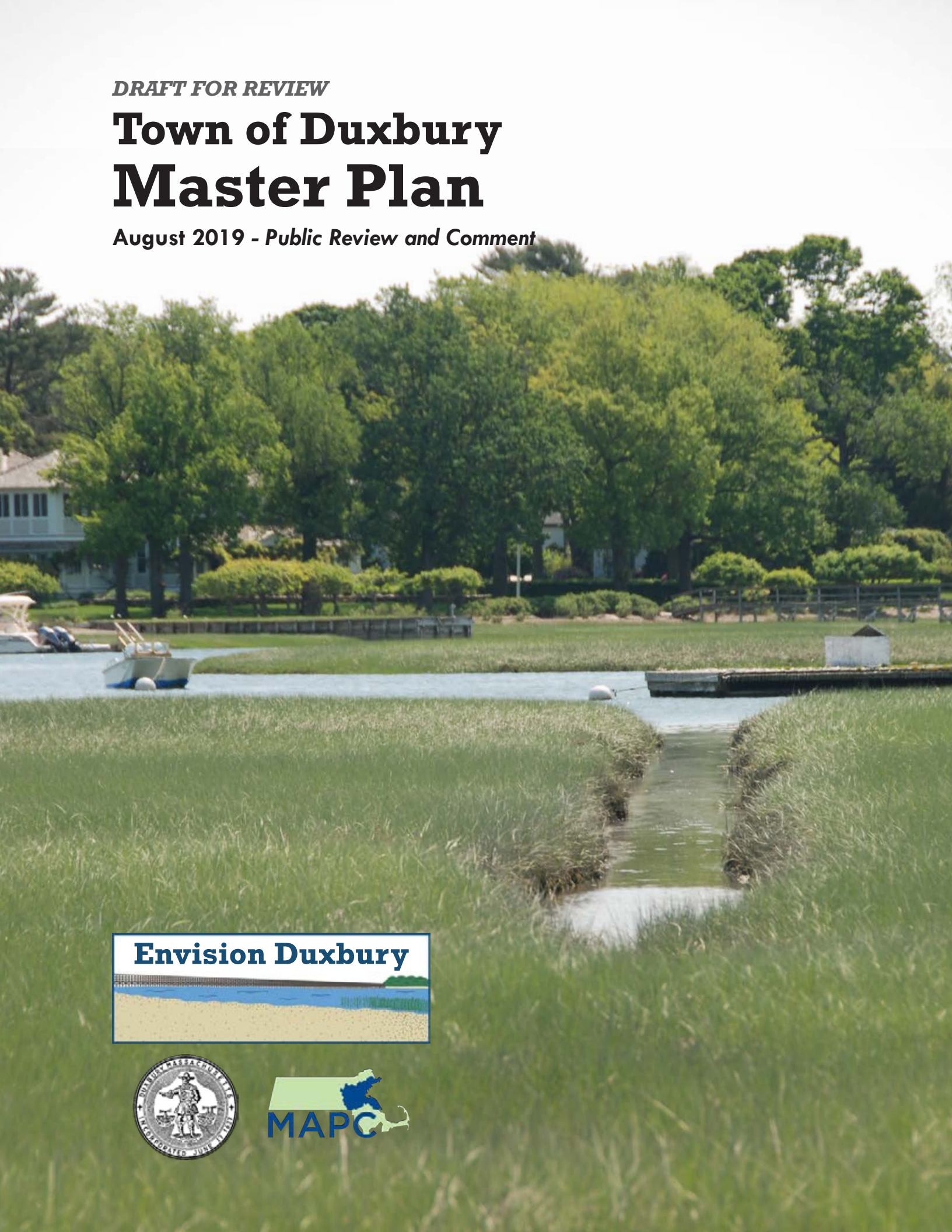
DRAFT FOR REVIEW

Town of Duxbury
Master Plan

August 2019 - *Public Review and Comment*



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Funding

Town of Duxbury
District Local Technical Assistance (DLTA)

Envision Duxbury

Cover and Background Image: Bluefish River Source: MAPC

Master Plan Ambassadors

The Envision Duxbury Master Plan process would not have been a success without the dedication and involvement of the following individuals who provided input, attended meetings, reviewed draft materials, reached out to the community, and offered their perspectives on Duxbury.

- Anne Antonellis, *Economic Development*
- Judi Barrett, *Housing*
- Diane Bartlett, *Housing*
- Skip Bennett, *Economic Development*
- Sue Bradford, *Public Facilities and Services*
- Paul Brogna, *Transportation and Circulation*
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- Rob Fawcett, *Economic Development*
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- Mike Juliano, *Economic Development*
- Tony Kelso, *Historic and Cultural*
- Pat Loring, *Open Space and Recreation*
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- Holly Morris, *Sustainability*
- Janet Rich, *Historic and Cultural*
- Janet Schwartz, *Historic and Cultural*
- Myrna Walsh, *Public Facilities and Services*
- Sally Wilson, *Land Use and Zoning*

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August 2019 - *Public Review and Comment*

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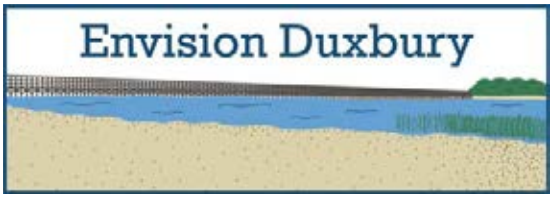

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Cover and Background Image: *Conservation Land Source: MAPC*

Introduction

Purpose and Process
Duxbury Today
Duxbury's Vision

Chapter 1
Purpose and Process

What is Envision Duxbury?

Envision Duxbury is a comprehensive master plan developed by the Town of Duxbury with the support of the Metropolitan Area Planning Council (MAPC) and under the direction of the Duxbury Planning Director, Planning Board, and a group of dedicated local volunteers called Master Plan Ambassadors.

The vision, goals, and objectives outlined in the Master Plan are the voice of the residents of Duxbury compiled from one-on-one conversations, community meetings, resident connections, online surveying, and meetings with boards and committees. Duxbury wrote this plan with the involvement of an estimated 1,500 participants who shared their time, expertise, and ideas through this process. This inclusive effort has documented Duxbury's plan, Duxbury's vision, and Duxbury's goals.

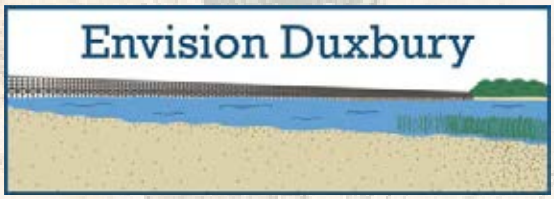


Image: *Duxbury Beach Source: Jill Erickson*

What is a Master Plan?

In the Commonwealth of Massachusetts, cities and towns are required periodically to develop a master plan that defines municipal goals and policies relating to:

- Land Use,
- Housing,
- Economic Development,
- Natural and Cultural Resources,
- Open Space and Recreation,
- Services and Facilities,
- Transportation, and
- Master Plan Implementation.

According to State statute, each master plan should be "designed to provide a basis for decision-making regarding the long-term physical development of the municipality." The Town of Duxbury's last master plan was completed in 1999. As outlined in the State statute, a master plan is a strategic framework that guides the future physical and economic development of the town based on the community vision and goals. Developing a master plan is more than just researching and writing a report. It is an open, public process through which the people of Duxbury have collaborated to establish future priorities to guide conservation, preservation, growth and development over the next decade. It is a process through which town residents and business owners, and Town boards and committees, talk to each other, listen to each other, and determine a set of common goals to guide future decisions in the Town of Duxbury.

The set of topics covered by the plan is comprehensive and the plan is intended to apply to the entire geography of the Town of Duxbury. The Envision Duxbury Comprehensive Plan process has included discussion and analysis of the following elements:

- Duxbury Today
- Duxbury's Vision for the Future
- Open Space and Recreation
- Sustainability: Climate Action and Energy
- Historic and Cultural Resources
- Transportation and Circulation
- Housing
- Public Facilities and Services
- Economic Development
- Land Use and Zoning
- Implementation

Process Summary

Community Engagement

During the course of the Envision Duxbury process, residents of all ages, business owners, elected and appointed representatives, and others were invited to weigh in on important issues facing Duxbury. The process included many ways to participate.

The Planning Director and Planning Board members, with assistance from MAPC, synthesized all findings, then developed a set of draft goals, strategies and actions for each element, and developed an implementation strategy for each. Once the draft plan elements were complete, the full document was released for public comment. Presentations and discussions occurred with residents and interested parties to solicit feedback (including at public forums throughout the process). Meetings with appointed and elected boards of Duxbury will also be held to solicit feedback and guidance.

Finally, after considerable input, the plan has been finalized and approved by the Planning Board. Once approved, Envision Duxbury will serve as the guiding planning document for the Town of Duxbury over the next 10 years.

What is MAPC and what is its role in Envision Duxbury?

The Metropolitan Area Planning Council (MAPC) is under contract with the Town of Duxbury to undertake the master planning process. MAPC is the Regional Planning Agency for the 101 cities and towns that make up Greater Boston. The agency's charge is to use planning to improve Metro Boston's livability, its prosperity, safety, health, equity, and distinctive character. To that end, MAPC assists its municipalities with planning projects; provides them with opportunities to save money with group purchasing; and acts as a regional think-tank, offering data, analysis, advocacy, and regional collaboration.

Project Timeline

The master plan process was divided into two phases to allow for enough space for each of the topics to be discussed and to assist in the funding of the effort. Overall, the two phase project took place over about 2 years. Phase 1 began in the later summer of 2017 and Phase 2 began the summer of 2018. The final draft of the Master Plan was completed at the beginning of the summer of 2019.

The elements included in this master plan, one element for each chapter of this document, were divided between the phases as follows:

Phase 1 Elements
- Community Vision
- Duxbury Today
- Housing
- Historic and Cultural Resources
- Open Space and Recreation

Phase 2 Elements
- Sustainability - Energy
- Sustainability - Climate
- Economic Development
- Transportation and Circulation
- Public Facilities and Services
- Land Use and Zoning

A diagram of the project timeline is shown on the following page. Highlights of the process include the following events and milestones.

Community Meetings

The Town of Duxbury Planning Board and MAPC hosted three open Community Meetings to invite feedback and discussion throughout this planning process. Each meeting was well publicized and well attended. The meetings occurred on November 17th 2017, October 24th 2018, and March 26th 2019. The first community meeting focused on discussion and feedback for Phase 1 elements. The second community meeting focused on discussion and feedback for Phase 2 elements. The third community meeting focused on discussion and

feedback for the draft goals and strategies for all elements of the Master Plan.

Planning Board Meetings

In addition to the Community Meetings, MAPC attended regular Planning Board meetings to discuss the Envision Duxbury Master Plan and present initial findings and progress throughout the planning process. These meetings were open to the public with posted agendas and televised on PACTV. Planning Board presentations and discussions occurred in June 2017, October 2017, April 2018, September 2018, November 2018, February 2019, May 2019, and June 2019. These recorded meetings were linked to the Town's Master Plan webpage.

Media Coverage

All Community Meetings and Planning Board Meetings were covered and broadcast live, with rebroadcasts to make the information widely available through PACTV. Interviews were given with the principal planner at MAPC and the Planning Director of Duxbury. The Duxbury Clipper provided coverage of meetings and events throughout the process helping to spread news about the process and provide a broader audience information about the content of the plan.

Department Head Meetings

The process and initial findings were discussed at Town of Duxbury Department Head meetings with presentation of initial findings made by the Planning Director. Town of Duxbury Departments were kept informed about the process and provided an opportunity to stay engaged with the plan content and provide feedback on initial findings, goals, and recommendations.

Board and Committee Meetings

During the months of April and May in 2019, the Planning Director met with Town Boards and Committees to engage them in discussion about

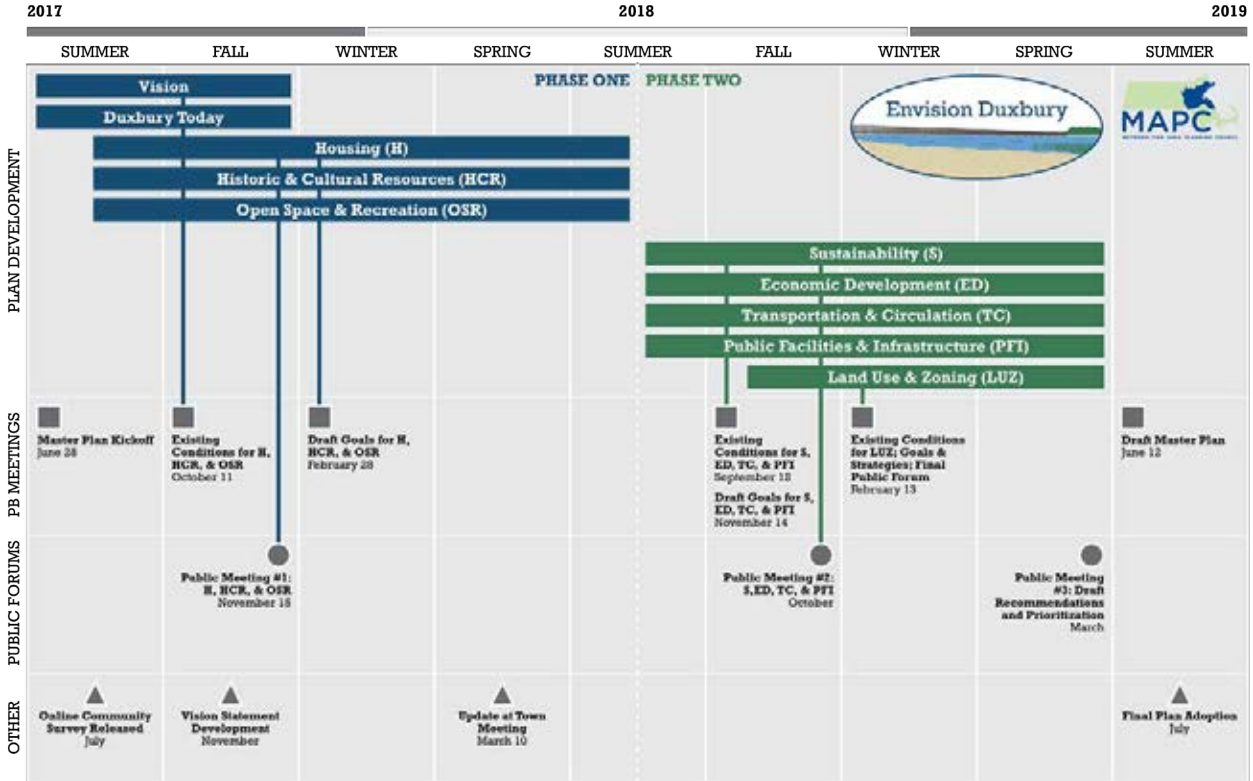


Image: *Envision Duxbury Master Plan Process Timeline Source: MAPC*

the Envision Duxbury Master Plan. The initial findings, goals and recommendations were shared in draft form and feedback was invited to help refine and improve the Envision Duxbury Final Draft. Through this process and discussion many comments were received and integrated into this final plan document. This process and final plan benefit from the dedicated involvement of all residents, boards, and committees who have taken the time to review and comment on the draft materials.

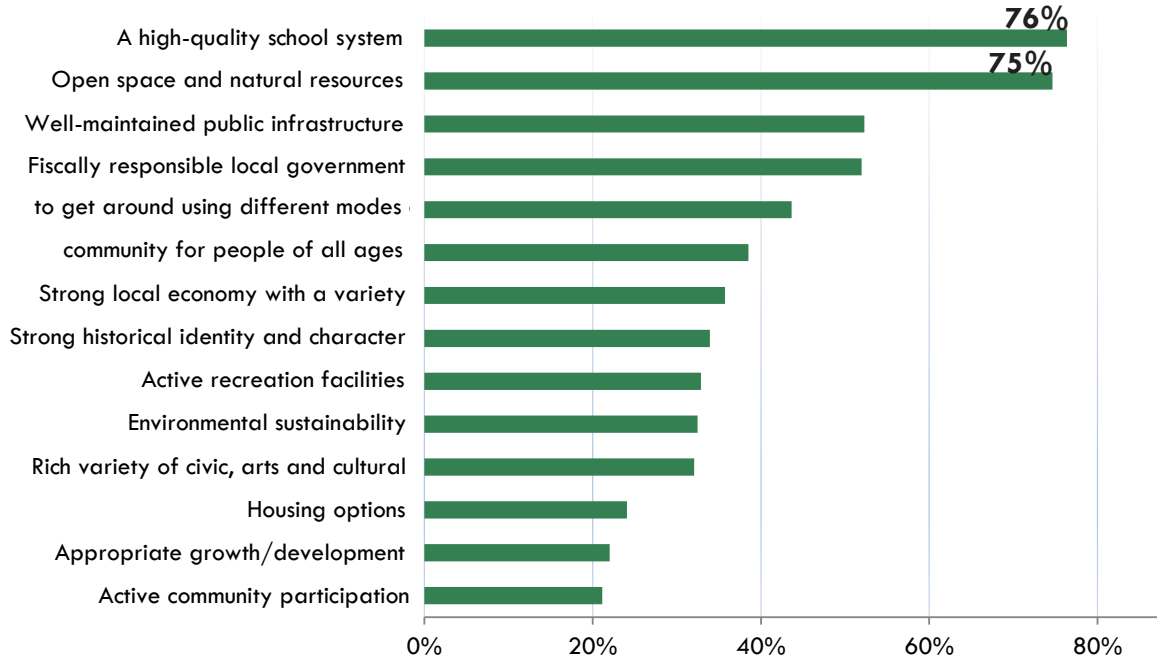
Ambassador Discussion and Feedback

In addition to all of these outreach and engagement efforts, the Envision Duxbury process relied on the dedication and effort of local residents involved in the process from the beginning. These residents, referred to as Master Plan Ambassadors, were a resource for local expertise, advice, engagement, and feedback for the planning team. Among all of the contributions of the Ambassadors, the resounding success of the Community Survey is perhaps the most notable. The Ambassadors were out in the community promoting participation in the survey by handing out cards at local events.

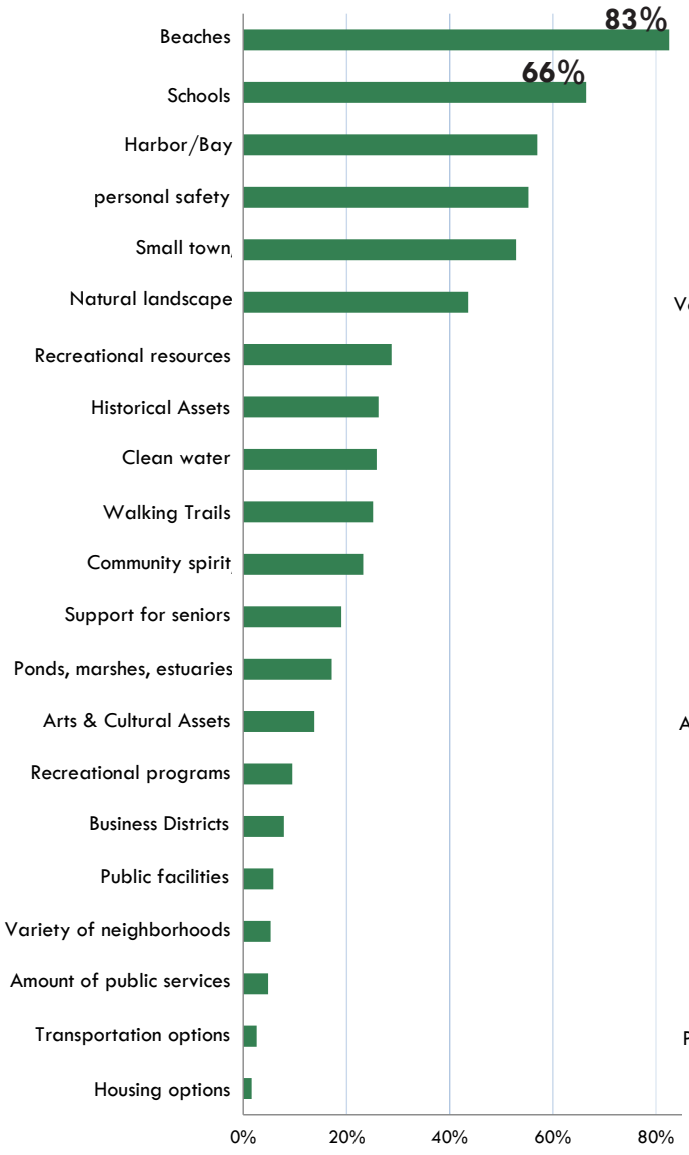
Community-wide Survey

As part of the extensive engagement process undertaken through Envision Duxbury, a community wide online and paper survey was made available to residents and stakeholders in Duxbury. The survey received over 1,200 responses from Duxbury residents. Based on the most recent total population of Duxbury, about 15,000 people, the responses to the survey represent a sample of about 8% of the Town's population. A very strong example of how this planning process is compiled from the voices of Duxbury residents. Examples of the responses from the survey are included on the following pages.

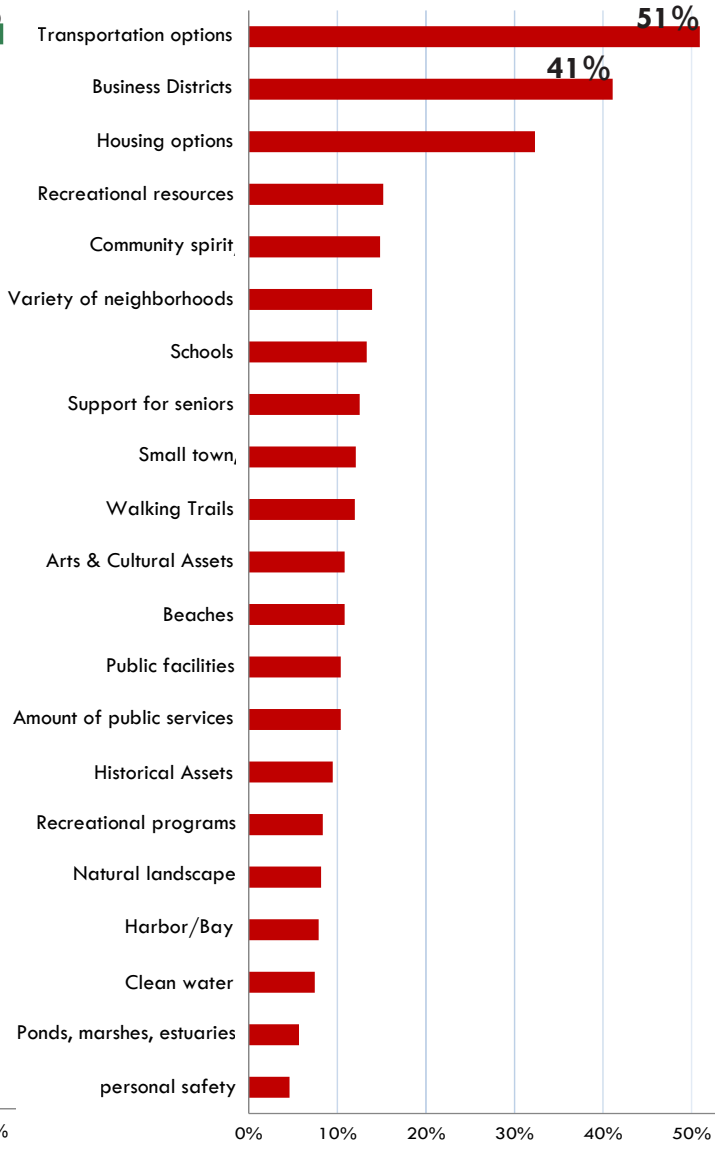
Which of these community values are most important to you?
Results from the 1,226 responses to this survey question:



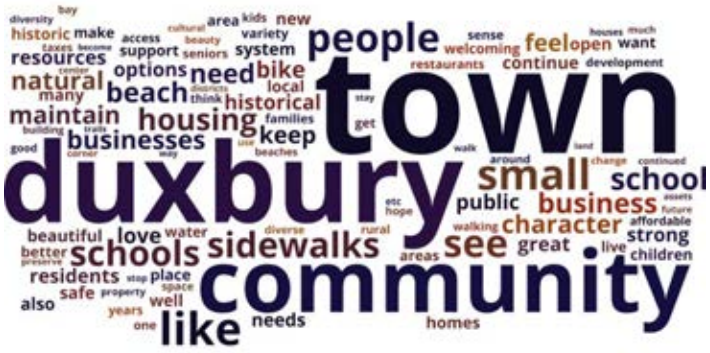
Greatest Assets: What do you like most about Duxbury?
Results from the 1,223 responses to this survey question:



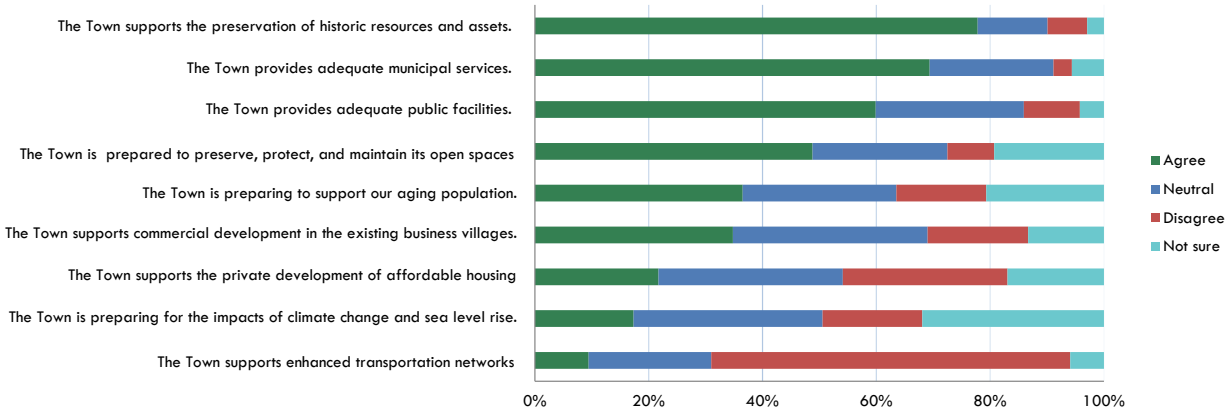
Greatest Challenges: What do you think is most in need of improvement of change in Duxbury?
Results from the 1,127 responses to this survey question:



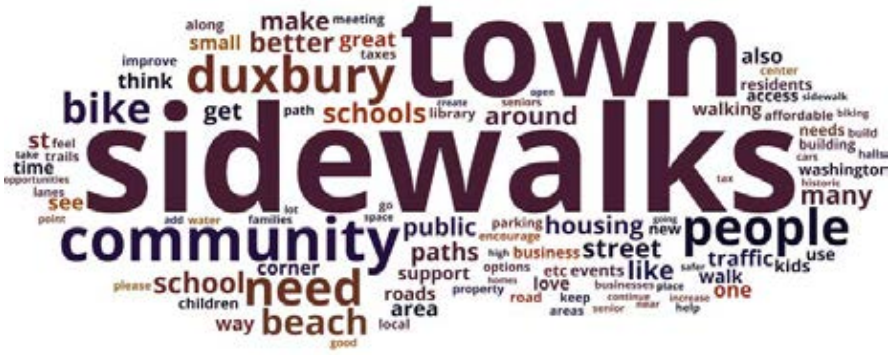
What is your vision for Duxbury?
This "word cloud" is composed of the 100 most frequently used words from 775 responses to this survey question:



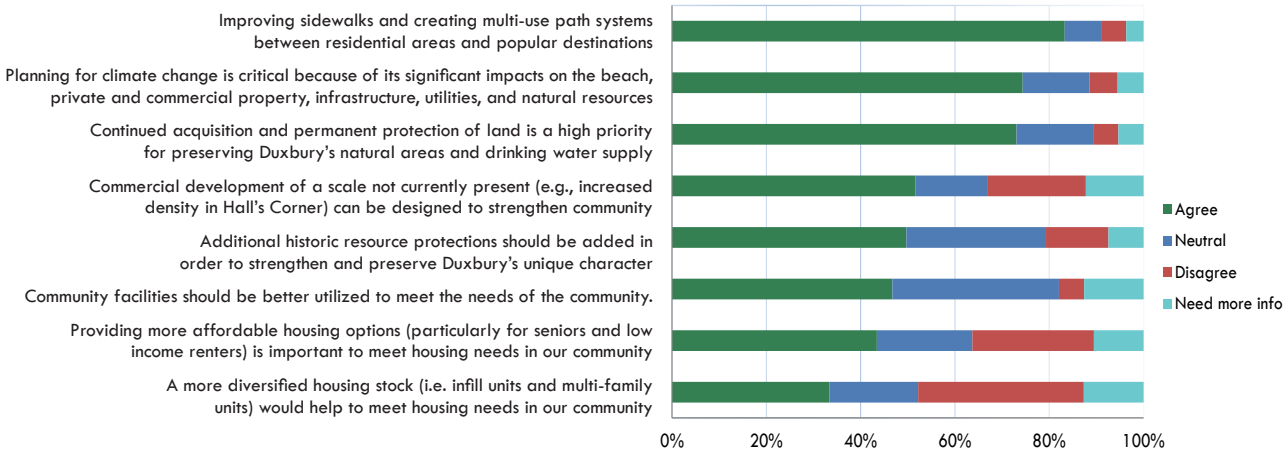
Please indicate your level of agreement/disagreement with the following statements?
Results from the 1,131 responses to this survey question:



Good Ideas? Many people have good ideas about how to make Duxbury a stronger community. These ideas may be big or small. What are your good idea(s)?
This "word cloud" is composed of the 100 most frequently used words from the 539 written responses to this survey question. The larger the word, the more frequently it was used. For example, the word "sidewalks" was used among the most frequent for good ideas.

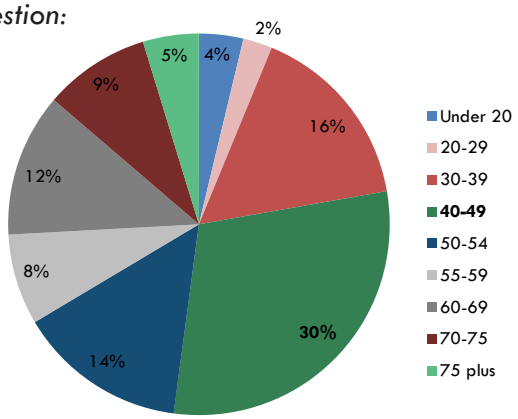


A review of existing plans have revealed different potential solutions to challenges and opportunities in Duxbury. Please share your current level of agreement or disagreement with the following.
Results from the 1,099 responses to this survey question:



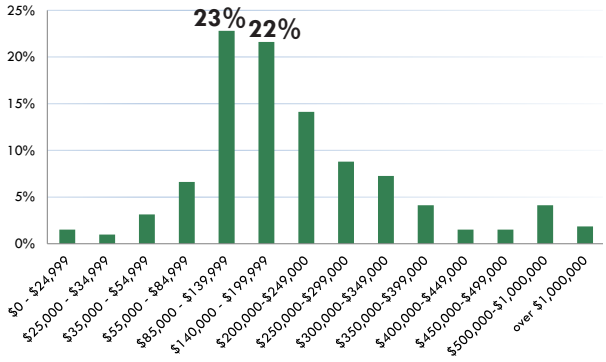
How old are you?

Results from the 1,013 responses to this survey question:



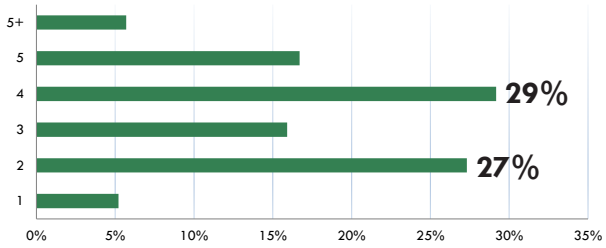
What is your annual household income?

Results from the 921 responses to this survey question:



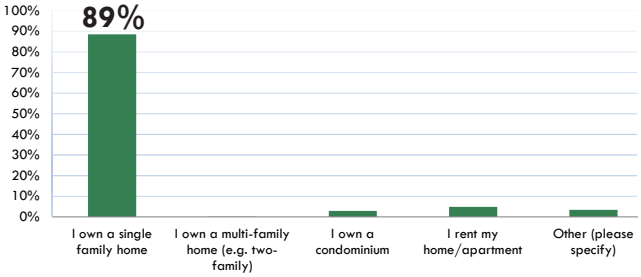
How many people live in your household?

Results from the 1,018 responses to this survey question:



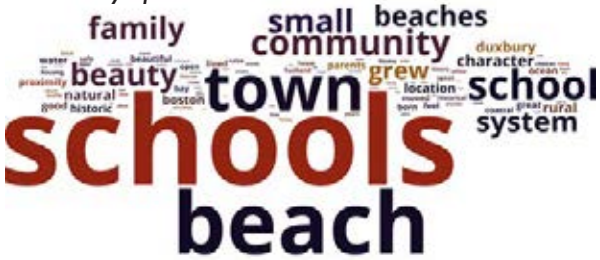
Do you own or rent your home?

Results from the 1,023 responses to this survey question:



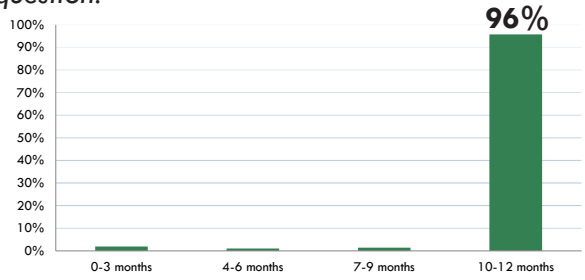
What originally attracted you to Duxbury?

This "word cloud" is composed of the 100 most frequently used words from the 842 responses to this survey question:



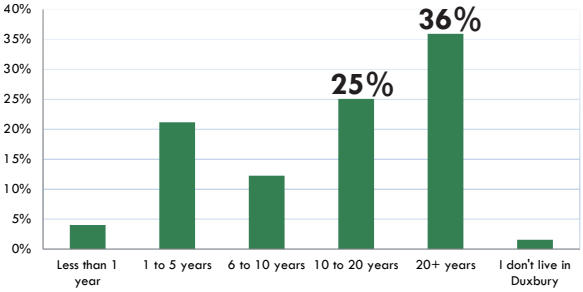
How many months of the year do you live in Duxbury?

Results from the 1,005 responses to this survey question:



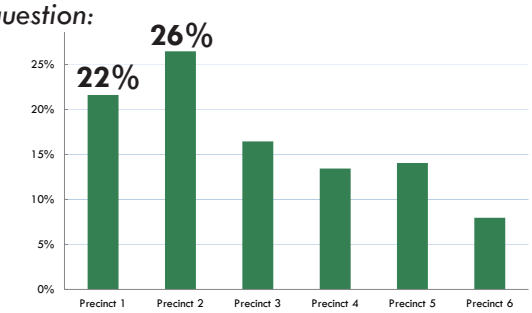
How long have you lived in Duxbury?

Results from the 1,021 responses to this survey question:



In which precinct in Duxbury do you live?

Results from the 967 responses to this survey question:



Chapter 2
Duxbury Today

Key Findings

This chapter sets the stage for goals, strategies, and recommendations of the master plan. A current understanding of the context of Duxbury today is critical in understanding where the community is in relation to its shared vision for the future. This chapter outlines current facts about Duxbury through:

- Location and Regional Context
- Historical Context
- Government Structure
- Planning Initiatives
- Population Characteristics and Projections

Overarching Themes

Change is Happening

Even though the Town of Duxbury has a strong legacy of conservation and preservation, the town remains in a constant process of change. These changes may be small - properties change ownership, change use, facilities age and are renewed, or priorities shift. These changes may also be big, and sometimes beyond the control of the Town - climate characteristics are changing, real estate markets are shifting, work place trends and commuter patterns shift. One measure of the type of changes that will occur over the life of this master plan document is shifting land use in the town. In the 1999 Master Plan residential acreage in the town was 4,430 acres and today it is approximately 7,316 acres. The Master Plan represents an opportunity for the Town to positively shape change and proactively guide the Town's solutions to development changes, demographic trends and climate change.

Unique but Connected

Today, the Town of Duxbury enjoys the benefits of decisions made by previous generations around conservation, preservation and economic development. The town is a unique world apart, but it is still dependent on its neighbors. Residents and local businesses are dependent on the broader conditions of the subregion and metropolitan Boston for goods, services, jobs, employees, and patrons. The South Shore Chamber of Commerce identifies two items that resonate with this Master Plan and the future of Duxbury in its Regional Development Strategy. First, attract a younger workforce and be welcoming to families and second, promote new business startups and entrepreneurship. Both of these strategies relate directly to strengths and trends in Duxbury including the exemplary school system, aging demographics, and growing percentage of the workforce choosing to work from home.

Safe Walking and Biking

Throughout this process, the community has expressed a strong desire for improved safety and convenience for walking and biking in Duxbury. Walking and biking have both grown as high demand and high benefit activities. Younger generations see walkability as a key characteristic of desirable communities and most everyone would prefer to be stuck in traffic congestion less frequently. Although solutions are not easy or without trade-offs, the goal to

Image: *New Local Businesses in Millbrook Source: MAPC*

improve walkability and bikability in the town has been clearly articulated. This plan explores several strategies for making progress on what could be a legacy effort and gift of foresight and planning for the next generation.

Coastal Resilience

Coastal resilience and sustainability efforts of the town are current and present needs that must continue to be a focus of planning and investment by the town. Sea level rise puts an estimated $12 million of commercial property at risk in Duxbury with potential impacts to coastal homes, historic properties, the shellfish industry, and natural functions of Duxbury Bay. Duxbury needs to remain in front of these issues and be a leader in climate adaptation and resilience efforts.

Stewardship and Legacy

The value of the historic and cultural assets of the town are well-known to its residents and leadership. Many aspects of this plan look to carry forward the legacy of the Town including its history, culturally significant sites, historic homes, dedication to conservation and environment, and high quality schools and municipal amenities. This stewardship applies to thousands of acres of protected lands, regional trail systems, and high quality organizations.

Location and Regional Context

The Town of Duxbury, Massachusetts is a coastal community located 35 miles southeast of Boston in Plymouth County. It is well connected to the Boston region due to its location along the Route 3 corridor, a controlled-access highway connecting Boston with Cape Cod, and Route 3A, a state highway connecting southern Plymouth north to Tyngsborough at the New Hampshire state line. Other numbered state routes in Duxbury include Route 14, Route 53, and Route 139. The South Shore town is bordered by Marshfield on the north, Pembroke on the west, Kingston on the south, and the Atlantic Ocean on the east. The easternmost part of Duxbury is a seven-mile-long barrier beach on Massachusetts Bay which shelters Duxbury Bay and at its end is Plymouth's Gurnet and Saquish.

Duxbury has a geographic area of almost 38 square miles, 24 of which is land and 14 of which is water. It is characterized by the Metropolitan Area Planning Council (MAPC) as an Established Suburb. Established Suburbs are lower density suburbs that are approaching

1. MAPC (2008), "Massachusetts Community Types," www.mapc.org/wp-content/uploads/2017/09/Massachusetts-Community-Types-Summary-July_2008.pdf
2. Ibid.

buildout with limited amounts of vacant land. They consist predominately of owner-occupied single family homes on ¾ - 1 acre lots. New growth is primarily teardowns, with some small-scale greenfield development and some redevelopment. Population in Established Suburbs is stable or growing moderately.[1]

Duxbury is generally lower density compared to its neighbors, particularly Kingston and Plymouth. Those communities are considered Maturing New England Towns, which tend to have mixed uses and densities, as well as compact neighborhoods on ¼ - ½ acre lots. Outlying areas are mostly low-density and there are large amounts of vacant developable land. New growth in these communities consists primarily of conventional subdivision development on vacant land. Compared to Established Suburbs like Duxbury, population and households are growing more rapidly in Maturing New England Towns.[2]

Historical Context

Duxbury is a seaside town with a rich history. The area known as Duxbury today was inhabited by people as early as 12,000 to 9,000 B.C. When European settlers arrived, the area was inhabited by Wampanoags. They were drawn to the area's vast resources for fishing, hunting, and farming. The area near Duxbury was referred to as Mattakeeset by the Wampanoag which means, a "place of many fish." The Wampanoag population was comprised of several cooperating tribes, with two main tribes that have survived and are recognized today, the Mashpee Wampanoag and the Wampanoag Tribe of Gay Head. The area near Duxbury was also referred to as Patuxet by the Algonquin which means "little waterfalls."

At the time of the arrival of English colonists, the Wampanoag population numbered in the thousands across southeastern Massachusetts and Rhode Island, including Martha's Vineyard and Nantucket. The Wampanoag cultivated corn, beans, and squash to complement the abundant fishing.

After first contact with the colonists, the Wampanoag suffered an epidemic thought to be associated with smallpox and leptospirosis, or 7-day fever. It was associated with a high fatality rate among the Wampanoag population. More than 50 years later, King Philip's War of Native American tribe allies against the English colonists resulted in the death of about 40 percent of the surviving tribe.

These events enabled Duxbury's colonial inhabitants, among the earliest European arrivals, to establish a farming community on Wampanoag lands. They lived amongst the Native Americans and then purchased the land from them by deed. The town's colonial history started when settlers at Plymouth began to spend summers farming Duxbury's lands and eventually established a year-round farming community. "Duxborough" became the second community incorporated in Plymouth County in Massachusetts in 1637.

During the 17th and 18th centuries, Duxbury was a quiet farming and fishing community. The population grew after the King Phillip's War of 1675-1678 and inland neighborhoods were established. Duxbury's shipbuilding industry began in the early 19th century, bringing great wealth and fame to the town. By 1840, Duxbury had become one of the largest and most famous shipbuilding centers in the world and many grand homes were built along Duxbury Bay.[3]

Duxbury began an economic downturn around the middle of the 1800s when trade in China flourished and demanded faster clipper ships, which were too deep for Duxbury Bay. Boston

then became the region's shipbuilding center and sailing vessels were made obsolete by other modes of transportation like steamships and railroads. Duxbury's shipbuilding and wealth steadily declined, as did its appearance. The Duxbury Rural Society was formed for the purpose of beautifying the town. The Society, now known as the Duxbury Rural and Historical Society, continues to preserve historical properties and documents today.[4]

By the 1870s, Duxbury was supporting a budding tourism industry and began attracting many summer visitors because of its rural character and unspoiled bay. Rooming houses, inns, and hotels were built, providing a large source of income for Duxbury. Vacationers also began constructing their own private residences. This pattern continued until the 1960s when Route 3 was completed, connecting Duxbury to Boston by highway. With the expedient automobile access to Boston, Duxbury's population exploded with the arrival of thousands of year-round residents.[5]

Government Structure

The Town of Duxbury is located in Massachusetts' 9th congressional district. As of 2019, it is represented by Josh S. Cutler in the Massachusetts House of Representatives, Patrick M. O'Connor in the Massachusetts Senate, William R. Keating in the U.S. House of Representatives, and Elizabeth Warren and Edward J. Markey in the U.S. Senate.

Duxbury is governed by an Open Town Meeting form of government, and is led by a Board of Selectmen and Town Manager. The Board of Selectmen are the Chief Elected Officials and Executive Officers of Duxbury. The Board consists of three members, residents who are elected by the community to three-year terms. According to Massachusetts General Laws, all municipal authority not delegated to other elected boards or retained by Town Meeting is vested with the Board of Selectmen. The Board appoints a Town Manager for managing the day-to-day business of the Town within its policy direction, and employs a Town Counsel for handling the Town's legal affairs.[6]

Town Meeting represents Duxbury's legislative branch. According to the Town Bylaws, Annual Town Meeting is held the 2nd Saturday of March. Special Town Meetings during other months of the year may also be called. During Town Meeting, all registered voter residents vote on the budget and other articles in the Warrant. The Town Clerk maintains all Town records and documents the votes and actions of the Town Meeting. The Town Moderator directs the progress of the meeting and appoints a number of boards and committees, including the Fiscal Advisory Committee and Duxbury Beach Committee.

There are over 20 Town departments that manage the day-to-day operations of Duxbury. These departments listed on the Town's website include: Animal Control, Assessing, Board of Health, Building, Cemetery and Crematory, Conservation, Council on Aging, Public Works, Duxbury Free Library, Emergency Management, Facilities, Finance, Fire, Harbormaster, Highway, Human Resources, Lands and Natural Resources, Municipal Services, Planning, Plumbing/Gas Inspector, Police, Procurement, Recreation, School's, Treasurer/Collector/s Office, Veteran's Office, and Water and Sewer. Duxbury also has almost 50 multiple-member appointed and elected organizations including the Board of Health, Planning Board, and Conservation Commission.

3. Leslie A. Lawrence, "Town History," Duxbury Historical Commission, https://www.town.duxbury.ma.us/historical-commission/pages/town-history
4. Ibid.
5. Duxbury Rural and Historical Society, "Local History," http://duxburyhistory.org/local-history/
6. Town of Duxbury, "Board of Selectmen," https://www.town.duxbury.ma.us/board-selectmen

Planning Initiatives

Past and Recently Completed Efforts

Comprehensive Plan (1999)

The last Comprehensive Plan for the Town of Duxbury was completed in 1999 and presented a series of widely-shared community goals. These goals include preserving the semi-rural, historical, and residential character of the town, focusing on providing top quality education, protecting Duxbury's water supply, maintaining and improving environmental quality, ensuring a sound fiscal basis for the Town while minimizing the tax burden on residents, and providing and enhancing recreational facilities. The plan also called for supporting and strengthening local businesses and integrating new or expanded housing into existing residential districts.

Hall's Corner Economic Development and Transportation Plan (2014)

In October 2014, the Old Colony Planning Council (OCPC), the regional planning agency for 16 communities in Southeastern Massachusetts, completed an Economic Development and Transportation Study for the Hall's Corner area. Major economic development recommendations from the OCPC report include marketing and promoting Hall's Corner, developing and recruiting additional business for the area, enhancing the public realm through improved streetscaping, updating wayfinding and directional signage, undergrounding utility wires, and developing a façade improvement program.

Hall's Corner Economic Development Analysis (2014)

MAPC completed a Hall's Corner Economic Development Study in 2014, which complements the findings and recommendations from the OCPC plan. The plan identifies a set of strategies to enhance the Hall's Corner business district, the most significant concentration of retail stores in Duxbury. To get a sense of the local market conditions in Duxbury and Hall's Corner, MAPC staff and members of the Economic Advisory Committee interviewed local business owners, property owners, brokers, and developers. MAPC also conducted a market analysis for the housing, retail, and office sectors and developed recommendations to enhance the area in order to better support current local businesses, broaden the current customer base, and attract additional targeted development. Strategies offered in the plan include creating a Hall's Corner Zoning Overlay District to encourage desired development, developing a Duxbury Business guide, and creating a Main Street Organization.

Housing Needs Assessment (2014)

The Town of Duxbury Housing Needs Assessment was completed in April 2014. The assessment lays out a number of strategies to increase the production and preservation of affordable housing in Duxbury. The report recommends encouraging affordable housing development in close proximity to retail and services such as the Hall's Corner area. It also notes significant demand for family and age-restricted units for households earning at or below 80% of area median income, as well as a need for affordable rental housing. Stakeholders that were interviewed for the Housing Needs Assessment also mentioned a need for more affordable housing for young professionals, seniors, and middle-to-lower income families with children that would like to move to the area.

Beach Management and Habitat Conservation Plan (2016)

Duxbury completed a Beach Management and Habitat Conservation Plan in 2016 to serve as a reference document for use by managers of Duxbury Beach, which is private but portions are leased to the town. The plan provides a

management program that is consistent with federal, state, and local laws and regulations for the various existing and potential uses of the beach, and provides guidelines that are flexible enough to be adapted, refined, and implemented on a daily basis by the on-site management staff of the beach. This comprehensive document also describes the Beach and Dune Maintenance and Restoration Program for Duxbury Beach and explains the Endangered Species Program to balance the protection of piping plovers and other rare species with the recreational uses of the beach.

Open Space and Recreation Plan (2017)

The 2017 Duxbury Open Space & Recreation Plan reviews the progress on the goals of the 2008 Plan and identifies 5 goals for the years ahead based on the results of the 2015 Open Space & Recreation Survey. Duxbury is an attractive seaside town with diverse natural resources and cultural activities that make it an appealing place to live and the resulting growth presents challenges to the community. Development puts strains on wetlands resources and wildlife corridors, and residents are concerned that development has a deleterious impact on the historic character of the town.

Green Communities Energy Reduction Plan (2018)

In 2014, the Town consolidated energy management and maintenance services for both Town facilities and school buildings. Streamlining operations in this way ensures ease of communication between the Town facilities and the schools, and sets the Town well to successful implementation of their Green Communities Energy Reduction Plan. This report outlines specific actions for reduction of municipal energy use in the Town of Duxbury.

Climate Vulnerability Assessment and Action Plan (2018)

This climate action plan builds upon previous completed plans for hazard mitigation, coastal flooding, emergency management and open space protection. It takes an adaptive management approach that combines emergency preparedness, mitigation, and adaptation.

Hazard Mitigation Plan (2018)

Hazard Mitigation planning is a proactive effort to identify actions that can be taken to reduce the dangers to life and property from natural hazard events. In the communities of the Boston region of Massachusetts, hazard mitigation planning tends to focus most on flooding, the most likely natural hazard to impact these communities. The Federal Disaster Mitigation Act of 2000 requires all municipalities that wish to be eligible to receive FEMA funding for hazard mitigation grants, to adopt a local multi-hazard mitigation plan and update this plan in five year intervals.

Housing Production Plan (2019)

The Town of Duxbury hired LDS Consulting Group, LLC (LDS) to update the 2014 Affordable Housing Production Plan completed by LDS into an updated, new Housing Production Plan (the "Plan") for submission to the Massachusetts Department of Housing and Community Development (DHCD) in accordance with 760 CMR 56.00. The first part of the Plan contains an Affordable Housing Needs Assessment ("HNA"), which identifies the supply and demand for affordable housing in Duxbury. The second half of the Plan contains a strategic plan to assist the Trust in determining how it should best direct and leverage its resources to meet the affordable housing needs in Duxbury.

Population Characteristics and Projections

Population Size and Age

Duxbury is a medium-size town whose population has almost doubled since the 1970s. At the time of the last U.S. Census in 2010, Duxbury's population was 15,059. This number has likely increased further, and the population was 15,297 according to 2015 American Community Survey (ACS) 5-Year Estimates. While the population has been growing steadily over the past few decades, growth rates do not compare to those seen between 1970 and 1980 when the population size grew 55%, from 7,636 in 1970 to 11,807 in 1980. Since 1990, the population growth rate has been between 3% and 6%. According to MAPC projections, Duxbury's population is expected to remain stable moving forward with small growth.

While the populations of the under 20 and 20-24 age groups have remained relatively stable since 1990, the population of the 25-34 age cohort, young professionals, has shrunk by almost 50%. This is the only age group that

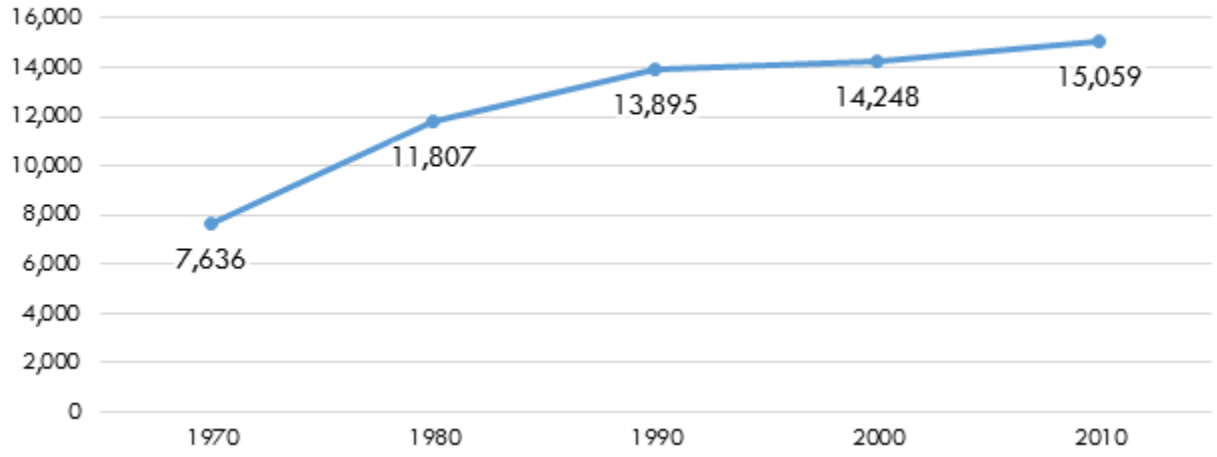


Figure: *Duxbury Population Trends by Decade Source: U.S. Census*

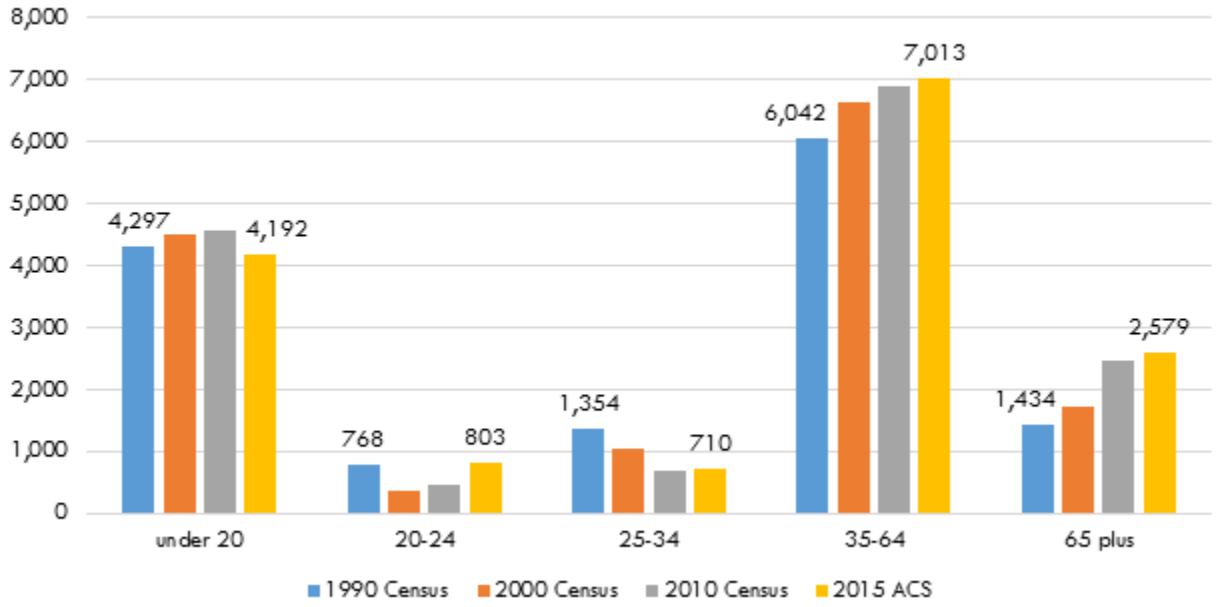


Figure: *Duxbury Population Change by Age Group, 1990-2015 Source: U.S. Census*

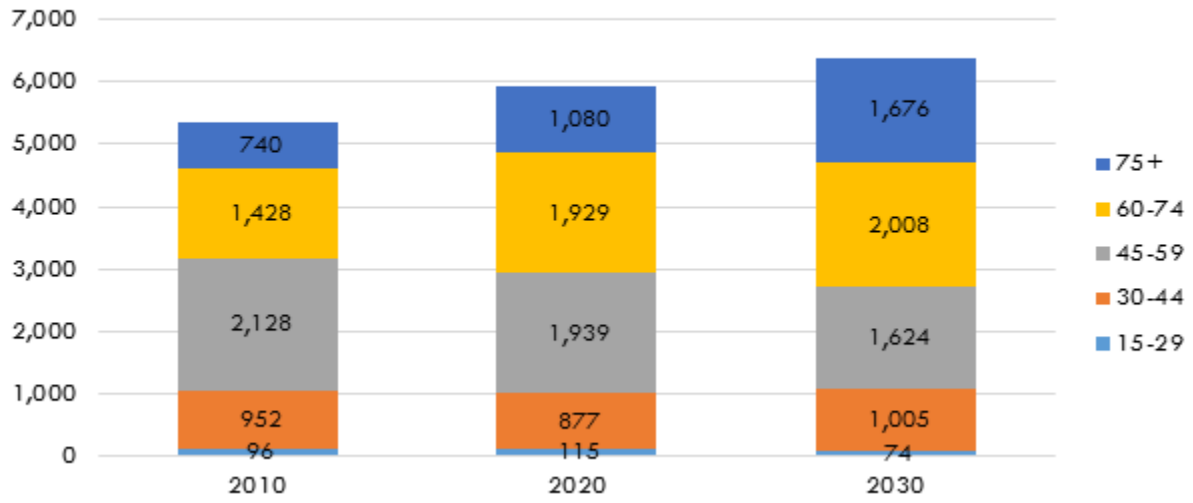


Figure: *Household Projections by Age Source: U.S. Census, MAPC*

has seen a decrease in population, as shown in the figure. The 35-64 age cohort has seen modest growth while the 65 plus group has seen substantial growth, increasing 80% between 1990 and 2015. These patterns show that the population in Duxbury is aging and that families with dependent school-age children in the household remain relatively stable.

Households

While Duxbury's overall population is expected to remain stable, its number of households are projected to grow 20% (1,043 households) by 2030, from 2010 counts. This is on top of the 8% growth in households seen between the 2000 and 2010 U.S. Census. Like with population growth, household growth will mainly come from increases in older households, particularly those with a householder over 75. Alternative housing types will be needed to support this growth in households, as well as the needs of Duxbury's aging population. Today, 78% of the town's 5,406 households are families, according to 2015 ACS 5-Year Estimates. In comparison to other nearby communities, Plymouth County, and the state, Duxbury has the highest percentage of family households.

School Enrollment

Duxbury is known throughout the state for its excellent public education system, and it attracts many families with children to the town. According to the Massachusetts Department of Elementary and Secondary Education, during the 2016-2017 school year, the school district enrollment in the Duxbury Public Schools was 3,121. This is a slight decline from ten years ago when the enrollment was 3,372 for the 2006-2007 school year. Demographic trends and anecdotal observations suggest that the school age population and households with children remain relatively constant in the town due to a transitioning of families into and out of Duxbury around educational milestones. Since Duxbury's population is aging overall, school enrollment would likely decline further if not for this pattern of in- and out-migration of families.

Race and Ethnicity

The population of Duxbury is relatively homogeneous from a race and ethnicity perspective. According to the 2010 U.S. Census, the racial makeup of the population is 98% White, 1.4% Asian, 0.8% two or more races, 0.6% Black or African American, 0.5% other races, 0.3% Native American, and 0.1% Pacific

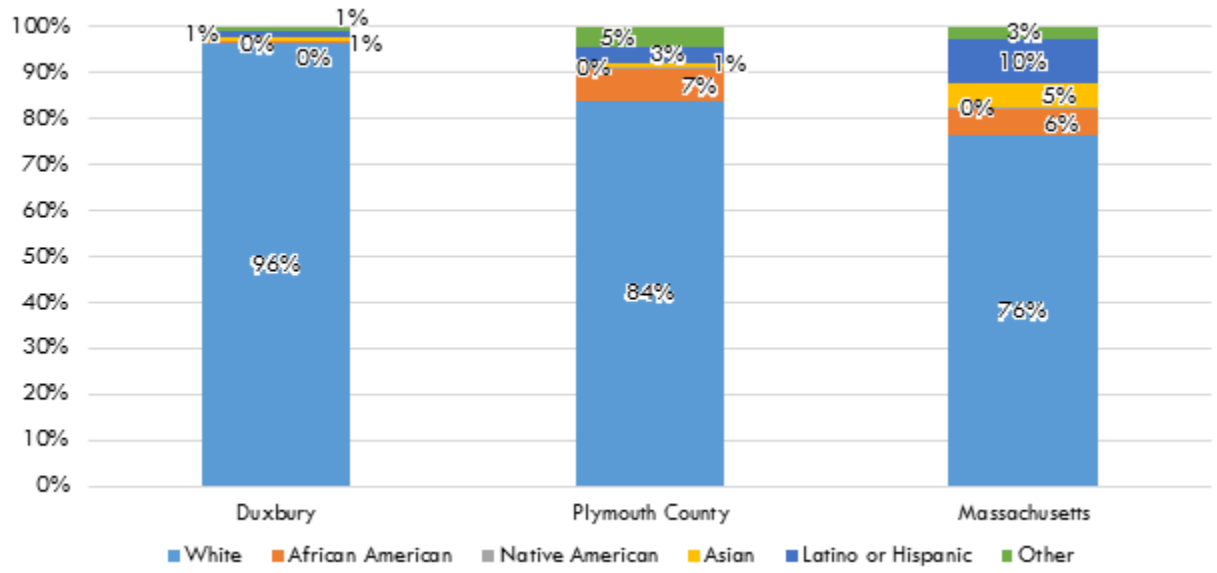


Figure: *Racial and Ethnic Share Comparison Source: U.S. Census*

Islander. Hispanic or Latino residents of any race make up 1.20% of the population. Compared to Plymouth County and the Commonwealth, Duxbury is much less racially and ethnically diverse.

Educational Attainment and Income

Duxbury residents are well educated, which is illustrated by the fact that 72% of those 25 and older have completed an associates degree or higher, compared to 44% of those in Plymouth County and 49% of those Massachusetts.

Income tends to be correlated with educational attainment, and this is not an exception in Duxbury. Almost 60% of households in town earn more than $100,000 annually, compared to 36% of county households and 34% of state households. According to 2015 ACS

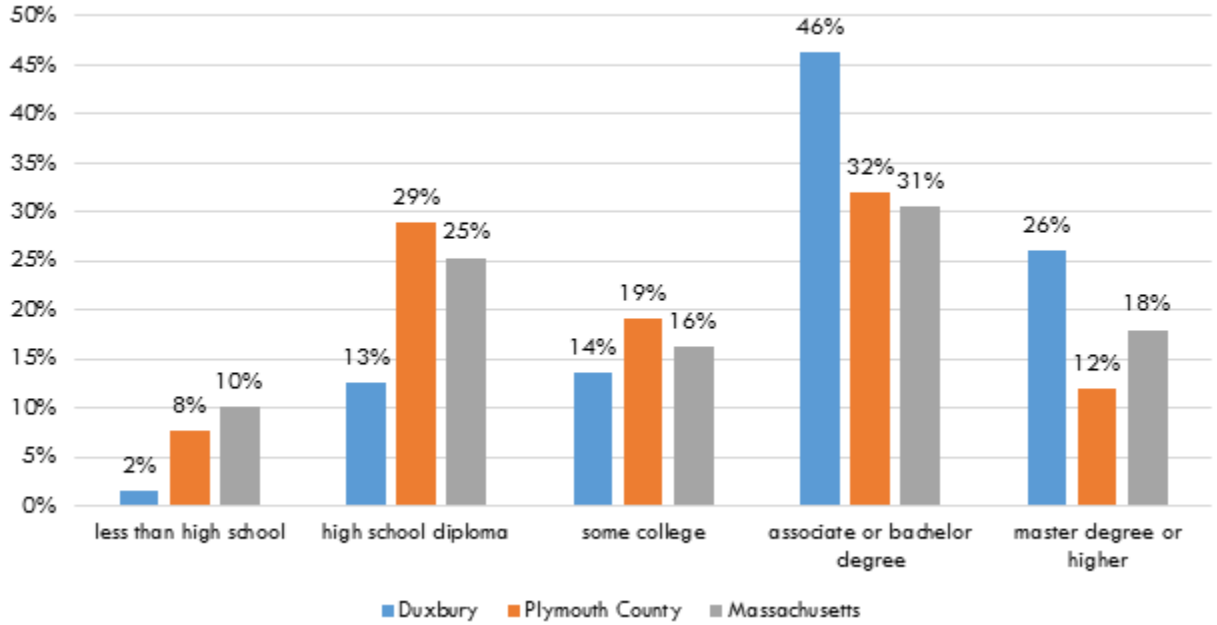


Figure: *Educational Attainment Comparison Source: U.S. Census*

5-Year Estimates, the median household income of $120,267 in Duxbury is much higher than that seen in Plymouth County ($75,835) and the Commonwealth ($68,563), as well as in neighboring municipalities. It is important to note that the median household income for families of $138,938 is more than three times that of non-family households ($44,063) in Duxbury.

Employment and Transportation to Work

As of the 2015 ACS 5-Year Estimates there Duxbury's civilian employed population 16 years and over consists of 7, 168 workers. More than half (57%) of this population works in management, business, science, and art occupations; another 23% works in sales and office occupations; and 9% works in service occupations. A quarter (24%) of Duxbury's labor force population works in the educational services, health care, and social assistance industry; 16% works in the professional, scientific, and management industry; and 14% works in the finance, insurance, and real estate industry. These are all industries associated with higher than average incomes.

Almost 80% of working Duxbury residents drive alone to work. Another 3.2% of working residents drive in a carpool with other riders, 3.5% take public transportation, and 2.2% walk, bike, or use another means of transportation. A fairly high proportion (11.6%) of the town's labor force works at home when compared with the rest of the state (4.5%). The mean travel time to work for Duxbury residents is 34.6 minutes, with over a third (34.1%) of the labor force population commuting 20 minutes or less, and quarter (22.4%) commuting 60 minutes or more.

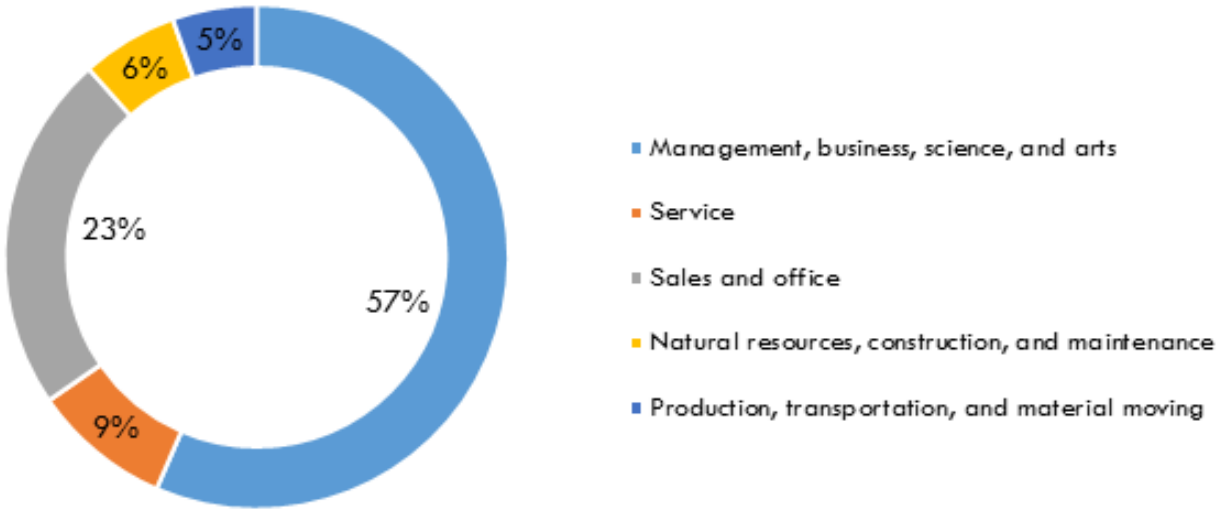


Figure: *Duxbury Resident Occupations Source: U.S. Census*

Chapter 3
Duxbury's Vision

Key Findings

The Vision Statement is a community-based statement describing a future for Duxbury that is trying to be achieved through the goals and objectives of this plan, projecting future improvements to come over the next 10 to 20 years.

As one Master Plan Ambassador articulated, the Vision Statement attempts to address the following questions:

How do we see the world as individuals and as a community? How will our Town of Duxbury continue to grow and evolve over this century? What lies ahead for future generations? How will we embrace change with thoughtful development and creative redevelopment, and mitigate climate change wither energy conservation, alternative energy, preservation, and sustainable living? What will be our legacy?

Image: *Duxbury Bay Source: http://newenglandboating.com/destinations/duxbury-bay*

Vision Statement

Looking forward, the Town of Duxbury continues to be a prosperous coastal community with exceptional assets. Residents of all ages and backgrounds are able to enjoy a high quality of life in Duxbury with convenient access to everything the town has to offer: beautiful beaches, an excellent school system, a thriving harbor, thousands of acres of protected habitats, conservation, and open space, vibrant businesses, cultural and recreational amenities, and attractive residential neighborhoods.

The Town proactively protects its waterfront heritage and resources to make them more resilient against the impacts of climate change. Coastal resilience protects Duxbury's rich maritime and shipbuilding history and enhances continued waterfront activity, Duxbury's multi-functional public beach, and active bay, continuing to draw residents and visitors to the coast.

The network of preserved open space and conservation land in Duxbury continues to offer opportunities for recreation, enhance scenic views, and protect the Town's water supply and rare species habitats.

Duxbury Public Schools sustain excellence and the town attracts families looking to form deep roots in the community. Transparent and fiscally-responsible Town government manages growth and development in a way that maintains Duxbury's authentic character yet balances revenues to sustain excellent public services, facilities, and infrastructure.

Hall's Corner, Snug Harbor, and Millbrook serve as the centers of local economic activity with modest mixed-use buildings with first floor retail, transportation improvements, and streetscape enhancements that create more vibrant and walkable neighborhood business districts.

The town's smaller neighborhood business districts also support successful businesses that serve residents and visitors of Duxbury in compact and walkable districts. Duxbury continues to protect its historic resources, especially working to preserve historic homes that may be at risk of being torn down and replaced. Alternative housing types have also created a greater variety of housing options for Duxbury residents, leading to more affordable options for families, seniors, and young adults while integrating with the character of the Town.

As observed throughout the Envision Duxbury Master Plan process, the vision for Duxbury in 2030 is strengthened through a community that is informed, engaged, and productively working toward a shared vision and commitment to achieving a prosperous and sustainable future.

DRAFT FOR REVIEW

Envision Duxbury

DRAFT FOR REVIEW

Duxbury's Natural and Cultural Heritage

Open Space and Recreation
Sustainability - Energy
Historic and Cultural Resources
Sustainability - Climate

Chapter 4
Open Space and Recreation

Key Findings

The Town of Duxbury has an incredible wealth of open space and recreational resources, and it is the reason that many residents are attracted to the town. Resources such as Duxbury Beach, Duxbury Bay, and the greenbelt of conservation land contribute significantly to the character of and quality of life in town, in addition to their ecological and recreational value. Community Survey respondents support the continued acquisition and preservation of land for protection of Duxbury's natural areas and drinking water supply, the latter being the primary rationale behind past open space planning because of the Town's dependence on groundwater. As remaining land for both preservation and development grows scarce, land acquisition should be done in a strategic manner that incorporates smart growth principles.

It is important that providing recreational opportunities does not negatively impact Duxbury's natural environment. This is often difficult and conflicts can exist between uses. For example, balancing recreational beach-goers and rare bird species on Duxbury Beach. Recreational opportunities that improve appropriate public access to Duxbury's waterfront and improve access for residents with disabilities should be prioritized. In terms of active recreation facilities like playgrounds and fields, residents have called both for better maintenance of existing facilities as well as the development of new facilities as funds become available. All future open space and recreation planning should also consider the permanent effects of climate change and long-term strategies should be developed to protect sensitive resources like Duxbury Beach.

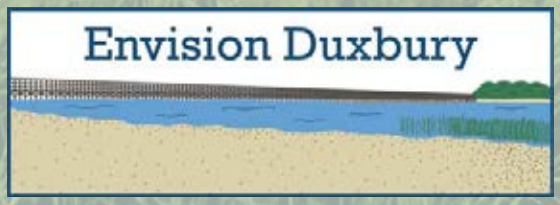


Image: *Duxbury Beach Source: MAPC*

Introduction

Open space is entwined in the history of Duxbury, and it remains a treasured community asset today. The Wampanoags who first inhabited the area as early 12,000 years ago were drawn to the coastal area's vast resources for fishing, hunting, and farming. Later, European colonists established a quiet farming and fishing community in Duxbury. During the first half of the 19th century, the town's coastal location enabled it to become one of the largest and most famous shipbuilding centers in the world. When the shipbuilding industry declined, Duxbury's rural character and beautiful bay supported a successful tourism industry which enabled the town to come out of economic decline.

