Global Summary Report

Category 3, 4-foot SLR

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

Induced Flood Damage

Shelter Requirements

Debris Generation

Г

dix A: County Listing for the Region Massachusetts - Bristol		Appendix B: Regional Population				
				Building	/alue (thousands of dolla	irs)
			Population	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
Summary Report Category 3, 4-foot SLR		Hazus Global Summary Rep	ort Catego	ny 3, 4-foot SLR		
eport	Page 10 of 11		on oalegu	-, -, -, -, -, -, -, -, -, -, -, -, -, -		Page 11 of 1

Haz	us-MH: Flood Event Report		Table of Contents	
Region Name:			Section	Page #
Region Name.	New Bedford, Fairhaven and Acushnet		General Description of the Region	3
Flood Scenario:	Category 4, 0-foot SLR		Building Inventory General Building Stock	4
Print Date:	Thursday, June 05, 2014		Essential Facility Inventory	
Print Date:	Huisbay, sure 03, 2014		Flood Scenario Parameters	5
			Building Damage	6
			General Building Stock	
			Essential Facilities Damage	
			Induced Flood Damage	8
			Debris Generation	
			Social Impact	8
			Shelter Requirements	
			Economic Loss	9
			Building-Related Losses	
				10
			Appendix A: County Listing for the Region	
			Appendix B: Regional Population and Building Value D	ata 11
Disclaimer:				
Totals only reflect data for those census tr	acts/blocks included in the user's study region.			
The estimates of social and economic imp	acts contained in this report were produced using Hazus loss estimation methodology			
software which is based on current scienti	Tic and engineering knowledge. There are uncertainties inherent in any loss estimation			
technique. Therefore, there may be signific	cant differences between the modeled results contained in this report and the actual social			
Hazus Global Summary R	eport Category 4, 0-foot SLR		Hazus Global Summary Report Category 4, 0-foot SLR	
		Fio	od Event Summary Report	Page 2 of 11

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.

Category 4, 0-foot SLR

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.

Occupancy	Exposure (\$1000)	Percent of Total
Residential	6,754,711	72.9%
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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 1

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

Flood Event Summary Report

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, 0-foot SLR

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1,650 41.50

Count (%)

3 21.43 14 100.00 151 43.64 37 55.22

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Flood Event Summary Report

Hazus Global Summary Report

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od Scenario Parameters					Building Dam		Dem										
lazus used the following set of inform his report.	nation to define the flood	parameters for the floor	d loss estimate pro	vided in	General Build												
Study Region Name:	New Bedford, Fa	rhaven and Acushnet			Hazus estimate number of buil	dings in the	e scena	ario. Then	e are a	an estima	ated 1,	,718 buildi	ings tha	t will be	comple	tely des	troyed.
enario Name:	Category 4, 0-foo	t SLR			The definition Table 3 below												
turn Period Analyzed:	Mix0				summarizes the									-		-	
s Options Analyzed:	No What-Ifs										_						
								Table 3: E	xpected								
						1-10		11-20		21-30		31-4		41-50		Substa	
					Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	t (%)
					Agriculture		0.00	0		0	0.00		0.00		0.00		0.00
					Commercial		3.28	3		6	9.84		6.56		8.20		67.21
					Education Government		0.00	0		0	0.00		0.00		0.00		0.00
					Industrial		0.00	0		0	0.00		0.00 3.13		0.00 12.50		0.00
					Religion		0.00	0		0	0.00				0.00		0.00
					Residential		0.00	27		232	5.84		11.19	1,622			41.50
					 											-	
					Total	2		30		238		450		1,631		1,718	1
					Total	2		30 Table 4: Exp	pected E		Damage		ing Type			1,718	1
					Building	1-10		Table 4: Exp 11-20		Building I 21-30	0	e by Build	0	9 41-50		Substa	ntially
					Building Type	1-10 Count	(%)	Table 4: Exp 11-20 Count	(%)	Building I 21-30 Count	0 (%)	e by Build 31-40 Count	0 (%)	e 41-50 Count	(%)	Substa	ntially t (%)
					Building Type Concrete	1-10 Count 0	(%)	Table 4: Exp 11-20 Count	(%) 0.00	Building I 21-30 Count 0	0 (%) 0.00	e by Build 31-44 Count 0	0 (%) 0.00	e 41-50 Count	(%) 78.57	Substa Count	ntially t (%)
					Building Type	1-10 Count 0	(%) 0.00 0.00	Table 4: Exp 11-20 Count	(%) 0.00 0.00	Building I 21-30 Count 0	0 (%) 0.00 0.00	e by Build 31-44 Count 0 0	0 (%)	e 41-50 Count	(%) 78.57 0.00	Substa Count 3 14	ntially t (%) 21.43
					Building Type Concrete ManufHousing	1-10 Count 0 0	(%) 0.00 0.00 0.00 2.99	Table 4: Exp 11-20 Count 0 (0 0 (0)	(%) 0.00 0.00 0.00 4.48	Building I 21-30 Count 0 0	0 (%) 0.00 0.00 3.76 5.97	e by Build 31-44 Count 0 0 8	0 (%) 0.00 0.00 2.31 7.46	e 41-50 Count	(%) 78.57 0.00 50.29 23.88	Substa Count 3 14 151 37	ntially t (%)

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

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		the region had 0 hospita		e. On the day of the	Induced Flood Damage
cenario flood event, the r	nodel estimates that	0 hospital beds are availab	le in the region.		Debris Generation
	Table 5:	Expected Damage to Esse	ntial Facilities		Hazzu estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dyv 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.
			# Facilities		types of material nationing equipment required to natione the debits.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	The model estimates that a total of 486,966 tons of debris will be generated. Of the total amount, Finishes
Fire Stations	3	1	0	1	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
Hospitals	0	0	0	0	generated by the flood.
Police Stations Schools	54	1 10	1	11	
					Social Impact
f this report displays all zeros o (1) None of your facilities		s can explain this. the checked by mapping the invento	rv data on the depth grid		
(2) The analysis was not	t run. This can be tested	by checking the run box on the An		sage	Shelter Requirements
box asks you to replace t	me existing results.				
					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
					inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in
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					inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in
					inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in
Hazus Global Sum	mag Basard	Category 4, 0-foot S	B		inundated area. Of these, 27,019 people (out of a total population of 120,088) will seek temporary shelter in

nomic L	OSS						Appendix A: County Listing for the Region	
							Massachusetts	
		ated for the flood is 2	2,343.16 million do	ollars, which repres	ents 63.71 %	of the total	- Bristol	
replacement	value of the scenar	o buildings.						
Building-R	elated Losses							
		into two categories: estimated costs to re						
ontents.	The business inte	rruption losses are t	he losses associa	ated with inability	to operate a	business		
		ned during the flood. ced from their homes be		ion losses also inc	lude the tempo	orary living		
The total b	uilding-related loss	es were 2,336.77 mi	lion dollars 0%	of the estimated	losses were m	elated to the		
business inte	erruption of the re	gion. The residential	occupancies made					
provides a su	ummary of the losse	s associated with the bu	ilding damage.					
		Table 6: Building-Rela		s Estimates				
		(Milli	ons of dollars)					
Category	Area	Residential	Commercial	Industrial	Others	Total		
Building Loss								
	Building Content	715.73 410.96	267.58 433.13	121.91 262.95	21.26 49.09	1,126.48 1,156.13		
	Inventory Subtotal	0.00	14.14 714.85	38.88 423.74	1.14 71.49	54.16 2,336.77		
Business Inte	erruption							
	Income Relocation	0.03 0.43	1.93 0.52	0.03	0.09	2.07		
	Rental Income Wage	0.31 0.08	0.37	0.00	0.00 0.47	0.69 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		
Hazus G	Global Summary F	teport Categ	ory 4, 0-foot SLR				Hazus Global Summary Report Category 4, 0-foot SLR	
Event Sum	mary Report					Page 9 of 11	Flood Event Summary Report	Page 10 of 11

		Building Val	ue (thousands of dolla	irs)
	Population	Residential	Non-Residential	Total
ssachusetts				
Bristol	120,088	6,754,711	2,513,478	9,268,189
al	120,088	6,754,711	2,513,478	9,268,189

