NANTUCKET RESILIENCE TOOLKIT

Including Resilience Glossary

THECRAIGGROUP

Your partners in preservation, planning and policy

2021

RESILIENT NANTUCKET

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RESILIENT NANTUCKET

Introduction to the Resilience Toolkit

Nantucket Islanders have long looked to the ocean to determine their future. From fishing village to international whaling port to beloved seaside escape, the waters that surround Nantucket have served as inspiration. A National Historic Landmark with more than 800 pre-Civil War era historic structures, Nantucket is one of the countless coastal communities whose citizens now rethink their relationship with the sea. Through the assistance of a Municipal Vulnerability Program (MVP) grant, the Town of Nantucket (Town) has led the way in planning and preparing for climate change to increase the resilience of its built environment, protect its historic character and sustain its natural resources. In doing so the Town is working with several local and state partners focused on increasing public awareness as to both the risks associated with climate impacts as well as the opportunities resilience planning affords for the protection and enhancement of the island's heritage assets.

In 2019, the Town completed the Natural Hazard Mitigation Plan which set forth goals and actions for the Town to take to increase its resilience. As a part of Strategy Number F8 in the Natural Hazard Mitigation Plan, the Town was awarded an Action Grant from the MVP to create resilient design guidelines as a supplement to the well-established, model design guidance "Building with Nantucket in Mind." In addition, the MVP grant supported the compilation of a resilience "toolkit." This toolkit is intended to provide information on flood risk, flood preparedness, flood insurance, flood recovery, and flood adaptation alternatives useful for historic properties, cultural sites, and the island's larger *cultural landscape*. As well, this toolkit recognizes the importance of personal preparedness and offers resources to support the preparation of emergency plans for families, homes, and businesses. The toolkit should serve as an island-wide resource for real estate and insurance professionals, conservationists, property owners, and land-holding organizations. The Craig Group, Thomason & Associates, and Preservation Institute Nantucket are working together and in partnership with the Nantucket Preservation Trust and ACKlimate Nantucket to further public awareness regarding the climate change challenges ahead and offer private and public resources that can ensure that the goals, objectives, and actions of the Town's Hazard Mitigation Plan are addressed.

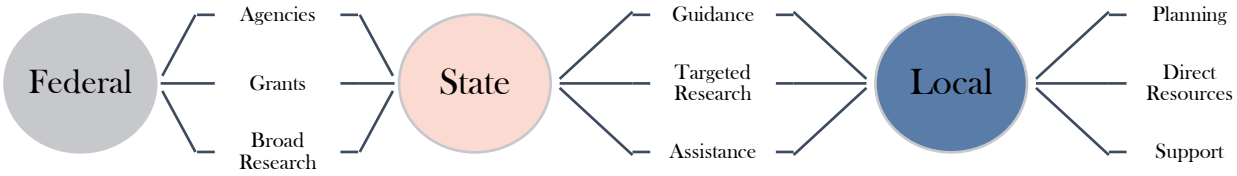
The Resilience toolkit provides a repository of documents, articles, and visualizations for Nantucket's "whole community." FEMA identifies preparedness as a shared responsibility that calls for the involvement of the community and its government in preparedness. Community is defined as individuals and families, businesses, faith-based and civic organizations, nonprofits, schools, the media, and local, state, and federal governments. Whole community preparedness means:

- Involving people in the development of preparedness documents.
- Ensuring their roles and responsibilities are reflected in the content of the materials.

Organization

The graphic below reflects the role of government partners in preparedness planning and references the resources available based on their respective roles in the planning and implementation process. At the **Federal** level, agency resources include technical guidance, broad research, and funding opportunities. At times, federal resources are channeled into state-level preparedness activities, which in turn funnel into local action plans. An example is the Nantucket Natural Hazard Mitigation Plan which

received both funding and approval from FEMA through the Massachusetts Emergency Management Agency. Thus, the **Commonwealth of Massachusetts** resources are more directed, with research, technical assistance, and guidance specific to what is allowed under state laws and regulations. The **Local Level** section details documents that most readily impact people and property, and where this toolkit looks to expand as supported by the development of resource-specific plans and implementation strategies. This includes updates to the Nantucket Hazard Mitigation Plan, the Coastal Resilience Plan (now under development), the Climate Action Plan (now under development), and any plan to come that is climate-centric and resource based.



Property Owner Resources offers guidance for commercial, real estate, and residential property interests. Finally, the **Plan-to-Plan** category focuses on individual preparedness efforts, including resources and research on creating family emergency plans, business continuity planning, historic property adaptation and user-friendly modeling and visualization resources for determining inundation risk. Combined with the toolkit is a Flood Insurance Q&A and a Resilience Glossary as appendices. The glossary defines and familiarizes readers with standard terminology used in climate change, resilience planning and historic preservation. Terms found in the **Resilience Glossary** are highlighted by *italics* throughout the toolkit. Additionally, this document contains links to other important planning documents, appropriately underscored and highlighted in blue throughout the toolkit.

Use of Resilience Toolkit

The toolkit can be read in its entirety, including exploring the live links found throughout the document, giving the reader the broadest context for climate change and resilience planning, preparedness, and recovery. That stated, residential property owners may be interested only in design guidance for adapting their properties and can easily skip to that section. It is important for the reader to understand that preparedness planning must begin with their own personal and family emergency plan. Reviewing and resourcing as many elements of the toolkit as possible is recommended, but to access a specific topic of interest, such as business continuity planning, the reader can click on the Table of Contents link to jump to that component of the toolkit.

General Information

While this document was researched and developed during 2020 and 2021, technology and information are constantly changing, hence inks to resources may also change or a referenced document may be replaced with a more relevant one. Thus, the reader should not solely rely on this document for all information on climate impacts, planning and adaptation, but should use the Toolkit as a springboard for further research. As understandings and projects on climate change develop, the relevancy of the resources in the Toolkit will vary. This applies to Appendix B as well, which shows images from the modeling and visualization resources listed. These documents were current to their most recent date of release (January

2021), but as research continues these images may require updating. Vocabulary around the topics of climate change and sustainability will also evolve, therefore the Resilience Glossary may be periodically updated. This document is meant to support research, resources, and policy, not supersede, or take the place of those efforts.

Conclusion

However the reader uses this toolkit, it is important to understand that through increased public awareness and action can *whole community* resilience be achieved. The Town of Nantucket, working with its partners and residents will develop Island wide adaptation and mitigation strategies to minimize risk in response to climate impacts of sea level rise and erosion. The individual actions of Nantucket householders, property and business owners and community organizations will ensure a sustainable, scalable, and comprehensive resilience effort. We hope this toolkit and its future updates will provide the whole community what is needed to attain that goal of a more ***Resilient Nantucket***.

Federal

As previously stated, state and local governments follow and expand upon the guidance provided by Federal agencies actively engaged in climate change mitigation and *adaptation*, *resilience* planning and disaster preparedness and recovery. A multitude of Federal agencies have collaborated on the U.S. Climate Resilience Toolkit, a collection of climate-related research and resources in one accessible location. Below are relevant agency resources for Nantucket's resilience planning effort.

Advisory Council on Historic Preservation

The Advisory Council on Historic Preservation (ACHP) is an independent federal agency that promotes the *preservation*, enhancement, and productive use of our nation's historic resources and advises the President and Congress on national historic preservation policy. Because the ACHP gives higher priority to the protection of National Historic Landmarks, it is particularly critical that Nantucket consider climate change *adaptation* and *mitigation* actions within the context of this Federal designation.

The ACHP promotes sustainable and resilient communities where historic properties are used as assets for promoting energy efficiency and

An Introduction to Section 106

Section 106 of the National Historic Preservation Act requires federal agencies to consider the impact of their actions on historic properties and provides the ACHP an opportunity to comment on projects before implementation. Consulting parties are critical to this process and in the case of proposed adaptation or mitigation actions that might be deemed a federal *undertaking* (i.e., licensing, permitting, funding) with *adverse effects,* the Town of Nantucket, the Nantucket Preservation Trust, and the Massachusetts Historical Commission would be involved along with the federal agency in a dialogue on how best to avoid, minimize or mitigate that effect through the development of a *Memorandum of Agreement.* This process is outlined in more detail on the ACHP website as well as on the Massachusetts Historical Commission webpage.

Sustainability & Climate Resilience

The ACHP is working to help ensure that the federal government addresses historic properties as it creates and implements *sustainability* and climate *resilience* policies and programs. Under "Related Resources" you will find a collection of links to information on the importance of historic properties to the national conversation on sustainability and climate resilience.

Environmental Protection Agency

Founded December 7, 1970, the Environmental Protection Agency (EPA) grew out of concern for human-caused environmental impacts. The most notable concerns came from Rachel Carson, author of "Silent Spring," *who* in 1962 documented the adverse environmental effects of pesticides. This at nearly the same time as the rash of river fires occurring throughout the nation, but most notably the Cuyahoga River in Ohio, due to chemical and waste dumping. It was after the 1969 Cuyahoga River that congressional action created the EPA. The core mission of the EPA is to protect human health and the environment.

Climate Change Adaptation Resource Center (ARC-X)

ARC-X is an interactive resource to help local governments effectively deliver services to their communities even as the climate changes. Decision-makers can create an integrated package of information tailored specifically to their needs. Once readers select areas of interest, they will find information about the risks posed by climate change to their issues of concern; relevant adaptation strategies; case studies illustrating how other communities have successfully adapted and tools to replicate their successes; and EPA funding opportunities.

Climate Change Resources

EPA research improves knowledge of the impacts of climate change on human health and the environment. The scientific information and tools can be used by communities to manage the impacts of a changing world effectively and sustainably. This site is organized into four categories: 1) Research Areas for Climate Change; 2) Popular Research Topics; 3) Available and Awarded Funding; and 4) Publications, Tools and Resources.

Climate Change: Resilience and Adaptation in New England (RAINE)

The Resilience and Adaptation in New England (RAINE) database is a collection of *vulnerability*, resilience, and adaptation reports, plans and webpages at the state, regional and community level. This includes the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Environmental Justice

The EPA provides resources for funding, planning, and partnerships when addressing the challenges and complexities of environmental justice. The Office of Environmental Justice also publishes an annual environmental justice report which documents EPA research and activities incorporating the principles of environmental justice.

Nantucket Data Profile

Nantucket received a coastal community resilience grant to implement flood and erosion-control measures at three vulnerable and high-use public sites prioritized by the town's Coastal Management Plan (CMP) and to identify and map low-lying areas that act as pathways for storm tides to inundate inland areas. This resource includes a collection of Nantucket documents that FEMA has gathered, including the University of Florida's visualization report and impacts.

Climate Ready Estuaries

The Climate Ready Estuaries program works with the National Estuary Programs and the coastal management community to assess climate change vulnerabilities, develop and implement adaptation strategies, and engage and educate stakeholders.

Figure 1: Lily Pond Park. Credit: Kimberly Rose, 2021

Federal Emergency Management Agency

The Federal Emergency Management Agency's (FEMA) mission is to help people before, during and after disasters. Headquartered in Washington, D.C., FEMA has 10 regional offices located across the country; Nantucket is in Region 1 which includes the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

FEMA provides a wealth of information regarding disaster preparedness and recovery with a strong emphasis on enhancing resilience through planning. Technical guidance for state and local planning, disaster readiness, property mitigation and flood insurance are available, as is information on funding programs targeted to state and local governments. The following are just a few of the resource publications of value to Nantucket. (Note that some of the technical resources have not been updated on the website to reflect the current FEMA funding programs.)