Today, open space and recreation resources continue to attract residents and visitors to Duxbury, are a source of local employment, and they contribute to the town's high quality of life. Not only does outdoor recreation promote healthy lifestyles, public open space areas also provide an important setting for community life and socializing. Beyond its benefits for human enjoyment, open space provides vital habitat for plants and animals, protects groundwater resources, and serves as a protective factor against the impacts of climate change.

The Town of Duxbury recently completed an Open Space and Recreation Plan (OSRP) update process. The OSRP provides a comprehensive overview of the Town's cultural and natural history, a detailed inventory of all open space and recreational resources in Duxbury, and recommendations for protecting and improving these resources. A Seven-Year Action Plan provides detailed steps for achieving the plan's goals and objectives, including the relevant parties responsible, timeframe for achieving the action, and potential funding sources. This element of Envision Duxbury provides a summary and highlights key recommendations of the recently-completed OSRP, as well as referencing other recent planning efforts like the 2015 Athletic Field Utilization Study.

Existing Conditions

Geology, Soils and Topography

It is important to understand the interrelation between geology, soils, and topography, especially in a coastal town like Duxbury, because each physical component comes with its own inherent potential and limitations. This understanding can help guide future land use into patterns that avoid or limit environmental damage and degradation. Areas of town that have historically been unsuitable for development because of these physical constraints have become some of Duxbury's most prized conservation resources.

Duxbury's land features are a function of its underlying surficial geological deposits. Its physical characteristics are derived from two distinct periods: the Proterozoic bedrock from several billion years ago and the gravel, sand, silts, and clay from the Pleistocene glacial period. The sand and gravel layer contains the town's aquifer. Bedrock outcroppings can be found in the bay at Cripple Rock and Bay Farm, as well as along Temple Street near the Pembroke line. The geologic deposits overlying this bedrock base resulted from the late Wisconsian stage of glacial activity.

Soil types are among the considerations that generally define land use potential for an area. Duxbury's soils are mostly well- to excessively-drained, with slopes ranging from level to very steep. The primary soil types found in town are Scituate-Essex-Merrimac and Hinckley-Merrimac-Muck, with a small percentage (3%) of land consisting of Hinckley-Carver Association soils on extremely steep slopes. The latter soil type provides the most favorable groundwater recharge conditions and is a critical component of the town's soil makeup.

Distinct variations in Duxbury's topography account for many areas of scenic, ecological, and historic importance. In general, the town's topography gently slopes down from small hills to Duxbury and Kingston Bays, a result of the slightly varied terrain produced by glacial activity during the last ice age. The land surface is level to gently rolling, with its highest elevation at 196 feet above mean seal level. Captains Hill, the site of the Myles Standish Monument and State Park, is the highest point in town. Low lying areas occur along Duxbury's coast and salt marshes.

Water Resources

Surface Waters

The eastern side of Duxbury is framed by Duxbury and Kingston Bays. Duxbury Bay, accessible by 14 Town landings, is formed by The Gurnet, a sandbar extending southeasterly from Marshfield into Cape Cod Bay. Kingston Bay is an inlet into the larger Plymouth Bay. Duxbury Bay supports both hard and soft shell clams, blue mussels, and oysters, and shellfish harvesting is a popular activity for both recreational and commercial purposes. In fiscal year 2015, 1,349 recreational permits and 66 commercial licenses were sold, generating $78,955 and $7,855, respectively. Over 82 acres of tidal flats in Duxbury are leased for shellfish farming, providing employment to over 200 individuals during the summer months. Duxbury Bay supports a number of other recreational activities, including boating, swimming, windsurfing, and fishing. In the winter, waterfowl hunting is a popular activity as the bay is home to mallard, common eider, goldeneye, bufflehead, and red breasted merganser.

A number of rivers, brooks, and streams meander throughout Duxbury and connect water bodies. The watersheds of many of these tributaries are located within Aquifer Protection Zoning District for Duxbury's drinking water supply.

Image: *Duxbury Bay Source: http://newenglandboating.com/destinations/duxbury-bay*

Phillips Brook, Keene Brook, and an unnamed branch originating in the Loring cranberry bogs off East Street, along with water from inland marshes, bogs and reservoirs, converge near Temple Street in Camp Wing to become the South River. The river then courses through Marshfield where it joins the North River. Also flowing into Marshfield is the Green Harbor River, which originates at the Wright Reservoir, cranberry bogs, and marshes in North Duxbury.

West Brook becomes Duck Hill River as it enters Duxbury Marsh and further downstream it becomes the scenic Back River and flows into Duxbury Bay. Pine Brook, Hall's Brook, Bassett Brook, and Mile Brook, feed the Jones River, which provides habitat for fish, aquatic life and wildlife, and is also used for recreation. The Bluefish River runs behind the St. George Street School Complex and courses through Wright's Dike, a former ice pond for the Wright Estate that was once located on the former High School property, before mixing with saltwater from Duxbury Bay and terminating between Long Point and Bumpus Wharf. The river is listed as an anadromous fish run, with a privately owned fish ladder south of Harrison Street.

Originating at Island Creek Pond, a stream flows south to Mill Pond and exits through the salt marsh near Hicks Point into Kingston Bay. Island Creek Pond, accessed from Tobey Garden Street, is the only Great Pond in Duxbury, a naturally occurring body of water of more than ten acres on which all Commonwealth citizens have the right to fish, fowl, and navigate. It is actively used for fishing, boating, and skating. Island Creek is the other anadromous fish run in Duxbury and contains two fish ladders which were reconstructed in 2007 with CPA funds, under the guidance of the Duxbury Bay Management Commission, the MA Division of Fisheries, and the Duxbury Conservation Commission. In hopes of developing a robust fishery, the MA Division of Marine Fisheries stocks the pond with river herring and smelt, and counts are managed by the Conservation Commission and volunteers.

Image: *Duxbury Marsh Source: Shawn Dahlen*

Wetlands

Wetlands are important natural features that have several functions, including flood protection, water filtration, erosion prevention, and provide natural habitat to wildlife. Wetlands can also be unique passive recreational areas. Duxbury has nearly 3,000 acres of wetlands, including saltwater marshes and freshwater ponds and wetlands. The magnificent Duxbury Marsh, located in the northeastern section of town, is the largest of the wetland areas at 1,000 acres in Duxbury and Marshfield. This highly productive marsh serves as both a food source and habitat for shellfish, fish, birds, and mammals. Twice daily tides bring nutrients and oxygen to the marsh and remove waste and debris. In addition to serving as an important ecosystem, marshlands protect coastal areas from flooding, storm surges, and sea level rise while retaining carbon from greenhouse gases.

Cranberry bogs, which are located inland, are one of the most distinctive features in the Duxbury landscape, providing seasonal aesthetic, agricultural, and wetland values to the community. Duxbury was one of the first towns in Southeastern Massachusetts to purchase cranberry bogs for open space and to preserve this unique landscape and agricultural heritage. The bogs are under the oversight of the Conservation Commission and most are still in production, providing work for farmers and attractive areas for passive recreation.

A number of potential vernal pools have been identified in Duxbury, and a few have been certified by the Massachusetts Natural Heritage and Endangered Species Program. Vernal pools are unique wetland habitats that serve as an important breeding ground and are home to a number of amphibians and invertebrate animals. Also known as ephemeral pools, autumnal pools, and temporary woodland ponds, these natural sites fill with water in the fall or winter due to rain and rising groundwater. They stay ponded through the spring and into summer, but tend to dry completely by the middle or end of the summer. This occasional drying prevents fish from permanently populating the pools, allowing amphibians and invertebrate species

to reproduce without being targeted by fish predators.[1] Certified vernal pools can usually be protected from development and are afforded protection under a number of state regulations.

Vegetation

From coastal dunes at its eastern shore to inland forest, freshwater ponds, and cranberry bogs, Duxbury possesses an extraordinary variety of habitats. As such, the town's plant inventory is understandably extensive and diverse. Duxbury is also proud to report that it has received the Tree City USA award from the Arbor Day Foundation for 24 consecutive years.

Duxbury Bay supports one of the most important aquatic resources: eelgrass (Zostera marina). Eelgrass grows in mud and muddy sand in estuarine waters that are protected from wave action and can be found in both lower intertidal and sub-tidal areas. According to a 2009 report from the Duxbury Bay Management Commission, eelgrass beds are significant to the marine environment because they facilitate sediment disposition and water quality, provide substrate for epiphyte algae and micro-invertebrates, and serve as a nursery for many species of fish and shellfish. Although studies of the causes are ongoing, eelgrass beds are being lost at a fairly alarming rate, possibly due to increased turbidity and reduced light penetration, natural cyclical changes, disease, and boat propellers increasing wave action and uprooting the grass.

The early settlers cut and cleared Duxbury's forests for shipbuilding, fuel, and homes. In the late 1800s and early 1900s, the town's landscape changed to open fields that supported farming and livestock. Eventually, agricultural land was allowed to go fallow and, consequently, much of the forest and any remaining fields have been lost to residential development. Duxbury's inland forest areas are almost entirely second growth trees comprised mainly of two species: white pine and red oak.

Duxbury's Conservation Commission initiated an aggressive land acquisition campaign in the 1970s and continues to secure land that has important conservation values. The largest uninterrupted blocks of woodland are the North Hill Wildlife Sanctuary (1,000 acres of land and wetlands), Camp Wing Conservation Land (459 acres in Duxbury and Pembroke), and the Lansing Bennett Forest (344 acres). The latter is contiguous with 316 acres of the Ashdod Forest and 39 acres of the Black Friar Swamp and Swanson Conservation Land. Invasive plants are becoming a growing concern in the forested areas as they compete with native plants that are beneficial to migrating songbirds. Oriental honeysuckle, Asiatic bittersweet, multiflora rose, and Japanese honeysuckle are among the invasive species.

Fisheries and Wildlife

Marine Fisheries

The marine and terrestrial habitats in and around Duxbury, Kingston, and Plymouth Bays support some of the State's most important wildlife and fisheries. As such, the management and protection of the bay, salt marsh, tidal flats, beach, and brackish tidal marsh are important in order to protect marine biodiversity. A constant challenge is balancing this along with recreational demands, residential and commercial development, and shellfish farming.

Shellfishing has both commercial and recreational value in Duxbury and harvest species include soft shell clams, quahogs, mussels, razor clams, sea clams, and oysters. Just under 2% of Duxbury Bay and the Duxbury portion of Kingston Bay (82 acres) supports shellfish farming and is leased to Duxbury residents, who in turn hire

1. "Vernal Pools," MA EOEEA, www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/vernal-pools

Image: *One of the local shellfish businesses Source: https://merryoysters.com/*

high school and college students to do the farming. Grant sites are scattered throughout the bay in areas that avoid near shore shellfish beds, navigation channels, and eelgrass beds. The industry has proven to be very successful and Duxbury oysters are shipped throughout the U.S. and Asia. Annual oyster festivals have been very popular and often serve as fundraisers for academic scholarships and sustainable aquaculture in other countries.

Duxbury's shellfish aquaculture industry provides many benefits to the community. According to the 2009 Duxbury Aquaculture Management Plan, there are a variety of economic, environmental, and recreational benefits associated with this industry. From an economic standpoint, it employs residents year round, contributes to local businesses, and has large multiplier effect on the local economy; every $1 spent on shellfish aquaculture leads at least $4.50 in economic growth in Massachusetts, according to estimates from the Massachusetts Division of Marine Fisheries. Shellfish growers have also been working with the Duxbury Harbormaster to develop a recreational oyster fishery that will provide revenue to the Town. A strong commercial presence increases the opportunity for state and federal funding for projects such as dredging, which was last completed in January 2016.

Controlled shellfish aquaculture has a number of positive effects on the natural environment. The clearance of suspended particles from the water column creates conditions conducive to eelgrass survival. Removing organic matter from the water column also helps limit and/or reverse the undesirable effects of nutrient enrichment, particularly from nitrogen, in shallow coastal areas. Further, having an increased structure in normally featureless muddy bottoms has also been shown to support more diverse food webs and provides habitat for juvenile crustaceans and fishes. Shellfish growers have been participating in water quality monitoring in association with the Southeastern Massachusetts Aquaculture Center and the Jones River Marine Ecology Center. The Duxbury Shellfish Growers Association were awarded grants to deploy water quality sensors to aid in shellfish disease

forecasting efforts and overall water condition assessments.

Other than shellfishing, Duxbury Bay also supports significant fin fishing. Important commercial and recreational species include striped bass, bluefish, tautog, and fluke. A few fin fish charter boats operate from the harbor.

Wildlife

Duxbury's extensive and often interconnected forest habitat provides important feeding and nesting areas for a variety of wildlife. Opossum, skunk, raccoon, fox, rabbit, deer, and coyote are commonly found in the fields and woodlands. Wetland areas support otter, mink, fisher, muskrat and beaver, black duck, wood duck, mallards, and swans. Some streams and ponds provide fishing opportunities for brown and brook trout, white perch, pickerel, and black bass. The eastern box turtle, a State "species of special concern," has been recorded at a number of locations throughout Duxbury. The few remaining fields and edge zones support ruffed grouse, eastern bluebird, turkey, bobolink, red-tailed hawk, pheasant, and great horned owl.

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) has proclaimed Duxbury Beach, its adjacent salt marsh, flats, and shallow bay a "High Priority Site for Protection" of piping plovers (Federally and State listed as "threatened"), least terns, and Arctic terns. All three species nest on Duxbury Beach and protection of these birds is under the coordinated oversight of the Conservation Commission and the Harbormaster.

Duxbury's extensive sand and mud flats provide excellent feeding habitat and also act as important resting and foraging sites for southward migrating shorebirds, particularly from mid-July through October. Migratory birds that are heading toward breeding sites feed on enormous quantities of horseshoe crab eggs deposited on the flats during May and June. Declines in the horseshoe crab population have resulted in State regulations to reduce the number of crabs taken for bait and harvested for medical purposes (horseshoe crab blood contains amebocytes which release a protein

Image: *Beach grass planting on Duxbury Beach Source: Shawn Dahlen*

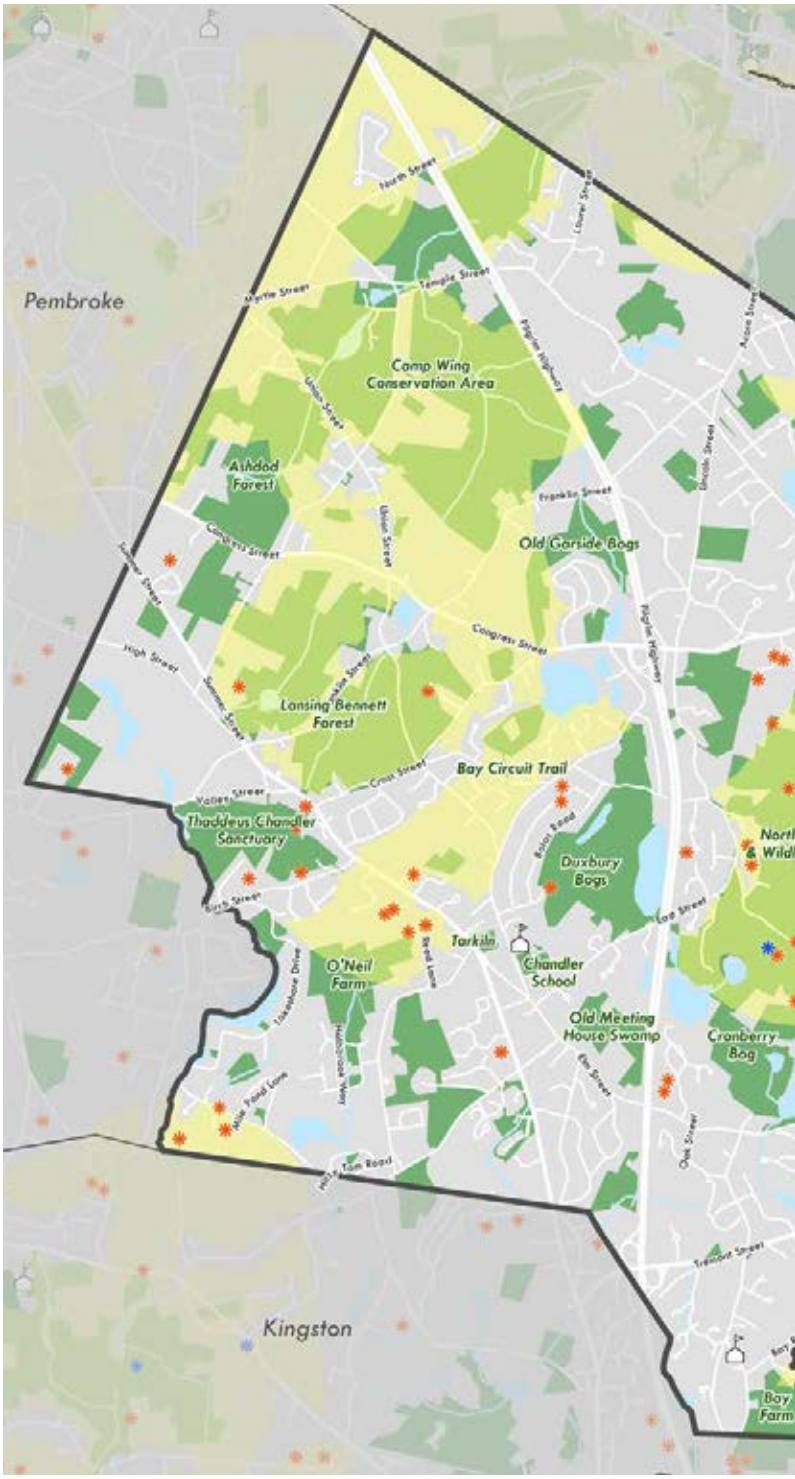
when bacterial endotoxin is encountered in medical laboratories), and disallow harvest during spawning periods.

Environmental Challenges

Duxbury's environmental challenges are mainly related to flooding and the impacts of climate change, as well as protection of the town's drinking water supply. Flooding in the coastal areas of town is a recurring problem and is becoming more of a concern with rising sea levels. Areas in Federal Emergency Management Area (FEMA) flood hazard areas are typically flooded during high lunar tides and major storm events. These zones include lowlands adjacent to the Bluefish River and Gurnet Road, and along King Caesar Road; they are becoming chronic problems. Duxbury was hit particularly hard during Winter Storm Juno, which left a path of destruction across New England in January 2015, due to the combination of heavy snow, coastal flooding, and hurricane-force winds.

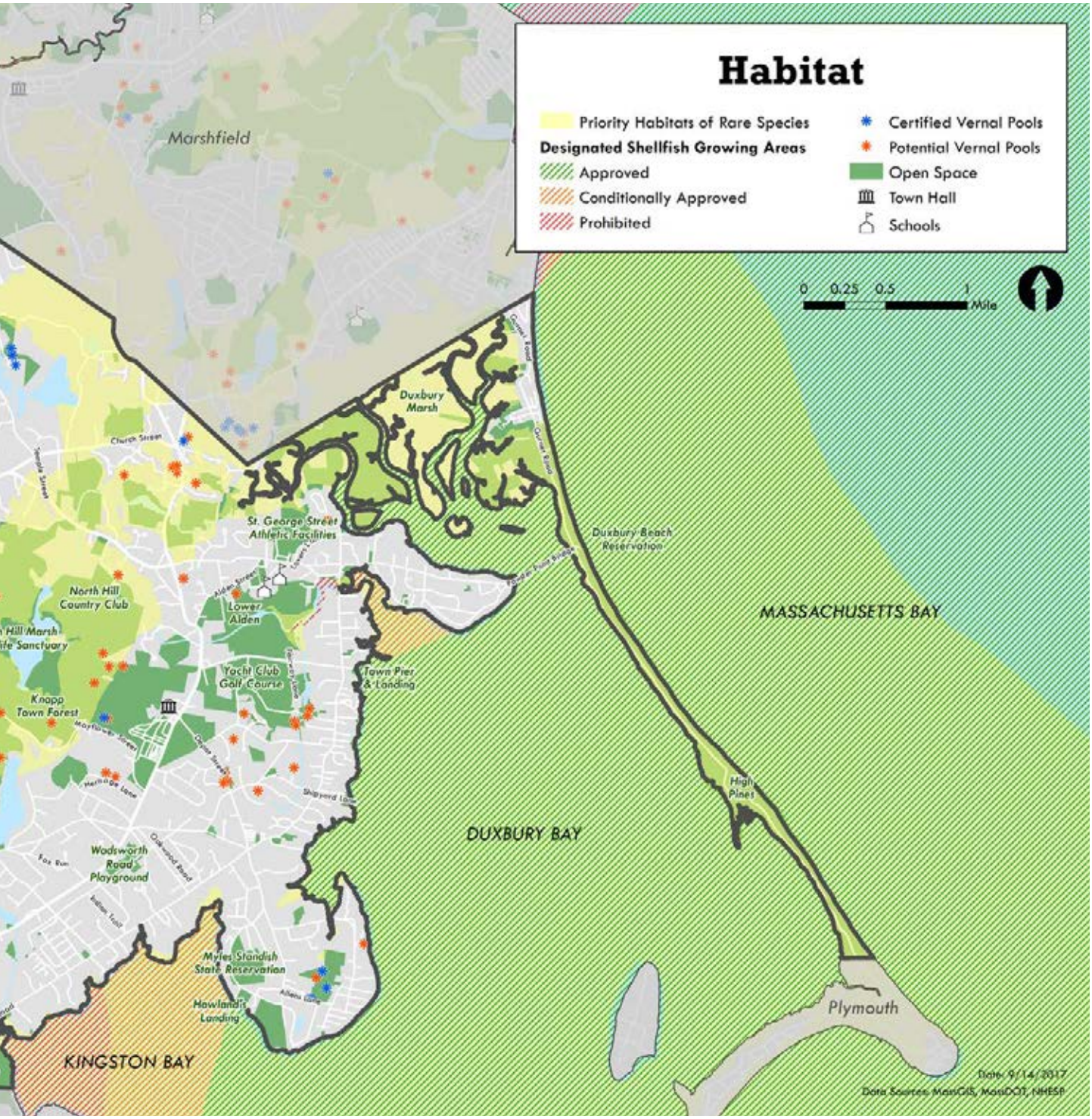
Duxbury Beach serves as a protective barrier for Duxbury, Kingston, and Plymouth Bays. The northerly section of the barrier is heavily populated with 300 homes that are subjected to property damage during significant coastal storms. To the south, the undeveloped barrier repeatedly suffers extensive damage to the dune structure. The beach was heavily damaged by two major storms in the 1990s, seriously threatening Duxbury Bay and a sacrificial dune had to be constructed. Again, in 2013, the beach was slammed by another storm that incurred nearly a million dollars in damages. The Duxbury Beach Reservation, Inc., the nonprofit organization that owns and

Image: *Flooding from Winter Storm Juno*
Source: https://twitter.com/DXFD_PIO



manages the beach, is undertaking a $5 million fundraising campaign to elevate the height of the sacrificial dune.

On January 4, 2018 Duxbury experienced significant flooding due to a nor'easter. The storm coincided with astronomical high tides and resulted in a surge, recorded at the Boston tide station, of 15.16 feet—higher than the highest surge from the Blizzard of 1978. In March 2018, the Greater Boston Region, and in particular the South Shore, suffered from

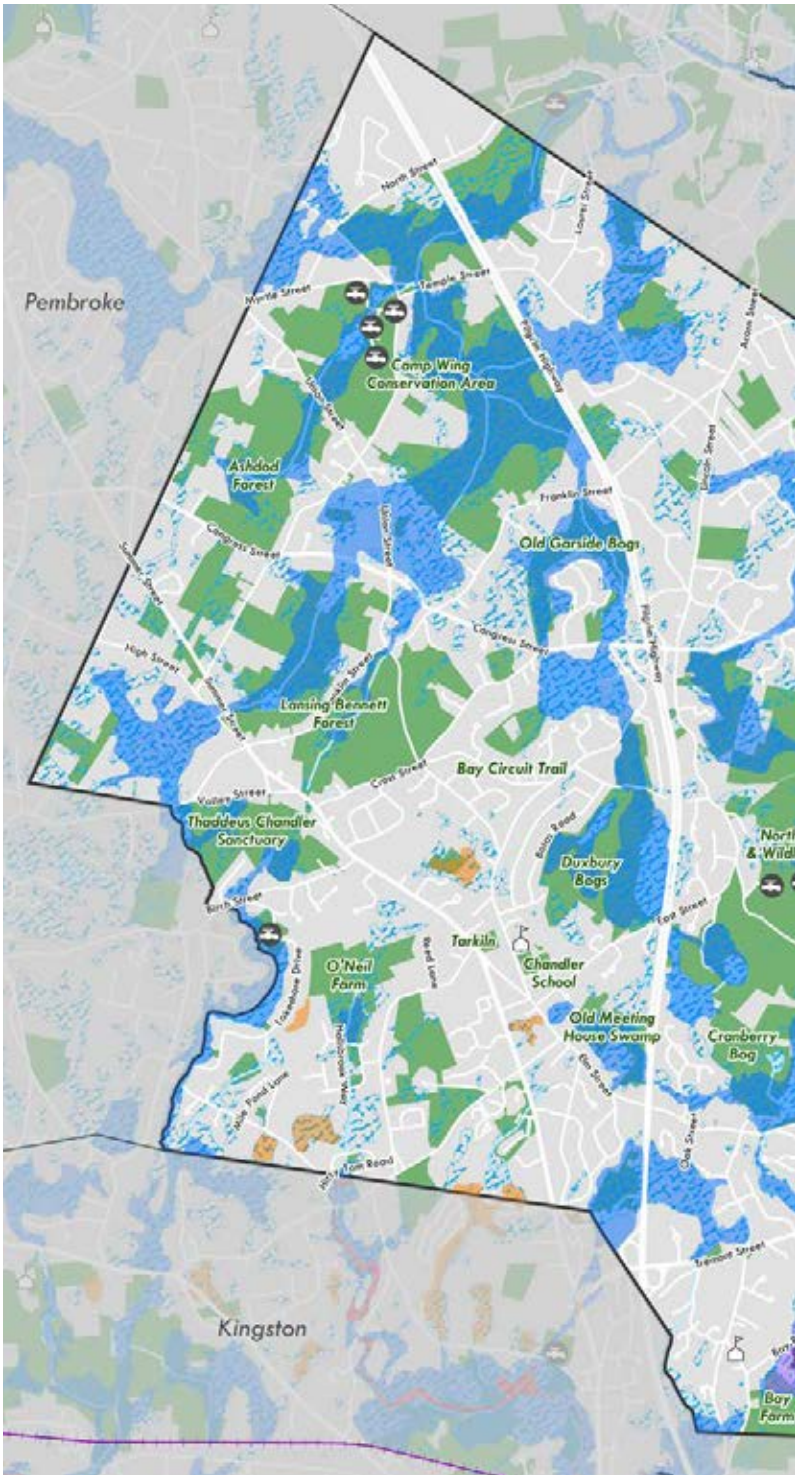


three major nor'easters that flooded homes and business, crippled infrastructure, and left hundreds of thousands without power. The storm surge from a March 2 nor'easter was so strong that on March 5, part of Duxbury's seawall collapsed into the ocean.

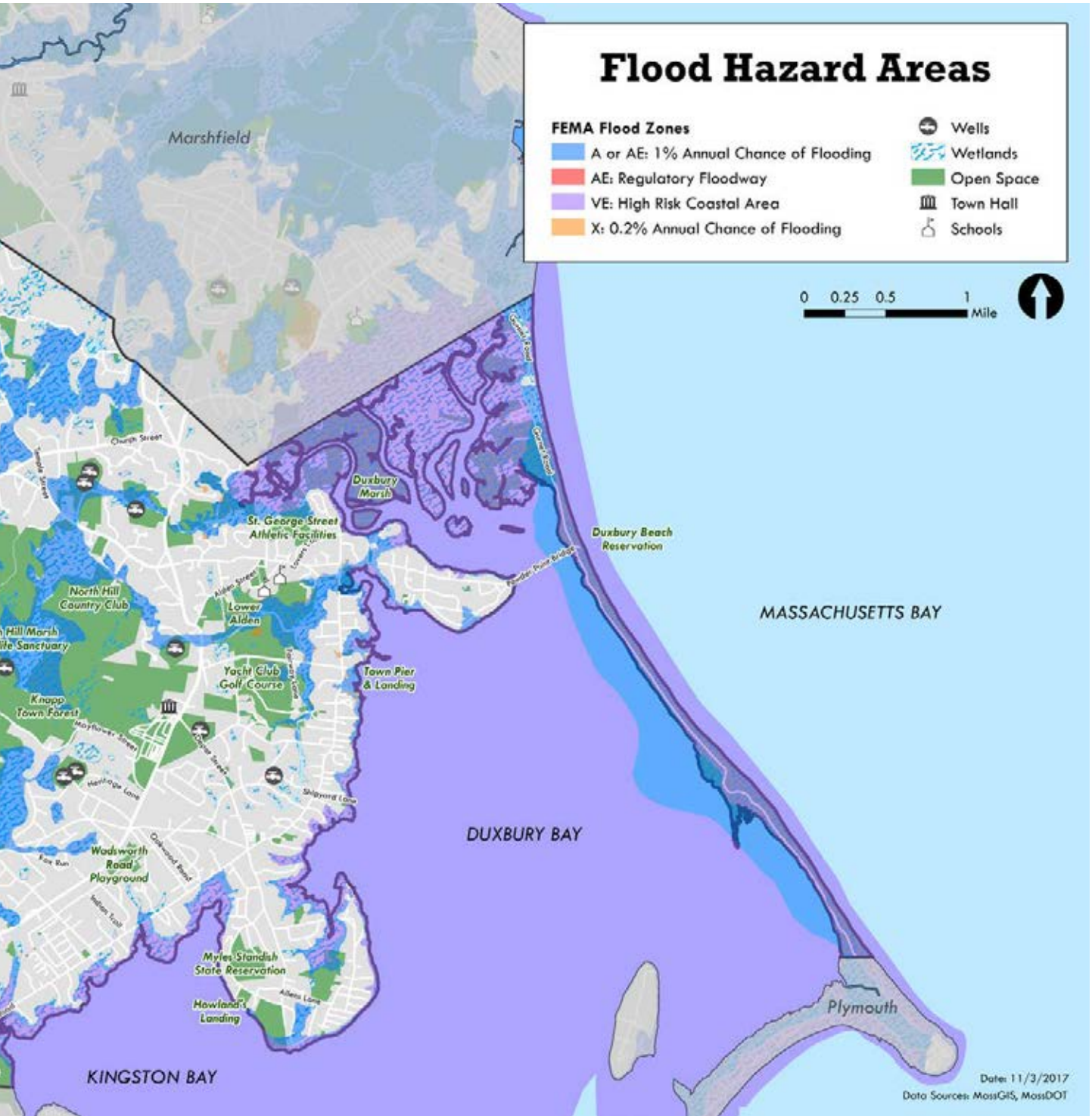
Kleinfelder conducted a Sea Level Rise Study for the Towns of Duxbury, Marshfield, and Scituate in 2013 to study the impacts of sea level rise related to climate change on the communities. The study presents a candid forecast for beaches along the town's coastline, including Duxbury Beach, Shipyard Lane Beach, and the other smaller beaches and landings. If the beaches are not nourished with sand and increased in elevation, there could be partial or complete loss of beach at high tides. The potential for storms to increase in frequency and intensity will further exacerbate the erosion. Duxbury Beach is an important nesting site for least tern and the piping plover, but rising sea levels could potentially destroy nesting habitat and decrease the fledge rates of these and other coastal birds. According to the study, Duxbury Bay's thriving shellfish industry would also be negatively impacted by rising sea levels and water temperatures.

Duxbury is entirely dependent on groundwater for its drinking water supply, and preventing contamination of the groundwater is a constant challenge for the Town. Protection of the aquifer has historically been the primary rationale behind open space planning in Duxbury because of the town's dependence on groundwater. As a growing residential community, Duxbury's most obvious measurable contaminant threats are from sewage waste, herbicides, and fertilizers. Given that most homes have septic systems, there is great concern that sizable residential subdivisions will impact the drinking water supplies. Septic systems encroaching upon the zones of contribution to municipal wells are a threat as they can discharge nitrogen and other undesirable chemicals into the groundwater. Other wastewater management options that are available to support potential redevelopment considerations include shared/ cluster wastewater systems or on-site wastewater treatment plant systems.

As it relates to climate change, residential and



commercial septic systems could be affected by rising sea and groundwater levels. Septic systems adjacent to the coast could potentially fail and contaminate these areas. Three shared septic systems, which collect waste and pump it to leaching fields away from the coast, were constructed along Washington Street at the Bluefish River, at Mattakeesett Court in Snug Harbor, and along Bay Road. Rising sea level could potentially affect the power supply to the pumps in these systems.



Scenic Landscapes

New England coastal towns are known worldwide for their scenic qualities. Duxbury is among the many South Shore towns that value historic buildings, coastal character, and scenic roadside views. Water views of Kingston and Duxbury Bays are visible from many local streets, particularly Standish, Marshall, Crescent, Washington, St. George, Powder Point, and King Caesar. These streets offer significant views of Duxbury Bay, a large span of salt marsh, and the Bluefish River and comprise what is now the Town's Waterfront Scenic Area (WSA). Many other smaller residential roads that connect to these feeder streets also offer exceptional harbor views. Mattakeesett Court, which leads to the Town Pier, offers views of the boat basin and lively harbor activity. From Route 14 and Temple and High Streets, rewarding vistas of cranberry bogs are also available.

From the top of the Myles Standish Monument on Captain's Hill, one can occasionally see the Pilgrim Monument in Provincetown, 17 miles to the east. Mariners traveling along the Massachusetts coast use the monument as a navigational guide. Recurring roadside views

Figure: *Waterfront Scenic Areas in Duxbury (red) Source: Town of Duxbury*

of farmhouses, cranberry bogs, harbors, salt marshes, boats on their moorings, historic houses, shellfish farmers working on the tidal flats, and rowing shells skimming the water are among the many attractions that draw tourists to Duxbury throughout the warmer seasons.

At Annual Town Meeting over 15 years ago, voters established a Pier Access and Shoreline

Image: *Myles Standish Monument Source: www.massmoments.org*

Study Committee to address pier regulations along Duxbury's waterfront. Among their recommendations was the designation of Waterfront Scenic Areas which, after being amended by Town Meeting, were incorporated into the Duxbury Zoning Bylaw. In 2012, voters approved the acquisition of the Blairhaven, a five-acre parcel adjacent to Howlands Landing Park on Standish Shore. As more private landowners erect barriers to the views of the surrounding bays, this property now affords access and viewscapes in perpetuity.

Open Space and Recreation Land

Open Space

Open space in the Town of Duxbury is owned by many government and non-government agencies and has varying levels of protection. Protected lands are typically, but not always, preserved in perpetuity and under the care and control of the Duxbury Conservation Commission, the Duxbury Water Department, or the Massachusetts Department of Conservation and Recreation. They may also be owned and managed by non-profit organizations like the Massachusetts Audubon Society, the Wildlands Trust, or the Duxbury Beach Reservation, Inc. In the 1970s, the Duxbury Conservation Commission, under the leadership of Dr. Lansing Bennett, acquired over 2,000 acres of land which is still under the control of the Conservation Commission today. In 1974, Massachusetts Audubon Society acquired the North Hill Wildlife Sanctuary and the Wildlands Trust began acquiring open space in Duxbury in the 1980s.

An impressive 550 acres of Duxbury's land is permanently protected with Conservation Restrictions and an additional 122 acres are permanently protected due to an Agricultural Preservation Restriction on the Historic O'Neil Farm. These restrictions ensure that land remains in its natural state and cannot be developed. Conservation restrictions are required of all land acquired with Community Preservation Act funds. They are approved by the Massachusetts Secretary of Energy and Environmental Affairs and are recorded in the Plymouth County Registry of Deeds.

North Hill Marsh Area

North Hill Marsh is an important and actively used recreational area for birding, biking, horseback riding, cross country skiing, and walking. It is surrounded by the Frederick B. Knapp Town Forest, the Massachusetts Audubon North Hill Wildlife Sanctuary, the Town's North Hill Country Club, and other town conservation land. Collectively, these areas comprise over 1,000 acres of contiguous woodlands and wetlands. The Massachusetts Division of Fisheries and Wildlife designates the entire area as Estimated Habitat of Rare Wildlife and Priority Habitat of Rare Species. Access is restricted on small portions of land that contain the Mayflower wells and the Millbrook water supply.

Lansing Bennett Forest and Adjacent Lands

The 344-acre Lansing Bennett Forest was purchased by the Town of Duxbury in July 1970 from the Lot Phillips Company, a wooden box manufacturer formerly located in Hanover. This conservation area was once known as Trout Farm, but was later dedicated to Dr. Lansing Bennett, chair of the Duxbury Conservation Commission from 1967 to 1979. Dr. Lansing Bennett sought to preserve the rural charm of Duxbury and its wetland resources by developing and implementing the Greenbelt Land Protection Plan, a greenbelt of land extending along the town's river watersheds. Lansing Bennett Forest is adjacent to the 316-acre Ashdod Forest and 39 acres of the Black Friar Swamp and Swanson Conservation Land.

Camp Wing Conservation Area

The Town's Camp Wing Conservation Area is one of the largest conservation areas in Duxbury. The Camp Wing Conservation Area is a total

of 450 acres of upland forests, wetlands, and South River frontage.[2]

Camp Wing Campground

It is managed by the nonprofit Crossroads for Kids, is situated on 153 acres in West Duxbury. The camp offers overnight and day camp experiences for inner-city and local children during the summer. Boating, hiking, pool swimming, and archery are all offered at Camp Wing. Older campers can participate in Maritime Adventures, a program at the DBMS that exposes campers to sailing, shellfishing, rowing, and marine ecology. The program is free to Camp Wing and is underwritten by corporate and private grants.

Myles Standish State Reservation

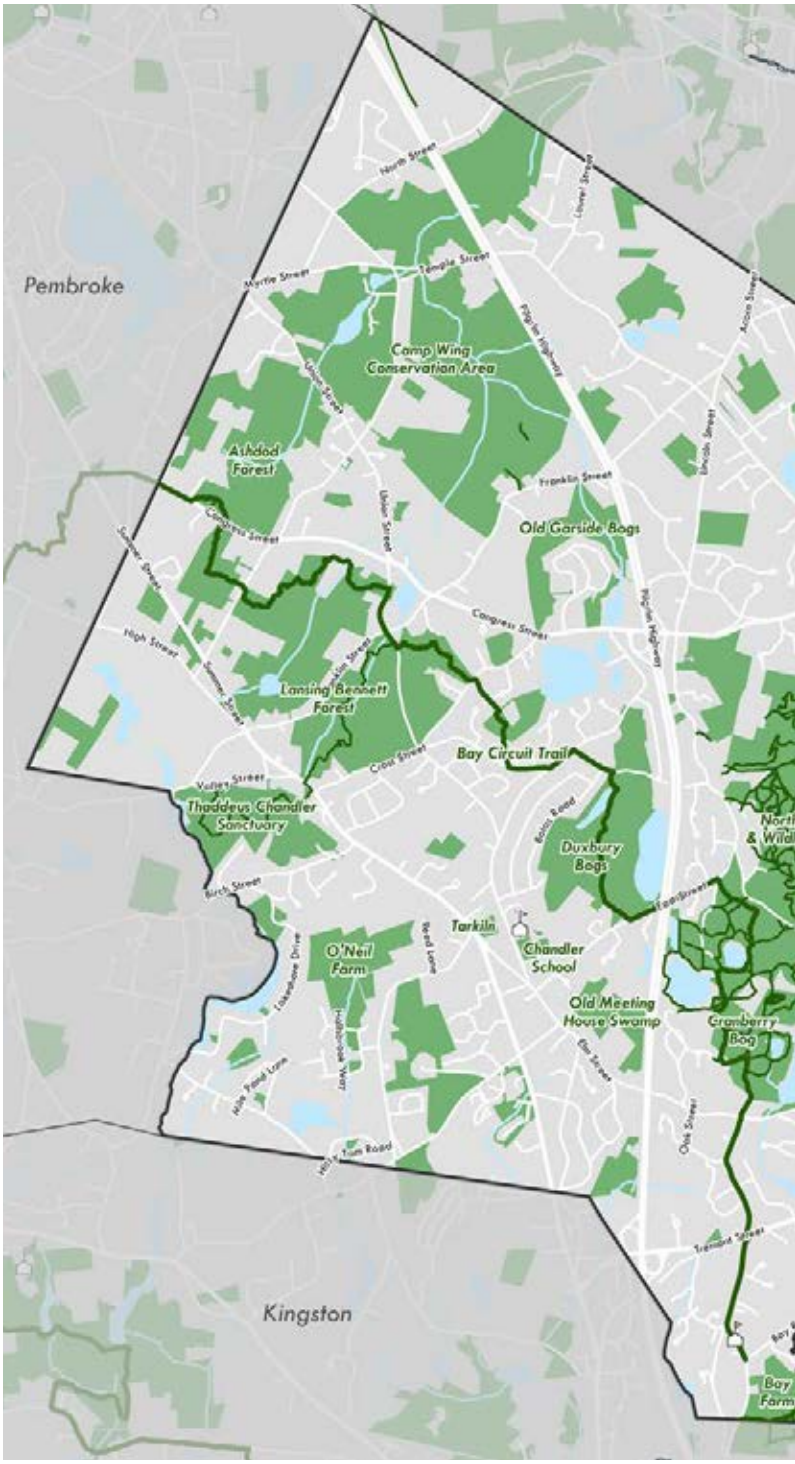
The Massachusetts Department of Conservation and Recreation owns and manages the Myles Standish State Reservation, a state-owned park and historic area that has a 116-foot granite tower topped with a large statue of Myles Standish facing seaward and holding the colony's charter. The monument and its almost 27 acres of wooded open space and walking paths are located at the top of Captain's Hill, on what was once Standish's farm.

Image: *O'Neil Farm Source: http://www.historiconeilfarm.org/news*

2. "Town of Duxbury Conservation Land and Other Points of Interest" (2009), Duxbury Conservation Commission

Historic O'Neil Farm

With over 200 years of continuous production, the O'Neil Farm is the oldest operating dairy farm on the South Shore. The farm is currently owned by the Historic O'Neil Farm, Inc., a nonprofit organization dedicated to continuing



the dairy operation and other farming. Over 120 acres are permanently protected on this site through an Agricultural Preservation Restriction. The farm has a ¾-mile walking trail and hosts an active 4-H Club. The farm hosts Farm Day and summer and school vacation programs.

Bay Farm

80-acres of open space for recreation, Bay Farm Field was once the site of grazing grounds for dairy cattle and other livestock. The Duxbury portion of Bay Farm was purchased

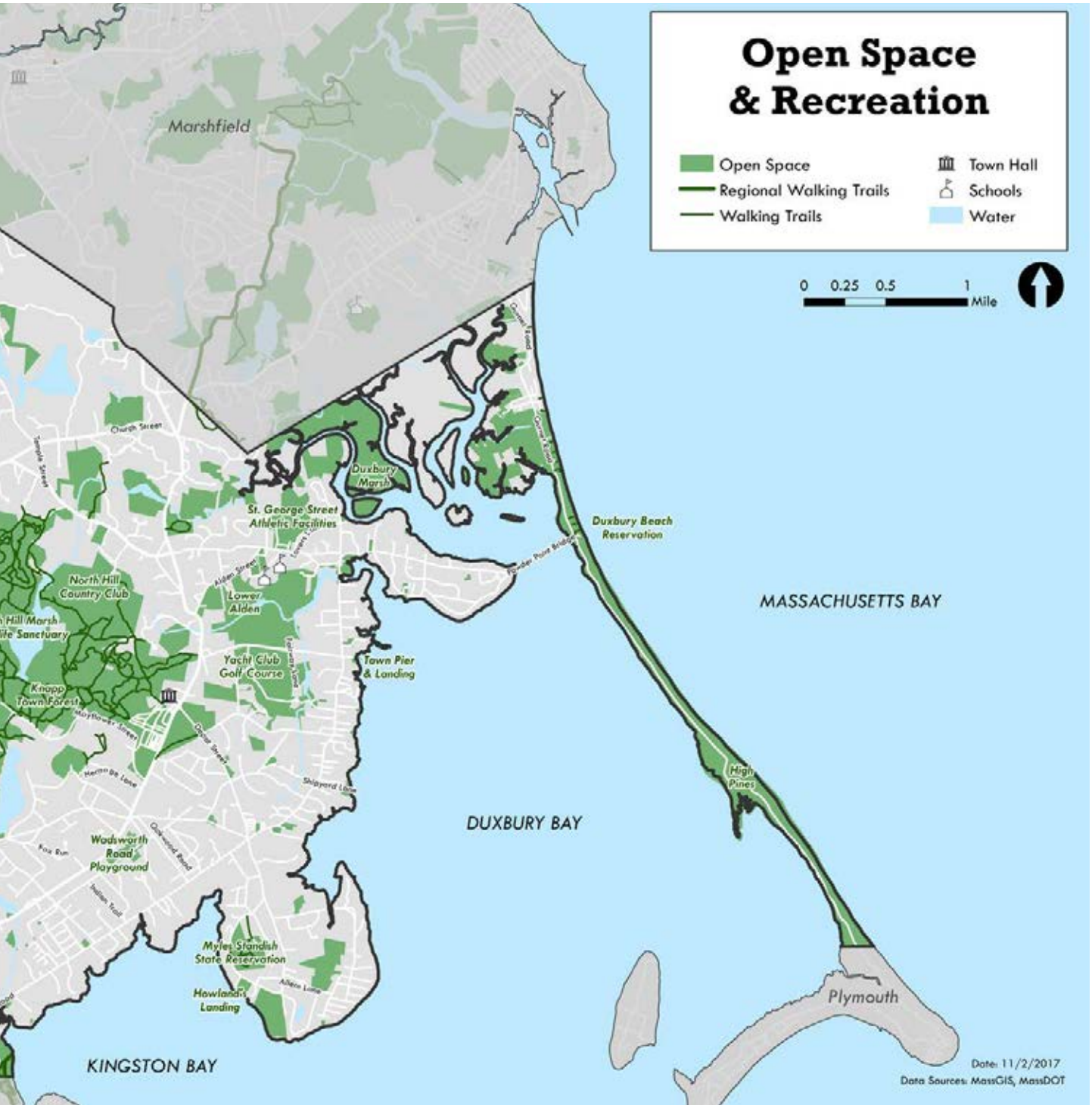


Image: *Bay Farm Source: http://baystatements.blogspot.com/2012/11/bay-circuit-trail-duxbury-thanksgiving.html*

by the Town in 1973 and the Town of Kingston acquired its portion in 1989 with assistance from the Trust for Public Lands. The Commonwealth of Massachusetts also purchased a small area of Bay Farm land. The three owners have an existing management agreement (MOU) for this area that should be revisited.

Bay Circuit Trail

Crossing through a number of open space properties in Duxbury is the Bay Circuit Trail, a 200-mile trail linking 79 areas of green space necklace from one end on Plum Island in Newburyport to the other end at Bay Farm in Duxbury. The Bay Circuit Trail is the grand vision of Charles Eliot II, nephew of renowned landscape architect Charles Eliot and grandson of his namesake Charles William Eliot, president of Harvard University. Charles Eliot II was an urban planner who spent a significant phase of his career in Washington, D.C., as Director of the National Capital Park and Planning Commission and then Director of the National Resources Planning Board. When he returned to Cambridge in the 1950s, Eliot conceived of the idea for the Bay Circuit Beltway, greenbelt of parkland encircling the Boston area, and began its establishment.[3]

Recreation

Duxbury is fortunate to have many high-quality, Town-owned recreation facilities, including a nine-hole golf course and an indoor pool. The Town's playgrounds, courts, and athletic fields, including a School Department turf field, are all heavily used and a need for additional field space has been identified given current demand. During the summer months, Duxbury's boat ramps, town landings, and beaches are enjoyed by both local residents and visitors alike.

Duxbury Bay

There are many opportunities for water-based recreation along Duxbury Bay. Two non-profit organizations, the Duxbury Bay Maritime School (DBMS), a community boating facility, and the Duxbury Yacht Club, a member's only facility, offer opportunities for boating, swimming, windsurfing, and fishing. There are also a number of private companies that are associated with maritime recreation in Duxbury, including local boatyards and marinas, launch services, and charter fishing boats.

Throughout the summer season, waterfront festivals are held often along Duxbury Bay, starting with Opening of The Bay on Memorial Day weekend. Sponsored by DBMS, Opening of the Bay always includes a visiting tall ship. The ship is open to the public during the weekend. Throughout the summer, many sailboat races and regattas are hosted by Duxbury Yacht Club and DBMS. In September, Classic Boat Weekend rounds out the summer season and is sponsored by DBMS, Duxbury Yacht Club, Duxbury Rural and Historical Society, and Duxbury Art Association.

3. "Charles W. Eliot, II," The Cultural Landscape Foundation, https://tclf.org/pioneer/charles-eliot-ii
4. "North Hill Country Club," http://www.northhillcountryclub.com/

Image: *Duxbury Beach Reservation Source: http://newenglandboating.com/daytrip-destination-blakemans-of-duxbury-beach/*

Image: *Percy Walker Pool Source: http://www.percywalkerpool.com/*

Duxbury Beach Reservation

The Duxbury Beach Reservation's 280 acres of barrier beach provides opportunities for walking, salt water swimming, jogging, bird and nature observation, picnicking, and shell and fin fishing to Duxbury residents and the general public. A beach sticker is required for vehicular access to the beach, with non-Duxbury residents paying higher fees than residents. Over the Sand stickers allow access to the outside of the barrier beach, where 500 four-wheel-drive vehicles are allowed per day. On hot summer days, vehicles are frequently turned away because the capacity has been reached. The number of beach stickers issued each year stays relatively constant.

Percy Walker Pool

The indoor Percy Walker Pool was given to the Town of Duxbury by an anonymous donor in 1976. It is open to the public and offers memberships for Duxbury residents and non-residents. Percy Walker Pool offers swim lessons and water aerobics and hosts Duxbury High School's Swimming and Diving Team. The six-lane pool is 25 yards long and has a one meter diving board.

North Hill Country Club

Adjacent to North Hill Pond and Marsh is North Hill Country Club, a nine-hole golf course owned by the Town of Duxbury and leased and managed by Johnson Fold Management, Inc. The golf course was built on the former Merry Family farm and opened in 1962. In addition to the course, North Hill Country Club also has a clubhouse with a restaurant where various banquets and events are held. Duxbury residents enjoy preferential membership rates at North Hill Country Club.[4]

Playgrounds and Fields

Originally part of the John Alden Farm, the Arthur Train Athletics Fields were initially sold to Duxbury Rural and Historical Society (DRHS) with the intention of creating the town's first public playground. Arthur Train was a well-known summer resident who funded the $600 sale for DRHS; the land was named for him after it was sold to the Town in 1925. For years, the Train Fields served as the central athletic fields for the Duxbury Public Schools campus

5. "Town of Duxbury Conservation Land and Other Points of Interest" (2009)
6. "2017 Fall Programs," Duxbury Recreation Department, http://www.town.duxbury.ma.us/Public_Documents/DuxburyMA_Recreation/Fall%20Programs%202017

until the St. George Street Athletic Facilities were constructed on the old High School site.[5]

Duxbury's recreation facilities are owned by both the Town of Duxbury and the School Department, with Town-owned land primarily managed by the Recreation Department. Recreation- and School Department-owned playgrounds, fields, and related recreational facilities are identified in the following table.

An Athletic Field Utilization Study prepared for the Town in 2015 documented the heavy use of Duxbury's existing athletic fields during the spring and fall months, especially on weekdays. The study found that the number of existing fields is inadequate to meet the needs of all the Duxbury High School teams and Duxbury Youth Sports programs. Due to the lack of fields, there is inadequate time to "rest" fields and allow turf to reestablish. This leaves the fields in poor condition by the end of each season, reducing safety and quality of play due to lack of cover, dust, and mud. The study recommended that the Town of Duxbury construct additional grass practice/game fields, add field lighting to lengthen the available time on each field, and construct one or more multi-use synthetic turf fields (or convert from an existing grass field).

Management and Resource Priorities

Town of Duxbury Departments and Committees

Conservation Department and Commission

Approximately 3,000 acres of land in Duxbury are under the control of the Conservation Commission. In addition to land management and acquisition, the Conservation Commission is charged with administering the Massachusetts Wetlands Protection Act, the Town of Duxbury Wetlands Protection Bylaw, and related regulations. The Conservation Department coordinates the efforts of the Conservation Commission and, through its Conservation Fund, manages and maintains conservation land and creates walking trails for public enjoyment.

Recreation Department

With a few exceptions, the Recreation Department manages all Town-owned recreation facilities on non-School Department properties. This includes the 5-acre property on Keene Street, Lincoln Street Playground, Percy Walker Pool and Field, Tarkiln Community Center, Train Fields, and the Wadsworth Road Playground. In addition to managing the facilities, the Recreation Department also runs a variety of programming for Duxbury residents of all ages. The following is a list of the Recreation Department's fall 2017 programs:[6]

- Middle School Girls Volleyball
- Girls Field Hockey
- Flag Football
- City Kickers (youth soccer)
- Early Bird Bootcamp
- After School Athletics
- Ice Skating at The Bog in Kingston
- Horseback Riding
- Tiny Tigers and Little Ninjas Karate
- Swimming

Any non-school group or organization wishing to use any fields in town, including those on school land, must first obtain a field permit from the Recreation Department. The only exception is the turf field which is scheduled through the Athletic Director at Duxbury High School. Tennis courts throughout Town are available for use for residents on a first-come, first-served basis, but anyone using the courts to hold private lessons must apply for a permit as well as pay a $30/hour fee.

Department of Lands and Natural Resources

The Department of Lands and Natural Resources, housed within the Department of Public Works, is responsible for maintaining Duxbury's open spaces and athletic fields (as well as the town's other public lands, public buildings, trees, trash

Site	Size	Manager	Facilities
Chandler School/Coppens Field	6 acres	School Department	• 2 full-size soccer fields • 1 full-size baseball diamond with lights • 2 playgrounds
Keene Street Playground/ Walter Kopke Park	5 acres	Recreation Department	• 3 little league diamonds • 1 multi-use field • 1 playground • 1 tennis court • ½ basketball court
Lincoln Street Fields	3.5 acres	Recreation	• 3 soccer/multi-use fields
Lower Alden	6 acres	School Department	• 1 field hockey/lacrosse field • 1 multi-use field • 1 playground • 2 softball diamonds • 3 tennis courts
Percy Walker Pool Field	3 acres	Recreation Department	• 1 field for soccer, youth football or lacrosse
St. George Street Athletic Facilities	37 acres	School Department	• 2 softball fields • 1 multi-use artificial turf field with lights • 1 track • 2 multi-use practice fields • 1 basketball court • 6 tennis courts
Tarkiln Community Center	1.5 acres	Recreation Department	• 2 little league fields • 2 tennis courts • 1 small playground
Train Fields	4.5 acres	Recreation Department	• 1 baseball diamond • 1 softball diamond with lights
Wadsworth Road Playground	2 acres	Recreation Department	• 2 tennis courts • 1 little league baseball diamond • 1 small playground

Table: *Recreation Facilities Managed by School and Recreation Departments*

removal, fuel depot, and ADA access ramp at Duxbury Beach). The department has an active maintenance program that includes athletic field mowing and maintenance, street tree trimming, and roadside mowing. Duxbury's Director of Public Works also serves as the Tree Warden.

School Department

The School Department manages athletic fields and playgrounds at the Alden and Chandler Schools, as well as across the street from Duxbury Middle and High School at the St. George Street Athletic Facilities. Duxbury High School used to be located on the site of the athletic complex but was moved in 2014 when the co-located Middle and High School opened in 2014.

While the School, Lands and Natural Resources, and Recreation Departments are involved in the management and maintenance of facilities and the development of their budgets, all

three municipal entities recommend that these facilities, especially the playing fields, be managed by a single department. The Schools also offer the Before & After Dark year-round community program.

Duxbury Beach Committee

The Duxbury Beach Committee advises the Board of Selectmen, Town Manager, and relevant Town departments on the use and management of the Town-leased portion of Duxbury Beach. Committee members include the Police Chief, Harbormaster, and Conservation Administrator as ex-officios, three designees of the Duxbury Beach Reservation, Inc., and six at-large members, one of whom is year-round Duxbury Beach resident. All committee members are appointed by the Moderator and hold three-year staggered terms.

Duxbury Bay Management Commission

At the 2006 Town Meeting, the Bay Management Committee was officially designated the Duxbury Bay Management Commission and charged with continuing their work in inventorying and providing draft management policies for the many bay uses. Such uses being looked at include: piers, aquaculture grants, moorings, shellfish beds, town landings and beaches, and the management concerns these activities generate. In the late 2000s, the commission released a Duxbury Bay Management Plan and Duxbury Aquaculture Management Plan.

Nonprofit and Private Organizations

Duxbury Rural and Historical Society

The Duxbury Rural and Historical Society was formed in 1883 to "improve and ornament" the town in response to the deteriorating condition of the community resulting from the collapse of the shipbuilding industry. At this time, trees were planted, street lamps installed, and fences and signs erected. The Society became one of the first—possibly the first—organization in the country to acquire land for conservation. Today, the Duxbury Rural and Historical Society owns and maintains over 150 acres of conservation land in town, along with four historic home properties: the King Caesar House (built in 1809), Captain Gershom Bradford House (1808), Nathaniel Windsor, Jr. House (1807), and Wright Building (1909). All four former homes are listed on the National Register of Historic Places. Housed within the Wright Building is the Drew Archival Library, a collection of historic documents and photographs.

Duxbury Beach Reservation, Inc.

In 1919, the Duxbury Beach Association acquired Duxbury Beach, a six-mile barrier beach which creates Duxbury Bay on its landward side. In 1975, the title to the Beach was transferred to the Duxbury Beach Reservation, Inc. in order to preserve the beach as a geological barrier, wildlife habitat, and recreational resource consistent with the group's primary ecological objective. The Reservation leases most of the beach to the Town of Duxbury but is responsible for preserving the dunes, and maintaining the parking lots and the back road to Gurnet-Saquish. Duxbury Beach Reservation, Inc. also funds the extensive Endangered Species Program that is mandated by the federal government to protect the threatened species that nest on Duxbury Beach, like the piping plover.

The Reservation hired an Executive Director for the first time in 2017 and has added an additional staffer to assist. The Reservation hires a manager to operate the parking lot and food pavilion at the north end of the beach who receives a portion of the parking revenues. Its main source of revenues are from the Town's lease payment. Its only other source of income is private donations, which help fund proactive measures to protect the beach, as well offset expenses of costly storm damage and related repairs, and grants to assist with coastal management planning and restoration.[7]

7. "Mission," Duxbury Beach Reservation, Inc., http://www.duxburybeach.com/learn/

Duxbury Bay Maritime School

The Duxbury Bay Maritime School (DBMS) was established in 1997 as a community sailing school. A decade later, DBMS now offers 80 different educational and recreational classes in sailing, rowing, marine ecology, Accessail (for sailors with physical or cognitive disabilities), navigation, windsurfing, boating safety, paddle board rowing, and kayaking. The school has partnered with the Duxbury High School Sailing and Rowing teams and provides water activities to inner city campers at Camp Wing.

Youth Sports Organizations

There are a number of private and nonprofit youth sports organizations in Duxbury that are not affiliated with the Duxbury Recreation Department. These groups, which include Duxbury Youth Baseball, Football, Hockey, Lacrosse, Soccer, and Softball, represent thousands of resident users who helped to identify a need for additional athletic fields as indicated in two independent reports from 2015 (the Athletic Field Utilization Study and a follow-up Athletic Facility Expansion Master Plan and Feasibility Study for the Chandler Elementary School). Beyond hosting youth sport programs, these organizations also assist with field maintenance by donating funds or equipment such as fences and signs.

Funding Sources

Community Preservation Act

In 2001, Duxbury adopted the Community Preservation Act (CPA) at the 3% surcharge level with a goal established for the protection of three of every ten acres of undeveloped land. CPA allows communities to create a local Community Preservation Fund for open space protection, water protection, outdoor recreation, historic preservation, and affordable housing. Unfortunately, the downturn in the economy in 2008 and the tax burden of multiple capital projects in Duxbury led to in a reduction in the CPA surcharge from 3% to 1% in 2012. The Community Preservation Committee (CPC) is appointed by the Selectmen and charged with reviewing funding requests and making recommendations at Town Meeting for voter approval. Despite the reduction in the surcharge, the town has been supportive of CPA projects, particularly those that preserve land and scenic resources, develop recreational sites, and restore historic properties. The CPC printed an informative brochure explaining the Act and highlighting CPA-funded projects. Recognizable CPA signage is posted throughout the community and non-profit organizations who have received CPA funds for restoration projects use plaques to acknowledge the town's generosity.

Duxbury Conservation Fund

The Conservation Department manages and maintains conservation lands, and creates walking trails for public enjoyment through its Conservation Fund. CPA funds have often been used to restore the Conservation Fund for acquisition of smaller parcels of land and ancillary expenses.

Grant Opportunities

Having an Open Space and Recreation Plan that has been approved by MA's Division of Conservation Services makes Duxbury eligible for State and Federal grants for open space and recreation. The Local Acquisitions for Natural Diversity (LAND) Grant Program helps Massachusetts communities acquire land for conservation and passive recreation purposes. The grants reimburse cities and towns for the acquisition of land in fee or for a conservation restriction. The general public must have reasonable access to land acquired through the LAND Program, and $400,000 is the maximum grant award.[8] The Federal Land and Water Conservation Fund provides up to 50% of the total project cost for the acquisition of parkland or conservation land, creation of new parks and trails, and renovations to existing parks.[9]

8. LAND Grant Program, https://www.mass.gov/service-details/local-acquisitions-for-natural-diversity-land-grant-program
9. "Massachusetts Land and Water Conservation Fund Grant Program," https://www.mass.gov/service-details/massachusetts-land-and-water-conservation-fund-grant-program

Community Input

2017 Community Survey

The online Community Survey completed by over 1,200 Duxbury residents confirmed the important value that open space and recreation resources provide to the town. When asked which community values are most important, 75% of all survey respondents identified open space and natural resources, making it the highest ranked value after a high-quality school system. Active recreation facilities including parks, playgrounds, and playing fields, were selected by 33% of respondents. Further, 83% of those who took the survey chose Duxbury's beaches as the town's greatest asset (making it the most selected asset), 57% selected the harbor/bay, and 44% selected natural landscape/scenic view.

About 30% of survey respondents chose recreational resources like parks, trails, and playgrounds as Duxbury's greatest asset while 15% identified those resources as challenges, making this category the most selected challenge after transportation options, business districts, and housing options. Multiple people mentioned the need to improve and better maintain Duxbury's playgrounds and playing fields, especially Coppens Field at the Chandler School. Residents also feel that Duxbury could benefit from additional athletic fields and playgrounds throughout town.

Survey respondents are supportive of the continued preservation of land in Duxbury. When asked to share their level of agreement with the statement "Continued acquisition and permanent protection of land is a high priority for preserving Duxbury's natural areas and drinking water supply," 74% of respondents were in agreement, 16% were neutral, 5% disagreed, and 5% needed more information. Just under half (49%) of respondents feel that the Town is prepared to preserve, protect, and maintain its open spaces and drinking water aquifer. About a quarter (24%) feel neutral about this, while 8% agree, and 20% were not sure.

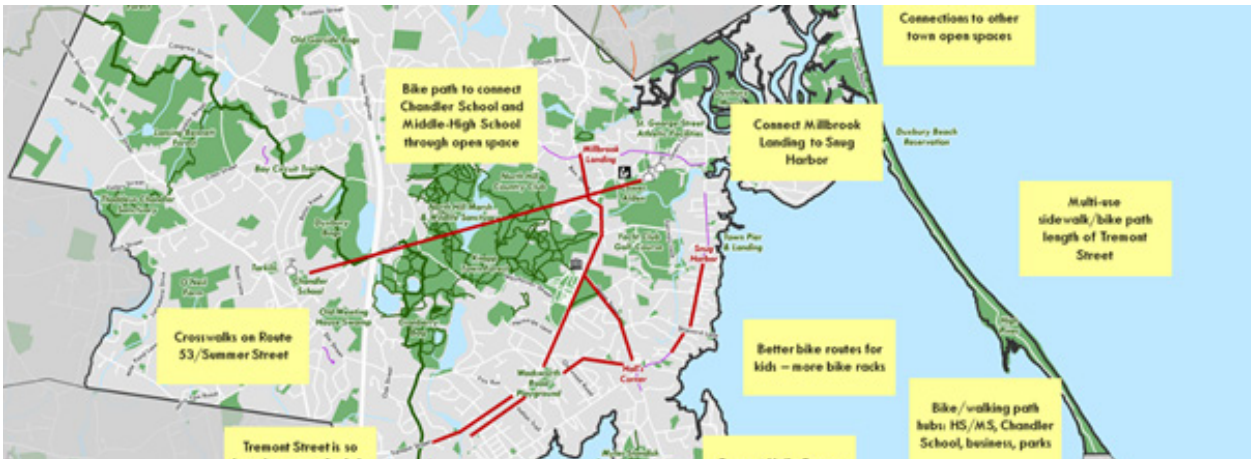


Image: *If it were safe to travel to locations in Duxbury - such as Town facilities, open space and recreational areas, or business districts - by walking or biking, what routes would you take? Source: MAPC*

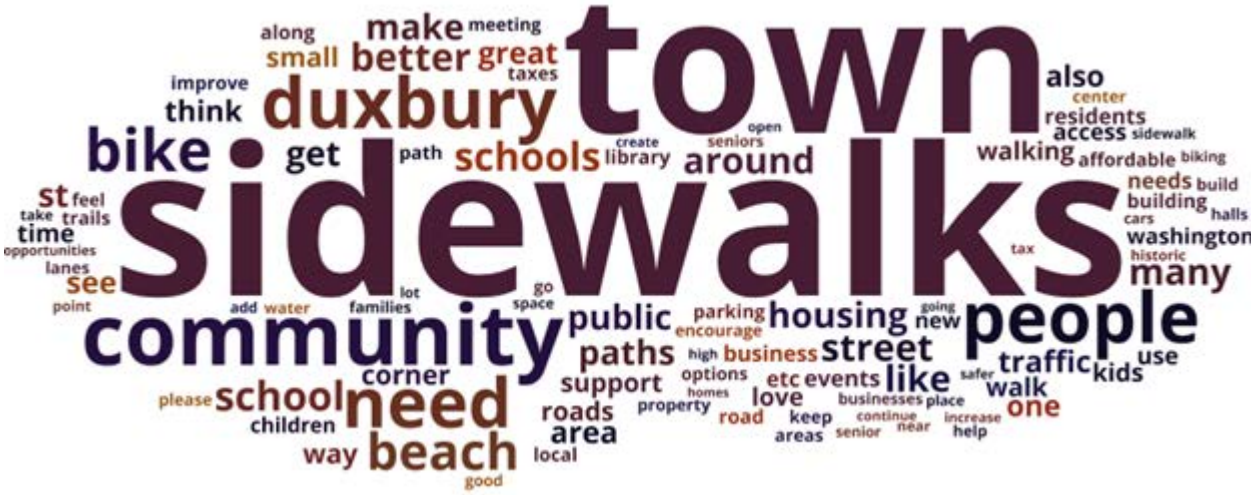


Image: *What are your good ideas for making Duxbury a stronger community? Source: MAPC*

November 2017 Community Forum

The existing conditions analysis of Duxbury's open space and recreation resources was presented and discussed with the Planning Board on October 11, 2017 and presented at the Community Forum on November 15, 2017. Forum attendees identified priorities for open space and recreation, including additional sports fields (specifically for youth soccer), a balance between growth and continued open space preservation and acquisition, and plastic dog waste bags at entrances to walking trails.

Image: *What bike and pedestrian connections are appropriate for Duxbury? Source: MAPC*

Open Space and Recreation
Recommendations

The following goals and strategies have been adapted from the recently completed Duxbury Open Space and Recreation Plan, and modified based on public input received during the Envision Duxbury process. Most recommendations related to preparing for climate change will be included in the Sustainability Element of this plan.

Goal 1: Protect Duxbury's water resources.

This goal reflects the primary rationale behind past and current open space planning in Duxbury: protection of the town's aquifer and drinking water resource. As new growth and redevelopment occurs in Duxbury, it should be balanced with efforts to control stormwater runoff and prevent other sources of contamination.

• **Strategy 1.1:** Protect drinking water quality by preventing contamination, runoff, and diversion of water that directly contributes to aquifer recharge.

Specific steps to protect the aquifer include the continued monitoring of nitrogen loading and contamination in groundwater and the development of a town-wide Stormwater Management Bylaw. Such a bylaw would establish minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff, decreased groundwater recharge, and nonpoint source pollution associated with new development and redevelopment.

• **Strategy 1.2:** Pursue a variety of land acquisition strategies for protecting sensitive groundwater recharge areas.

Future land acquisitions in Duxbury should continue to be prioritized based on their ability to protect groundwater resources and meet other goals for recreation and habitat conservation.

• **Strategy 1.3:** Continue to educate residents about the influence of surface water on the town's groundwater.

Education should be provided around steps to protect both water quality and quantity, with a focus on water conservation measures and demand reduction.

• **Strategy 1.4:** Develop and implement stormwater management strategies such as low-impact development (LID).

LID techniques implement small-scale hydrologic controls that mimic the natural hydrologic regime of watersheds while still allowing development to occur. Rain gardens, green roofs, porous pavement, and other examples can help control water pollution, erosion, and sedimentation by slowing the flow of stormwater, filtering out sediments and other pollutants, and promoting groundwater infiltration. Redevelopment that integrates these techniques can improve current conditions and impacts of previously developed properties.

• **Strategy 1.5:** Evaluate climate change impacts on the aquifer and develop long-term strategies to protect this resource.

A major area of concern is saltwater intrusion of Duxbury's aquifer associated with rising sea levels and increased pumping. Should a portion of the aquifer become contaminated with seawater, it would compromise the use of nearby wells as a freshwater source.

• **Strategy 1.6:** Evaluate street drainage systems that discharge into Duxbury Bay.

This strategy is more focused on maintaining the water quality of the bay for the plants and animals that inhabit it and for the humans that use it for recreation. The Town should assess which

parts of the municipal separate storm sewer system (MS4) are discharging fecal coliform and other contaminates into Duxbury Bay and make necessary repairs.

Goal 2: Protect Duxbury's natural areas and environment.

This goal explores ways to protect other natural resources in Duxbury, focusing on steps to acquire land and preserve sensitive habitats like wetlands and coastal resources.

• **Strategy 2.1:** Strategically acquire and protect land based upon past planning efforts and smart growth principles.

Future land acquisitions should be informed by past planning efforts like the Greenbelt Land Protection Plan, which was developed to protect surface water, groundwater, and wildlife corridors that generally follow streams and rivers. Given the fact that limited land remains in Duxbury for either preservation or development, smart growth principles that mix land uses, take advantage of compact design, and create walkable neighborhoods should be integrated into decisions.

• **Strategy 2.2:** Preserve ecologically valuable habitat and natural resources through acquisition and/or local regulation.

Areas targeted for acquisition include salt marsh and freshwater wetland areas and their buffers, for example as has been done around North Hill Marsh. Regulatory means of protecting sensitive resources include developing stormwater design guidelines and certifying vernal pools. As it relates to the rare bird species that nest on Duxbury Beach, the Beach Reservation should continue to review and update the Endangered Species Monitoring Program for least terns and piping plovers that is administered by the Town of Duxbury in accordance with Duxbury Beach Reservation, Inc.'s Duxbury Beach Management and Habitat Conservation Plan.

• **Strategy 2.3:** Minimize habitat fragmentation to help protect Duxbury's species diversity.

Past efforts to minimize habitat fragmentation include the restoration of historic fish ladders at Island Creek to support anadromous fish populations passing from Kingston Bay, through Island Creek and Mill Pond, and into Island Creek Pond. Duxbury should continue working with volunteers to undertake annual fish counts and utilize the restored fish run as an educational and recreational resource.

• **Strategy 2.4:** Preserve the connectivity of inland wetlands and riparian corridors.

As other strategies have mentioned, the Town of Duxbury should continue to prioritize land acquisitions on areas that protect the town's aquifer and groundwater resources.

• **Strategy 2.5:** Protect Duxbury's coastal resources.

This strategy mainly focuses on efforts to protect and maintain Duxbury Beach, which in turn provides protection for the rest of Duxbury, and involves implementing the Duxbury Beach Management Plan to protect the beach's dune, intertidal areas, and wildlife habitat. Specific actions include continuing to track dune height, planting/fertilizing beach grass and other dune vegetation, and maintaining/ creating additional artificial piping plover nesting habitat.

• **Strategy 2.6:** Identify natural resources in Duxbury that are vulnerable to the effects of climate change, and develop long-term

strategies to protect those resources.