Details Page # General Description of the Region 3 Building Inventory 4 General Building Stock 5 Building Damage 6 General Building Stock 5 Building Damage 6 General Building Stock 6 Building Damage 6 General Building Stock 6 Building Damage 6 General Building Stock 6 Building Stock 6 Building Stock 6 Building Stock 8 Building Related Losses 9 Building-Related Losses 9 Building-Related Losses 9 Building-Related Losses 9 Building-Related Losses 1 Appendix A: County Lating for the Region 10 Appendix B: Regional Population and Building Value Data			
Betting Page 4 General Description of the Region 3 General Description of the Region 3 General Description of the Region 3 General Description of the Region 5 General Description of the Region 6 Description of the Region 6 Better Region Provide In Age Noner Building Penetral Code Description of the Region 6 Building Penetral Code Description of the Region 10 Appendix A: County Listing for the Region 10 Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11 Hazus Global Summary Repot Category 4, 1-foot SLR Hazus Global Summary Repot Category 4, 1-foot SLR	Table of Contents		General Description of the Region
Economic Loss 9 Building-Related Losses 0 Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11	General Description of the Region Building Inventory General Building Stock Essential Facility Inventory Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact	3 4 5 6 8	Massachusetts Note: Appendix A contains a complete listing of the counties contained in the re The geographical size of the region is 51 square miles and contains 40 thousand households and has a total population of 120,088 pe of population by State and County for the study region is provided in App There are an estimated 38,601 buildings in the region with a total 9,268 million dollars (2006 dollars). Approximately 90,49% of the
Appendix A: County Listing for the Region 10 Appendix B: Regional Population and Building Value Data 11		9	
Appendix &: County Listing for the Region Appendix B: Regional Population and Building Value Data 11 Hazus Global Summary Report Category 4, 1-foot SLR Hazus Global Summary Report Category 4, 1-foot SLR Category 4, 1-foot SLR	Building-Related Losses		
Hazus Global Summary Report Category 4, 1-foot SLR Hazus Global Summary Report Category 4, 1-foot S	Appendix A: County Listing for the Region	10	
	Appendix B: Regional Population and Building Value Data	11	
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	Flood Event Summary Report	Page 2 of 11	Flood Event Summary Report

on model that was developed by the Federal Emergency istitute of Building Sciences (NIBS). The primary purpose of application to develop multi-hazard losses at a regional scale. local, state and regional officials to plan and stimulate efforts imergency response and recovery. were based on a region that included 1 county(ies) from the contained in the region. niles and contains 2,267 census blocks. The region contains over n of 120,088 people (2000 Census Bureau data). The distribution is provided in Appendix B . ion with a total building replacement value (excluding contents) of 90.49% of the buildings (and 72.88% of the building value) are

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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	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%

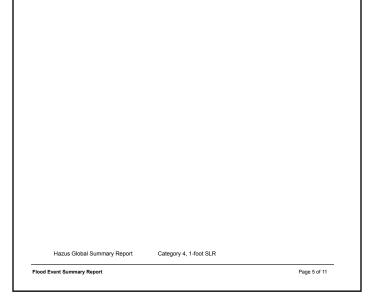
Essential Facility Inventory

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.

Hazus Global Summary Report Category 4, 1-foot SLR

Flood Event Summary Report

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

Category 4, 1-foot SLR Mix0

No What-Ifs

New Bedford, Fairhaven and Acushnet

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		11-2)	21-3	0	31-4	0	41-5	50	Substan	tially
Occupancy	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	1-1	1-10	11-20		21-30		31-40		41-50		Substantially	
Туре	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

Study Region Name:

Return Period Analyzed:

Analysis Options Analyzed:

Scenario Name:

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

Hazus Global Summary Report Category 4, 1-foot SLR		Hazus Global Summary Report Category 4, 1-foot SLR	
Flood Event Summary Report	Page 6 of 11	Flood Event Summary Report	Page 7 of 11

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 food.

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 shefters. 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 shefter in public shefters.

Hazus Global Summary Report

Category 4, 1-foot SLR

Flood Event Summary Report

JORY 4, 1-FOOT SLR

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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

ALL	Total	1,203.54	756.07	436.87	76.75	2,473.2
	Subtotal	0.91	5.01	0.11	0.62	6.6
	Wage	0.08	2.09	0.04	0.49	2.7
	Rental Income	0.33	0.38	0.00	0.00	0.7
	Relocation	0.46	0.54	0.04	0.03	1.0
	Income	0.03	2.00	0.03	0.10	2.1
Business	Interruption					
	Subtotal	1,202.63	751.06	436.76	76.13	2,466.5
	Inventory	0.00	14.55	40.02	1.18	55.7
	Content	434.17	448.85	270.39	51.14	1,204.5
	Building	768.46	287.67	126.35	23.82	1,206.3

Hazus Global Summary Report

Category 4, 1-foot SLR

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Others

Total

lassachusetts Bristol					
				Value (thousands of dolla	
		Population	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
Summary Report Category 4, 1-foot SLR	Hazus Global	Summary Report Catego	ory 4, 1-foot SLR		

Ha	zus-MH: Flood Event Report	Table of Contents	
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riood Scenario.		General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
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		Essential Facilities Damage	
		Induced Flood Damage	8
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		Building-Related Losses	
		Amondia A. Countril letting for the Design	10
		Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
software which is based on current scie	repetit consistent in this moort meet produced using Maxau base astimation methodology ratific and engineering incuntedge. These are uncertainties inherent in any loss estimation affacent differences between the modeled results contained in this report and the exclusi social		
Hazus Global Summary	Report Category 4, 2-foot SLR	Hazus Global Summary Report Category 4, 2-foot SLR	
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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 dificatis 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 9,286 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.

Hazus Global Summary Report Category 4, 2-foot SLR

Flood Event Summary Report

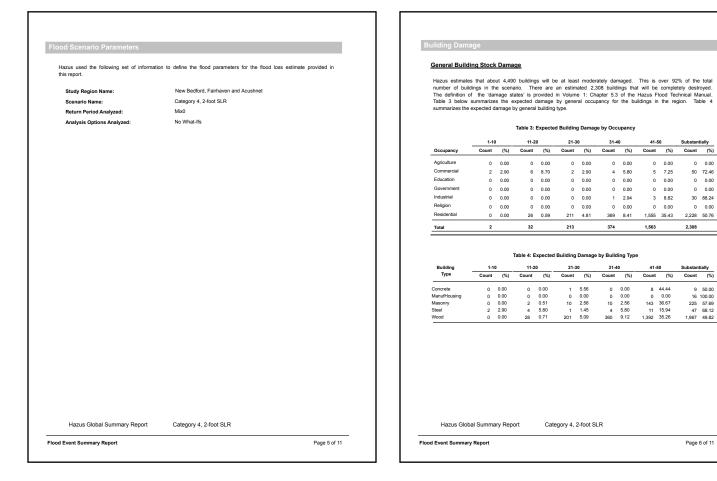
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Essential Facility Damage

Flood Event Summary Report

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
	t run. This can be tested	e drecked by mapping the inv	enory and on its deput plug in the Analysis Nerv and Leening IT's me	sage

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.

41-50

0 0.00

5 7.25

0 0.00

0 0.00

3 8.82

1,563

0 0.00

1,555 35.43 2,228 50.76

Substantially

0 0.00

50 72.46

0 0.00

0 0.00

0 0.00

30 88.24

2,308

9 50.00 16 100.00 225 57.69 47 68.12 1,967 49.82

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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 food.

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 shefters. The model estimates 10.513 nouseholds 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.

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Category 4, 2-foot SLR

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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

Hazus Global Summary Report

Flood Event Summary Report

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	Tota
Building Los	s					
	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 In	terruption					
	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

Category 4, 2-foot SLR

Hazus Global Summary Report	Category 4, 2-foot SLR	

Appendix A: County Listing for the Region

pendix B: Regional Population a	nd Building Valu	e Data		
			ue (thousands of dolla	
	Population	Residential	Non-Residential	Total
Massachusetts Bristol	120,088	6,754,711	2,513,478	9,268,189
tal	120,088	6,754,711	2,513,478	9,268,189
tal Study Region	120,088	6,754,711	2,513,478	9,268,189
Hazus Global Summary Repo	rt Catego	ry 4, 2-foot SLR		
d Event Summary Report				Page 11 of 11
,,				3

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Appendix D: continued

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d Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 4, 4-foot SLR		Hazus Global Summary Report Category 4, 4-foot SLR	
Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data	10 11		
Building-Related Losses			
Economic Loss	9	associated with residential housing.	
Social Impact Shelter Requirements	8	There are an estimated 38,601 buildings in the region with a total building replacemen 9,268 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.	nt value (excluding contents) o 88% of the building value) are
Debris Generation		of population by State and County for the study region is provided in Appendix B.	,
Induced Flood Damage	8	The geographical size of the region is 51 square miles and contains 2,267 census bit 49 thousand households and has a total population of 120,088 people (2000 Census	
Essential Facilities Damage		Appendix A contains a complete listing of the counties contained in the region .	
Building Damage General Building Stock	•	Note:	
Flood Scenario Parameters	5		
General Building Stock Essential Facility Inventory		The flood loss estimates provided in this report were based on a region that inclu following state(s): . Massachusetts	aea 1 county(ies) from the
Building Inventory	4		and a second deal from "
Section General Description of the Region	Page #	Hazus is a regional multi-hazard loss estimation model that was developed I Management Agency (FEMA) and the National Institute of Building Sciences (NIBS Hazus is to provide a methodology and software application to develop multi-hazard These loss estimates would be used primarily by local, state and regional officials I to reduce risks from multi-hazards and to prepare for emergency resonce and recovery.). The primary purpose of losses at a regional scale.

