

3.3. MASSACHUSETTS

3.3.1. BARNSTABLE, MA

Population Density	76.3/ sq. mi.
Form of Government	Town
Category	Seasonal Ocean and Bayfront
CRS Rating	Not Participating

Median Household Income	Median Per Capita Income	% Owner Occ	Population	2000-2010 Pop Growth Rate	% White	% Hispanic Minority	% Seasonal Housing
58601	33838	54.5	45193	-0.58	89.3	3%	12.6%

Adaptations	Status	Incorp orates CC	Type	Impact	Standard	Costs	Funding Source
Climate Change Adaptation Project	In Progress	Yes	Procedural	Recommendation	Unique	Low (< \$10,000)	NGO/Foundation
Incorporates SLR into Coastal Resource Management Plan	Implemented	Yes	Procedural	Recommendation	Unique	Very Low (< \$1,000)	Other
Incorporates CC Into Comprehensive Plan	Implemented	Yes	Procedural	Recommendation	Above Required	Very Low (< \$1,000)	None
Incorporates SLR into Hazard Mitigation Plan	Implemented	Yes	Procedural	Recommendation	Above Required	Very Low (< \$1,000)	None
Zoning Law Explicitly Incorporates Sea Level Rise, Requires Freeboard and allows Height Limit Waiver	Implemented	Yes	Accommodation	Mandatory	Unique	Zero	None

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POPULATION AND GEOGRAPHY

Barnstable is the largest town, in area and population, on Cape Cod. It covers a large land area of 60 square miles, that extends from the Cape Cod Bay shore on the north to the Nantucket Sound on the south. It contains seven villages within its jurisdiction, including the large village of Hyannis, where the Barnstable town offices are located. It has land borders with the town of Sandwich and Mashpee on the west and Yarmouth on the east.

The town contains a large variation in geography within its borders. In addition to the large village of Hyannis, the town has many beaches, from the dunes of Sandy Neck on the north to the popular summer communities along the south shore beaches. The town contains 170 miles of shoreline, 11 great ponds, over 3,800 acres of salt marsh, 264 acres of fresh marsh, and 932 acres of barrier beach/dunes (Barnstable, Mass., Hazard Mitigation Plan, p. 14).

Elevations range from sea level along the north and south shores to a high point of approximately 230 feet on the moraine, near the Sandwich town line.

(Barnstable, Mass., Open Space and Recreation Plan (2010), p. 36). The northern part of town has extensively sloping terrain characterized by the knob and kettle landscape of the moraine, while the south is dominated by level outwash plain. The town is a hub of activity on the cape and contains the cape's largest airport; it is famous as the summer home of the Kennedys.

It has a relatively large share of permanent residents, numbering over 45,000. 22% of the housing is seasonal. The population is middle income and largely white. 54% of homes are owner-occupied. As described in the Coastal Resource Management Plan for the Three Bays and Centerville River Systems:

The Town of Barnstable is home to abundant and varied coastal resources, including harbors, bays, estuaries, salt marshes and shoreline. The extensive coastal resources are a source of local pride and scenic beauty, and they provide important ecological functions such as aquatic and terrestrial habitat, storm damage prevention, pollution attenuation, and sediment replenishment. They also support recreational and commercial activities ranging from shellfishing, fin fishing, and aquaculture to birdwatching, boating and beachgoing. These activities provide important opportunities for residents and visitors of the Town to enjoy the



Figure 3.3.1:1 - Downtown Hyannis, part of the Town of Barnstable

refreshing beauty of the coastline, which in turn nurtures environmental stewardship (Barnstable, Mass., Coastal Resource Management Plan, Three Rivers and Centerville River Systems, 1.1).

COASTAL ISSUES

As a large town on the Cape Cod peninsula, with two coastal exposures, Barnstable is highly susceptible to coastal hazards. The Hazard Mitigation Plan identified the risk of hurricanes and coastal storms, winter storms and nor'easters, shoreline change/coastal erosion, sea level rise, and dam failure. The hazard identification matrix—which includes measures on frequency, location, and extent—ranks floods, hurricanes, and wind as the most threatening risks.

The town has 7,475 acres in hurricane surge zones and 8,000 acres in flood zones, as well as 18 repetitive loss properties. The town has 24 critical facilities in the hurricane surge zone.

The town has over 1,000 residential units with an assessed value of over \$425 million in the 100-year flood zone. Commercial property value in the flood area is over \$38 million, excluding mixed-use categories. (Barnstable, Mass., Hazard Mitigation Plan, p. 18)

The town has a number of areas of special concern that are subject to coastal flooding and at risk from sea level rise. The Craigville Beach area and the Centerville Village Center are neighborhoods particularly at risk. The town has recognized this by designating them a District of Critical Planning Concern (DCPC). A number of roads are also subject to flooding. In particular, Route 6 in Barnstable (evacuation route), Mill Way in Barnstable, Commerce Road in Barnstable, and the West Bay (Oyster Harbors) Bridge are at risk.