Duxbury should implement recommendations from the recently-completed Climate Vulnerability Assessment and Action Plan, including monitoring and restoring eelgrass beds, working with a consultant to further evaluate the aquifer's susceptibility to saltwater intrusion, and supporting/funding efforts to protect Duxbury Beach.

• **Strategy 2.7:** Consider creating shoreline development guidelines to protect the waterfront and Duxbury Bay.

Shoreline development guidelines include building setbacks to protect sensitive shoreline resources and minimize visual impacts, the use of soft design approaches for shoreline treatment, and a vegetative buffer to shield development and preserve scenic views.

Goal 3: Preserve the unique, semi-rural character of Duxbury.

As Duxbury plans for the future, the Town should continue taking steps to preserve the characteristics of the community that make Duxbury a unique and special place to live. These characteristics include an active recreational and commercial shellfish industry, cranberry bogs, and the presence of many historic homes and other buildings.

• **Strategy 3.1:** Continue to identify and protect important areas, vistas, historic buildings, archaeological sites, and open spaces that contribute to Duxbury's character.

The Town of Duxbury should continue to advocate for and utilize Community Preservation Act (CPA) funds to acquire land and preserve sites that contribute to the town's character and history. Other means of protection include encouraging private landowners to place conservation restrictions or easements on their properties, promoting the Commonwealth's Chapter 61 programs, and developing Local Historic Districts that impose preservation restrictions on historic buildings.

• **Strategy 3.2:** Protect and preserve agricultural land.

Efforts to retain Duxbury's remaining agricultural land include identifying and classifying all active farms in Duxbury (including Town-owned land, private agricultural land, and "backyard farms") and working with farmers to protect their land through State programs. This could be through a temporary program like Chapter 61A, which gives preferential tax treatment to farmers of 5 acres or more who make a long-term commitment to farming, or through a permanent solution like an Agricultural Preservation Restriction.

• **Strategy 3.3:** Support and preserve agriculture, horticulture, silviculture, and aquaculture in Duxbury.

Beyond directly protecting land, other steps Duxbury's Agricultural Commission can take to preserve these industries are publicizing and participating in farm-related events, promoting farming as a viable career, and supporting local farmers in their endeavors, especially in the event of conflicts.

• **Strategy 3.4:** Continue to protect the aesthetic character of Duxbury's scenic roads and landscapes.

As steps are taken to increase bike and pedestrian connections in Duxbury, it should be done in way that is sensitive to Duxbury's scenic roads and landscapes. Economic development and investments should also be done in such a way to preserve community character, mitigate negative

impacts, and expand community amenities.

• **Strategy 3.5:** Educate town residents on how the CPA contributes to and protects Duxbury's unique characteristics.

The Community Preservation Committee should provide materials to residents about what the Community Preservation Act is and why it is important for maintaining the character of Duxbury. The Town should continue partnering with the Duxbury Rural and Historical Society to develop programs and educational materials that illuminate the community's history.

Goal 4: Provide recreational opportunities with minimal impact to the environment.

The Town of Duxbury should continue partnering with nonprofit organizations to offer world-class recreation and educational opportunities and increase awareness of these opportunities. Additional facilities like athletic fields and playgrounds will likely be needed to meet current demand and should be thoughtfully integrated into the sizable open space resources of the town.

• **Strategy 4.1:** Increase awareness of passive and active recreational opportunities.

Through nonprofit partners like the Duxbury Bay Maritime School and the Duxbury Beach Reservation Inc., Duxbury should use events and programming to bring attention to the recreational resources offered by the town. To raise awareness about recreational opportunities, as well as historical, cultural, and conservation areas in Duxbury, the Town should develop and implement a multi-media communication plan.

• **Strategy 4.2:** Strive to improve access to Duxbury's natural resources and recreational facilities for the physically challenged.

Steps include developing ADA-accessible pathways, designating ADA-accessible parking, providing seating and picnic tables that could accommodate patrons in a wheelchair, and more. A number of facilities in Duxbury contain some of these accessibility measures, and efforts to improve/update open spaces should include ways to make sites more ADA-compliant. The Town should work with the Duxbury Bay Maritime School to expand on-the-water programs for people with disabilities and provide opportunities for seniors.

• **Strategy 4.3:** Add additional recreational facilities like playing fields and playgrounds as resources become available.

Duxbury should continue to pursue the development of Town and/or School land to provide additional athletic fields, playgrounds, courts or other facilities deemed necessary by residents. Reflecting the results of the 2015 Athletic Field Utilization Study, the Town of Duxbury should meet the demand for playing fields by prioritizing the construction of additional grass fields, field lighting, and/or a multi-use synthetic turf field. The Town should also assess if there is a need for an additional outdoor basketball court in the community. To fund the acquisition of land or construction of recreation facilities, Duxbury should allocate CPA funding or seek grant funding from the MA Division of Conservation Services.

• **Strategy 4.4:** Support a maintenance and improvement program for the Town's open spaces, recreation areas, athletic facilities, and programs.

Actions should be taken to improve the condition of existing recreation facilities in Duxbury, primarily athletic fields. For grass playing fields, this involves giving the fields time to "rest" and allowing turf to reestablish, a nearly impossible

task in Duxbury due to the demand for fields. Should Duxbury add another grass field to its roster and/or convert an existing multi-use field to a synthetic turf field, the Town should utilize a maintenance and improvement plan to rotate activity so overused fields are completely taken out of use for at least a year.

• **Strategy 4.5:** Continue working with local nonprofits in Duxbury to provide high-quality recreational opportunities.

Partnerships with the Duxbury Bay Maritime School, Duxbury Beach Reservation, Inc., Duxbury Rural and Historical Society, Mass Audubon, the Historic O'Neil Farm, Inc., and more are crucial for maintaining Duxbury's open space and recreation network and offering excellent programs and events for residents and visitors. Action items related to expanding recreation programming from the Open Space and Recreation Plan include working with the Historic O'Neil Farm, Inc. to enhance educational programming and increase farm events and supporting the Reservation's efforts to sponsor/fund Mass Audubon's summer education programs at Duxbury Beach. Public education is key to mitigating the negative impacts of recreation.

• **Strategy 4.6:** Improve opportunities for water-based recreation in Duxbury Bay, at Duxbury Beach, and in other surface waterways while mitigating potential negative impacts.

Opportunities for expanding water-based recreation involve working with the Duxbury Bay Maritime School to grow the Adult Sailing Program, expand on-the-water programs for people with disabilities, provide new on-the-water programs for non-racing youth, and offer more options for high school rowers. This should be coupled by efforts on the part of DBMS and Bayside Marine Corporation to provide better education and an appreciation of these resources for boaters of all ages.

• **Strategy 4.7:** Improve appropriate public access to Duxbury's waterfront through land acquisitions and improved signage.

With the redevelopment of the Battelle site by Island Creek Oyster, there will be excellent opportunities to expand public access to Duxbury's waterfront. In addition, if areas along the coast become inhabitable or undevelopable due to flooding and sea level rise associated with climate change, the Town should prioritize that those areas be returned to open space for public use. Improved signage and wayfinding can make residents and visitors more aware of publicly-accessible areas along the waterfront and better orient them to these sites.

Goal 5: Provide opportunities for safe walking and biking in Duxbury.

Duxbury currently lacks opportunities for safe walking and biking in town due to the absence of sidewalks, bike lanes, and other facilities for active transportation. The Town should identify key areas for the development of these facilities, design them in a way that is sympathetic to Duxbury's scenic character, ensure that they are well-maintained following their construction, and work with neighboring towns to establish regional connections.

- **Strategy 5.1:** Consider future maintenance and upkeep needs in the planning and design of new improvements.

In order to address concerns about pedestrian and bike facilities not being well maintained, the Town of Duxbury should be proactive in developing a maintenance program that involves inspections of facilities, sets a multi-year schedule for repairs, prioritizes improvements and additions to the system, and addresses funding mechanisms.

Chapter 5
Sustainability - Energy

Key Findings

The Town of Duxbury has made steady improvements towards reducing municipal greenhouse gas (GHG) emissions and installing renewable energy sources. In 2017, Duxbury received designation as part of the Green Communities program from the Massachusetts Department of Energy Resources. Through the program, Duxbury has committed to reducing municipal energy use by 20% over the next 5 years through a variety of technical projects and behavioral changes. The facilities that are the highest municipal energy users are the schools, which make up 42% of total municipal energy use. However, many efforts have already been made to reduce energy use at the schools and the Duxbury Middle-High Schools is considered a Collaborative High Performance School for sustainability.

In addition to energy efficiency, the Town has taken efforts to support renewable energy generation both for municipal buildings as well as allowing access for residents to take advantage of solar. The town owns several rooftop solar arrays, as well as purchases electricity from solar and wind systems in the region. The Town also allows accessory, rooftop solar by-right in several major zones. The goals and strategies of the Master Plan look to continue the strength of these recent efforts.

Image: *Duxbury Landfill Solar Photovoltaic Source: Renewable Energy Development Partners, LLC*

Introduction

Energy is an increasingly critical topic for municipalities across Massachusetts, both in terms of reducing municipal energy costs as well as meeting Greenhouse Gas (GHG) emission reduction goals as one part of responding to climate change. Massachusetts has a statewide goal of reducing GHG emissions by 80% (from a 1990 baseline) by 2050, and many municipalities are setting local or regional goals to reduce emissions in line with this broader goal. The Town of Duxbury is also a designated Green Community and has committed to reducing municipal energy use by 20% from 2016 through this state program. The Town looks to reducing energy usage through increasing efficiency and increasing usage of non-emitting, renewable energy sources that can help Duxbury meet these goals.

Incorporating energy efficiency and clean energy into municipal planning has several benefits including:

- Helping the Town save money and reduce costs
- Stabilizing energy prices through the use of clean energy
- Reducing local air pollution
- Reducing local greenhouse gas emissions
- Adding to energy resilience and energy independence

Municipalities can impact energy and GHG emissions directly through control over municipal energy usage, and indirectly through policies and programs for residents and businesses. This chapter of the Envision Duxbury Master Plan summarizes the existing state of energy usage in Duxbury and highlights the Town's successes to date related to efficiency and clean energy. This chapter also outlines recommended goals and strategies for Duxbury's continued work on energy, both as a municipality and more broadly community-wide.

Existing Conditions

Municipal Energy Use

Municipalities have direct control over energy use in their municipal facilities including town-owned buildings, properties, open space and recreation, street lights, water and sewer infrastructure, and vehicle fleets. While municipal energy use typically only makes up a small portion of the total energy use within a community, municipal leadership on energy efficiency and renewable energy can be critical to elevating the issue and leading by example. Energy efficiency efforts can help save the Town money in annual budgets and reduce energy costs. Similarly, purchasing renewable energy can help stabilize energy prices and may reduce costs for the Town.

Energy Management

In Duxbury, municipal energy use is managed by the Facilities Director and an Energy Specialist who focuses on energy in municipal buildings and schools. In 2014, the Town took steps to streamline energy management and consolidate it across both municipal buildings and schools. In addition to Town staff, there is a volunteer, ad-hoc Alternative Energy Committee (AEC) which is a 13-member committee appointed by the Board of Selectmen. The purpose of the AEC is to develop and make informed recommendations to the Town Manager and Board of Selectmen on how to reduce energy usage and costs of the Town. The utilities that serve Duxbury include Eversource as the electricity provider and Columbia Gas as the natural gas provider.

Green Communities

In 2017, the Town of Duxbury received a Green Communities Designation from the Massachusetts Department of Energy Resources (DOER). In order to be designated, the Town created a 5-year energy reduction plan (ERP) to reduce municipal energy use 20% by 2021 (as compared to an energy use baseline year of 2016). In addition to the ERP, the Designation requires the community to achieve four additional criteria, including 1) approve zoning for renewable energy generation, 2) adopt expedited permitting for as-of-right energy facilities, 3) adopt a fuel-efficient vehicle policy, and 4) adopt the Massachusetts' Board of Building Regulations and Standards (BBRS) Stretch Code (780 CM 115.AA) in order to minimize life-cycle costs and increase energy efficiency in new construction. The Green Communities Designation allows the Town to be eligible for state grant funding to implement energy conservation measures (ECMs) across town owned property, buildings, and vehicles.

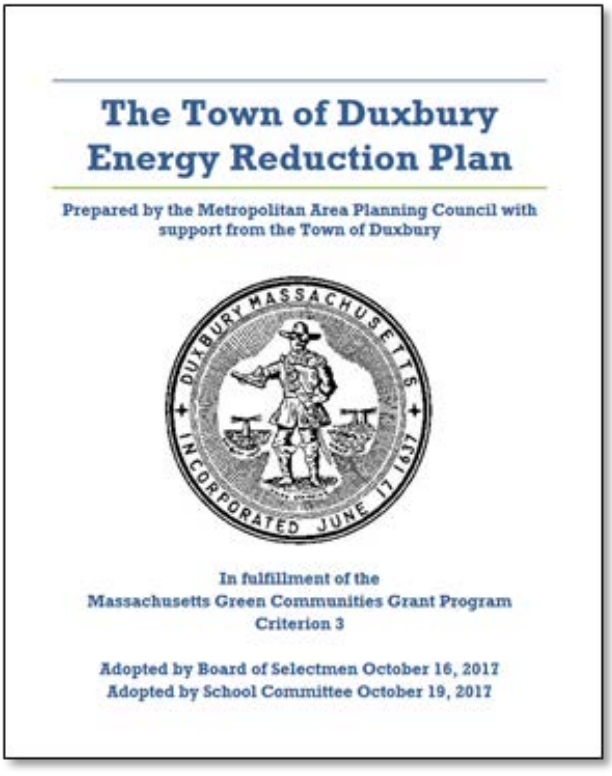


Image: *Cover of the Town of Duxbury Energy Reduction Plan Source: MAPC*

The Energy Reduction Plan shows that in 2016 the municipal energy use baseline was 59,445 MMBTUs (one million British Thermal Units) and the goal is to reduce that energy use by at least 11,889 MMBTUs.[1] Municipal buildings made up 69.8% of the Town's baseline energy use. Of that, the schools including the Middle-High School, Alden Elementary School, and Chandler Elementary School made up a significant portion of total energy use at 46%. However, Duxbury has led by example in their Middle-High School facility, which is a verified Collaborative High Performance School (CHPS), a building sustainability standard similar to achieving LEED Silver by utilizing a variety of sustainable building elements. The municipal fleet of vehicles was responsible for 23.0% of the baseline energy use. Water and Sewer made up 7.0% of the baseline energy use. Streetlights and traffic lights make up a small percentage of the baseline and Eversource, not the Town, owns and operates most of the streetlights.

In 2017, the Town of Duxbury received $139,705 in grant funding to implement energy conservation measures aligned with the ERP. Efforts to reduce energy consumption in municipal buildings and schools have included installing and utilizing energy management systems, retrofitting buildings with LED lighting and installing smart lighting controls, controlling plug load, improving ventilation and weatherizing buildings. While the Town has taken steps to reduce energy in key facilities, the overall energy use has gone up slightly. This discrepancy may be due to differences in energy demands that relate to weather conditions of a given year.

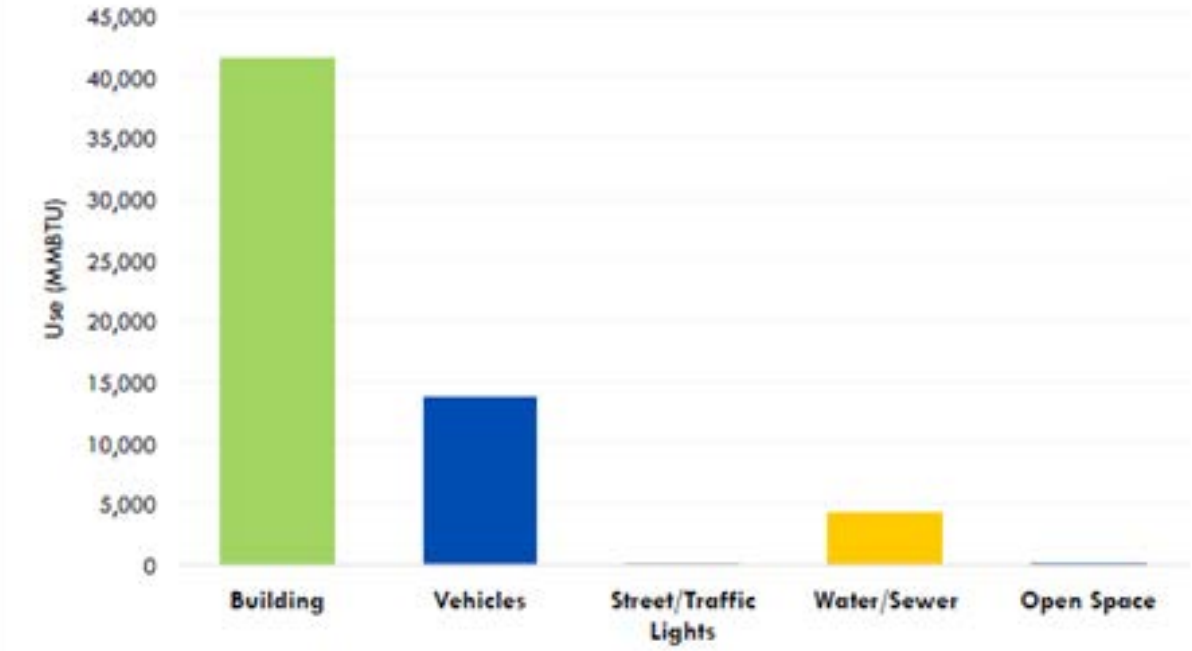


Figure: *Municipal Energy Use Baseline (FY2016) by Facility Category (Note: Open Space includes the Chandler Street Field, Old Cordwood Barn, and Crowell Barn)*
Source: Duxbury Energy Reduction Plan (2017) and MassEnergyInsight

1. The energy use baseline includes electricity, natural gas, delivered fuels (oil, propane) and gasoline and diesel for vehicles. Energy use is converted to million British Thermal Units (MMBTUs) in order to make comparisons across fuel types.

Municipal Energy Use Over Time

	FY2016	FY2017	FY2018
Null (Non-Assigned)	85	85	92
Building	41,401	43,204	43,344
Open Space	22	24	25
Street/Traffic Lights	98	99	107
Vehicle	13,682	12,949	11,979
Water and Sewer	4,157	5,003	4,665
Total MMBTUs	59,445	61,364	60,212
Percent Difference from Baseline Year	0.00%	3.23%	1.29%

Table: *Municipal Energy Use over Time (FY2016-FY2018) in MMBTU's*
Source: MassEnergyInsight[2]

Community-wide Energy Use

Energy, both electricity and thermal energy, used by the residential, and combined commercial and industrial sectors make up a larger portion of the energy used in Duxbury than that of municipal energy use. In 2016, according to data collected by MassSave the residential sector made up approximately 75% of electricity use across all sectors and commercial and industrial accounted for 25%. This energy use break-down reflects the fact that the residential sector is more substantial than either commercial or industrial sector in Duxbury. When looking at electricity usage over time. Residential electricity usage has increased by approximately 9% between 2013 and 2016. Electricity usage in the commercial and industrial sector has remained fairly flat over the same time period.

Annual Electricity Usage by Sector (in MW)

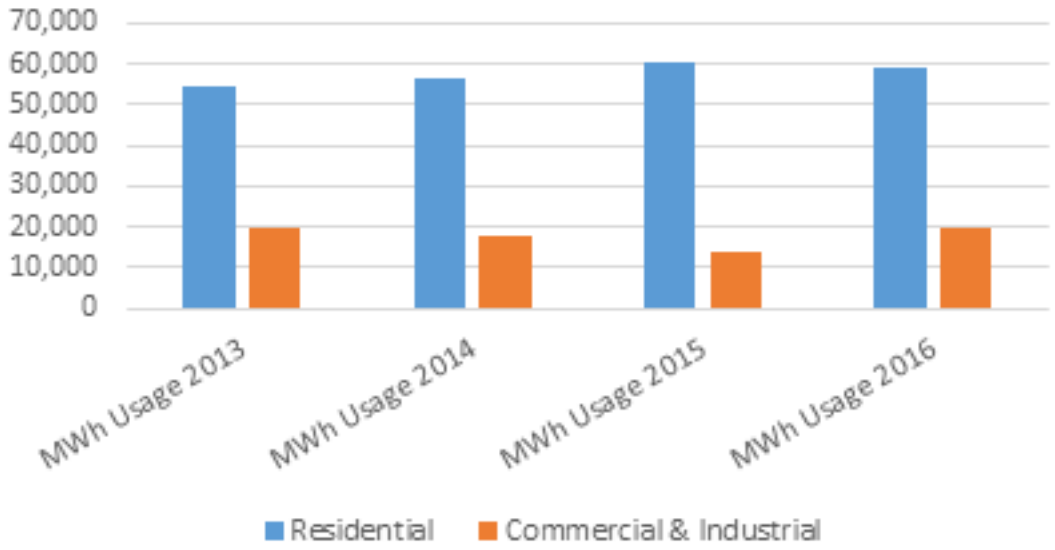


Figure: *Annual Electricity Usage by Residential and Commercial and Industrial Sectors from 2013-2016 Source: MassSave*[3]

2. The baseline and subsequent years energy usage does not include weather-related data, which would reflect how temperatures would impact energy usage. For example, more heating days during cold weather may impact heating fuel usage.

When comparing electricity usage from Duxbury to the neighboring communities of Kingston and Pembroke, Duxbury has a higher average residential electricity usage per capita. In Duxbury, which has a population of 15,572 and approximately 5,957 households, residents used 3.8 megawatt-hours (MWhs) per year per person, compared to 3.17 MWhrs per year per person in Kingston and 3.3MWhrs per year per person in Pembroke. This is already reflected in higher average electricity use per household. However, due to Duxbury's limited commercial and industrial sector, where electricity usage is significantly less in these sectors when compared to neighboring communities, total electricity usage is also lower, in spite of a higher average residential electricity usage per capita.

MassSave also collected utility data for thermal energy usage, including natural gas measured in British Thermal Units (BTUs). However, this data may not fully reflect thermal energy usage from delivered fuels such as oil and propane. In 2015, annual thermal energy usage was comprised of 86% from the residential sector and 14% from the commercial and industrial sector. Similar to electricity usage, thermal energy in the residential sectors has increased by 20% between the years 2013 to 2015, while a slight decrease in usage has occurred in the commercial and industrial sector.

Similar to electricity, annual per capita thermal energy usage is higher in Duxbury than in neighboring Kingston or Pembroke (in the residential sector). While Duxbury used 280 Therms per capita in residential buildings in 2015, Kingston used 136 Therms per capita and Pembroke used 190 Therms per capita. Residential thermal energy usage in Duxbury is more than double the thermal energy usage in neighboring Kingston, which has a lower population size. While commercial and industrial sector usage in Duxbury remains

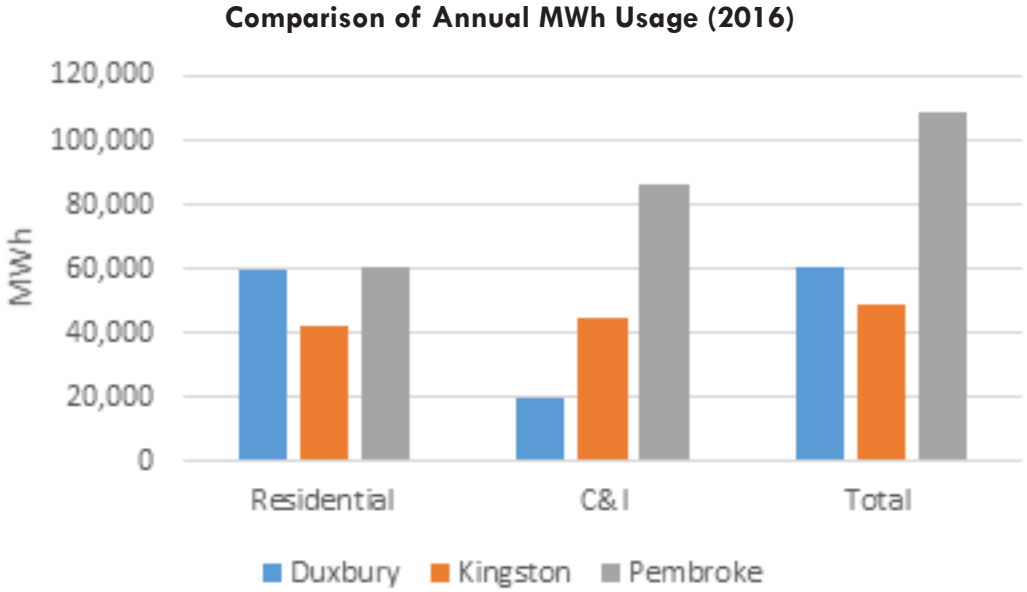


Figure: *Comparison of Annual MWhr Usage between Duxbury, Kingston, and Pembroke Source: MassSave*[3]

3. Source: MassSave http://www.masssavedata.com/Public/GeographicSavings?view=U
This data is sourced from residential and C&I customer profile studies (available http://ma-eeac.org/studies/), which use gross savings and incentives data collected from a combination of PA customer tracking and other vendor data (such as upstream lighting sales by store location) to geographically represent savings and spending across the Commonwealth. The study data does not always tie directly to the PA customer tracking systems and DPU reported savings, which take into account other factors, such as evaluation impact factors and attribution.

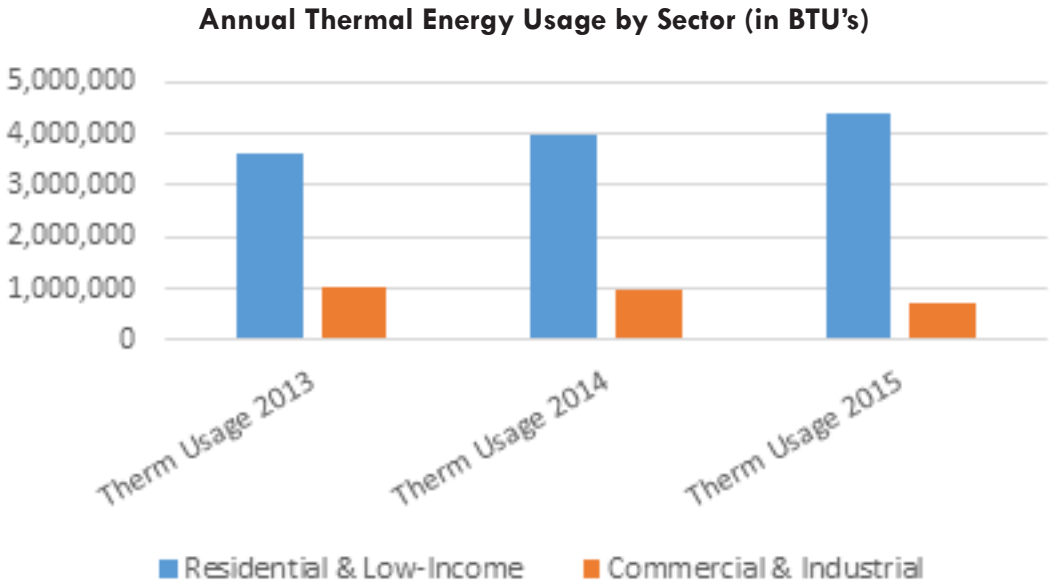


Figure: *Annual Thermal Energy Usage by Residential and Commercial and Industrial Sectors from 2013-2015 Source: MassSave*

lower comparatively, the total Thermal energy usage of Duxbury is similar to that of Pembroke, which has several thousand more residents than Duxbury.

Clean Energy in Duxbury

According to Mass DOER, Duxbury has had a total of 2,355 kilowatts (kW) of solar installed between 2011 and 2018.[4] Nearly half of the solar capacity installed since 2011 have been residential systems, and a third of the solar capacity is installed on the roofs of school facilities. Installation on commercial and industrial sites made up only 1% of the total solar capacity, and 23% was made up of other large-scale solar arrays.

Image: *Duxbury Landfill Solar Photovoltaic Source: Renewable Energy Development Partners, LLC*

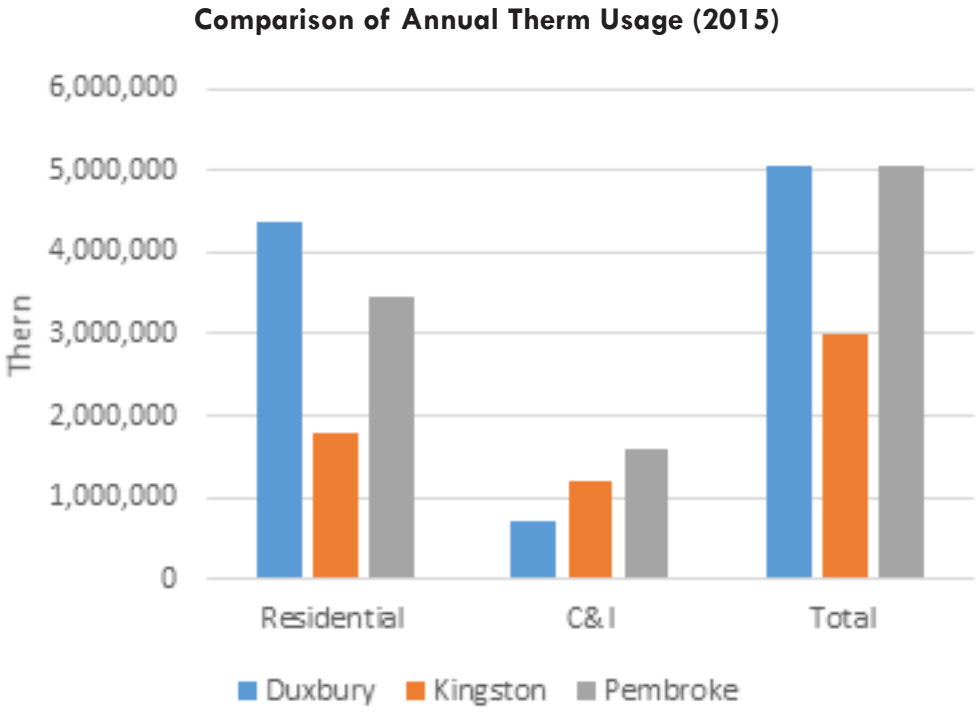


Figure: *Municipal comparison of annual thermal energy usage by sector Source: MAPC*

Duxbury has been a regional leader in municipal solar and renewable energy, and has used both municipally owned-property to host solar and participated in off-site energy generation through Power Purchase Agreements (PPAs).[5] Local municipal renewable energy projects include:

• Roof-mounted solar at Middle-High School/ Performing Arts Center

– 427 kW roof-mounted system

• Solar Array at Chandler School

– 2.4 kW ground mounted system used for educational purposes

– 266 kW roof-mounted system

• Acushnet Gravel Pit Solar Array

– 300 kW systems, provides energy to municipal buildings (approx. 25%)

• Town of Duxbury Landfill Solar Array

– 532 kW system on 3 acres

– Duxbury has a PPA with the Renewable Energy Development Partners LLC that developed the solar on the landfill property

• Purchasing Electricity from Off-Site Wind Turbine that is located in another Town using a PPA

Renewable Energy Zoning

In addition to direct investments in increasing renewable energy use municipally, Duxbury has enabled the growth in renewable energy, particularly solar PV through its zoning by-laws:

Article 621 Solar Photovoltaic Facilities of the code defines and regulates solar photovoltaics, including for small accessory solar less than 50 kW and larger solar PV facilities. Accessory Solar PV can provide up to 125% of principal

4. Mass.gov "Qualified Generation Units". https://www.mass.gov/service-details/qualified-generation-units. Accessed February, 11, 2019.
5. A Power Purchase Agreement, or PPA, is a special contract by which a third party develops and maintains the solar array on a customer's property and then sells the energy to that customer at a fixed price.

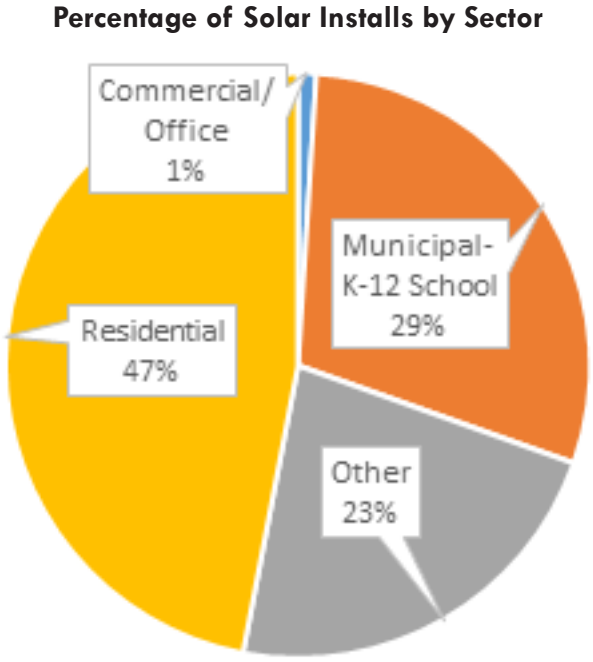


Figure: *Percentage of Solar Installs by Sector Source: MAPC*

use energy consumption and is allowed by right in several zones including the Residential Compatibility District, Neighborhood Business Districts, and Planned Development Districts. However, ground mounted and ground mounted solar canopies require site plan review and are only allowed in certain areas, which does not include the Residential Compatibility District or the Planned Development Districts.

Section 618 Ground-Mounted Solar Photovoltaic Installation Overlay Districts creates a 3-acres overlay district which allows large-scale 250 kW+ systems on town-owned land at the existing transfer station. The overlay also takes into consideration buffer distances from neighboring properties. This overlay district was established as part of the Green Communities designation process. This overlay limits the development of additional large-scale solar within Duxbury because it already contains the large-solar array at the town landfill. Additional large-scale solar installations in Duxbury would require an amendment to the zoning bylaw or a creation of new overlays.

Community Input

October 2018 Community Forum

On October 24th, 2018 Duxbury hosted a public form focused on the second phase of the Envision Duxbury Master Planning process, including the elements of sustainability. Prior to the public form, MAPC discussed the energy element with the Chair of the Alternative Energy Committee to better understand what current goals and projects the AEC has underway. These goals were used to inform the presentation and engagement elements at the Public Forum.

During the Public Forum, MAPC presented the existing conditions on energy and community members were asked to provide feedback and input, including on potential energy planning priorities. The potential energy planning priorities were outlined as: improving energy efficiency in municipal buildings, purchasing electric and/or alternative fuel vehicles for the municipal fleet, promoting programs and initiatives to encourage reduction of residential and commercial energy use, developing a plan to reduce community-wide greenhouse gas emissions, exploring opportunities to develop clean energy assets in town, and developing charging stations for electric vehicles. We also asked "what would you like to see in order to build a more sustainable, clean energy future in Duxbury?" Responses ranged on a variety of sustainability topics, including reducing light pollution, increasing access to solar through parking canopies, and suggesting programs such as municipal composting.

The feedback gathered at the meeting was used to inform the development of recommendations below.

Image: *Clean Energy presentation at a Community Forum held at the Duxbury Bay Maritime School Source: MAPC*

Sustainability - Energy
Recommendations

The following goals and strategies are intended to support continuing efforts to reduce greenhouse gas emissions, reduce energy usage, and save on energy costs both at the municipal level and community wide.

Goal 1: Develop a community-wide Climate Action Plan that sets the community on a path towards becoming net-zero, including buildings, transportation, and waste sectors.

• **Strategy 1.1:** Extend the Ad-Hoc Alternative Energy Committee's goals to include considering a feasibility analysis of net-zero commitment and supporting a long-term GHG reduction plan.

There is local and regional interest in setting GHG reduction goals, including getting to net-zero by 2050. The AEC's purpose is to help reduce energy usage and costs for the Town of Duxbury and make recommendations to the Selectmen and Town Manager. This purpose could be extended to include a more explicit look at carbon and GHG emissions.

• **Strategy 1.2:** Establish a GHG baseline for the community to better understand usage across residential, commercial and industrial, transportation and waste sectors.

In addition to setting a GHG reduction goal, conducting a GHG inventory and establishing a baseline can aid in future planning towards that goal. A community-wide GHG inventory should consider emissions across multiple sectors and help prioritize community-wide action and policies.

• **Strategy 1.3:** Explore targets for GHG reductions and Net-Zero goals, including interim targets for every decade (i.e. 2030 and 2040) and near-term targets for reduction.

Establishing a GHG target or net-zero goal can help a community work towards reducing their impact on climate change. Net-zero may consider emissions from different sectors including buildings, transportation and waste. The Massachusetts state government has set a state goal of 80% reduction of GHG emissions by 2050 (based on a 1990 baseline). Duxbury could establish their own local goal or participate in a regional goal.

• **Strategy 1.4:** Once targets have been established develop a strategy for reaching GHG reductions and launch projects and initiatives that balance greatest impact and costs.

A road-map/plan to reach GHG reduction and/or net-zero goals will help provide a community-wide framework for what policies will need to be in place, and what projects and program will help reduce emissions.

Goal 2: Increase access for local residents and businesses to clean energy for electricity and heating/cooling needs.

• **Strategy 2.1:** Encourage the development and participation in Community Shared Solar (CSS), in which multiple subscribers can benefit from a single, large solar array (within the same utility load-zone). CSS helps provide access to solar to those who are unable to install it on their own property, whether they have roofs that aren't appropriate or are renters who don't own their home.

There are several ways municipalities can support CSS, including vetting existing or new CSS projects and supporting marketing to local residents or including CSS options in a solarize campaign model. Duxbury can also help advocate for low-moderate income households who may otherwise not have access to solar.

• **Strategy 2.2:** Host a Solarize plus or Heat Smart campaign to promote and reduce costs of air source heat pumps and the electrification of heating/cooling systems, while also reducing costs for solar through bulk purchasing of rooftop solar (Solarize).

While traditional solarize campaigns focus on increasing solar PV installations, newer models may include bulk purchasing of air-source heat pumps or increasing assess to community shared solar.

Goal 3: Reduce municipal greenhouse gas emissions.

• **Strategy 3.1:** Continue projects to reduce energy usage at municipally-owned buildings, including schools through energy efficiency measures, retrofitting HVAC and boilers, and behavioral changes.

Duxbury was designated a Green Community and should continue to engage in that state program, including applying for grant funding in order to fund energy efficiency measures in municipal buildings. Duxbury should complete the projects listed in their 2017 Energy Reduction Plan in order to reach their 20% reduction goal.

• **Strategy 3.2:** Continue to reduce energy use from municipally-owned vehicles including investing in fuel efficient and alternative fuel vehicles, and tracking vehicle usage.

In addition to addressing energy usage in municipal buildings, Duxbury should continue to comply with their clean vehicles policy when purchasing new vehicles and replacing old. Fuel efficient vehicles should be considered and used when appropriate and the Town should track fuel usage to identify challenges and opportunities for energy use reduction.

• **Strategy 3.3:** Install and purchase renewable energy for municipal use, either through direct ownership or power purchase agreements (PPAs) with solar and wind sources nearby.

Duxbury is already a regional leader in municipal solar and purchases wind power from off-site. Duxbury should continue to install rooftop solar on municipal buildings, particularly as municipal facilities are renovated or retrofitted with new roofs.

• **Strategy 3.4:** While a majority of the streetlights in Duxbury are owned by Eversource, the Town should continue working towards municipally owned streetlights and lights at facilities, and consider retrofitting to LEDs and/or dimming lights where appropriate (as identified in the 2017 Energy Reduction Plan).

Duxbury should take into consideration strategies that help reduce electricity usage as well as reduces light pollution to neighbors. This is especially relevant at exterior lighting on municipally owned buildings including parking lots and recreation facilities.

Goal 4: Support local residents and business in reducing their energy use through energy efficiency programs and initiatives.

• **Strategy 4.1:** Educate property owners about the benefits and programs to conduct a home energy audit and partner with existing programs through Eversource and MassSave.

Residential energy usage, both for electricity and natural gas, make up a large portion of the total community energy usage. Homeowners can receive free or low-cost energy audits that will help them determine how best to save energy and save on costs.

• **Strategy 4.2:** Establish a weatherization program for home-owners and business owners, or explore partnerships with existing programs.

While Duxbury has taken measures to improve energy efficiency in municipal buildings, similar energy efficiency projects can help home owners and business owners reduce energy usage and save on energy costs. The Town could help advertise existing programs through the utilities.

Goal 5: Increase energy resilience at critical facilities and public safety buildings.

• **Strategy 5.1:** Identify critical facilities ideal for resilient energy systems, including facilities that may be used as local emergency shelters or command centers.

Critical facilities were identified during the municipal vulnerability preparedness process. Considering these facilities with the lens of energy resilience can help prioritize energy resilience projects.

• **Strategy 5.2:** Explore the technical and financial feasibility of installing islanding capabilities at municipally-owned solar energy systems to be used during power outages (such as at the schools).

• **Strategy 5.3:** Explore the technical and financial feasibility of installing battery storage with solar either at existing solar arrays, or building a new solar array plus storage.

The costs of storage are declining and Massachusetts' SMART program provides incentives for solar plus storage. If Duxbury installs additional municipal solar, the Town should consider adding storage to that site to take advantage of the incentives and add to energy resilience.

Chapter 6
Historic and Cultural Resources

Key Findings

Residents of Duxbury have long demonstrated their commitment to conserving and protecting the town's historic buildings and semi-rural character. The Town is fortunate to have three key organizations that are stewards of this heritage. Two are Town entities: the Historical Commission and the Local Historic Districts Commission. The third is a non profit organization, the Duxbury Rural and Historical Society.

Since the Duxbury Rural and Historical Society was established in 1883, Duxbury has integrated land conservation, historic preservation, a commitment to enhancing the character and physical condition of the town, and a commitment to education and outreach. The Duxbury Rural and Historical Society has preserved and showcased three historic houses as museums, manages the Drew Archival Library at the Wright Memorial Library building, and has acquired lands throughout the town to aid in the conservation and enhancement of Duxbury's natural open spaces.

This long-standing commitment to preservation has allowed the town to maintain a living agricultural history. The Duxbury Bogs continue to produce cranberries, the Historic O'Neil Farm, protected with conservation restrictions through the Wildlands Trust, continues to function as a working farm, and a shellfishing industry continues to operate in the waters of Duxbury Bay. Conservation and preservation of Duxbury's historic assets, particularly continued restoration of Duxbury Beach, provides protection against the threat of sea-level rise and storm surge.

This consistent commitment to preservation has established organic clusters of historic and cultural resources. The area between Alden Street and the Bluefish River, Snug Harbor, and the area around the O'Neil Farm and Tarkiln Community Center each represents a unique combination of scenic beauty, historic value, and cultural activity. In addition, the clusters can help direct new inventory efforts as part of the upcoming historic preservation planning process. Existing partnerships among the organizations active within these clusters can be leveraged for coordinated planning and programming efforts that continue to celebrate the town's rich history and cultural heritage.

Image: *Alden House Source: Alden Kindred of America*

Introduction

Since its earliest inhabitants drawn to the abundance of fish in its waters, Duxbury and its natural resources have been a draw for those who choose to settle here. Its proximity to the water helped fuel an economic boom when it became a hub for shipbuilding in the 18th century, and its beaches spurred a second revival as a summer resort community in the late 19th century. The founding of the Duxbury Rural and Historical Society (DRHS) in 1883 as a community improvement society established a long tradition of historic preservation and land conservation in Duxbury. Since its founding, the DRHS has received and acquired multiple historic properties, which it uses to showcase the historic character of the town through exhibits, archives, and educational programming. Duxbury's commitment to documenting and preserving its history is evident from the more than 800 listings captured within the Massachusetts Cultural Resource Information System (and included in an appendix to this report), of which more than 300 have been listed on the Massachusetts State Register of Historic Places. In addition, the Town of Duxbury has adopted three local historic districts and explored the adoption of four more. These districts establish rules and guidelines for additions and improvements to buildings therein to encourage property owners to preserve their structures' historic character permanently. While the town is replete with buildings and sites of historic significance, we focus on the most prominent sites – particularly those that contribute directly to communicating the historic and cultural heritage of Duxbury and streetscapes, and to the arts and cultural life of the town.

Snapshot of Historic Resources

A snapshot of the historic resources in Duxbury is outlined in the tables below and on the following page. Duxbury's consistent commitment to preservation has established organic clusters of historic and cultural resources. The area between Alden Street and the Bluefish River, Snug Harbor, and the area around the O'Neil Farm and Tarkiln Community Center each represents a unique combination of scenic beauty, historic value, and cultural activity. In addition, the clusters can help direct new inventory efforts as part of the upcoming historic preservation planning process. Existing partnerships among the organizations active within these clusters can be leveraged for coordinated planning and programming efforts that continue to celebrate the town's rich history

Duxbury Historic Designations	
Total Historic Resources Inventoried in MACRIS	731
National Register Listings	50
Properties with Preservation Restrictions	4
National Historic Landmarks	1
National Register Historic Districts	3
• Old Shipbuilder's Historic District	
• Tinkertown Historic District	
• Cove Road Historic District	
Local Historic Districts	10

Valued Arts, Culture and Historic Resources
Name
Powder Point Bridge
Duxbury Beach
Town Pier
Duxbury Bay Maritime School
Snug Harbor Area
Alden House
Duxbury Free Library
Art Complex Museum
Art and Music Festivals (Ellison Center for the Arts)
Wright Memorial Library
Bluefish River Area
First Parish Church
Duxbury Rural and Historical Society Museums
Myles Standish Monument and State Reservation
Camp Wing
Historic O'Neil Farm/Joseph Chandler, Jr. House
(15) First Period Houses (1625-1725)

and cultural heritage. Within and beyond these clusters, Duxbury's residential fabric is rich with history. Families in town take pride in their connection to the town's history and to its historic homes, many built in the 18th and early 19th centuries, that contribute to the town's character and identity. The town's wealth of historic and cultural assets are preserved and maintained largely through the individual actions of private property owners. The master plan process presents an important opportunity to consider how to enhance Duxbury's historic character while meeting other planning priorities.

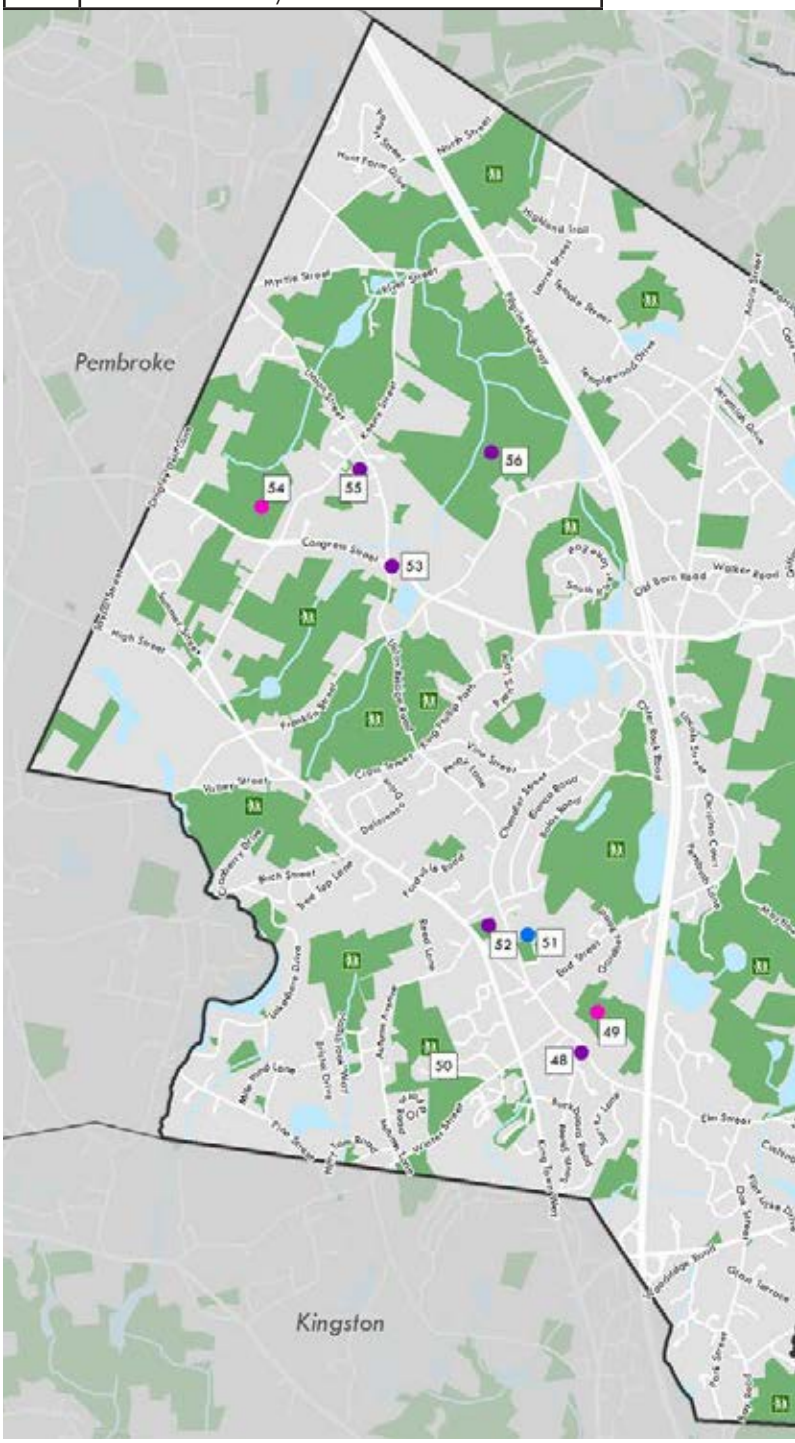
Key Historic Resources with Designation[1]

Name	*Date*	*Address*	*#*
Early Alden Homesite	c. 1630	71-77 Alden Street	2
Myles Standish Burying Grounds	1632	Chestnut Street	34
Alden House	1700	105 Alden Street	4
Alexander Standish House	1750	341 Standish Street	1
Enoch-Freeman House and Stable	1775	907 Tremont Street	2
Sampson-Gifford House	1804	104 Standish Street	1
Nathaniel Winsor Jr. House	1807	479 Washington Street (owned by DRHS)	1
Captain Gamaliel Bradford House	1807	942 Tremont Street	1
Captain Gershom Bradford House	1808	931 Tremont Street (owned by DRHS)	1
Captain Daniel Bradford House	1808	251 Harrison Street	1
King Caesar House	1809	120 King Caesar Road (owned by DRHS)	1
Seth Sprague, Jr. House and Barn	1813	476 Washington Street	2
Reverend Benjamin Kent House, Duxbury District Schoolhouse No. 9	1820	992 Tremont Street	2
Charles Drew House	1826	685 Washington Street	1
Possibly Joseph Chandler's House[2]	1832	915 Tremont Street (not inventoried)	-
First Parish Church and Hearse House	1840	842 Tremont Street	2
Captain Freeman Soule House	1847	987 Tremont Street	1
Tarkiln School	1871	245 Summer Street	1
Wright Memorial Library	1909	147 St. George Street	1
Pillsbury Summer House	1938	45 Old Cove Road	1

1. Address and Construction date data sources: Massachusetts Historical Society and Town of Duxbury.
2. Chandler, Barb. "News from the Edmund Chandler Family Association Winter 2012." Edmund's Community Corner, Edmund Chandler Family Association: January 17, 2012. Accessed online (https://ecfanews.wordpress.com/2012/01/17/winter-2012-edmunds-community-courier/) December 21, 2017.

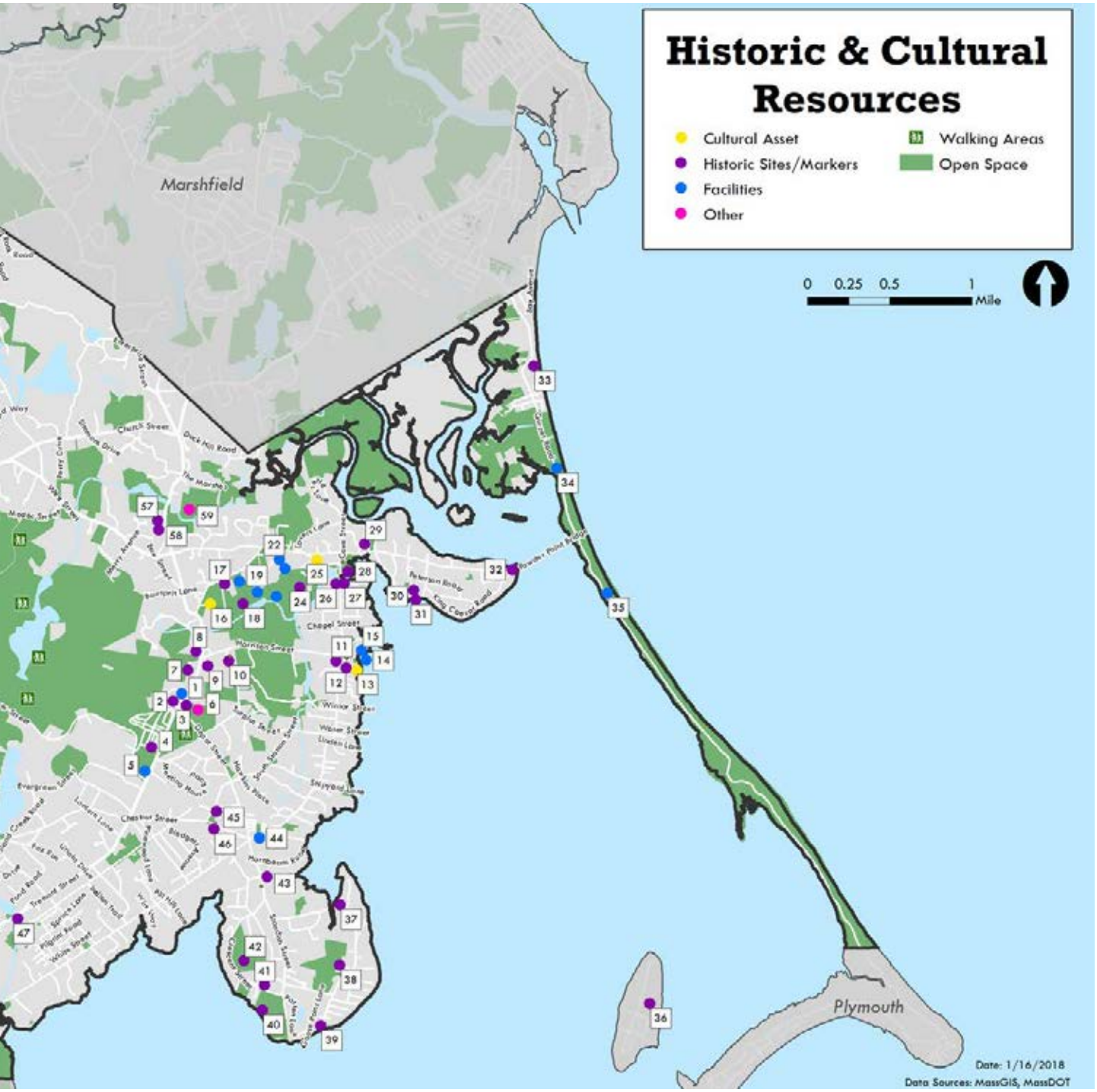
Historic and Cultural Resources Map

Map Key and Resource Name	
1	Old Town Hall
2	First Parish Church
3	Charles Boomer Square
4	Mayflower Cemetery
5	Senior Center
6	Lapham Woods
7	Capt. Gamaliel Bradford House
8	First School House
9	Capt. Gershom Bradford House
10	Capt. Daniel Bradford House
11	Seth Sprague, Jr. House
12	Nathaniel Winsor House
13	Duxbury Bay Maritime School
14	Town Pier, Mattakeesett Court
15	Duxbury Yacht Club
16	Art Complex Museum
17	Alden House
18	John Alden Cellar Hole
19	Duxbury Free Library
20	Alden School
21	Performing Arts Center
22	Wright Building/Drew Archival Library
23	Duxbury Middle-High School
24	The Cushman House
25	Ellison Center for the Arts
26	Tide Grist Mill, Helen P.F. Hill House
27	Bluefish River Firehouse
28	Charles Drew House
29	Honest Dick's Grave/Powder Point School
30	King Caesar House
31	Bumpus Park/Weston Wharf
32	Powder Point Bridge
33	Cable Hill (Rouses Hummock)
34	Duxbury Beach and Bathhouse
35	Duxbury Beach
36	Cedarfield (located in Plymouth)
37	Helen Hunt Property
38	Elder Brewster's Lilics
39	Myles Standish Homestead
40	Allen Property
41	Alexander Standish House
42	Myles Standish Monument State Park
43	Nook Gate Site
44	Girl Scout House/Rec. Dept. Office
45	First Church Site/Old Burial Ground



46	Second Meeting House Site
47	Island Creek Fish Ladder
48	Tree of Knowledge
49	Old Meeting House Swamp
50	O'Neil Farm
51	Chandler Elementary School
52	Tarkiln Community Center

53	Ashdod Triangle
54	Ashdod Forest
55	Ashdod Cemetery
56	Camp Wing Conservation Area
57	Grist Mill Site
58	Ford's Store
59	Cow Tent Hill



Existing Conditions

History of Duxbury

Early Settlers

As the earliest Europeans to establish a farming community on Wampanoag lands, Duxbury's colonial inhabitants lived among Native Americans, purchasing land from them by deed in 1649 and 1672 and becoming embroiled in King Philips War.[3] Duxbury's colonial history began as settlers at Plymouth began to spend summers farming its lands and eventually establishing a year-round farming community. In 1637 Duxbury became the second incorporated community in the Plymouth colony in Massachusetts. Early settlers in Duxbury included important figures in the Plymouth colony, including Captain Myles Standish, the military leader; Elder William Brewster, the religious leader, and John Alden, the colony's Assistant Governor. The legacy of these men and their families provides a foundation for the historic preservation, cultural heritage, and conservation that have nurtured Duxbury's historic character and identity. The story of this period of the town's history is told through the Alden House Historic Site, the Myles Standish Burial Ground, which features fifteen grave markers from this period, and the Historic O'Neil Farm.

Development: From Agricultural Community to Shipbuilding Hub

Duxbury's character was initially shaped by its rural origins when large agricultural homesteads divided the land among the Plymouth colony's early settlers and firmly established with the growth in its wealth and civic infrastructure as it became a hub for the shipbuilding industry. The expansion of trade and fishing rights after the American Revolution fueled an explosion of shipbuilding activity in Duxbury.[4] That activity concentrated along the spine of Washington Street, which was constructed to support the growing ship-building industry. Prominent shipbuilding families built large stately houses along Washington Street in the Federal style. The architectural character of the district helped secure the street's designation as the Old Shipbuilder's Historic District on the National Register of Historic Places in 1983 and continues to define the historic character of Duxbury. Houses from this era are often situated close to the right-of-way. They convey a distinctly Federal architectural style that is highly visible from the street and establish the historic character and identity throughout the district. Similar development patterns of buildings situated close to major roads with open land behind can be found in South Duxbury as well and among clusters of historic properties throughout the town.

In addition to establishing a development pattern that has ensured the continued character and beauty of Duxbury, the town's economic prosperity during this era established the its civic center as well. Wealth generated from the shipbuilding industry funded the construction of Duxbury's Town Hall and First Parish Church in 1840, establishing an architecturally prominent center of civic life on Tremont Street.

Development: The Rise of Summer Tourism

Changes in shipbuilding practices led to the industry's decline in Duxbury, and the Civil War hastened an economic downturn as over 200 men enlisted to fight. After the war, the extension of the Boston and Cohasset railroad to Duxbury in 1871 increased Duxbury's attraction as a

3. Beyond the Pilgrim Story: In Their Own Write. Pilgrim Hall Museum online collections, accessed January 9, 2018: http://www.pilgrimhallmuseum.org/in_their_own_write.htm
4. Duxbury Rural and Historical Society. "Duxbury in Brief: A Historical Sketch." Accessed online January 9, 2018: http://duxburyhistory.org/local-history/

summer destination. Powder Point Bridge, built in 1891 provided scenic access to Duxbury Beach, the town's most treasured natural resource. The bridge remains the longest wooden bridge in the United States. The bridge, the beach, and landings dotting the shoreline drew residents and visitors to Duxbury Bay in the late nineteenth and early twentieth century for swimming, fishing, boating, and relaxation. Year-round and summer residents' shared appreciation for the town's natural scenic beauty and historic charm fueled civic efforts to beautify the town, conserve its natural resources, and promote its history. Duxbury Beach helped anchor Duxbury's identity as a summer retreat at the turn of the 20th century.

This period saw a rapid growth in civic associations, artistic and cultural activity and a commitment to preserving and enhancing the character of Duxbury – an enthusiasm that has continued through the present day. Residents of this era celebrated the town's history with the erection of prominent monuments and memorials in 1872, including the Myles Standish Monument and the Civil War Monument in the Mayflower Cemetery. The Duxbury Rural and Historical Society was founded during this era. Founded in 1883, the Duxbury Rural and Historical Society began acquiring lands and developing educational programs to help residents connect with the town's history. The Bradford, Allen and Wright families emerged as important civic leaders in this era. The first public library was constructed and donated to the town by the Wright family in 1909. The Duxbury Art Association was established in 1917. Residents established the Duxbury Beach Association in 1919, a common law trust organized to protect the beach that was a forebear to the Duxbury Beach Reservation, Inc., a permanent management structure established in 1975.

Development: Civic and Cultural Expansion

The completion of Route 3 in 1963 provided a high-speed connection to Boston from the South Shore and Cape Cod. This new regional transportation access established Duxbury as an attractive year-round community for working families in the greater Boston area. The beginning of the Old Colony Railroad service in 1997 further contributed to Duxbury's population growth. Residents of Duxbury are drawn to the town's historic character and natural beauty. Civic and cultural life grew during this era with the Art Complex Museum opening in 1971, the Percy Walker Pool in 1976 and a Duxbury campus of the South Shore Conservatory in 1980. In 1996, the renovation of an historic church into the Ellison Center for the Arts provided a home to both the Duxbury Art Association and the South Shore Conservatory, and the expansion of the Duxbury Public Library in 1997 provided space to MakerSpace and artistic tools and supplies into the borrowing offerings.

The Duxbury Bay Maritime School, completed in 1997, preserves the town's maritime culture and heritage. Arts and culture have been integrated into Duxbury's education system with the 2014 Middle School and High School buildings co-located on the campus of the Duxbury Performing Arts Center. Altogether, a cluster of arts, culture, history, and education has grown organically around the Early Alden Homesite area along the Bluefish River up to Alden and Saint George Streets. The town has also preserved historic agricultural activities including its cranberry bogs, the O'Neil farm, and shellfishing, with Island Creek Oysters as a regional attraction from that industry. These civic and cultural assets connect Duxbury's rich history to its emerging future.

Timeline of Significant Historic Resources

Colonial Era Historic Resources: 1637-1775

Colonial Era Housing
(Image: Town of Duxbury)
At least fifty intact buildings from this period remain in Duxbury. Many reflect the Colonial Cape Cod style similar to the Dr. Thomas Delano house shown to the left.

Myles Standish Burial Ground
(Image: Larry Lamsa)
The Myles Standish burial ground is the oldest maintained burial ground in the United States. It was listed on the National Register of Historic Places in 2015.

Alden House Historic Site
(Image: Alden House)
The existing Alden family home in Duxbury, whose core was likely completed c. 1700, is now a museum run by the Alden Kindred of America organization.

Historic O'Neil Farm
(Image: Historic O'Neil Farm, Inc.)
The O'Neil farm dates to the Second Division of Land in Duxbury in 1715. In 2004, the became a non-profit and established conservation restrictions to preserve its agricultural use in perpetuity. Today the farm provides visitors access to walking trails with interpretive signage, a variety of events.

Maritime Era Historic Resources: 1776-1850

Old Shipbuilders' Historic District
The district encompasses Washington Street from South Duxbury to Powder Point Avenue and is defined by its prominent Federal Style buildings including the home of the Duxbury Rural and Historical Society and the Seth Sprague House condominiums, which are protected as part of the Winsor Street Local Historic District.

Nathaniel Winsor, Jr. House
(Image: DRHS)
Built in 1807 by Nathaniel Winsor, Jr., owner of a large fishing fleet and one of the first wharves in town, the house was used as a private residence for most of its history, then as an inn. It was acquired by the Duxbury Rural and Historical Society through community fundraising in 1997. It currently serves as the headquarters for that organization and is operated as a museum and is located in a Local Historic District.

Seth Sprague, Jr. House and Barn
(Image: Duxbury Clipper)
Currently reconfigured as condominiums after being repurposed as a hotel, the grandeur of the 1831 Seth Sprague mansion highlights the wealth generated by Duxbury's most successful shipbuilding families and their connection to Washington Street as the spine of the shipbuilding industry.

King Caesar House and Bumpus Park
(Image: DRHS)
The King Caesar House was built by the wealthiest shipbuilding family at the time in 1809. Herman Carey Bumpus, Sr., who

served as Director of the American Museum of Natural History and President of Tufts University restored the house in the late 1930s. The Duxbury Rural and Historical Society acquired house and grounds and dedicated the house as a museum in 1967. It was listed on the National Register of Historic Places in 1978 and is located in a Local Historic District.

First Parish Church
(Image: Duxbury Historical Commission)
Built in 1840 as the Fourth Meeting House of the Parish, the First Parish Church was designed to seat one thousand worshipers. The church represents the culmination of civic growth in the maritime era. The sanctuary was the largest single span building in New England when it was built. A bell built by an apprentice to Paul Revere hangs in the belfry, and for its historic and cultural significance, the building was added to the National Register of Historic Places in 1978. It has also been designated as the First Parish Local Historic District by the Town of Duxbury.

Old Town Hall
(Image Duxbury Historical Commission)
Built in 1840, and funded by the economic prosperity of Duxbury's shipbuilding families, the building marks the first time that a building was constructed explicitly to house town government functions separate from church worship. The Town Hall held Town Meeting until 1927 and currently houses the offices for the Town Manager and Board of Selectmen.

Summer Tourism Era Historic Resources: 1871-1963

Duxbury Beach
(Image: Duxbury Beach Reservation, Inc.)
In 1919, local families purchased the beach in to protect it from development pressure, and generations have continued to invest in conserving the beach and protecting its ecology. Today the beach also hosts a variety of creative activities and festivals.

Powder Point Bridge
(Image: Jennifer Macauley on Flickr.com)
Built in 1891, Powder Point Bridge is an iconic historic feature of the town.

Town Landing
Built in 1900, the landing off Mattakeesett Court provides an important public access point for the Bay as well as bay access for the Duxbury Yacht Club and the Duxbury Bay Maritime School. The landing represents a commitment to public access to the water and is one of sixteen landings in town. The Town Landing is important for its proximity to the Winsor Street Local Historic District and the Old Shipbuilders National Historic District.

Captain Gershom Bradford House
(Image: DRHS)
Constructed in 1808, "The

Bradford house" is a typical ship captain's home of the earlier era. The home nurtured a family active in contemporary social movements including abolitionism and Transcendentalism. All four Bradford daughters grew into accomplished women: two Civil War nurses, an educator, and a painter. The restoration of their family home and its artifacts is helping the DRHS to tell the story of Duxbury's contributions to the Civil War. It is located in a Local Historic District.

Wright Building and Drew Archival Library
(Image: DRHS)
Named for its benefactor Georgianna Wright, the Wright Building was designed by the architect Joseph Everett Chandler and completed in 1909. The building operated as Duxbury's public library until 1997. Through Community Preservation Act funds allocated for its renovation and restoration, and a unique partnership with the nonprofit DRHS and Town of Duxbury the building currently houses the archival records of the DRHS, serves as a hub for school tours, and houses Town of Duxbury records/objects - open to the public, year round.

Myles Standish Monument
(Image: Pete Forsyth)
Stephen Allen, a descendant of Myles Standish, purchased land from the original Standish homestead estate at the end of the nineteenth and spear-headed the construction of the Myles Standish Monument, whose cornerstone was laid in 1872. The Commonwealth of Massachusetts assumed ownership of the monument and its surrounding parkland in 1920, and continues to be manage it as a state park.

Civic Expansion Era Historic Resources: 1963-2017

Art Complex Museum
The museum, opened in 1971, is an important arts anchor in Duxbury. In addition to its main exhibition hall constructed in 1971, the museum owns two older buildings on the property, including a house from 1790. In addition, the museum's proximity to the John Alden House, the Duxbury Free Library, and the Duxbury Performing Arts Center represents and opportunity to strengthen the connections between the town's history and its vibrant artistic heritage.

Duxbury Free Library
(Image: MAPC)
The Duxbury Free Library, formed in 1890 when the Wright family gave a house for the first library on the site of the current Wright Building on St. George Street. The original house of the first library was moved off the site for the construction of the Wright Building in 1909. From the Wright Building on St. George Street, the library recently moved into the expanded and renovated Alden School building that it currently occupies in 1997. The library not only provides the community access to books and literary events, but also offers a variety of creative programming including music and crafts for children, a makerspace with a

3D printer and crafting supplies available to borrow, knitting, and game nights for adults.

Ellison Center for the Arts and Duxbury Arts Events

Home to the Duxbury Art Association, founded in 1917, and the South Shore Conservatory, founded in 1970, the Ellison Center for the Arts joins the arts to Duxbury's history and cultural heritage. Housed in a former church built in 1934, the Center represents a $3.5 million investment in the historic structure to transform it into an arts complex providing Duxbury access to instruction, exhibitions, and performances in the visual and performing arts. Its juried art shows, classes, and events help connect the Duxbury community through the arts. The South Shore Conservatory hosts the annual Duxbury Music Festival, which brings music to public spaces across the town.

Duxbury Bay Maritime School

Founded in 1997, the school purchased the last property with broad access to the bay through funding provided by the Ellison Foundation. In honor of its benefactor, the campus was named the William P. Ellison campus. The school anchors Duxbury to its maritime history by providing instruction and recreational access to the Duxbury Bay.

Duxbury Performing Arts Center and Duxbury Middle/High School

The Duxbury Performing Arts Center and newly constructed Duxbury Middle/High School Complex have established a community cultural and educational campus in the heart of Duxbury's historic and cultural resource cluster between Alden Street and the Bluefish River.

Island Creek Oysters

The preservation of Duxbury's shellfishing industry helps to keep its connection to maritime culture alive. The success of Island Creek Oysters has elevated Duxbury's identity as a source of local shellfish and created an economic anchor with cultural and historic significance.