ling Inventory			Flood Scenario Paramete	rs	
eneral Building Stock	e 38,601 buildings in the region which hav	e an annrenate total replacement	this report.	of information to define the flood parameters for the flood loss estimate provided in	in
268 million (2006 dollars).	Table 1 and Table 2 present the relative d Region and Scenario respectively. Appe	listribution of the value with respe	ct to the	New Bedford, Fairhaven and Acushnet	
e building value by State and C			Scenario Name:	Category 4, 4-foot SLR	
	Table 1		Return Period Analyzed:	MixO	
Buildi	Table 1 ng Exposure by Occupancy Type for the Stu	udy Region	Analysis Options Analyzed:	No What-Ifs	
Occupancy	Exposure (\$1000)	Percent of Total			
Residential	6,754,711	72.9%			
Commercial	1,606,696	17.3%			
Industrial	661,541	7.1%			
Agricultural Religion	<u>31.872</u> 115,972	0.3%			
Government	47,795	0.5%			
Education	49.602	0.5%			
Total	9,268,189	100.00%			
10101	-,,				
	Table 2 ilding Exposure by Occupancy Type for the				
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total			
Occupancy Residential	ilding Exposure by Occupancy Type for the				
Occupancy	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 48,458	Percent of Total 67.5% 18.5% 11.5%			
Occupancy Residential Commercial Industrial Agricultural	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2.632.545 720.472 448.458 18.584	Percent of Total 67.5% 18.5% 11.5% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion	liding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,458 18,584 47,788	Percent of Total 67.5% 18.5% 11.5% 0.5% 1.2%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2.832.545 720.472 448.458 18.584 47.788 11.023	Percent of Total 67.5% 18.5% 11.5% 0.5% 1.2% 0.3%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,652,545 720,472 488,458 18,554 47,788 11,023 2,0/72	Percent of Total 67.5% 18.5% 0.5% 1.2% 0.3% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion Government	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2.832.545 720.472 448.458 18.584 47.788 11.023	Percent of Total 67.5% 18.5% 11.5% 0.5% 1.2% 0.3%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,652,545 720,472 488,458 18,554 47,788 11,023 2,0/72	Percent of Total 67.5% 18.5% 0.5% 1.2% 0.3% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	Exposure by Occupancy Type for the Exposure (\$1000) 2,652,545 720,472 488,458 18,554 47,788 11,023 2,0/72	Percent of Total 67.5% 18.5% 0.5% 1.2% 0.3% 0.5%			
Occupancy Residential Commercial Industrial Addicutural Reliation Government Education Total	liding Exposure by Occupancy Type for the Exposure (\$1000) 2.632.545 720.472 448.458 18.554 47.788 11.023 20.972 3.899,842	Percent of Total 67.5% 18.5% 0.5% 1.2% 0.3% 0.5%			
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	liding Exposure by Occupancy Type for the Exposure (\$1000) 2.632.545 720.472 448.458 18.554 47.788 11.023 20.972 3.899,842	Percent of Total 67.5% 18.5% 0.5% 1.2% 0.3% 0.5%			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	Iilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,455 18,584 47,788 11,023 20,072 3,899,842	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	liding Exposure by Occupancy Type for the Exposure (\$1000) 2.632.545 720.472 448.458 418.554 47.788 11.023 20.972 3.899,842 X	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	Iilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,455 18,584 47,788 11,023 20,072 3,899,842	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	Iilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,455 18,584 47,788 11,023 20,072 3,899,842	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	Iilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,455 18,584 47,788 11,023 20,072 3,899,842	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.			
Occupancy Residential Commercial industrial Agricultural Reliation Education Total Security Invention essential Facility Invention resential facilities, there are no	Iilding Exposure by Occupancy Type for the Exposure (\$1000) 2,632,545 720,472 448,458 18,554 18,554 47,788 11,023 0,072 3,899,842	Percent of Total 67.5% 18.5% 1.5% 0.5% 0.5% 0.5% 0.5% 100.00% sty of no beds.		Report Category 4, 4-foot SLR	

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 accupancy 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)	21-3	0	31-4	0	41-5	0	Substar	ntially
Occupancy	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	1-1	0	11-2	0	21-3	80	31-4	0	41-5	0	Substar	tially
Туре	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

Category 4, 4-foot SLR

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, retear, 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 food.

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 shefters. 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 shefter in public shefters.

Essential Facility Damage

Schools

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 Hossinita 0 0 0 0 Police Stations 5 0 1 1

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 tealed by checking the run box on the Analysis Menu and seeing if a message box asks you regrade the existing result.

Hazus Global Summary Report

Flood Event Summary Report

Hazus Global Summary Report

Flood Event Summary Report

Induced Flood Damage

Shelter Requirements

Debris Generation

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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.

Category 4, 4-foot SLR

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 Los	s					
	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 In	terruption					
	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
	Total	1.677.26	958.68	509.16	113.24	3.258.34

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Flood Event Summary Report	

Category 4, 4-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

Category 4, 4-foot SLR

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Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Repo

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Existing Value (Housands of dollars) Messachusetts Residentil Non-Residentil Total Instri 120,088 6,754,711 2,513,478 0,268,198 Total 120,088 6,754,711 2,513,478 0,268,198 Total 120,088 6,754,711 2,513,478 0,268,198	ix A: County Listing for the Region assachusetts	Appendix B: Regional Population	and Building Valu	<u>e Data</u>		
Massachusetts Entol 120.089 6,754,711 2,613,478 0,268,199 Total 120,088 6,754,711 2,613,478 9,268,199 Total Study Region 120,088 6,754,711 2,613,478 9,268,199	husetts stol			Building V	alue (thousands of dolla	rs)
British 120,088 6,754,711 2,513,478 9,288,189 Total 120,088 6,754,711 2,513,478 9,288,189 Total 120,088 6,754,711 2,513,478 9,288,189			Population			
Total 120,088 6,754,711 2,513,478 9,268,169 Total Study Region 120,088 6,754,711 2,513,478 9,268,169						
Total Bludy Region 120,088 6,754,711 2,513,478 9,288,189		. <u> </u>				
		Total Study Region	120,088	6,754,711	2,513,478	9,268,189
Hann Clobal Summer Board Colorent 4 4 for 512						
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Hann Clobal Summer Boood Colorens 4.4 feet 51.2						
Hann Clobal Summer Boood Colorens 4.4 feet 51.2						
Hanna Clobal Summary Barard Colorany 4.4 for 51.2						
Hanne Clobal Summer Bened						
Harus Olehel Summer Papert Category 4.4 feet C.P.						
nazus Giobai Summary Report Gategory 4, 4-1001 SER	4, 4-foot SLR	Hazus Global Summary Rep	ort Catego	ry 4, 4-foot SLR		

Haz	zus-MH: Flood Event Report	Table of Contents	
Region Name:	New Bedford, Fairhaven and Acushnet	Section	Page #
Region Nume.	New Bedford, Fairnaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 4 (Extreme), 0-foot SLR	Building Inventory General Building Stock	4
		Essential Facility Inventory	
Print Date:	Friday, June 06, 2014	Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	
		Appendix A: County Listing for the Region	10
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
The estimates of social and economic in software which is based on current scier	tractablocks included in the user's study region. Inpacts contained in this report were produced using Hazas loss estimation methodology raffic and engineering invaviledge. There are uncertainties inherent in any loss estimation fillical differences between the modeler estudia contained in this report and the actual social		
Hazus Global Summary I	Report Category 4 (Extreme), 0-foot SLR	Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR	
		Flood Event Summary Report	Page 2 of 1

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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

Flood Event Summary Report

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

Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR

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.

Total

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.

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%

Table 1

Table 2 Building Exposure by Occupancy Type for the Scenario

9.268.189

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.

Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR

Flood Event Summary Report

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100.00%

Building Damage Flood Scenario Parameters General Building Stock Damage 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 Category 4 (Extreme), 0-foot SLR Scenario Name: Mix0 Return Period Analyzed: No What-Ifs Analysis Options Analyzed: Building Туре Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR Flood Event Summary Report Page 5 of 11 Flood Event Summary Report

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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 2,782 buildings that will be completely destroyant. 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 accupancy 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		11-2)	21-3	0	31-4	0	41-5	50	Substan	tially
Occupancy	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 Substantially 1-10 11-20 21-30 31-40 41-50 Substant Count (%) Count

0	0.00	0	0.00	0	0.00	0	0.00	4	28.57	10	71.43
0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	100.00
0	0.00	2	0.49	8	1.96	7	1.72	109	26.72	282	69.12
2	2.63	4	5.26	1	1.32	2	2.63	9	11.84	58	76.32
0	0.00	24	0.57	191	4.57	314	7.51	1,286	30.74	2,368	56.61
	0 0 2	0 0.00 0 0.00 2 2.63	0 0.00 0 0 0.00 2 2 2.63 4	0 0.00 0 0.00 0 0.00 2 0.49 2 2.63 4 5.26	0 0.00 0 0.00 0 0 0.00 2 0.49 8 2 2.63 4 5.26 1	0 0.00 0 0.00 0 0.00 0 0.00 2 0.49 8 1.96 2 2.63 4 5.26 1 1.32	0 0.00 0 0.00 0 0.00 0 0 0.00 2 0.49 8 1.96 7 2 2.63 4 5.26 1 1.32 2	0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 2 0.49 8 1.96 7 1.72 2 2.63 4 5.26 1 1.32 2 2.63	0 0.00 0 0.00 0 0.00 0 0.00 0 0 0.00 2 0.49 8 1.96 7 1.72 109 2 2.63 4 5.26 1 1.32 2 2.63 9	0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 0 0.00 2 0.49 8 1.96 7 1.72 109 26.72 2 2.63 4 5.26 1 1.32 2 2.63 9 11.84	0 0.00 0 0.00 0 0.00 19 0 0.00 2 0.49 8 1.96 7 1.72 109 26.72 282 2 2.63 4 5.26 1 1.32 2 2.63 9 11.84 586

	mage				
setore the flood analyzes scenario flood event, the m			tal beds available for use ole in the region.	 On the day of the 	Debris Generation
	Table 5: E	Expected Damage to Ess	ential Facilities		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 handing equipment required to handle the debris.
			# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals	3	1 0	0	1	estimated number of truckloads, it will require 26,348 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Police Stations Schools	5	1 7	0 4	1	
If this report displays all zeros or					Social Impact
	run. This can be tested b	e checked by mapping the invent by checking the run box on the Ar	ory data on the depth grid. nalysis Menu and seeing if a mes	sage	Shelter Requirements
					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 120,083) will seek temporary shelter in public shelters.

nomic L	oss						Appendix A: County Listing for the Region Massachusetts	
	conomic loss estim value of the scenari	ated for the flood is a io buildings.	2,745.25 million do	ollars, which repres	sents 70.21 %	of the total	- Bristol	
Building-R	elated Losses							
direct buildin contents. because of t	ng losses are the The business inte the damage sustain	n into two categories: estimated costs to re irruption losses are t ned during the flood. ced from their homes be	pair or replace th he losses associa Business interrupti	e damage caused ated with inability	to the buildir to operate a	ng and its business		
business int	erruption of the re	es were 2,738.04 mi gion. The residential s associated with the bu	occupancies made					
		Table 6: Building-Rela (Millio	nted Economic Loss	s Estimates				
Category	Area	Residential	Commercial	Industrial	Others	Total		
Building Los	Building Content Inventory	880.48 481.28 0.00	328.50 479.61 15.28	136.15 287.29 42.53	30.19 55.45 1.28	1,375.32 1,303.64 59.08		
Business Int	Subtotal erruption	1,361.77	823.39	465.97	86.92	2,738.04		
	Income Relocation Rental Income Wage	0.04 0.51 0.36 0.09	2.18 0.57 0.41 2.24	0.03 0.04 0.00 0.04	0.11 0.04 0.00 0.55	2.35 1.16 0.77 2.92		
ALL	Subtotal Total	1.00 1,362.77	5.40 828.79	0.12 466.08	0.70 87.61	7.21 2,745.25		
Hazus (Global Summary R	Report Category 4	(Extreme), 0-foot	SLR			Hazus Global Summary Report Category 4 (Extreme), 0-foot SLR	

		Building	alue (thousands of dolla	ars)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
Massachusetts Bristol	120,088	6,754,711	2,513,478	9,268,189	Flood Scenario:	Category 4 (Extreme), 1-foot SLR
Total	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Friday, June 06, 2014
Total Study Region	120,088	6,754,711	2,513,478	9,268,189		
					The estimates of social and e software which is based on ci	e census tractablocks included in the user's study region. commin impact contained in this regort wave produced using Hazuk lose estimation to takefulfic and explanation provided, the area uncertainties in their report as by be significant differences between the modeled results contained in this report as
					Hazus Głobał Su	

Table of Contents		General Description
Section	Page #	Hazus is a regional Management Agency (F
General Description of the Region	3	Hazus is to provide a These loss estimates w
Building Inventory	4	to reduce risks from multi
General Building Stock	-	The flood loss estimate
Essential Facility Inventory		following state(s):
Flood Scenario Parameters	5	- Massachusetts
Building Damage	6	Note:
General Building Stock		Appendix A contains a con
Essential Facilities Damage	.	The geographical size of
Induced Flood Damage	8	49 thousand households
Debris Generation		of population by State and
Social Impact	8	There are an estimated
Shelter Requirements		9,268 million dollars (20 associated with residential
Economic Loss	9	associated with residential
Building-Related Losses		
	10	
Appendix A: County Listing for the Region		
Appendix B: Regional Population and Building Value Data	11	
Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR		Hazus Global Summ
lood Event Summary Report	Page 2 of 11	Flood Event Summary Report

	eral Description of the Region
M H T	azus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency anagement Agency (FEMA) and the National institute of Building Sciences (NIBS). The primary purpose of azus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. tese loss estimates would be used primarily by local, state and regional dificials to plan and stimulate efforts reduce risks from multi-hazards and to prepare for emergency response and recovery.
	ne flood loss estimates provided in this report were based on a region that included 1 county(ies) from the llowing state(s):
	- Massachusetts
	te: pendix A contains a complete listing of the counties contained in the region .
Th 49	e geographical size of the region is 51 square miles and contains 2,267 census blocks. The region contains over thousand households and has a total population of 120,088 people (2000 Census Bureau data). The distribution population by State and County for the study region is provided in Appendix B.
9,2	ere are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 68 million dollars (2006 dollars). Approximately 90.49% of the buildings (and 72.88% of the building value) are sociated with residential housing.

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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	ancy Exposure (\$1000)	
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%

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 destroyant. 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 accupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

21-30

Count (%)

0 0.00

3 3.80

0 0.00

0 0.00

0 0.00 0 0.00

197 4.07

200

Table 4: Expected Building Damage by Building Type

21-30

Count (%)

0 0.00 0 0.00 7 1.65 3 3.45 189 4.34

189

31-40

Count (%)

0 0.00

0 0.00

0 0.00

1 2.13

0 0.00

319 6.60

321

31-40

Count (%)

0 0.00 0 0.00 5 1.18 2 2.30 313 7.19

41-50

0 0.00

6 7.59

0 0.00

0 0.00

7 14.89

0 0.00

1,312 27.13

1,325

41-50

1 7.69 0 0.00

90 21.23 11 12.64

1,211 27.82

Count (%) Count (%)

Substantially

0 0.00

63 79.75

0 0.00

0 0.00

0 0.00

35 74.47

2,986 61.75

3,084

12 92.31 20 100.00 320 75.47 65 74.71 2,616 60.10

Count (%) Count (%)

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), 1-foot SLR

Flood Event Summary Report

General Building Stock Damage

Occupancy

Agriculture

Commercial

Government

Industrial

Religion

Total

Residential

Building

Type

Concrete ManufHousing Masonry Steel Wood

Education

1-10

Count (%)

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0 0.00

0

1-10

0 0 0 0.00

0 0.00

0.00

0.00

11-20

Count (%)

0 0.00

6 7.59

0 0.00

0 0.00

4 8.51

0 0.00

22 0.45

32

11-20

0 0.00

2

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

0.00

6.90 0.55 24

Count (%) Count (%)

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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 Mix0 Return Period Analyzed: No What-Ifs Analysis Options Analyzed: Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR Flood Event Summary Report Page 5 of 11

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 AtLeast At Least Loss of Use Classification Tota Substantia Fire Stations Hospitals Police Stations Schools If this report displays all zeros or is blank, two possibilities can explain this.

Event Summary Report		Page 7 of 11
Hazus Global Summary Report	Category 4 (Extreme), 1-foot SLR	
box asks you to replace the existing results.		