Building Alliances for Equitable Resilience (2021)

One of the newest resources from FEMA takes a deep dive into the difference between equality and equity, and also approaches some questions that will help communities, governments, and project managers understand why climate justice is important. It also includes considerations on how to advance and ensure equitable approaches and communication.

Building Resilient Infrastructure and Communities (BRIC) Grant Program (2020)

This single-page pamphlet briefly describes the new BRIC grant program, that helps fund the *mitigation* and adaptation of the built environment.

Community Rating System

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the *National Flood Insurance Program (NFIP)*. Over 1,500 communities participate in CRS nationwide. In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts to address the three goals of the program: 1) reduce and avoid flood damage to insurable property; 2) Strengthen and support the insurance aspects of the National Flood Insurance Program, and 3) Foster comprehensive floodplain management.

Flood Insurance Manual (2020)

Updated this past year, this publication is essential for every property owner on the Island as it details why flood insurance is an essential financial tool. As FEMA states, "where it rains, it floods." Thus, this resource provides the details on how to plan, write, endorse, renew, and cancel a flood insurance policy and the implications of not having protection under the National Flood Insurance Program (NFIP).

Floodplain Management Bulletin: Historic Structures (2008)

While not directly accessible through the FEMA website, this FEMA document addresses how historic structures are considered under the National Flood Insurance Program, including definitions, regulatory requirements and treatment strategies for new construction, non-contributing structures, substantial improvements to contributing structures, and minimizing impacts on historic buildings.

Hazard Mitigation Assistance Guidance and Addendum (2015)

All the requirements, stipulations, and considerations for pre-, post-, and disaster mitigation funding programs are combined into one place for easy access. The addendum looks at mitigation actions including property acquisition, demolition, relocation, *reconstruction*, and *elevation* along with open space, wildfire mitigation, and safe rooms, and guidance on funding.

Hazard Mitigation Grant Program for Individuals

This resource outlines the process an individual property owner can take to apply through their local government for a mitigation grant after a disaster. The Massachusetts Hazard Mitigation Office can provide specific details on how this process might work for property owners applying through the Town of Nantucket.

Mapping Flood Risks: An Overview to Floodplain Management and Flood Insurance (2009)

This pamphlet briefly explains how a flood map is created and updated, factors included in the process, and how a change is requested. It also provides essential information on the National Flood Insurance Program, eligibility, and enrollment.

Figure 2: Resilience Cycle as provided by FEMA.

National Park Service

The National Park Service (NPS) preserves unimpaired the natural and *cultural resource*s and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The National Park Service is a bureau of the U.S. Department of the Interior and is led by a Director nominated by the President and confirmed by the U.S. Senate. All State Historic Preservation Offices and local historic preservation programs are administered through this Federal agency.

Coastal Adaptation Strategies Handbook (2016)

Although this document was developed specifically for National Park Service properties, it provides useful guidance on planning and adaptation strategies consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties as applied in coastal and estuarine *areas*. It addresses policy, planning, natural resources, cultural resources, facility management, communication and education, costs and impacts of protecting infrastructure, and general lessons learned in considering resilience for historic resources.

Coastal Hazards & Climate Change Asset Vulnerability Assessment Protocol: Project Description & Methodology (2016)

This protocol establishes a standard methodology and set of best practices for conducting *vulnerability assessments* in the built environment. Standardizing the methodologies and data utilized in these assessments allows managers to compare coastal park assets' vulnerability across local, regional, and national levels.

New Bedford Whaling National Historical Park Roger Williams National Memorial Coastal Hazards & Sea-Level Rise Asset Vulnerability Assessment (April 2019)

This document was created following the protocol above. New Bedford analyzed twenty-two buildings and five transportation assets and found that "Approximately three-quarters of assets (70%) at [New Bedford Whaling National Historic Park Roger Williams National Memorial] have low vulnerability to coastal hazards and sea-level rise, while 11% of assets have minimal vulnerability (i.e., not located in any exposure zone) to the coastal hazards in this study."

Cultural Resources Impact Table (2020)

This table illustrates various climate change challenges such as rising temperatures, higher humidity, storms, and sea level rise on archeological resources, *ethnographic resources*, and buildings & structures.

Guidelines on Flood Adaptation for Rehabilitating Historic Buildings (2019)

The goal of the "Guidelines on Flood Adaptation for Rehabilitating Historic Buildings" is to provide information on adapting historic buildings to be more resilient to flooding in a manner that will preserve their historic character and meet The Secretary of the Interior's Standards for Rehabilitation. The National Park Service has developed these guidelines in accordance with its directive to provide information concerning professional methods and techniques to ensure the *preservation* and *rehabilitation* of historic properties significant to our nation's heritage.

Secretary of the Interior's Standards for Rehabilitation (2017)

The Secretary of the Interior is the guiding body for federal historic preservation and establishes the Treatment Standards for preservation, rehabilitation, *restoration*, and reconstruction. Resilience projects fall under the *Rehabilitation* standard. This document details those ten guiding standards upon which all historic preservation review bodies rely, providing additional details and technical assistance.

Secretary of the Interior's Standards for the Treatment of Historic Properties (2017)

This document is the fundamental technical assistance guide for treatments applied to historic resources under the four standards of Preservation: Preservation, Rehabilitation, Restoration, and Reconstruction. It discusses the guiding principles and provides recommended and not recommended treatment approaches for different building elements and their environmental settings including repair, replacement, and new construction.

Figure 3: January 2, 1987 flooding on South Beach Street looking at the Nantucket Yacht Club from the Whaling Museum. Credit: Courtesy of Nantucket Historical Association

National Center for Preservation Technology and Training

Founded in 1944, the National Center for Preservation Technology and Training (NCPTT) helps preservationists find better tools, materials, and approaches to conserving buildings, landscapes, sites, and collections. It conducts research and training around the United States. NCPTT pushes the current preservation practice envelope by exploring advances in science and technology in other fields and applying them to cultural resource management.

Climate Change and Cultural Landscapes (2013)

This resource highlights the method for preserving *cultural landscapes*. There are four areas discussed: science, mitigation, adaptation, and communication and their relevance to the treatment of climate impacted cultural landscapes.

Condition Assessment Tools for Aid in Disaster Response and Recovery (2011)

NCPTT partnered with Heritage Preservation (HP) and the American Institute for Conservation of Historic and Artistic Works (AIC) on the release of the 2011 updated Building and Site Condition Assessment forms and database for use in documenting the devastating effects of natural disasters on historic properties.

Figure 4: Brant Point Lighthouse. Credit: Kimberly Rose, 2020

Commonwealth of Massachusetts

Coordinated Statewide Emergency Preparedness

COSTEP MA
Coordinated Statewide Emergency Preparedness

COSTEP's mission is to build and foster a statewide emergency planning process that serves the cultural and emergency management, and addresses disaster preparedness and response.

Addressing Climate Change

COSTEP compiled a list of resources in Massachusetts focused on climate change for the Commonwealth. The resources listed include cultural resources and preservation practices applicable to any field.

Massachusetts Department of Transportation

Moving Massachusetts Forward massDOT

The Massachusetts Department of Transportation (MassDOT) supports the mission to provide transportation infrastructure, which is safe, reliable, robust, and resilient, in order to strengthen the state's economy and improve the quality of life for all.

Compost Blankets for Erosion Control and Vegetation Establishment

This research examines how and whether blanket applications of 1–3 inches of compost over soil can stabilize the slope and whether applications can aid in the establishment of native grasses and forbs, particularly for sloping roadside conditions.

Statewide Climate Change Adaptation Plan Objectives

This study provides a better understanding of which MassDOT assets are at risk due to future inland flooding. The potential impact of extreme heat on transportation assets and operations is also investigated qualitatively. The project delivers prototype methodology for estimating inland flooding risks and vulnerability, downscaled climate projections for emission scenarios, future floodplain maps for selected scenarios, risk analysis, extreme heat impact analysis, and priorities for the state.

Massachusetts Historical Commission

The Massachusetts Historical Commission (MHC) is the State Historic Preservation Office. This office oversees preservation in Massachusetts through surveying, evaluating, and nominating significant historic buildings, sites, structures, districts, and objects to the National Register of Historic Places (including National Historic Landmarks) and the State Register of Historic Places. MHC also has a historic preservation plan that outlines priorities for all historical commissions and districts within the state. Included in this plan are efforts to address climate change and disaster planning and response.

Massachusetts Cultural Resource Information System

The Massachusetts Cultural Resource Information System (MACRIS) allows the user to search the Massachusetts Historical Commission database for information on historic properties and areas in the Commonwealth.

Massachusetts Historic Rehabilitation Tax Credit

Provided in this link is information describing the Commonwealths tax credit program along with examples of completed projects. Under the program, a certified rehabilitation project on an income-producing property is eligible to receive up to 20% in tax credits of certified rehabilitation expenditures. There is an annual cap, so selection criteria ensure the funds are distributed to the projects that provide the most public benefit.[1]

Massachusetts Preservation Projects Fund

The Massachusetts Preservation Projects Fund (MPPF) is a state-funded 50% reimbursable matching grant program established in 1984 to support the preservation of properties, landscapes, and sites (cultural resources) listed in the State Register of Historic Places. Applicants must be a municipality or nonprofit organization.

Massachusetts State Historic Preservation Plan 2018-2022

The State Historic Preservation Plan is the document that sets the focus and tone for historic preservation across the commonwealth for the duration of the plan. This edition addresses concerns for climate change, *sustainability*, and resilience. The topics areas include major accomplishments, challenges ahead, and goals and objectives.

Massachusetts Office of Coastal Zone Management

CZM is the lead policy, planning, and technical assistance agency on coastal and ocean issues within the Executive Office of Energy and Environmental Affairs (EEA) and implements the state's coastal program under the federal Coastal Zone Management Act.

Interpreting Federal Emergency Management Agency Flood Maps and Studies in the Coastal Zone

When designing, siting, and reviewing projects on the coast it is important to consider the potential for dangerous storm-generated wave action and flooding. The Flood Insurance Rate Maps (FIRMs) produced by FEMA are the primary tools used to determine the extent and magnitude of predicted flooding in a major coastal storm. This document, developed by the Massachusetts Office of Coastal Zone Management (CZM) guides the reader on how to use the maps to better understand the potential effects of flooding on buildings, properties, and underlying natural resource areas allowing homeowners and consultants to design the safest possible coastal projects and support public officials in evaluating projects.

[1] There are also federal tax incentives for different projects. Learn more: https://www.nps.gov/tps/tax-incentives.htm

Coastal Landscaping in Massachusetts

Landscaping can greatly affect resilience. This resource guides users in determining options for controlling erosion and storm damage through the use of plantings safe for Massachusetts ecosystems. Other benefits addressed are visual appeal, conservation, and habitat for island wildlife.

Figure 5: Flooding on Washington Street, September 22, 2020. Credit: Kimberly Rose

At the Local Level

Local Government

Building Community Resilience with Nature-Based Solutions: A Guide for Local Communities (2020)

This recently released guide from FEMA walks through what *nature-based solutions* are, the economic factors of using these natural adaptation methods, and how nature-based adaptation can be included in planning and policy. It also showcases implementation projects through the use of public and private investment and incentives. Federal funding opportunities and key takeaways are provided, along with a resource list.