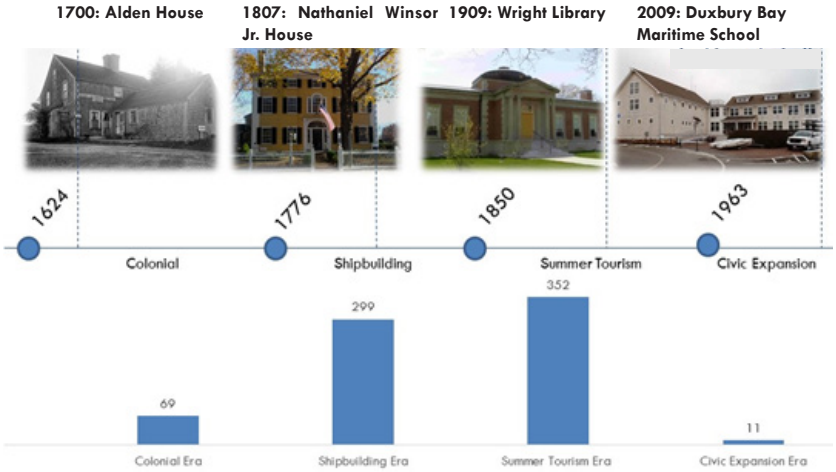


Figure: *731 Duxbury Historic Resources by Date and Era Source: MACRIS Inventory*

Historic and Cultural Asset Clusters

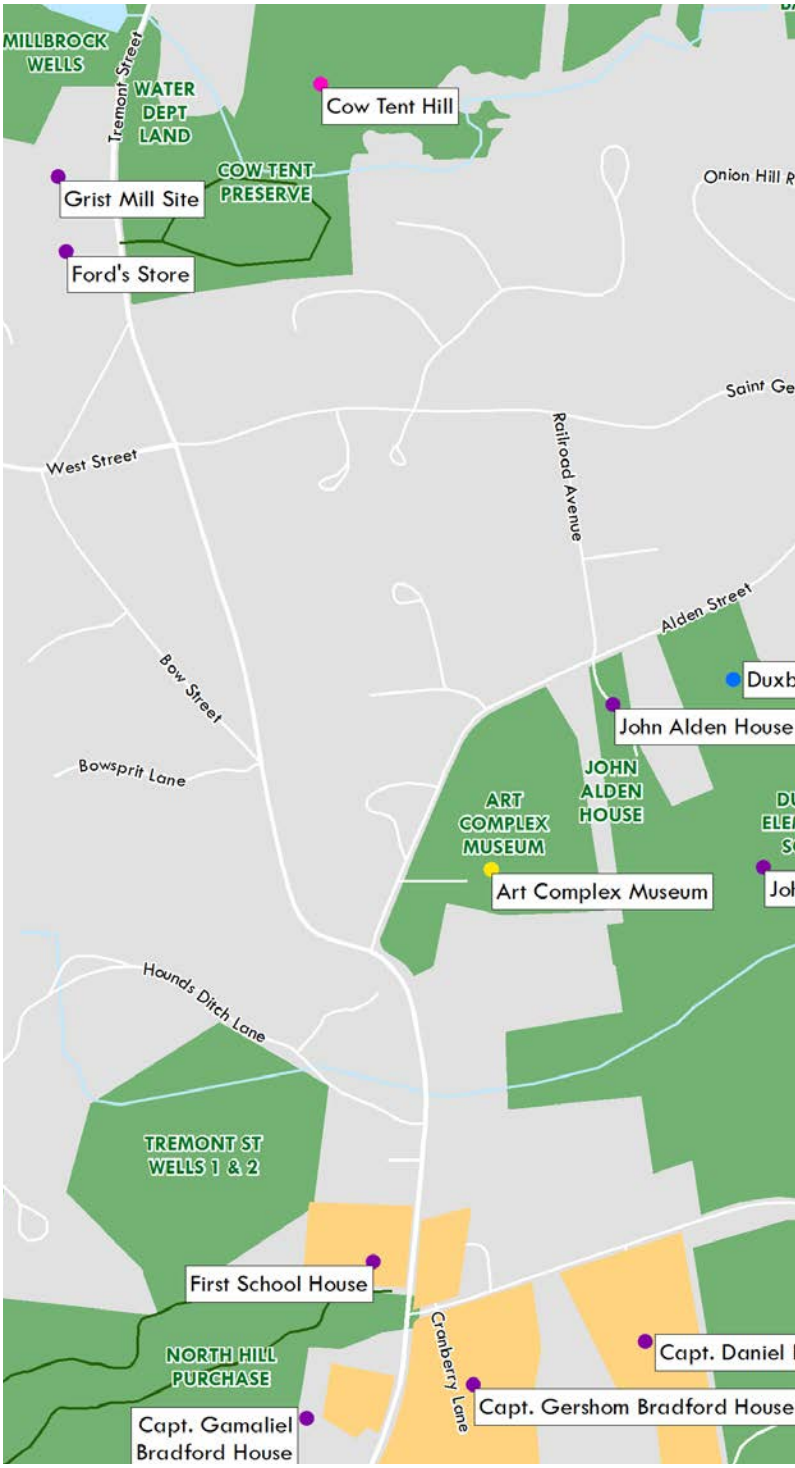
Duxbury's history is represented through historic properties distributed across the town. However, a few areas bring together clusters of assets that combine to suggest eloquent narratives of Duxbury's history and heritage. Two clusters in particular stand out both for the unique stories they tell and for their potential to support and focus larger planning priorities.

Bluefish River Asset Cluster: History, Culture, and Education

The land surrounding the Bluefish River, from Harrison Street to Saint George Street and from Route 3A and Alden Street to Washington Street, connects to the earliest foundations of the town as the site of the first and second Alden houses. It is home to the town's first public library, a privately funded public commitment to culture and education, as well as the town's Middle School and High School, the Duxbury Free Library, the Art Complex Museum, an important cultural institution, the Duxbury Art Association and South Shore Conservatory housed in the Ellison Center for the Arts on Saint George Street.

Also near this cluster are many of Duxbury's 15 First Period Houses dating from 1625-1725. Below is a list of these important historic assets:

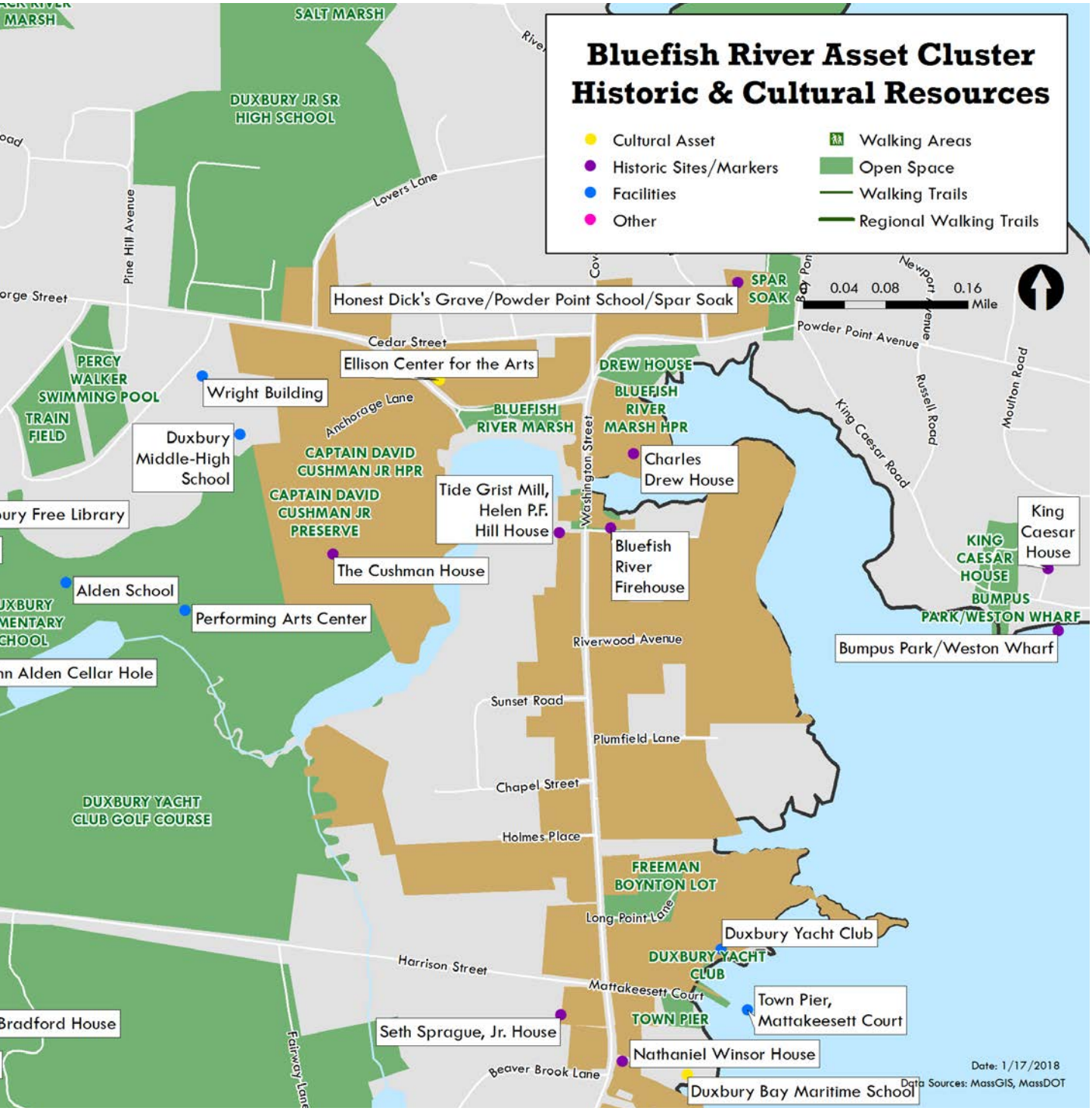
- 8 Houndsditch Lane, Edmund Hunt, c. 1641
- 44 Duck Hill Road, built by Edward Gray, c. 1662 - moved to its present location
- 1347 Tremont Street, Constant Southworth, c. 1665
- 341 Standish Street, Alexander Standish, c. 1666
- 787 Keene Street, Josiah Keen, c 1680
- 109 Laurel Street, Joseph Peterson, c. 1695
- 761 Temple Street, Isaac Simmons, c. 1696
- 227 Bay Road, Moses Soule, c. 1700 - moved to its present location
- 1161 Tremont Street, Thomas Southworth, c. 1701
- 68 Myles View Drive, Alexander Standish, bef. 1702
- 636 Union Street, Josiah Soule, c. 1708
- 809 Mayflower Street, Ichabod Wadsworth, c 1708



- 66 Summer Street, Joseph Chandler, c. 1710
- 37 Bow Street, Philip Delano, c. 1716
- 144 Winter Street, Joseph Chandler, Jr., c. 1720

Source: Caroline Ravenscroft , DRHS

Figure: *Historic Assets Clustered Near the Bluefish River Source: MAPC*



Tarkiln Asset Cluster: Intersection of Health and History

In the Tarkiln area of Duxbury, where Summer Street meets Kingstown Way, Chandler Street, and Winter Street, another cluster of assets that connect Duxbury's history to its present through the preservation of local food production in the Historic O'Neil Farm and the Duxbury Cranberry Bogs. The walking trails that wind through the conserved lands provide opportunities for exercise and communion with nature while the Tree of Knowledge and the Tarkiln Community Center serve as reminders of the town's history. The Tarkiln cluster is situated in close proximity to both the Chandler Elementary school, serving Duxbury youth from kindergarten through second grade, and the Village at Duxbury, a retirement community for ages sixty-two and up. It has connections to some of Duxbury's oldest and youngest residents, as well as access to the natural environments that contribute to Duxbury's semi-rural character.

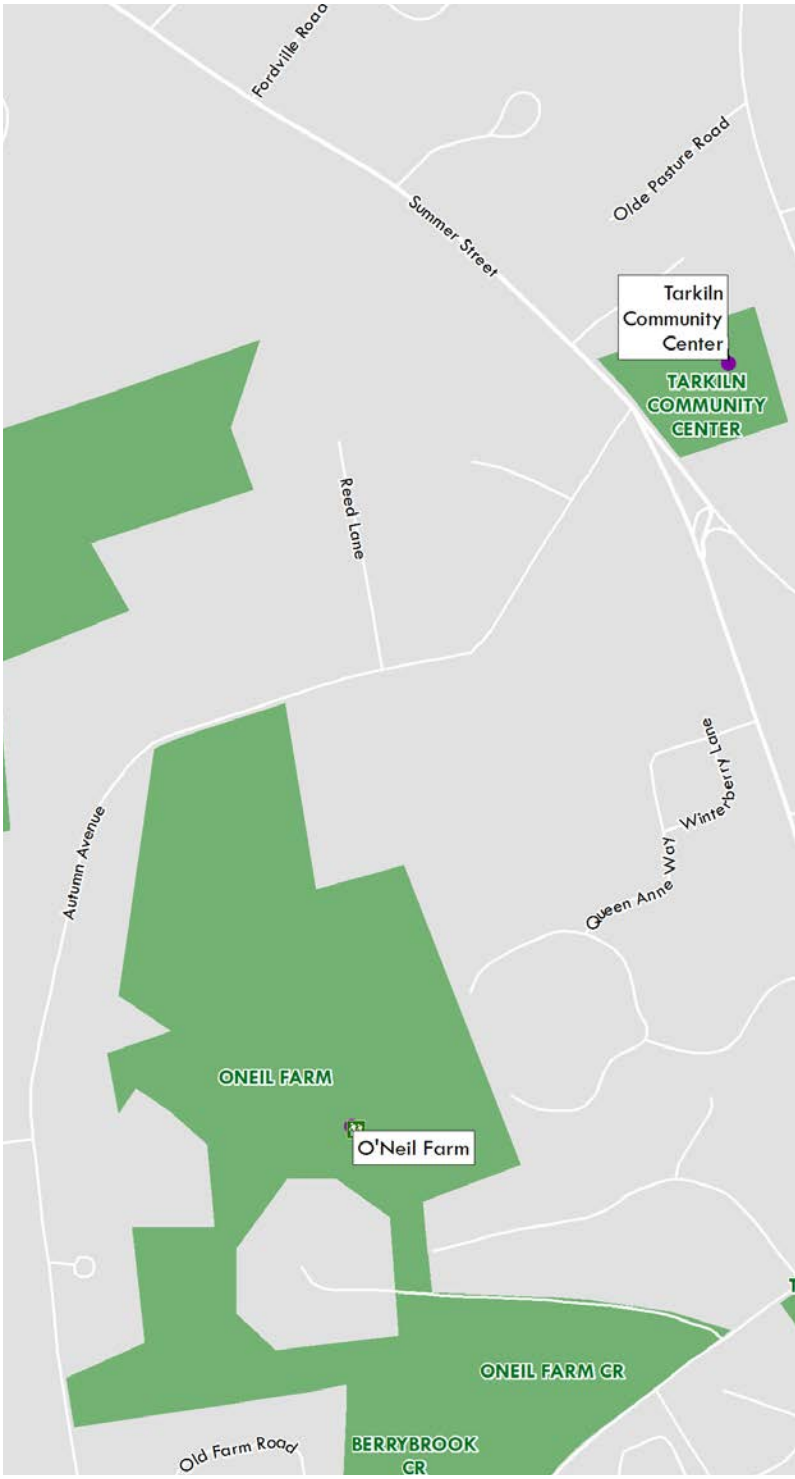
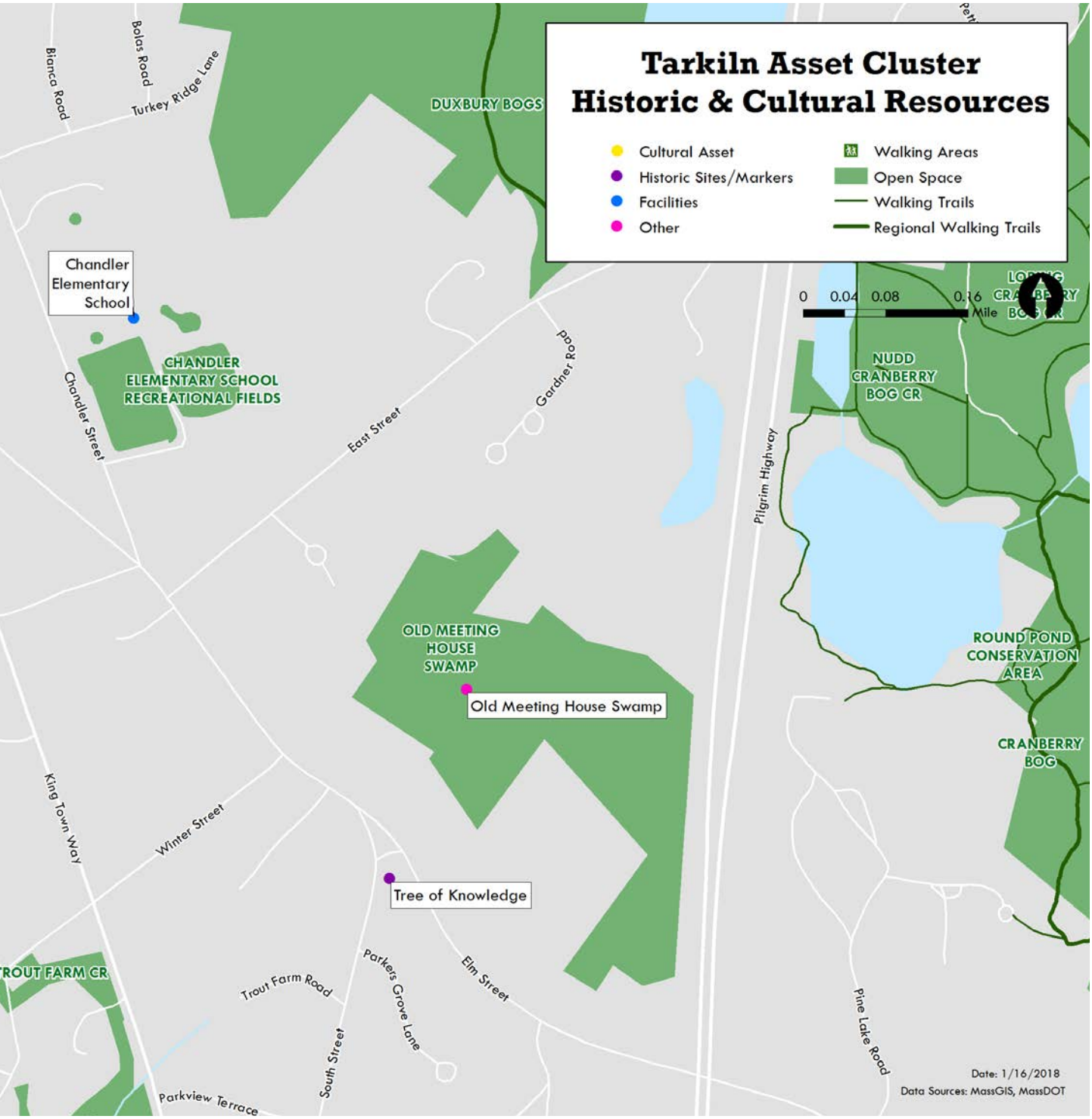


Figure: *Historic Assets Clustered Near the Tarkiln Community Center Source: MAPC*



Historic Preservation and Cultural Organizations

Duxbury Rural and Historical Society

The Duxbury Rural and Historical Society (DRHS) has been a leader in the preservation and curation of historic buildings and archives in Duxbury since the late nineteenth century. It is a nonprofit organization that is nationally-recognized for its preservation and curation of historic buildings and collection. Housed in the historic Nathaniel Winsor, Jr. House, the DRHS has restored and preserved three important houses that capture the grandeur of Duxbury's shipbuilding era. In addition, the Society with the Conservation Commission has been active in the protection of open spaces and maintains a number of historic open spaces in town including Round Pond, Lapham Woods, and Bumpus Park, among others. The DRHS historic archives housed within the Drew Archival Library inside the Wright Memorial Library building preserves a wealth of historic documents, artifacts, and photographs. Some of the collections at the Drew Archival Library are nationally significant. Having an archivist and historian on staff, allows the DRHS to interpret and share Duxbury's history through events, lectures and educational programs.

Alden Kindred of America

Alden Kindred of America has converted the historic Alden House into a museum honoring one of Duxbury's first settlers and providing an opportunity for residents to learn about the town's colonial history.

Historic O'Neil Farm

The Historic O'Neil Farm, Inc. was formed in partnership with the Wildlands Trust of Southeastern Massachusetts has preserved the farm for agricultural use in perpetuity along with a number of the historic structures on the farm. The O'Neil Farm is protected with a Massachusetts agricultural preservation restriction, allowing for passive recreation along the pastures and hayfields of this important open space. As a non-profit organization, the farm provides educational programming and opportunities to learn about the farm and Duxbury's agricultural history.

Art Complex Museum

The Art Complex Museum is an anchor arts and culture organization in Duxbury. Built in 1971, the museum building was designed by artist Ture Bengtz and architect Richard Owen Abbott and sits within thirteen acres of woodland and open fields. The museum's permanent collection features the art collection of the Weyerhaeuser Family and features exhibitions, lectures, concerts, and classes.

Ellison Center for the Arts

The Ellison Center for the Arts occupies a 1934 building on Saint George Street. It is home to the Duxbury Art Association, founded in 1917, and an important arts anchor. The association provides classes, gallery shows, and juried shows, and supports participation in the visual arts for both children and adults. The Ellison Center for the Arts is also home to the South Shore Conservatory of Music, founded in Hingham in 1970. The Conservatory opened a Duxbury campus in 1980, and provides access to arts education and performance for all ages.

Historic Preservation and Cultural Organizations in Historic Properties in Duxbury			
Historic Asset	*Property Address*	*Year Built*	*Historic Preservation/ Cultural Organization*
Alden House	105 Alden St	1700	Alden Kindred of America
Historic O'Neil Farm House	146 Winter St	1720	Historic O'Neil Farm, Inc.
Art Complex Museum	189 Alden St	1971	The Art Complex, Inc.
Nathaniel Winsor, Jr., House	479 Washington St	1807	Duxbury Rural and Historical Society
Capt. Gershom Bradford House	931 Tremont St	1807	Duxbury Rural and Historical Society
King Caesar House	120 King Caesar Rd	1808	Duxbury Rural and Historical Society
Ellison Center for the Arts	64 Saint George St.	1934	South Shore Conservatory of Music

Table: *Historic Property Stewardship in Duxbury Source: MAPC*

Other Protections

Community Preservation Act

Community Preservation Act funds have been an important tool for historic preservation and rehabilitation of important historic landscapes and buildings. Historic resources granted CPA matching funds include the Delano Farm, the Historic O'Neil Farm, the Bluefish River Firehouse, the Alden House, the King Caesar House, the Wright Memorial Library building, Camp Wing, the Island Creek Fish ladders, and the Tarkiln Community Center, First Parish windows, Old Town Hall restoration, Bradford House windows, Temple Street housing, Howland's Landing Park, WWI Memorial, Congress Street bogs, Keene Mill Restoration, Myles Standish Cemetery Gravestone and site restoration, Nathaniel Winsor House chimneys, Merry Land Bogs and Wright Reservoir, Gifford Bog, DeLorenzo Land, Williams Land, and baseball dugouts among others. A map showing the location of some of these Community Preservation Fund projects is shown on the following page.

Demolition Delay

Duxbury's Historical Commission administers the town's Demolition Delay Bylaw #609, "Demolition of Historically Significant Buildings," adopted in 1997. Under this bylaw, all proposals for the partial or total demolition of any structure that is 75 or more years old are reviewed by the Historical Commission to determine whether that structure has any architectural or historical significance. The homeowner initiates the process by completing a one-page Historic Structure Demolition Application along with the Building Permit Application and submitting it to the Historical Commission.[5] If, after a public hearing, a determination is made that the building or structure is historically significant meeting one of the three criteria of a "regulated building or structure," the Zoning Enforcement Officer shall not issue a demolition permit for a period of twelve months from the date of notification to the Zoning Enforcement Officer.[6]

Criteria for a regulated building or structure

5. Town of Duxbury Historical Commission. "Historic Structure Demolition Application," accessed online on March 7, 2018 at https://www.town.duxbury.ma.us/sites/duxburyma/files/uploads/historical_application_guide.pdf
6. Town of Duxbury Bylaw 609, "Demolition of Historically Significant Buildings," Section 3, "Procedures." Accessed online on March 7, 2018 at https://www.town.duxbury.ma.us/sites/duxburyma/files/uploads/historical_demolition_by-law.pdf

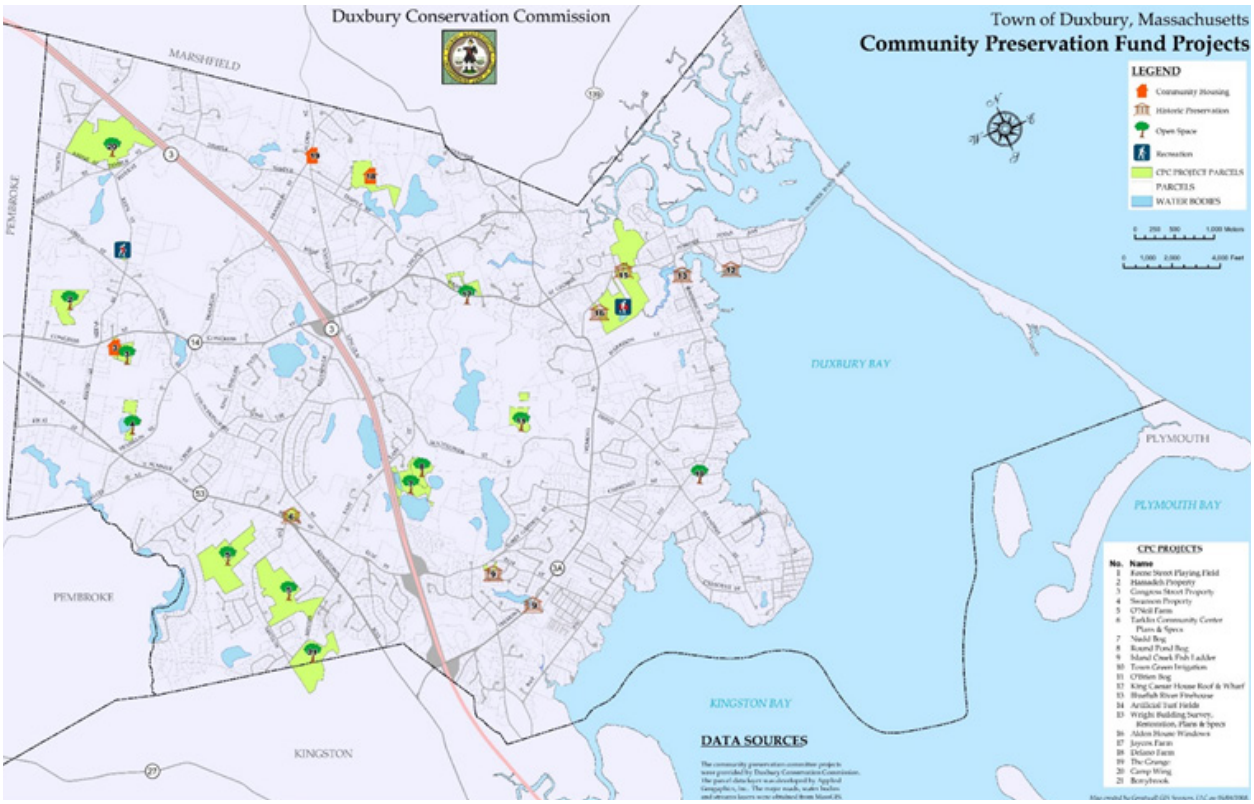


Figure: *Select Community Preservation Fund Projects in Duxbury Source: Conservation Commission*

include:

a) Listed or eligible to be listed on the National Register of Historic Places, or on the State Register of Historic Places; or
b) Associated with one or more historic persons or events, or with broad architectural, cultural, economic, political or social history of the Town;
c) Historically or architecturally significant in terms of period style, method of building construction or association with a significant architect or builder either by itself or as part of a group of buildings.[7]

Future documentation and inventory of historic buildings and structures will need to record information related to b) and c) to better inform the demolition delay review process and efforts to preserve buildings and structures of historic significance.

Public Facilities

Many important historic properties in Duxbury are preserved and maintained as public facilities. From the early Alden Homesite archaeological site on the town's school and library campus to the Old Town Hall, the Town of Duxbury plays an important role in historic preservation efforts.

7. Town of Duxbury Bylaw 609, "Demolition of Historically Significant Buildings," Section 2 "Definitions." Ibid.

Historic Assets Preserved as Public Facilities		
Historic Asset	*Property Address*	*Year Built*
Early Alden Homesite	71 Alden Street	c. 1630
Old Town Hall	862 Tremont Street	1840
Girl Scout House (Dept. of Rec.)	28 Washington Street	1850
Tarkiln Community Center	245 Summer Street	1871 and 1908
Wright Memorial Library	147 Saint George Street	1909
Duxbury Fire House – Engine House #1	645 Washington Street	1910
Duxbury Free Library	77 Alden Street	1927
Town Landing	25 Mattakeesett Court	1960

Historic Assets Restricted Through Land Trust			
Historic Asset	*Property Address*	*Year Built/Donated*	*Land Trust*
Historic O'Neil Farm	146 Winter St	1720	Wildlands Trust of Southeastern Mass
Captain David Cushman, Jr. House	40 Anchorage Ln	1837	Wildlands Trust of Southeastern Mass
Cedar Hill Retreat	344 Standish St	1940	Wildlands Trust
DRHS Allen Property	-	1980	Wildlands Trust

Conservation Restrictions

The Wildlands Trust of Southeastern Massachusetts has been instrumental in preserving historic properties and uses. It was an important partner for the Historic O'Neil Farm to establish long-term sustainability of its agricultural activity. Other properties preserved through the Wildlands Trust include the Captain David Cushman, Jr. House and the Cedar Hill Retreat, formerly owned by the Allen family.

Zoning Incentives and Regulations

Much of Duxbury's historic housing was constructed prior to the formation of its Planning Board in 1925 and prior to it enacting zoning bylaws to regulate new construction in 1944.[8] The purposes of zoning as provided in section 2 of the Zoning Enabling Act, MGL Chapter 40A were to promote the health, safety, convenience, morals, or welfare of the inhabitants of the city or town.[9] Duxbury's first zoning bylaw established lot frontage and area requirements, setting a minimum lot area of 20,000 square feet.[10] These regulations were a rational response to the rapid division of land into smaller lot sizes in the early twentieth century. Based on current parcel data, the impact of these zoning bylaws on development in Duxbury was profound. Whereas 40% of parcels built-out between 1900 and 1944 were less than 20,000 square feet in area; after 1944, only 8% of built-out

8. Broadrick, Tom, "Duxbury Planning." Duxbury Clipper, Wednesday, April 17, 1998. Accessed on March 14, 2018 at http://theduxburyfile.wikispaces.com/file/view/Editorial,+Duxbury+Planning,+April+1996.pdf
9. "Introduction," The Zoning Act. Boston, MA: Commonwealth of Massachusetts Department of Housing and Community Development, November, 2016. Massachusetts General Laws, Chapter 40A, p. a.
10. Broadrick, Tom, ibid.

parcels are less than 20,000 square feet. Among historic properties built out before 1900, about 18% of parcels are smaller than 20,000 square feet in area. The map below shows that most of the parcels smaller than 20,000 square feet or 40,000 square feet that were built out before 1900 are concentrated along Washington Street and other historically important streets and nodes. Using zoning regulations to protect and enhance these historic nodes and corridors through tailored design guidelines, lot requirements, and preservation incentives that allow homeowners to generate income to offset maintenance and restoration costs would be an innovative approach to historic preservation in Duxbury.

Historic Designations

Duxbury is home to many properties of historic character and significance, and this is reflected in its extensive list of properties and assets on the Massachusetts State Register of Historic Places. Over two hundred properties are located within the Old Shipbuilder's National Register Historic District although not all of them contribute to its historic character and identity.

Local Historic Districts

In 2011, the Town of Duxbury established a Local Historic District by adopting a new Chapter 12 to the Town's General Bylaws. Local historic districts impose design guidelines and restrictions on the privately owned historic properties located within them. The purpose of

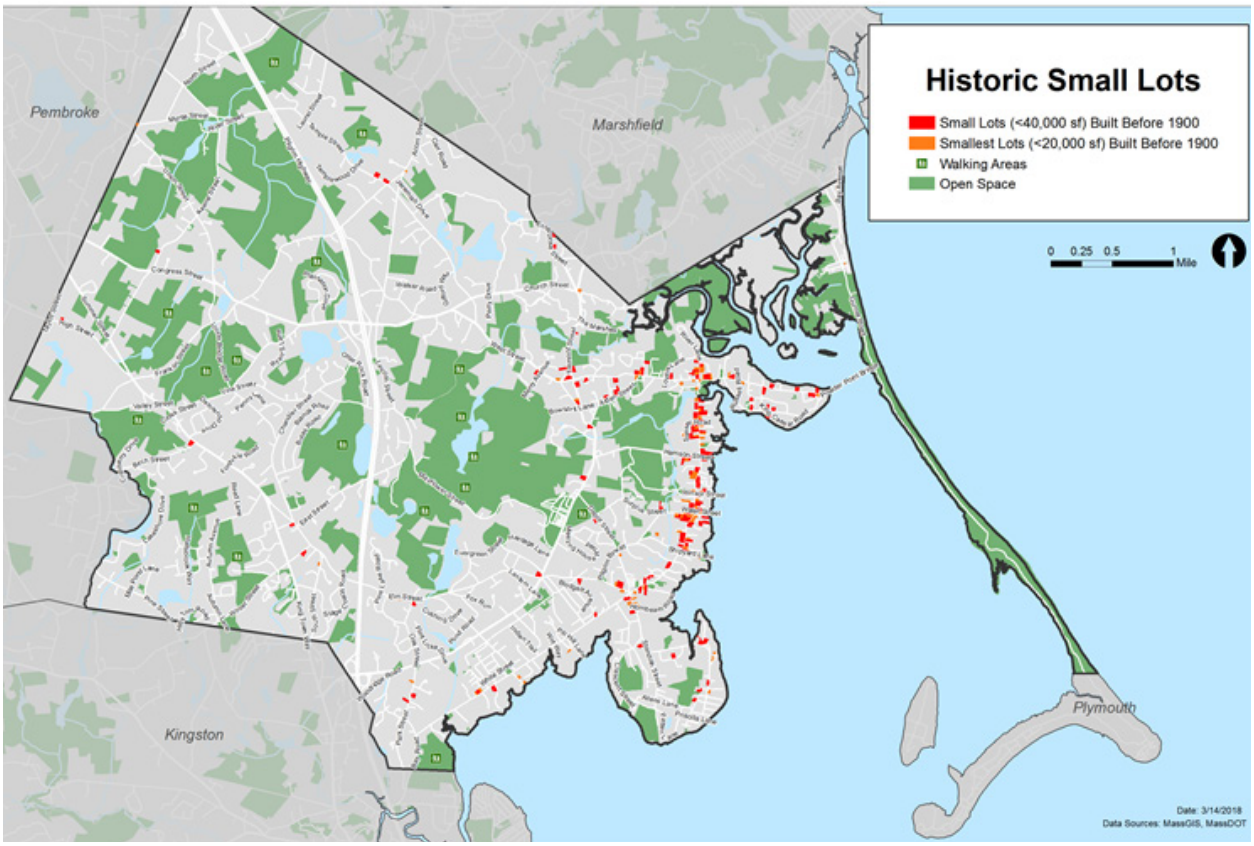


Figure: *Concentrations of Historic Small Lots Source: MAPC*

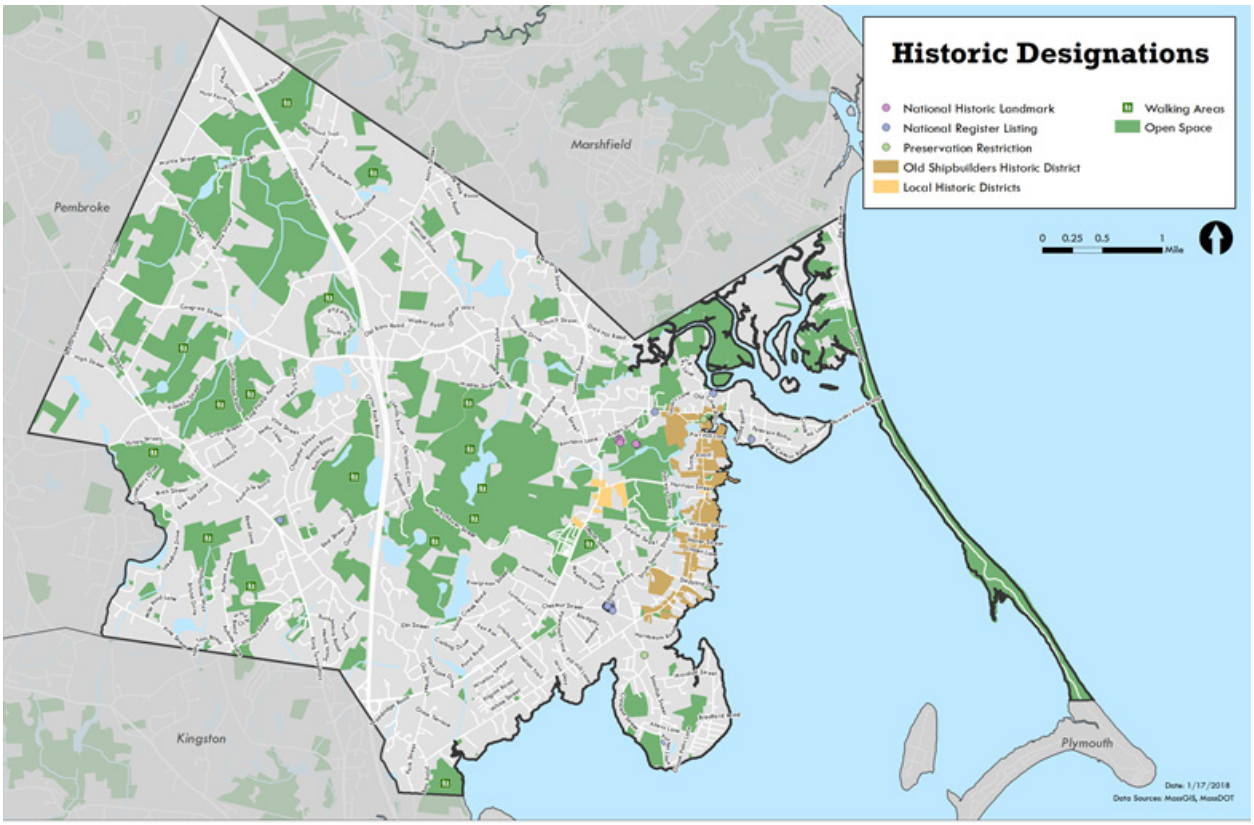


Figure: *Locations and Types of Historic Designations in Duxbury Source: MAPC*

the Local Historic District, as stated in the bylaw is as follows:

The purpose of this bylaw is to aid in the preservation and protection of the distinctive characteristics and architecture of buildings and places significant in the history of the Town of Duxbury, the maintenance and improvement of their settings and the encouragement of new building designs compatible with the historically significant architecture existing in the Local Historic District(s) when this Bylaw was first adopted in 2011. This Bylaw does not seek to establish an architectural museum, but instead to inform concerning the historical process of architectural growth and adaptation to heighten a sense of educated pride in our heritage. Permanently prevents total demolition by restricting the deed.[11]

These districts help preserve clusters of assets and aid in preserving the historic identity of the areas where they are located. In Duxbury, the adoption of Chapter 12 has resulted in eleven local historic districts overseen by the Duxbury Local Historic Districts Commission made up of five regular and three alternate members. Property owners within these districts are required to obtain a certificate from the Local Historic Districts Commission prior to starting any exterior work on structures visible by the unaided eye from the public way.

Old Shipbuilders' National Register Historic District

Designation of the Old Shipbuilders' Historic District on the National Register of Historic Places recognizes the important contributions made by

11. Chapter 12 of Duxbury General Bylaws, Section 1, "Purpose." Accessed on March 7, 2018 at https://www.town.duxbury.ma.us/sites/duxburyma/files/uploads/local_historic_district_by-law.pdf

Local Historic District	Example Historic Asset in the District	Owner	Year Built
Bay Road	120 Bay Road	Sara Wilson	not available
Bay View Road	91 Bay View Road	Philip and Jamie Tuck	not available
Bradford LHD	Capt. Gershom Bradford House	DRHS	1807
King Caesar Historic District	King Caesar House	DRHS	1808
First Parish Church LHD	First Parish Church	First Parish Church	1840
Millbrook	1250 Tremont Street	Penelope Walker	not available
Powder Point	233 Powder Point Avenue	Robert Vose	not available
Surplus Street	88 Surplus Street	Kimberly Murphy	not available
Washington Street	338 Washington Street	William Rice	not available
Winsor LHD	Nathaniel Winsor Jr. House	DRHS	1807

Table: *Local Historic District Assets*

Duxbury's shipbuilding industry to United States history. Of the 212 buildings located within the district boundary, 139 have been estimated to contribute to the historic image and identity of the district. From the nomination form submitted to the National Park Service for historic district designation which began in 1983:

The Old Shipbuilders' Historic District, Duxbury, retains integrity of location, design, setting, materials, feeling, workmanship, and association. The district includes 212 buildings, most of which were built between 1780 and 1850, Duxbury's most intensive period of growth and development. Of these, 29 structures were altered so extensively from their original appearance as to no longer retain integrity; there are also 44 mid-20th century intrusions. As examples of well-built Georgian, Federal, and early Victorian styles, some modest, others far more sophisticated, these buildings reflect Duxbury's transition from sparsely populated rural settlement to prosperous shipbuilding center. The district is particularly unusual for its high proportion of well-preserved Federal-style residences. The shipbuilding industry in the district declined dramatically in the mid 19th century, with the result that the district retains a virtually unaltered assemblage of early 19th century residences reflecting its period of greatest prosperity…

A number of buildings and structures are highlighted for their contribution to the historic value of the district with information about their architectural style and historic importance. Contributing structures include simple and ornamented mariners' cottages from the eighteenth century, Georgian style houses, and more than forty Federal style residences built between 1790 and 1830. In addition, important civic and commercial buildings remain in the district including Sweester's General Store in the heart of Snug Harbor next to the Duxbury Rural and Historical Society's headquarters and close to the Town Landing. These assets preserve the historic fabric of civic life by the seaside in Duxbury.

Details about the contributing buildings and structures contained in the nomination form can guide existing and future efforts to preserve the historic character and value of the district.

Figure: *Old Shipbuilders' National Register District Source: Town of Duxbury*

The designation itself does not afford any protections or development restrictions for the buildings therein.

National Register Historic Properties

A National Register of Historic Places designation recognizes local cultural and historical significance at the state and national level. Including the Myles Standish Burial Ground and 34 grave markers within that mark the final resting place of individuals important to Duxbury's history, the town is home to fifty listings on the National Register of Historic Properties. In addition, the Early Alden Homesite foundation and the Alden House and associated buildings are also designated as National Historic Landmarks. Both are included in one designation awarded in 2008. Although inclusion on the National Register does not confer any preservation restrictions, it does confer eligibility for preservation loan programs and historic preservation tax credits.

Funding Sources

Funding preservation efforts is a key challenge facing Duxbury. Much of Duxbury's historic fabric comprises privately owned primary residences ineligible for most existing funding programs. Serious efforts to incentivize preservation by individual homeowners will require exploration of creative mechanisms to support and fund private preservation work.

Community Preservation Act

The Community Preservation Act, adopted in Duxbury in 2001, has been used by Duxbury to support preservation efforts throughout the town. The Act allowed Duxbury to create a local Community Preservation Fund for open space protection, historic preservation, recreation and affordable housing. Duxbury's Community Preservation Committee reviews applications for CPA funding and makes recommendations to Town Meeting. Since 2001, 78 projects have received CPA funding, and of those, thirty three (42%) fall into the category of historic preservation. The 33 projects totaled $4.9 million, or 20% of all CPA funding. CPA funds for historic preservation come with some restrictions. Funds may be appropriated for a building, structure, vessel, real property, document, or artifact that is either on the National Register of Historic Places or has been determined by the

Historic Resources on National Register of Historic Places		
Name	*Date*	*Address*
Myles Standish Burying Ground	1632	Chestnut Street
Early Alden Homesite foundation	1630's	71 Alden Street
Alden House (also a National Landmark)	1700	105 Alden Street
Alexander Standish House	1750	341 Standish Street
Sampson Gifford House	1804	104 Standish Street
Captain Gershom Bradford House	1807	931 Tremont Street
Captain Gamaliel Bradford House	1807	942 Tremont Street
Nathaniel Winsor House	1807	479 Washington Street
Captain Daniel Bradford House	1808	251 Harrison Street
King Caesar House	1808	120 King Caesar Road
Bradford, Capt. Daniel House	1808	251 Harrison St
First Parish Church	1840	842 Tremont St
Tarkiln Twin School Houses	1871	245 Summer Street
Wright Memorial Library	1909	147 St. George Street
Pillsbury Summer House	1938	45 Old Cove Road

Table: *National Register of Historic Places in Duxbury*

Duxbury Historical Commission to be significant in the history, archeology, architecture, or culture of Duxbury. In addition, appropriated funds may only be used for acquiring, preserving, rehabilitating, or restoring those eligible resources. Finally, properties acquired for historic preservation using CPA funds required a permanent historic preservation restriction to be placed on them, approved by the Massachusetts Historical Commission and filed with the Registry of Deeds.

Federal Historic Preservation Tax Credit

A 20% tax credit is available for the rehabilitation of historic, income-producing buildings that are determined by the Secretary of the Interior, through the National Park Service, to be "certified historic structures." A certified historic structure is a building that is listed individually in the National Register of Historic Places or a building that is located in a registered historic district and certified by the National Park Service as contributing to the historic significance of that district. Rehabilitation work must comply with the Secretary of the Interior's Standards for Rehabilitation. Owner-occupied residential structures are not eligible for this tax credit. Changes to the tax code within Public Law No: 115-97 Section 13402 modifies the 20% Historic Rehabilitation Tax Credit and provides certain transition rules. Use of this credit is subject to these recent changes.

Massachusetts Historic Rehabilitation Tax Credit

The Commonwealth of Massachusetts administers a Historic Rehabilitation Tax Credit program set to expire in 2022. Under the program a certified rehabilitation project on an income-producing property is eligible to receive up to 20% of the cost of certified rehabilitation expenditures in state tax credits. The Massachusetts Historical Commission certifies the projects and allocates available credits. There is an annual cap, so

there are selection criteria that ensure the funds are distributed to the projects that provide the most public benefit. These criteria include: Affordable Housing, Preservation, Potential for Loss, Statement of Need, Geographic Distribution, Feasibility, Public Support, State of Utility, and Economic Impact.

Alternate funding mechanisms

Preservation Loan Funds

In Arlington, Massachusetts, a nonprofit organization, Arlington Preservation Fund, Inc., formed for the purpose of providing low-interest loans to owners of historically significant properties in the town of Arlington. Initiated through a Community Development Block Grant, the fund is administered by a nine-member board appointed by the Arlington Board of Selectmen. Eligible properties are located within the town's local historic districts, listed on the National Register of Historic Places, documented through Historical Commission inventories, or otherwise deemed significant by the Board. Preservation restrictions are applied to the areas of work funded by the loans for twice the term of the loan unless the property is in a Local Historic District. More information on the program is available at http://www.arlingtonpreservation.org/.

Use Allowances for Historic Preservation

An innovative, but as-yet untested preservation funding strategy would create financial incentives for historic preservation through zoning use regulations. By moderately increasing allowable income-producing activities within historically significant properties, the zoning code can help create supportive conditions for historic preservation. Examples of incentives would include the allowance of an additional by-right housing unit within structures certified as historically significant or the allowance of a set of home-based occupations that would not disrupt or alter the historic character of the building or surrounding neighborhood. An example of this is the draft Cultural Heritage Ordinance currently under review in the City of Beverly.

Community Input

Responses to the Envisioning Duxbury survey affirm the high value placed on the town's historic character and the interest in preserving and enhancing Duxbury's historic and cultural assets.

Preserving Duxbury's Historic Character and Identity

More than half of survey respondents named Duxbury's historic small town, semi-rural character as among its greatest assets and more than a quarter identified its historic assets and historic sites among the things they like most about Duxbury. In response to open-ended questions about the challenges facing Duxbury and residents' vision for the future, many raised concerns over the loss of the town's historic character. Demolition of historic properties and the scale and style of new construction was an overriding concern. Residents want stronger protections in place to ensure appropriate design and maintenance of properties to protect and enhance the town's historic character and

identity.

"[I am] concerned about the gentrification of Duxbury at [the] expense of [its] small town, rural character. Demolition of historic homes threatens the character of the town."

"While Duxbury's most well-known historic structures are still standing, many less-known, but equally important structures that define the historic character of the Town are not protected or have been lost, eroding Duxbury's unique building fabric and the authenticity and meaning of our historic surroundings."

"The Local Historic Districts need specific, precise, and prescriptive design guidelines."

Preservation of the town's identity as a historic center of maritime and shipbuilding activity is also important. Washington Street, the town's public landings, and Duxbury beach were frequently mentioned as key assets that need to be maintained and preserved.

"It's the preservation of historic structures on the waterfront that embraces the maritime and shipbuilding history."

Preserving and Protecting Historic Homes in Duxbury

Many residents committed to historic preservation envisioned a future with stronger protections and incentives for preserving historic housing and preventing demolition of historic properties. For a number of respondents, the issue of preserving historic housing is tied to a concern over the scale of new construction.

"I hope that Duxbury holds tight to its history and doesn't change much over time. Already with the homes being torn down along Washington Street and Powder Point, and new large scale homes being built the landscape of history is changing. Keep it small and keep it great."

"We need to put our money where our mouth is and provide economic incentive for folks to own these homes and upkeep them because the market alone is certainly not doing so."

"Create incentives for preservation and redevelopment in lieu of demolition and replacement."

The need for increased pedestrian safety throughout the town and especially in areas with clusters of historic and cultural assets was widely recognized. Washington Street, home to the Old Shipbuilders National Historic District, and the cluster of assets along Alden Street and Saint George Street were called out explicitly as areas appropriate for pedestrian improvements. While many respondents expressed a desire for sidewalks, a clear contingent remain adamant that sidewalks are inappropriate to the semi-rural historic character of the town.

"The one project I would like to see addressed and implemented is walking access (sidewalks) in the village within the 3A | St George | Powder Point | Washington St. | Bay Rd area. Many residents use these areas daily for walking, jogging and biking. It would be a tremendous asset to our amenities as well as residents safety."

Historic and Cultural Resources
Recommendations

Incorporated in 1637 as the second settlement in Massachusetts, Duxbury's history is among the oldest in the country. Through over 135 years of conservation efforts led by the Duxbury Rural and Historical Society and continued through a constellation of Town bodies and private organizations, Duxbury has successfully preserved its historically significant architecture from its past as a shipbuilding center and historic economic activities including agriculture, horticulture, and aquaculture.

The town's wealth of historic and cultural assets are preserved and maintained largely through the individual actions of private property owners. Respondents voiced concerns over the demolition of historic housing for new development as a threat to Duxbury's historic character. They expressed a desire for creative strategies to facilitate and fund private preservation of historically significant housing. This master planning process represents an important opportunity to consider how to enhance Duxbury's historic character while meeting other planning priorities.

The following goals and strategies are intended to support continuing efforts to preserve and enhance Duxbury's historic character and to strengthen its cultural resources and heritage. As these resources reflect the foundations of the town, so do these recommendations position these resources as a foundation from which to achieve a shared vision for Duxbury's future.

Goal 1: Preserve the historic residential character of Duxbury.

This goal honors the value that residents place on the historic residential fabric of Duxbury's main roads and historic neighborhoods. The purpose of the strategies is to facilitate historic preservation and maintenance among homeowners, provide guidance for the Town in evaluating historic significance of residential structures, and incentivize preservation of structures that contribute to the town's character and identity.

• **Strategy 1.1:** Document histories and record inventories for structures that retain historic character and significance.

Documentation and evaluation are a critical foundation for preservation planning. Using property records as a starting point to identify structures built during Duxbury's historic eras, documentation should draw on the archives and expertise of the Duxbury Rural and Historical Society and local architectural historians.

• **Strategy 1.2** Identify regulatory hurdles to adaptive reuse of historic buildings to support housing needs.

Adaptive reuse can be an effective way to preserve historic forms through adapting them to economically viable uses and activities. Changing the use of a property, and making significant alterations to a structures trigger requirements to conform to contemporary zoning and building code regulations. Minimum lot size, setback, and building envelope, and parking regulations as well as modern building codes can create hurdles to adaptive reuse as an historic preservation strategy. To encourage preservation of historic structures, incentives for adaptive reuse should be explored and barriers to adaptive reuse minimized.

• **Strategy 1.3** Incentivize preservation of historic structures on the waterfront to enhance Duxbury's identity as a maritime and shipbuilding center.

The Old Shipbuilder's National Historic District stretches along Duxbury's commercial waterfront and the historic buildings in the district preserve connections to the town's importance as a

shipbuilding center. Key properties in the district are protected within local historic districts. Preservation incentives may be more appropriate to encourage preservation of many of the district's 226 properties. Once properties are designated as locally significant and contributing to the town's maritime history, they could be made eligible for expedited approval of new uses such as home based occupations or other income-generating uses or expedited review of accessory structures or dwelling units not visible from the public right of way. If highlighting other historic narratives beyond maritime and shipbuilding is desired incentives could also be devised to support preservation of other targeted historic clusters or another narrative focus.

• **Strategy 1.4** Develop specific and precise design guidelines for Local Historic Districts.

Local Historic Districts currently encompass properties with documented historic significance and contributing aspects. The design guidelines should pertain to rehabilitation, restoration, additions, and new construction. Historic materials used in siding, windows and doors, porches, roofing, and exterior architectural details should be documented for each property; elements contributing to architectural style including proportion, façade symmetry, architectural details, casings, thresholds, and rooflines should be documented for each property. Evaluation of site character, grading, streetscape, old growth trees, and limitations on clear cutting should also be included.

• **Strategy 1.5** Establish validation program for historic homes retaining historic architectural character.

To expedite historic preservation incentive programs and improve quality of inventory records, establish a program in which property owners can document the historic character and significance of their home to be eligible for preservation incentive programs, participation in historic house tours, and other benefits. Detailed documentation through Massachusetts Historical Commission inventory form addressing criteria for local and national significance should be a prerequisite for program.

Goal 2: Develop local capacity to manage and enhance historic and cultural resources.

• **Strategy 2.1** Expand partnerships among historic and cultural organizations through development of a Historic Preservation Plan.

Expand on existing partnerships among Duxbury Historical Commission, Duxbury Rural and Historical Society, Duxbury Local Historic District Commission, Duxbury Cultural Council, Duxbury Community Preservation Committee, Duxbury Agricultural Commission and local residents with an interest in architecture and historic preservation through an historic preservation planning process.

• **Strategy 2.2** Cultivate new partnerships among organizations within historic and cultural asset clusters for programming, maintenance, fundraising and promotion.

As part of historic preservation planning effort, convene managers and owners of historic properties and cultural assets within asset clusters to identify opportunities to strengthen assets, coordinate programming and promotion and fund ongoing preservation and maintenance.

• **Strategy 2.3** Support resident efforts to maintain historic assets, especially the beach and town landings, through improved access and signage, increased DPW maintenance, waste collection procedures, and recognition of volunteer efforts.

Residents currently help maintain cleanliness of and access to Duxbury landings and other historic assets. Integrate town landings into existing Duxbury Litter Patrol Adopt-a-Spot program. Signage and posted information about how to dispose of waste and rules for use of publicly accessible historic assets, and that access to the

bay is for all, could educate residents. Duxbury could partner with the Duxbury Litter Patrol to recognize highly active clean-up volunteers as stewards of the town's public realm and support them to become community leaders with knowledge and relationships to promote the maintenance of public natural and historic resources.

Goal 3: Protect Duxbury's historic and cultural resources.

• **Strategy 3.1** Expand CPA funding for the acquisition, preservation, rehabilitation and restoration of historic properties and resources.

Continue the use of Community Preservation Act funds to support historic preservation priorities. Link this priorities to those that emerge from historic preservation planning process. Forge consensus on the importance of historic and cultural resources and enhance public awareness of Duxbury's history and culture. Engage students and teachers in activities that cultivate recognition and appreciation of local history and culture.

• **Strategy 3.2** Explore funding mechanisms for maintenance of privately owned historically significant homes.

Some communities have set up preservation loan funds to help offset homeowners' preservation costs. Other strategies include preservation easements with tax incentives or small preservation grants. Allowing owners of validated historic properties to engage in income generating activities to offset the cost of historic preservation and maintenance is another possibility.

• **Strategy 3.3** Provide information through the Town's Historical Commission about how to research house histories, and strategies for preserving and restoring historic character.

Instructions for how to research house histories, maintain and restore historic features should be shared through the Duxbury Historical Commission website. The website should include information on Duxbury policies and procedures for updating historic properties. The DRHS offers assistance through their "Dateboarding Your Home" program available at http://duxburyhistory.org/dateboarding-your-home/ Additionally, Arlington, Massachusetts has produced something similar: http://www.arlingtonhistoricalcommission.org/researching_home.html. This provides easily accessible information and guidance to homeowners who may want to preserve historic features but do not know how.

Goal 4: Enhance creative and cultural economic development.

• **Strategy 4.1** Encourage private land conservation in support of semi-rural heritage and economic activities including agriculture, horticulture, and aquaculture.

Preservation of Duxbury's semi-rural character is important to Duxbury residents. Land conservation should be encouraged broadly, in addition to preservation of natural resources, habitat, and ecosystem services, private lands should be encouraged to be conserved for and protected for historic agricultural, horticultural, and aquacultural uses. These types of uses offer economic activity on the land that enables maintenance and land conservation through the private sector. Farmland provides a positive cash flow to Massachusetts municipalities, requiring $0.47 in services for every $1.00 of tax revenue generated.[12] Conservation of land for agricultural, horticultural, and aquacultural uses should continue and be encouraged by the Town.

12. Bowell, Ben, Cris Coffin, Mike Eley and Doris Mittasch. 2008. Farms for the Future: Massachusetts' Investments in Farmland Conservation. Northampton, MA: American Farmland Trust. Accessed October 31, 2013.http://www.farmland.org/programs/states/ma/documents/MAInvestmentsfinal.pdf. Referenced in "Municipal Food Systems Planning Toolkit for MAPC Communities." CLF Ventures and MAPC, 2013.

Chapter 7
Sustainability - Climate

Key Findings

Climate change is a global phenomenon with direct local impacts. Duxbury routinely experiences coastal flooding and inundations, even with the relatively moderate occurrence of a lunar high tide. Climate change will likely result in more frequent extreme weather events and projected sea level rise. The goals and strategies of this element are intended to support continuing efforts to prepare Duxbury for the impacts of climate change and to strengthen community resilience including incorporating climate resiliency into all local and regional planning efforts, creating a resilient shoreline, positioning Duxbury's coastal economy to remain vibrant through climate change, and protecting Duxbury's water resources from the impacts of climate change.

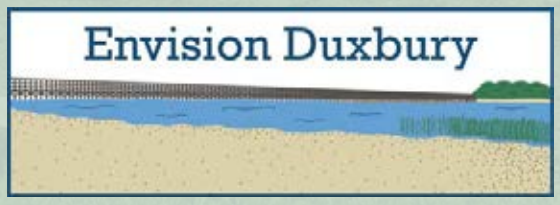


Image: *Bluefish River Source: MAPC*

Introduction

Climate change is the most compelling environmental, economic, and social issue of our time and the northeastern United States is one of the most vulnerable to our changing climate, particularly with projected sea level rise (SLR). Additionally, in the last five years, Massachusetts has experienced increasingly more frequent and severe weather events. Record-breaking snowfall in 2015, a wide-spread and severe drought in 2016, the warmest year on record in 2017, four Nor'easters in one month and flooding comparable to the Blizzard of 1978 in 2018, and the wettest fall on record in 2018. In just early 2018 alone, two coastal storms caused a state of emergency, mandatory evacuations, and significant damage to seawalls. Climate change is not a distant challenge, but affecting the people and cities and towns of the Commonwealth today, particularly those in coastal and riverine communities such as the Town of Duxbury.

Duxbury contains a rich fabric of cultural and natural assets and the community through time has had the foresight to protect these assets to uphold its cultural character as part of a healthy, livable community. These assets will increase the Town's ability to mitigate, adapt to, and recover from the impact of climate change and severe weather events. These include protection of Duxbury Beach, a barrier beach providing shoreline protection from high-energy coastal storms to Duxbury and the surrounding towns. It also includes over 3,500 acres of protected, intact conservation land supporting healthy ecosystems and ecosystems services, over 1,600 acres of marsh land and living shoreline, and 8,300 acres of tree canopy capturing over 21,630 pounds of carbon dioxide annually.

Duxbury has taken initiative to plan and vision for its future in response to changing climate and shoreline conditions. These include several climate-related planning efforts listed below and importantly, the Duxbury Climate Vulnerability Assessment and Action Plan, which enabled the Town to be a designated by the State a Municipal Vulnerability Preparedness community.

- Duxbury Natural Hazard Mitigation Plan (MAPC, 2018)
- Duxbury Climate Vulnerability Assessment and Action Plan (MAPC, 2018)
- SLR Study for the Towns of Marshfield, Scituate, and Duxbury, MA (Kleinfelder, 2013)
- South Shore Coastal Hazards Adaptation Study (MAPC, 2011)

The intent of this Sustainability-Climate Resilience Plan is to highlight the most significant climate change risks and vulnerabilities in Duxbury and ensure that resilience strategies are integrated across all elements of the Envision Duxbury Master Plan. As climate change crosses jurisdictions and sectors, recommendations and actions of this plan should emulate this cross-cutting, systems approach to resilience and community vibrancy.

Climate Change Risks

Our climate has always been regulated by gases, including carbon dioxide, methane, and nitrous oxide, that blanket the earth. These gases trap heat that would otherwise be reflected out to space; without them our planet would be too cold to support life. We refer to these gases as "greenhouse gases" (GHGs) for their heat trapping capacity. Changes in GHG concentrations occur naturally, due to such events as volcanic eruptions, and variations in solar energy entering the atmosphere.

In the past century, human activity associated with industrialization has contributed to a growing concentration of GHGs in our atmosphere. The combustion of fossil fuels, our primary energy source in the age of industrialization, releases GHGs into the atmosphere. As shown in Figure 1, there is a correlation between increases in carbon dioxide concentrations and increases in global temperature. There is by now widespread consensus among scientists regarding the warming of our climate and its causes.[1,2,3] The severity and intensity of climate change impacts is determined by the extent of greenhouse gas concentrations in the atmosphere. Managing and eliminating our greenhouse gas emissions is an essential component of climate resilience.

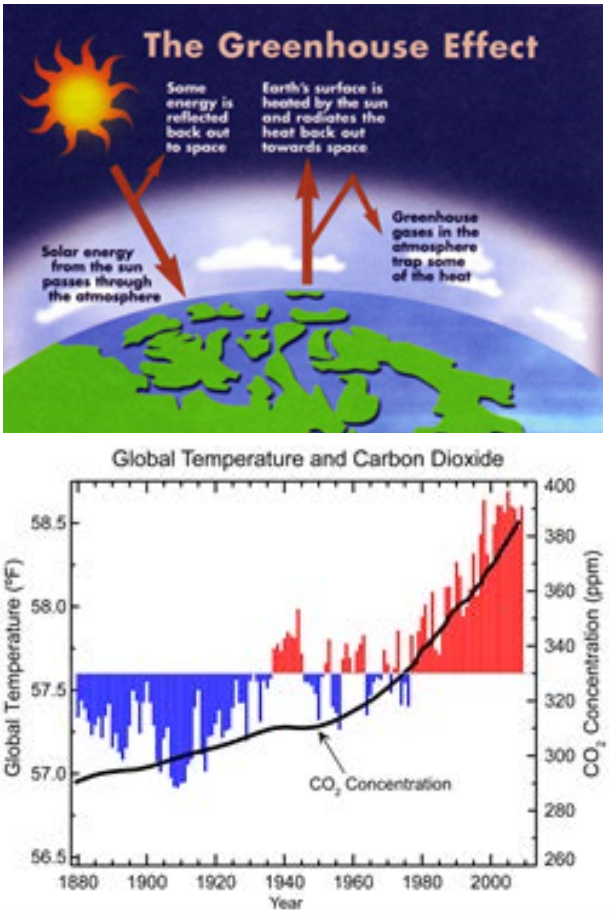


Figure: *The Greenhouse Effect and Global Temperature and CO^2 Trends*

Sea Level Rise

Over the last century, sea level rise has increased by 11 inches (Figure 1) and the Boston Research Advisory Group (BRAG) anticipates that the rate of increase will accelerate, anticipating an additional eight inches by 2030.[4,5] Warming temperatures contribute to sea level rise in two ways. First, warm water expands to take up more space. Second, rising temperatures are melting land-based ice which enters the oceans as meltwater. Also, another minor contributor to sea level rise in New England is a small amount of land subsidence (drop in elevation in response to the last glacial period, when pressure from the heavy ice compressed the land causing land areas around the glacier to curl upward in that time period. With glacial retreat, the land is very slowly reshaping its elevation (returning to an isostatic balance) causing some portions of the east coast to rebound (rise), and some areas to subside (sink).[6]

There are several models and projections for

1. Fourth National Climate Assessment (2018)
2. Statement on Climate Change from 18 Scientific Organizations (https://www.aaas.org/sites/default/files/migrate/uploads/1021climate_letter1.pdf)
3. Intergovernmental Panel on Climate Change. Climate Change *2014 Synthesis Report Summary for Policymakers*
4. U.S. Environmental Protection Agency. 2016. Climate Change Indicators in the United States, 2016. Fourth meditation. EPA 430-R-16-004. www.epa/gov/climate-indicators

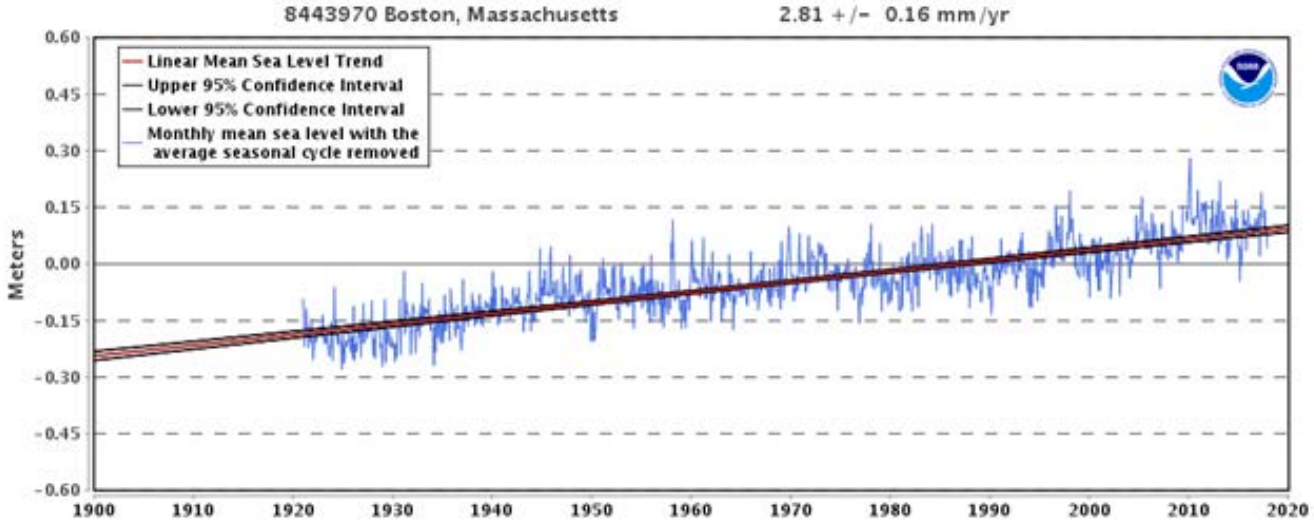


Figure: *Observed sea level rise in Boston which indicates over 11 inches of sea level rise in the last century Source: Boston Tide Station from 1921-2016*

sea level rise available summarized in Table 1 which assume the highest emission scenario. Though projection models will become more refined through time as we advance in technology and lessen knowledge gaps on climate processes and trends, Envision Duxbury should anticipate major shoreline investments to consider the high-extent of sea level rise through the lifetime of the infrastructure. Recent research indicates an accelerated increase in carbon dioxide emissions in the atmosphere, the highest concentrations in 2018 since concentrations have been recorded.[7] The impact of these emissions is accelerating ocean warming and glacial melting in Greenland and Antarctica, both major contributors to sea level rise.[8]

Temperature

According to the US National Climate Assessment 2018, temperatures in the Northeast US have increased at a rate greater than any other region in the US.[12] Indeed, nine of the warmest years on record have occurred since 2007 (Figure 3), and the impact of that global

	2030	2050	2070	2100
Boston BH_FRM[9]	8.00 in.	1.50 ft.	3.10 ft.	7.40 ft.
South Shore[10]	8.04 in.	1.85 ft.	3.39 ft.	6.52 ft.
Boston Tide Gauge[11]	1.1-1.3 ft.	2.4 ft.	4.2 ft.	7.0 ft.

Table: *Relative sea level rise projections for Boston Harbor and the South Shore for "highest emission" scenario*

5. Climate Ready Boston, "The Boston Research Advisory Group Report: Climate Change and Sea Level Rise Projections for Boston," June 2016
6. Upton, J. Sinking Atlantic Coastline Meets Rapidly Rising Seas. Scientific American. April 2016
7. https://www.washingtonpost.com/energy-environment/2018/12/05/we-are-trouble-global-carbon-emissions-reached-new-record-high/?noredirect=on&utm_term=.5968695ad0ed
8. https://www.nytimes.com/2019/01/21/climate/greenland-ice.html
9. Douglas, E.M., Kirshen, P.H., Bosma, K., et al. 2017. Simulating the Impacts and Assessing the Vulnerability of the Central Artery/Tunnel System to Sea level Rise and Increased Coastal Flooding. J Extreme Events 3 (4): 1650013 (28 pages).
10. "Sea Level Rise Study. The Towns of Marshfield, Duxbury, Scituate, MA". 2013. Kleinfelder.
11. Northeast Climate Science Center. UMass Amherst. "Massachusetts Climate Change Projections". December 2017
12. Fourth National Climate Assessment. Chapter 18 Northeast. 2018

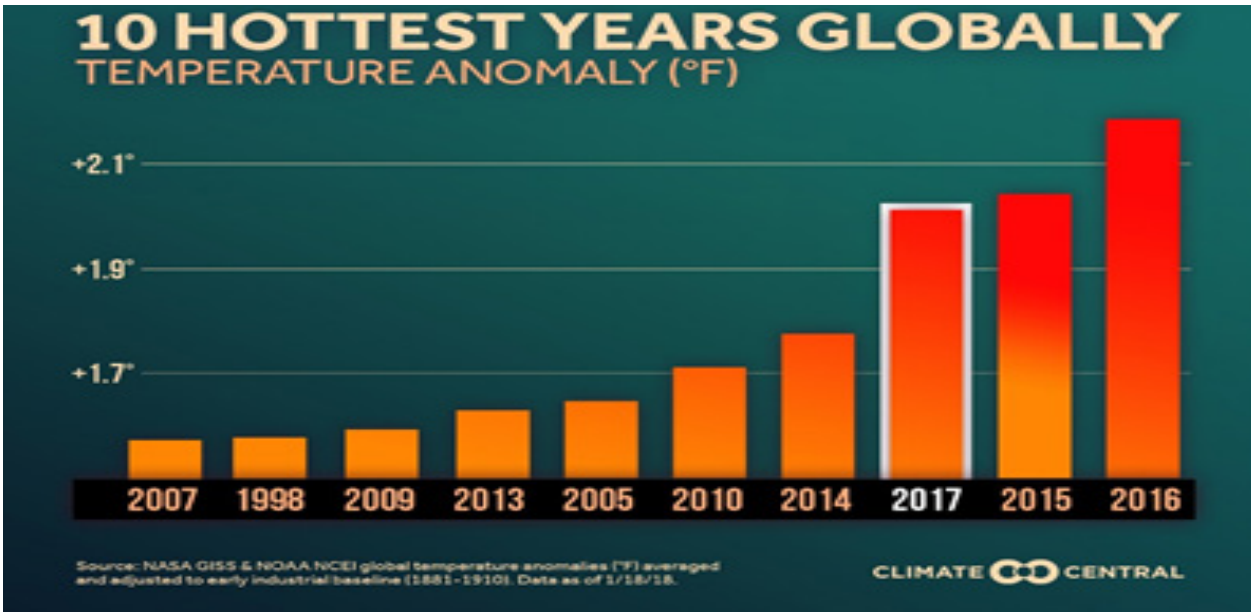


Figure: *The hottest years globally on record Source: Climate Central*

warming is an increase in the growing season by 10 days in the Northeast since the 1990s.[13]

Future temperature projections for the Northeastern US show a greater increase in average summer temperatures relative to winter and are projected to increase at an accelerated rate.[14] A number of local temperature projection models for Massachusetts and the Boston region also demonstrate an increasing likelihood of heat waves, as indicated by the increased number of days over 90 and 100 degrees each year.[15,16,17] Whereas Duxbury today averages approximately eight days above 90° annually, that may increase to 22 days by mid-century and 31 days by the end of the century.[18] The impact of increasing temperatures is a shorter winter and longer growing season. For example, scientists expect 5 to 17 fewer winter days by the 2070s and 9 to 34 fewer winter days by the end of the century.[19]

Precipitation

For the last fifty years, precipitation has increased 70% in the Northeast in the amount of rain that falls in the top 1% of storm events.[20] Fall of 2018 and specifically November of 2018 are both the wettest fall and the wettest November on record since 1891. And, 2018, is the third wettest year overall on record.[21] Due to several stormy periods during the year, annual precipitation was very high and totaled 67.20 inches, which was more than 18 inches wetter than the long-term mean and nearly 14 inches more than the 30-year normal. The highest precipitation totals occurred in March (mostly as snow), September and November.