Flood Event Summary Report Page 6 of 11

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 dabris 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 food.

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, \$1.551 people (out of a total population of 120,088) will seek temporary shelter in public shelters.

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

Flood Event Summary Report

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	Tota
Building Lo	<u>ss</u>					
	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 In	Income	0.04	2.22	0.03	0.11	2.40
	Relocation	0.54	0.58	0.03	0.04	1.20
	Rental Income	0.34	0.42	0.04	0.04	0.79
	Wage	0.09	2.28	0.05	0.57	2.99
	Subtotal	1.04	5.50	0.12	0.72	7.38
	Total	1,419,55	852.30	480.25	91.81	2.843.91

Hazus Global Summary Report Category 4 (Extreme), 1-foot SLR

Flood Event Summary Report

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ppendix A: County Listing for the Region		Appendix B: Regional Populati	on and Building Valu	ie Data		
- Bristol				Building	Value (thousands of dolla	ırs)
			Population	Residential	Non-Residential	Total
		Massachusetts	1			
		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 Global Summary Report Category 4 (Extreme), 1-foot SLR		Hazus Global Summary I	Report Category 4	(Extreme), 1-foot Sl	R	
bod Event Summary Report	Page 10 of 11	Flood Event Summary Report				Page 11 of 11

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Haz	us-MH: Flood Event Report	Table of Contents	
Region Name:		Section	Page #
Region Name:	New Bedford, Fairhaven and Acushnet	General Description of the Region	3
Flood Scenario:	Category 4 (Extreme), 2-foot SLR	Building Inventory General Building Stock	4
		Essential Facility Inventory	
Print Date:	Friday, June 06, 2014	Flood Scenario Parameters	5
		Building Damage	6
		General Building Stock	
		Essential Facilities Damage	
		Induced Flood Damage	8
		Debris Generation	
		Social Impact	8
		Social impact Shelter Requirements	
		Economic Loss	9
		Building-Related Losses	9
		Dunungreekted Losses	
			10
		Appendix A: County Listing for the Region	
		Appendix B: Regional Population and Building Value Data	11
Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
The estimates of social and economic in	npacts contained in this report were produced using Hazus loss estimation methodology		
software which is based on current scier	filic and engineering knowledge. There are uncertainties inherent in any loss estimation ificant differences between the modeled results contained in this report and the actual social		
technique. Therefore, there may be sign	incant direrences between the modeled results contained in this report and the actual social		
Hazus Global Summary I	Report Category 4 (Extreme), 2-foot SLR	Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR	
		Flood Event Summary Report	Page 2 of 11

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 efficials 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 .

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

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 9,286 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	incy Exposure (\$1000)	
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 Event Summary Report

Flood Event Summary Report

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udy Region Name: :enario Name: :turn Period Analyzed: nalysis Options Analyzed:	New Bedford, Fairhaven and Acushnet Category 4 (Extreme), 2-foot SLR Mix0		Hazus estimate number of buil The definition of Table 3 below	dings in the	scena	rio. Ther	e are a	an estim	ated 3,3		ngs tha			
enario Name: eturn Period Analyzed:	Mix0				iade sta		ovided i							
eturn Period Analyzed:	Mix0			summarizes			amage							
			summarizes the											
	No What-Ifs					Table 3: E	xpected	1 Building	Damag	je by Occu	nancy			
				1-10		11-20		21-3		31-40		41-50	Su	bstantially
			Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count (_	count (%)
			Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0 0.0	00	2 100.00
		I	Commercial	0	0.00	6	7.50	2	2.50	1	1.25	4 5.0	00	67 83.75
		I I	Education	0	0.00	0	0.00	0	0.00	0	0.00	0 0.0	00	0 0.00
		I I	Government	0	0.00	0	0.00	0	0.00	0	0.00	0 0.0	00	0 0.00
		I I	Industrial	0	0.00	4	9.09	0	0.00	1	2.27	5 11.3	36	34 77.27
		I I	Religion	0	0.00	0	0.00	0	0.00	0	0.00	0 0.0	00	0 0.00
		I	Residential	0	0.00	24	0.48	193	3.89	311	6.27	1,213 24.4	47 3	3,216 64.88
			Total	0		34		195		313		1,222	3	3,319
		1 1	Building Type	1-10		11-20 Count		21-3 Count	(%)	31-40 Count		41-50		bstantially count (%)
		1 1		Count	(%)	Count	(%)	Count		Count	(%)	Count (
			Concrete	0		0 0			0.00	0		1 6.6		14 93.3
		I I	ManufHousing Masonry	0		2 0			0.00		0.00 1.38	0 0.0		19 100.00 350 80.65
			Steel	0	0.00	6	7.06	2	2.35	2	2.35	8 9.4		67 78.8
		I I	Wood	0	0.00	26	0.58	186	4.17	304	6.82	1,131 25.3	6 2	2,813 63.07

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 Count
 (%)
 Count
 (%)

 0
 0.00
 2
 100.00

 4
 5.00
 67
 83.75

 0
 0.00
 0
 0.00

 0
 0.00
 0
 0.00

 5
 11.36
 34
 77.27

 0
 0.00
 0
 0.00

 1.113
 24.47
 3.216
 64.88

14 93.33 19 100.00 350 80.65 67 78.82 2,813 63.07

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sential Facility Da	amage				Induced Flood Damage
			tal beds available for use	. On the day of the	
cenario flood event, the r	model estimates that	0 hospital beds are availa	ble in the region.		Debris Generation
	Table 5: E	Expected Damage to Ess	ential Facilities		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 stab), concrete block, rebar, etc.). This distinction is made because of the different
			# Facilities		types of material handling equipment required to handle the debris.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations	3	1	Ō	1	estimated number of truckloads, it will require 29,069 truckloads (@25 tons/truck) to remove the debris
Hospitals	0	0	0	0	generated by the flood.
Police Stations	5	5	6	1	
Schools	54	5	6	11	
this report displays all zeros o	r is blank, two possibilities	can explain this.			Social Impact
		e checked by mapping the invent			
(2) The analysis was not box asks you to replace t		by checking the run box on the A	nalysis Menu and seeing if a mess	age	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 11.1365 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.
Hazus Global Sum	mary Report Ca	ategory 4 (Extreme), 2-	foot SLR		Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR
Event Summary Report	t			Page 7 of 11	Flood Event Summary Report Page 8 of 11

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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 Los	s					
	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 In	terruption					
	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

Massachusetts	
- Bristol	

Hazus Global Summary Report Category 4 (Extreme), 2-foot SLR

Flood Event Summary Report

		B. 11.11.				azus-MH: Flood Event Report
	Population		ue (thousands of dolla Non-Residential	rs) Total	Region Name:	New Bedford, Fairhaven and Acushnet
Massachusetts					-	
Bristol	120,088	6,754,711	2,513,478	9,268,189	Flood Scenario:	Category 4 (Extreme), 4-foot SLR
Total	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Friday, June 06, 2014
Total Study Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer:	
					The estimates of social and econor software which is based on current	nsus Practablocks included in the user's study region. In: Impacts contained in this report were produced using Hasus loss estimation methodolog accentific and engineering incontedge. There are uncertainties inherent in any loss estimation significant differences between the modeled results contained in this report and the actual

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Appendix A: County Listing for the Region Appendix B: Regional Population and Building Value Data 1	Social Impact Shelter Requirements Economic Loss Building-Related Losses	9	There are an estimated 38,601 buildings in the region with a total building replacement value (excluding contents) of 9,268 million datasr (2006 dotars). Approximately 90.49% of the buildings (and 72.88% of the building value) are associated with residential housing.
	Appendix A: County Listing for the Region		
	Appendix B: Regional Population and Building Value Data	11	
Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR			