Daring Cities 2020: Know More, Act Better and Lead Together

Daring Cities is a "global, action-oriented virtual forum, designed by ICLEI [Local Governments for Sustainability] and Bonn [Germany], to empower urban leaders to tackle the climate crisis, especially in the context of the COVID-19 pandemic." There are 982 cities and regions as part of this movement. At the virtual meeting in 2020 there were 4,668 attendees, 150 counties, and over 850 local and regional governments present who committed to creating a resilient and sustainable future.

Fact Sheet | How Can Revolving Loan Funds Make Our Coasts More Resilient?

This fact sheet discusses the benefits of using a revolving loan fund to fund a variety of initiatives ranging from support for small business to infrastructure and other community needs. These funds are used in a variety of ways and by a variety of businesses and organizations, such as the Environmental Protection Agency to promote clean water and even the Commonwealth of Massachusetts which provided a revolving fund for the Community Septic Management Program.

Flood Risk Communication Toolkit for Community Officials: Start Guide (2019)

FEMA's Start Guide provides a communications toolkit including templates and guides for designing a communication plan, hosting public meetings, developing social media strategy, and creating story maps and videos. This document walks through each tool and addresses how elected and agency officials can use the tool. Tips on how to communicate complex topics are included.

Hazard Mitigation Grants for Governments

Once a presidential major disaster declaration is made, the governor can request funding be made available to the communities affected. This resource addresses how to apply for funding, complete damage assessments, develop a project scope, draft, and submit an application for assistance and actions to take prior to receiving funding.

Pre-Disaster Recovery Planning Guide for Local Governments (2017)

This document is designed to help local governments prepare for recovery by crafting a pre-disaster recovery plan, developing recovery capabilities with partners, and creating an organizational

framework for local recovery efforts. The document features preparation, planning, review, and implementation guides.

Preparing Your Historic Property for A Future of Rising Seas (2020)

As part of the Town of Nantucket Action Grant through the Massachusetts Municipal Vulnerability Grant, state and local experts presented federal, state, and local adaptation and insurance options. This link is to the recording of this presentation.

Cultural

Getty Institute | Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions (1999)

The Getty Institute provides this step-by-step guide for cultural institutions to develop their own emergency preparedness and response strategy. This workbook addresses the three groups generally responsible for developing and implementing emergency procedures—institution directors, emergency preparedness managers, and departmental team leaders—and discusses the role each should play in devising and maintaining an effective emergency plan. Several chapters detail the practical aspects of communication, training, and forming teams to handle the safety of staff and visitors, collections, buildings, and records.

Department of the Interior Museum Program | Emergency Management

This resource is a list of documents, plans, and guides for emergency response for cultural institutions. Resources for disasters are organized by hazard events such as flood, fire, earthquake, and tsunami. A section is included on salvage and how to practice recovery in a way that saves as many artifacts as possible.

Society of American Archivists | Climate Change Resources for Archivists

Designed to help archivists and related professionals understand how climate change events may affect archives, libraries, and museums, this resource addresses enactment of emergency plans and how to respond to an event while also addressing long term planning for climate change. The Smithsonian includes a section on protecting personal health after a traumatic event, dealing with stress, and making sure resources like food and water are safe to consume post-event.

dPlan: The Online Disaster-Planning Tool for Cultural and Civic Institutions

dPlan assists cultural and civic institutions to create a plan for disaster prevention and response. By entering data into the online template, institution staff can create a customized disaster plan. This planning tool is designed to support preventing or mitigating disasters, preparing for the most likely emergencies, responding quickly to minimize damage if disaster strikes, and recovering effectively from disaster while continuing to provide services to your community.

Property Owner Resources

Just as the resilient design guidelines for Nantucket were viewed as a necessary document for the Historic District Commission and property owners, a similar document, the Boston: Resilient, Historic Buildings Design Guidelines is being used in Boston to guide design decisions. Resilience, mitigation, adaptation, *dry floodproofing, wet floodproofing*, and *elevation* are all discussed in detail with illustrations of each approach considered historically appropriate in Boston. While Nantucket's built and natural environment differs from Boston, the adaptation strategies are similar enough to inform Nantucket property owners about approaches consistent with Building with Nantucket in Mind.

Commercial

Center for Climate and Energy Solutions | Business Strategies to Address Climate Change

This resource explains how businesses assess and prepare for climate response. It discusses climate action plans, goals and targets, carbon pricing[2], energy efficiency, and innovative finance.

Department of Homeland Security | Business Continuity Plan

Interruption to business during a disaster or emergency can be economically crippling. A business continuity plan can expedite recovery and ensure that the affected business returns to operation as quickly as possible after an event.

Disaster Recovery Institute | The Professional Practices for Business Continuity Management

This website assists businesses of all sizes to develop, implement, and manage their continuity programs. The framework provided reduces the possibility of gaps in planning. It supports planning for natural events and human disasters such as terrorism and cyber threats that could disrupt regular business operations.

Insurance Institute for Business and Home Safety | Open for Business EZ Toolkit

This is a free resource designed to help small businesses plan for multiple types of disruptions and to re-open and resume business quickly following a disaster.

Small Business Administration | Disaster Assistance

Businesses of all sizes located in declared disaster areas, private nonprofit organizations, homeowners, and renters affected by declared disasters, including civil unrest and natural disasters such as hurricanes, flooding, wildfires, etc. can apply for disaster assistance from the Small Business Administration (SBA). The SBA also provides a section on how to prepare for disasters.

[2] The Town of Nantucket Energy Office provides resources to request an Energy Assessment that is free. This can be for your home and business!

Real Estate

Urban Land Institute | Climate Risk and Real Estate: Emerging Practices for Market Assessment (2020)

This document briefly contextualizes the risk climate change poses for real estate and how to assess and understand that risk. Discussed are the physical risks, level of investment into resilient infrastructure, and local government capacity to implement resilience policies, funding sources, and market risk assessments.

Urban Land Institute | Living with Heat (2019)

ULI Boston and New England gathered to look at how extreme heat would affect real estate economics and communities, designers, developers, and policymakers. They looked at four Boston neighborhoods and proposed solutions to make areas more resilient to environmental conditions and improve comfort for residents.

Residential

Above the Flood: Elevating Your Flood Prone House (2000)

FEMA released this document to act as guidance for property owners who want to elevate their property. Techniques include extending walls vertically, raising the lowest floor, converting the existing lower areas into non-habitable space, making second floors primary living space and elevating the entire house on a new foundation. It includes case studies for each technique.

Home Builder's Guide to Coastal Construction: Technical Fact Sheet Series

FEMA Technical Fact Sheets provide guidance and recommendations concerning topics of interest. This resource is a collection of thirty-seven fact sheets on coastal residential buildings. The fact sheets are sorted into the following categories: General, Planning, Foundations, Load Paths, Wall Systems, Openings, Roofing, Attachments, Repairs, and Guide.

Homeowner's Guide to Retrofitting: Six Ways to Protect Your Home from Flooding (2014)

This FEMA document informs property owners of the options for adapting residential properties threatened by flooding, specifically elevation, relocation, wet floodproofing, dry floodproofing, barrier systems, and demolition.

Mitigation of Flood and Erosion Damage to Residential Buildings in Coastal Areas (1994)

The purpose of this FEMA investigation was to document the broad range of nonstructural mitigation activities undertaken nationwide in communities exposed to coastal flooding and erosion. This survey provides necessary documentation on which to base a federal, state, or community coastal flood and erosion hazard mitigation program.

Protecting Building Utility Systems from Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems (2017)

This document reviews the regulatory framework for ensuring that flooding mitigation methods comply with federal flood and building codes. Included are mitigation options by category of use for both residential and non-residential structures.

Reducing Flood Risk to Residential Buildings That Cannot Be Elevated

Elevating an entire structure is the preferred method for protecting a building as promoted by FEMA, however it is not always possible. This can be due to structural characteristics such as attached dwelling units, row houses, townhomes, or just certain building materials do not support elevation. This resource provides alternative measures for single family and multi-family buildings.

Plan to Plan

Individuals

American Red Cross | Disaster Preparedness Plan

Through this web page the American Red Cross provides resources for family emergency planning for multiple emergency types. Users can download a family disaster preparedness plan and survival kit instructions, as well as information on receiving training in First Aid and CPR.

Cape Cod | Floodplain Regulations and Historic Structures in Massachusetts

This document is an excellent resource for understanding flooding terminology and answers common questions historic property owners may have on flood management regulations.

Centers for Disease Control and Prevention | Infographic: Prepare for Everywhere

The Center for Disease Control and Prevention (CDC) has compiled resources and information on the importance of planning for different types of public health emergency events. This includes communication resources, supply kits, first aid kits, and general health tips.

Department of Homeland Security | Prepare My Family for a Disaster

The Department of Homeland Security (DHS) provides a walkthrough of topics related to disaster emergencies. For example, what a family should do if not together during a disaster and where to meet after a disaster event. Other topics include financial preparedness, school plans, campus plans, workplace plans, and warning systems.

Federal Emergency Management Agency | Create Your Family Emergency Communication Plan

FEMA provides information specifically for communicating both with family members and emergency personnel. This document provides a form for writing down important phone numbers and contact information.

Massachusetts Office on Disability | Disability Emergency Preparedness

Issues of accessibility can hinder a person's ability to prepare for an emergency or disaster. This Massachusetts resource provides planning assistance to people with disabilities, as well as local emergency services and first responders.

Massachusetts Office of Preparedness and Emergency Management | Individual and Family Preparedness Information

This website serves as a springboard into many topics around preparedness. Whether preparing for a disaster, pandemic, or general emergencies, this website provides tools to plan.

Massachusetts Office of Preparedness and Emergency Management | Know Plan Prepare

This is another Massachusetts resource from the state that delves into preparedness and the resources available.

Research

American Planning Association | Disaster Recovery Resources (ongoing)

The American Planning Association (APA) has collected research and publications for communities and individuals to use in planning for Post-Disaster Recovery, Wildfires, Hurricanes, and Flooding. Also, this APA resource includes the Resilience Roundtable Podcast, and APA, Federal, and Nonprofit support information.

American Planning Association | Climate Change Resources (ongoing)

APA has collected information and resources to assist planners and local or state governments with current best practices in climate change planning. The compilation provides resources for communities needing to understand the impacts of climate change and related topics including energy, hazard mitigation, and sustainability. On this website is APA's library of policy guidance to help professionals and communities to increase their preparedness process's effectiveness.

Federal Emergency Management Agency | Hazard Mitigation Planning and Resilient Communities Story Maps

Story Maps are illustrative tools to demonstrate or communicate topics in a way that increases engagement and understanding of the larger topic of resilience. These Story Maps created by FEMA are focused on planning and communicating hazard mitigation. It also includes case study examples of communities using FEMA tools and resources such as Lycoming County, Pennsylvania, Harris County, Texas, and the Nebraska Department of Natural Resources. This is a source for learning what other communities are doing to engage residents in resilience efforts.

Federal Emergency Management Agency | Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program (2008)

The information provided with this resource focuses on structural and finish building materials for normal construction practices and the process used to determine whether the materials are flood damage resistant. Some simplified examples with diagrams are used to illustrate the use of these flood-resistant materials below the *base flood elevation*.

ICF International | Matching Funding Sources to Economic Development Initiatives

Funding sources post-disaster are critical as a community begins to recover. There are sources such as the U.S. Economic Development Administration (EDA) disaster recovery grants and the Housing and Urban Development CDBG-DR grants that can be joined. However, this offers some difficulty with requirements and exactly how to apply those funds. This resource breaks that down and explains the difference between the two despite their many similarities.