Projections for future precipitation suggest

13. United States Environmental Protection Agency Climate Change Indicators.
14. Climate Ready Boston, "The Boston Research Advisory Group Report: Climate Change and Sea Level Rise Projections for Boston," June 2016
15. Under RCP 4.5 conditions. City of Cambridge, Climate Change Vulnerability Assessment, (City of Cambridge, 2015), http://www.cambridgema.gov/CDD/Projects/Climate/climatechangeresilianceandadaptation.aspx cited in BRAG.
16. Boston Indicators, "Trends in Climate Change, Metro Boston and New England," http://www.bostonindicators.org/indicators/environment-and-energy/5-4clean-energy-and-climate-stability/5-4-1trends-in-climate-change-metro-boston, accessed March 25, 2017
17. Northeast Climate Science Center, UMass Amherst. Massachusetts Climate Change Projections. January 2018.
18. Northeast Climate Science Center, UMass Amherst. Massachusetts Climate Change Projections. January 2018
19. Under RCP 4.5 conditions. City of Cambridge, Climate Change Vulnerability Assessment, (City of Cambridge, 2015), http://www.cambridgema.gov/CDD/Projects/Climate/climatechangeresilianceandadaptation.aspx cited in BRAG.
20. USGCRP, 2018: Impacts, Risks, and Adaptation in the United States:Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.
21. Blue Hill Observatory & Science Center. 2019. http://bluehill.org/observatory/2018/02/2018-precipitation/

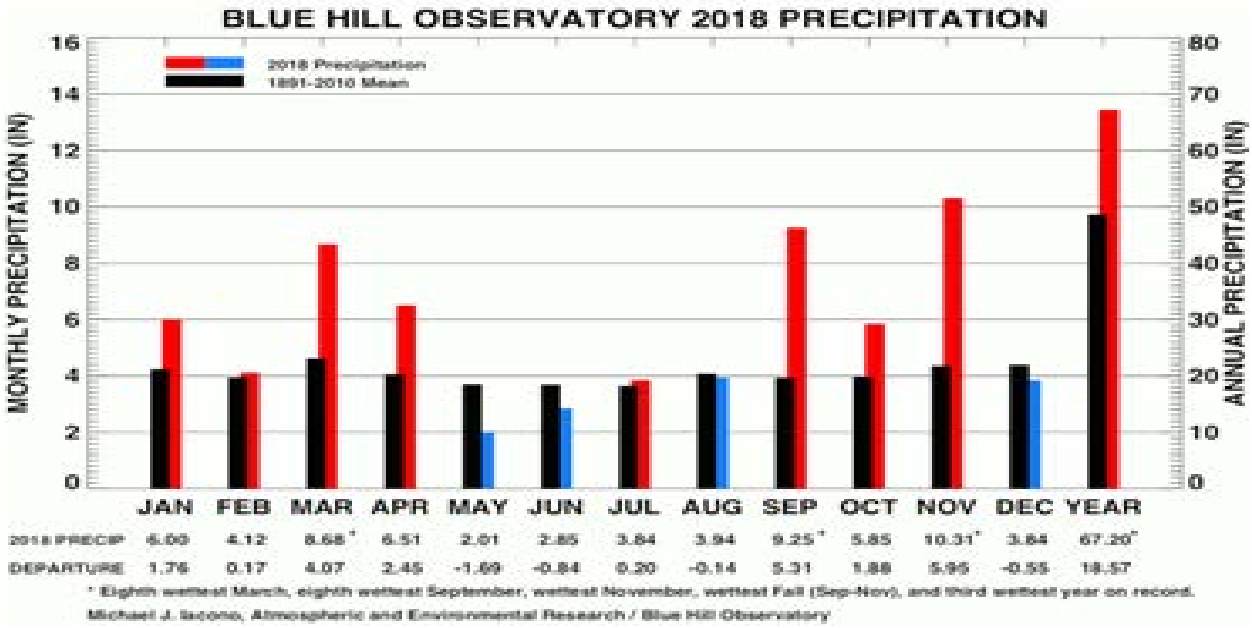


Figure: *Precipitation Levels in 2018 Source: Blue Hill Observatory*

an increase in total precipitation, changes in precipitation patterns, and increased frequency of extreme storms such as hurricanes and nor'easters. For example, a 100-year storm is defined as a storm that would have a 1% chance of occurring in any given year or consecutive years. Historically, a 100-year storm averages 8.9 inches of rain created during that storm event, but that could increase to 10 inches of rain by 2044 and 11.7 inches of rain by 2084.[22] This increased precipitation has the potential to exacerbate existing stormwater runoff issues and pollution of existing impaired waters.

However, the actual amount of increased precipitation or number of extreme weather events per year is difficult to ascertain, largely due to localized climate variability and greenhouse gas emissions into the future.[23,24] The Northeast Climate Center at UMass Amherst projects that Plymouth County has a baseline of approximately 8 days with greater than 1-inch precipitation events, that increases to 10 days by mid-century and nearly 11 days by 2100.[25] Nonetheless, climate scientists still anticipate some periods of drought. Warming temperatures can cause greater evaporation in the summer and fall as well as earlier snowmelt,[26] and this could cause a modest increase in the number of consecutive dry days in Duxbury from 17 to approximately 18.5 by mid-century.

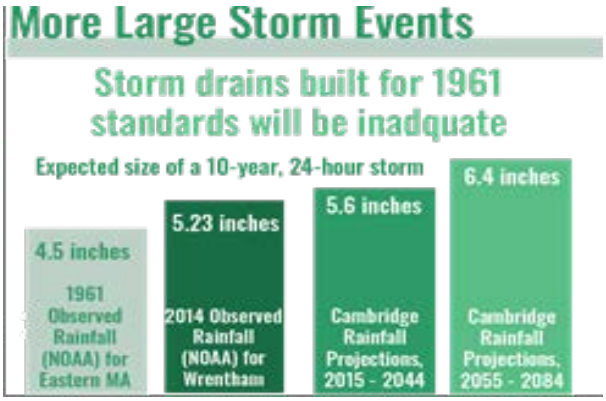


Figure: *Future precipitation projections for design storms Source: Cambridge Climate Vulnerability Assessment, 2015.*

22. City of Cambridge, Climate Change Vulnerability Assessment, (City of Cambridge, 2015), Temperature and Precipitation Projections (http://www.cambridgema.gov/CDD/Projects/Climate/~/media/A9D382B8C49F4944BF64776F88B68D7A.ashx)
23. Climate Ready Boston, "The Boston Research Advisory Group Report: Climate Change and Sea Level Rise Projections for Boston," June 2016
24. USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.
25. Northeast Climate Science Center, UMass Amherst. Massachusetts Climate Change Projections. January 2018.
26. Climate Ready Boston, "The Boston Research Advisory Group Report: Climate Change and Sea Level Rise Projections for Boston," June 2016.

Climate Change Vulnerability

Sea Level Rise

There are two dams vulnerable to hurricane storm surge and sea level rise in 2038 and 22 dams that are located in a 1% Annual Chance Flood. No critical facilities are located in SLR 2038 or 2088, except the Powder Point Bridge. There are 68 historic structures at risk to flooding in a 1% Annual Flood Chance Flood and approximately 54 historic structures vulnerable to sea level rise in 2088 with a Category 1 Hurricane. Further, with a 1% Annual Chance Flood with both coastal and riverine flooding, Duxbury could anticipate up to $22 million in residential economic losses and approximately $14 million in commercial economic losses from both building damage and business interruption.[27]

Duxbury Beach provides protection and buffer from high-energy wave action during coastal storms. However, coastal inundation from storm surge is creating flood damage in many of Duxbury's roads and neighborhoods. Some areas are beginning to flood during a lunar high tide. There are eighteen areas locally identified with problematic flooding.[28] Duxbury has suffered 467 flood insurance claims totaling nearly $6.8 million and has 50 repetitive-loss properties with 175 losses totaling $3.3 million in claims.[29] Neighborhoods with the most urgent need for attention due to continued or high-risk coastal flooding include Gurnet Road, Snug Harbor, Powder Point, King Caesar Road, Bay Road and Washington Street/St. George Street.[30]

Duxbury has experienced coastal erosion since the 1800s. Specifically, Duxbury Beach is a high-risk area which, without ongoing nourishment and dune restoration by the Duxbury Beach Reservation, Inc., has been damaged by wash-overs (surge washing over the beach, dune, and road into the bay) with storm surge by the Third Crossover. Continued wash-overs could permanently alter the beach and surrounding oceanic and land systems. Most specifically, the northern portion of Duxbury Beach is indicating coastal landward migration, typically of barrier island process, at the northern portion of the barrier beach. Also, the High Pines area of Duxbury Beach has notable coastal erosion since the mid-1800s. Other areas with notable coastal erosion since the mid-1800s include Long Point, Eagle's Nest, and the shoreline along Bay Road. The many

Table: *Building-related economic loss estimates in Duxbury with 1% annual chance coastal and riverine food event*

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	9.06	0.75	0.08	0.07	9.96
	Content	7.72	2.24	0.18	0.52	10.66
	Inventory	0.00	0.01	0.02	0.00	0.04
	Subtotal	16.78	3.01	0.29	0.59	20.66
Business Interruption						
	Income	0.09	5.11	0.00	0.38	5.59
	Relocation	3.50	0.85	0.00	0.10	4.46
	Rental Income	1.08	0.64	0.00	0.01	1.73
	Wage	0.23	3.93	0.01	1.45	5.62
	Subtotal	4.90	10.64	0.02	1.93	17.38
ALL	Total	21.68	13.64	0.30	2.51	38.04

27. HAZUS-MH. Flood Global Risk Report. Duxbury Riverine and Coastal 100-Year Flood. Modeled July 26, 2018.
28. MAPC. Town of Duxbury Natural Hazard Mitigation Plan. 2018
29. MAPC. Town of Duxbury Natural Hazard Mitigation Plan. 2018

Image: *Cranberry bogs adjacent to North Hill Pond, adjacent to the Merry Memorial Dam Source: MAPC*

salt marshes along the coast of Duxbury, which provide critical habitat for the commercial fish industry, sequester significant carbon, and provide natural shoreline protection, are at risk of deterioration and erosion from sea level rise and constant submergence.

Finally, Duxbury's water is supplied from wells located in the Towns of Duxbury and Marshfield. The water supply is vulnerable to scarcity during periods of drought. Salinization from sea level rise is a potential threat to the freshwater lens and should be monitored. Three of its shared waste water collection systems are located within a 1% Annual Chance Flood Zone and the flood risk increases greatly with sea level rise in 2038 and 2088.[31]

Precipitation Vulnerability

While coastal flooding is the main concern for Duxbury, the severe precipitation events can cause flooding of water bodies including Keene Brook, the South River Reservoir, and the Chase Reservoir. Chase Reservoir flooding has occurred due to the dam overtopping. Since dams were designed to historic storms, this vulnerability could increase with climate change and projected increase in frequency and intensity of precipitation events. However, current flooding in these areas is relatively limited and active land conservation and wetland protection measures have limited the exposure of homes and businesses in this area.

Duxbury is vulnerable to flooding particularly if storm surge and heavy rain from new precipitation patterns occur together. Flooding can occur in areas where storm drain pipes may be undersized because they were designed for lesser rainfall averages when built. Stormwater management will be critically important for managing water quality and compliance with Commonwealth's Municipal Separate Storm Sewer System (MS4) permits and the Clean

30. MAPC. Town of Duxbury Natural Hazard Mitigation Plan. 2018
31. MAPC. Duxbury Climate Vulnerability Assessment and Action Plan. 2018

Water Act, as well as flooding. Duxbury and Kingston Bays, the Blue Fish River, and the Jones River are all considered impaired waters, where water quality is already a concern.

Finally, wetlands that remain submerged for long periods of time will eventually transform ecosystem type into a freshwater system with subsequent land loss. As already highlighted, the fall of 2018 was the wettest on record. The excessive precipitation created a very high water table that remained high through the winter and into the spring of 2019 and additional winter snow melt created even greater flooding of the wetland systems. In that time period, wetlands in Duxbury remained submerged from the fall into the spring.

Temperature Vulnerability

With increasing temperatures globally and locally, Duxbury is vulnerable to extreme heat events and changing ecosystems, both marine and land-based ecosystems, as a result of warming temperatures and prolonged growing season. Extreme heat poses many health risks, particularly those with prolonged exposure such as outdoor workers or those with chronic medical conditions such as respiratory and cardiovascular diseases. Prolonged exposure to high temperatures can cause heat-related illnesses, such as heat cramps, heat exhaustion, heat stroke, and in severe cases, death. Heat exhaustion is the most common heat-related illness and if untreated, it may progress to heat stroke. Temperature vulnerability is exacerbated by physical characteristics of the environment with man-made environments absorbing more heat than natural environments due to the absorption, color, and radiance of materials such as asphalt in parking lots or on the roofs of buildings. Locations where the characteristics of the environment are contributing to higher temperatures than the surrounding areas are referred to as urban heat islands. In Duxbury,

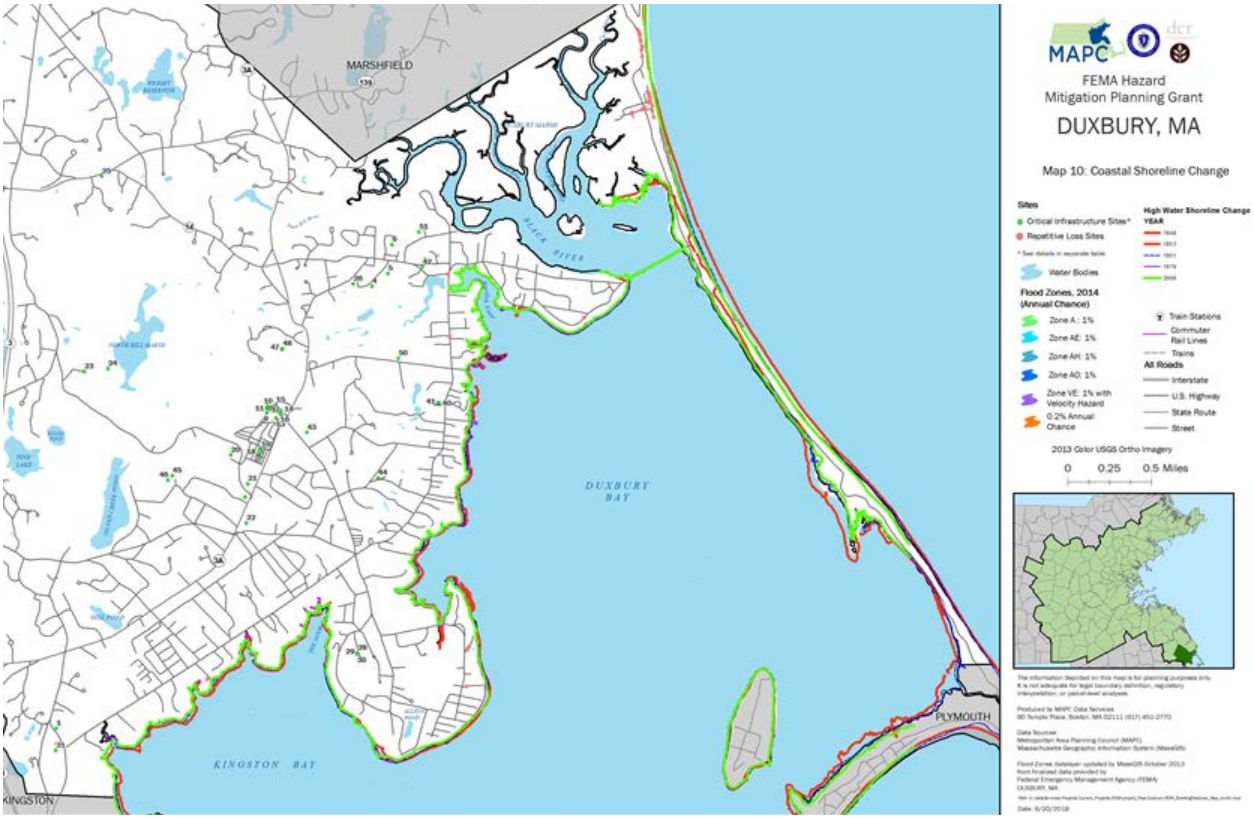


Figure: *Coastal shoreline change 1848-2009 Source: MAPC*

urban heat islands occur at the school campuses on Alden Road, Chandler Street and at Hall's Corner. All locations with larger impervious parking areas. These areas present a unique vulnerability because the schools are also a location for prolonged exposure for children playing outdoors for sports or recreation.

Additionally, senior adults are at particularly high risk to heat for several reasons. They may not adjust to sudden changes in temperature as quickly as younger people, they are more likely to have a chronic medical condition whose symptoms may be exacerbated by heat, and they are more likely to be taking prescription medications that affect their ability to control body temperature.[32,33] In Duxbury, 16.9% of the people are over 65 years old.

Though longer growing seasons and increased carbon in the atmosphere overall may benefit forest productivity, forests will undergo stressors related to our changing climate such as periods of intense precipitation and/or drought, and warmer winters. As mentioned, the growing season in the last 60 years has increased from 7 days to 10 days;[34] and warmer winters may increase the incidence of ice storms. These factors work in conjunction to cause several vulnerabilities to the forest including favoring

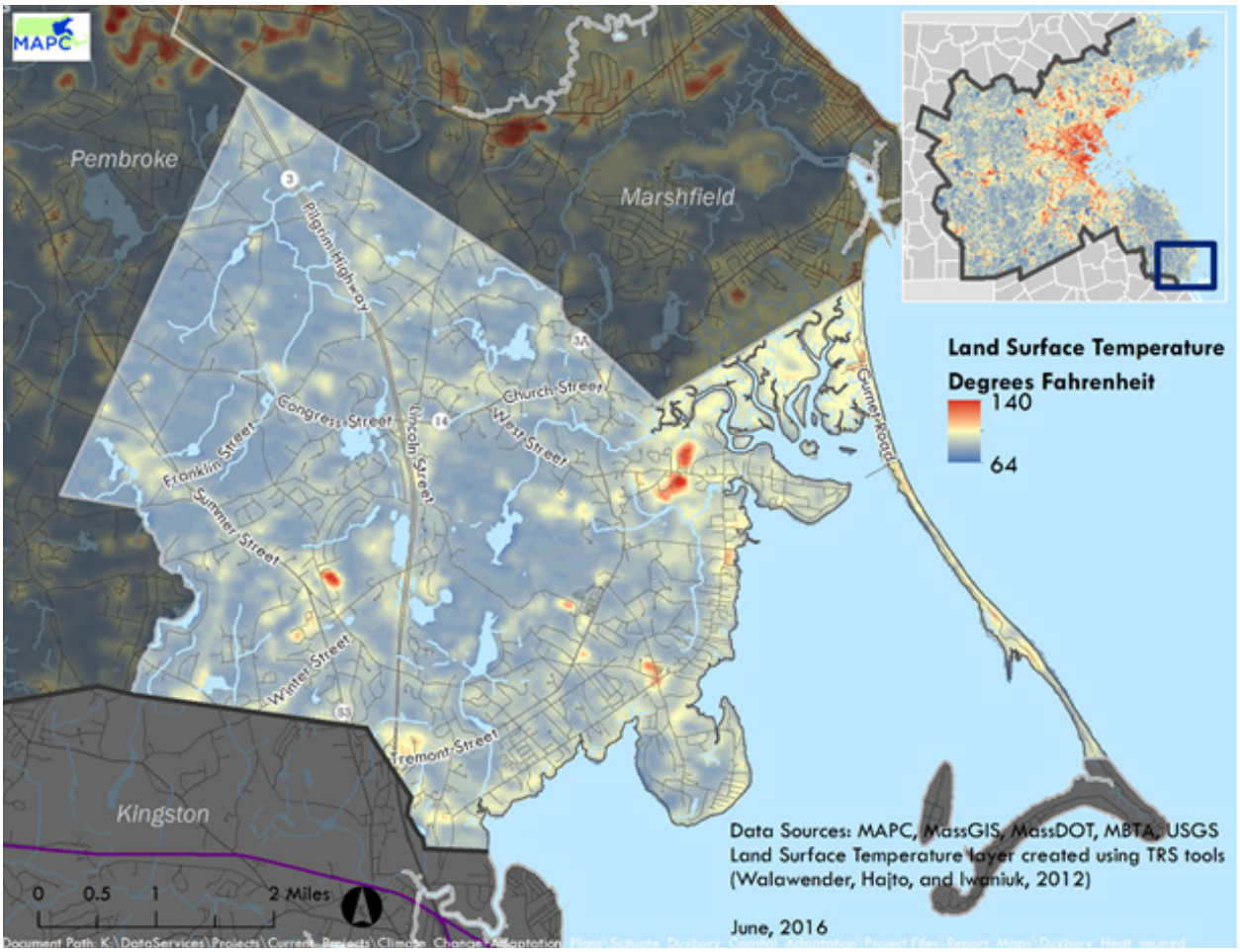


Figure: *Urban heat islands in Duxbury Source: MAPC*

32. Gamble, J. L., Hurley, B. J., Schultz, P. A., Jaglom, W. S., Krishnan, N., & Harris, M. (2013). Climate Change and Older Americans: State of the Science. Environmental Health Perspectives, 121(1), 15–22. http://doi.org/10.1289/ehp.1205223
33. Center for Disease Control and Prevention. Natural Disasters and Severe Weather. https://www.cdc.gov/disasters/extremeheat/older-adults-heat.html

invasive plant species and exotics establishments with gaps in the canopy due to wind and ice storms; migration of species to more northern climates and immigration of new species and/or pests; and weakened trees with drought causing greater susceptibility to insects and diseases.[35] The overall impact is an anticipated shift in forest type in Southern New England from a Maple/Birch/Beech forest to forests more characteristic of southern New York, New Jersey and Pennsylvania, and Oak/Hickory forests.[36]

Increasing ocean temperatures locally can detrimentally affect ecosystem function, causing species migration, potentially introduction of new pathogens, and harmful algal blooms. In the last three decades, sea surface temperatures have been higher on average than over the last century since being recorded.[37] During this time, sea surface temperatures have exceeded the last century's average every year. There is a reported increase in some naturally-occurring bacteria found in warm, brackish waters on the Eastern seaboard,[38] and state agencies, local health officials and the shellfish industry carefully monitor for the presence of such organisms.

This monitoring prevents occurrences of illness which can result when contaminated shellfish are consumed raw.[39] Duxbury, Kingston and Plymouth Bays at times are temporarily closed to swimming and shell fishing after storm events to prevent harvests of shellfish or exposure to waters[40] with elevated levels of storm-related contaminants. These bays are home to some of the most successful oyster harvesting businesses in the United States, and the careful coordination and cooperation of the industry, as well as the ongoing work to reduce land-based nutrient loads by these communities, has significantly improved water quality during this same time period.

Duxbury has experienced a loss of nearly1,000 acres of eelgrass between 2012 and 2014, whose meadows are routinely monitored by Commonwealth of MA Division of Marine Fisheries. Their research suggests that as much as 3,440 acres of eelgrass were present in 1951. Seagrass meadows such as eelgrass provide important ecological and climate resilience benefits. They capture sediment and take up nutrients ultimately providing better water clarity that is important for fish habitats. Importantly, seagrass meadows also dissipate wave energy and wave height thereby reducing shoreline erosion.[41] Seagrass decline can be attributed to many factors such as pathogens; sea grass is highly vulnerable to environmental stressors such as nitrogen loading from stormwater, sewer systems, and fertilizers, and warming ocean temperatures.[42]

34. Massachusetts Climate Adaptation Partnership. 2015. Massachusetts Wildlife Climate Action Tool. Accessed in October 2017
35. Catanzaro, P., A. D'Amato, E. Silver Huff 2016. Increasing Forest Resiliency for an Uncertain Future. UMass Extension Landowner Outreach Pamphlet. 28 pages
36. U.S. Forest Service, Changing Climate, Changing Forests. The Impacts of Climate Change on the Northeast United States and Eastern Canada. 2011
37. National Oceanic and Atmospheric Administration. Climate Change Indicators in the United States. 2016 http://www.globalchange.gov/browse/indicators/indicator-sea-surface-temperatures
38. Vezzulli et al. 2016. Climate influence on Vibrio and associated human disease during the past half-century in the coastal North Atlantic. PNAS August 23, 2016. 113(34)
39. Executive Office of Health and Human Services. Public Health Implications of Climate Change. http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/public-health-implications-of-climate-change.html
40. MA Division of Marine Fisheries. 2016 Annual Report. http://www.mass.gov/eea/docs/dfg/dmf/publications/2016-dmf-annual-report.pdf
41. Bradley, Kevin and Houser, Chris. 2009. Relative velocity of seagrass blades: Implications for wave attenuation in low-energy environments. Journal of Geophysical Research, Vol 114 F01004
42. Short, Fred; Klein, Anita; Burdick, David; and Moore, Gregg. 2012. The Eelgrass Resource of Southern New England New York: Science in Support of Management and Restoration Success. NOAA Restoration Center

Existing Conditions

Duxbury has significant assets to bring forth a strong resilience strategy toward mitigating the impacts of a changing climate. These include natural resilience strengths as well as social, programmatic and municipal strengths that could maximize its adaptive capacity for a changing climate.

Nature-based Strengths

Duxbury's natural lands and tree canopy, though susceptible to a changing climate, weave a fabric of resilience against climate risks and vulnerabilities. These areas mitigate flooding, alleviate stress on stormwater systems, serve to recharge and clean the Town's aquifer, mitigate air pollutants, and cool the town through evapotranspiration and shade. According to the US Environmental Protection Agency (EPA), suburban areas with mature trees are four to six degrees Fahrenheit cooler than new suburbs without trees. Shaded surfaces can be 25-40 degrees cooler than the peak temperatures of unshaded surfaces. Trees also absorb remarkable quantities of precipitation; in addition to water uptake by roots, tree leaves intercept rainfall and it is stored or evaporated back into the atmosphere reducing the amount of stormwater runoff and flooding.

For example, Duxbury has a tree canopy over approximately 50% of the Town's area. These

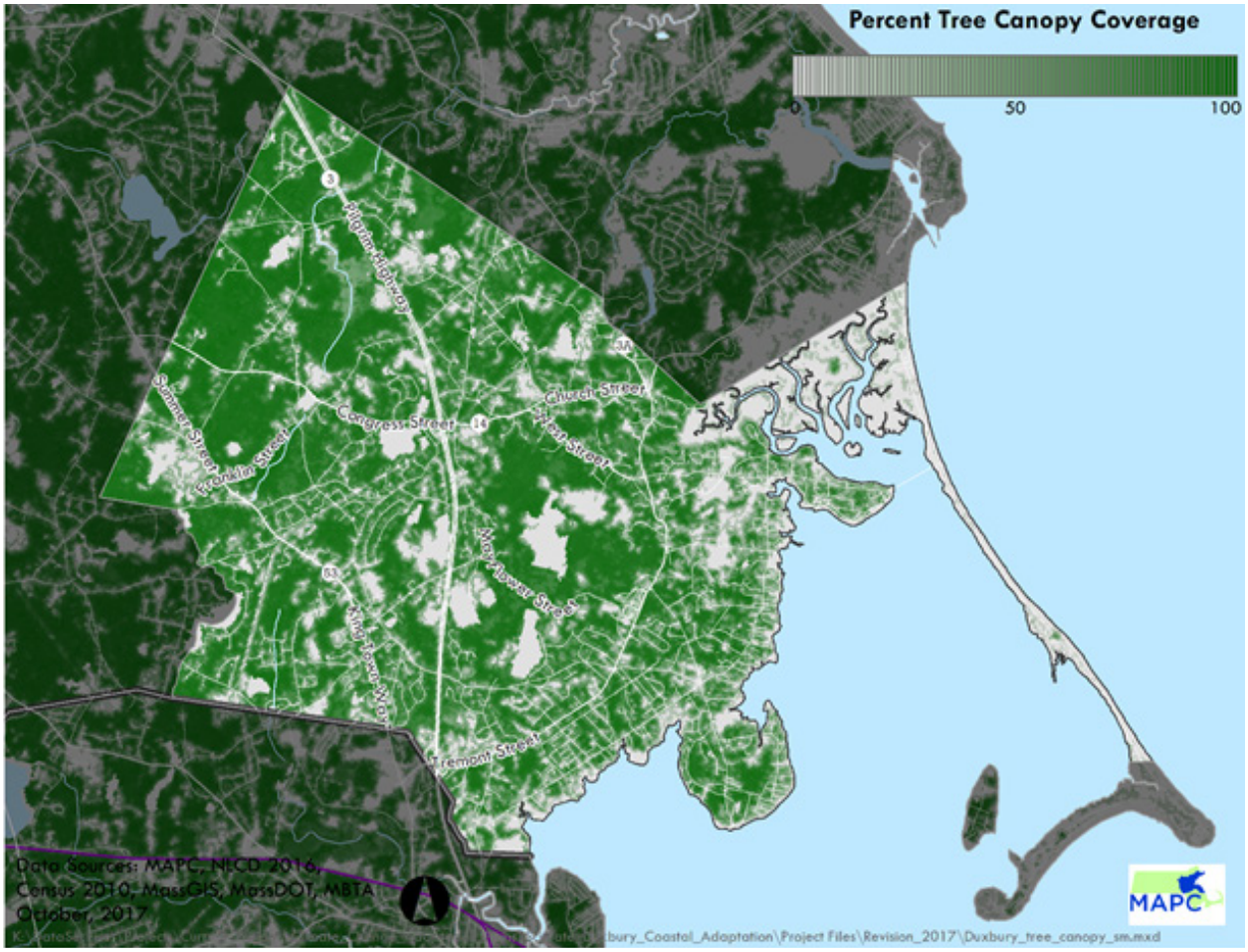


Figure: *Tree canopy coverage in Duxbury (2011). Duxbury's land use contains over 50% forest and 16.2% open space and recreation land Source: MAPC*

trees intercept about 794 million gallons of rainfall per year with a value of the reduced runoff at about $769,585 per year. Estimates of pollution reduction from Duxbury's tree canopy show a reduction of 5,834 lbs./yr. of carbon monoxide, 60,594 lbs./yr. of nitrogen dioxide, and 442,806 lbs./yr. of ozone. The estimated value of Duxbury's tree canopy for carbon storage is over $48 million while the value of annual carbon sequestration (tree growth minus loss due to decomposition and mortality) is over $845,000 per year, or the equivalent to 21,630 tons of carbon dioxide sequestration per year.[43]

Furthermore, the town contains 10,356 acres of BioMap2 Core Habitat and Critical Natural Landscape and nearly 70% of that total area is protected.[44] In addition, Duxbury contains 1,612 acres of Wetland Core Habitat. These healthy, intact ecosystems sustain critical ecosystem functions and support biodiversity. They also have the ability to better withstand stressors associated with climate change.

Functional and Municipal Strengths

Duxbury has significant strengths that will minimize the impact of climate change. These strengths will inform a shared agenda for climate action by the Town and the South Shore Region.

1. Duxbury is proactive. Duxbury's propensity to act is demonstrated by its participation in multiple planning efforts around sea level rise and climate change, hazard mitigation planning, and Envision Duxbury, its master plan. The municipality is also designated as a Green Community. This foresight will create a foundation for incremental resilience programs and projects to ensure Duxbury remains a vibrant community into the next century and beyond.

2. Duxbury is committed to conservation. This is evident in the town's robust history of acquiring land for drinking water, natural resources, wildlife habitat protection, and recreation in addition to implementing measures to ensure clean harbors and bays.

3. Duxbury has a dynamic network of non-profits, institutions, community groups, residents, and businesses that are highly engaged in the community and vested in its future.

4. Duxbury supports collaboration. In discussing and acting on current and future regional matters, there is a culture and practice of collaboration between elected officials, municipal staff, residents, community groups, and private sector representatives.

Figure: *An example of a November 2017 Envision Duxbury Public Forum Climate Change Board Source: MAPC*

43. United States Forest Service. Itree. https://www.itreetools.org/resources/content/Landscape_factsheet.pdf
44. Natural Heritage and Endangered Species Program. Conserving the Biodiversity of Massachusetts in a Changing World- Duxbury. 2012. http://maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Duxbury.pdf

Community Input

Climate Change planning has been an ongoing effort that has built on planning processes that have been occurring from 2017, continuing into 2018, 2019 and beyond. As a result, the Town of Duxbury is already designated a Municipal Vulnerability Preparedness community by the Commonwealth of Massachusetts and qualifies to apply for state and federal funding for building its resilience to climate change. Duxbury's Climate Planning was guided by a designated Climate Steering Committee, residents and stakeholders through participation and engagement at several events, public meetings and public forums. Suggestions and feedback provided here are incorporated into Duxbury's climate resilience strategy and will help inform a lens of climate resilience through all of Envision Duxbury.

November 2017 Community Forum

As part of the Envision Duxbury process, Sustainability and Climate were specific topics for discussion at Community Forums held for Phase 1 and Phase 2 of the Master Plan. These Community Forums occurred in November of 2017 and October 2018 respectively. Participants at the November 2017 public forum were asked what was important to them to protect in Duxbury in the face of climate change. The health of the marine environment, its economy and natural systems, were highlighted as the greatest concern to residents for protection. Other concerns were increased incidences of vector-borne diseases such as Lyme disease from ticks and the water quality issues related to onsite waste water systems and the vulnerability of these systems to climate change (sea level rise and increased precipitation). Further, walkability and bikability were important strategies for reducing emissions and creating a healthier community that were also highlighted by participants.

October 2018 Community Forum

Climate Change public awareness and engagement increased significantly in 2017-2018. This is in part due to the Town's climate planning efforts but also and importantly, the winter of 2018 brought four nor'easters with significant storm surge, coastal flooding, power outages, and infrastructure damage. In March 2018 during Winter Storm Riley, Duxbury announced mandatory evacuation and a state of emergency was declared in the Town. Storm surge and coastal flooding had destroyed a sea wall in Marshfield causing significant flooding along Plymouth Avenue and Gurnet Road in 2014, and then in 2018 the wall was breached and destroyed in several locations. Residences in Gurnet remained flooded longer than 10 days after the storm had ended. The sea wall was moderately repaired with boulders while the Town pursues federal funding to more comprehensive replace or improve it.

Public response to climate change at the October 2018 public forum was more diversified then previous responses. Residents voiced more frequent concern for protecting neighborhoods that have flooded, protecting Duxbury Beach dune elevation and nourishment, and providing regulatory processes (building and zoning codes) that enable elevating infrastructure in response to sea level rise. Other concerns expressed were focused on the important natural resources that define the town including protecting salt marshes from sea level rise, water quality in the bays, and saltwater intrusion potential in Duxbury's aquifers.

Sustainability - Climate
Recommendations

The following recommendations are adapted from Duxbury's Climate Vulnerability Assessment and Action Plan, the Duxbury Natural Hazard Mitigation Plan, and public input and feedback the community forums and public meetings, presentations, and events summarized above. These recommendations are intended to align all planning, development, and infrastructure improvements with a lens of climate resiliency.

Goal 1: Incorporate climate resiliency into all local and regional planning efforts.

- **Strategy 1.1:** Establish a Climate Resilience Task Force/municipal committee which oversees the implementation of Duxbury Climate Vulnerability Assessment and Action Plan, Natural Hazard Mitigation Plan and the Envision Duxbury Master Plan Sustainability element.

- **Strategy 1.2:** Maintain the Town's MA Executive Office of Energy and Environmental Affairs Municipal Vulnerability Preparedness Designation every five years.

- **Strategy 1.3:** Continue to leverage local funds with state and federal climate resilience and natural hazard mitigation funding opportunities to implement resilience measures across the Town.

- **Strategy 1.4:** Explore zoning that prohibits and/or regulates building in high hazard areas to strengthen resilience.

- **Strategy 1.5:** Ensure capital improvements (such as transportation, stormwater systems, park improvements, municipal buildings, etc.) incorporate design standards that will mitigate climate change impacts and strengthen resiliency.

- **Strategy 1.6:** Create climate resiliency regulations or incentives related to increasing safety and minimizing damage related to coastal storms.

Goal 2. Create a resilient shoreline.

- **Strategy 2.1:** Support the health of existing living shorelines such as salt marshes and eel grass meadows. Engage in restoration projects that enable ecosystem services and adaptive capacity of living shorelines.

- **Strategy 2.2:** Practice and support beach nourishment and sacrificial dune opportunities to increase coastal infrastructure protection, wildlife habitat, and recreation opportunities.

- **Strategy 2.3:** Create a plan to manage sea walls. Plan sea wall investments to be able to withstand future sea level rise and coastal inundation for the projected lifetime of the sea wall (approximately 30-50 years).

- **Strategy 2.4:** Explore voluntary coastal buy-back programs for residences and businesses in high hazard or repetitive loss areas. Utilize state funding through the Environmental Bond Bill H.4835 or FEMA Coastal Buy Back program (when active).

- **Strategy 2.5:** Investigate the use of earthen berms for increased shoreline protection along coastal roads with persistent coastal flooding such as Bay Road, King Caesar Road, Washington Street in Snug Harbor, Powder Point Road, Gurnet Road, Duxbury Beach Access Road, Pine Point Road and Marginal Road.

- **Strategy 2.6:** Explore opportunities to acquire and protect land along the shoreline to enhance coastal flood management, increase public access to the shoreline, and reduce infrastructure vulnerability.

Goal 3. Position Duxbury's coastal economy to remain vibrant through climate change.

• **Strategy 3.1:** Engage in a community-led district resilience planning and development effort of Snug Harbor that includes resilience zoning, development, migration (where applicable), and resilience project prioritization.

• **Strategy 3.2:** Work with the commercial fishing industry and other coastal business (yacht club, Duxbury Bay Maritime School, etc.) to create a sustainable coastal access area resilient to sea level rise and coastal flooding.

• **Strategy 3.3:** Commit and realize Net Zero goals to minimize local contributions to ocean warming (detrimental to marine ecosystem function) and ocean acidification (threatening commercial fish and shellfish industries).

• **Strategy 3.4:** Strengthen the viability and resilience of the Powder Point Bridge to withstand coastal storms and ice jams to protect recreational access to Duxbury Beach.

Goal 4. Protect Duxbury's water resources from the impacts of climate change.

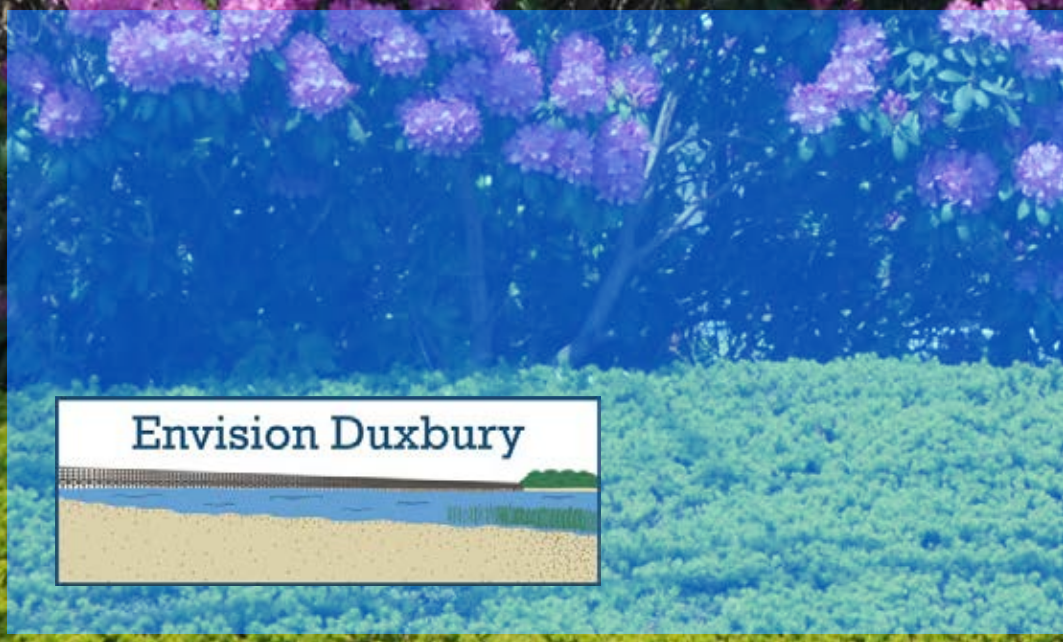
• **Strategy 4.1:** Reduce stormwater runoff into Duxbury's waterways by using green infrastructure and other natural filtration systems.

• **Strategy 4.2:** Ensure that wastewater systems are climate resilient to prevent contamination of Duxbury's waterways from storm surge, coastal flooding and riverine flooding.

• **Strategy 4.3:** Explore salt water intrusion vulnerability of Duxbury's aquifers with sea level rise.

• **Strategy 4.4:** Promote actions for sustaining and improving water quality in Duxbury Bay to ensure healthy marine ecosystems such as salt marshes, eel grass beds, and marine life habitat.

DRAFT FOR REVIEW



DRAFT FOR REVIEW

Duxbury's Social and Community Well-being

Transportation and Connectivity
Housing
Public Facilities and Services
Economic Development

Chapter 8
Transportation and Connectivity

Key Findings

Duxbury faces a variety of transportation challenges, primarily in the areas of safety, pedestrian and bicycle connectivity, and in moving projects from ideas to implementation. While the Town has historic homes, beaches, pedestrian-scaled neighborhood business districts and Town-owned forests, Duxbury could improve ways to safely and effectively connect these resources for all residents and visitors. The Town should develop a comprehensive transportation action plan that prioritizes safety in high crash areas, and that creates a multimodal network connecting residents to key destinations in the Town including schools, neighborhood business districts, and recreation areas.

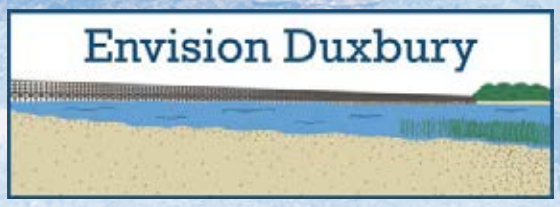


Image: *Tremont Street (Route 3A) is a common street layout in Duxbury Source: MAPC*

Introduction

Duxbury's transportation network includes historic two-lane roadways and local streets, modern multi-lane highways, off-road paths and trails, some sidewalks, as well as limited transit services and ride sharing options. A successful transportation network plans for the efficient and safe movement of people and goods, and provides multiple travel options to access destinations. Transportation affects land uses and development, the environment – including air quality, noise, and water quality – and the health and safety of all users, irrespective of travel mode. As such, a well-designed and functional transportation network can have positive impacts on economic development and the quality of life for the community.

Existing Conditions

History of Town Transportation

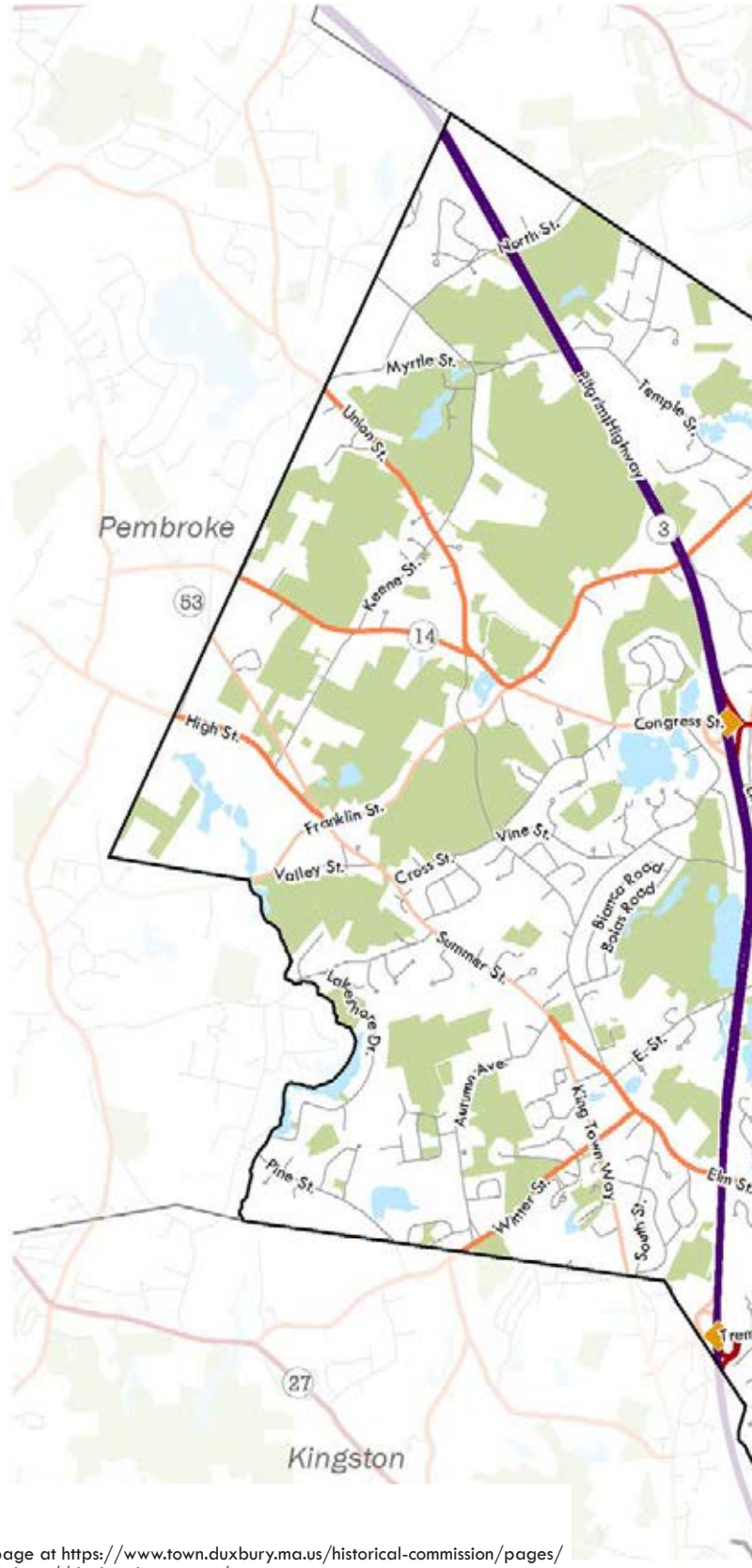
Prior to the industrial revolution, transportation in the town was primarily by foot or horseback. Accordingly, the Town initially developed in a compact geography with tightly clustered buildings that were focused near the coast and Washington Street. Between the 1790s and the 1850s, Duxbury became a powerful shipbuilding community, with the Town's location at Duxbury Bay and nearby Plymouth Bay playing a key role in the development of this industry. Rail access in the 1870s allowed Duxbury to attract summer visitors and expanded transportation options.[1] With the decline of rail travel in the latter half of the 20th century, most of modern Duxbury's growth is tied to construction of a new Route 3 highway (called Pilgrim Highway) in the 1960s, which allowed additional tourism traffic and commuter traffic with a more direct and convenient connection to employment in greater Boston. The re-establishment of commuter passenger rail service between Kingston or Plymouth and downtown Boston in 1997 further cemented the connection to Boston.

Roads and Streets

Roadways and streets provide critical connectivity in Duxbury, perhaps most importantly along key MassDOT routes that connect with Route 3. Town-maintained roadways also provide important connections within Duxbury, particularly to schools, destinations, and neighborhood centers.

Functional Classification of Roadways

Duxbury has over 125 miles of roadways within the Town limits. The Town has five state-maintained facilities – Routes 3, 3A, 14, 53 and 139; these routes are 16 miles of roadway within Duxbury. Most of the remainder are Town-controlled streets, with a majority classified as local streets.



1. For more on Duxbury's history, see the Duxbury Historic Commission webpage at https://www.town.duxbury.ma.us/historical-commission/pages/town-history as well as the Duxbury Rural and Historical Society webpage at http://duxburyhistory.org/

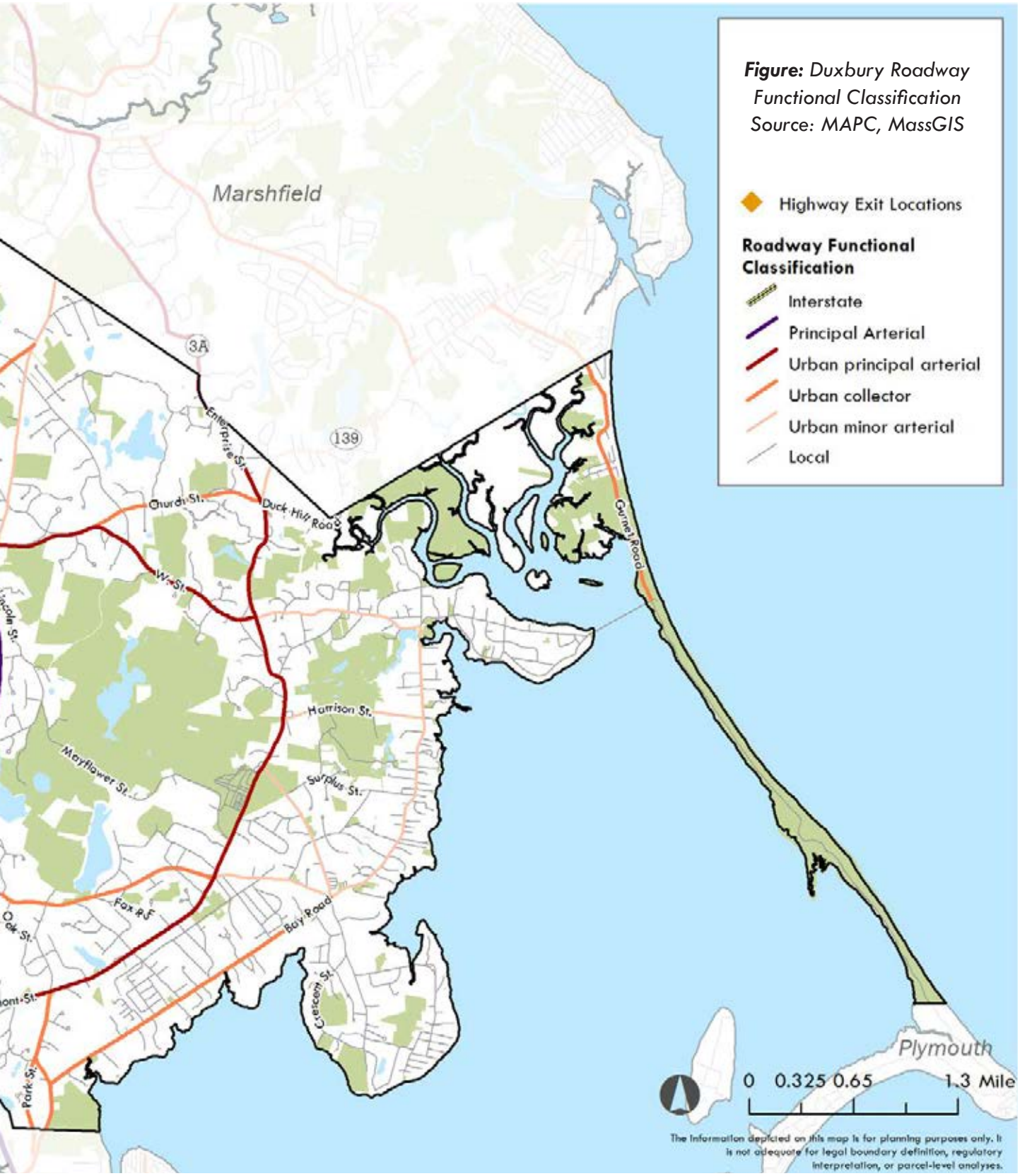


Figure: *Duxbury Roadway Functional Classification*
Source: MAPC, MassGIS

Street	Location	Average Daily Traffic[2]	Year
Pilgrim Hwy (Rt 3)	N Of Tremont St (Rt 3A)	58,488	2015
Pilgrim Hwy (Rt 3)	N Of Tremont St (Rt 3A)	68,000	2005
Tremont St (Rt 3A)	N Of Pilgrim Hwy (Rt 3)	11,816	2014
Tremont St (Rt 3A)	N Of Pilgrim Hwy (Rt 3)	11,000	2003
Tremont St (Rt 3A)	S Of Woodbridge Rd	11,343	2015
Tremont St (Rt 3A)	S Of Woodbridge Rd	11,099	2005
Tremont St (Rt 3A)	S Of Duck Hill Rd	5,134	2016
Tremont St (Rt 3A)	S Of Duck Hill Rd	6,637	2006
Tremont St (Rt 3A)	S Of Church St (Rt 139)	6,074	2015
Tremont St (Rt 3A)	S Of Church St (Rt 139)	5,600	2007
High St	N Of Keene St	2,103	2014
High St	N Of Keene St	2,283	2010

Table: *Duxbury Traffic Volumes, Select Locations and Years Source: Old Colony Traffic Volumes Report, 1987-2017*

Traffic Volumes

To determine trends in vehicular traffic, MassDOT and Old Colony Planning Council (OCPC) traffic counts and crash data for Duxbury were analyzed. Vehicular traffic data was taken from the Old Colony Traffic Volumes Report, 1987-2017 and crash data was collected from MassDOT. Although there are only a few locations where data counts are available for historic comparisons, the data show little vehicular traffic growth. While overall daily vehicular traffic counts on most streets have not changed significantly, the Town experiences traffic congestion in the morning and afternoon peak periods, particularly around schools and neighborhood business district areas, and experiences vehicular congestion with beach traffic in the summer and on weekends.

Traffic Safety

While traffic volumes have remained relatively constant, the number of vehicular crashes in Duxbury has been increasing. Total vehicular crashes in Duxbury and Plymouth County have increased from 2012 to 2016, the last year of available data. While exact causes are unknown, these increases mirror statewide and national trends.

Year	Town of Duxbury	Plymouth County
2010	189	9,250
2011	181	9,319
2012	169	8,834
2013	178	9,660
2014	199	9,804
2015	229	10,689
2016	260	11,019

Table: *Vehicular Crashes Source: MassDOT*

The four most recent years of crash data were categorized by severity (fatalities, injuries, property damage only, or unknown) and mapped. The data show that there are clusters of crashes along the more heavily traveled corridors including Route 3, Route 3A, Washington Street, Summer Street (Route 53) and Congress Street (Route 14).

To determine which areas have the highest crash rates when compared to traffic volumes, a more

2. Average volume for a 24-hour period (one weekday), usually derived from a 48-hour weekday volume count, and not seasonally adjusted. Source: Counts taken by MassDOT and OCPC, published in the Old Colony Traffic Volumes Report, 1987-2017

detailed analysis of the crash data in Duxbury was completed.

Crash rates are expressed in crashes per Million Vehicle Miles Traveled (MVMT). Geographic Information Systems (GIS) tools were used to analyze crash data and produce a layer that defines the frequency and rate at which crashes occur along a roadway section.[3] This GIS tool uses the methodology defined by the Federal Highway Administration for conducting a network screening. The rate is calculated by dividing the crash frequency by average daily traffic per segment of roadway. Average annual daily traffic counts for Duxbury are sourced from MassDOT roads files from 2011 and 2012.

Four years of MassDOT Crash Data (2013 – 2016) was appended into a MassDOT roadway file for Duxbury and entered for crash locations. Locations were weighed by severity of crash as follows:

The analysis shows at least seven areas of concern with high crash rates, marked on the

Crash Severity	Weight
Fatal injury	5
Non-Fatal Injury	3
Not Reported	1
Property Damage only	2
Unknown	1

Table: *Crash Data Weighting Source: MAPC*

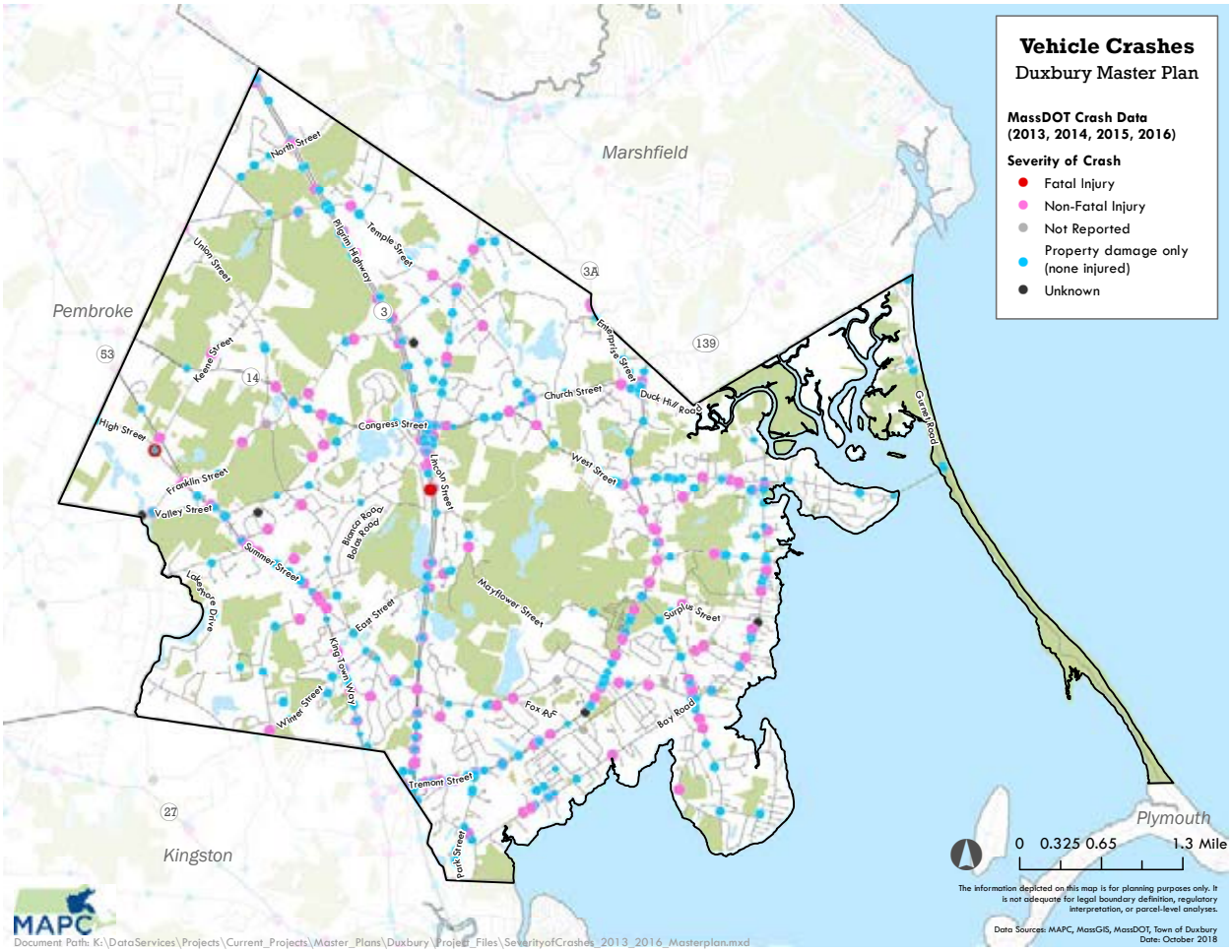


Figure: *Vehicle Crashes in Duxbury, 2013-2016 Source: MassDOT and MAPC*

3. https://solutions.arcgis.com/local-government/help/crash-analysis/workflows/calculate-crash-rate/

Crash Rates map in pink circles. Most of the areas of concern lie on intersections with substantial traffic volumes. The most prominent of those are concentrated on the Pilgrim Highway (Route 3) and Congress Street (Route 14) interchange, particularly the northbound exit ramp onto Congress Street. This area is marked as Area of Concern 1 on the map on the following page and also experiences the highest traffic volumes in Duxbury. The annual average daily traffic along Pilgrim Highway based on 2012 and 2013 MassDOT counts range between 55,000 and 62,000 vehicles.

Tremont Street (Route 3A) has three areas of concern, all located at intersections. The five way intersection at Hall's Corner (Washington Street, Chestnut Street, Depot Street, and Standish Street), also experiences high crash rates especially along the road segment on Standish Street (labeled Area 6 on the map). The area of concern west of Route 3 (Area 2) is at a v-shaped intersection of Kingstown Way and Summer Street, which has a confusing array of right and left turn lanes, with poor sight lines and no crosswalks or sidewalks. Even though the road segments along Washington Street and Cove Street (Area 7) do not experience high traffic volumes – only about 4,000 annual average daily traffic - the crash rates are notable.

The findings from this analysis support, in part, the recommendations and findings from the Duxbury Route 3A Corridor Study (2017), and from the Route 3A Corridor Road Safety Audit (2018), which included safety recommendations on Route 3A to specific intersections with east-

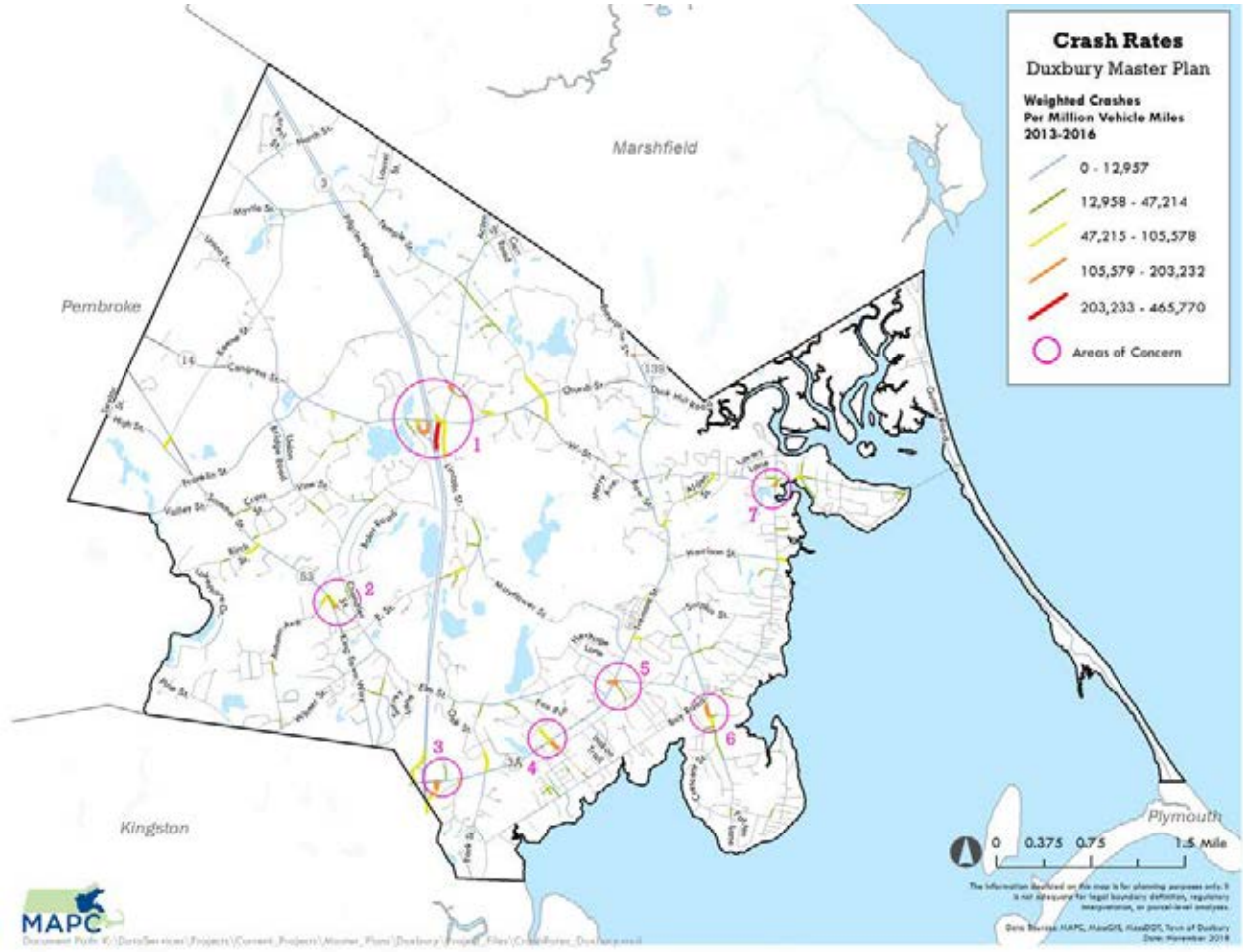


Figure: *Duxbury Crash Rates and Areas of Concern Source: MassDOT and MAPC*

west streets. Those studies found that the Route 3A corridor has higher crash rates at intersections than most other municipalities in southeastern Massachusetts. The findings for the high crash rates for Hall's Corner support the 2014 Halls Corner Economic Development Plan and Transportation Study, which recommended vehicular traffic calming and other safety improvements. Nearly all of the areas of concern with higher crash rates also lack sidewalks, crosswalks, and bicycle facilities, making them even more dangerous for pedestrians and cyclists.

The Town has a Highway Safety Advisory Committee, consisting of Town staff and citizens who evaluate roadway projects. The Committee's main focus in recent years has been evaluating intersections in Town for possible safety modifications, some of which are included in the Areas of Concern map above. The Committee also has provided input on recent studies along Route 3A and Hall's Corner.

Public Transit

Duxbury residents have access to publicly operated transit as well as access to other bus and rail transit options in neighboring communities.

GATRA

Duxbury is served by a single fixed route bus operated by the Greater Attleboro Regional Transit Authority (GATRA, www.gatra.org), running between Kingston and Marshfield. In Duxbury, the route serves Island Creek, Hall's Corner, the Town Library and the school complex along Alden Street. In 2016, GATRA began testing a revised route to serve portions of Washington Street from Hall's Corner to Saint George Street to serve more of the neighborhood business and residential areas along the eastern edge of town. Previously, the route primarily served the Route 3A corridor. According to GATRA, the authority plans to re-evaluate with the Town the revised bus route to determine whether to make the new routing permanent.

Bus service hours are from approximately 6 am to 7 pm weekdays, with buses running roughly every hour, as well as operating around every 90 minutes from 8:30 am to 7 pm on Saturdays. Riders can connect in Kingston with other GATRA routes serving Plymouth. GATRA offers no service on Sundays and major holidays. While there are bus stop signs, almost no stops in town have seating or shelters. While the route does not connect to commuter rail, it does connect to the Plymouth and Brockton commuter bus at Kingsbury Plaza in Kingston. A one-way bus fare is $1.50, with half-price discounts for seniors, persons with disabilities, and students through high school.

GATRA provides dial-a-ride demand-response

Figure: *GATRA Public Transit Route Source: GATRA*

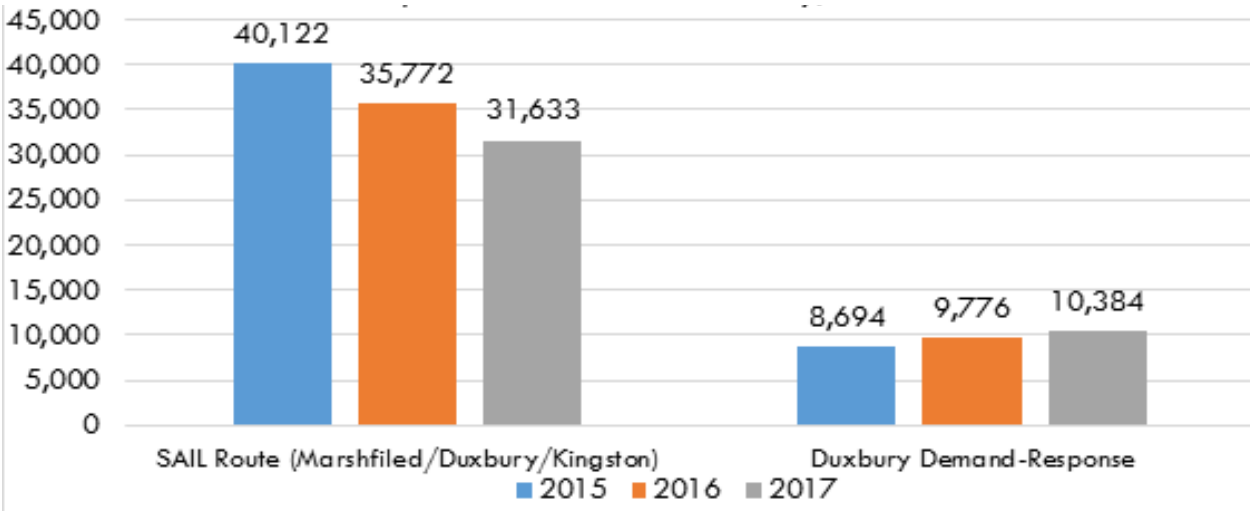


Figure: *Ridership on GATRA Services in Duxbury Source: GATRA Annual Reports, 2015-2017*

transit (sometimes known as paratransit) to those with disabilities within a three-quarter mile radius from any GATRA fixed-route bus service corridor, as required by the Americans with Disabilities Act (ADA). GATRA also provides the Boston Hospital Bus, which gives rides to hospitals in the greater South Shore area for seniors and persons with disabilities.

Under a weekday performance ranking in GATRA's 2015 Regional Transit Plan, the route serving Duxbury was ranked 23rd of GATRA's 30 bus routes. The route scored low due to low ridership per revenue hour and high subsidy per trip. The 2015 Regional Transit Plan recommended changes to the routing in Marshfield, but no recommendations for altering the routing in Duxbury; the report did recommend adding night and Sunday service. As noted above, GATRA has recently experimented with a revised route in Duxbury serving Washington Street as an attempt to boost route performance. Duxbury pays an assessment for GATRA fixed route and paratransit bus services. The Town pays no assessment to MBTA.

Ridership on the SAIL (Seaside Area InterTown Line) bus route serving Marshfield, Duxbury and Kingston has fallen by over 20 percent in the last three years. In comparison, the number of demand-response trips provided by GATRA in Duxbury has increased nearly 20 percent between 2015 and 2017. These figures suggest that as Duxbury's population is aging, there is an increasing demand for transit by those who qualify for the demand-response services, with fewer Duxbury residents using the SAIL fixed route.

Passenger Rail

The nearest commuter rail station is the south of Town at Kingston/Route 3, a terminus of the MBTA's Kingston/Plymouth line with daily service to Boston's South Station. Passenger service on this line was restored in 1997. One of two terminal stations on the Kingston/Plymouth line, the station has 11 northbound (to Boston) and 11 southbound arrivals on weekdays with less frequent weekend service as well. A typical commuter rail trip is one hour from Kingston to South Station. A one-way commuter rail fare from Kingston to South Station is $11.50, with half price reduced fares for seniors and students. Parking at the Kingston lot (owned by the MBTA) is $4 per weekday and $2 on per day on weekends.

According to 2018 commuter rail ridership counts, the Kingston station has the second highest ridership of the Kingston/Plymouth line outside of South Station with 586 boardings

(ons) and alightings (offs). A 2015 survey of vehicles parked at commuter rail stations[4] found that approximately 38 vehicles from Duxbury were parked at the Kingston MBTA commuter rail station on a given weekday, second only to Plymouth (138 vehicles). Duxbury has had no direct rail service since operations ceased in 1959. Today, most of the railroad right-of-way within Duxbury has been sold to adjacent property owners.

Shuttle to Plymouth and Boston

The Plymouth and Brockton Street Railway Company (www.p-b.com) is a privately owned and operated bus service connecting areas in Plymouth and Barnstable Counties with service to downtown Boston and Logan Airport. The closest stop to Duxbury is the park and ride at Kingsbury Plaza at the intersection of Route 3A and Route 53, along a route connecting Hyannis, Barnstable, Sagamore, Plymouth, Kingston, Marshfield, Rockland, and Boston. The route has six Boston-bound weekday morning trips and seven weekday afternoon (from Boston) trips serving the Kingston location. Duxbury residents can access the bus service either by car or by connecting with GATRA.

A one way fare between Kingston and Boston is $16, with a round trip discount of $29. A trip from Kingston to Logan airport is $22, with a discounted round trip of $40. Seniors receive discounted fares of $14 (one-way) and $28 (round trip) to Boston but no discounts for fares to Logan Airport. According to the company's website, a typical bus trip between Kingston and downtown Boston takes about one hour. A 2015 OCPC commuter study found on a weekday that 13 vehicles from Duxbury parked at the Kingsbury Plaza park and ride lot. Being a private corporation, the Plymouth and Brockton Street Railway Company does not publish ridership reports.

Senior Transportation

The Duxbury Council on Aging (located at the Duxbury Senior Center) provides transportation for resident seniors and residents with disabilities to the Senior Center for lunches and other programs. The program also provides rides within the Town limits for daily needs such as trips to the post office, library or shopping, as well as medical trips within Duxbury and to surrounding towns. It also provides home delivered meals. These services are funded by the Town through its support of the Council on Aging.

The Council on Aging has three vehicles, all subleased through GATRA. The rider fees for these trips are nominal; for example, the round trip fare for a medical trip between Duxbury and Kingston is $3.50. According to the Town Annual Report, the Council on Aging provided 9,220 rides in fiscal year 2017, with nearly 3,000 of those being medical trips. The Council also provided 52 medical trips to Boston that same year. The number of trips provided to seniors has increased almost 19 percent between 2015 and 2017; this increase is similar to the increase in the number of demand-response trips provided by GATRA for Duxbury residents over this same time period, indicating that the need for individualized transportation assistance is increasing.