			Flood Scenario Parameters	
eneral Building Stock	e 38,601 buildings in the region which hav	an accrement total replacement t	Hazus used the following set of info this report.	prmation to define the flood parameters for the flood loss estimate provided in
268 million (2006 dollars).	Table 1 and Table 2 present the relative d (Region and Scenario respectively. Appe	listribution of the value with respec	Study Region Name:	New Bedford, Fairhaven and Acushnet
e building value by State and C		endix o provides a general distrio	Scenario Name:	Category 4 (Extreme), 4-foot SLR
			Return Period Analyzed:	Mix0
Buildi	Table 1 ing Exposure by Occupancy Type for the Stu	udy Region	Analysis Options Analyzed:	No What-Ifs
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 ilding Exposure by Occupancy Type for the Exposure (\$1000)			
Occupancy	ilding Exposure by Occupancy Type for the Exposure (\$1000)	Percent of Total		
Occupancy Residential	iliding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618	Percent of Total 67.3%		
Occupancy Residential Commercial	illding Exposure by Occupancy Type for the Exposure (\$1000) 2.780.618 788.213	Percent of Total 67.3% 19.1%		
Occupancy Residential Commercial Industrial	illding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 451,676	Percent of Total 67.3% 19.1% 10.9%		
Occupancy Residential Commercial Industrial Agricultural	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,780.618 788.213 451.676 19,295	Percent of Total 67.3% 19.1%		
Occupancy Residential Commercial Industrial	illding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 451,676	Percent of Total 67.3% 19.1% 10.9% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Religion	ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 451,676 19,295 53,283	Percent of Total 67.3% 19.1% 10.9% 0.5% 1.3%		
Occupancy Residential Commercial Industrial Agricultural Religion Government	Ilding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 451,676 19,295 53,283 11,821	Percent of Total 67.3% 19.1% 10.9% 0.5% 1.3% 0.3%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 481,676 19,226 53,283 11,821 27,202	Percent of Total 67.3% 19.1% 10.9% 0.5% 1.3% 0.3% 0.3%		
Occupancy Residential Commercial Industrial Agricultural Religion Government Education	lilding Exposure by Occupancy Type for the Exposure (\$1000) 2,780,618 788,213 481,676 19,226 53,283 11,821 27,202	Percent of Total 67.3% 19.1% 10.9% 0.5% 1.3% 0.3% 0.3%		
Occupancy Residential Commercial Industrial Addicutaria Relicion Government Education Total	Exposure by Occupancy Type for the Exposure (\$1000) 2.760.018 768.213 451.676 19.225 53.283 11821 27,202 4,132,108	Percent of Total 67.3% 19.1% 10.9% 0.5% 1.3% 0.3% 0.3%		
Occupancy Residential Commercial Jodustial Adjocutural Reliation Education Total Sesential Facility Invention ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2,780.618 788.213 451.076 19,295 53.283 11.821 27.702 4,132,108	Percent of Total 67.3% 19.1% 0.0% 0.3% 0.3% 0.7% 100.0%		
Occupancy Residential Commercial Jodustial Adjocutural Reliation Education Total Sesential Facility Invention ressential facilities, there are re	lilding Exposure by Occupancy Type for the Exposure (\$1000) 2.760.018 768.213 451.676 19.225 53.283 11.821 27.202 4.132.108	Percent of Total 67.3% 19.1% 0.0% 0.3% 0.3% 0.7% 100.0%		
Occupancy Residential Commercial Jodustial Adjocutural Reliation Education Total Sesential Facility Invention ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2,780.618 788.213 451.076 19,295 53.283 11.821 27.702 4,132,108	Percent of Total 67.3% 19.1% 0.0% 0.3% 0.3% 0.7% 100.0%		
Occupancy Residential Commercial Jodustial Adjocutural Reliation Education Total Sesential Facility Invention ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2,780.618 788.213 451.076 19,295 53.283 11.821 27.702 4,132,108	Percent of Total 67.3% 19.1% 0.0% 0.3% 0.3% 0.7% 100.0%		
Occupancy Residential Commercial Jodustial Adjocutural Reliation Education Total Sesential Facility Invention ressential facilities, there are re	Exposure by Occupancy Type for the Exposure (\$1000) 2,780.618 788.213 451.076 19,295 53.283 11.821 27.702 4,132,108	Percent of Total 67.3% 19.1% 0.0% 0.3% 0.3% 0.7% 100.0%		

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 accupancy 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		11-2	0	21-3	0	31-4	0	41-5	60	Substar	ntially
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	1-10		11-20		21-3	21-30		31-40		41-50		ntially
Туре	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

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

Clas

Schools

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.

None of your facilities were flooder. This can be checked by mapping the inventory data on the depth grid.
 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.

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

Flood Event Summary Report

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, retear, 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 ions 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.

Shelter Requirements

Flood Event Summary Report

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 shefters. 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 iosses 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 accidated with the building damage.

Table 6: Building-Related Economic Loss Estimates (Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Los	<u>ss</u>					
	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 In	terruption					
	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
	-	1.15	5.86	0.14	0.86	8.01
	Subtotal					

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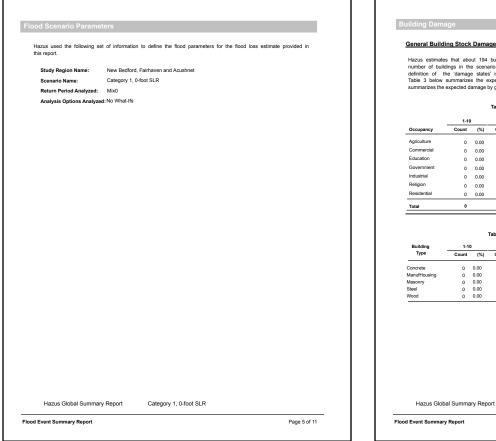
Hazus Global Summary Report Category 4 (Extreme), 4-foot SLR

Flood Event Summary Report

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- Bristol			Building	Value (thousands of dolla	
		Population	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
				R	



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 accupancy 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		11-2	0	21-3	30	31-4	D	41-5	0	Substant	ially
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	1-1	0	11-3	20	21	-30	31-4	0	41-5	0	Substant	ially
Туре	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

Category 1, 0-foot SLR

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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. 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 shefters. 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 shefter in public shefters.

Category 1, 0-foot SLR

Essential Facility Damage

Flood Event Summary Report

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

		At Least	At Least	Loss of Use
Classification	Total	Moderate	Substantial	
Fire Stations	3	0	0	
Hospitals	0	0	0	
Police Stations	5	0	0	
Schools	54	0	0	
	vere flooded. This can b un. This can be tested t	e checked by mapping the inve	vrtory dolla on the depth grid Analysis Menu and seeing if a mess	uge

Cimate Change Vulnerability Assessment And Adaption Planning Study for Water Quality Infrastructure in New Bedford, Fairhaven, and Acushnet Technical Report

Hazus Global Summary Report

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Flood Event Summary Report

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) Residential Commercial Category Area Industrial Others Total Building Loss Building Content Inventory Subtotal 15.61 10.50 0.00 **26.11** 0.97 3.22 0.06 **4.25** 17.54 16.15 0.42 34.11 0.57 1.23 0.22 **2.03** 0.40 1.20 0.13 **1.73** Business Interruption 0.00 0.02 0.00 0.00 0.02 26.13 0.02 0.00 0.02 0.04 4.29 0.00 0.00 0.00 0.00 0.00 2.03 0.02 0.02 0.00 0.03 0.07 34.18 0.00 0.00 0.01 0.01 0.01 1.74 Income Relocation Rental Income Wage Subtotal Total ALL Hazus Global Summary Report Category 1, 0-foot SLR

Massachusetts _ Bristol		
Hazus Global Summary Report	Category 1, 0-foot SLR	

		Building	Value (thousands of dolla	irs)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
assachusetts					Flood Scenario:	Category 1, 0-foot SLR
Bristol	120,088	6,754,711	2,513,478	9,268,189		
tal	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
tal Study Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer:	
						tracts/blocks included in the user's study region.
					The estimates of social and economic in software which is based on current scie.	neutrational and an internation of the set o
Hazus Global Summary Re	port Categor	y 1, 0-foot SLR			Hazus Global Summary	Report Category 1, 0-foot SLR

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Appendix D: continued

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pod Event Summary Report	Page 2 of 11	Flood Event Summary Report	Page 3 of 11
Hazus Global Summary Report Category 1, 0-foot SLR		Hazus Global Summary Report Category 1, 0-foot SLR	
Appendix B: Regional Population and Building Value Data	11		
Appendix A: County Listing for the Region	10		
Flood Scenario Parameters Building Damage General Building Stock Essential Facilities Damage Induced Flood Damage Debris Generation Social Impact Shelter Requirements Economic Loss Building-Related Losses	5 6 8 8 9	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 2,287 census block 49 thousand households and has a total population of 120,086 people (2000 Census E of population by State and County for the study region is provided in Appendix B. There are an estimated 38,801 buildings in the region with a total building replacement 9,266 million doins (2006 doins). Approximately 90.49% of the buildings (and 72.88° associated with residential housing.	Bureau data). The distribution
Section General Description of the Region Building Inventory General Building Stock Essential Facility Inventory	Page #3	Management Agency (FEMA) and the National Institute of Building Sciences (NBS). Hazus is to provide a nethodology and software application to develop multi-hazard lo These loss estimates would be used primarily by local, state and regional officials to 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 include following state(s): Masachusetts	The primary purpose of osses at a regional scale. plan and stimulate efforts
Table of Contents		General Description of the Region Hazus is a regional multi-hazard loss estimation model that was developed by	the Federal Emergency