Landscape News | Why the fight for climate justice is a fight for justice itself

This resource discusses that while the pandemic revealed the vast inequalities in health and income, climate change will further peel the curtains back to show the intersectional challenges ahead. From climate-induced migration to unequal access to resources, climate change will affect historically marginalized and underrepresented communities in an unprecedented way.

National Alliance of Preservation Commissions | The Alliance Review: Rising Water, Rising Challenges | Elevating Historic Buildings Out of Harm's Way (Summer 2018)

The summer 2018 issue of National Alliance of Preservation Commission's The Alliance Review focuses on the challenges faced by communities and preservationists from climate change related sea level rise and flooding. Articles include developing a cultural resource hazard mitigation plan for Annapolis, Maryland; whether to elevate or not to elevate in Charleston, South Carolina; flooding and an elevation case study in Cedar Rapids, Iowa; and how elevating historic buildings can meet federal standards with examples in Louisiana and Mississippi.

National Trust for Historic Preservation | Climate Change and Preservation: Where Do They Intersect? (2015)

Stephanie Meeks, former President and CEO of the National Trust for Historic Preservation, wrote this article to reflect on the intersection of preservation efforts and climate concerns with an emphasis on climate change mitigation, sustainable architecture, and reduction of greenhouse gas emissions. "The greenest building is the one already built;" therefore, she calls for building upon that foundation as represented by historical buildings.

National Trust for Historic Preservation | Treatment of Flood-Damaged Older and Historic Buildings

This document discusses common issues facing historical materials, structures, and foundations that are water damaged. It also provides a checklist to complete as water recede.

National Trust for Historic Preservation | Preservation & Climate Change Resources Page (ongoing)

The National Trust for Historic Preservation (NTHP) is a guiding body for preservation in the United States. This resource page includes documents, coalitions, advocacy, news, and other resources to keep people informed about climate change through the lens of historic preservation and the cultural environments.

Resilient Heritage in The Nation's Oldest City: City of St. Augustine, Florida

While this entire resource is of high value. Chapter 3 is particularly important because it is one of, if not the first, economic analysis of historic properties in climate affected areas. "The goal of this analysis is to understand the economic consequences of storm damage to a city's historic resources. This is achieved in three parts: 1) By quantifying the present total value of St. Augustine's historic resources, and those at particular risk; 2) By assessing the economic impact experienced following a storm event and measuring the loss of jobs, income, and visitor expenditures due to decreased tourism visitation, and 3) Predicting the impact that the loss of historic resources would have as the result of future extreme weather events."

Resilient Cities Network | Resilient Water Management-How Resilient Cities Share Strategies for Adapting to a Changing Climate

The Resilient Cities Network was launched from the Rockefeller Foundation funded program, 100 Resilient Cities. This specific article examines how cities around the world manage sea level rise and other water hazards. For example, Rotterdam has instituted water plazas, one of which spurred revitalization while retaining 1.7 million liters of water that is slowly reintroduced into a canal and groundwater system.

Safeguarding Tomorrow Through Ongoing Risk Mitigation Act of 2020

The Committee on Homeland Security and Governmental Affairs has recommended this act to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act so that FEMA can allocate funding to provide hazard mitigation grants for states to create revolving loan funds. "To be eligible to receive capitalization grants, the state must develop a statewide hazard mitigation plan. If localities want to be eligible for the capitalization grant that the state has received, local governments must supply the state with project proposals, assessments of recurring disaster vulnerabilities, and a description of how those projects would address the goals of the state's hazard mitigation plan. Projects should be prioritized if they: increase resilience or risk of harm to infrastructure; take regional impact hazards into account; and or provide resilience for major economic sectors or critical national infrastructure."

StrongTowns | Hard Times Can Galvanize a Community: Why Localism and "Small Ball" Matter Most in a Disaster (2020)

Local reliance and responsibility are essential in recovery. Storm events can cut an area off and knowing the community's strengths and responsible parties is vital for getting to those in need quickly and efficiently.

United Nations | Sustainable Development Goals Climate Justice

This resource discusses the impacts of climate change on underprivileged communities globally. It also points to the Youth Uprising as a solution to past oversights to push the world to a more equitable future for all.

Yale Climate Connections | What is 'climate justice'?

Yale Climate Connections breaks down how climate change is not only an ecological issue, but also a social issue. It is evident that as climate change progresses, the impacts will not necessarily be distributed equally, and instead felt greater among historically marginalized and underserved communities. This resource provides a launchpad for further research into climate justice using three key factors.

Modeling and Visualizations

Snapshots of each visualization is provided in Appendix B for convenience while reading this document. However, data is updated regularly, therefore it is highly recommended to explore these sites and ensure that the most updated are being referenced. All images were taken January 2021.

Army Corps of Engineers Sea Level Curve Calculator

Utilizing the tide gauges that the National Oceanic and Atmospheric Administration (NOAA) manages, the Army Corps has developed a tool to graph flooding projections. By selecting the tide gauge of interest from the drop-down, the reader can preview maps and graphs of tide and flooding levels. The graphs can be adjusted to show various flood levels by changing the parameters in other categories.

Climate Central Surging Seas Risk Finder

Climate Central is a peer-reviewed science community that looks at fact-based sea level rise. The viewer can type in the search location. By scrolling down, views of various data graphs and projections are downloadable into PowerPoint, Excel, and other formats for easy data collection and presentation. Climate Central provides a local downloadable fact sheet and report on sea level rise for selected area.

Federal Emergency Management Agency Flood Map Service Center

FEMA houses the National Flood Insurance Program (NFIP) and Flood Insurance Rate Maps (FIRMs). These maps show the flood risk zones determined by historic flood events, elevation, and other data that informs the risk determinations. To use this tool, the reader can type in the search location, which then populates a digital map; if a map is not available, the reader is redirected to a digital copy of a paper map. FIRMs often inform state and local policy flood mitigation professionals, but property owners can use them to inform their own property adaptation decisions.

Federal Emergency Management Agency Massachusetts Coastal Erosion Hazard Map

This map is non-regulatory and meant to communicate future coastal erosion hazards and inform planning and mitigation efforts. To use, agree to the disclaimer on the screen, and navigate to the area of interest. The viewer can use the Map Layers & Legend section on the right side of the screen to see different scenarios. Each scenario provides three projection years, 2030, 2050, and 2100. Since this is looking at coastal erosion, it does not provide data for the Harbor of Nantucket due to the difference in water behavior.

Massachusetts Sea Level Rise and Coastal Flooding Viewer

To support the assessment of coastal flooding vulnerability and risk for community facilities and infrastructure, the Massachusetts Office of Coastal Zone Management (CZM) developed the Sea Level Rise and Coastal Flooding Viewer. This viewer maps areas of potential inundation under various sea level rise and worst-case hurricane surge scenarios and located within the Federal Emergency Management Agency (FEMA) coastal flood zones.

National Oceanic and Atmospheric Administration Coastal Inundation Dashboard

The National Oceanic and Atmospheric Administration (NOAA) uses live data from tide gauges placed around the United States to provide information about tides, potential flooding, and future

risks. To use the inundation dashboard, the viewer can zoom into the area of interest and click on the tide gauge nearest the location. A pop up will appear showing real-time data from the tide gauge, as well as a link to "Inundation History" for that gauge from its time of placement.

National Oceanic and Atmospheric Administration Sea Level Rise Viewer

The Sea Level Rise Viewer projects potential sea level rise into 2100. The Sea Level Rise tab shows the risk of flooding and allows the user to adjust water level. The Local Scenarios tab shows five potential scenarios ranging in severity from Intermediate Low to Extreme. It also shows the water levels for each scenario in 2020, 2040, 2060, 2080, and 2100. Mapping Confidence shows the potential for fluctuations in sea level rise estimates depending on the development of variables outside of NOAA's research. The next tab shows Marsh Migration, both salt and freshwater naturally occurring as sea levels rise. Like the Local Scenarios tab, this allows for the addition of accretion to factor into the marshlands' movement. The Vulnerability tab shows the populated areas and the severity of the sea level rise threat. Finally, the High Tide Flooding tab shows the tide gauge data discussed in the previous tool.

University of Florida Preservation Institute Nantucket, Resilient Nantucket: 3D Digital Documentation and Sea Level Rise Visualization

The Preservation Institute Nantucket (PIN) has been a Nantucket institution for half a century, documenting Nantucket with the utmost technology and methodologies. The Resilient Nantucket initiative was in collaboration with the TON, and the Nantucket Preservation Trust. Funding was provided by the Nantucket Community Preservation Committee, Massachusetts Coastal Zone Management Program, Osceola Foundation, and ReMain Nantucket. This document explains the methodology and provides a series of modeling scenarios for each location.

Nantucket Contacts and Resources

ACKlimate Nantucket & Partners

Conservation Commission

Coastal Resilience Advisory Committee

Coastal Resilience Coordinator, Vince Murphy

Department of Natural Resources

Diversity, Equity, and Inclusion Office

Energy Coordinator, Lauren Sinatra

Energy Office

Envision Resilience Nantucket Challenge

Historic District Commission

Nantucket Historical Commission

Planning and Land Use Services

Preservation Institute Nantucket

Preservation Planner, Holly Backus

Resilient Nantucket

Worcester Polytechnic Institute

Appendix A: Why Should I Have Flood Insurance? Q&A

Q: Why do I need flood insurance?

A: Flood insurance can be the difference between recovery and financial ruin. Water damage is not inexpensive, and depending on the level of flooding, it can become exponentially more expensive than many people can afford out of pocket.

Q: Am I required to have it?

A: Technically, if you are not in a high-risk flood zone, you are not required to have it. However, lenders may require you to purchase flood insurance regardless before a mortgage.

Q: How do I know if I am at high risk or not?

A: FEMA houses the *National Flood Insurance Program* and Flood Insurance Rate Maps (FIRMs). These maps show the risk of an area through flood zones that look at historic flood events, elevation, and other data to inform the risk and decisions. To use this tool, type in the location in the search bar. A digital map will populate if available; if one is not available, it will redirect to a digital copy of a paper map. FIRMs often inform state and local policy, but property owners can use them to inform adaptation decisions. The link to FEMA Flood Maps can be found in the Modeling and Visualization section.

Q: I rent; do I still need flood insurance?

A: Ask the landlord if they have flood insurance on the building or unit. However, the policy they may have may not cover the contents within. There is a contents-only policy that would cover your possessions.

Q: Is flood insurance included in my rental, homeowners, or commercial insurance?