Image: *Council on Aging Van Source: MAPC*

4. See Commuter Origins Study Report (December 2016) compiled by the Old Colony Planning Council.

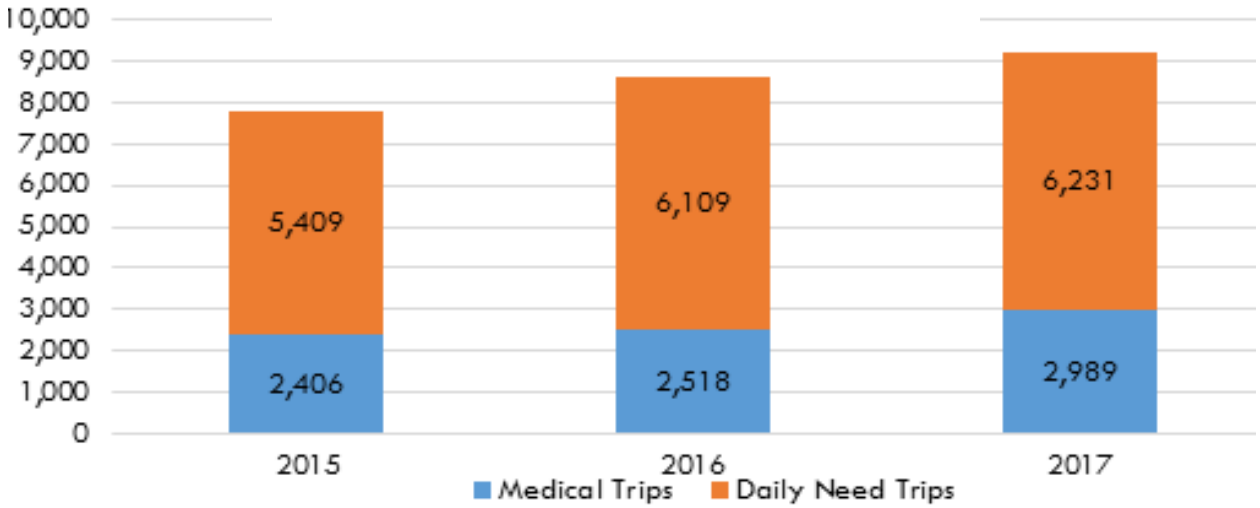


Figure: *Trips Provided by Duxbury Council on Aging Source: Duxbury Annual Reports, 2015-2017*

Pedestrian and Bicycle Facilities

The Town has limited dedicated pedestrian and bicycle facilities, requiring walking or biking on the roadway in most areas. This lack of facilities, and the need for improvements, has been noted by residents in previous planning efforts. For example, in a 2016 Town survey, residents stated that the lack of sidewalks and unsafe conditions for cyclists are the most important safety issues for the Route 3A corridor. Similar findings of resident's concerns for cyclists and pedestrian safety were noted in the 1999 Comprehensive Master Plan and both recent studies of Hall's Corner. While the Town has limited sidewalks and bicycle facilities, Duxbury does have a growing network of trails as part of Town open space resources. A major challenge for the town in constructing sidewalks is the narrow historic road layouts.

LandLine Greenway Network

The LandLine Regional Greenway Network is being developed by MAPC in partnership with each of the region's 101 communities. The greenway corridors identified as part of this regional network are planned to be prioritized for active transportation use and are separate from vehicular traffic to the greatest extent feasible, or traffic calmed to allow for sharing the road. Corridors identified as part of the existing and future LandLine network are ideally shared-use paths, or separate bicycle lanes and sidewalks clearly separated from vehicular traffic. However, limited right of way may not allow complete separation, and particularly in Duxbury, the corridors would focus on sharing lower traffic streets, and implementing traffic calming measures to prioritize walking and cycling. The roadways closest to the coast are also designated a part of the LandLine network, regardless of roadway condition, given the desire for access.

The three main LandLine greenway corridors in Duxbury are outlined as follows, but require additional discussion with the community:

• *Coastal Route* – A through route along the coast connecting Kingston to the south and Marshfield to the north. Potential improvements along Bay Road and Washington Street include adding 4 foot shoulders for bicycling and walking. North of these sections of Washington St and Bay Road, the traffic volumes are low enough to potentially provide shared road conditions through signage and road markings.

• *Inland Route* – This route follows West Street and Temple Street providing a connection to

Hanover and the future rail trail there. Potential interventions include traffic calming and priority markings for pedestrians and cyclists.

• *Marshfield Rail Trail Connection* – This route diverts off the two above routes to provide a short connection to the rail trail in Marshfield. Further development of the trail in Marshfield is required to provide a seamless connection.

Sidewalks

The Town currently has a very limited sidewalk network along some Town-controlled streets, almost exclusively along Washington and West Streets. There is a lack of adequate pedestrian connections to important Town resources such as Town Hall, the Town library, schools, the Senior Center, and neighborhood business districts. Many of the existing sidewalks often lack curb cuts, clear crosswalks, have obstructions such as utility poles and signs, and lack consistent connections and therefore do not meet ADA requirements.

The Town Sidewalk and Bike Path Committee has been working towards adding more sidewalks and multi-use paths. Recent efforts have concentrated on adding a path along the south side of Alden Street between the Library, Alden Elementary School and the Alden House Museum, with a second connector along Railroad Avenue. These connections would allow safer access for high school and middle school students to various commercial establishments along Railroad Avenue, which is a popular destination after school. The Committee and

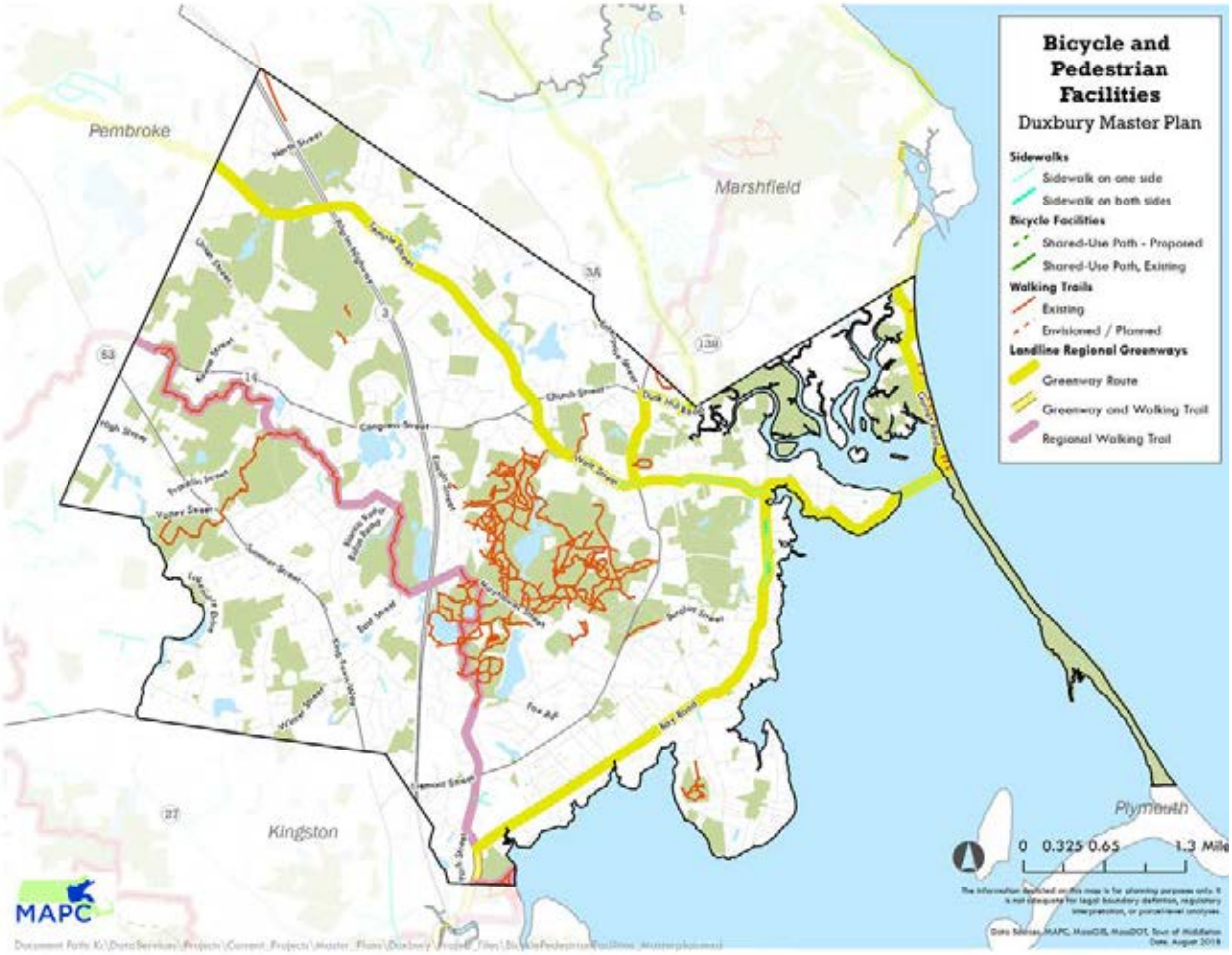


Figure: *Existing and Proposed Bicycle and Pedestrian Facilities in Duxbury Source: MAPC*

Image: *Sidewalks in Duxbury are often non-existent, such as near Town Hall (left), or incomplete, as seen in Hall's Corner (right) Source: MAPC*

Town staff are evaluating how to improve bicycle and pedestrian connections along corridors identified with safety and connectivity concerns.

On-Road Bike Facilities

The Town has no bicycle lanes, "sharrows" or "Bicycles May Use Full Lane" signs to help accommodate cyclists on its streets. Some local streets have wide shoulders that Town residents have noted are perceived as safer for cycling, but these are piecemeal and not part of a larger bicycle network. The Town does not have any bicycle sharing services. The Town currently has no requirements for commercial establishments or employers to provide bicycle racks, bike storage, or showering/changing facilities for employees who cycle to work.

Off-Road Pedestrian and Bicycle Facilities

As noted previously, Duxbury has an off-road network of foot paths through Town-owned forest and land. These are mostly for recreational use and are not designed to connect major activity centers such as commercial establishments or schools. A section of the 230 mile Bay Circuit Trail passes through Duxbury to the southern terminus on the Kingston line. The Sidewalk and Bike Path Committee is pursuing a multi-use path through town-owned land that would connect the Chandler School with the St. George Street School complex with a connection to Town Hall; however, this idea was not previously supported at Town Meeting.

Pedestrian and Bicycle Crash Data

Because pedestrians and cyclists are more likely to have serious injury in a collision with a motor vehicle, an analysis of the pedestrian and bicycle crash data from MassDOT was also undertaken. Pedestrians and bicycle crashes with motor vehicles from the most recent four years were mapped, along with bicycle-vehicle crash "clusters" as defined by MassDOT (10 or more bicycle crashes in the last 10 years, clustered within a single location of100 meters/328 feet). The location of the crashes, and the crash clusters are some of the same locations as the high crash rate areas – particularly at the two Duxbury interchanges with Route 3. Cox Corner – the intersection of Church Street, Tremont Street and Duck Hill Road – is another high crash area for cyclists.

Local Access Score

MAPC developed an online mapping tool called Local Access Score (localaccess.mapc.org) to help communities prioritize sidewalk and bike route improvements. The tool looks at the utility for a given segment of street or road for active

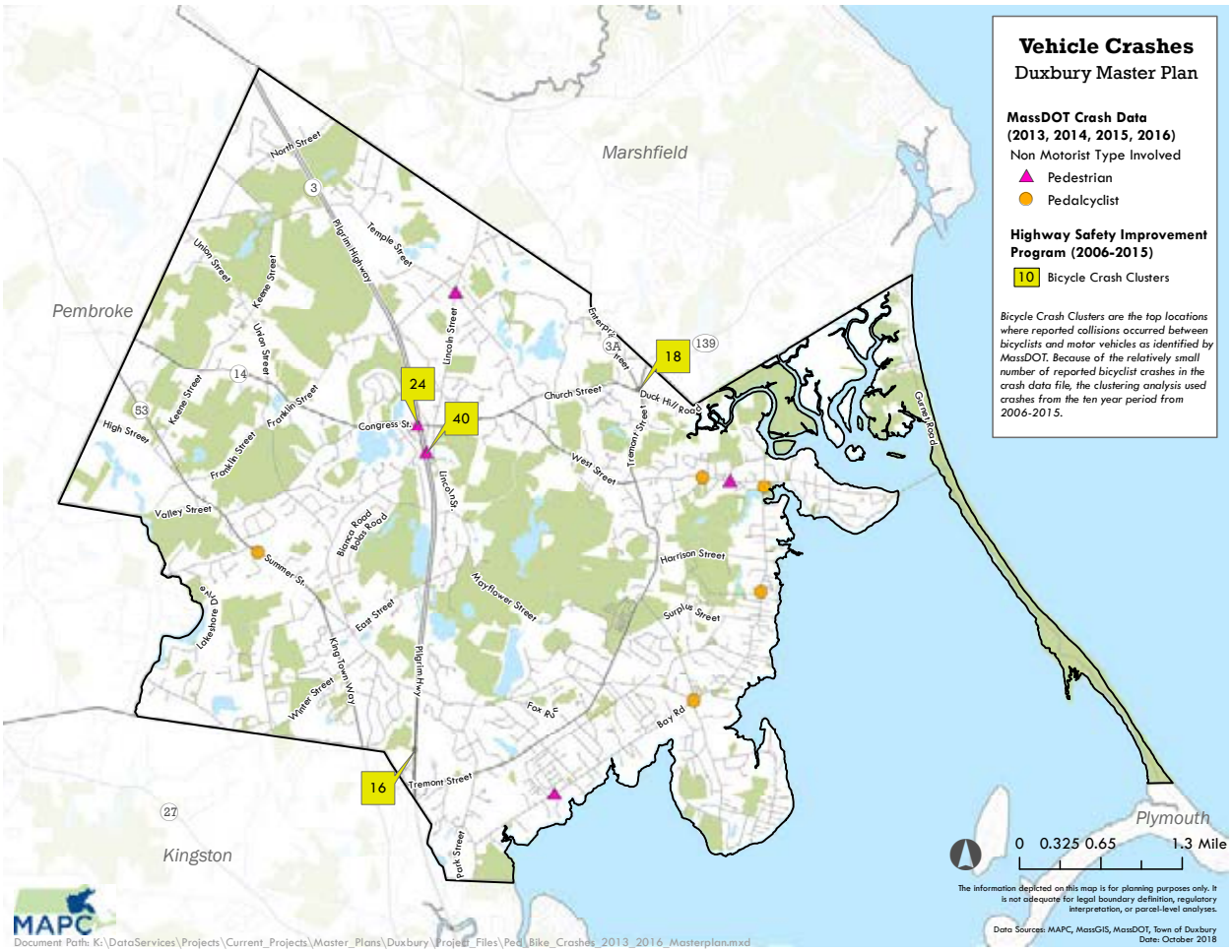


Figure: *Duxbury Pedestrian and Bicycle Crash Locations[5] Source: MassDOT*

transportation, and provides a quantitative estimate of current or potential roadway utility. The tool provides an active transportation network utility score for the roadway segment to indicate how useful that segment is for connecting residents with schools, shops, restaurants, parks and transit stations. The Local Access Score is calculated using travel demand software that uses input data on population and destinations to estimate the number of trips households are likely to make in a given day, the likely destinations of those trips, and the most direct routes connecting households to their destinations. The dataset contains a separate score for four different types of destinations (school, shops and restaurants, transit stations, and parks) and two different modes (walking and biking), for a total of eight basic scores. These scores are combined and weighted to produce walking and biking scores as well as an overall composite score.

Route 3A, Depot Street, and Standish Street are the north-south routes with the highest composite utility scores, while Powder Point Avenue, segments of Route 14, Route 139, Cross Street/ King Philip Path, and East Street have the highest composite utility score for east-west streets. Of those highest-scored streets under Local Access, only portions of Route 14, Route 139, and Standish Street have existing sidewalks. None of the highest-scored streets west of Route 3 have sidewalks, similar to most portions of Route 3A. While useful, this regional analysis, may

5. The bicycle crash cluster boxes show the number of bicycle/vehicle collisions within a 100 meter/328 foot area in the past 10 years, within an approximate location. Source: MassDOT.

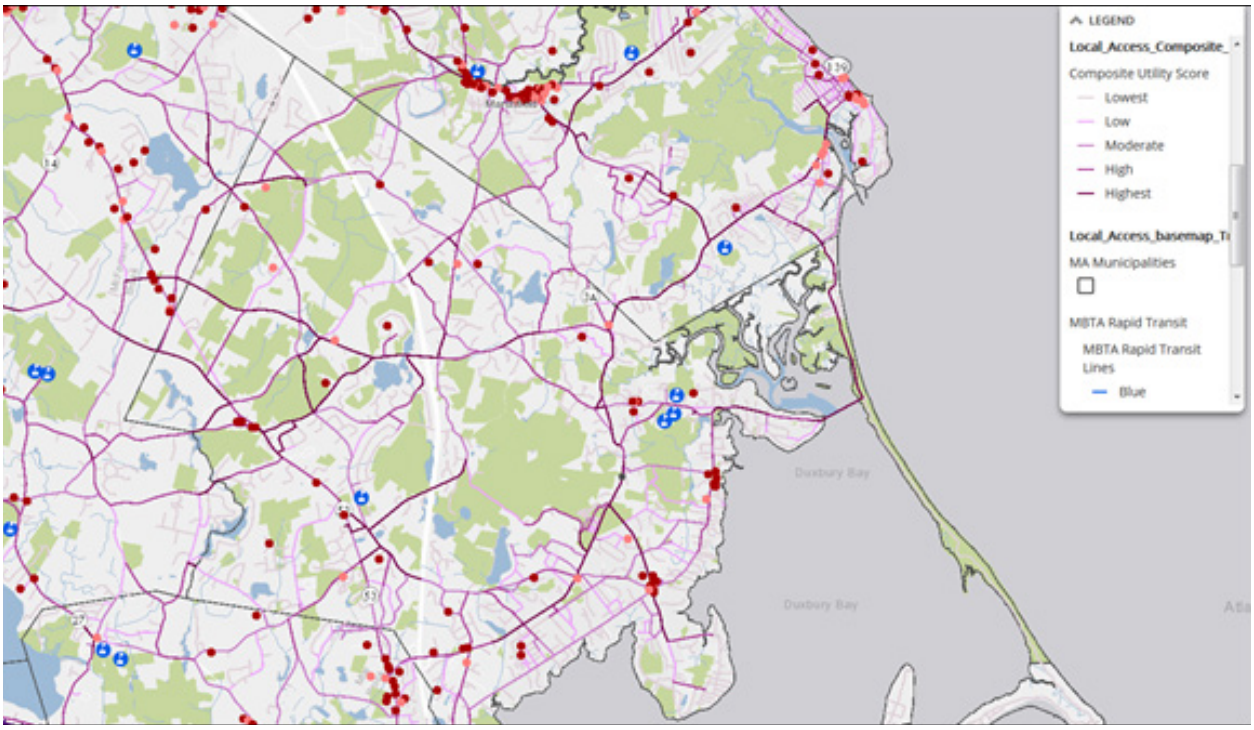


Figure: *Local Access Composite Utility Scores in Duxbury Source: MAPC*

leave out important local connections such as Washington Street or St. George Street.

Parking

The Town regulates parking through its parking requirements and controls a limited number of spaces along Town-maintained streets. There are no parking meters in Town, but some on-street spaces have time restrictions to encourage turn over and discourage all-day parking. There are no known Town-wide parking studies. Previous planning efforts have noted resident perceptions of a shortage of parking in neighborhood business district areas such as Snug Harbor, Hall's Corner, and Millbrook. All of these historic locations include front-in or angled parking, which requires drivers to pull back out into oncoming traffic when exiting the parking spaces. Previous studies for Hall's Corner have included recommendations to alter the parking and traffic lane markings to reduce these potential vehicular conflicts.

Image: *Front-in Parking at Snug Harbor (left) and Hall's Corner (right) Source: MAPC*

Commuting Characteristics

Vehicle Ownership

Duxbury averages 2.2 vehicles per household, and each household drives approximately 75 miles per day (per the Massachusetts Vehicle Census 4th Quarter 2014). These figures are similar to Duxbury's surrounding communities (Kingston, Marshfield and Pembroke), but are far higher than the statewide household average of 1.7 vehicles and 49 miles per day. These figures reflect the Town's low-density of development, minimal transit options within the Town, and the distances that residents must drive to reach destinations and basic services. These figures also point to the potential impact improved pedestrian and bicycle connections could have in the Town.

Journey to Work Data

The vast majority of workers living in Duxbury drive alone to work. Around four percent take transit, but now around 10 percent work from home – nearly doubled since 2000. This work from home rate is higher than Plymouth County. Interestingly, the percent of workers in Duxbury who drive has decreased slightly over the past 25 years, and the percent of workers taking transit has dropped since 2000. The data suggest that a small but measurable number of workers have shifted to telecommuting.

According to 2012-2016 data from the American Community Survey, around a third of Duxbury commuters who work outside of the home have a commute of fewer than 20 minutes, and around 50 percent have a commute of 30 minutes or less. Around 22 percent have commutes of more than one hour. These average travel times are similar to the 2000 Census data for the Town, suggesting that overall commute times have not been increasing.

	1990	2000	2012-2016
Total Workers	6,750	6,703	7,037
Drove	88%	86%	83%
Transit	3%	8%	4%
Worked from Home	5%	6%	10%
Other	3%	1%	3%

Table: *Travel Mode for Duxbury Commuters, 1990-2016 Sources: 1990 and 2000 US Census, 2012-2016 ACS*

Employment Concentrations/Connections

According to 2015 data from the Census, nearly as many Duxbury workers commute into Boston as work within the Town limits of Duxbury. Other top destinations for commuters are Plymouth, Quincy, and Kingston. Although Boston and Duxbury are by far the primary locations, these two locations only account for about 25 percent of work destinations for Duxbury workers. When mapping the employment of Duxbury residents,

Destination	Workers	Share (Percent)
Boston	825	13.3
Duxbury	750	12.1
Plymouth	417	6.7
Quincy	257	4.2
Kingston	214	3.5
Marshfield	186	3.0
Hingham	172	2.8
Norwell	168	2.7
Braintree	151	2.4
Weymouth	141	2.3
All other locations	2,900	46.9
Total	*6,181*	*100.0*

Table: *Places of Work for Duxbury Residents, 2017 Sources: Longitudinal Employer-Household Dynamics (LEHD); LEHD Origin-Destination Employment Statistics (LODES), 2015*

Figure: *Top Five Workplace Locations for Duxbury Workers, 2015 Sources: Longitudinal Employer-Household Dynamics (LEHD); LEHD Origin-Destination Employment Statistics (LODES), 2015*

there are noticeable clusters along the coast of Duxbury, Kingston, Plymouth, as well as a definitive pattern of work locations along Route 3, and concentrations in downtown Boston and Boston's Seaport district.

Transportation Planning in Duxbury

Transportation planning efforts in Duxbury are led by the Board of Selectmen, and when requested, input is provided by the Sidewalk Bike Path Committee and the Highway Safety

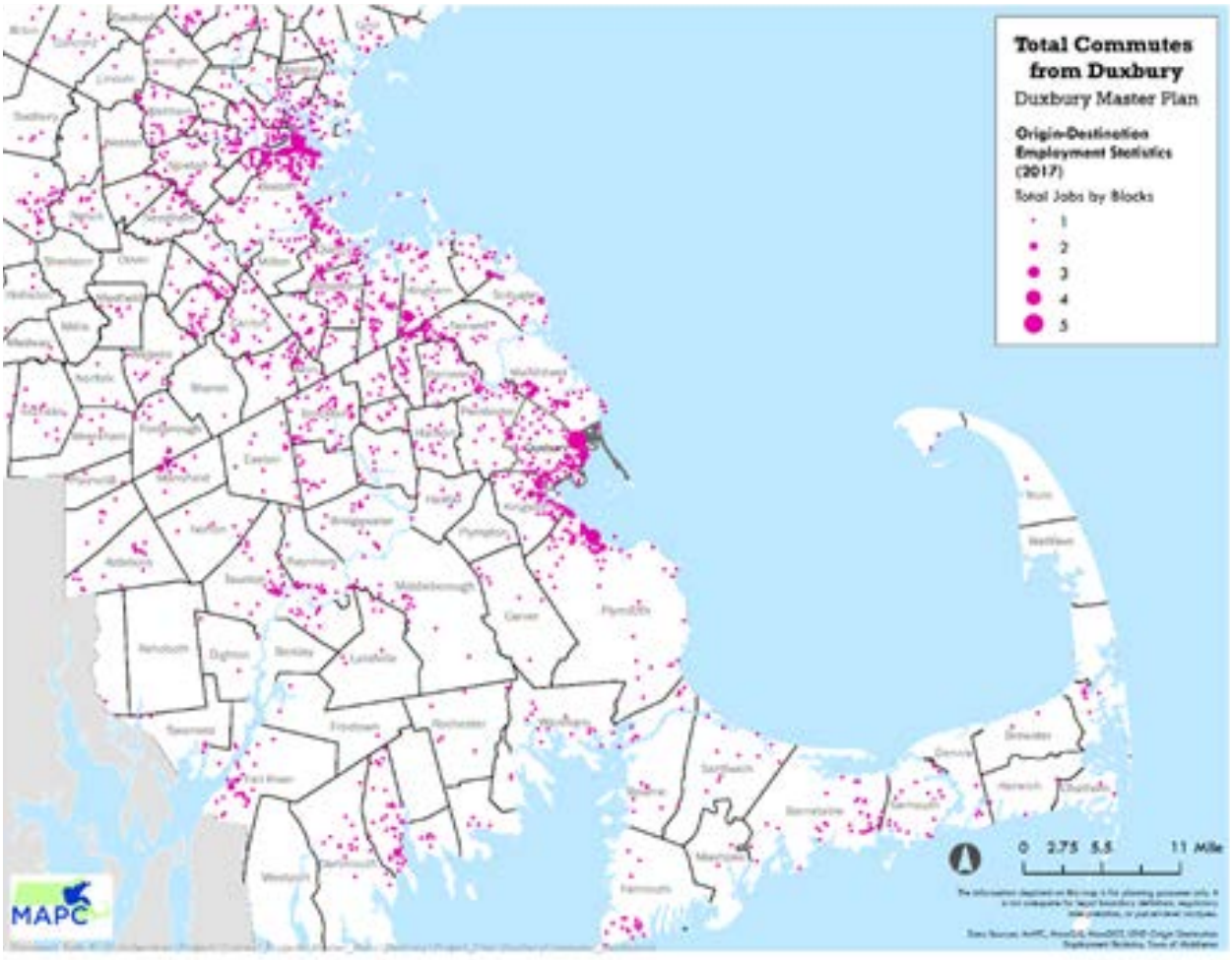


Figure: *Places of Work for Duxbury Residents, 2017 Sources: LODES (2017), MAPC*

Committee with assistance from the DPW and Planning Directors and Police and Fire Departments as needed.

Local Plans

Recent planning efforts that include recommended changes to transportation infrastructure in Duxbury include the following.

- **1999 Duxbury Comprehensive Plan** – recommendations included safety modifications at key intersections, as well as other vehicular traffic flow and non-motorized changes at locations such as Bennett's Corner, Cox Corner, Snug Harbor, and Halls Corner, as well as construction of pedestrian and bicycle infrastructure and the creation of a formal Town Path Committee.

- **2001 Town of Duxbury Ad Hoc Sidewalk Committee Report** – this document recommended sidewalks and other pedestrian infrastructure on streets and roads including Route 3A, Washington Street, Route 14, Route 53, and Keene Street.

- **2004 Duxbury Community Development Plan** – transportation recommendations in neighborhood business district areas included streetscape improvements reducing curb cut conflicts, redesigning on-street and off street parking, extending and repairing sidewalks, adding bicycle racks in select locations, and correcting traffic safety issues at key intersections.

- **2014 Hall's Corner Economic Development and Transportation Study** – specific transportation recommendations for this area included removal of diagonal and parallel parking in select locations, better crosswalks, sidewalks and bicycle shared-lane markings, better traffic signage, and creation of a modern roundabout to more safely route vehicular traffic in the area.

- **2016-2017 Duxbury Route 3A Corridor Study** – noting the lack of pedestrian and bicycle accommodations along this roadway, the study recommended adding sidewalks and bicycle lanes along the corridor, and/or the creation of a parallel multi-use pathway. The study also recommended specific modifications to key intersections at Church Street/Enterprise Street (Route 139), West Street (Route 14) and Saint George Street, and at Chestnut Street/ Tobey Garden Street. A follow up Road Safety Audit of three intersections along Route 3A made similar recommendations.[6]

- **2018 Traffic Study for Saint George Street, Alden Street and Railroad Avenue** – specific recommendations included tightening turning radii at intersections and narrowing lanes to slow down vehicular traffic, as well as adding or widening sidewalks and crosswalks.

In addition to the above local plans, other documents reviewed for local transportation planning efforts included Duxbury Town Annual Reports for 2015 through 2017, 2015 Old Colony Human Services Coordinated Plan, 2015 GATRA Regional Transit Plan, GATRA Annual Reports 2015 through 2017, 2016 Commuter Origins Study, and the 2018 Old Colony Bicycle and Pedestrian Connectivity and Livability Study. All of the above plans and documents were studied to understand the changes and improvements that were previously recommended, and to review historic trends on transit use, traffic volumes and commuting patterns against recent data. Common themes running through all of the documents included the lack of pedestrian and bicycle accommodations, safety concerns at significant intersections, and overall connectivity concerns. Some locations such as Hall's Corner and Route 3A have had similar recommendations suggested repeatedly over at least 20 years. It should be noted that Town Meeting directed the Board of Selectmen to stop building sidewalks several years ago. The survey results indicate that this sentiment may have changed and could be revisited.

6. See Route 3A Corridor Road Safety Audit, April 2018.

Regional Transportation Organizations

Duxbury is served by two regional planning agencies: the Metropolitan Area Planning Council (MAPC) and the Old Colony Planning Council (OCPC). MAPC provides a variety of resources that include land use and transportation planning and other technical assistance. Duxbury is within MAPC's South Shore Coalition (SSC) subregion of 12 municipalities, along with neighboring communities of Pembroke and Marshfield. The Old Colony Planning Council (OCPC), based in Brockton, provides technical assistance on topics including transportation and economic development planning.

Prior to 2018, Duxbury was a member of the Boston Metropolitan Area Planning Organization (MPO), which is the regional organization responsible for conducting the federally required metropolitan transportation planning process for the Boston area. In 2018, Duxbury left the Boston MPO and joined the Old Colony MPO. Because of this recent change in MPO membership, the long-range transportation plans and transportation improvement programs for both MPO's was reviewed for planned transportation projects in Duxbury.

Upcoming Transportation Projects

The following are the transportation projects listed in the Long-Range Transportation Plans and the Transportation Improvement Plans for Duxbury. MassDOT requires local funding sources for engineering design in order to advance projects into the Transportation Improvement Plan (TIP), unless the project is a state-priority.

• Signal installation at Route 3 northbound and southbound ramps and Route 3A (Tremont Street) – the signals are recommended for installation in Old Colony Planning Council Transportation Improvement Program (OCPC TIP) 2019-2023, and scheduled to occur between 2021 and 2025. These intersections were also identified for needed safety modifications in the 2017 Duxbury Route 3A Corridor Study. Given that these interchanges were identified as high crash areas in our analysis (including a cluster of bicycle crashes), the planned signal improvements present an opportunity to add safety modifications for pedestrians and cyclists as well. The Planning Director has been actively seeking local funding needed for the engineering design in recent years.

• Bridge replacement, Route 3 northbound and southbound over Franklin Street – both bridges, constructed in 1962, are identified as deficient and needing replacement in the 2040 Old Colony Regional Transportation Plan (2040 OCRTP). The OCPC TIP has identified the bridges to be replaced post-2023. Although Franklin Street is not identified as a priority pedestrian or bicycle network in the Town's plans or in LandLine, the Town should work to ensure the new bridge design allows for future sidewalks or bicycle lanes on Franklin Street. These bridge replacements are MassDOT projects.

• Cleaning, painting, repairing bridges over Route 3 – listed to occur in future years in OCPC TIP.

• Powder Point Bridge over Duxbury Bay – this bridge is identified as structurally deficient in the 2040 OCRTP. The Town DPW Director and Planning Director are actively seeking funding for repairs, and Town Meeting is supporting the exploratory engineering costs at this time to assess what needs to be done.

• Intersection improvements at Route 3A/Route 139 – identified in universe of projects in Boston MPO 2040 Long Range Transportation Plan, this intersection was also recommended for vegetation removal on state and private property and installation of a flashing red signal in the 2017 Duxbury Route 3A Corridor Study. The intersection is included in MassDOT's list of bicycle cluster crashes for Duxbury. To-date, however, the project does not appear in the OCPC TIP nor in the 2040 OCRTP.

Community Input

2017 Community Survey

Community input on transportation needs were amassed through the 2017 Duxbury Master Plan Visioning Survey available online for all Town residents. The survey was open for several months in the summer and fall of 2017 and generated over 1,200 survey responses. In the community survey, transportation was noted as a major concern several times:

- "A walkable/bikable community" was one of the top five selections when asked "which of these community values are most important to you?"
- When asked about the greatest challenges in Duxbury, "Transportation Options" was the highest rated for the community at 51% of respondents.
- 63% of respondents disagreed with the statement "The Town supports enhanced transportation networks" – the most of any statement polled.
- 83% agreed that improving sidewalks and multi-use paths between residential areas and popular destinations is important; this was the highest rated statement polled.
- Over 45% said they never bicycle in town, but nearly the same percent say that they regularly walk in Town.
- "Sidewalks" was one of the most frequent responses when asked to provide "good ideas about how to make Duxbury a stronger community."

October 2018 Community Forum

An existing conditions analysis of transportation data was presented at a community forum on October 24, 2018. During the open house portion of the forum, residents were asked to provide input on transportation and connectivity on three posters.

- Residents were asked to draw lines on a town map showing walking or biking connections they would like improved. Route 3A, Summer Street, Elm Street, Congress Street, West Street, Harrison Street, Depot Street, Washington Street, and streets along Powder Point were identified. Key connections identified included to routes to area schools, Hall's Corner to the Duxbury High School, sidewalks and trails to the Duxbury Senior Center, and more bicycle amenities on the west side of Town.

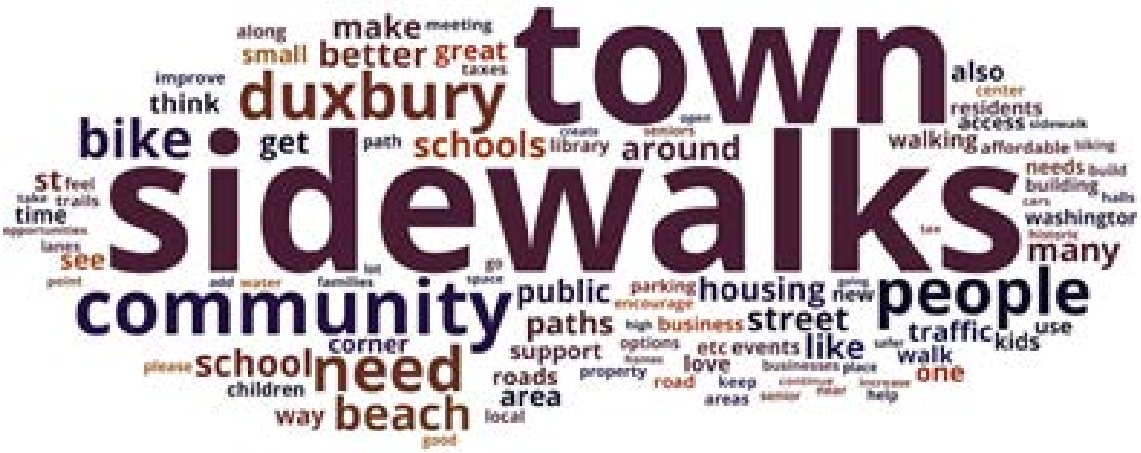


Figure: *"Word Cloud" of most frequent resident responses to what are your ideas to make Duxbury a stronger community Sources: MAPC*

- On a map showing locations of recent crashes, residents were requested to mark areas that should be studied for safety improvements. Many of the locations identified by residents match the "areas of concern" noted above for the high crash rates. Other feedback included requests for bike trails and sidewalks to schools, changes at Hall's Corner, lowering speed limits along West Street, and improvements at Cox Corner.
- Residents were shown examples of transportation options that could improve connectivity for pedestrians and cyclists. Sidewalks, off-road trails, and sidepaths (multi-use paths parallel to roadways) were the favorite options identified by residents. Paved shoulder and advisory shoulder changes (restriping existing pavement to create a paved shoulder for pedestrians and cyclists) were the less popular ideas presented at the forum.

Figure: *An example of the type of information board used to collect community feedback at Community Forums Sources: MAPC*

Recommendations

The following goals and strategies are intended to support continuing efforts to improve the Town's transportation networks, particularly in the efforts to create a safer and more inclusive system for the growing number of seniors in the Town and people who do not drive. The recommendations are particularly designed to help move the Town towards implementation in those areas that have had repeated recommendations, such as more pedestrian connections, improvements at Hall's Corner, and better connections to schools and neighborhood business districts.

Goal 1: Develop a traffic safety prioritization plan.

• **Strategy 1.1:** Study high crash locations to develop a safety prioritization plan that includes vehicular traffic calming measures to reduce speeds.

The study could be done as a separate technical study through the OCPC. Modifications should include designs to protect the safety of pedestrians and cyclists including but not limited to signage for "calmed areas", "slow", "share the road" and flashing light beacons to alert drivers to shared roadway areas.

• **Strategy 1.2:** Coordinate the traffic safety prioritization plan with pedestrian and bicycle priorities.

Any roadway safety projects should consider the Town's long-range plans for improving pedestrian and bicycle networks. Resident meetings on street segments identified for further discussion of pedestrian connectivity should occur early in the discussion of options.

• **Strategy 1.3:** Monitor autonomous vehicle adoption, specifically in the South Shore, including what infrastructure might be needed to promote safety.

Autonomous vehicles are vehicles that rely on onboard technologies to sense and interpret its environment and navigate itself without human intervention. They are intended to safely operate on public roadways and interact with existing infrastructure and other roadway users, including pedestrians, bicyclists, and drivers. An important step to prepare for the future of autonomous vehicles is for the Town to start planning for the onset of autonomous technologies. The Town should monitor the adoption of autonomous vehicles and follow best practices for street design, lanes, markings and signage that will help safely accommodate this new technology, with particular attention to how these vehicles can safely operate in a multimodal environment with pedestrians and cyclists. The Town should also monitor federal and state developments in policies and make sure its interests are voiced.

Goal 2: Move into implementation of previous studies and recommendations.

• **Strategy 2.1:** Create a policy and prioritization plan for multi-modal and safety improvements that reflects and maintains the rural and small town character.

There have been various studies completed since the last Town comprehensive plan in 1999 which have recommended transportation improvements such as new sidewalks, roadside paths, and bicycle lanes; however, the overall street network in the Town has remained relatively unchanged. Creating a plan is a critical first step to move from recommendation to implementation. MAPC and MassDOT can provide technical assistance on both creating a policy and prioritization plan. There are now standards for creating street improvements that fit and maintain the character of smaller towns and rural areas.

• **Strategy 2.2:** Continue "safe routes to schools" efforts to identify and improve priority corridors and actions that will support safe cycling and

walking for children.

These efforts can be done in conjunction with the evaluation of routes to connect key nodes and the development of a prioritization plan.

- **Strategy 2.3:** Create a single town transportation committee to concentrate on roadside paths, sidewalks, traffic safety, and bicycle needs to ensure coordinated prioritization and implementation.

While the Town has various committees that handle roadway safety, sidewalks, and bike paths, a single transportation committee will allow for greater coordination and planning for projects that accommodate all modes – vehicular, pedestrian, and bicycles. At a minimum, the existing Town committees should ensure there is adequate coordination among projects and committee goals and priorities.

- **Strategy 2.4:** When feasible, conduct temporary infrastructure pilot projects with movable bollards and temporary paint to evaluate the effectiveness of recommended projects.

Change can be sometimes difficult to adopt, especially when the changes may require significant Town resources. Using temporary infrastructure such as signs, movable bollards, and temporary paint can be ways to test various alternatives and monitor people's reactions and opinions before embarking on a final design and implementation.

Goal 3: Create a town-wide multimodal network connecting key nodes.

- **Strategy 3.1:** Consider roadside paths, including trails separated from the roads by several feet, with an aim for creating a multimodal network to connect key destinations such as schools, neighborhood business districts, regional bike trails, and nearby transit stations.

A better connected multimodal network could offer an alternative and safe travel option and could address many of the impediments to connecting destinations, including narrow roads, a lack of sidewalk or path along main roads, volume and speed of traffic, size of vehicles or vehicle towing large trailers, lack of crosswalks, lack of signage, and insufficient parking. There are now more state resources to implement these connections: in November 2018, the Baker-Polito administration announced the new MassTrails Program to provide $5 million in matching grants to municipalities, non-profits and others to design, construct, and maintain high-quality connections.

- **Strategy 3.2:** Evaluate roadway and streets for pedestrian and bicycle improvements, such as wide shoulders, shared-use paths, traffic calming, and develop specific projects to create the network, including pilot projects to test new ideas.

Evaluate if a complete streets policy and priority plan should be pursued by the Town – one that includes a plan for roadside paths *and working with MassDOT and others on pilot projects are key steps to implementing this strategy. MAPC also has resources, including the Local Access Score website (localacess.mapc.org) that are tools that can help in prioritizing routes.*

- **Strategy 3.3:** Plan a bicycle network connecting key destinations such as schools and neighborhood business districts (may include bicycle facilities on or parallel to roads and roadside paths).

This work should be coordinated with street improvements to accommodate bicycles as well as the expanded Town roadside path network.

- **Strategy 3.4:** Explore potential bicycle share options and benefits, in coordination with adjacent communities, to allow cyclists to ride between communities, particularly during

summer tourism periods.

Bicycle share should only be undertaken once a larger scale bicycle network plan has been adopted and additional bicycle facilities have been constructed in Town. Similar bicycle share programs have been implemented in the Boston region, with several adjacent municipalities forming bicycle-share coalitions to allow for inter-municipal connectivity.

- **Strategy 3.5:** Plan for "micro-mobility" battery powered non-motorized options such as Segways, scooters, and e-bicycles, and how the Town's transportation infrastructure could accommodate them.

These newer mobility technologies are currently more common in urbanized areas but are growing in popularity. The Town should follow guidance from MassDOT, MAPC and others on best practices to accommodate these evolving forms of personal mobility, and where appropriate adopt ordinances to guide their use in Duxbury, as part of the larger multi-modal network. Motorized mobility devices are prohibited on Town conservation land.

- **Strategy 3.6:** Plan for expanded ride-hailing services (Uber, Lyft, taxis) and autonomous vehicle with pick-up/drop-off areas at key destinations.

While Duxbury currently does not have many ride-hailing options (the Town of Duxbury only had 5,143 originating ride-hail trips in 2017, one of the lowest numbers in the MAPC region) these services are expanding and the number of ride-hail trips are projected to increase. Similarly, autonomous vehicles are operating in Boston and will soon expand to other areas, likely first with ride-hail services. These services may reduce parking needs, but will likely increase the need for curb space for pickups and drop-offs. As such, the Town should monitor the growing availability of best practices for regulating on-street and off-street curb space in key areas such as neighborhood business districts and schools to minimize negative impacts to pedestrian, bicycle, and vehicular traffic flow.

Goal 4: Create walkable economic centers.

- **Strategy 4.1:** Design safe pedestrian and bicycle connections in key neighborhood business districts including Snug Harbor and Railroad Avenue, similar to recent designs being discussed for Hall's Corner.

Nearly every Town planning effort since 1999 has noted the need for sidewalks and bicycle connections in the Town, particularly in and around neighborhood business districts. The recently drafted concept designs for reimagining the streets and sidewalks in Hall's Corner could be the test case for similar modifications in other key neighborhood centers. These efforts must include connections to the future expanded sidewalk and bicycle network.

Future studies that evaluate safer pedestrian and bicycle connections in economic centers should evaluate where there is excess pavement that encourages speeding, and how the areas can be redesigned to encourage slower driving speeds with sidewalk and crosswalk extensions, better lighting, and on-street parking.

- **Strategy 4.2:** Conduct parking studies in neighborhood business districts to determine parking needs, including ways to ensure parking turnover for commercial establishments, and ensure safe pedestrian connections through parking lots.

To date there have been no stand-alone parking studies undertaken in the Town. Before implementing improvements in commercial areas, a comprehensive parking study should be completed that measures existing parking resources, typical

parking needs and turnover, with recommended strategies to ensure adequate parking while making other changes to accommodate non-motorize uses.

The parking studies should also address the safety issues of the neighborhood business district areas that have front-in parking that require vehicles to back into oncoming street traffic, which is an unsafe maneuver that can lead to collisions. Signage alerting drivers to use caution and proceed slowly could also improve safety in these districts.

• **Strategy 4.3:** Create placemaking pedestrian and bicycle infrastructure and (where needed) transit infrastructure in the existing neighborhood business districts, such as bicycle racks, wayfinding, seating, and dedicated pick-up/drop-off areas.

Placemaking should create an environment where residents can be dropped off (or park their vehicles once) and safely walk among several destinations. Pedestrian scale improvements such as wayfinding, seating, street trees, and lighting can create a more pleasant and safer walking environment.

Goal 5: Expand transit options and transit supportive infrastructure.

• **Strategy 5.1:** Evaluate ridership and on time performance of the GATRA route serving Duxbury to determine whether to keep the route along Washington Street or return the routing to Route 3A, or other changes to improve transit access.

The existing route serving Duxbury is one of the lower performing bus routes in the GATRA system. The Town should review ridership and on/off data with GATRA to see if the summer routing options have increased performance. The bus route should include an evaluation of vulnerable populations including households without automobiles, seniors, and lower-income families, and ways the routes can best connect these individuals with daily needs including shopping, medical, and education.

• **Strategy 5.2:** Implement infrastructure to support transit use such as seating at bus stops, and considering signage with bus schedules.

Once the evaluation of the bus route is complete and the bus route finalized, an infrastructure plan for the Town's bus stops should be developed that prioritizes the busiest stops.

• **Strategy 5.3:** Include access to bus stops in pedestrian project prioritization.

A streets prioritization plan should include access to bus stops as a key metric.

• **Strategy 5.4:** Long-term, evaluate with GATRA the feasibility of a single bus route connection from Duxbury to the Kingston commuter rail.

Currently, the GATRA bus route serving Duxbury allows for connections with the Plymouth-Brockton commuter bus to Boston at Kingston Plaza. The Town should explore with GATRA in their next long-range transit plan whether extending the Duxbury bus route to the Kingston commuter rail station is feasible, or what other connecting transit services might be reasonable.

• **Strategy 5.5:** Evaluate senior transportation services in nearby towns of Plymouth, Kingston and Marshfield to determine if a coordinated dispatch would create a more efficient and effective service.

Several municipalities in Massachusetts have created consolidated senior transportation services that allow for a more flexible and efficient use of senior shuttles. The Town should work with MAPC, MassDOT, the Massachusetts Executive Office of Health and Human Services and nearby Towns to conduct a study of the senior

transportation needs and resources to determine if a consolidated or coordinated senior shuttle service would be beneficial.

• **Strategy 5.6:** Explore the feasibility of copying replicating the new Attleboro partnership for subsidized Uber and Lyft rides to help fill the gaps in GATRA services.

In 2017, several non-profits in Attleboro created the Community Accessing Rides (CAR) program and began providing subsidized ride-hail trips to eligible persons who could not access existing public transit or paratransit services. GATRA has been a key partner in this program. Examples include trips at night and on weekends when GATRA and CoA transportation is not available, or to medical and employment beyond the reach of existing bus routes. These partnerships allow for a lower cost way to expand the reach of transit for those who do not have access to an automobile. GATRA is now expanding the pilot to Plymouth; the Town should monitor the program results and determine if a similar program could help fill gaps in transit services in Duxbury.

Goal 6: Include climate resiliency in developing changes to transportation infrastructure.

• **Strategy 6.1:** Ensure that new transportation infrastructure is able to accommodate climate change impacts such as rising sea levels and stronger storms.

These efforts should be done in coordination with the Town's comprehensive climate change and resiliency planning.

• **Strategy 6.2:** Reduce impervious surfaces where possible when redesigning economic centers and street improvements.

As key areas or corridors are reimagined, look for ways to reduce the amount of pavement where possible.

• **Strategy 6.3:** Add Electric Vehicle (EV) charging stations in Duxbury.

According to the Alternative Fuels Data Center, Duxbury has no public EV charging stations. However, Duxbury residents have taken advantage of the state's MOR-EV rebate program. https://mor-ev.org/program-statistics (look under map by zip). The Town should take advantage of state programs to install public Electric Vehicle (EV) charging stations, and consider requirements that new developments (commercial and residential) install EV charging stations.

Chapter 9
Housing

Key Findings

The attractive coastal and historic qualities of Duxbury and the high quality of its housing stock contribute to making Duxbury a desirable place to live in the metropolitan area of Boston. The Town is close enough to benefit from the economy, opportunity, and amenities of the area, while being a distinct coastal community that has a semi-rural character. Effective policies for the conservation of land and the preservation of community character have contributed directly to the attractiveness of the Town, but are also factors contributing to a growing pattern of high housing costs which is one of the greatest challenges for the future of housing in Duxbury. The housing strategies seek to address several demographic trends in the Town – modest population and household growth and an aging population. Additional housing units are needed to accommodate continued and projected growth of the population in such a way that the attractive qualities of Duxbury are not compromised. Additional types of housing units are needed to accommodate an aging population to allow long-time residents to remain a part of the community. Duxbury's housing stock is primarily comprised of single-family homes. Additional types of housing choices are also needed to provide a greater diversity of offerings in the Town for unit size, tenure, and affordability. The expansion of housing choices primarily focuses on alternatives to the single-family home, such as additional housing units as part of mixed-use village centers and conversion of large historic homes into multiple housing units. Lastly, housing should be seen as a positive opportunity to shape community, connectedness, and pride in Duxbury by adding activity, vitality, and support for local services and businesses.

Image: *The Historic Nathaniel Winsor, Jr. House, Housing of a Previous Era Source: MAPC*

Introduction

The housing element of a Master Plan is defined in the Massachusetts General Law Chapter 41 Section 81D as follows:

"The comprehensive plan shall be internally consistent in its policies, forecasts and standards, and shall include the following elements: Housing element which identifies and analyzes existing and forecasted housing needs and objectives including programs for the preservation, improvement and development of housing. This element shall identify policies and strategies to provide a balance of local housing opportunities for all citizens".

In responses to this outline description, the housing element is comprised of three primary sections the Existing Conditions of housing in Duxbury, the Community Input around housing through this Master Plan process, and the recommendations for community goals and strategies for housing in Duxbury. The existing conditions analysis builds on the recently completed Duxbury Housing Production Needs Assessment (2014) and is divided into analyses of the Town's demographics, housing stock, housing affordability, development constraints and limitations, and recommendations. The recommendations build on the foundation for housing strategies that was established in Duxbury's previous Comprehensive Master Plan completed in 1999 and carried forward by Duxbury's most recent Housing Production Plan in 2019.

Existing Conditions

Demographics

The demographic analysis provides a baseline of information for the characteristics of the population of Duxbury. The characteristics of the population and projected population trends can be compared to the characteristics of the housing stock and housing affordability to inform the housing recommendations.

Population

The total population of Duxbury, according to the United States Census (2010) was 15,059. The U.S. Census is updated every 10 years with the next update in 2020. In the intervening years, the population is estimated by the U.S. Census through the American Community Survey (ACS). The total number population according to the American Community Survey (ACS) 5-Year Estimates from 2011-2015 was 15,297. When compared to the previous decades, the population of Duxbury has been growing steadily, but not at a rate close to the peak population growth period between 1970 and 1980. In 1970, the total population of the Town was 7,636 and grew 55% to 11,807 in 1980. In 1990, the total population was 13,895. In 2000, the total population was 14,248. Since 1990 the population growth rate has been between 3% and 6% per decade. The Census figures count residents based on the location of their "usual residence" and would therefore not account for any seasonal fluctuation in population that may occur in Duxbury.

The total population of the Town is bound to the total area of Duxbury which is 37.6 square miles. Of the total area, 23.8 square miles of it is land and 13.9 square miles of it is water. This results in a population density of 632.7 people per square mile (Source: U.S. Census).

To help plan for the future of the region, MAPC has prepared a dynamic model of future population, household, and housing demand for Metro Boston and its municipalities. These projections can be used by local, regional, and state agencies to set policies and make investments that anticipate the region's future needs and help to achieve shared goals. Development of the projections was supported by an advisory team comprising academic experts, state agencies, neighboring regional planning agencies, and member municipalities. The projections include two scenarios for regional growth, the "Stronger Region" scenario explores how changing trends could result in higher

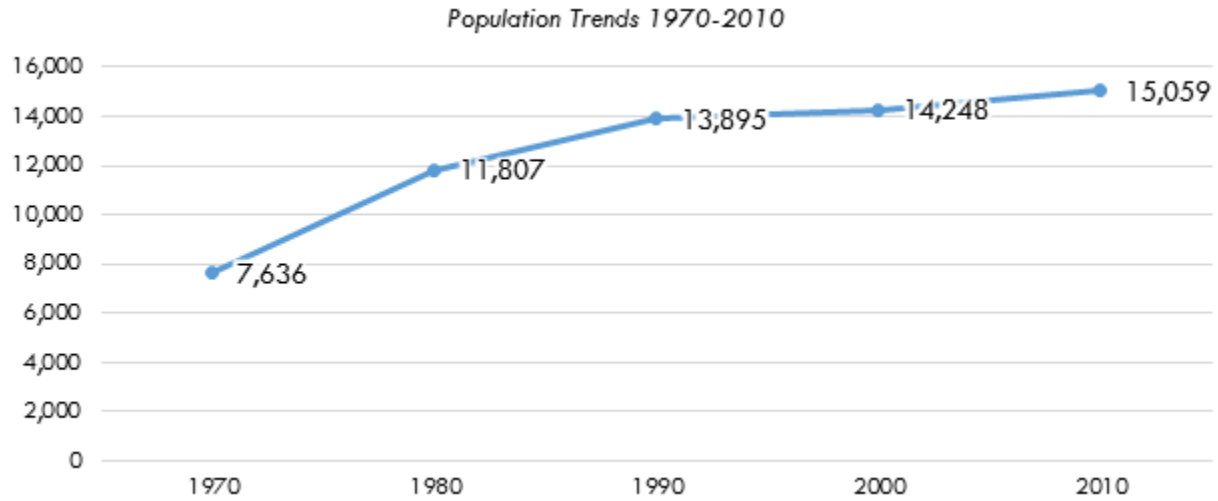


Figure: *Overall Population in Duxbury by Decade Source: U.S. Census (2010)*

population growth, greater housing demand, and a larger workforce. Regional projections and municipal forecasts were last updated in 2014. Using the "Stronger Region Scenario" the projected population for Duxbury in 2020 was 15,140. The projected population in Duxbury in 2030 is 15,434. This is a little more than a 2% increase, similar to the past two decades of modest population growth.

It is worthwhile to point out several key findings from the regional projections that are mirrored in the local data and trends in Duxbury. First, new housing demand will outpace population growth due to declining household size. Second, a "senior sell-off" may provide most of the single family homes needed by younger families. Third, many signs point to the resurgence, and importance, of urban communities and smaller nodes of services and amenities that provide similar attributes. Fourth, the number of school-age children in the region and most municipalities peaked in the year 2000 and is likely to decline over the coming decades.

In addition to the trend of overall growth in the total population of Duxbury, it is important to consider the age cohorts for that population growth. The age cohorts include grouping the population together in age ranges including "under 20", "20-24", "25-34", "35-64", and "65 plus." The under 20 age cohort has remained relatively steady from 1990 to 2015 at about 4,200 people. The 20-24 age cohort has also remained relatively steady at about 800 people. The 25-34 age cohort has shrunk by almost 50%. The 35-64 age cohort has seen modest growth. The 65 plus age cohort has seen the most substantial growth of about 80% in that time period. The vast majority of the total population is in the 35-64 age cohort at about 46%, followed by the under 20 age cohort at about 27%, and the 65 plus age cohort at about 17%. These patterns show that the population in Duxbury is aging and that families with dependent children in the household remain relatively stable. The age cohort representing young professionals and young families is the only cohort that is decreasing.

Households

While the total population is accommodated by the total amount of housing in Duxbury, that

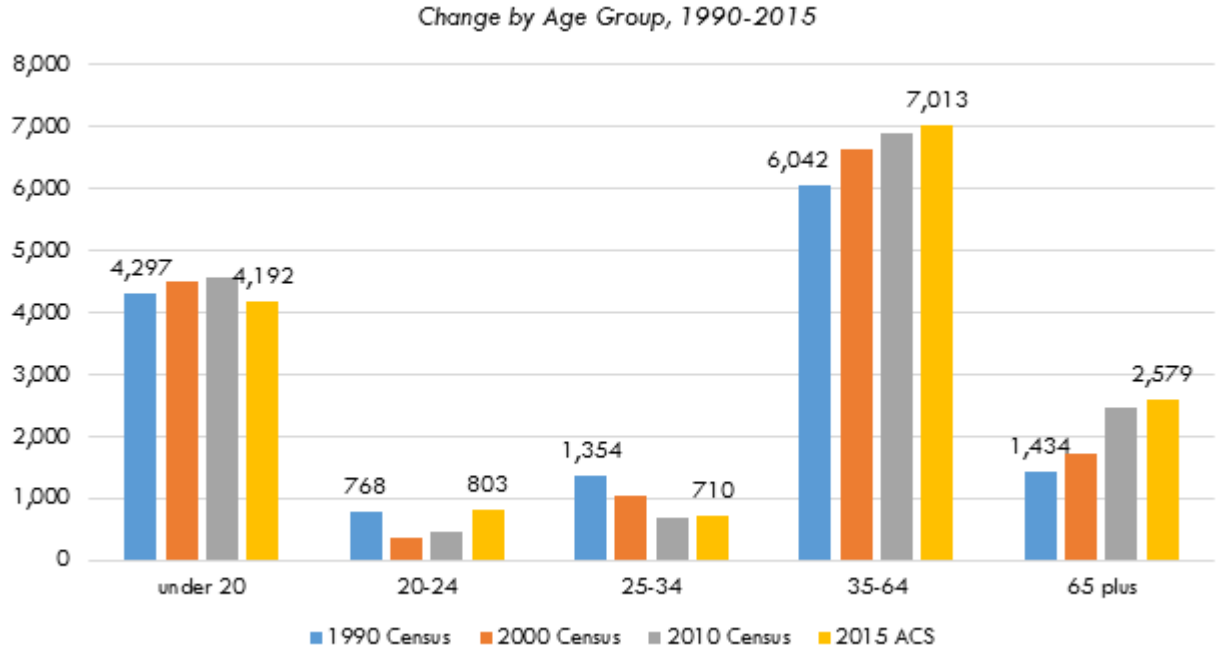


Figure: *Duxbury Population Change by Age Source: U.S. Census*

total number of households is a much better comparison to the total number of housing units in Town as multiple residents often reside in a single housing unit. The households may be families of related individuals, or non-families with unrelated individuals living in the same housing unit. The total number households according to the American Community Survey (ACS) 5-Year Estimates from 2011-2015 was 5,406. This estimate was up slightly from the U.S. Census of 2010 which recorded 5,344 total households. Similar to the overall population trend, Duxbury has been experiencing growth in the number of households with household growth from 2000 to 2010 reaching about 8%. The Metropolitan Area Planning Council's (MAPC) Metro Boston Population and Housing Projections project the household growth to continue to 2020 with a total household projection of 5,940 and to 2030 with a total household projection of 6,387. Also similar to the total population trends, the household age cohorts expected to grow are the older cohorts with the most growth occurring in the 60-74 age cohort and the 75+ age cohort. The division of age cohorts does not exactly match the total population age cohorts, but the overall pattern of growth of an older population is evident, while the younger cohorts are remaining steady or decreasing. The household growth was not evenly distributed across the Town. Across the three Census Tracts in Duxbury (5071.01, 5071.03 and 5071.04), the tract to the southeast (5071.03) increased at the highest percentage from 2000 to 2010.

From the ACS 5-Year Estimate, households that were families were 4,242 or 78% and households that were non-families were 1,164 or 22%. In comparison to other nearby communities, Plymouth County, and the Commonwealth, Duxbury has the highest percentage of family households, as shown in the chart below

From the ACS 5-Year Estimate, two other population trends in Duxbury were evident. First, that the percentage of households with one or more persons under age 18 is higher than surrounding communities. In the population trends and projections, this age cohort remained relatively constant. Second, the percentage of households with one or more persons over the age of 65 is higher than surrounding communities. In the population trends, this is the age cohort where the most growth is occurring in Duxbury.

The average household size in Duxbury at

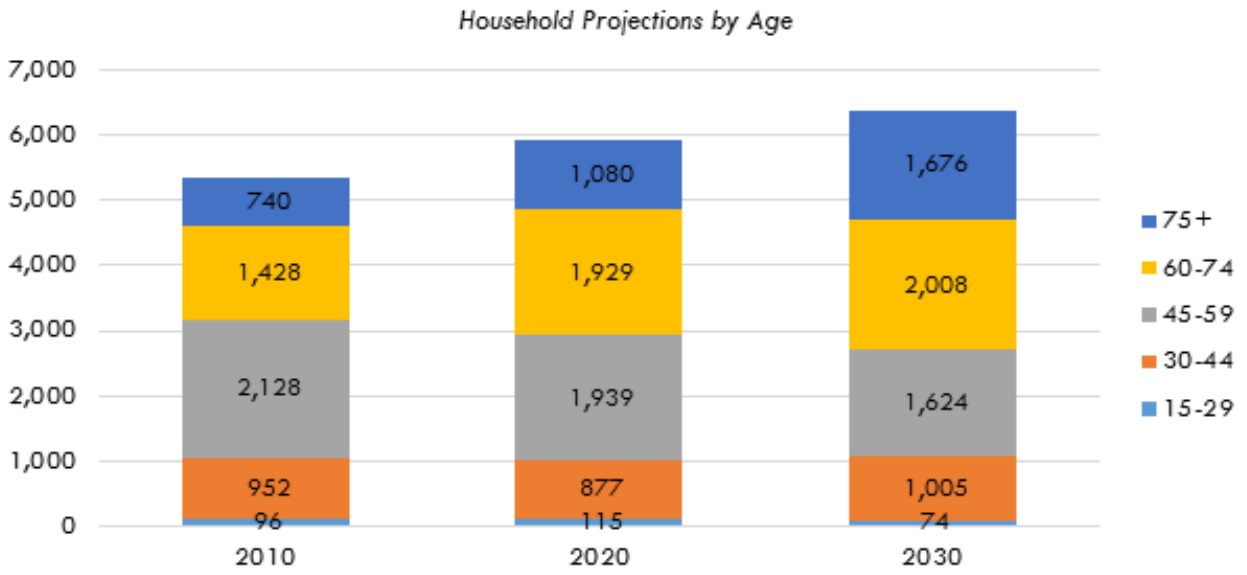


Figure: *Duxbury Household Projections by Age Source: U.S. Census, MAPC*

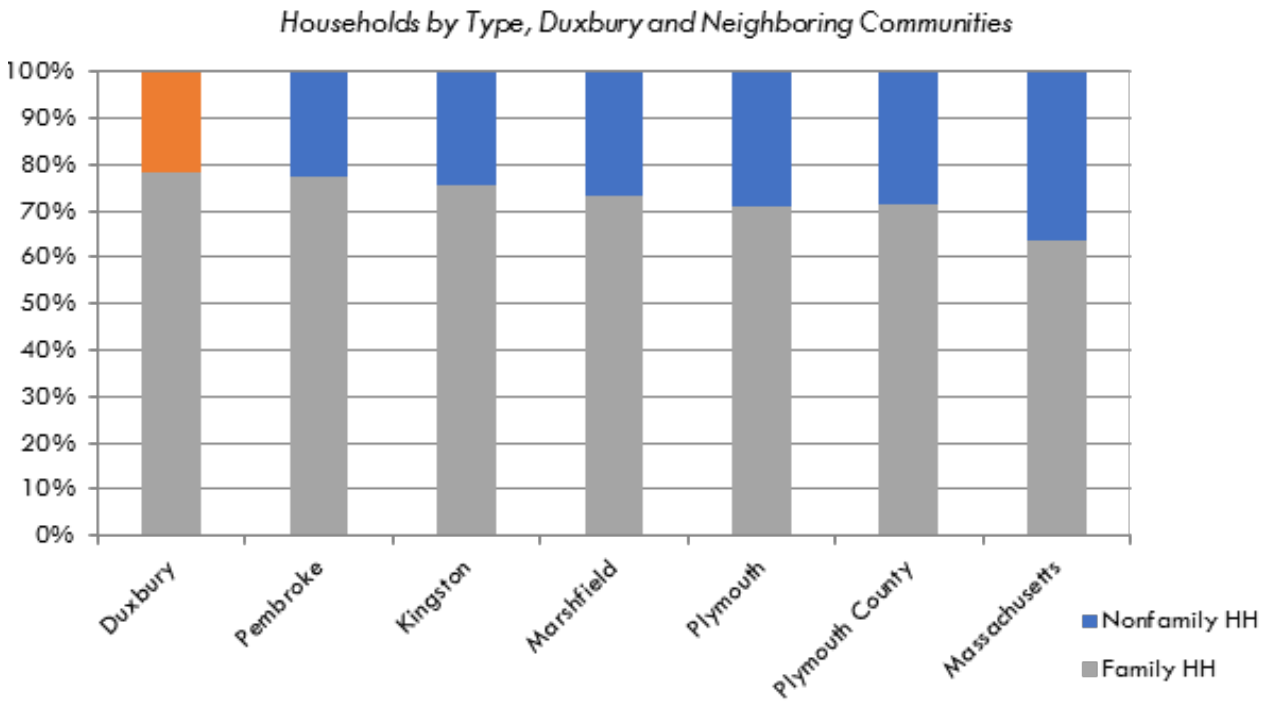


Figure: *Household Type Comparison with Neighboring Communities Source: U.S. Census*

2.81 is relatively large, particularly when compared to the County and Commonwealth. Pembroke is the only community with a higher average household size among the surrounding communities. The source for the average household size is the 2011-2015 ACS 5 Year Estimates. The average household size is another piece of data that points to the prominence of families as a large portion of the Duxbury households and population.

Race and Ethnicity

The population of Duxbury is relatively

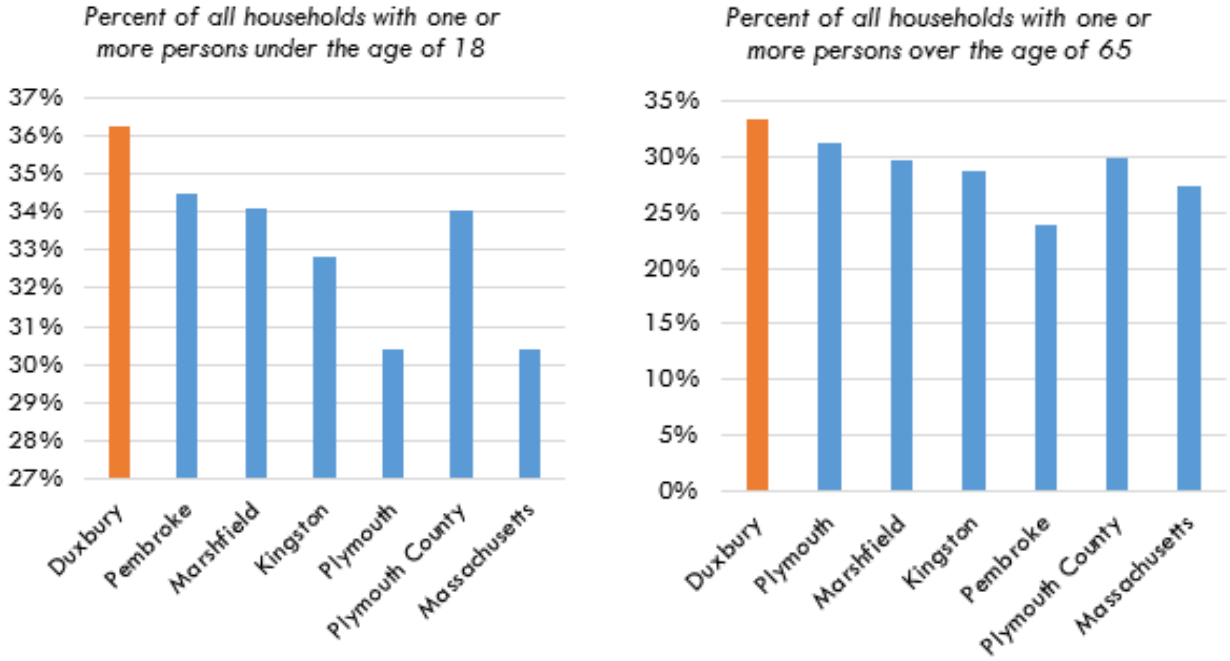


Figure: *Household Characteristics Comparison with Neighboring Communities Source: U.S. Census*

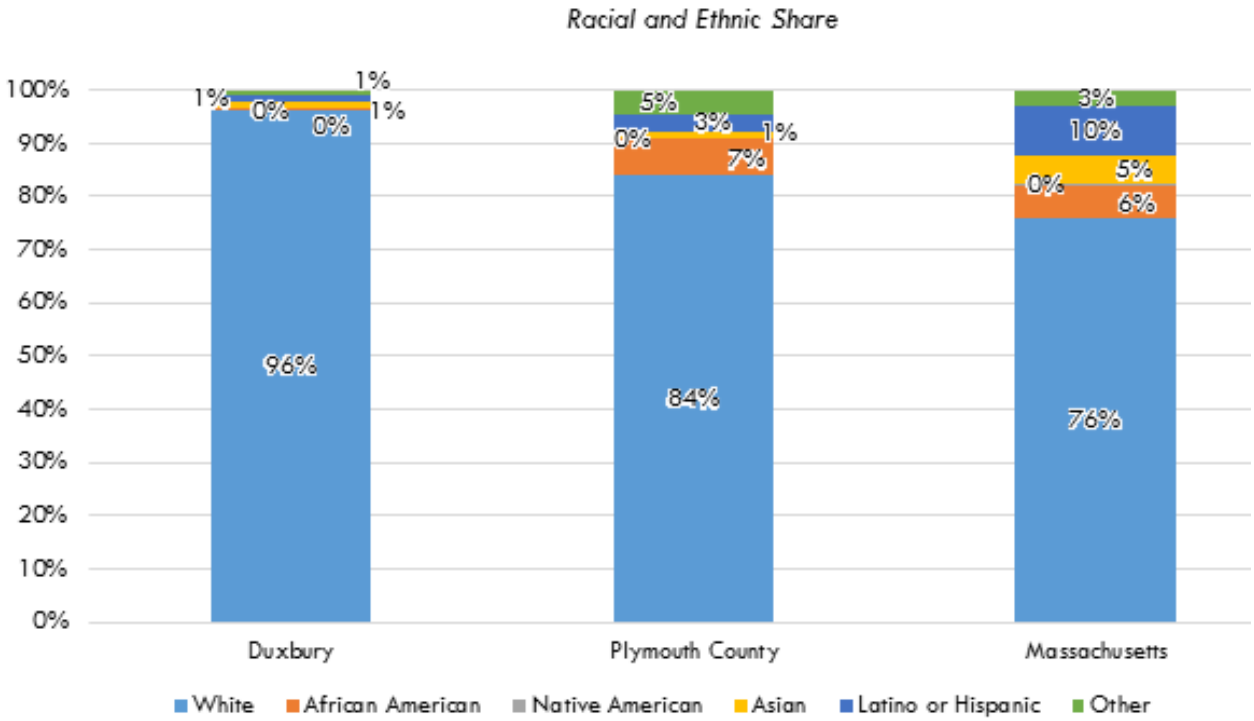


Figure: *Racial and Ethnic Comparisons to County and State Source: U.S. Census*

homogeneous from a race and ethnicity perspective. The racial makeup of the population is 98% White, 1.4% Asian, 0.8% two or more races, 0.6% Black or African American, 0.5% from other races, 0.3% Native American, and 0.1% Pacific Islander. Hispanic or Latino of any race were 1.20% of the population. These race and ethnicity classifications and percentages are from the U.S. Census of 2010.