286 million (2006 dollars). Table 1 an neral occupancies by Study Region a building value by State and County. Building Exposu Occupancy Residential Commercial Industrial Agricultural Religion Government Education	d Table 2 present the relative di	endix B provides a general distribution	Hazus used the following set of infor this report. Study Region Name: Scenario Name: Return Period Analyzed: Analysis Options Analyzed:	rmation to define the flood parameters for the flood loss estimate provided in New Bedford, Fairhaven and Acushnet Category 1, 0-foot SLR Mu0 No What-Ifs
268 million (2006 dollars). Table 1 an eneral occupancies by Study Region a be building value by State and County. Building Exposu Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total	d Table 2 present the relative di nd Scenario respectively. Appe Table 1 re by Occupancy Type for the Stur <u>Exposure (\$1000)</u> <u>6,754,711</u> <u>1,606,696</u> <u>661,541</u> <u>31,872</u> <u>415,972</u> <u>47,795</u> <u>49,602</u>	Percent of Total 72.9% 77.1% 0.3% 1.3% 0.5%	Scenario Name: Return Period Analyzed:	Category 1, 0-foot SLR Mix0
Building value by State and County. Building Exposu Occupancy Residentia Commercial Industrial Agricultural Reliaton Government Education Total	Table 1 re by Occupancy Type for the Stur 6,754,711 1,606,606 661,541 31,872 415,972 47,785 49,602	tdy Region Percent of Total 72.9% 17.3% 0.3% 1.3% 0.5%	Return Period Analyzed:	Mix0
Occupancy Residential Commercial Industrial Agricultural Religion Government Education Total	re by Occupancy Type for the Stur Exposure (\$1000) 6,754,711 1,006,696 661,541 31,872 115,972 47,795 49,602	Percent of Total 72.9% 17.3% 7.1% 0.3% 1.3% 0.5%		
Occupancy Residential Commercial Industrial Agricultural Reliation Government Education Total	re by Occupancy Type for the Stur Exposure (\$1000) 6,754,711 1,006,696 661,541 31,872 115,972 47,795 49,602	Percent of Total 72.9% 17.3% 7.1% 0.3% 1.3% 0.5%	Analysis Options Analyzed:	No What-Ifs
Residential Commercial Industrial Agricultural Religion Government Education Total	6,754,711 1,806,696 661,541 31,872 115,972 47,795 49,602	72.9% 17.3% 7.1% 0.3% 1.3% 0.5% 0.5%		
Commercial Industrial Adricultural Religion Government Education Total	1,606,696 661,541 31,872 115,972 47,795 49,602	17.3% 7.1% 0.3% 1.3% 0.5% 0.5%		
Industrial Agricultural Bellaton Government Education Total	661,541 31,872 115,972 47,795 49,602	7.1% 0.3% 1.3% 0.5% 0.5%		
Agricultural Religion Government Education Total	31.872 115.972 47.795 49,602	0.3% 1.3% 0.5% 0.5%		
Religion Government Education Total	115,972 47,795 49,602	1.3% 0.5% 0.5%		
Government Education Total	47,795 49,602	0.5% 0.5%		
Education Total	49,602	0.5%		
Total				
	9,268,189	100.00%		
Occupancy	Exposure (\$1000) 396.672	Percent of Total 70.9%		
Residential Commercial	396,672 89,927	70.9%		
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				
or essential facilities, there are no hospitals tere are 54 schools, 3 fire stations, 5 police				
Hazus Global Summary Report	Category 1, 0-foot SLR		Hazus Global Summary Report	t Category 1, 0-foot SLR

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 accupancy 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		11-2	0	21-3	80	31-4	D	41-5	D	Substant	ially
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	1-1	0	11-3	20	21-	-30	31-4	0	41-5	0	Substant	ially
Туре	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

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	
At Least	At Least	

Classification	Total	Moderate	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 no. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asis you to regise the existing results.

Hazus Global Summary Report

Flood Event Summary Report

Hazus Global Summary Report Category 1, 0-foot SLR

Induced Flood Damage

Debris Generation

Shelter Requirements

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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, retear, 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.

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 shefters. 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 shefter in public shefters.

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.

Category 1, 0-foot SLR

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	Tota
Building Los	is.					
	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 Int	terruption					
	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

ŀ	lazus Global Summary Report
Flood Eve	nt Summary Report

Category 1, 0-foot SLR

Flood Event Summary Report

Hazus Global Summary Report

Category 1, 0-foot SLR

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Matters . Building Water (Housands of dollar). Pactor Restore it Using Region 2.512.71 2.512.71 2.512.71 1.51 1.52.81 <th>pendix A: County Listing for the Region</th> <th>Appendix B: Regional Population a</th> <th>nd Building Valu</th> <th>ue Data</th> <th></th> <th></th>	pendix A: County Listing for the Region	Appendix B: Regional Population a	nd Building Valu	ue Data		
Population Readeration Readeration Readeration Branch 100.008 0.705/171 2.051.047 0.2085.109 Branch 100.008 0.705/171 2.051.047 0.2085.109 Total Branch 100.008 0.4764.711 2.051.047 0.2085.109 Total Branch 100.008 0.4764.711 2.051.047 0.2085.109				Building	Value (thousands of doila	urs)
Bread 120.08 0.76.711 2.51.078 0.200,100 Total 120.08 0.756.711 2.51.078 0.200,100 Total 120.08 0.756.711 2.51.078 0.200,100 Total Shory Region 120.08 0.756.711 2.51.078 0.200,100			Population			
Total Story Region 120,088 4,784,711 2,513,478 9,284,189			120,088	6,754,711	2,513,478	9,268,189
		Total	120,088	6,754,711	2,513,478	9,268,189
zus Global Summary Report Category 1, 0-foot SLR			120,088	6,754,711	2,513,478	9,268,189
	Hazus Global Summary Report Category 1, 0-foot SLR	Hazus Global Summary Repo	rt Catego	bry 1, 0-foot SLR		
	Gategory 1, 0-1001 SER		n calego	77 1, 0-1001 OLK		

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		Section	Page #
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	Category 1, 1-foot SLR	Building Inventory	4
Flood Scenario:	category 1, 1 loc of 1	General Building Stock	
Print Date:	Thursday, June 05, 2014	Essential Facility Inventory	
Finit Date.	,	Flood Scenario Parameters	5
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Disclaimer:			
Totals only reflect data for those census	tracts/blocks included in the user's study region.		
software which is based on current scient	rpacts contained in this report were produced using Hazui loss estimation methodology rific and engineering knowledge. There are uncertainties inheren in any loss estimation rificant differences between the modeled results contained in this report and the actual social		
Hazus Global Summary	Report Category 1, 1-foot SLR	Hazus Global Summary Report Category 1, 1-foot SLR	

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General Description of the Region

Hazus Global Summary Report

Flood Event Summary Report

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.

Category 1, 1-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.

Build	ing Exposure by Occupancy Type for the Stu	idy Region
Occupancy	Exposure (\$1000)	Percent of Total
Residential	6,754,711	72.9%
Commercial	1,606,696	17.3%
Industrial	661,541	7.1%

Table 1

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

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.

Hazus Global Summary Report

Flood Event Summary Report

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ood Scenario Parameters				Building Dama	age				
Hazus used the following set of informa this report.	ation to define the flood parameters for the flood lo:	as estimate provided in		General Build					
Study Region Name: Scenario Name: Return Period Analyzed: Analysis Options Analyzed:	New Bedford, Fairhaven and Acushnet Category 1, 1-foot SLR Mix0 No What-Ifs			Hazus estimate number of build definition of ti Table 3 below summarizes the	dings in th he 'damag summarize	ne scena ge state es the e	ario. The s' is pro- expected	ere are rided in damage I building	an e Volu by
				Occupancy	Count	0 (%)	11-2 Count	(%)	Co
				Agriculture	0	0.00	0	0.00	
				Commercial	0	0.00	0	0.00	
				Education	0	0.00	0	0.00	
				Government	0	0.00	0	0.00	
				Industrial	0	0.00	0	0.00	
				Religion	0	0.00	0	0.00	
				Residential	0	0.00	47	19.03	
			1 1	Total	0		47		
							Table 4: E	xpected	Buil
				Building	1-1	0	11-2	0	
									l Buil
				Building Type Concrete	1-1 Count 0	0 (%) 0.00	11-2 Count 0	0 (%)	
				Building Type Concrete ManufHousing	1-1 Count 0 0	0 (%) 0.00 0.00	11-2 Count 0 0	0 (%) 0.00 0.00	
				Building Type Concrete ManufHousing Masonry Steel	0 0 0 0 0	0 (%) 0.00 0.00 0.00 0.00	11-2 Count 0 0 0 0	0 (%) 0.00 0.00 0.00 0.00	
				Building Type Concrete ManufHousing Masony	0 0 0 0	0 (%) 0.00 0.00 0.00	11-2 Count 0 0 0 0	0 (%) 0.00 0.00 0.00	
				Building Type Concrete ManufHousing Masonry Steel	0 0 0 0 0	0 (%) 0.00 0.00 0.00 0.00	11-2 Count 0 0 0 0	0 (%) 0.00 0.00 0.00 0.00	
Hazus Global Summary Report	Category 1, 1-foot SLR			Building Type Concrete ManufHousing Masonry Steel	1-1 Count 0 0 0 0	0 (%) 0.00 0.00 0.00 0.00	11-2 Count 0 0 0 0 47	0 (%) 0.00 0.00 0.00 19.11	