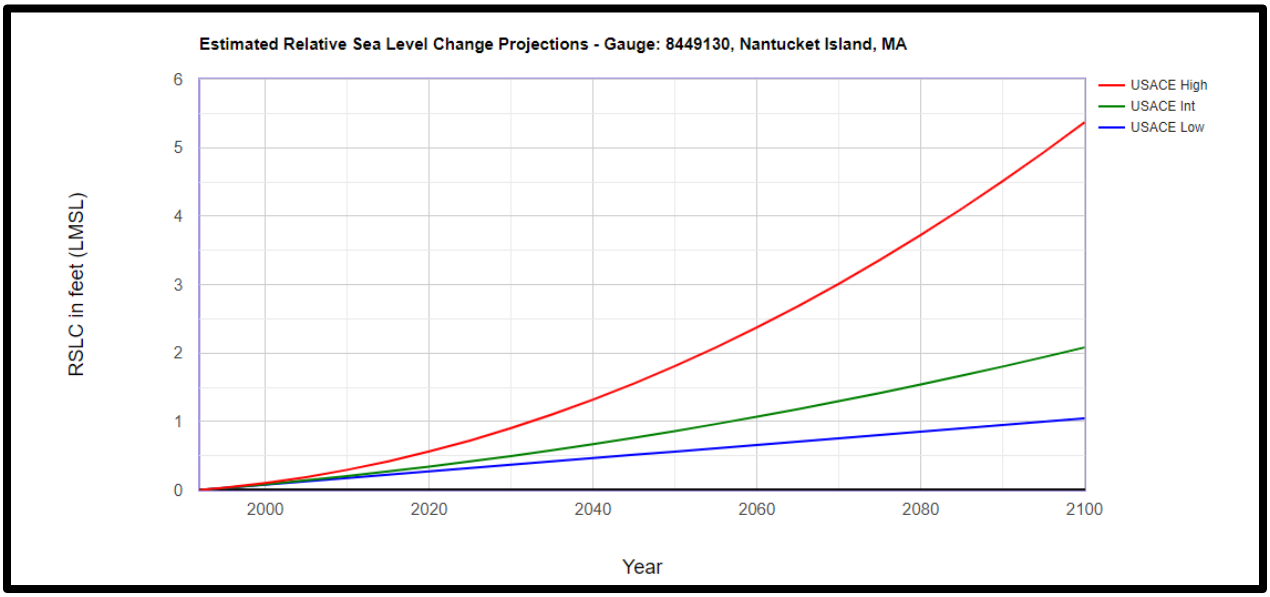
A: Not typically. Some insurance companies have begun to incorporate flood insurance; however, it is usually an add-on. The coverage limits for homeowners in the National Flood Insurance Program is $250,000 for the building and $100,000 for the building contents. These are typically purchased separately with separate deductibles. While coverage limits for rentals in the National Flood Insurance Program are $100,000 for contents-only coverage. Finally, the National Flood Insurance Program's commercial coverage limits are $500,000 for the building and $500,000 for the building contents.

Appendix B: Modeling and Visualizations

The following are samples of what a user can see in each modeling and visualization source. It is not all encompassing of all the scenarios, capabilities, or features of the resources. It is recommended to explore each of these sources to know what is available and see the most updated research.

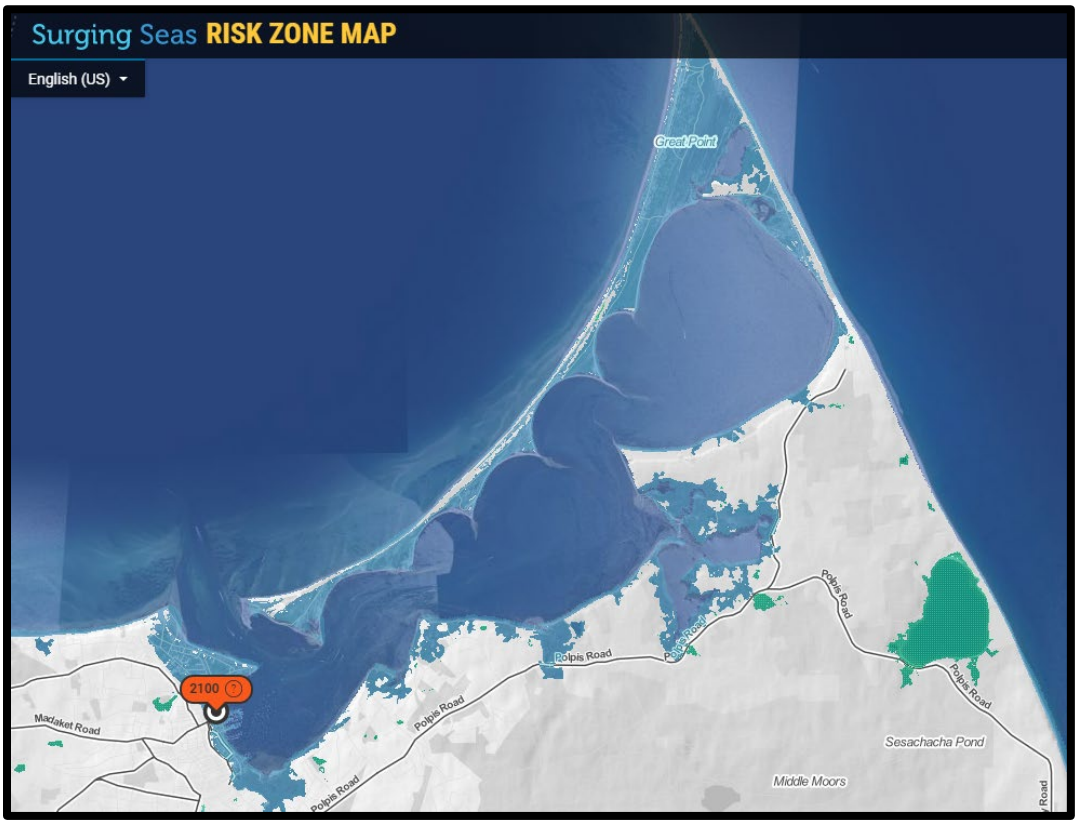
Army Corps of Engineers Sea Level Curve Calculator

This image is showing the Relative Sea Level Change Projections (RSLC) in feet by projection year. The Army Corps of Engineers (USACE) uses historical data which leans conservative in projection due to the inability to account for ice melt, rising temperatures, and erosion.



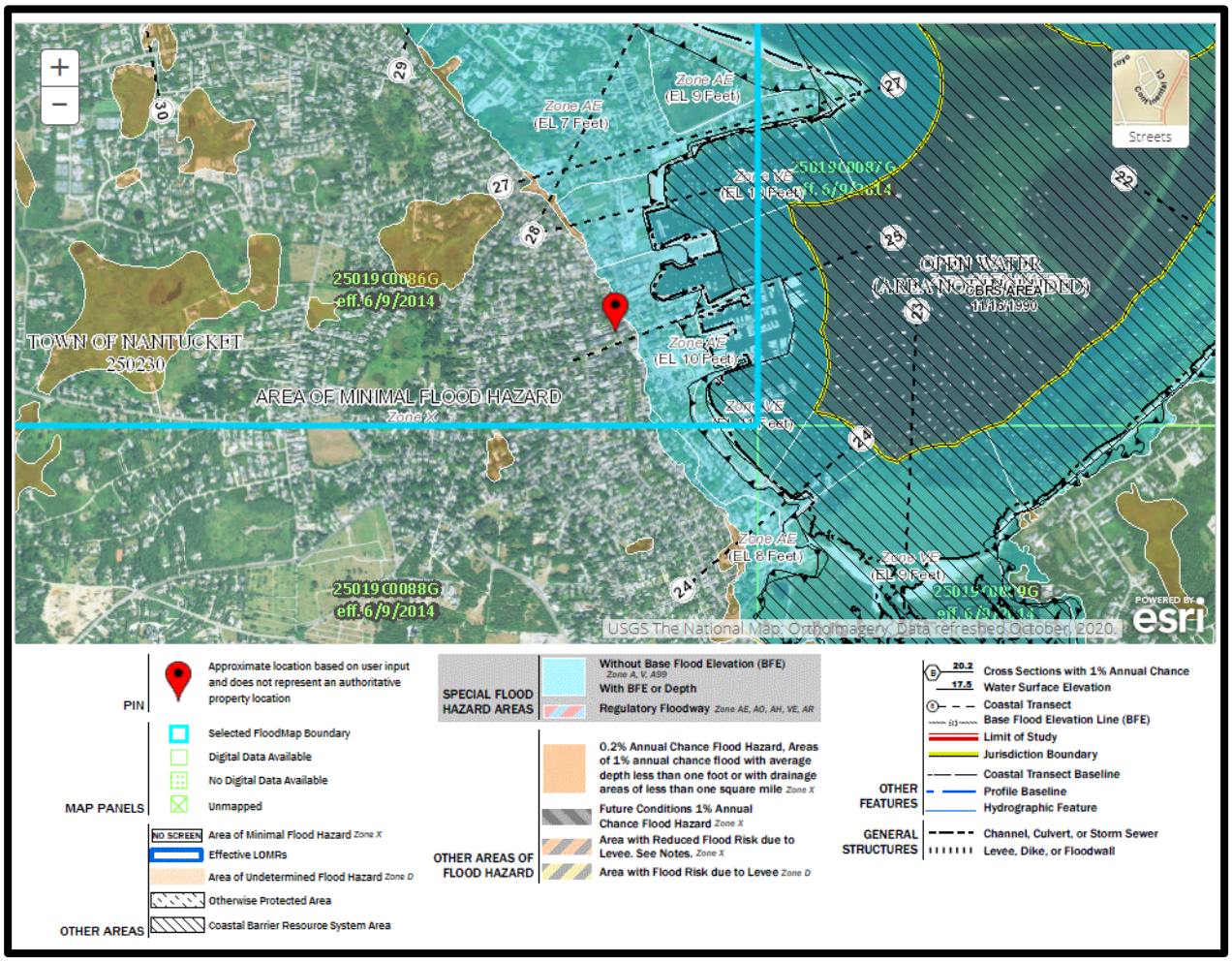
Climate Central Surging Seas Risk Finder

This image is showing sea level rise in the scenario of 2100 for Nantucket under the scenario of unchecked pollution. Great Point and much of the Town of Nantucket is inundated.



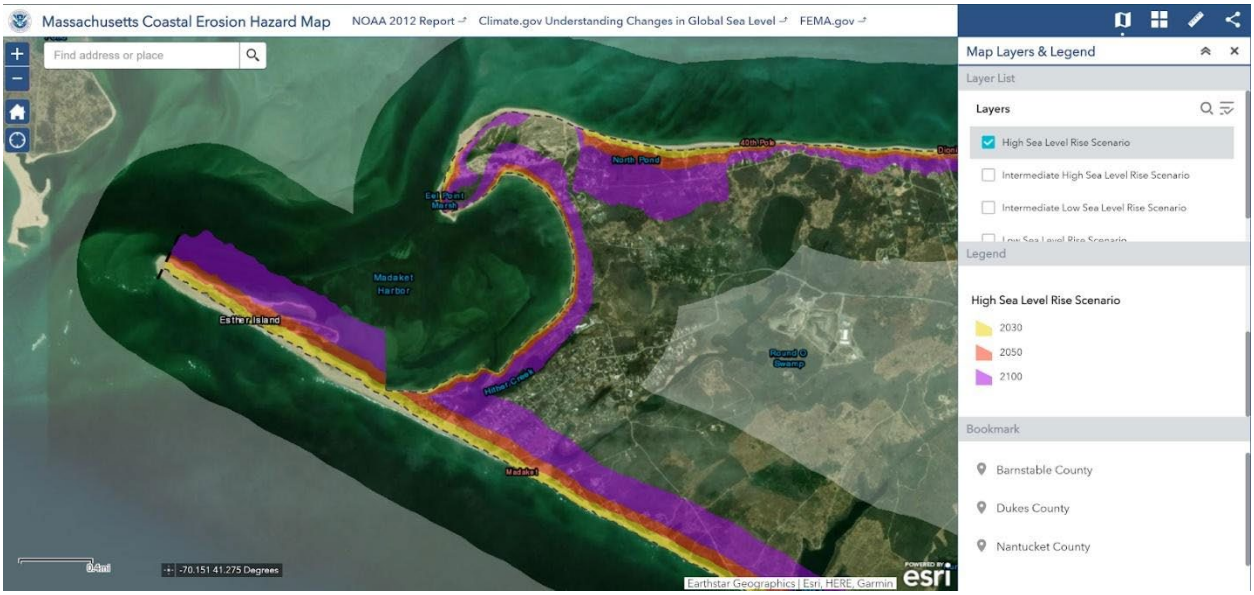
Federal Emergency Management Agency Flood Map Service Center

This image is provided by FEMA as the Flood Map of Nantucket. The last edition of this map was made in 2014, which is what this map is showing. Everything highlighted in blue is a special flood hazard area. Some of these zones have and parenthetical statement underneath. This is the recommended base flood elevation for insurance purposes to be above the flood level. Many areas recommend additional elevation due to the conservative nature of FEMA elevation recommendations. Like USACE, FEMA uses historic data that does not account for ice melt, rising temperatures, or erosion.