Education

The households with one or more persons under the age of 18 are directly correlated with the school enrollment figures of the Town. In the 2016-2017 school year, the school district enrollment was 3,121. The source of this information is the Massachusetts Department of Elementary and Secondary Education. The demographic trends and anecdotal observations suggest that the school age population and households with children remain relatively constant due to a transitioning of families into and out of the Town near the educational milestones of kindergarten or first grade and high school graduation. With an otherwise aging population, the school enrollment may be in decline if it were not for this pattern of in and out migration of families. The chart below shows the percent of

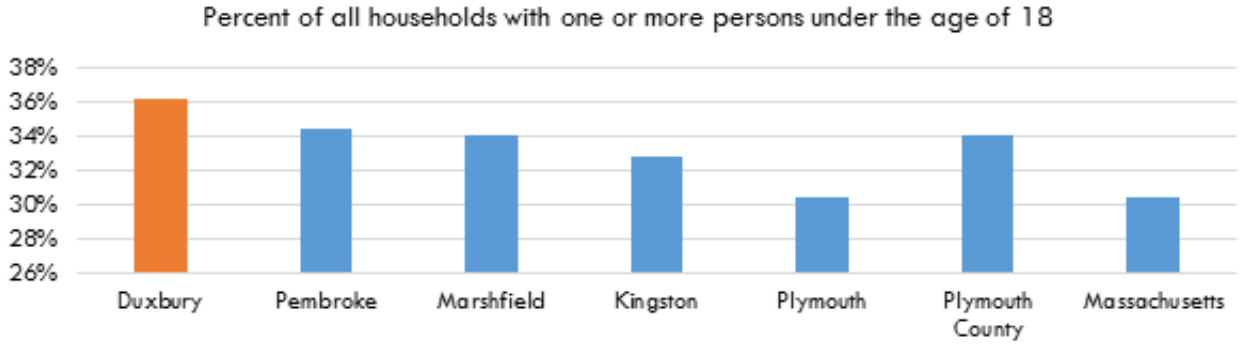


Figure: *Household Characteristics Comparison with Neighboring Communities Source: U.S. Census*

households with one or more persons under the age of 18. This percent remaining higher than the surrounding context is also supportive of this pattern.

Household Income

The household income is an important characteristic to consider for housing affordability. In 1990, the Median Household Income in Duxbury was $124,893, adjusted to 2015 dollars, from the source of the U.S. Census of 1990. The median household income in Duxbury grew as recorded in the U.S. Census of 2000 to $141,666, adjusted to 2015 dollars. The median household came back down and was somewhat reduced from the 1990 figure when adjusted for inflation. The Median Household Income in 2015 was $120,267 according to the 2011-2015 ACS 5 Year Estimates. Even with the somewhat lower median household income from a historical perspective, the median household income remains relatively high compared to surrounding municipalities.

The distribution of income among Duxbury households is biased toward the higher income range. Duxbury has a higher percentage of households earning over $100,000 per year as compared to the surrounding communities. Over

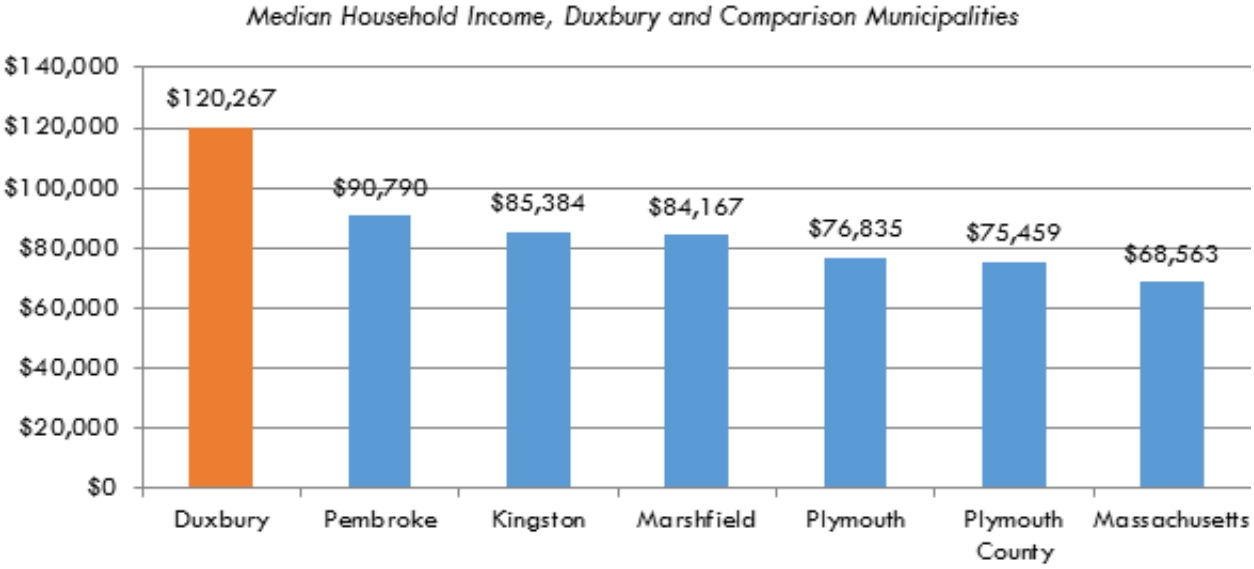


Figure: *Household Income Comparison with Neighboring Communities Source: U.S. Census*

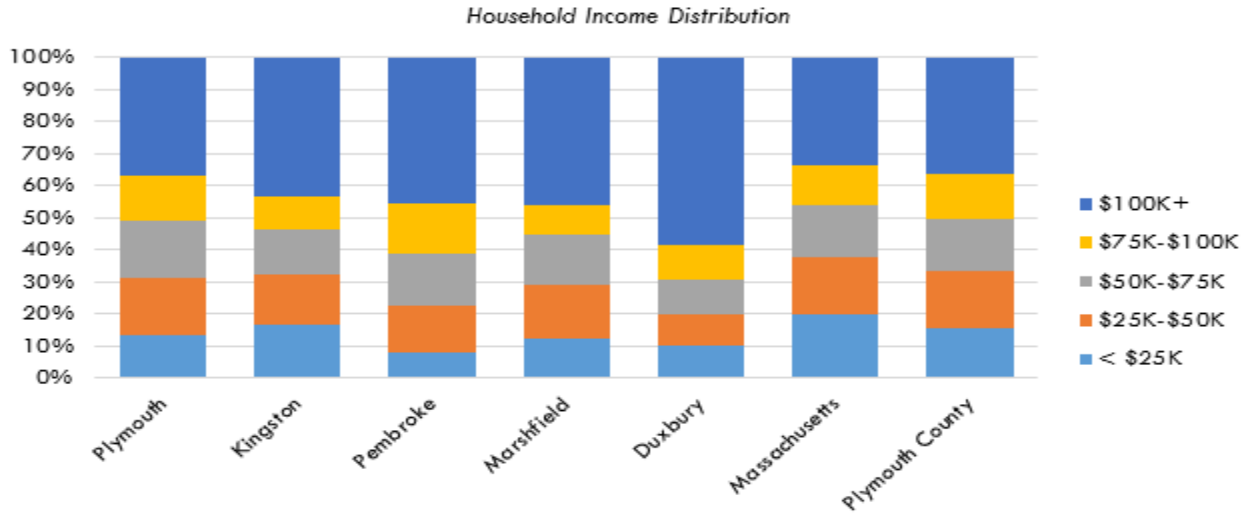


Figure: *Household Income Distribution Comparison with Neighboring Communities Source: U.S. Census*

59% of the households in Duxbury earn over $100,000 per year, about 11% of households earn between $75,000 and $99,000 per year, and the remaining 30% of households earn less than $74,000 per year.

Housing Stock

Housing Type and Age

According to the U.S. Census, a housing unit is a house, an apartment, a group of rooms, or a single room occupied or intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants do not live and eat with other persons in the structure and which have direct access from the outside of the building or through a common hall. Roughly corresponding to the total number of households of 5,406 is the total number of Duxbury housing units of 5,875. Based on the total land area of Duxbury the average housing density of the town is 246.8 housing units per square mile. The vast majority of housing units are single family homes with about 89% of the housing units. The distant second most prominent type of housing is two-family units with about 2.6% of the housing

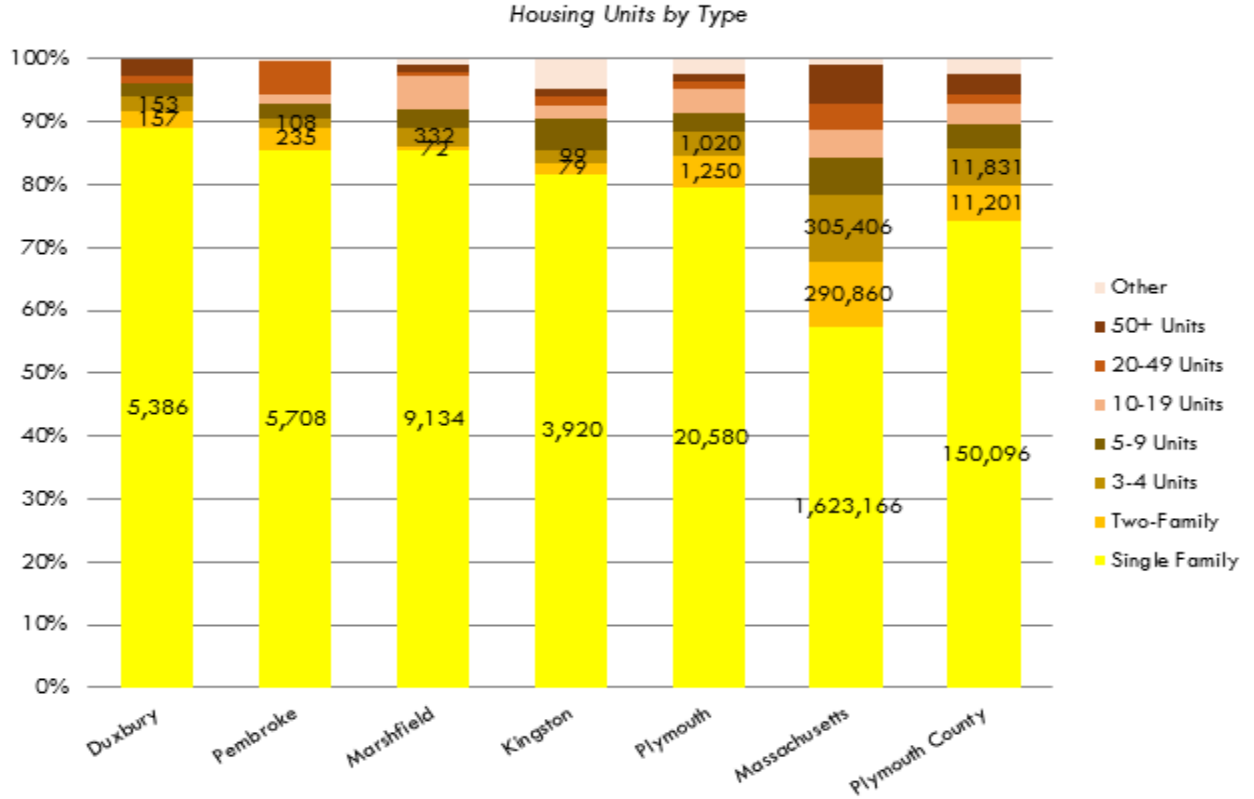


Figure: *Housing Type Comparison with Neighboring Communities Source: U.S. Census*

stock, followed by 3-4 unit types with about 2.5% of the housing stock. Housing types with multiple units (more than 5) are the remaining 5.9% of the housing stock. Compared to other surrounding communities, Duxbury has the highest percent of single family housing as the most dominant housing type.

Housing Tenure

Housing tenure refers to the arrangement under which a resident has the right to live in a house or apartment, the most common forms through tenancy as a renter or as an owner. According to the U.S. Census, a unit is owner occupied if the owner or co-owner lives in the unit, even if it is mortgaged or not fully paid for. A cooperative or condominium unit is "owner occupied" only if the owner or co-owner lives in it. All other occupied units are classified as "renter occupied", including units rented for cash rent and those occupied without payment of cash rent. In Duxbury, housing tenure is biased toward ownership with about 88.5% of the housing units owner occupied and about 11.5% of the housing units occupied as rentals according to the 2011-2015 ACS 5 Year Estimates. This proportion roughly corresponds to the percentage of single family homes as a housing unit type. It would be common and is likely, that most of the single family homes are owned and not rented.

Housing Vacancy

According to the U.S. Census, a housing unit is vacant if no one is living in it at the time of the census interview, unless its occupants are only temporarily absent. In addition, a vacant unit may be one which is entirely occupied by persons who have a usual residence elsewhere. New units not yet occupied are classified as vacant units if construction has reached a point where all exterior windows and doors are installed and final usable floors are in place. The housing unit vacancy rate in Duxbury was determined to be 10.7% according to the 2011-2015 ACS 5 Year Estimates. Below is a comparison of Duxbury's housing unit vacancy rate with other comparable geographies.

Housing Market

Critical to understanding housing affordability in Duxbury is a survey of the housing sales and

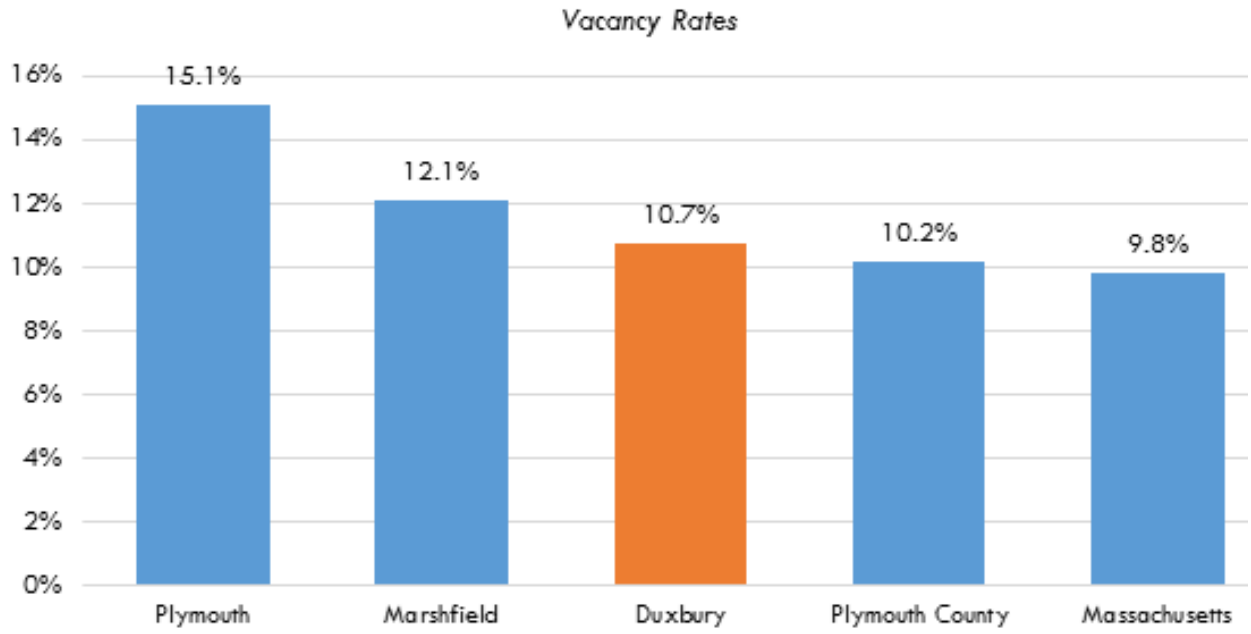


Figure: *Vacancy Rate Comparison with Neighboring Communities Source: U.S. Census*

rental figures. The average median listing price over the 6-month period from February 2017 to July 2017 was $771,333. The average median listing price over the preceding 6-month period from January 2017 back to August 2016 was $777,333. The median closing price was $659,000 with the average price per square foot at $272. Listing were on the market for a median of 59 days. This data was collected via a Multiple Listing Service (MLS) search. In 2016, the median sales price was $575,501 in Duxbury. The sales price is substantially higher than the surrounding comparable communities.

In addition to the sales price, the type and volume of sales are an important factor in understanding the market context. The home sales volume varies depending on the year and relates to broader economic cycles, such as the housing bubble and crash of the great recession from 2007-2010. Most of the variability is in the single family home sales due to the large percentage of the housing stock that is that type. If 200 units is about the annual sales volume across the variations through the years, it is only about 3% of the single family housing stock that may be available any given year. The source for this information is the Warren Group.

Recent and Future Development

Another important aspect of the housing market is the production of new housing units. Regionally, production of housing units has not kept pace with demand for housing units. This pattern has contributed to rising housing costs and continues to have a direct negative impact on housing affordability. The production of housing units in Duxbury in about the past 10 years has been modest. Since 2007, the total number of housing units produced is about 140 units with about 74 single family homes and 66 multifamily housing units. Over the next few years, about 350 additional housing units have been projected and associated with future projects, nearly all of these additional units are projected as multifamily housing units.

Housing Affordability

Everyone needs a home. Young professionals, families with kids, empty nesters, seniors, workers, people with disabilities, people struggling to make ends meet. Assessing housing affordability in Duxbury is important to understanding broader issues of local housing, economy, and equity. Housing affordability

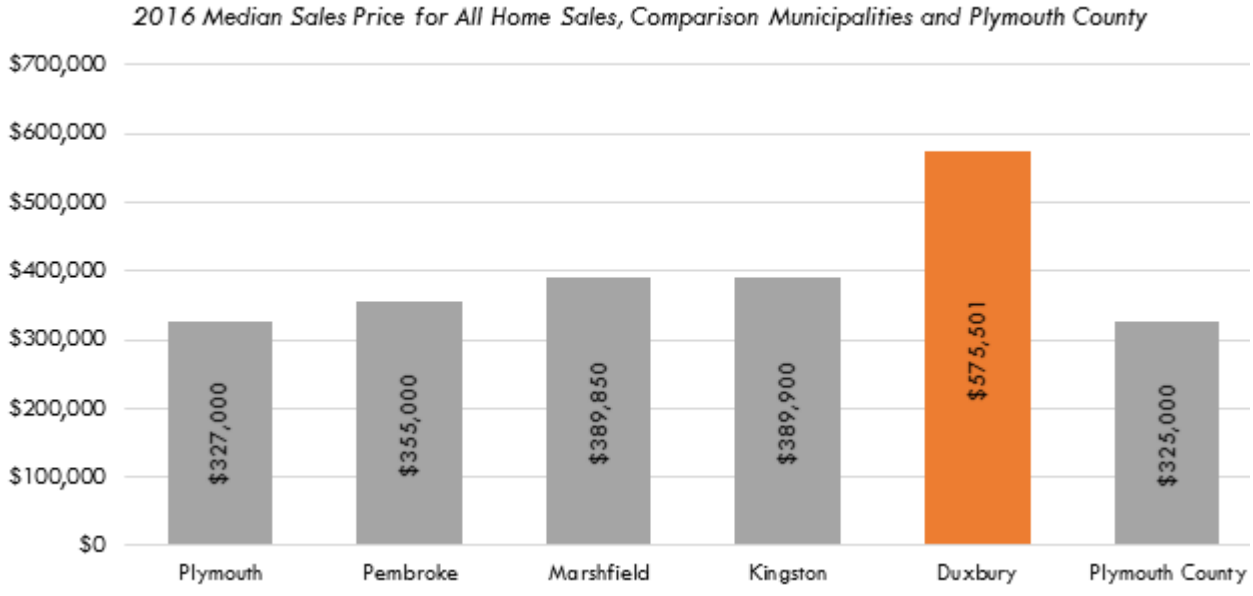


Figure: *Median Sales Price Comparison with Neighboring Communities Source: U.S. Census*

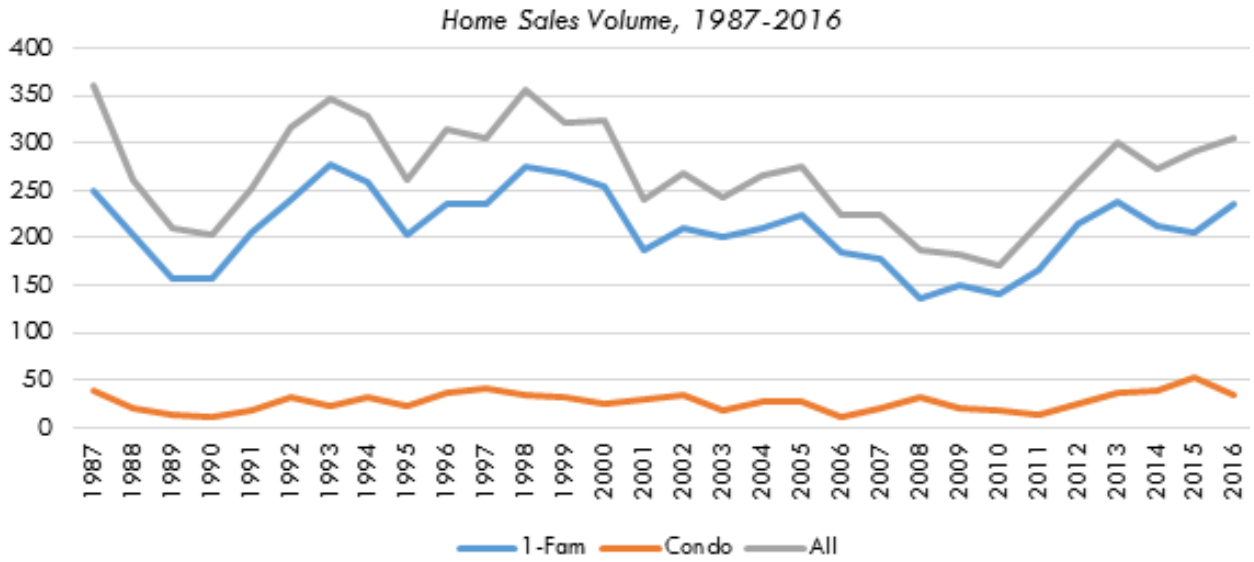


Figure: *Annual Volume of Home Sales in Duxbury Source: Warren Group*

is an issue for households living below the poverty level, households eligible for housing assistance, and middle-class households that may be burdened by high housing costs. Housing affordability is assessed through an understanding of local poverty rates, fair market rents, the current subsidized housing inventory, and an analysis of the housing cost burden and potential affordability gap. Although the median household income in Duxbury is higher than surrounding communities, about 30% of the households earn less than $75,000 indicating that housing affordability is an issue that many households are confronting.

The poverty data available, when analyzed at the municipal level were associated with a margin of error too large to be reliable. County data was compared to state data to give a more reliable representation of the poverty patterns. Based on data from Plymouth County in the 2011-2015 ACS 5 Year Estimates, across all family households, the percent living below the poverty line is 5.9%. This is lower than the overall poverty rate in Massachusetts of 10.4%. This rate represents the percentage of people who fell below the poverty line, $24,340 of annual income per household based on the 2016 ACS 1 Year Estimate. While it is difficult to assess an accurate share of this percent present in Duxbury, it is important to recognize that housing affordability must accommodate a broad spectrum of incomes in all communities.

Another metric that can be used to assess rates of poverty in the community is a measure of the percentage of enrolled school age students who are considered economically disadvantaged. The metric of economically disadvantaged is defined and tracked by the Massachusetts Department of Elementary and Secondary Education. The metric is based on a student's participation in one or more of the following state-administered programs: the Supplemental Nutrition Assistance Program (SNAP); the Transitional Assistance for Families with Dependent Children (TAFDC); the Department of Children and Families' (DCF) foster care program; and MassHealth (Medicaid). The measure does not line up exactly with the Census Bureau's income-based definition of poverty, but s a useful surrogate in identifying how many children are served at the lower end of the socioeconomic scale. In Duxbury of the 3,121 K-12 students enrolled in the 2016-2017 School Year, approximately 6% were defined as students who are economically disadvantaged. The chart below compares

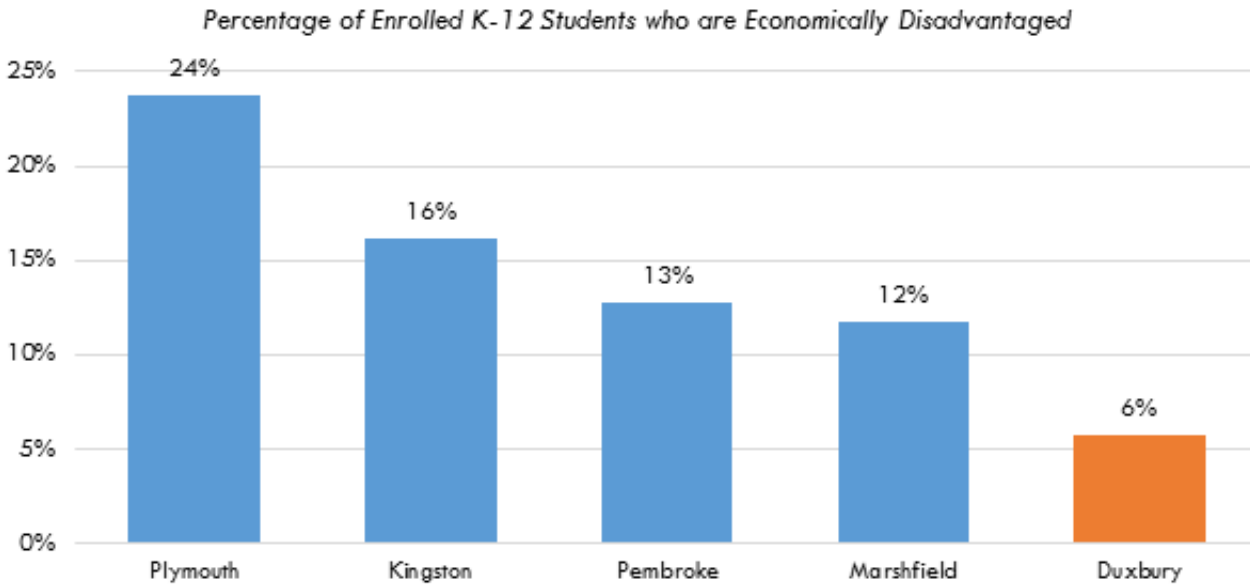


Figure: *Economically Disadvantaged Student Comparison Source: U.S. Census*

Duxbury to surrounding communities for this metric and shows that Duxbury has a much lower percent of students who are economically disadvantaged.

Fair Market Rents

Fair Market Rents are used to determine the payment standard amounts for the Housing Choice Voucher program of the U.S. Department of Housing and Urban Development (HUD). HUD annually estimates Fair Market Rents for defined metropolitan areas, Duxbury is within the defined metropolitan area Boston-Cambridge-Quincy, MA-NH. The table below shows the fair market rents for the past 8 years. In that 8 year period, Fair Market Rents have increased from 15% for an efficiency/studio unit to 33% for a 4 bedroom unit. The table below depicts these changes from 2011 to 2016.

Subsidized Housing Inventory

Massachusetts General Law Chapter 40B is a state statute, which enables a local Zoning Board of Appeals to approve affordable housing developments under flexible rules if at least 20-25% of the units have long-term affordability restrictions. While contentious in many communities, Chapter 40B is an important mechanism supporting the production of affordable housing in Massachusetts. Each community has a target of creating 10% of its total housing units as affordable units. Each year the Massachusetts Department of Housing

Boston-Cambridge-Quincy, MA-NH HUD Metro FMR Area								
Bedrooms	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
Efficiency	$1,083	$1,099	$1,035	$1,042	$1,071	$1,056	$1,194	$1,253
1 Bedroom	$1,149	$1,166	$1,156	$1,164	$1,196	$1,261	$1,372	$1,421
2 Bedrooms	$1,349	$1,369	$1,444	$1,454	$1,494	$1,567	$1,691	$1,740
3 Bedrooms	$1,613	$1,637	$1,798	$1,811	$1,861	$1,945	$2,116	$2,182
4 Bedrooms	$1,773	$1,799	$1,955	$1,969	$2,023	$2,148	$2,331	$2,370

Figure: *Fair Market Rents for Duxbury Source: Federal Dept. of Housing and Urban Development (HUD)*

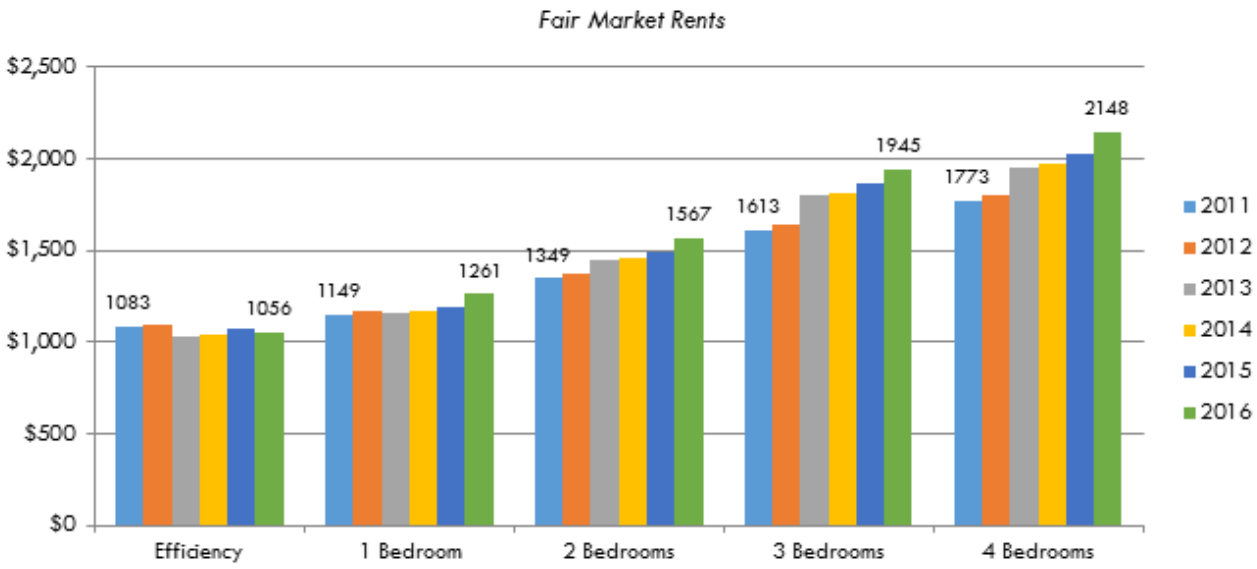


Figure: *Fair Market Rents for Duxbury Source: HUD*

and Community Development (DHCD) Chapter 40B Subsidized Housing Inventory is updated to reflect local progress against this 10% goal. The list was most recently updated on September 14, 2017. On the list Duxbury the total housing units as per the most recent census (2010) of 5,532 housing units is used as the denominator for the calculation. The list reflects the total number of development units that have been recorded with DHCD as 441 and that 410 of them are subsidized housing inventory units. This is used as the numerator for the calculation for current progress of 7.4% against the 10% goal.

Housing Cost Burden

HUD defines cost-burdened households as those who pay more than 30% of their annual household income for housing and therefore may have difficulty affording necessities such as food, clothing, transportation, and medical care. Severely cost-burdened is defined as paying more than 50% of annual income on rent. In Duxbury, according to 2011-2015 ACS 5 year Estimates, 30.7% of the households are cost-burdened. Of the surrounding comparison communities, Pembroke has a lower percentage of cost-burdened households and all others have a higher percent of cost-burdened

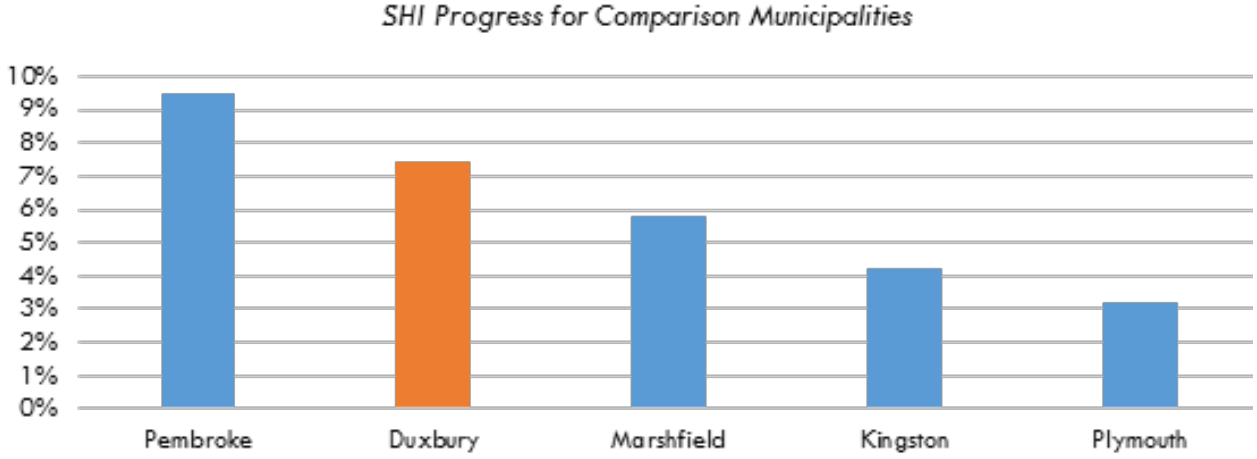


Figure: *Subsidized Housing Inventory Comparison Source: MA DHCD*

households. Of the 30.7% of cost-burdened households in Duxbury, about half of them or 15.27% are severely cost-burdened and pay more than 50% of their annual income on rent. The frequency of cost-burdened households vary by household tenure with more cost-burdened households in renter occupied units than in owner occupied units. Owner occupied units have about 29% of total households that are cost-burdened. Whereas, renter occupied units have about 45% of total households that are cost-burdened.

Municipal Tax Rate

Another component of housing affordability is the annual cost of municipal property taxes. The proposed single tax rate for the 2018 Fiscal Year is $15.16 per $1,000 of assessed value. This is a reduction from the 2017 tax rate of $15.51 per $1,000 of assessed valuation and the 2016 tax rate of $15.55 per $1,000 of assessed valuation. The average single family home tax bill for 2018 is projected to be $10,311.83 as per the Town of Duxbury FY2018 Tax Classification Hearing Fact Sheet. The average single family annual tax bill for 2017 was $9,924.85. The 2018 Fiscal Year property tax rates in the surrounding towns of Pembroke are $14.89 per $1,000 of assessed value, Kingston are $16.45 per $1,000 of assessed value, and Marshfield are $13.38 per $1,000 of assessed value.

Duxbury Affordable Housing Trust

The Town of Duxbury established an Affordable Housing Trust through Article #25 at the March 2008 Annual Town Meeting. The purpose of an affordable housing trust is to assist in identifying housing needs and opportunities for residents of all income levels, while at the same time preserving the Town's character and resources. The affordable housing trust receives funding from the Community Preservation Committee through Town Meeting action, development mitigation payments, and contributions. The Community Preservation Act was adopted in Duxbury in 2001 and can be used to support the creation of affordable housing in the town when proposals are received.

Housing Development Constraints and Limitations

The analysis of demographics, housing stock, and affordability provide a view into the trends and dynamics of housing in Duxbury. These characteristics point to the need to continue to create new housing opportunities in Duxbury. It is important to consider the constraints and limitations that present challenges for the production of housing in Duxbury. These items are discussed below and have built on the list of challenges presented in the 2014 Duxbury Housing Production Needs Assessment.

Open Space and Conservation Parcels

As documented in the Open Space and Recreation Plan and the Open Space and Recreation element of the master plan, the conservation of land in Duxbury has been a strong priority for decades. In the 1970s, the Duxbury Conservation Commission acquired over 2,000 acres of land which remains under the control and stewardship of the Conversation Commission today. Of that, 550 acres of Duxbury's land are permanently protected with Conservation Restrictions and an additional 122 acres are permanently protected through an Agricultural Preservation Restriction.

These lands, both wetland and upland, have been protected due to their conservation value, of which water protection is one of vital importance. While this pattern of protection has been a part of Duxbury for generations and has protected much of Duxbury's natural environment, aesthetics, and desirability, it also presents difficulties when exploring opportunities

for housing production in Town. Although it may appear that many acres of land in the Town are undeveloped, they are in fact a part of these conservation resources or part of single family home lots that comprise about 77% of the Town's land use. An option available for use of Community Preservation Act (CPA) funds is the acquisition of land for affordable housing purposes.

Municipal Utilities

Development in Duxbury is also limited by the access to utilities, particularly wastewater services in the town. The protection of municipal water sources is a priority for the Town and this protection potentially reduces the available location for prospective future development or may pose limitations on the scale or density of that future development. Similarly, municipal sewer is not available in the town, except for some areas near municipal boundaries. Supporting development through on-site shared septic systems or package wastewater treatment plants pose similar reductions to the potentially available locations for prospective future development and may pose limitations on the scale or density of that future development.

Zoning and Permitting Requirements

One zoning requirement that poses a limitation to the potential production of housing is the permitting requirements for any housing that is not single family. Currently, a special permit is required from the Zoning Board of Appeals or the Planning Board for most uses, except for single family homes. This requirement reduces the predictability of the review and approval process and would likely increase the amount of time required for approval for any type of housing that is not single family. An alternative to requiring a Special Permit for most uses that could be considered by the Town is a detailed Site Plan Review process which allows the Town to review the details of the project proposal and ensure that its development approach, site plan, and architecture, fit with the character of the Town prior to approval. The proposed project would be required to conform to zoning, and would still be subject to additional review by the Town, but would be less constrained by the uncertainty of a Special Permit process.

Allocation of Community Preservation Act Funds to Housing

A possible funding source for affordable housing is use of funds from the locally-enacted Community Preservation Act (CPA). 14 affordable housing projects have received funding from the Community Preservation Committee since 2001. Currently, the funds generated are allocated to prioritize open space and conservation activities to meet the goals of the Duxbury Open Space and Recreation Plan (OSRP):

- Protection of drinking water supply
- Preservation of natural areas
- Preservation of the unique character of Duxbury
- To manage town recreational opportunities with minimal impact to the environment
- To plan for climate change

The Community Preservation Committee reviews proposals for affordable housing as they are received, but does not initiate projects.

Community Input

2017 Community Survey

Public input for the Housing Element occurred throughout the year-long process for Phase 1 of the Duxbury Master Plan. Initial priorities for housing in Duxbury were assessed through an online community survey which was widely promoted in the Town, and had a very high response rate. The survey was open for several months in the late summer and fall of 2017. Over 1,200 survey responses were received, representing about 8% of the total population of Duxbury. A summary of the results most relevant to housing is outlined below. The Community Survey was organized into three major categories, "Creating a Shared Community Vision", "Assessing Existing Conditions", and "About You." Interesting results pertaining to housing can be found in each of these categories.

In "Creating a Shared Community Vision", the first survey question asked respondents to prioritize community values. One of the values listed was phrased as "housing option for a range of household incomes and life stages." Out of 14 values, this housing-related sentiment was ranked 12th out of 14, a relatively low priority. As an example of the other types of values listed, "a high-quality school system" was rated as the most important.

The second survey question asked respondents "what do you like most about Duxbury?" The importance of preserving the "small town, semi-rural character" was the 5th most important. The "variety of neighborhoods" and "housing options" were near the least important at 18th and 21st respectively out of 21 statements about assets. The most liked asset of Duxbury is the "beaches." Conversely, the "housing options", "variety of neighborhoods" were listed near the top of the greatest challenges, responding to the question "what do you think is most in need of improvement or change in Duxbury?" at the 3rd and 6th most important challenges respectively. Also, important as a consideration for housing options, the "business districts (size, character, quality, and mix of uses)" was listed as the 2nd greatest challenge of the Town, following only "transportation options."

The word "community" was used most frequently in responses to the open-ended question "What is your vision for Duxbury in the future?" Housing could play an important role in the enhancement of community in the future of the town. Respondents were asked to indicate the level of agreement or disagreement with specific statements about important topics, including housing. One such statement was "The Town is preparing to support our aging population." Less than 40% agreed with the statement, less than 20% disagreed, and over 40% were neutral or not sure about the statement. Another such statement was "The Town supports the private development of affordable housing for low and moderate income households." Just over 20% agreed with the statement, over 20% disagreed, and nearly 60% were neutral or not sure about the statement.

Finally, one survey question asked for the current level of agreement or disagreement with potential solutions to challenges and opportunities in Duxbury that had been put forward by previous plans or processes. Two of these items were directly related to housing. The first was "providing more affordable housing options (particularly for seniors and low income renters) is important to meet housing needs in our community." Over 40% agreed with the statement, about 20% were neutral, about 30% disagreed and about 10% needed more information. The second was "a more diversified housing stock (i.e. infill units and multi-family

units) would help to meet housing needs in our community." Over 30% agreed with the statement, about 20% were neutral, over 30% disagreed with the statement, and over 10% needed more information. A majority, at 61% of the respondents of the survey, have lived in Duxbury for at least 10 years.

Additional public input on housing in the Town of Duxbury was gathered at a Community Forum held on the evening of November 15, 2017. The following exercises were provided to gather input from the community members present at the meeting. The Forum was attended by nearly 100 members of the community. The following results were compiled from this meeting.

November 2017 Community Forum

The existing conditions analysis of the housing data was presented and discussed with the Planning Board on October 11th, 2017 and presented at the Community Forum on November 15th, 2017. Other housing related exercises and inputs were gathered at the Community Forum and are summarized below. One of the most interesting housing exercises asks participants to place a dot next to photo examples of different types of housing they think are appropriate for Duxbury. The most highly ranked images are included below and were in the categories of clustered/cottage housing, two or three family homes, and mixed-use housing. The top five most preferred images of housing appropriate for Duxbury are included and reflect a modest scale, traditional style, and high quality building and site design.

A draft summary of the Housing Element recommendations and strategies was prepared and distributed to the Master Plan Ambassadors, Town Departments and Boards, and the Planning Board for review and comment in January of 2017. The feedback received as part of this review has been integrated with the full compilation of the Housing Element. A draft of the Housing Element was presented to the Planning Board on March 21st, 2018.

Figure: *Preferred Images of Housing Types from the Community Forum Source: MAPC*

Recommendations

The Town of Duxbury is primarily a residential community with an attractive housing stock that includes many historic homes and large estates. The character of the Town is largely defined by individual homes with 89% of the housing stock in the form of an owner-occupied single family home. The 2017 Community Survey confirmed that the small town, semi-rural character of Duxbury is one of its greatest assets. Preserving and strengthening this character is a primary focus of the housing recommendations.

However, several other housing dynamics have been identified that must be balanced with preservation of the existing character and neighborhoods. First, housing can be used more strategically to introduce additional economic activity in existing business districts. The 2017 Community Survey identified housing options and the business district size, character, quality and mix of uses as two of the Town's greatest challenges. Second, the demographic trends in Duxbury show an aging population, highlighting the need to provide future options for current residents. The 2017 Community Survey confirmed that an inclusive and supportive community for people of all ages is an important community value. Finally, housing affordability is a major concern that underlies each of the other housing dynamics and that must be proactively addressed.

Goal 1: Diversify housing options to support affordability and a more diverse population.

An increase in the available choices for housing in the community will increase the likelihood that affordable options are available. Diverse housing options which may be further considered by the Town include smaller homes in a compact cluster, encouraging units above commercial uses, accessory units on the property of a single-family home, multiple units created from a large historic single family home, or other approaches.

- **Strategy 1.1:** Foster new housing types, such as mixed-use housing at neighborhood business districts.

Mixed-use housing at the upper level of neighborhood business district buildings provides a housing choice not widely available in the community today and should be further encouraged through the zoning bylaw by offering density bonuses or other incentives for adding the type of housing that is desired.

- **Strategy 1.2:** Explore adaptive reuse options to create multiple housing units in existing and historic structures.

Not a strategy for every historic structure, but at the right location for the right property and owner, the conversion of a larger and historic single-family home into multiple housing units is an effective approach to preservation and the creation of affordable housing units.

- **Strategy 1.3:** Support the Affordable Housing Trust, cooperative housing, or other models to diversify housing offerings and options.

Proactive housing implementation activities can advance some or all of these housing choices by either developing new housing in these models, or by providing a framework and support for others to produce housing in these models.

- **Strategy 1.4:** Explore a policy or program to permit previously unpermitted housing units and add them to the roster of affordable housing options in the Town.

Explore incentives to encourage property owners to make informal housing circumstances formal so that they can be recognized as a resource for housing affordability in the Town.

- **Strategy 1.5:** Identify Town-owned or privately owned land that would be well suited to additional affordable housing production that aligns with other Master Plan goals.

If land suitable for housing production can be

identified or acquired, then a process for the production of affordable housing could be pursued. Ideally, the opportunity would align with other Master Plan Housing goals and provide synergy with other Master Plan elements. An inventory was done in 2018 by a consultant working for the Affordable Housing Trust and at the present time almost no additional Town-owned land is available for housing.

• **Strategy 1.6:** Preserve existing affordable housing units that may require deed-restriction renewals.

The progress that has been made in the production of affordable housing needs to be maintained through continued monitoring and renewal of deed-restrictions or other agreements that pertain to affordability, currently this is the role of the Affordable Housing Trust.

• **Strategy 1.7:** Continue to add all existing eligible affordable housing units to the Subsidized Housing Inventory.

If existing units are eligible to contribute to the Town's affordable housing inventory, then they should be documented and added to the inventory. If existing units have the potential to be restricted for use as an affordable unit, owners should be assisted through the process working with the assistance of organizations such as the Citizen's Housing and Planning Association (CHAPA) to include units that should qualify. The most recent update occurred in 2019 through the updated Housing Production Plan.

• **Strategy 1.8:** Maintain updates to the Housing Production Plan most recently updated in 2019.

The detailed Housing Production Plan should continue to be updated and maintained. The plan should be consistent with the Master Plan's housing goals and build on its strategies.

Goal 2: Preserve and strengthen the Town's established and historic residential neighborhoods and semi-rural and coastal character.

This goal has a strong overlap with the Historic and Cultural Resources goals and is an area of considerable synergy and shared strategies.

• **Strategy 2.1:** Identify and develop design guidelines for each established and historic residential neighborhood to strengthen the character and features of each.

In addition to establishing the important characteristics for each district or neighborhood, the guidelines should establish the desired characteristics of future investments. This assessment and articulation of design should be combined with regular design review.

• **Strategy 2.2:** Create local historic districts in the most historically significant residential neighborhoods.

Local historic districts offer recognition and the strongest protection of historic resources and should be combined with other tools such as regulations or preservation incentives to protect historically significant buildings.

• **Strategy 2.3:** Reduce the likelihood of removal of historic homes through both regulations, such as increased dimensional controls, and incentives, such as historic tax credits.

Although some of these types of protections and incentives are currently used, each of these tools should be explored to further strengthen the protection of historic resources.

• **Strategy 2.4:** Encourage additions, conversions, or accessory dwellings that enhance the economic viability of preservation while maintaining neighborhood character.

Active economic use of historic structures must be a part of the preservation of these structures. Exploring conversions that are acceptable approaches to preservation and the production of housing units should be a preferred approach.

• **Strategy 2.5:** Explore opportunities to allow income-producing historic properties to expand

tax credit opportunities.

The creation of housing units in historic structures may provide an economic incentive for preservation and open opportunities for other economic incentives, such as historic tax credits that might not otherwise be available, such as the Low Income Historic Tax Credit (LIHTC).

Goal 3: Strengthen walkability within existing compact nodes of residential development and mixed-use centers.

Compact nodes of existing housing should be strengthened as a walkable neighborhood that is compact and connected by sidewalks and bike paths. Additionally, multi-use paths should connect residential and mixed-use neighborhood business districts in Town that allow for circulation without the use of a vehicle.

- **Strategy 3.1:** Use redevelopment as an opportunity to encourage private investment to increase pedestrian and bicycle connections.

Redevelopment should be designed to make connections between existing concentrations of development and activity. New public realm benefits should be designed to facilitate walking and biking connections interior and exterior to the redevelopment site.

- **Strategy 3.2:** Encourage redevelopment to occur in existing, compact, mixed-use clusters that support walkability.

The focus on compact clusters reinforces the historic patterns of the Town and respects the distances that can be comfortably traveled by walking or biking. The more these compact clusters can be strengthened within walking or biking distance to existing neighborhood business districts, the more beneficial they will be.

- **Strategy 3.3:** Require or incentivize development to add amenity or access to adjacent public resources or to contribute to improving the conditions of the district in which they are located.

Development investments should be leveraged to bring amenity and access to public recreation, open space, and local resources. Sensitive and low impact development may occur near natural resources or within neighborhood business districts and should mitigate potential impacts and offer new benefits such as multi-use paths, common amenities, or parking, that may be needed to support Town's extensive open space resources or neighborhood business districts.

Goal 4: Encourage independent living for seniors, people with disabilities and other special needs.

Independent living may take several forms to address the diverse needs that may be present in the community. It may range from specialized care facilities to market-based housing units that offer a choice of smaller units that may be maintenance free and within walking distance of relevant amenities and Town services.

- **Strategy 4.1:** Identify targeted locations near existing clusters, such as The Village at Duxbury, to add age-restricted and special needs housing units and additional amenities.

Clusters of senior and special needs housing are emerging in the Town and could be locations to concentrate a cluster of additional housing choices and resources. The Village at Duxbury and Bay Path Rehabilitation and Nursing Center is one such existing cluster. Island Creek Village is another existing cluster. Other targeted locations may include those near Town services or neighborhood business districts. In addition to housing units, add amenities, walking paths, and multi-modal connections to enhance attractiveness and utility of these clusters.

- **Strategy 4.2:** Streamline zoning and permitting approvals for senior and special needs housing including exploring opportunities for incentives.

As specific needs are identified, mechanisms for supporting the response to those needs should be in place. The mechanisms may be through special

zoning districts, incentives such as density bonuses, provision of Town land for specific types of uses, or support through the Affordable Housing Trust or other entities, such as the Senior Center.

• **Strategy 4.3:** Explore tax benefits to assist senior residents.

In order to directly address housing affordability concerns, particularly for community members with a fixed income and rising property taxes, property tax exemptions are an effective tool for relief. Other property tax relief could be considered as an incentive for the creation of accessory dwelling units.

Goal 5: Integrate new housing into existing neighborhood business districts.

This goal has a strong overlap with Economic Development, Open Space and Recreation, and Transportation. By providing the opportunity to add housing units in previously developed neighborhood business districts, the new units strengthen support for local businesses, direct housing units away from undeveloped areas, and encourage walking and biking between destinations for new residential uses.

• **Strategy 5.1:** Encourage conversion of upper-story commercial space with residential units where appropriate.

Upper story uses in the Neighborhood Business Districts of Hall's Corner, Snug Harbor, Millbrook may be underused or may provide an economic opportunity if converted to housing units. This conversion should be allowed and encouraged. In some cases, this require new construction rather than building conversion and new design guidelines should be in place.

• **Strategy 5.2:** Encourage the redevelopment of single-story commercial buildings into multiple story buildings that include ground floor commercial uses and upper floor residential units in the neighborhood business districts of Hall's Corner, Snug Harbor, and Millbrook.

Increasing the density in neighborhood business districts is a straightforward approach to strengthening vitality and sustainability of these districts. One-story structures in these districts generally represent an opportunity for adding new activity to support vital centers. Design guidelines should be in place to support appropriate architectural massing and design.

• **Strategy 5.3:** Streamline zoning and permitting approvals for projects that include residential uses and amend the zoning bylaw to encourage mixed uses in existing neighborhood business districts.

Zoning can be aligned with the production of housing and provide incentives for adding new housing where it is desired, such as in neighborhood business districts.

• **Strategy 5.4:** Explore targeted infrastructure investments, such as wastewater, to support additional mixed-use activity in neighborhood business districts.

Opportunities for district-based package treatment plants may provide shared benefits to district property owners and the Town, by enhancing the viability of increased residential uses through an increase in density at neighborhood business districts. The Town should consider the study and implementation of these types of infrastructure improvements, such as has already been done at Snug Harbor.

• **Strategy 5.5:** Focus regulations and incentives on the creation of both smaller units and rental units to diversify housing options in existing neighborhood business districts.

Zoning should align with the production of different types of housing, other than the predominant single-family owner-occupied house, and provide incentives for adding smaller housing units or rental units in suitable locations. The Town can encourage the Affordable Housing Trust to support the production of housing in neighborhood business districts to support housing affordability in the community.

Chapter 10
Public Facilities and Services

Key Findings

The public facilities and services element of a master plan takes stock of a community's facility resources and helps to guide decisions relevant to the management of public buildings, utilities, and infrastructure in order to meet present and future needs of the community. Public facilities make it possible for municipal employees and volunteers to provide services for the public good. These facilities are also required by various mandates of state and federal government. Citizens, as taxpayers, assume the provision of basic services such as fire, public safety, education, town government and water supply. Beyond that, residents frequently convey the importance of a desire for a sense of place, membership in a community and to be cared for across the cycles of life.

Image: *Duxbury Town Hall Source: MAPC*

Introduction

The adequacy of a municipality's public facilities for the functions they serve is determined by multiple factors, including:

- The form, size, and organization of the local government;
- The municipality's land use patterns;
- Proximity to other or larger governmental entities and potential shared resources;
- The expectations of the municipality's citizens

Duxbury's ability to provide adequate facilities and services depends on effective capital planning, a commitment to implementation, sound asset management policies, and the amount of revenue available for local government operations. Duxbury, like many other municipalities, receives very little funding from non-local sources and relies largely on local property taxes for financial support.

This chapter details the structure of Town government and describes the existing conditions of facilities owned by the Town of Duxbury, including those operated by the public schools, and a description of the service activities of the departments which rely on them. Recommended goals and strategies to guide the Town of Duxbury's maintenance, development, and use of its public facilities and services follow at the end of the chapter.

Existing Conditions

Town Government

Following the area's European settling by Myles Standish and John Alden in 1624, the Town of Duxbury was incorporated in 1637. Pursuant to the Town's General Bylaws, last revised in June 2018, Duxbury is governed by an Open Town Meeting form of government, and is led by a three member Board of Selectmen. The Town amended their form of government in 1987 through a special act charter providing for the appointment of a Town Manager. Town Meeting is the legislative body of the Town; during Town Meeting, all residents in attendance (who are also registered voters) vote on the budget and other articles in the Warrant. The Board of Selectmen, as the Chief Elected Officials and Executive Officers of the Town of Duxbury, serve as the goal setting, long range planning, and policy making body of the town; they recommend major courses of action to Town Meeting, and adopt policy directives and guidelines to be implemented by officers, boards, committees, commissions, and employees of the Town. The Town Manager, who is appointed by the Board of Selectmen, is the Chief Administrative Officer of the Town and is responsible for the day to day management of town operations.

The Town of Duxbury regularly completes formal reviews of its governmental structure and practices. Most recently, in 2015 Annual Town Meeting approved the creation of a Government Study Committee[1] charged with studying and making recommendations relevant to the Town's form of government, organizational structure and General Bylaws. Following a robust process involving the solicitation of public opinion and consultation with numerous internal and external stakeholders, the Government Study Committee affirmed Duxbury's basic form of government: Open Town Meeting with a three member Board of Selectmen and a strong Town Manager. However, Annual Town Meeting in 2019 approved a citizen petition proposing the expansion of the Board of Selectmen from three members to five by a vote of 108 to 52. Prior to taking effect, the Board of Selectmen must petition the state legislature to formalize the change.

Town Departments

The Town of Duxbury's government is comprised of a number of departments, each vital to the efficient operation of town business and the provision of public services. As the Chief Administrative Officer, the Town manager supervises town departments under the jurisdiction of the Board of Selectmen and appoints most department heads, such as the collector-treasurer, fire chief, police chief, harbormaster, and director of public works, among others. An elected School Committee appoints and oversees the School Superintendent who runs the daily operation of the Duxbury Public Schools.

A list of Town departments which carry out governmental activities, classified by function, is below:

General Government

- Assessing Department
- Board of Selectmen
- Conservation Department
- Facilities Management
- Finance Department
- Human Resources
- Planning Department
- Town Clerk
- Town Manager
- Town Moderator
- Treasurer/Collector's Office

1. The Government Study Committee was comprised of a representative from the Board of Selectmen, Fiscal Advisory Committee, Finance Committee and School Committee, as well as five at-large members. The Government Study Committee was comprised of a representative from the Board of Selectmen, Fiscal Advisory Committee, Finance Committee and School Committee, as well as five at-large members.

Public Safety

- Emergency Management
- Fire Department
- Harbormaster
- Municipal Services (Board of Health, Building Department, Procurement, Zoning Board of Appeals)
- Police Department
- Regional Old Colony Communications Center

Public Works

- Animal Control
- Department of Public Works (Cemetery and Crematory, Highway Department, Lands and Natural Resources, Recycling and Transfer Station, Vehicle Maint., Water and Sewer)

Human Services

- Council on Aging
- Veterans Office

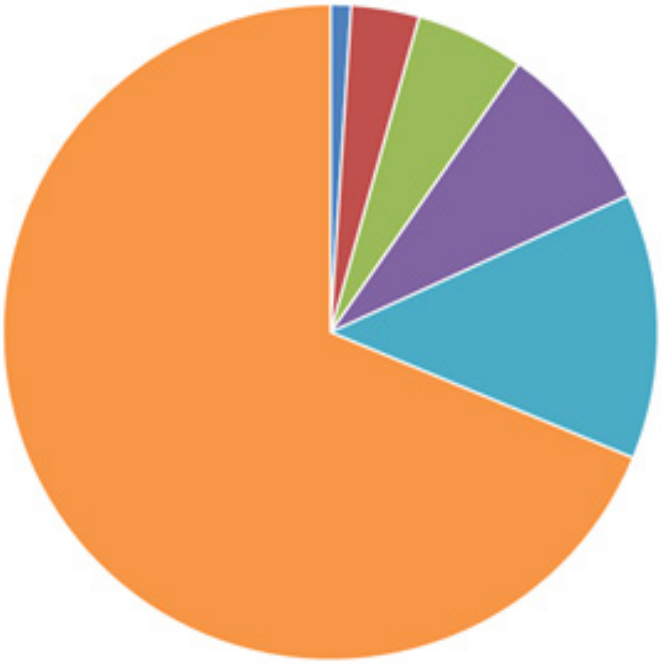
Culture and Recreation

- Duxbury Free Library
- Recreation Department

Education

- Duxbury Public Schools

In 2018, the Town of Duxbury supported 595 full-time equivalent[2] Town employees, inclusive of all departments including the schools.



Total FTE: 595

Governmental Function: Departments	FTE (2018)
Human Services: Council on Aging, Veterans Office	6
Culture and Recreation: Duxbury Free Library, Recreation Department	20
General Government: Assessing, Board of Selectmen, Conservation, Facilities, Finance, Human Resources, Planning, Town Clerk, Town Manager, Town Moderator, Treasurer/Collector	32
Public Works: Animal Control, Department of Public Works	50
Public Safety: Emergency Mgmt, Fire, Harbormaster, Municipal Services, Police, Old Colony Communications Center	78
Education: Duxbury Public Schools	409

Figure: *Full-time Equivalent Employees by Function Source: 2018 CAFR*

2. Full-time Equivalent (FTE) positions are calculated by adding the total hours worked by all department employees and dividing by the total hours in a full-time schedule. For example, if a department had two employees – each of who worked 30 hours per week – with a full time schedule of 40 hours/week, the department would have 1.5 FTE (60/40 Hours).

Town Boards and Committees

In addition to the professional staff who comprise the Town of Duxbury's government departments, volunteer boards and committees are a crucial component of properly functioning town governance. State statutes outline the powers and duties of statutory boards, such as the School Committee, Board of Health and Planning Board. Town bylaws specify the operations of their work. The Duxbury Board of Selectmen also establishes advisory boards and committees to support the performance of their responsibilities.

Duxbury's various boards and committees differ in their appointing authority. While some are elected by residents of the town, others are appointed by the Town Moderator or the Board of Selectmen.

Elected Town Officers, Boards, and Committees

- Board of Selectmen
- Board of Assessors
- Town Moderator
- Town Clerk
- School Committee
- Board of Library Trustees
- Planning Board
- Duxbury Housing Authority

Town Boards, and Committees Appointed by Town Moderator

- Cemetery Trustees
- Duxbury Beach Committee
- Finance Committee
- Fiscal Advisory Committee
- Water and Sewer Advisory Board

Town, Boards, and Committees Appointed by Board of Selectmen

- Affordable Housing Trust
- Agricultural Commission
- Alternative Energy Committee
- Board of Appeals
- Board of Health
- Community Preservation Committee
- Conservation Commission
- Council on Aging
- Design Review Board
- Duxbury Bay Management Commission
- Duxbury Cultural Council
- Duxbury Seawall Committee
- Economic Advisory Committee
- Highway Safety Committee
- Historical Commission
- King Caesar Committee Advisory
- Local Historical District Committee
- Municipal Commission on Disabilities
- Nuclear Advisory Committee
- Open Space Committee
- Recreation Activities Committee
- Registrars of Voters
- Shellfish Advisory Committee
- Sidewalk and Bike Path Committee

Town of Duxbury Organization Chart

The following organization chart was drawn from the Town of Duxbury 2018 Comprehensive Annual Financial Report. Annual Town Meeting in 2018 voted to change the appointment and reporting authority of the Town Planner from the Planning Board to the Town Manager.

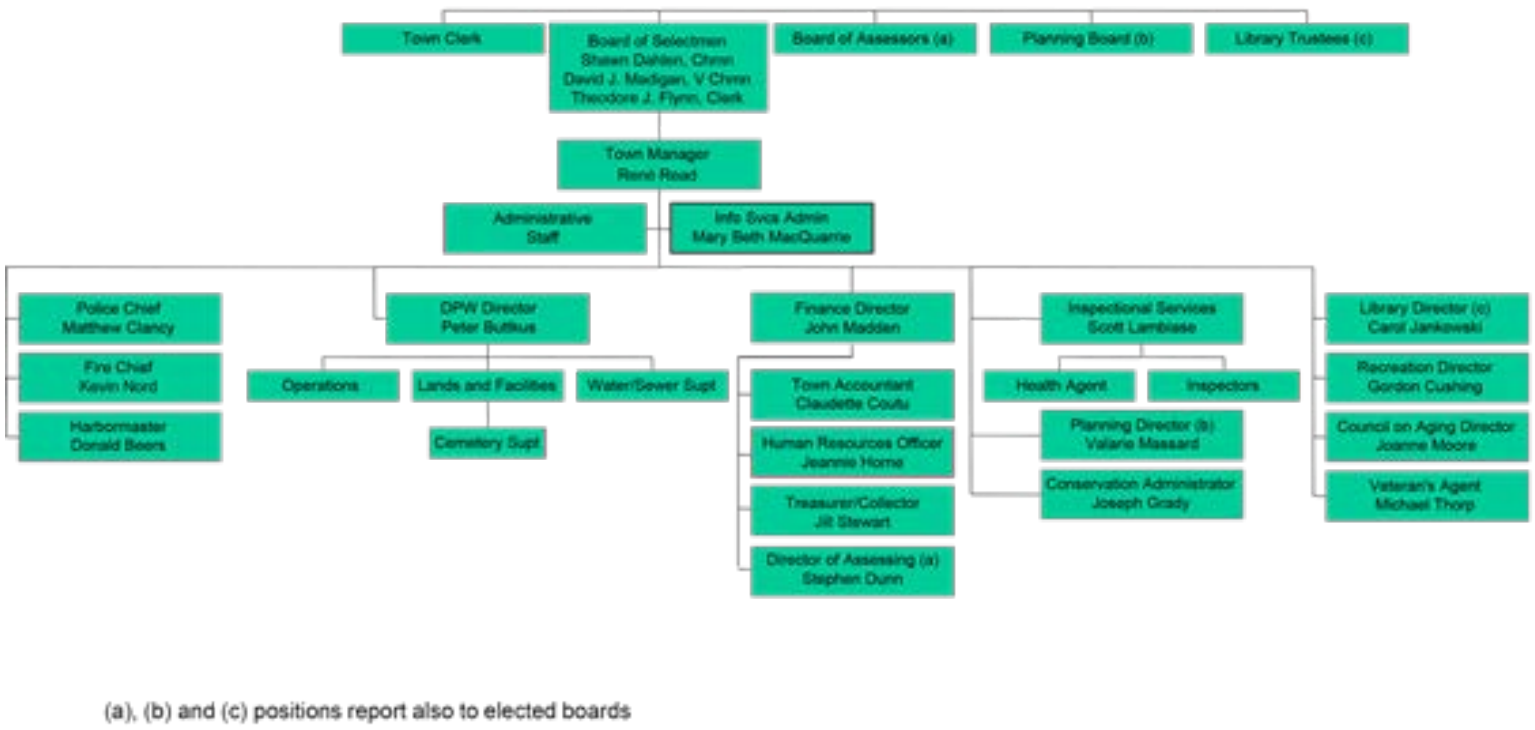


Figure: *Town of Duxbury Organization Chart Source: 2018 CAFR*

Town Facilities and Infrastructure

Between 1960 and 1980, the Town of Duxbury's population more than doubled – from 4,727 to 11,807 – and the demand for additional services spurred the construction of numerous public facilities. These new facilities included school buildings, an addition to Town Hall, and new public safety facilities. Several of the facilities built in this time period continue to be used, such as the Percy Walker Pool and the Town Office Buildings, while others were subsequently replaced or repurposed. Further significant periods of investment and building activity occurred in the late 1990s and 2010s. The "Existing Conditions" section below contains more detailed, narrative descriptions of the Town of Duxbury's public buildings' evolution.

As a historic, coastal community, the Town of Duxbury also maintains coastal structures which facilitate access to coastal water resources and infrastructure designed to protect inland assets. The Town's maintenance and management of these resources are increasingly challenged by the present and future effects of climate change. The Public Facilities and Services element of Envision Duxbury includes a history and high level overview of Duxbury's coastal facilities and infrastructure; please see the "Sustainability – Climate Resilience" chapter of this plan for a more detailed exploration of actions the Town of Duxbury can take to respond to climate risks.

Town Facilities Management

In 2012, Duxbury's Town Meeting voted to create the position of Facilities Director, charged with leading a consolidated Facilities Department responsible for managing and maintaining all town owned buildings, including the schools. The creation of the shared Facilities Department supported a broader move to consolidate administrative functions of the Town and School Department, including but not limited to Financial, Personnel, and Maintenance services.

The Facilities Department currently consists of an operating engineer, an energy/project manager, a licensed construction supervisor, an HVAC technician, as well as 25 custodians and 2 grounds keepers/painters.

As part of its mission, the Facilities Department completes preventative and corrective maintenance. Preventative maintenance activities include regularly scheduled inspections of building systems and components – e.g. boilers, HVAC, elevators. After the consolidated Facilities Department was formed, the Town hired an HVACR technician which reduced annual operating costs by reducing or eliminating the need for contractor service calls. For corrective maintenance, department heads or a building designee submit non-emergency work order requests through School Dude, a facilities management platform which allows for tracking and reporting on work orders. Emergency work request are made by phone, but later captured in the work order system by Facilities staff. Between November 2017 and November 2018, the Facilities Department completed 1,970 work order requests, including both corrective and preventative.

The Facilities Department is also responsible for the Town's energy management operations in Town and School buildings. In 2017, the Town of Duxbury received Green Communities Designation from the Massachusetts Department of Energy Resources (DOER). In 2017, the Town of Duxbury received $139,705 in grant funding to implement energy conversation measures aligned with the Town's Energy Reduction Plan. Efforts to reduce energy consumption in municipal buildings and schools have included installing and utilizing energy management systems, retrofitting buildings with LED lighting and installing smart controls, controlling plug load, improving ventilation and weatherizing buildings. Please see the Clean Energy chapter of this Master Plan for more details.

Although preventative and corrective maintenance activities are critical to maintaining the operational efficiency of Town buildings, larger capital investment in town owned buildings are also required to maintain them long term. The Facilities Department is charged with developing and maintaining a town-wide 10 year capital improvement plan for Town owned facilities, including projects such as those related to building envelopes, building systems, flooring, and fixed building assets that are not department specific. The Facilities Department's 10 year Capital Improvement Plan, developed in FY17, calculated a town wide building capital needs liability of $3.3 million. The plan calls for the predictable, regular expense of $300,000 per year in Town buildings and $30,000 per year in water enterprise facilities, i.e. pump houses. The Facilities CIP provides a structured framework to guide investment decisions, but it is a fluid document and unanticipated needs can and do arise. Capital improvements which fall outside of the Facilities Department management scope also require planning and investment. Town wide capital improvement processes are described in the section below.

Capital Improvement Planning

The Town of Duxbury's financial management policies and objectives – most recently revised and adopted by the Board of Selectmen in August 2018 – define capital expenditures as those with an estimated useful life of five years or more, and a cost of $25,000 or more. This includes capital projects – such as the construction or improvement of buildings, land, and other public infrastructure – and capital purchases – such as the acquisition of land or major equipment, e.g. motor vehicles. Sidewalks and road improvements are not included in capital planning because the Town only relies on Chapter 90 funds, which are used for typically road maintenance only. The development and maintenance of Duxbury's capital assets are

central to the performance of Town departments and the delivery of high quality public services.

The majority of capital requests originate with the heads of Town departments and the schools, who have ongoing capital needs. All departmental capital funding requests are annually submitted to the Fiscal Advisory Committee (FAC) for review ahead of Town Meeting. The FAC is responsible for developing a town-wide five year capital plan, and prioritizes annually received requests in light of the plan and the Town's overall financial position. After reviewing the proposals, the FAC develops recommendations on the capital budget for the Town Manager. The FAC also presents its recommendations for Town Meeting to the Board of Selectmen, the Finance Director, and the Finance Committee. The capital budget is finalized by the Town Manager and memorialized in a Warrant Article which is submitted to Town Meeting for a vote. Warrant articles for activities such as new construction or major infrastructure often are proposed through articles outside of the capital budget. The funding of all capital expenditures are subject to approval at Town Meeting.

Funding for capital projects comes from a variety of sources. The Town's Financial Management Policies encourage the use of "free cash" – the balance of remaining, unrestricted funds from the operations of the previous fiscal year – for smaller capital items to minimize the issuance of debt and its related tax impacts. In 2019, Annual Town Meeting approved the establishment of a Capital Improvement Stabilization Fund, which will provide a dedicated source of funding for one time capital costs and related debt service within the limits of Proposition 2 ½. Money appropriated to the Capital Stabilization Fund may come from "free cash", sale of assets, and re-appropriation of unused funds from previously approved capital expenditures.

The Town's financial management policies generally restrict borrowing to capital items with a cost of at least $100,000 and a useful life longer than five years. Some projects are financed through "non-excluded debt," which uses appropriations from the Capital Stabilization Fund to pay for debt service. Other projects rely on "excluded debt," where debt service obligations are met through temporary increases to the property tax levy. In order to raise the funds necessary to pay debt service costs for a particular project from the property tax levy, the Town may pursue a "debt exclusion."[3] Debt exclusions raise property taxes for the term of a bond used to finance a capital project or major capital purchase. Exclusions are placed on the Town Meeting Warrant by the Board of Selectmen and require a two-thirds vote at Town Meeting as well as a majority vote at Town Election in order to take effect. Town of Duxbury voters approved multiple debt exclusions in 2011 to fund the rehabilitation of the Fire Department, the construction of a new police station, and the design and construction of the new co-located Duxbury Middle/High School. Most recently, in 2019 Town Meeting approved a debt exclusion for a new Department of Public Works Facility, but voters at Town Election declined to support it.

The Town also continuously pursues alternative financing strategies to acquire funding for capital needs by means other than conventional borrowing, such as grants, federally subsidized loan programs, or zero-interest loans from state agencies. Funds through the Community Preservation Act may be available for eligible projects; however, eligible projects are narrowly defined by statute. Capital needs for the Town's Water Department may be funded through retained earnings or with borrowing whose debt service is paid through collected rate payments.

3. Cities and towns may also pursue debt overrides, which result in permanent increases to the tax levy and are intended to correct structural shortfalls in town revenues to support operational expenses of local government and the school system. Duxbury last approved a debt override in 1992.

Town Facilities Existing Conditions

General Government Facilities		
Name	*Address*	*Year Built, Renovated*
Town Manager's Office (Old Town Hall)	878 Tremont Street	1839, 1999
Town Office Building (New Town Hall)	878 Tremont Street	1975

Duxbury's **Town Manager's Office (Old Town Hall)** was constructed in 1839 as the first building in Duxbury dedicated solely to government use; the building continues to serve as a center for the Town's civic life. The Old Town Hall accommodated Town Meeting from until the late 1920s, and was later used as a general civic center to host lectures, dances, and other gathering. The Council on Aging temporarily occupied the building in the late 1990s prior to the opening of the Town's first dedicated Senior Center in 2002. Following the Council on Aging's move into their new facility, the Old Town Hall was repurposed to accommodate the Board of Selectmen and Town Manager's offices. Recent improvements to the facility include its 2011 exterior restoration – roof replacement and work on façade and foundations – funded through the Community Preservation Act; and the replacement of its fire alarm system in 2017. Potential projects which may be proposed in the coming years include bathroom renovations and the upgrading of the building's conference room.