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least moderately damaged. This is over 45% of the total estimated 2 buildings that will be completely destroyed. The tume 1: Chapter 5.3 of the Hazus Flood Technical Manual, general occupancy for the buildings in the region. Table 4

Category 1, 1-foot SLR

uilding Damage by Occupancy

	1-10		11-20		21-30 3		31-4	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		

lding Damage by Building Type 21-30 ount (%) 31-40 41-50 Substantially Count (%) Count (%) Count (%) 0 0.00 0 0.00 0 0.00 0 0.00 28 11.38 0 0.00 0 0.00 1 100.00 0 0.00 0.00 0.00 0.00 0.00 11.38 0.00 0.00 0.00 0.00 0.81 0 0 0 0 0 0 0.00 0 28 0

ry 1, 1-foot SLR

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lefore the flood analyzed cenario flood event, the m			ital beds available for use able in the region.	. On the day of the	Induced Flood Damage Debris Generation
		Expected Damage to Es	-		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
			# Facilities		types of material handling equipment required to handle the debris.
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use	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
Fire Stations Hospitals Police Stations	3 0 5	0 0 0	0 0 0	0 0 0	estimated number of truckloads, it will require 362 truckloads (@25 tons/truck) to remove the debris generated by the flood.
Schools f this report displays all zeros or	54 is blank, two possibilities	0 can explain this.	0	0	Social Impact
	run. This can be tested b	checked by mapping the inver y checking the run box on the A	ntory data on the depth grid. Analysis Menu and seeing if a messa	age	Shelter Requirements
					require accommodations in temporary public shetters. The model estimates 521 households will be displaced due to the flood. Displacement includes households exocutand from within over y near to the inundated area. Of these, 977 people (out of a total population of 120,088) will seek temporary shetter in public shetters.

nomic L	.055						Appendix A: County Listing for the Region	
							Massachusetts	
		ated for the flood is	s 44.47 million do	llars, which repres	sents 7.55 % o	f the total	_ Bristol	
	t value of the scenario	buildings.						
Building-R	elated Losses							
direct buildin contents.	ng losses are the e The business intern the damage sustaine	into two categories: estimated costs to re ruption losses are f ad during the flood. ed from their homes be	epair or replace the the losses associa Business interrupt	ne damage caused ated with inability	to the building to operate a	and its business		
business int	terruption of the regi	es were 44.38 milli ion. The residential associated with the bu	occupancies made					
		T-1-1- 0. D-11-1 D-1						
		Table 6: Building-Rela (Milli	ions of dollars)	s Estimates				
Category	Area	Residential	Commercial	Industrial	Others	Total		
Building Loss	<u>s</u>							
	Building Content	20.34 13.86	1.28 4.06	0.76	0.50 1.44	22.88 20.97		
	Inventory Subtotal	0.00 34.20	0.08 5.42	0.30	0.16 2.10	0.53 44.38		
Business Inte	erruption							
	Income Relocation	0.00	0.02	0.00	0.00	0.03		
	Rental Income Wage	0.00	0.00	0.00	0.00	0.00 0.03		
	Subtotal	0.03 34.23	0.05 5.47	0.00	0.01	0.09 44.47		
ALL	Total	34.23	5.47	2.67	2.10	44.47		
							Hazus Global Summary Report Category 1, 1-foot SLR	
Hazus C	Global Summary Re	eport Categ	gory 1, 1-foot SLR					

		Building Va	lue (thousands of dolla	ars)		
	Population	Residential	Non-Residential	Total	Region Name:	New Bedford, Fairhaven and Acushnet
assachusetts					Flood Scenario:	Category 1, 2-foot SLR
ristol	120,088	6,754,711	2,513,478	9,268,189		
tal	120,088	6,754,711	2,513,478	9,268,189	Print Date:	Thursday, June 05, 2014
al Study Region	120,088	6,754,711	2,513,478	9,268,189		
					Disclaimer: Totals only reflect data for those consus	Pactablocki included in the user's study region.
					software which is based on current scier	ripads contained in this report were produced using feasus loss estimation methodology title and engineering houseldge. There are uncertainties internet may loss estimation ilicant differences between the modeled results contained in this report and the actual so
Hazus Global Summary Repo	rt Categor	ry 1, 1-foot SLR			Hazus Global Summary	Report Category 1, 2-foot SLR

d Event Summary Report		Page 2 of 11	Flood Event Summary Report
Hazus Global Summa	y Report Category 1, 2-foot SLR		Hazus Global Summary Report Catego
Арр	endix B: Regional Population and Building Value Data	11	
Арр	endix A: County Listing for the Region	10	
	Building-Related Losses		
Eco	Shelter Requirements	9	9,268 million dollars (2006 dollars). Approximately 9 associated with residential housing.
Soc	al Impact	8	There are an estimated 38,601 buildings in the region
inde	Debris Generation	°	49 thousand households and has a total population of population by State and County for the study region is p
	Essential Facilities Damage	8	The geographical size of the region is 51 square mile
	General Building Stock		Note: Appendix A contains a complete listing of the counties cor
	d Scenario Parameters ding Damage	5	
	Essential Facility Inventory		- Massachusetts
	General Building Stock		The flood loss estimates provided in this report we following state(s):
	ding Inventory	4	to reduce risks from multi-hazards and to prepare for em
Sec	ion eral Description of the Region	Page #	Hazus is a regional multi-hazard loss estimation Management Agency (FEMA) and the National inst Hazus is to provide a methodology and software ay These loss estimates would be used primarily by to
			General Description of the Region

model that was developed by the Federal Emergency ute of Building Sciences (NIBS). The primary purpose of plication to develop multi-hazard losses at a regional scale. cal, state and regional officialis to plan and stimulate efforts ergency response and recovery. e based on a region that included 1 county(ies) from the tained in the region.

s and contains 2,267 census blocks. The region contains over of 120,088 people (2000 Census Bureau data). The distribution rovided in Appendix B.

with a total building replacement value (excluding contents) of 0.49% of the buildings (and 72.88% of the building value) are

ry 1, 2-foot SLR

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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 500year flood. Furthermore, FEMA guidance provides an additional benchmark for quantifying risk to critical facilities. such as water ouality 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 negineering 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 slu

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 C50 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 at the sublity 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 B). This study modeled flooding from hurricane events, however, in the long term, if there is more than 1 – 2 feet of SR, 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 sever infastructure 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 sever 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,
- Io confirm elevations of possible points of entry for water (e.g. vents, door sil windows)
 The vulnerability of critical infrastructure within each pump station
- The vulnerability of critical infrastructure within
 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 rerforit 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 about 3.3' above ground. Air intake or exhaust is about 3 above ground. Below grade electrical vault will be vulnerate to flooding. Equipped with SCADA and telemetry so can bu 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' abo ground at entry door landing. Several buried concrete vaul are adjacent or nearby the structure. Contents of those vau are not known but likely points of entry into pump station. T vaults may be inlet works, wet wells or electrical vaults.Site not equipped with a generator and pigtail connection is at do sill elevation. Some electrical service enters building from ground. Facility will be equipped with SCADA and telemetry 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 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 floabboards 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 abo 0.8' above ground. Window sills are about 4.7' above ground. Sever concrete vaults with hatches or accessways exist below grade that like 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 electric service is below inundation levels. A transformer adjacent to the site a generator is on right at grade.
Peckham Road	0	0		
Sassaquin Avenue	0	0		
Pequot Street	0	0		

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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 doo 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			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 a about 2.8' above grade. Vent is about 4.25' above grade. No generate
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 fo 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 ar 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 500year 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 avaid the 0.2% (500-year) floodplain or pratect 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 500year 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 re 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 500year 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) ware 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 SL, and South SL 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 wate 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	
reatment Plants				
Arsene Street	0	0	None	
West Island	0	0	None	

** 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.