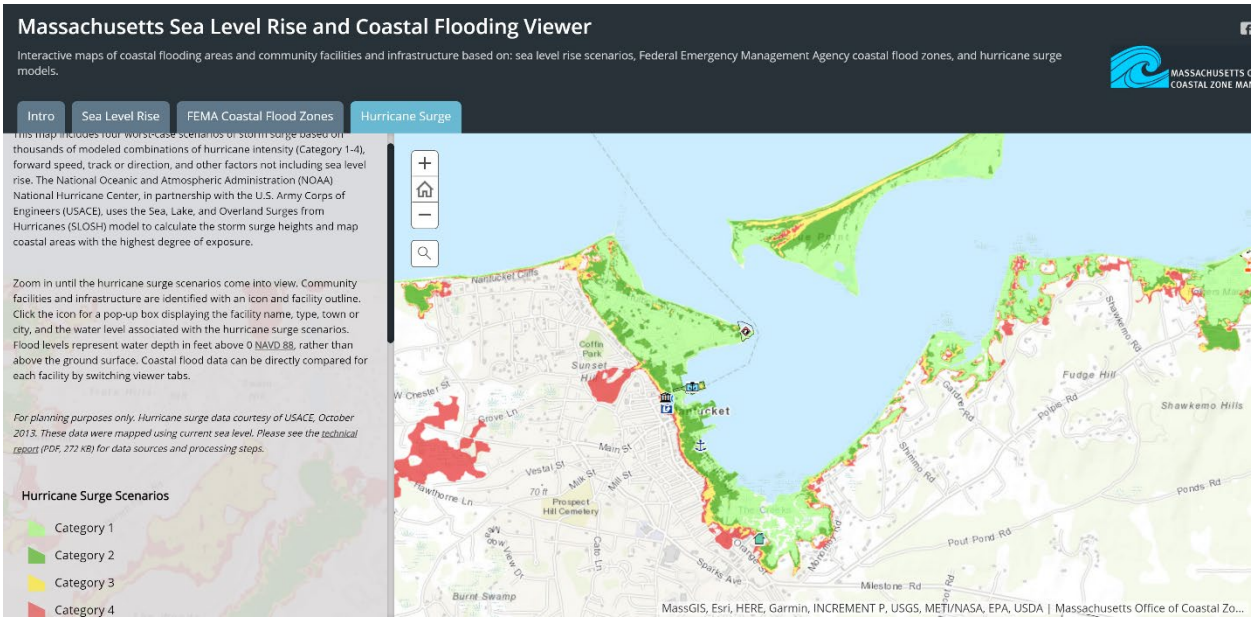
Federal Emergency Management Agency Massachusetts Coastal Erosion Hazard Map

The erosion map shows that much of Madaket is at risk of erosion over time. The yellow color shows the extent of erosion projected by 2030, the red color is erosion by 2050, and the purple shade is erosion projections for 2100. This does not consider storm erosion because that cannot be accurately projected, it also does not consider sea level rise. Erosion and sea level rise can exacerbate timelines for each other. If sea level rise is destabilizing a beach or a bluff, then erosion will occur rapidly. If erosion occurs in an area naturally, like on the majority of Nantucket, there is less land to hold water back leading to frequent flooding during conditions where it would not typically flood.



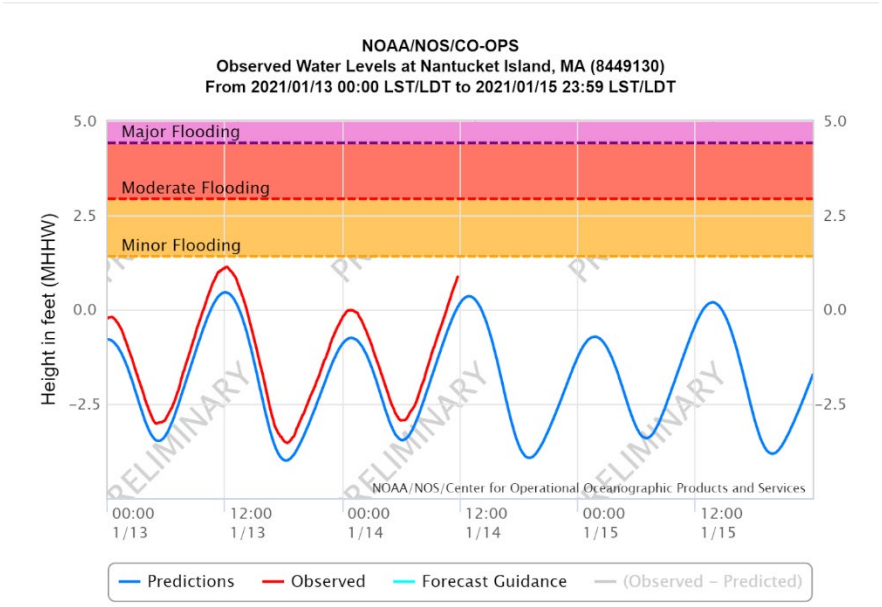
Massachusetts Sea Level Rise and Coastal Flooding Viewer

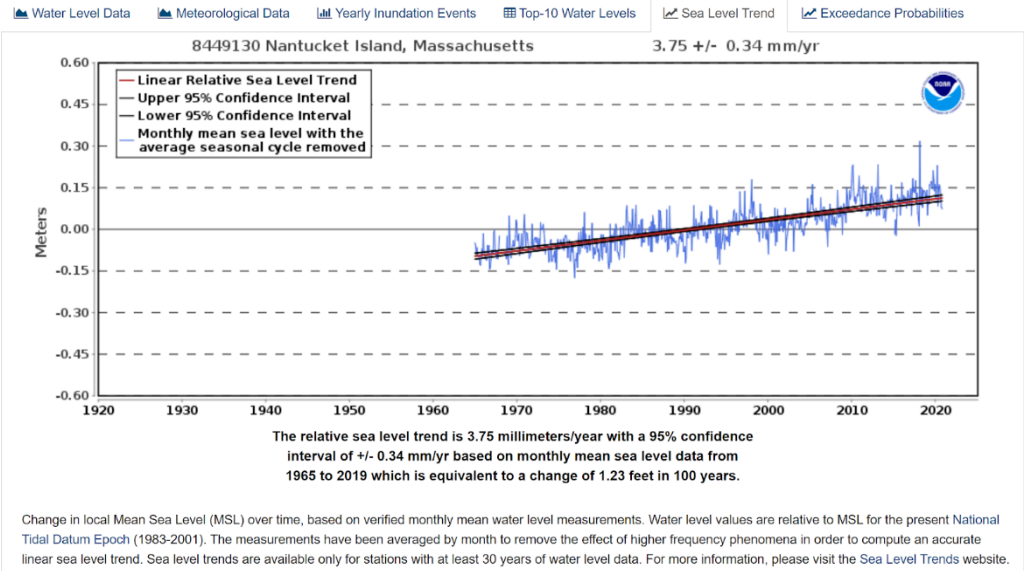
This map is showing hurricane surge for Category 1-4. NOAA and USACE collaborated to model storm surge heights and map coastal areas for high degree of exposure. A category 1 or 2 hurricane can inundate much of Nantucket, Brant Point, and surrounding areas to a high degree. Category 3 and 4 hurricanes do not extend much farther due to the elevation change.



National Oceanic and Atmospheric Administration Coastal Inundation Dashboard

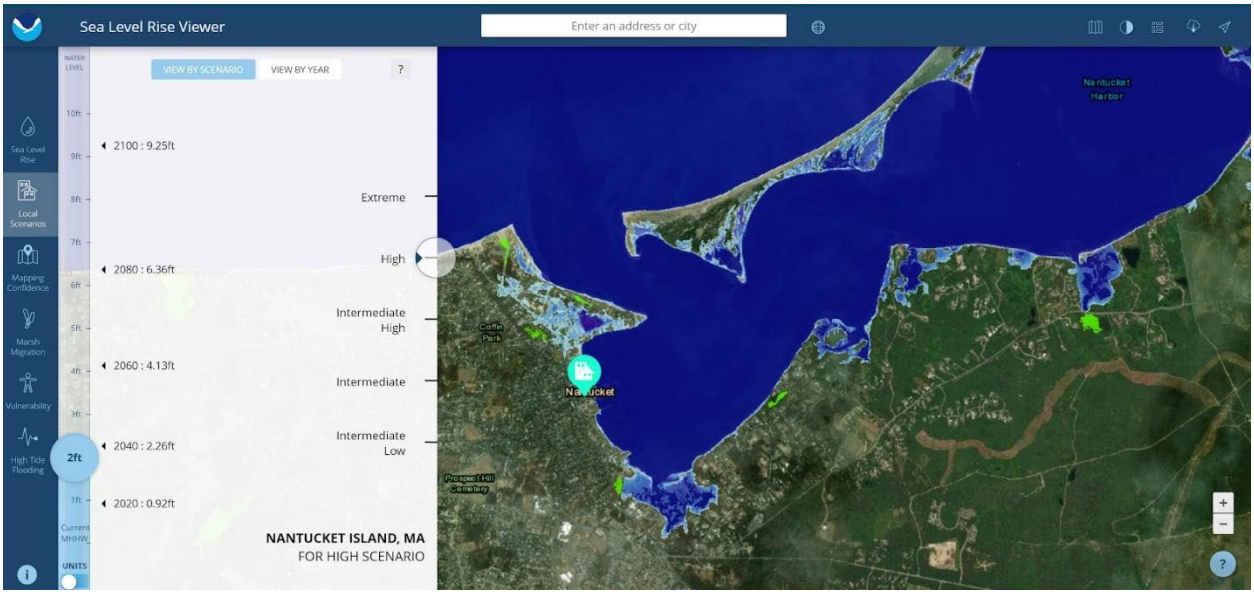
The first image is the water levels reported by the tide gauge in Nantucket Harbor. It has been recording since the 1970s, which as provided a long term look at sea level rise. The blue line is NOAAs prediction versus the reported condition from the tide gauge. The second image is from the inundation dashboard. This chart is showing sea level rise trends with a 95% confidence. On average, sea levels rise about 3.75 millimeters per year, give or take .34 millimeters. This showing the averaged water level per month for half a century.