ADAPTATIONS

Climate Change Adaptation Project

Barnstable (along with Dover, NH, Cranston, RI, and Wells, ME) recently signed on to participate in a Climate Change Adaptation Project led by the Consensus Building Institute, the Massachusetts Institute of Technology, and the National Estuarine Research Reserve System. The goal of the project "is to develop a better understanding of climate change risks, barriers to preparing for climate change impacts, and potential risk management strategies" (Barnstable, Mass., Press Release, Nov. 1, 2012) It will involve the community in role-play simulations as well as produce a comprehensive stakeholder assessment and mapping of various scenarios.

The town billed the project as "important and timely because climate change has the potential to impact coastal communities like Barnstable in a variety of ways, including increased flooding, shoreline erosion, saltwater intrusion into drinking water supplies, and possible damage to infrastructure and property...coastal communities can make investments and policy changes that will reduce their vulnerability...while protecting local environments and the communities that rely on them" (Barnstable, Mass., Press Release, Nov 1., 2012). Funding is being provided by the National Estuarine Research Reserve program administered by the University of New Hampshire.

Incorporates Sea Level Rise into Coastal Resource Management Plan: Three Bays and Centerville River Systems

In 2009, the town prepared and adopted a coastal resource management plan for the Three Bays and Centerville River systems, which are among the Town's south-facing coastal resource areas. The plan includes such matters as Marine Services and Facilities, Fisheries, Natural Resources, and Coastal Structures. The goals for the plan were to enhance natural resources, enhance public access, protect traditional water activities and uses, and enhance aesthetic quality.

The project incorporates Sea Level Rise as a concern throughout the document. (6.3.3.1) It recommends the town continue periodic monitoring of bathymetry and hydrodynamics in light of the concerns about sea level rise.

The plan states, "Recent publications suggest potential of approximately three feet of relative sea level rise by 2100. Possible effects include shoreline erosion, loss of wetlands and beach areas, damage to sensitive infrastructure, saltwater intrusion into wells, and elevated storm surge levels. Relative sea level rise is an impending threat to natural resources, public infrastructure and private property. Although the acceleration of sea level rise is beyond the scope of local control, the Town can adopt management practices to prepare and potentially mitigate damaging effects."

In the recommended actions, it suggests the town should "protect the integrity of coastal features that provide storm damage protection" by:

- Focusing on land acquisitions in FEMA A and V zones,
- Limiting development in FEMA V zones,
- Ensuring regulations allow for reasonable use of property,
- Adoption of a sewer neutral regulation,
- Adoption of a Flood Plain ordinance. (6.4.3)

Other recommendations include "assess potential threats posed by accelerated sea level rise" (6.4.3.2) by collecting data on shoreline elevations and land uses, and recommends the town "develop a local management plan for sea level rise. (6.4.3.3).

Incorporates Sea Level Rise and Climate Change into Comprehensive Plan

The Town Comprehensive Plan includes recommended actions to address flood hazards and sea level rise, including:

- Purchasing land in FEMA A and V zones and barrier beach areas
- Preparing a pre-disaster mitigation plan to meet FEMA standards
- Directing development outside of FEMA A and V zones
- Developing regulations to prevent movement of earth, development of erosion control structures, or mounding of septic systems from altering the flood preventing functions of coastal landforms
- Adopting a flood plain bylaw based on the Cape Cod Commission Model
- Designing stormwater infrastructure and septic systems within A and V zones to accommodate sea level rise (Comprehensive Plan, 2.2.2.1).

The plan promotes smart growth by encouraging compact development patterns and infill and redevelopment.

This approach is aimed at preserving the Town’s sensitive environmental areas and natural resources. The plan designates areas as “designated for growth,” “designated for infill and redevelopment,” or “not designated for growth,” and states that areas including FEMA flood zones and Hurricane Surge Inundation areas are “not designated for growth.”

Zoning Law Explicitly Incorporates Sea Level Rise (Districts of Critical Planning Concern (DCPC), Requires Freeboard and Allows Height Limit Waiver

The town has recognized that the Craigville Beach area and the Centerville Village Center are at particular risk to coastal flooding. The town enacted a special zoning ordinance as part of the designation of the Craigville Beach area as a District of Critical Planning Concern. Districts of critical concern are permitted under the Cape Cod Commission legislation, and permit towns to supersede state law with respect to certain regulations, including requiring freeboard of structures above the state law.