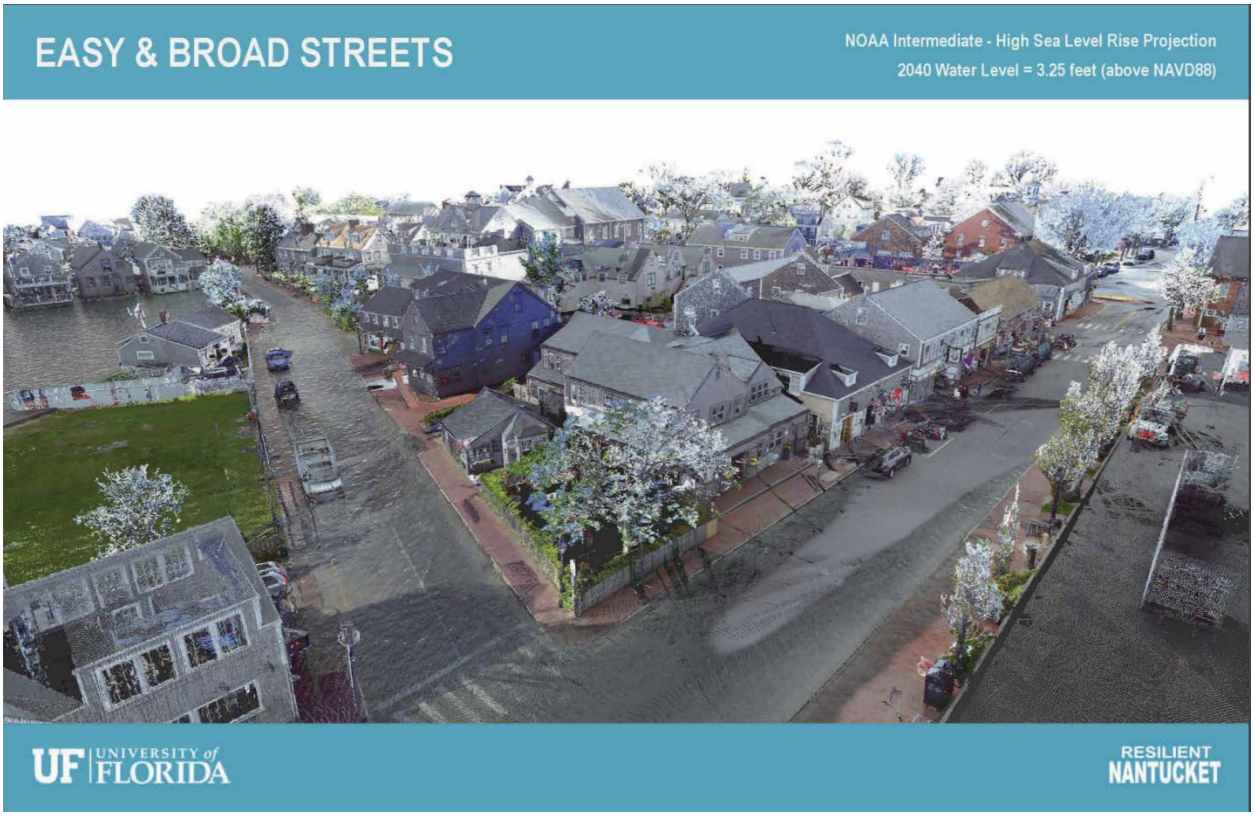
National Oceanic and Atmospheric Administration Sea Level Rise Viewer

The scenario below is showing NOAA's projection for 2040 in the high scenario. This scenario level was proposed by the Coastal Resilience Advisory Committee and adopted by the Select Board in 2020. The Creeks are holding water, Brant Point is inundated, particularly around the wetland in the center of the Point. Easy street, the major transportation avenue, is regularly threatened by flooding, and parts of Coatue are underwater in twenty years.



University of Florida Preservation Institute Nantucket, Resilient Nantucket: 3D Digital Documentation and Sea Level Rise Visualization

The visualization below shows the corner of Easy Street and Broad. This is called a bathometric visualization where the 3D model has elevation data added to it and water is simulated at the projected level. The projection for this visualization is based on the NOAA Intermediate-High scenario for 2040. Broad Street has a rise in the middle of the road, which illustrates the model's simulation to real world scenarios of how water behaves.



Resilience Glossary

The Resilience Glossary defines terms commonly used in climate change and historic preservation. Creating baseline definitions assists with clarity and understanding while discussing a complex subject such as the intersections of climate and heritage. While some of these words can be found in this document, others come from the resources or are relevant to the topics at hand. As our understanding develops, so will these definitions, many of which already of layers. The definitions below are baseline definitions which may be expanded upon in the Nantucket design guidelines, and as updates to this document occur. Take a moment to browse the terms below. A pronunciation guide for each term has been provided as well as alternative terms or abbreviations. The last entry for each term is an "Example of usage." These have been catered to the Nantucket context to provide clear and relevant references. In the case of two definitions, two examples of usage will also be provided with numbering aligning to the respective definition.

A

Adaptation

(/ ˌadapˈtāSH(ə)n /) Alternatives: adapt | adapting

1. The act of acclimating, adjusting, or modifying to new conditions or environments to ensure the best fit.
2. Climate Change: Different methods, technology, and strategies to help ensure the best fit.

Example of usage: 1. We must begin adaptation processes to explore what works best.

2. Elevation, wet floodproofing, and dry floodproofing are examples of adaptation strategies.

Adaptive Capacity

(/ əˈdaptiv/ /kəˈpasədē /)

Comprises the properties of a system and the ability to modify to maintain or achieve the desired state of resilience of the built and natural environment.[3]

Example of usage: Biodiversity can strengthen natural adaptation approaches, thus increasing a landscape's adaptative capacity.

Adverse Effects

(/ adˈvərs/ /əˈfekts /)

Affects that diminish characteristics qualifying a property for inclusion in the National Register.[4]

Example of usage: While building a sea wall in Nantucket Harbor would protect the town, it would have adverse effects on the historic context of the Town, as well as tourism and the local economy.

[3] Jakku, Emma & Lynam, Tim. (2010). What is adaptive capacity. South East Queensland Climate Adaptation Research Initiative. Climate Adaptation National Research Flagship. CSIRO.
[4] Provided by the Advisory Council on Historic Preservation

B

Base Flood Elevation

(/ bās/ /fləd/ /ˌeləˈvāSH(ə)n /) Alternatives: BFE

The projected elevation of flood waters during a 100-year flood, usually provided by the Federal Emergency Management Agency's Flood Insurance Rate Maps along with a flood zone.

Example of usage: Washington Street has a base flood elevation of nine feet, whereas Union Street has a base flood elevation of seven feet according to FEMA Flood Insurance Rate Maps.

Figure 5: Diagram showing flood zones with base flood elevation notations. Credit: Massachusetts Office of Coastal Zone Management, 2017.

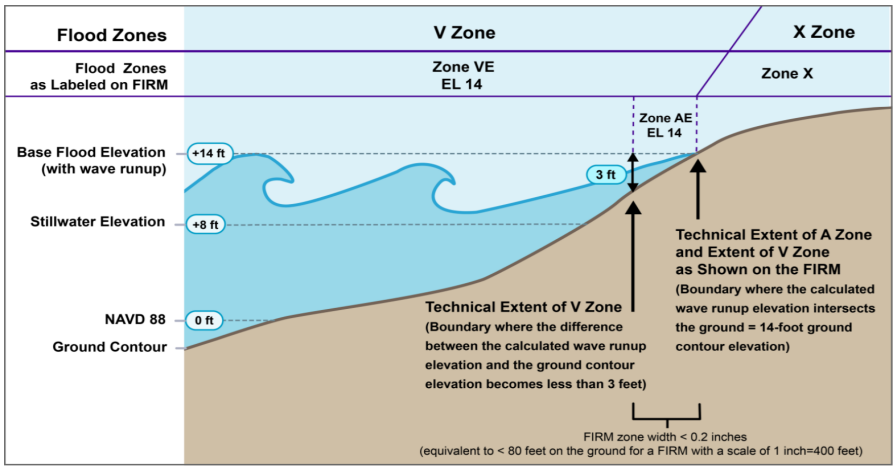


Figure 5. Cross-sectional diagram of flood zones on a steep embankment with runup. Here, an A Zone is shown in the profile, but would not be mapped on the FIRM because the zone is less than 0.2 inches in width on the FIRM—thereby not meeting the minimum zone width for mapping at the scale used for FIRMs. Where A Zones such as these are not mapped, the V Zone will extend to the designated ground elevation that corresponds to the V Zone BFE on the FIRM.

C

Cultural Landscape

(/ ˈkəlCH(ə)rəl/ /ˈlan(d)ˌskāp /)

A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: *historic sites*, *historic designed landscapes*, *historic vernacular landscapes*, and *ethnographic landscapes*.[5]

Example of usage: The Sherburne Settlement is held in conservation by the Nantucket Conservation Foundation, and while there is not much in terms of the built environment, one can see the human impact on the physical landscape, and with the potential for archeological significance; thus making this a cultural landscape warranting more study.

[5] Provided by the National Park Service

Cultural Resource

(/ ˈkəlCH(ə)rəl/ /ˈrēˌsôrs /)

Any prehistoric or historical remains or indicators of past human activities, including artifacts, sites, structures, landscapes, and objects of importance to a culture or community for scientific, traditional, religious, or other reasons.

Example of usage: Nantucket has many cultural resources from the Wampanoag peoples housed with the Nantucket Historical Association.

D

Design Flood Elevation

(/ drī/ /fləd/ /ˌeləˈvāSH(ə)n /) Alternatives: DFE

The height of the lowest occupiable floor, or the height of the lowest structural member of an inhabitable floor. Depending on the area's specifications, the DFE could be separated from the BFE by freeboard. (See *Freeboard*)

Example of usage: FEMA FIRM's say the BFE for my house is seven feet, but there is a freeboard of one foot for my flood zone, therefore I have a Design Flood Elevation of eight feet to elevate to.

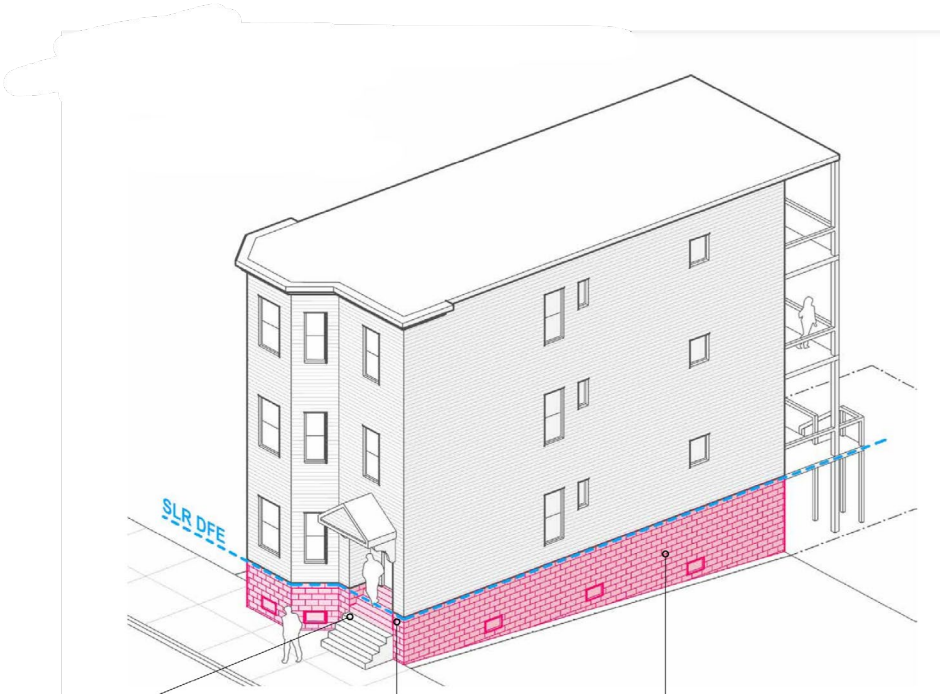
Dry Floodproofing

(/ drī/ /fləd ˈpro͞ofiNG /)

This adaptation approach is meant to keep water out as much as possible either by temporary means (i.e., sandbags) or permanent installations (i.e., flood gates and shields). This approach is typically effective for flood levels below three feet.