Figure 3.3.1:2 - House in Craigville Beach District of Critical Planning Concern

The purpose and intent section of the town code states: "As the entire complex of coastal wetland resources moves landward due to relative relative sea level rise, the Craigville Beach area’s coastal floodplains immediately landward of salt marshes, coastal beaches, barrier beaches, coastal dunes, and coastal banks require special protection" (Barnstable, Mass., Town Code Sec. 131.1) The law requires structures in the V zone and the A zone to be elevated to 2 feet and 1 foot above base flood elevation, respectively. (Sec 131.7)

§240-131.1 Purposes and Intent

A. The purposes and intent of this section is to guide development in the Craigville Beach District by promoting development and redevelopment that:

- (1) Contributes to and respects the character and historic development patterns of the area; lessens development and redevelopment impacts to the historic and community character resources in this area;
- (2) Protects and preserves scenic views and vistas and ways to the water;
- (3) Protects and improves natural resources including but not limited to the barrier beach and groundwater and coastal water quality; lessens development and redevelopment impacts to the natural resources and ecosystems in this district;
- (4) Protects human life and property from the hazards of periodic flooding,
- (5) Preserves the natural flood control characteristics and the flood control function of the flood plain,

(6) Preserves and maintains the ground water table and water recharge areas within the floodplain. As the entire complex of coastal wetland resources moves landward due to relative sea level rise, the Craigville Beach area's coastal floodplains immediately landward of salt marshes, coastal beaches, barrier beaches, coastal dunes, and coastal banks require special protection.

The special district, which was also concerned with preservation of views and community character, specifically allows for waiver of height limits when necessary to elevate a structure:

Within the flood plain the maximum building height, when necessary to flood proof the structure, reconstruction or addition, may be increased to allow the required elevation above the BFE plus 2 feet (131.7)



Figure 3.3.1:3 - Craigville Beach

Incorporates Climate Change into Hazard Mitigation Plan

Sea level rise was addressed as separate hazard in the town's HMP. In addition to sea level rise, the hazard mitigation team determined that the town was at risk to hurricanes and coastal storms, winter storms and nor'easters, shoreline change/coastal erosion, earthquakes, drought/wildfire, and dam failure.

The plan considers two mitigation actions in relation to sea level rise specifically:

Mitigation Action #11 suggests "Buildings and infrastructure in areas of projected sea level rise should be designed for protection from flooding as well as to minimize risk to human health and safety. The priority level was rated low, however.

Mitigation Action #12 recommends the town "design stormwater management systems and new and replacement septic systems within FEMA A and V zones to accommodate a sea level rise." The priority level was also rated low for action 12.

Many of the other recommended actions would also be climate and sea level rise adaptive, including:

Mitigation Action #4: Explore the adoption of regulations and incentives to restrict new development and redevelopment in A and V zones, on barrier beaches, or on coastal dunes where there is known to be danger of significant flood damage

Mitigation Action #9, reduce impacts in FEMA A and V zones by amending the Zoning Ordinance to require floor area ratio requirements that allow development and redevelopment that does not create large impervious surface, is also climate adaptive, and

Mitigation Action #15, which is to identify, pursue, and fund actions, regulations or outreach efforts necessary to qualify for the National Flood Insurance Program's Community Rating System (CRS).

Incorporates Sea Level Rise and Flood Mitigation into land acquisition strategy/ uses restoration, "undevelopment" to improve Environmental quality

The Barnstable 2010 Open Space and Recreation Plan, which is a component of the Barnstable Comprehensive Plan, considers the town's open space needs and proposes a strategy for land acquisition.

As an overall open space plan, it considers all of the needs of the town including protection of public water supply, protection of fresh and marine surface water bodies, wildlife habitat, agriculture, and public access to the water. The plan considers the issue of sea level rise and its impact on open spaces at numerous points. The plan also includes as a priority action to "look for opportunities to protect open space adjacent to coastal resource areas for the purposes of public access and/or resource protection, through acquisition or alternative land protection tools. (Barnstable, Mass., Open Space Plan, p. 13)

One unique element of the plan is support for retreat strategies, or "Property Reclamation" or "undevelopment," which the town adopted as a land use strategy. The town uses reclamation for a variety of purposes, "including traffic mitigation, resource protection or property remediation, with the added benefit of creating open spaces in densely developed areas" (Barnstable, Mass. Open Space Plan, p.18) Six properties in Hyannis, Centerville, and Cotuit have been undeveloped. A former motel on Craigville Beach Road in Centerville was acquired and demolished, to preempt more intensive development in the vulnerable coastal location. The property is now used as the town's coastal plant nursery. In addition, a Gulf Station on Main Street in Hyannis was razed and now serves as a pocket park utilizing phytoremediation (p.19).