Example of usage: The Sea Street station has installed deployable flood shields at the entrances and elevated all machines to avoid flooding in case.

Figure 7: Design Flood Elevation (DFE) illustration. Source: Boston Planning & Development Agency, 2019. Coastal Flood Resilience Design Guidelines



E

Elevation

(/ ˌeləˈvāSH(ə)n /)

Structures are lifted above the designated flood level. This can be done by lifting the entire building onto a new foundation, or by elevating the interior floors with minimal changes to the exterior.

Example of usage: Increasingly, the Nantucket Historic District Commission is seeing applications for elevating houses within FEMA flood zones.

Ethnographic Landscape

(/ ˌeTHnəˈgrafik/ /ˈlan(d)ˌskāp /)

A landscape containing a variety of natural and cultural resources that associated people define as heritage resources.

Example of usage: The coastal areas of Nantucket were used by the Wampanoag making these areas significant ethnographic landscapes for understanding Wampanoag cultivation traditions prior to European contact.

Ethnographic Resource

(/ ˌeTHnəˈgrafik/ /ˈrēˌsôrs /)

The cultural and natural features of an area are of a time-honored significance to traditionally associated peoples.

Example of usage: Wampanoag artifacts found in coastal areas are significant ethnographic resources providing information to better understand Nantucket's indigenous population's traditions and practices.

Figure 8: Busy Nantucket Harbor at sunset. Credit: Kimberly Rose, 2019.

F

Freeboard

(/ ˈfrēbôrd /)

Extra footage regulated by local or state governments to provide extra protection to properties in flood zones. The distance between the BFE and DFE.

Example of usage: For new construction, the State of Massachusetts regulates a foot or two-foot freeboard additional to the BFE depending on the flood zone of the property.

H

Historic Designed Landscape

(/ hi-ˈstȯr-ik / /dəˈzīnd/ /ˈlan(d)ˌskāp /)

A landscape that was consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist according to design principles, or an amateur gardener working in a recognized style or tradition. The landscape may be associated with a significant person(s), trend, or event in landscape architecture; or illustrate an important development in landscape architecture's theory and practice. Aesthetic values play a significant role in designed landscapes.[6]

Example of Usage: The English Garden typology on Nantucket could be considered a historic designed landscape, as could park systems by the Nantucket Land Bank.

Historic Site

(/ hi-ˈstȯr-ik //ˈsīt /)

A landscape significant for its association with a historic event, activity, or person.

Example of usage: Sconset and Nantucket are both significant for the Whaling Era history, rise in heritage tourism, and pioneering Preservation for Massachusetts.

Historic Vernacular Landscape

(/ hi-ˈstȯr-ik // vər-ˈna-kyə-lər//ˈlan(d)ˌskāp /)

A landscape that evolved through use by the people whose activities or occupancy shaped that landscape. Through social or cultural attitudes of an individual, family, or community, the landscape reflects the physical, biological, and cultural character of those everyday lives. Function plays a significant role in vernacular landscapes. They can be a single property such as a farm or a collection of properties such as a district of historic farms along a river valley.[7]

Example of usage: Sconset, used as a retreat for working Nantucketer's and later tourists, has retained its original form of a whaling outpost, allowing a glimpse into the past for organic development.

[6] Provided by the National Park Service, Preservation Brief 36: Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes

[7] Ibid.

I

Integrity

(/ inˈtegrədē /)

The ability of a property to convey its historical associations or attributes. While the National Historic Landmark (NHL) and National Register of Historic Places (NR) programs use the same seven aspects of integrity to evaluate properties (location, setting, design, materials, workmanship, feeling, and association) NHLs must retain them to a higher degree than required for NR listing.

Example of usage: Nantucket's retention of integrity can be traced to grass root movements which are outlined in the National Historical Landmark designation.

M

Memorandum of Understanding

(/ ˌmemәˈrandәm/ /әv/ /ˌәndәrˈstandiNG /)

A nonbinding, written document that states the responsibilities of each party to an agreement, before the official contract is drafted.

Example of usage: In times of disaster, FEMA will often collaborate on a memorandum of understanding with another agency to streamline resource allocation and response.

Mitigate

(/ ˈmidəˌgāt /) Alternatives: mitigation | mitigated

1. Climate Change: human intervention to reduce the human impact on the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.
2. Emergency Response: the effort to reduce the loss of life and property by lessening disasters' impact.

Example of usage: 1. Installing solar panels or checking the insulation of a building can help mitigate carbon and energy usage.

2. Emergency plans can improve disaster mitigation by providing processes to follow and expediting responses.

N

National Flood Insurance Program (NFIP)

(/ ˈnaSH(ə)n(ə)l/ /fləd/ /inˈSHoo͝rəns/ /ˈprōˌgram /)

Flood insurance for property owners, renters, and businesses, which helps them recover faster when floodwaters recede. The NFIP works with communities required to adopt and enforce floodplain management regulations that help mitigate flooding effects.[8]

Example of usage: The better protected your building, the better the rates will be for the National Flood Insurance Program will be.

National Historic Landmark Program

(/ ˈnaSH(ə)n(ə)l/ /hiˈstôrik/ /ˈlan(d)ˌmärk/ /ˈprōˌgram /)

Historic places that hold national significance. The Secretary of the Interior designates these places as exceptional because of their abilities to illustrate U.S. heritage. After designation, the program monitors properties and offers technical assistance.

Example of usage: Nantucket and its sister islands are National Historic Landmarks with other Massachusetts examples being the Boston Public Gardens and Brookline Reservoir of the Cochituate Aqueduct, just to name a few.[9]

National Register of Historic Places

(/ ˈnaSH(ə)n(ə)l/ /ˈrejəstər/ /əv/ /hiˈstôrik/ /plās-es /)

The official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

Example of usage: Nantucket, Tuckernuck, and Muskeget are listed on the National Register of Historic Places as a National Historic Landmark.[10]

Nature-based solutions

(/ ˈnā-chə / / ˈbāst / / sə-ˈlü-shə /)

Approaches that mimic characteristics of natural features but are created by human design, engineering, and construction to provide specific services such as coastal risk reduction.

Example of usage: Man-made oyster reefs support more robust ecosystems and absorb wave action, decelerating velocity.

[8] Provided by the Federal Emergency Management Agency
[9] Learn more about the National Historic Landmark Program here: https://www.nps.gov/orgs/1582/index.htm
[10] Learn more about the National Register of Historic Places here: https://www.nps.gov/subjects/nationalregister/index.htm

Non-Contributing Structure

(/ nän/ /kənˈtribyo͞otiNG/ /ˈstrək(t)SHər /)

Historic resources that, due to date of construction, alterations, or other factors, do not contribute to the historic significance or character. This is typically seen in zoning or other preservation guidelines or regulatory processes in contrast to a contributing structure.

Example of usage: Nantucket's National Historic Landmark designation was updated to include buildings previously considered non-contributing due to their date of construction.

P

Preservation

(/ ˌprezərˈvāSH(ə)n /)

The act or process of applying measures necessary to sustain the existing form, integrity, and historic property materials.

Example of usage: Drayton Hall in South Carolina is one of the best examples of the Preservation Standard.

R

Reconstruction

(/ˌrē-kən-ˈstrək-shən /)

The act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object to replicate its appearance at a specific period and in its historic location.

Example of usage: A storm in March 1984 eroded and significantly damaged the Great Point Lighthouse, which was reconstructed in a more secure site on the same plot of land.

Rehabilitation

(/ ˌrē-ə-ˌbi-lə-ˈtā-shən /)

The act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values. This includes projects of resilience.

Example of usage: Adaptive use is a primary rehabilitation focus and can be seen all over the Island, from the Whaling Museum, Academy Hill Apartments, and much of the Wharves.

Resilience

(/ rəˈzilyəns /)

1. Social context: The capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment. It is not a synonym for adaptation.
2. Ecological context: The ability of a natural system to bounce back after a disturbance.

Example of usage: 1. Communities need to improve their resilience by preparing for scenarios.

2. Healthy marsh systems have an inherent level of resilience, which extends to the area around them due to the ability to hold excess water and release it slowly.

Restoration

(/ ˌre-stə-ˈrā-shən /)

The act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.

Example of usage: The sensitive restoration of 55 Union in Nantucket maintained the home's interior floorplan, historic materials, and significant architectural details, earning the Nantucket Preservation Trust's Architectural Preservation Award in 2016.

S

Substantial Improvements

(/ səbˈstan(t)SHəl/ /imˈpro͞ovmənts /)

Any improvement of a structure, the cost of which equals or exceeds 50 percent of the market value(or smaller percentage if established by the community) before the "start of construction" of the improvement.

Example of usage: My house costs a million dollars market value, the changes I wish to make are at 400,000, since this is below half and does not disturb the historical integrity of my house, it is not a substantial improvement.

Sustainability

(/ səˌstānəˈbiləd**ē** /)

The integration of environmental health, social equity, and economic vitality to create thriving, healthy, diverse, and resilient communities for this generation and generations to come. The practice of sustainability recognizes how these issues are interconnected and requires a systems approach and an acknowledgement of complexity.[11]

Example of usage: Rain gardens, subsistence gardens, and native plantings are examples of sustainable approaches.

U

Undertaking

(/ ˈəndərˌtākiNG /)

National Historic Preservation Act 36 CFR 800.16(y) as a project, activity, or program that receives funding directly or indirectly from a Federal agency, including projects carried out by or on behalf of a federal agency; those requiring a Federal permit or license; and those under State or local regulation and needs approval from a Federal agency.

Example of usage: When FEMA deploys into a disaster area, it qualifies as an undertaking, and triggers a Section 106 review if there is not a Memorandum of Agreement.

V

Vulnerability

(/ vəl-n(ə-)rə-ˈbi-lə-t**ē** /)

The degree to which a resource, asset, or process is susceptible to climate change adverse effects, including climate variability and extremes.

Example of usage: Ecosystems impacted by human actions have a higher level of vulnerability than the ecosystems that can adapt as they need to.

Vulnerability Assessment

(/ vəl-n(ə-)rə-ˈbi-lə-t**ē**/ /ə-ˈses-mənt /)

Research completed analyzing the built and natural environment at a high level of detail to provide a rating and next steps. Findings typically propose policy and drive decisions and communication after the completed assessment.

Example of usage: New Bedford completed its vulnerability assessment in April 2019, which looked at a heritage site and proposed adaptation approaches.

[11] This definition is provided by the University of California: Los Angelas Sustainability Committee. https://www.sustain.ucla.edu/what-is-sustainability/

W

Wet Floodproofing

(/ wet/ /fləd'proo͞fiNG /)

This adaptation approach allows water to enter a space, typically a basement, in order to equalize water pressure. This approach is not recommended in high velocity, frequent, or long-term flooding.

Example of usage: Tobias Glidden's Wheels of Delight is a good example of wet floodproofing in Nantucket for its raised electrical equipment and water safe materials.

Whole Community

(/ hōl/ /kə'myo͞onədē /)

A system comprised of individuals and families, businesses, faith-based institutions, nonprofit groups, institutions of education, media, and all levels of government.

Example of usage: Preparedness efforts must reflect Nantucket's whole community to be effective and holistic in approach.

Figure 9: The Atheneum in Fall. Credit: Kimberly Rose, 2020

RESILIENT NANTUCKET

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