Duxbury's **Town Office Building (New Town Hall)** was constructed in 1975 and is the former location of a private school adjacent to Old Town Hall. The building anchors much of the Town's general governmental operations and consists of two floors of office space and a full basement which includes a public meeting and hearing room. The relocation of the Board of Selectmen and Town Manager to the Old Town Hall in 2002 allowed for a more efficient distribution of workspace in the newer facility. Although the building has been maintained and is in fair condition, the Town department staff located there would benefit from additional office space. In FY20, the capital budget included $30,000 for the first phase of a records management system project, which would both allow the Town Clerk to more quickly respond to requests for records and free up much needed storage space. A proposal to construct a new Department of Public Works Operations Center would centralize DPW operations and provide space for DPW and Water Department staff who currently operate out of Town Hall. By moving staff to the new facility, space within Town Hall could be further redistributed, lessening crowding. Recent improvements to the Town Office Buildings include the replacement of the building's fire alarm system and a phased replacement of the building's carpets. Potential upcoming projects include bathroom renovations.

Public Safety Facilities		
Name	*Address*	*Year Built, Notes*
Central Fire Station	668 Tremont Street	1967, 2011
Ashdod Fire Station	794 Franklin Street	1971, 2000
Antique Fire Apparatus Annex	668 Tremont Street	1985
Police Station and Garage	155 Mayflower Street	2012
Harbormaster's Office	25 Mattakeesett Court	1979
Blue Fish River Fire House (Harbormaster)	645 Washington Street	1906, 2006

Fire Department

The Town of Duxbury's Fire Department provides a range of emergency services, including fire prevention and suppression, emergency medical services, and code enforcement. As of FY18, the Fire Department is staffed by a Chief of Department, Deputy Chief, Administrative Captain; four Shift Captains that serve as Shift Commanders, 17 Career firefighters, nine Call Firefighters, a full-time administrative assistant, and a part-time secretary. The Department maintains 16 Paramedics, 13 Basic EMTs, and four First Responders.

The Town of Duxbury's **Central Fire Station** serves as the Fire Department Headquarters, and is staffed by an Officer and two Firefighter/EMTs or Firefighter/Paramedics. Originally constructed in 1967, Central Fire underwent a major renovation in 2011. The renovation project involved the replacement of the crew quarters wing with a new two-floor foot addition, which includes administration and operations space on the first floor and updated crew quarters on the second floor. The renovations and rehabilitation of the fire station provided the Fire Department with state of the art communications and security equipment, much needed improvements to equipment storage, and made the administrative offices ADA-compliant. The Central Fire Station also serves as the Town of Duxbury's Emergency Operations Center.

The Central Fire Station has six apparatus bays to house the vehicles and equipment stored on site. The central part of the station has three large bays, which can accommodate larger vehicles and three smaller bays for vehicles in the rear of the building. Currently, the Fire Department maintains one pumper engine, a ladder truck, two ambulances, two forest fire trucks, one light rescue truck, and two boats at the station.

The Regional Old Colony Communications Center (formerly known as the Duxbury Emergency Communications Center) relocated from the Duxbury Police Station to Central Fire following the renovation in 2011. The ROCCC provides 911 answering and emergency dispatch services to the Towns of Duxbury, Plymptom, Halifax, and Rochester; the program continues to attract interest and participation from additional municipalities. In order to allow for future growth, the ROCCC pursued and secured a competitive grant through the State 911 Grant program to fund the construction of a second floor addition to the Central Fire Station, which will house an expanded space for the ROCCC. Work for this project began in April 2019.

In order to store antique equipment – including a 1928 American LaFrance pumper and a 1905 Hand Tub –Duxbury firefighters organized and completed the construction of the **Antique Fire Apparatus Annex** behind the Central Fire Station in 1985. The Fire Department relied on private donations to fund the purchase of construction materials and Duxbury firefighters completed the labor in their off-duty time; as a result, the facility was constructed without taxpayer expense.

The **Ashdod Fire Station** serves as a secondary fire station whose operation provides faster response times to the north and west parts of Duxbury. The building was constructed as a substation in the early 1970s, but reduced Fire Department budgets and manning levels in the late 1980s and early 1990s resulted in the station's closure. For a period in the 1990s, the Town leased the facility to a private ambulance company, but 1998 Town Meeting approved the renovation and reopening of the station by the Duxbury Fire Department, and the renovated building opened in 2000. The renovated facility included a newly constructed 3-bay apparatus room and a second floor addition with living quarters for fire personnel stationed there. Presently, two Duxbury firefighters/EMTs man the station, which is supplied with one pumper

engine, a forest fire truck, a dive rescue truck, and a boat for emergency response. The facility remains in generally good condition; a proposed capital project to replace two roof top units was deferred in FY20 due to reprioritization.

Police Department

The Duxbury Police Department "operates under the community police philosophy," which prioritizes service and community partnerships in fulfilling the Department's public safety mission. The Duxbury Police Department participates in the Massachusetts Police Accreditation Program (MPAP), a voluntary process by which police departments are evaluated for their alignment with professionally defined organizational and operating standards. The Duxbury Police Department received accreditation in 2006, becoming the first police department in Plymouth County to achieve accredited status, and was most recently re-accredited in 2018.

The Department is led by the Chief of Police, who – with the support of the Deputy Chief of Police – oversees the divisions comprising the Police Department. The primary Police Divisions are the Operations Division and Investigations Division, each of which encompass multiple units or sections. The Operations Division is the largest and most visible of the divisions within the DPD, whose uniformed police officers conduct high visibility patrols, with specialty assignments including the Motorcycle Unit and K-9 Unit. The Operations Division is led by the Operations Lieutenant, and each shift is led by a Patrol Sergeant. Patrol officers include both full time and reserve personnel. The Investigations Lieutenant oversees the Investigations Division, which consists of several sections, including: Criminal Investigations Bureau, Crime Scene Unit, Property and Evidence, Prosecution and Public Records Division, as well as the School Resource Officer. The Police Department took over enforcement of the public leased area of Duxbury Beach in 2019.

The Police Department operates out of the Police Station on Mayflower Street. The new police station replaced the former police headquarters on West Street, which suffered from space deficiencies, water leaks, and generally poor condition which negatively affected the operations of the Police Department. The new facility provided code-compliant holding facilities, ADA accessibility for the public, energy efficient building systems, and state of the art communications and security infrastructure. Updated technology acquired as part of the new headquarters development – including hardware and software associated with digital forensics, evidence processing equipment and crime scene/auto crash scene reconstruction technologies – greatly expanded the Police Department's internal investigative capabilities, allowing for more efficient and effective investigation of crimes and serious crashes. In order to accommodate large equipment and vehicle storage, a free standing 3 bay garage was installed in the rear of the site.

The Police Station also includes a training room, which can accommodate up to 45 individuals comfortably and is available for use by both non-profit and for-profit entities when not in use by the Department for law enforcement training. Non-profit entities may use the room without charge, while for-profit organizations may use the facility for a fee. The meeting space has proven popular, both for Police Department and external use, and visitors attending trainings and meetings often require more parking than the parking lot can accommodate. In 2018, the Town approved a plan to expand the parking lot capacity by 20 spaces, which would bring the total onsite parking count to 74, construction began in 2019.

In FY20, the Facilities Department proposed a project to address extreme humidity reported within the Police Station. Analysis by Facilities Management staff and third party engineers identified potential solutions related to both

building design and the HVAC system. Although this project represented an unplanned expense not accounted for in the capital improvement plan, the humidity negatively impacted staff working conditions and its promotion of mold posed a threat to their health, so the project was identified as an immediate priority. Voters at 2019 Annual Town Meeting approved $200,000 in funding for the project.

Harbormaster

The Town of Duxbury's Harbormaster Department manages safe and appropriate access to the Town of Duxbury's bay, shore, and natural resources through education, presence, and enforcement activities. The Harbormaster's office is led by the Harbormaster and Executive Officer, and supported by an administrative assistant. In 2014, the Harbormaster's Department was formally merged as a Division of the Police Department for all law enforcement and public safety functions. The merger was an administrative action to ensure uniformity of training and practices for all Duxbury law enforcement services, and provides the Harbormaster's Division with access to all Police Department resources, such as computerized records management system and mobile data capabilities. In addition to patrol and public safety functions, Harbormaster staff participate in professional development and field training.

The Harbormaster is headquartered at the **Harbormaster's Office** located at the Town Pier in the Snug Harbor area. The single story wood framed structure was constructed in 1979. The Facilities Department secured $20,000 in FY20 to complete a rehabilitation project focused on the building's roof, windows, siding and doors; similar rehabilitative work on the public restrooms building located at the town pier was also proposed and funded. Although these improvements will contribute to the maintenance of the Harbormaster's Office, the Fiscal Advisory Committee's 2019 Annual Town Meeting presentation cited the future potential need for a major rehabilitation of the Harbormaster's Office which would require debt financing.

The Harbormaster also uses ***Bluefish River Fire House*** for equipment storage. The building was constructed in the early 1900s, but was completely refurbished in 2006 using a combination of Community Preservation Act funds and private donations raised by the Friends of the Bluefish River Fire House.

Human Services, Culture and Recreation Facilities

Name	Address	Year Built, Renovated
Senior Center	10 Mayflower Street	2002, 2018
Duxbury Free Library	71 Alden Street	1926, 1997
Wright Building	147 St. George Street	1907, 2007
Girl Scout House	22 Washington Street	1874, 1964
Tarkiln Community Center	245 Summer Street	1871, 2011
Percy Walker Pool	175 St. George Street	1976, 2010
North Hill Country Club - Clubhouse	47 Merry Avenue	1962-2000

The Town of Duxbury's Council on Aging works to meet the diverse and complex needs of Duxbury's growing senior population by connecting seniors with community services and through the provision of programming and experiences designed to respond to seniors' needs and interests, enhance their dignity, and support their independence and community involvement. The Senior Center serves as the focal point for these efforts, offering a space for health and education programming and

various community events. Duxbury's first Senior Center was located in the basement of the Lower Alden School, until a growing student and senior population required their movement to a temporary space in Old Town Hall. Construction of the new **Senior Center** on Mayflower Street began in 2000, and the Council on Aging moved into the facility in 2001. While Town funds were used to design and construct the building, Friends of the Council on Aging – a citizens group – launched a capital campaign to solicit donations for the purchase of furnishings. The state of the art building provided space to greatly expand the CoA's capacity to deliver programming and services. Although dedicated for use by seniors, a variety of other groups also use the center for meeting space in the evenings and on weekends, and it functions as a true community resource. An AARP grant with matching grants and private sponsors enabled the construction of a walking loop at the facility in 2019.

When the Senior Center was constructed, Duxbury had a senior population (60 and older) of approximately 2,300 residents; the senior population in 2017 was estimated to be around 4,000. As the senior population has grown, the Duxbury Senior Center's activity sessions have also seen increased demand, rising from just above 2,600 in 2013 to nearly 3,800 in 2017. In order to accommodate increased participation rates, the Senior Center has relied on multiple other town facilities – including the Police Station's training room, the Duxbury Free Library, and the Tarkiln Community Center – to host programming activities. In 2018, Annual Town Meeting approved a plan to expand the Senior Center through the construction of an addition. The recently opened addition provides consolidated staff office space, including room for the Town's Veterans Agent, as well as increased space for classrooms, fitness programs, and the daily program for individuals with early Alzheimer's disease.

As articulated by their mission statement, the **Duxbury Free Library** "serves as a community space for everyone to explore, learn, create, connect, enjoy and expand horizons." The Library staff, Trustees, and Friends are committed to championing reading and informational literacy and supporting a library which serves as an inclusive learning environment, offering free physical and digital materials, technology, and cultural programming. The Duxbury Free Library is located in the former Alden Upper School, which was renovated and repurposed for use as the Town library in 1997. The main floor consists of the circulation desk, reading rooms, stack areas, periodicals, the Helen Bumpus Gallery, and the Children's Library. The upper level hosts the Reference Desk, administrative offices, and the Lanman Trustees/conference room (which may be reserved for meetings). The basement includes storage, restrooms, and two meeting rooms. The Setter Room is suitable for small groups. The Merry Meeting Room is a large 90 person-capacity meeting room, accessible by its own exterior entrance, to accommodate public meetings and hearings sponsored by other Town Departments as well as Library Board meetings and other educational and community programs.

In 2017, the library grounds by the lower level lobby were transformed through the Reading Garden Entrance project. The project enhanced the entrance area through the installation of unique sculptures, benches, additional walkways, and all season plantings. The project was funded through a fundraising campaign which attracted private donations, but various Town departments – including the Facilities Department, the Department of Public Works, and Municipal Services – provided in-kind assistance, guidance, and professional expertise. The Merry Meeting Room was also improved through repainting, replacement of flooring, and the addition of new chairs. Technology improvements – including the installation of

additional wireless access points – will further allow the library to meet the evolving needs of library patrons.

The **Wright Building**, or Wright Memorial Library, is located on the same campus as the Duxbury Free Library and the Alden School and Middle/High School. The building was constructed in 1907 by a private patron, Georgianna Wright, who had also donated the land and building for Duxbury's first public library in the 1890s. Although the building was expanded through the construction of an addition in the 1960s, the library eventually outgrew the space. Following the completion of the new Duxbury Free Library building in 1997, the Town debated appropriate uses for the facility. In order to preserve the building as a visible historical and cultural asset of the Town, Community Preservation Act funds were used to renovate and restore the building in 2006. After careful consideration, the Town approved its re-use by two primary tenant organizations. The Duxbury Student Union Association, an independent non-profit which offers a variety of after school programs and special events, occupies the building's addition; the Duxbury Rural and Historical Society houses the Drew Archival Library in the original 1909 portion of the library. The facility remains in good condition; in FY18, the Facilities Department replaced the building's HVAC controller.

The **Girl Scout House** was originally constructed in the 1870s as an elementary school, and served as an educational space until the 1950s. In the 1960s, a donation from Helen Bumpus, a prominent citizen of Duxbury, paid for the renovation and expansion of the building. The building currently houses the Recreation Department's administrative offices in the rear addition, while the original portion of the building serves as a meeting room which may be reserved through the Recreation Department. Historically, the space available to the Recreation Department has been strained by the high number of visitors to the office during program registration times, although the implementation of online registration has partially alleviated this stress. Additionally, noise can be an issue when outside groups use the location during working hours. Although the Town and Recreation Department have explored opportunities to relocate the Recreation Department offices to an alternative facility in the past, the building generally serves its purpose well and there are no imminent plans to do so. In FY18, the Facilities Department received $40,000 in funding to complete interior and exterior renovations to the property.

The Recreation Department also manages rentals of the **Tarkiln Community Center**, which is available for classes, meetings, and other general social events. The Town of Duxbury originally developed the facility as an elementary school, and the existing building encompasses two separately constructed wings which were subsequently joined by a connector in 1926. Although the building ceased operation as a schoolhouse around 1950, it remained a center for community life in Duxbury. In continuous use since its opening, by the early 2000s the condition of the property had degraded and damage from an electrical surge in 2006 forced its closure. After years of study, planning, and debate, voters at Annual Town Meeting in 2009 approved using $400,000 in Community Preservation Act funds to preserve and restore the building for use as a community center. Volunteers, local contractors, and Town employees also donated their time or worked at reduced rates to see the project through to completion. The restored building, which had been placed on the National Register of Historic places in 2010, opened to the public in 2011.

Granted to the Town as a gift by anonymous donors, the Recreation Department's **Percy Walker Pool** opened in 1976. The indoor facility consists of a six lane, 25-yard pool with diving spring board, locker, rooms and changing

rooms, including a family changing room. Residents and non-residents are both eligible to use the facility, and it offers structured activities available to visitors of all ages, such as swim lessons and water aerobics. The pool is also used for swimming practice and competitions by the Aquadux Swim Team and Duxbury High School. The facility underwent a large scale renovation in 2010. Highlights of the renovations include the installation of a bank of new windows along the south side of the building, creating a more open and naturally lighted atmosphere; new building systems, e.g. HVAC, electrical; upgrades to pool's operation systems; a new roof, windows, doors; and the refurbishment of the locker rooms, as well as the construction of a family locker room. Most recently, in FY17 the Facilities Department completed an exterior building wash, and 2019 Annual Town Meeting approved $10,000 to replace the pool's starting blocks, with funding also provided by the Pool's booster organization. Future maintenance needs may entail roofing, HVAC, and ADA lift replacements. Recent changes in allowed sanitation procedures by the state should be explored relative to maintenance costs.

The **North Hill Country Club**, developed on the former Merry Family Farm and opened in 1962, is a nine-hole golf course owned by the Town of Duxbury and contractually managed by Johnson Golf Management LLC. The North Hill clubhouse was constructed in 2000, and includes a restaurant which hosts banquets and other events. Although the Town funded the demolition of the former clubhouse, Johnson Golf Management – which also held the operating contract in 2000 – paid to construct the new clubhouse. The Town has completed a number of significant capital improvements to the golf course in recent years. A severe lightning strike in 2013 caused a complete failure of the irrigation system, which unfortunately coincided with drought conditions. In order to maintain the course, the Town relied on a Reserve Fund Transfer of $70,000 to rehabilitate the irrigation system, which also required the replacement of a failed submersible pump the following year at a cost of $90,000. In 2014, the Facilities Department replaced the clubhouse's carpet, installed new fascia boards, trim, and doors, as well as power washed and painted the building exterior. Plans to restore a historic barn on the property using Community Preservation Act funds approved for the purpose in 2012 did not proceed, and the building was subsequently demolished. The above ground fuel depot was renovated in 2017. Future considerations include possible expansion from 9 to 18 holes with a practice facility, replacement of current above ground chemical storage facility, and installation of a wash down/water purification discharge system for maintenance vehicles.

In addition to the facilities described above, the Recreation Department maintains many other recreational facilities throughout the Town, such as playing fields and playgrounds. Please see the Open Space and Recreation Element of this plan for additional information.

The Recreation Department completed a field study in 2015 to investigate field and court expansion on School-owned land behind the Chandler School. This study outlined a way to add capacity for tennis courts, basketball courts, multi-use fields, and baseball/softball fields with parking. The cost of these improvements was estimated at about $3 million. A need for more field space has been identified to allow for the resting and rehabilitation of fields and to accommodate increased field use. Recently a new irrigation tank was installed under the Chandler Street fields through the collaboration of many municipal departments and local youth sports groups. Current Recreation Activities Committee plans are to convert two tennis courts located at Tarkiln to six permanent pickle ball courts using Community Preservation Act funds. Ongoing rehabilitation of tennis courts will continue and the Committee is exploring

Public Works Facilities		
Name	*Address*	*Year Built, Renovated*
Animal Shelter	878R Tremont Street	2005
DPW Operations Center	878R Tremont Street	1970
Transfer Station Buildings and Scale	145 Mayflower Street	1977

a location for a new basketball court. Long term considerations include an purchasing or constructing an indoor recreation facility to offer programs and space to residents, potential relocation of the recreation department office, and constructing restrooms at the fields.

The **Department of Public Works Operations Center** – located behind the Town Hall complex off of Tremont Street - consists of several buildings, including the Highway and Lands and Natural Resources Garage, vehicle maintenance garage, storage garage, sign shop, salt and sand shed, and a pole frame salt lean-to. Although the Department of Public Works has supported almost every major building project in town over the past decades and works continuously to maintain the Town's infrastructure, their own facilities are significantly degraded and require substantial investment in order to serve the needs of the Department and the Town as a whole. An evaluation by engineering firm Weston and Sampson in 2018 concluded that the DPW Operations Center's buildings have exceeded their useful life, do not meet current building codes, and their condition negatively impacts both the Department's operational efficiency and employee safety. In particular, their evaluation – developed through direct engagement with DPW staff – found inadequate basic employee support spaces and inadequate vehicle and equipment storage space. As a result, portions of the DPW's vehicle fleet and capital equipment, which the Town has invested millions of dollars in, need to be stored outdoors and unprotected from the elements which can reduce their useful life. Additionally, the vehicle maintenance area – where the DPW performs reparative work on vehicles for multiple town departments – are undersized and do not meet acceptable industry and safety standards.

A conceptual plan developed by Weston and Sampson proposes constructing a brand new consolidated public works facility on the same site footprint as the existing operations center, complete with office space, employee facilities, workshops, a vehicle maintenance area, and expanded vehicle and equipment storage. In addition to correcting existing deficiencies, the new facility may allow for increased space at Town Hall by providing workspace for DPW staff currently housed there. The conceptual plan also proposes transferring one of the existing buildings to the Harbormaster for equipment storage. Under the conceptual site plans, there would be no change to the Animal Shelter which shares the site of the DPW operations center. DPW staff from multiple divisions constructed the **Animal Shelter** in 2005, with other volunteer support, and thanks to attentive staff and volunteers the facility is considered one of the cleanest and most well maintained in the state.

The cost for the new DPW Operations Center is estimated to be roughly $18 million. A 2/3rds majority at Town Meeting approved a $1.4 million in funding - with $310,800 paid by water fund retained earnings and a $1.09 million bond - for engineering and design work related to the proposed facility. However, the required debt exclusion failed to gain majority support through Town Election.

The **Transfer Station** built in the 1970s will be due for a modernization project over the next decade to improve flow and operations. The DPW also assists with the replacement of the Town's water mains as noted under the Water and Sewer Division summary.

The Town's Board of Cemetery Trustees and the DPW's Cemetery Department oversee the preservation, maintenance, and operation of Duxbury's cemeteries, including the Ashdod, Dingley, and Mayflower Cemeteries, as well as the Myles Standish Burial Ground and the Smith and Weston Tombs. The Ashdod and Dingley cemeteries were established primarily to serve settlers at a time when travel to a central burial location would have proven logistically challenging. Although neither site has additional capacity, Ashdod Cemetery continues to be used for burials on previously purchased plots. The National Register of Historic Places recognizes the Myles Standish Burial Grounds as the oldest maintained Cemetery in the United States. The Smith and Weston Tombs are notable examples of small family burial lots common to the 17th Century, which have been especially well maintained. The Community Preservation Committee has provided funding for preservation of historic gravestones and cemetery site improvements.

Cemetery Facilities		
Name	*Address*	*Year Built, Renovated*
Duxbury Crematory and Cemetery Offices	150 Mayflower Street	2012
Cemetery Department Maintenance Building	774 Tremont Street	2015

Mayflower Cemetery, the Town's largest, was established in 1787 and continues to serve the Town of Duxbury and its residents as an historical resource and active burial place. The Board of Cemetery Trustees, the Cemetery Department, and other Town leadership have undertaken a series of projects over the past ten years to improve the aesthetic and operational integrity of the Cemetery. Originally constructed in 1980 as the first municipally owned crematory in Massachusetts, by 2010 the **Duxbury Crematory** was the most used crematory in the state with more than 3,000 cremations performed annually. In order to keep pace with the high volume of use and replace the outdated facility, the Town constructed a brand new, state of the art cremation facility which opened in 2012. The newly constructed Duxbury Crematory includes industry leading equipment and operational technology. The front of the building provides office space for the Town's Cemetery Department, which are separated from the cremation chambers and other rooms to provide privacy for families during the cremation process. In FY17, the Town's capital budget included funding to rebuild the crematory's four retort units, which due to their high use must be completed every 6-7 years. In 2015, the Town constructed a new **Cemetery Department Maintenance Building** behind the Crematory/Cemetery Office building, which includes work space for employees and storage for all Cemetery Department equipment. The construction of the new facility allowed for the demolition of the old maintenance buildings, which were located at the front of the cemetery, providing unobstructed views of the Cemetery from 3A and opening land for the creation of new plots.

Over the years, the Town has had to balance competing needs for land between the Cemetery Department and other municipal facility projects. The Duxbury Senior Center, located at the corner of Mayflower and Tremont, was built on land which was previously developable as grave space. In 2010, Town Meeting approved a motion to transfer Town owned land that abuts the rear of the Cemetery from the Board of Selectmen to the Cemetery Trustees for future expansion. In 2018, Annual Town Meeting approved a master planning project for the Mayflower Cemetery. The Mayflower Cemetery Master Plan is in the process of being prepared with the assistance of an outside consultant. The

Master Plan is focused on the development of cemetery property for graves and a memorial garden on the west side (by the current Senior Center) of the cemetery and along Mayflower Road to the current crematory site, as well as for expansion of the current columbarium facilities on Mayflower Avenue. The expansion/development process is expected to take several years to complete, and to be financed by utilizing cemetery funds as well as Town-appropriated funds.

Water and Sewer Facilities

Name	*Address*	*Year Built, Renovated*
Birch Street Water Tank	50 Birch Street	2009
Captains Hill Water Tank	235 Crescent Street	1972, 2019
Damon Well Treatment Plant and Pumping Stations	215 Church Street	2009
Depot Street Pump and Chem Building	261 Depot Street	1995
Evergreen Treatment Plant and Pumping Stations	169, 175 Evergreen Street	1998
Lake Shore Drive Pump Station	360 Lake Shore Drive	1996
Mayflower Pump Stations	590 Mayflower Street	1995
Millbrook Pump Station, Chem Building, and Garage	1300 Tremont Street	1995
Partridge Road Pump Station Well and Chem Building	106 Partridge Road	1996
High School Wastewater Treatment Plant	Lovers Lane	2002

As part of the Cemetery Master Plan, the vision for Mayflower Cemetery is to protect it as a sanctuary of remembrance, respect, and reflection, and not a site of recreation or public throughway. The property will be adopting sustainable land management and maintenance procedures and adapting facilities for energy conservation and reduction. The plan will also be exploring climate change vulnerability of cemetery properties and the need for expansion.

The Town of Duxbury's Water and Sewer Division of the DPW provides drinking water and water for fire protection to Duxbury residences, businesses, and institutional users, as well as a number of residences in neighboring Marshfield. Residents of Duxbury Beach and Gurnet Road receive their water through an interconnection to the Town of Marshfield, while Marshfield residents living on Careswell Street, Partridge Brook Circle, Prince Circle, Pioneer Trail, Settlers Path, and Enterprise Street receive water from the Duxbury Water Department. Duxbury's Board of Selectmen also act as the Town's Water and Sewer Commissioners. A three-member Water and Sewer Advisory Board appointed by the Town Moderator makes recommendations to the Board of Selectmen with regard to setting water rates and assists the DPW Director and Superintendent of Water in the development and implementation of long-range system improvement plans.

In 2017, the Duxbury Water Department pumped, treated, and distributed 585 million gallons of water to its approximately 5,600 service connections. The Duxbury water system draws its supply from 12 gravel-packed wells. Each well has its own pumping station and chemical feed equipment. Although soil naturally filters groundwater, the Evergreen Wells site includes a Water Treatment Plant to further treat the water by removing iron and manganese. The Facilities Department's capital improvements plan projects investing $30,000

annually in the maintenance and rehabilitation of water enterprise facilities, focused on features such as the building envelopes and building systems. In FY18, the Facilities Department completed restoration projects at the Millbrook and Lakeshore Drive pump stations. The Water Department separately accounts for and completes maintenance on the water pumping and treatment technology housed by the pumping station buildings. In 2019, Annual Town Meeting approved $250,000 in funding to purchase a generator for the Evergreen Treatment Plant and to conduct preliminary engineering work to plan for the future installation of generators at seven additional well sites. The generators are needed to allow for continuous operation during storm events, which are trending towards increasing frequency and intensity.

The Water Department also completes regular maintenance and other capital improvements to its water distribution infrastructure, relying on a combination of retained earnings and borrowing when necessary. In addition to annual system rehabilitation, which involves the replacement of undersized mains, the Town has traditionally funded $150,000 per year to remove vinyl-lined asbestos cement (VLAC) water pipes. However, in 2019 the Water Department requested and received $2.5 million in funding to complete the remaining VLAC water pipe replacements within one to two years. The Water Department is in the process of developing a comprehensive water system master plan, which will serve as a roadmap to guide the improvement of Duxbury's water system in the coming years. The previous water system master plan was completed in 2002 and has been completed.

Duxbury's two water storage facilities – the Captains Hill Water Tank and Birch Street Water Tank – augment the water supplied by well pumping, providing a reliable water source for fire protection and improving water pressure. The 2 million gallon Captains Hill Water Tank was constructed in 1972 and a $900,000 rehabilitation project was approved at 2017 Town Meeting. The Birch Street Water Tank was constructed in 2009, to replace the previously used water tank on site which dated to the 1940s. Although both the old and new structures were designed with a 1 million gallon storage capacity, the newly constructed Birch Street Water Tank is elevated, allowing for the availability of its full storage capacity. The construction of the new tank greatly improved water pressure and firefighting capabilities in the northwest side of Duxbury, and allowed for the division of the water system into two pressure zones.

Duxbury's municipal sewer system is also managed by the Water and Sewer Division of the Department of Public Works and under the direction of the Board of Selectmen in their capacity as the Town's Sewer Commission. Although residences along Gurnet Road are connected by municipal sewer to the Town of Marshfield's Wastewater Treatment Plant, the majority of the town is served by on site wastewater treatment systems, i.e. septic systems. However, the buildings located at the school complex campus – including the Middle/High School, Alden Elementary, Duxbury Free

School Facilities Existing Conditions

Name	*Address*	*Year Built, Renovated*
Duxbury Middle/High School	71 Alden Street	2014
Alden School	75 Alden Street	1949, 1997, 2003
Performing Arts Center	75 Alden Street	2004
Chandler Elementary School	93 Chandler Street	1974, 2003

Duxbury Public Schools Enrollment								
School Building	*Grades*	*14-15*	*15-16*	*16-17*	*17-18*	*18-19*	*Projected 19-20*	*Projected Change (+/-)*
Chandler Elementary	PreK to 2nd	659	640	614	628	635	641	6
Alden School	3rd to 5th	699	699	710	635	635	618	(17)
Middle/ High School	Middle: 6th to 8th	778	778	760	752	752	737	(15)
	High: 9th to 12th	1,106	1,106	1,068	1,059	1,006	1,000	(32)
Total:		3,242	3,218	3,152	3,109	3,028	2,996	(32)

Table: *Duxbury Public Schools Enrollment Source: Duxbury Schools Proposed FY20 Budget*

Library, and the Percy Walker Pool – are serviced by a the High School Wastewater Treatment Plant. The High School Wastewater Treatment Plant was constructed in 2002 as part of a broader Master Facility Plan for the Duxbury Public Schools. The wastewater treatment plant has a capacity of 100,000 gallons per day (gpd), although it is permitted for 50,000 gpd. In 2006, Town staff took over the operations of the treatment plant; operating the facility in-house without contractual assistance resulted in cost savings to the Town.

Duxbury operates its own school system, with 3,015 students enrolled across its four schools in the 2018-2019 school year. The district is governed by the Duxbury School Committee, a board of five elected members, and managed by the Superintendent, who is appointed by the School Committee. In FY20, the Duxbury Public Schools had an appropriated budget of $36.94 million and employed 415 FTE.

As articulated by the District's 2012-2017 Strategic Plan, the mission of the Duxbury Public Schools is to "engage students in a stimulating and diverse education that challenges all students to develop the competencies and confidence to adapt and contribute their skills in an ever-changing world." Developed through a process involving internal and external scans and engagement with stakeholder groups, the strategic plan outlines four overarching goals supported by related strategies and defined measurable outcomes. The four overarching goals include:

- *Goal 1:* Give academics a higher status
- *Goal 2:* Foster and support a curriculum that is robust, innovative rigorous and relevant for all students
- *Goal 3:* Forge new ways to provide authentic collaborative experiences and opportunities for our students to become college and career ready and globally astute upon graduation from high school
- *Goal 4:* Strengthen communication and partnerships with the community

As of early 2019, the Duxbury Public School District is in the process of updating its Strategic Plan, which will guide the District's operations over the next five years.

The district's elementary school population is spread across two school buildings. Students in prekindergarten through second grade attend the Chandler Elementary School, while third through fifth graders attend the Alden School. The Duxbury Middle/High School enrolls students from grades 6 through 12. When the 2012-2017 Strategic Plan was completed the District was in a period of historically high enrollment (3,200 – 3,400 hundred students). However, the District's enrollment forecast projects a decline in the student population over the coming years.

As noted by the Strategic Plan, the District's investment in creating state of the art school facilities and the local real estate market may influence future student enrollment in ways unaccounted for by the enrollment projection models. In 2000, the School Committee approved a Long-Range School Facilities Master Plan, which assessed the capacity and functionality of the four school buildings operating at the time. The Town quickly implemented several of the Plan's recommendations, by undertaking a large scale project supported by funding from the Massachusetts School Building Authority (MSBA) targeting the Chandler School, Alden School, and constructing a new wastewater treatment plant and Performing Arts Center on the St. George Street campus complex.

The **Chandler Elementary** school building, located to the West of Route 3, was constructed in 1974 to alleviate overcrowding within the growing school system. The 2000 Facilities Master Plan identified the Chandler as in need of renovation, the expansion of classroom space, and accessibility improvements. The construction of the additional classroom sections were completed and opened in January 2003, and the renovated cafeteria, kitchen, and gymnasium areas were opened in the spring. The building's roof required replacement in 2009, and the Facilities Department is in the preliminary stages of completing an HVAC modernization project which is partially supported by Green Communities funding.

In July of 1997, Duxbury reorganized grade levels and spaces throughout its schools system to optimize the use of its facilities in response to overcrowding. As part of the reorganization process, the **Alden School** building – which had been used by the Recreation Department and Council on Aging for programming space - was renovated and reopened for use as one of the Town's school buildings. Further improvements to the facility followed in the early 2000s, including updating and the addition of classroom space. Recent Facilities Department capital projects at the Alden School include the phased replacement of the building's windows and repairs to the school library's roof, which had suffered consistent leaks due to rain. The Facilities 10-year CIP projects several other large scale projects on the horizon, including renovations to the original building section and its roof replacement.

Opened in April 2004, the Duxbury Performing Arts Center was constructed both to support the educational programs of the Duxbury Public School system and to serve as a true community resource by providing a state of the art venue for a wide range of cultural and civic events. The Performing Arts Center has 975 seats, with 12 spaces for wheelchairs.

The 2000 Facilities Plan also identified the need to upgrade the Town's middle and high schools. The two separate buildings then in use were constructed in the 1960s, and despite maintenance suffered from deteriorated building systems, outdated layouts, and undersized classrooms and student services areas. The condition of the facilities was found to actively impede the educational mission of the schools, and in 2009 Duxbury voters approved a feasibility study to assess the conditions of both schools in anticipation of a major project. The feasibility study considered various options

to address the buildings' deficiencies, including a rigorous maintenance program, renovation and expansion, and new construction. The Town's School Building Committee identified new construction as the most advantageous and effective way forward.

At 2011 Annual Town Meeting, voters approved funding for architectural and engineering fees for schematic design work. The architectural firm Mount Vernon group, led by a Duxbury resident, subsequently developed schematic designs for a new co-located Middle/High School on the St. George Street campus, behind the existing middle school. The design was created as part of the MSBA Model School Program, which seeks to effectively adapt and re-use successful designs of previously constructed school facilities. Model School designs must be "efficient in design and easy to maintain, contain optimal classroom and science lab space, accommodate higher or lower enrollments, and incorporate sustainable design elements. Through the Town's partnership with the MSBA, 45% of the of the $128 million project budget was funded through State money; voters approved a debt exclusion to fund the Town's $77 million share of the project at Special Town Meeting in November 2011.

The newly constructed **Duxbury Middle/High School** opened in 2014. The building is composed of four distinct parts. The Middle School and High School classrooms each occupy a distinct portion of the building, which are joined by a central corridor to the shared community wing housing shared facilities such as the cafeteria, presentation hall, and library. The new building also connects to the Performing Arts Center. The former Middle and High School buildings were demolished as part of the development, and the space was repurposed for traffic circulation, parking, and green areas. In regard to recreation facilities, the School Department also maintains two multi-purpose grass athletic fields at the St. George School complex.

Coastal Infrastructure

Duxbury's coastal nature plays a prominent role in town history and continues to shape and contribute to the town's character today. Duxbury's coastal resources provide recreational, aesthetic, and natural benefits to the town and its residents. However, time and the present and anticipated effects of climate change, including sea level rise and increasingly intense storm events, have led to the degradation of important coastal infrastructure which provide access to water resources and protect the Town. The most immediate needs are outlined below for the coastal seawalls and Powder Point Bridge. Future needs may also include dredging, which was last completed in January 2016 and improvements to or replacement of the Town Pier.

Powder Point Bridge

Powder Point Bridge, originally constructed in 1891, provides scenic access to Duxbury Beach, the Town's most treasured natural resource. Once recognized as the oldest and longest wooden bridge in the world, the Powder Point Bridge was completely rebuilt due to structural degradation in the 1980s. The newly designed bridge was constructed using tropical hardwoods in order to incorporate the aesthetic values which had long been associated with the bridge, as well as the strength and durability normally associated with other materials. An inspection by the state Department of Transportation in 2010 classified all of the bridge's 555 piles as suffering either minor, moderate, or severe deterioration. Although the portions of the piles which sit outside of the tidal zone were in generally good condition, those pieces which were below the water line were affected. In 2012, the Town Meeting approved $2.4 million in funding for a rehabilitation project involving wrapping approximately half of the wooden pilings with a fiberglass shell to stabilize and protect their integrity. However, the fix proved to be short lived as by 2015 the fiberglass jackets failed

following particularly harsh winter weather. As of 2019, the Town had reached a settlement with the repair company to remove the wrap and are evaluating options to repair and preserve the bridge. Special Town Meeting in March 2019 approved $85,000 in funding for engineering and design services for short term repairs to the bridge.

Duxbury Beach Seawall

The Duxbury Beach seawall was constructed in the 1950s to protect the barrier beach and Gurnet Road, which now provides access to about 300 properties. The average seawall expectancy is approximately 50 years, with the structures passing the end of their useful life at more than 65 years. A study in 2011 found the Duxbury Beach seawall to be in critical condition and replacement was recommended. However, at the time the Town was embarking on a series of large scale capital construction projects – including the Police Station, Fire Station expansion, and the new Middle/High School – and no major improvements were made. In 2018, Winter Storm Riley caused 850 linear feet of the 3500 linear feet seawall to fail, which required emergency short-term solutions and precipitated action towards a longer term approach. 2019 Annual Town Meeting approved limited funding for the design, construction, maintenance, repair and replacement of the Duxbury Beach Seawall, and betterments will be part of the funding. The repair project will cost roughly $6 million but up to 75% of the expense may be refunded by the Federal Emergency Management Agency, while the state has provide $1 million in grant money. Permitting is delaying repair which is currently anticipated in 2021.

Recommendations

The following goals and strategies are intended to advance and sustain Duxbury's careful investment and direction of its public resources. The Town is evaluating grants to fund the long term replacement of the undamaged wall that remains and for beach maintenance all estimated at well over $20 million.

Goal 1: Leverage public facilities to provide professional and recreational opportunities to town residents.

- **Strategy 1.1:** Consider how town facilities, such as the library, can accommodate individuals who work remotely or in home occupations.

- **Strategy 1.2:** Expand on trainings and support available in the town for support of home businesses.

- **Strategy 1.3:** Evaluate town owned and operated waterfront facilities, e.g. public docks and waterfront parks, and identify improvements to allow for appropriate and improved public access to the town's water resources.

Goal 2: Continue developing capacity to plan and implement long term, proactive infrastructure and facilities improvements.

- **Strategy 2.1:** Identify and establish additional best practices for capital improvement planning for long term maintenance and infrastructure needs including establishing a fund to cover the local share of TIP or other shared funding projects.

- **Strategy 2.2:** Examine options for providing additional engineering expertise to respond to Town infrastructure needs.

- **Strategy 2.3:** Continue to prioritize and implement recommendations from prior planning efforts, such as the Town's Climate Vulnerability Assessment Plan and Hazard Mitigation Plan, to protect Town facilities and infrastructure

threatened by the present and anticipated effects of climate change, e.g. increased storm intensity and sea level rise. The Town received an MVP implementation grant to prioritize and assess infrastructure needs where vulnerable to flood and wave damage.

Goal 3: Identify opportunities to collaborate and coordinate regionally.

- **Strategy 3.1:** Continue, and consider expanding, participation in collective purchasing programs for capital equipment, e.g. police, fire and public works vehicles, to benefit from economies of scale and save staff time.

- **Strategy 3.2:** Collaborate with neighboring communities to encourage preservation of green spaces and to identify locations of possible shared use paths and other connections between adjacent green spaces.

- **Strategy 3.3:** Create processes and cultivate relationships to better coordinate with neighboring towns in addressing the impacts of development related to infrastructure, road safety, emergency access, and climate vulnerability.

Goal 4: Strengthen effective communication and collaboration within Town government and with the public.

- **Strategy 4.1:** Clarify roles, responsibilities, and communication between boards, committees, and professional staff and the way information should be shared.

- **Strategy 4.2:** Continue to disseminate important information through a variety of channels and refine outreach strategies when appropriate.

- **Strategy 4.3:** Develop approach to assist residents with engaging federal or state resources or agencies, e.g. FEMA.

Goal 5: Ensure that town and school facilities meet patterns of community use and departmental operations' needs.

- **Strategy 5.1:** Plan for the replacement or substantial improvement of facilities whose characteristics of size, condition, or location inhibit the efficient operation of the departments which rely on them.

- **Strategy 5.2:** Provide sufficient resources to support thorough and timely operational maintenance activities, including responses to corrective and preventive maintenance work orders.

- **Strategy 5.3:** Consider the long term future needs of cemetery expansion as part of town facilities planning.

In planning for the long term needs of the cemetery facilities, protect the historic Mayflower Cemetery as a sanctuary of remembrance, respect, and reflection.

Chapter 11
Economic Development

Key Findings

A town's livability and identity is heavily influenced by its economic activities. For residents of Duxbury, there are three major neighborhood business districts – the Snug Harbor waterfront, Hall's Corner and Millbrook – serving both local and regional needs and are important contributors to the town's commercial tax base. Additionally, there are five smaller districts dotted throughout town, including Cox Corner, Osborn's, Bongi's, Bennett's Corner, and the area near Duxbury Fitness. For a primarily residential community like Duxbury, sustaining and strengthening the commercial base will be critical in relieving the tax burden on residential owners. The vitality of the waterfront corridor, a revitalized Hall's Corner, and greater integration of its history into a larger economic strategy will further diversify the town's commercial tax base, while reinforcing Duxbury's identity as a quiet, community-focused seaside town.

Image: *Local Shops in Hall's Corner Source: MAPC*

Introduction

Throughout this process, MAPC and town staff reached out to various businesses in Duxbury to gauge their thoughts on town business-friendliness and compared Duxbury to other neighboring communities. Additionally, at the October open house, a couple of business retention and attraction exercises were created for participants to take part in. When asked about what they love most about Duxbury, residents and business owners almost always reference the town's coastal location, its beaches, history, its proximity to major population centers, and sense of place and intimate community. These community values and physical attributes hold potential for future economic growth in Duxbury.

Since 1950, Duxbury has grown more than five times its population from about 3,000 to more than 15,000 residents. The Town's population as of 2017 was 15,572 people with a median age of 45.5 and a median household income of $123,613. Between 2010 and 2017 the population grew by 675 people, a 4.5 percent increase, similar to the national rate, and more than the 3.9 percent increase for Massachusetts, and the town has become wealthier over the same time period. Median household income grew by $9,048 from $114,565, a 7.9 percent increase (compared to a state increase of 10 percent and US increase of 15.2 percent[1]). The mean household income for Duxbury is $155,330, which exceeds median household income, indicating that Duxbury is a town of high wealth residents. Households in Duxbury have a higher median annual income than Plymouth County ($82,081), Massachusetts ($68,563), and the United States as a whole ($53,889). The percentage of households with income levels below $100,000 saw a decline by 7.2 percent, compared to those who made $100,000 or more, that grew by 7.3 percent.

1. According to the Census, the 2016 national median household income was $57,617 and the state median household income was $70,954.

The 2017 median property value of owner-occupied homes in Duxbury is $594,000, and the homeownership rate is 90 percent. Compared with its nearest neighbors, Duxbury's median property value of owner occupied homes has increased substantially. Over the last decade the town has become wealthier and properties have become more valuable.

Housing costs as a percent of household income vary by whether one owns a home, pays a mortgage, or whether they rent. In general, home owners without a mortgage pay a lower percentage of their income for housing compared with renters or mortgage-holders. In Duxbury, a majority of renters pay over 20 percent of their household income to gross rent, with about a third paying more than 35 percent of their income. This is opposed to homeowners without a mortgage, where about half pay less than 15 percent of their household income on monthly home owner costs.

Homeowners purchase an asset that, on average, they hold for a long period. Homeowners pay between 18 and 23 percent of their income on housing (depending on whether their housing costs income a mortgage or not) whereas 25 percent of renters pay more than 50 percent of their income for rent. These figures together indicate that homeownership is typically a key indicator of economic security.

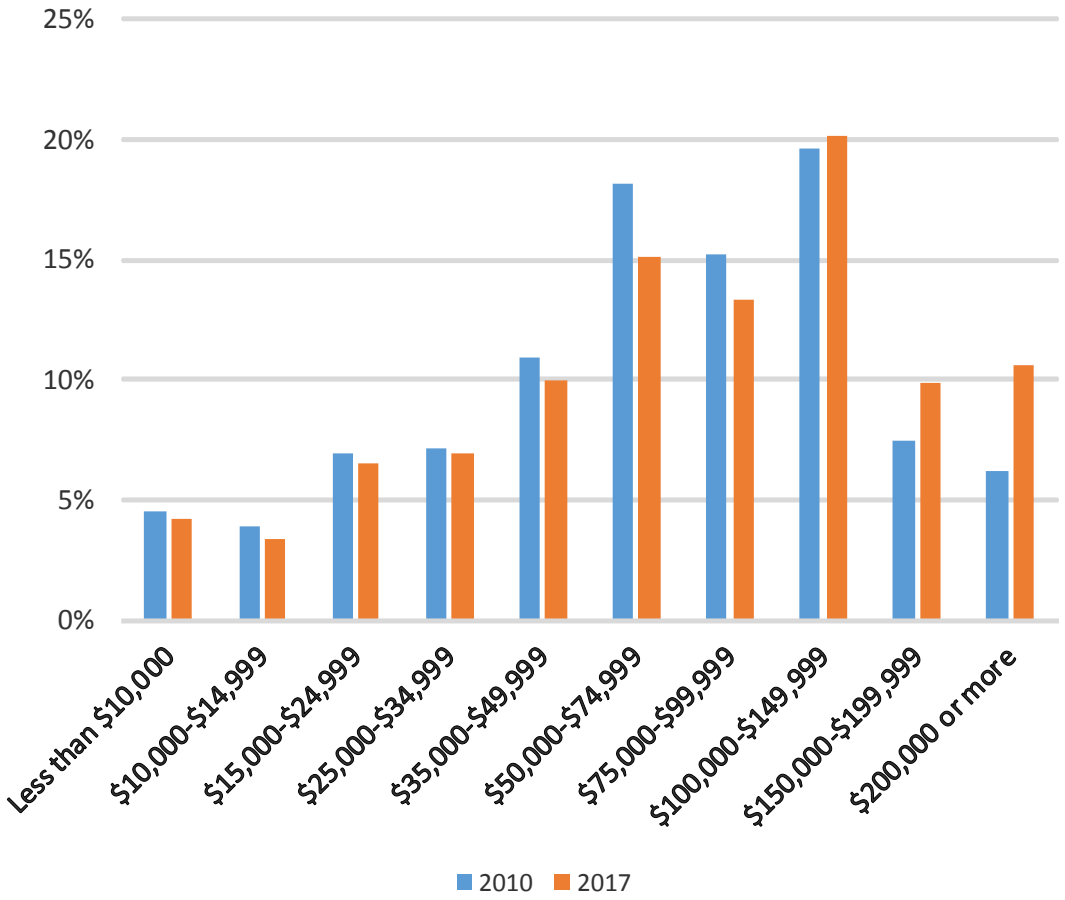


Figure: *Change in Household Income (2010-2017) Source: U.S. Census*

Existing Conditions

Industry Structure

In 2016, Duxbury's population 16 years and over was 12,042, of which the labor force participation rate was at 62 percent. The local economy employed about 4,451 full time, part time and seasonal people from throughout the region. The largest private employers in Duxbury are Bay Path Rehab and Nursing Center, the Village at Duxbury, and Allerton House. The largest employers in Duxbury are Elementary and Secondary Schools (785 employees), Nursing Care Facilities (220), and Legislative Bodies (613).

Regarding trends in average monthly employment, in both 2006 and 2016, the Education and Health Services industry had the largest share of employees (1,172 and 1,370 respectively). This was an increase of 198 jobs within the ten year period, more than any other industry. This was followed by Leisure and Hospitality, which gained 69 positions, Trade, Transportation and Utilities, which grew by 67 positions, and Dentists, which gained 39 employees. However, the largest increase in jobs was in the Building Equipment Contractors trades, which grew 240% from 15 positions to 51 during the ten year period.

	Industry Type	Number of Jobs	Percent of Jobs
	Total, All Sectors	*4,451*	*100 %*
1	Elementary and Secondary Schools	785	17.64%
2	Nursing Care Facilities	220	4.94%
3	Legislative Bodies	178	4.00%
4	Offices of Real Estate Agents and Brokers	176	3.95%
5	Lessors of Residential Buildings and Dwellings	163	3.66%
6	Assisted Living Facilities for the Elderly	157	3.53%
7	Full-Service Restaurants	152	3.41%
8	Offices of Dentists	96	2.16%
9	Offices of Physicians	92	2.07%
10	Semiconductors and Related Devices Manufacturing	88	1.98%
11	Religious Organizations	82	1.84%
12	Landscaping Services	76	1.71%
13	Charter Bus Industry	71	1.60%
14	Police Protection	59	1.33%
15	Offices of Lawyers	56	1.26%
16	Child Day Care Services	55	1.24%
17	Libraries and Archives	55	1.24%
18	Surgical and Medical Instrument Manufacturing	50	1.12%
19	Investment Advice	49	1.10%
20	Child and Youth Services	45	1.01%
	All Other Jobs	1,746	39.21 %

Table: *Employment by Sector (2016) Source: U.S. Census*

Conversely, Amusement and Recreation industries, along with doctor's offices, saw a small decline of positions. Services that were not within the education, health, professional, business, or leisure sectors also saw a decline, shedding about forty positions in the ten-year period. The largest industry to lose jobs, however, were the Professional and Businesses Services, which saw the loss of 95 positions, or over a quarter of their 2006 number of 334.

The majority of jobs in Duxbury are found in small businesses with fewer than 25 employees. In fact, only about fifteen businesses employ more than 50 people. This is not surprising given Duxbury's relative location along the coast and away from more densely populated areas. Large employers typically locate facilities adjacent to regional transportation networks that offer access from multiple directions to maximize employee convenience and/or provide convenient truck access for shipments. However, a few manufacturing firms have operations in Duxbury, like Woodchuck Industries and Wafer Inspection Services, for example.

Some of the largest employers in Duxbury range from assisted living facilities and nursing care to school districts and town services. In fact, senior services and school districts were the only businesses with over a hundred employees, both full-time, part time, and seasonal. Out of a total of 614 businesses, seven had over one hundred total employees, eight were between 50 and 99, 24 had between 20 and 49, and 58 had between 10 and 19.

However, most businesses had less than 10 employees, with 116 businesses having between 5 and 9 employees and 373 having less than five. Duxbury has a large number of businesses with only one or two employees. Although the

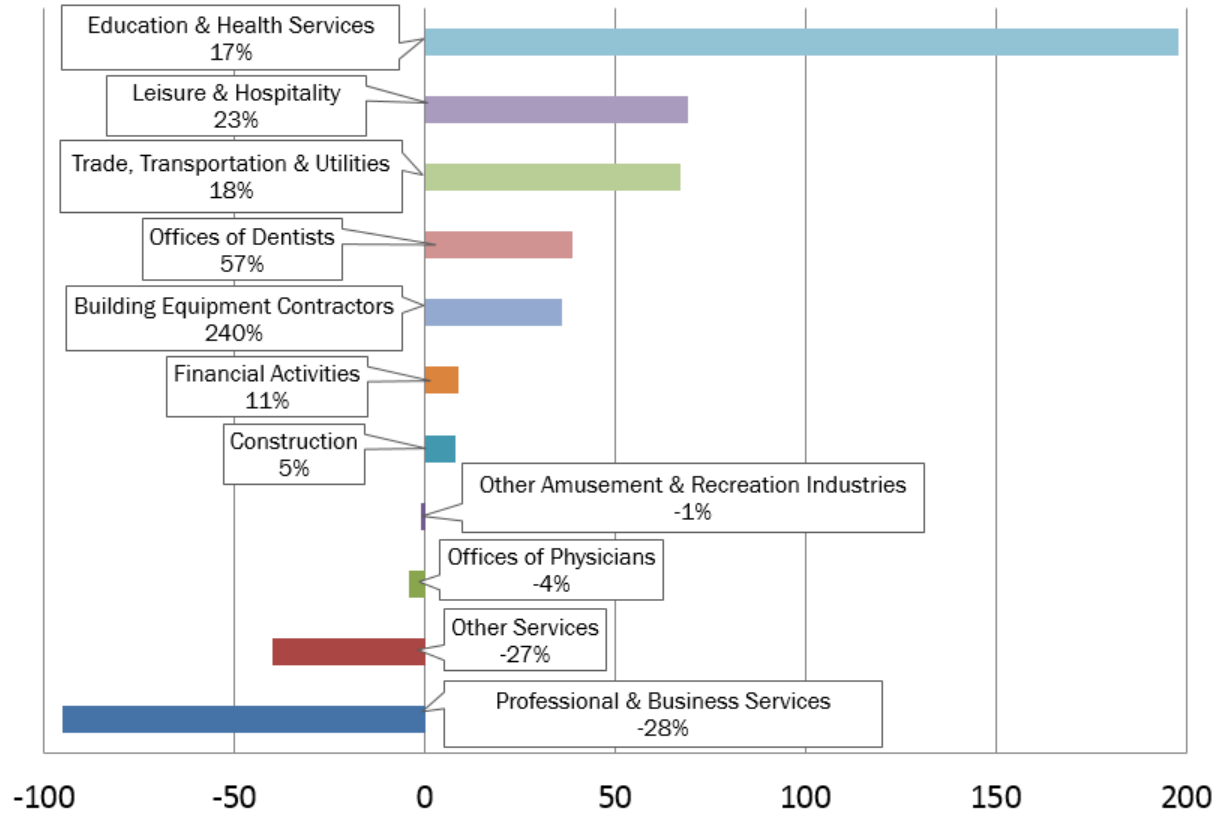


Figure: *Average Monthly Employment Trends by Business Sector (2006-2016) Source: U.S. Census*

	Company Name	Business Type	Employee Range
1	Bay Path Rehab and Nursing	Nursing Care Facilities	100-249
2	Duxbury School District	Elementary and Secondary Schools	100-249
3	Duxbury High School	Elementary and Secondary Schools	100-249
4	Village at Duxbury	Lessors of Residential Buildings and Dwellings	100-249
5	Allerton House	Assisted Living Facilities for the Elderly	100-249
6	Duxbury Middle School	Elementary and Secondary Schools	100-249
7	Alden Elementary School	Elementary and Secondary Schools	100-249
8	Wafer Inspection	Semiconductors and Related Devices Manufacturing	50-99
9	Duxbury Elementary School	Elementary and Secondary Schools	50-99
10	Duxbury Police Department	Police Protection	50-99
11	Chandler Elementary School	Elementary and Secondary Schools	50-99
12	Coldwell Banker	Offices of Real Estate Agents and Brokers	50-99
13	Ameds LLC	Surgical and Medical Instrument Manufacturing	50-99
14	Bay Farm Montessori Academy	Elementary and Secondary Schools	50-99
15	Milepost Tavern Restaurant	Full-Service Restaurants	50-99

Table: *Largest Individual Employers in Duxbury Source: U.S. Census*

data states that there are 91 businesses with just one employee and 117 businesses with two, Infogroup does not include many of the home-based businesses in town. Home businesses are usually defined by having a very small number of employees, usually through a sole proprietor or with the immediate family of the business owner, in which case it is also a family business. Most home businesses generally lack shop frontage, customer parking and street advertising signs.

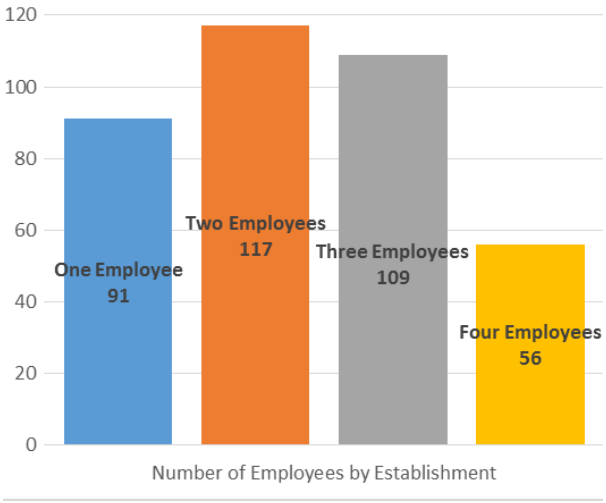


Figure: *Number of Small Businesses with Less Than Five Employees Source: U.S. Census*

Wages

The highest paying jobs in 2006, Financial Investment, Computer Systems Design, and Professional and Business Services, saw three distinct changes in the ten-year period. Although Financial Investors saw a $570 increase in wages, this was eclipsed by Computer Systems Designers, which saw the largest wage increase during the ten-year period, increasing by about $2,370, even as the number of establishments decreased from 14 to nine. Conversely, Professional and Business Services sector saw wages decline by approximately $410, the most out of any of the listed business types. This is also as the number of positions decreased from 334 to 239 in Duxbury. The largest industry in town, Education and Health Services, saw average wages decline a little under a hundred dollars in the ten years. Other industries that saw a decrease in wages were Natural Resources extractors, Trade, Transportation and Utilities, Residential Building Construction, Leisure and Hospitality, and Dentists.

Business Type	# of Firms	Adjusted Average Monthly Wage		Change in Wages
	2016	*2016*	*2006*	
Computer Systems Design	9	$4,374	$2,002	$2,371
Financial Activities	91	$2,405	$1,303	$1,101
Offices of Real Estate Agents/Brokers	8	$2,375	$1,618	$756
Electronic Markets/Agents/Brokers	37	$2,338	$1,718	$619
Building Equipment Contractors	51	$1,250	$645	$604
Other Financial Investment Activities	16	$2,758	$2,188	$569
Legal Services	7	$1,277	$779	$497
Other Professional/Technical Services	24	$957	$573	$383
Offices of Physicians	103	$1,649	$1,287	$361
Construction	174	$1,409	$1,111	$297
Architectural/Engineering Services	36	$1,598	$1,320	$277
Information	49	$1,017	$750	$266
Depository Credit Intermediation	20	$1,196	$943	$252
Management/Technical Consulting	44	$2,025	$1,821	$203
Insurance Agencies, Brokerages	21	$1,466	$1,266	$199
Manufacturing	29	$727	$540	$186
Child Day Care Services	27	$387	$366	$20
Offices of Dentists	108	$1,164	$1,197	($33)
Leisure and Hospitality	366	$45	$500	($48)
Residential Building Construction	26	$1,483	$1,533	($50)
Trade, Transportation and Utilities	435	$782	$864	($82)
Education and Health Services	1,370	$776	$868	($92)
Natural Resources and Mining	18	$647	$937	($290)
Professional and Business Services	239	$1,419	$1,829	($410)

Table: *Wage Growth per Duxbury Industry (Adjusted for Inflation) Source: U.S. Census*

Tax Structure

As of 2017, Duxbury splits its tax rate equally between residential, industrial, commercial, and personal property at 25 percent each. Given the town's relatively small commercial/industrial tax base, 4.18 percent of its total tax value comes from commercial, industrial, and personal property funds. Residential taxes account for 95.82 percent of Duxbury's tax base, making it the 17th highest residential tax percent out of total levy out of 351 municipalities in the state, between Clarksburg and Leverett.

Duxbury's total assessed value of more than $3.7 billion in 2017 is considerable given that the town is the 129th most populous municipality, but has the 85th highest total assessed value, even with a small industrial tax value and no open space tax. Duxbury's commercial assessed value of about $101 million makes it the 171st highest in the state, whereas its total residential value of $3.6 billion ranks it as the 72nd highest rate.

Within the South Shore, Hingham had the highest assessed value at about $6.5 billion. This was a combination of its population, size, and proximity to Boston, as well as its larger share of residential, commercial, industrial and personal property tax revenue. Hull had the lowest total tax value, and the lowest values in residential and commercial tax. It is also the only regional community with no industrial tax, given its small population and geography and lack of industrial spaces. Duxbury was generally in the middle in each tax value, although it ranked relatively high in residential taxes at$3.5 billion. None of these communities had an Open Space tax.

Duxbury's 2017 commercial and residential tax rates were at 15.51. This was close to the state median rate of 15.58 in Goshen. Furthermore, regarding commercial taxes, Duxbury's rate of was also lower than the state average of 17.86 and state median of Tyngsborough at 17.16.

Town	Residential	Commercial	Industrial	Personal Property	Total Assessed Value
Duxbury	**$3,590,943,268**	**$100,882,281**	**$3,009,900**	**$52,872,380**	**$3.75B**
Cohasset	$2,564,462,219	$163,904,671	$1,070,900	$25,930,820	$2.76B
Hanover	$2,132,022,383	$300,618,240	$59,399,727	$54,204,940	$2.55B
Hingham	$5,665,777,460	$521,896,100	$176,387,600	$101,728,750	$6.47B
Hull	$1,918,922,742	$56,445,658	0	$32,882,830	$2.01B
Marshfield	$4,218,292,026	$227,304,272	$49,318,100	$80,548,370	$4.56B
Norwell	$2,149,241,671	$300,707,832	$29,870,800	$47,474,220	$2.53B
Pembroke	$2,230,759,287	$213,509,908	$74,178,424	$36,916,870	$2.56B
Scituate	$4,091,047,873	$126,931,317	$12,397,200	$44,743,570	$4.26B

Table: *FY2017 Assessed Values by Class Source: Municipal Assessors Data*

Neighborhood Business Districts

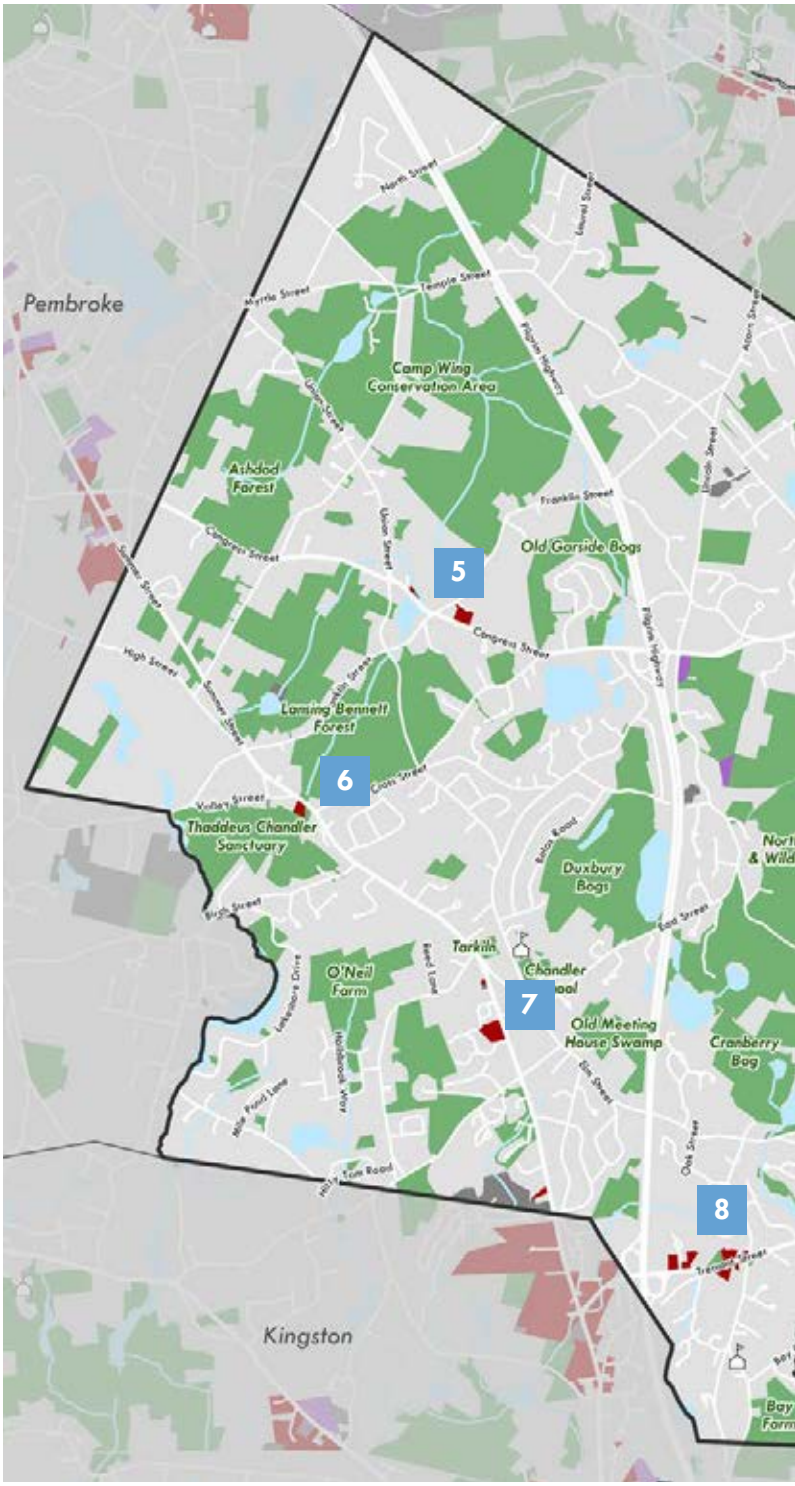
Overview

The Town of Duxbury has multiple Neighborhood Business Districts, as displayed in the map below, the three largest consisting of Hall's Corner (1), Millbrook (2), and Snug Harbor (3) Other districts include the areas around 3A and Church Street (4), Duxbury Fitness (5), Osborn's (6), Bongi's (7), and Island Creek Village and Bennett's Corner (8). Hall's Corner has the largest concentration of businesses compared to the other districts.

Retail Opportunity Gap Analysis

A retail gap analysis provides a comparison of demand within a geographic area, defined as the estimated spending potential of area residents for various types of goods and services, and supply, identified as sales of those goods and services. The size of the difference between the estimated demand and actual sales is the "retail gap" (represented as demand minus supply). Where estimated purchases by area residents exceed estimated sales, the retail sector is described as having "leakage"; that is, residents on balance leave the trade area to make purchases. A "surplus" occurs where estimated sales exceed estimated expenditures by residents, indicating that customers come from elsewhere to make purchases in the trade area.

In order to estimate the amount of additional retail and services that Duxbury can support, it is important to first identify a trade area. The trade area is the geographic area from which a retail establishment generates sales. There are many factors to consider when determining a primary trade area including the distance and time that people may be willing to travel in order to reach a destination, any physical or geographic barriers as well as regional competition. Defining the trade area is critical because it defines the boundaries for which data is gathered and analyzed to identify retail opportunities. In neighborhoods that are compact, pedestrian-friendly, and mixed-use, many activities of daily living can be within a fifteen minute walking distance. Outside of



Hall's Corner, and to a lesser extent, Millbrook and Snug's Harbor, few areas currently have this sort of density and walkability in Duxbury.

For the study area the local trade area is a five minute drive (or fifteen minute walk) from Hall's Corner. It is reasonable to assume that people would be willing to travel this distance in order to obtain goods and services near Hall's Corner. The primary trade area for this is a ten minute drive. At this point in time it is not a particularly walkable area from a design

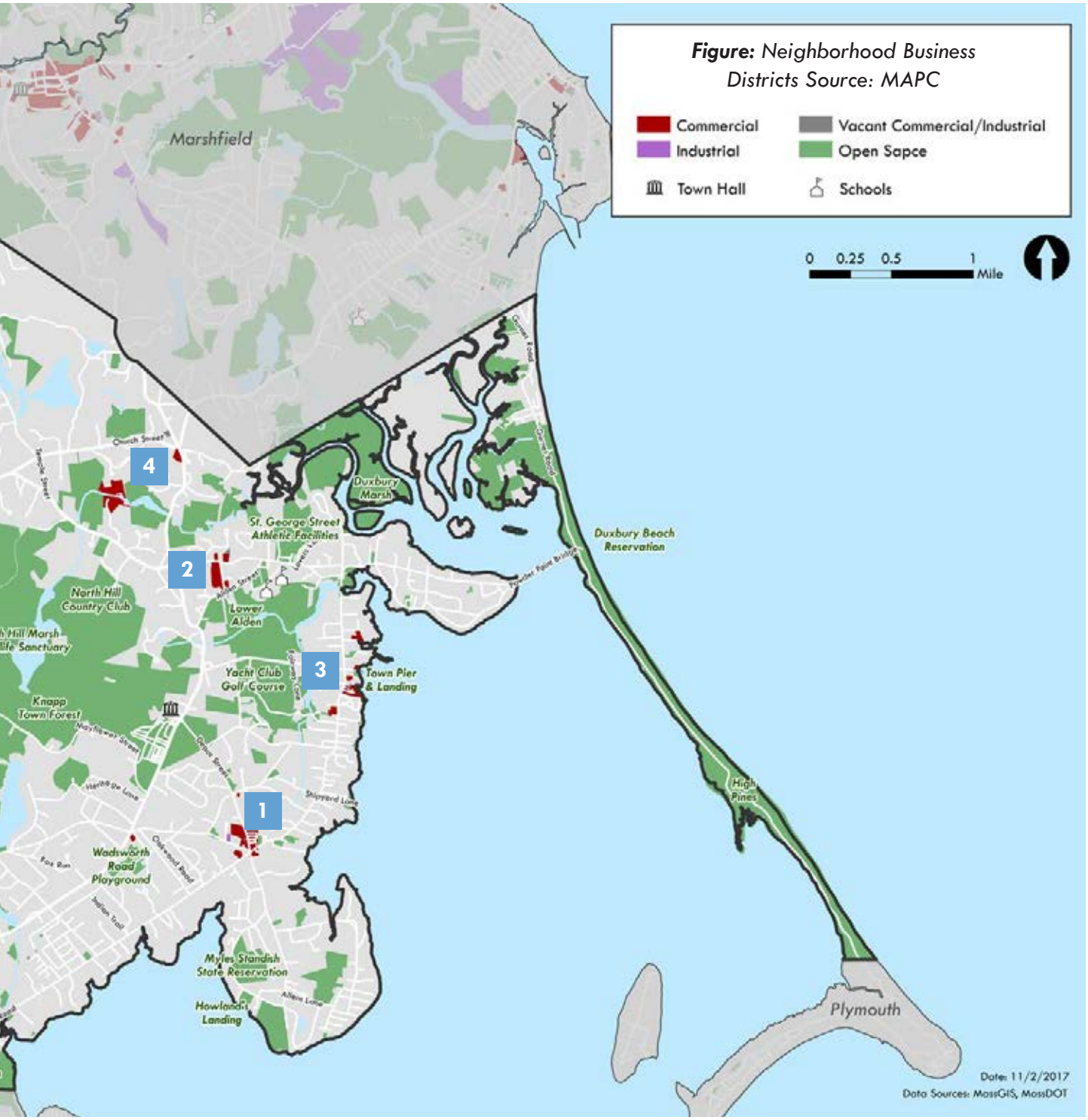


***Figure:** Neighborhood Business Districts Source: MAPC*

standpoint as there are a lack of sidewalks and as a result, more people travel by car, which needs to be taken into consideration when determining which businesses to attract and what potential infrastructure improvements should be undertaken to improve walkability and foot traffic.

Support for more sidewalks comes from both a commercial and recreational point of view. Not only do sidewalks provide for leisure but are good for business as well. Most US consumers say they typically travel 20 minutes or less to make everyday purchases, taking into account regional traffic conditions, a more conservative fifteen minute drive from Hall's Corner is used to determine secondary trade area.

For comparison and to account for a town-wide and regional draw, MAPC also considered a secondary, or regional trade area of a fifteen minute drive time off peak hours. Within the fifteen minute drive time, there is also significant competition outside of Duxbury with a number of other shopping areas and significant concentrations of suburban commercial strip retail. Municipalities within the fifteen-minute drive time include Marshfield, Pembroke, Kingston and Plymouth.

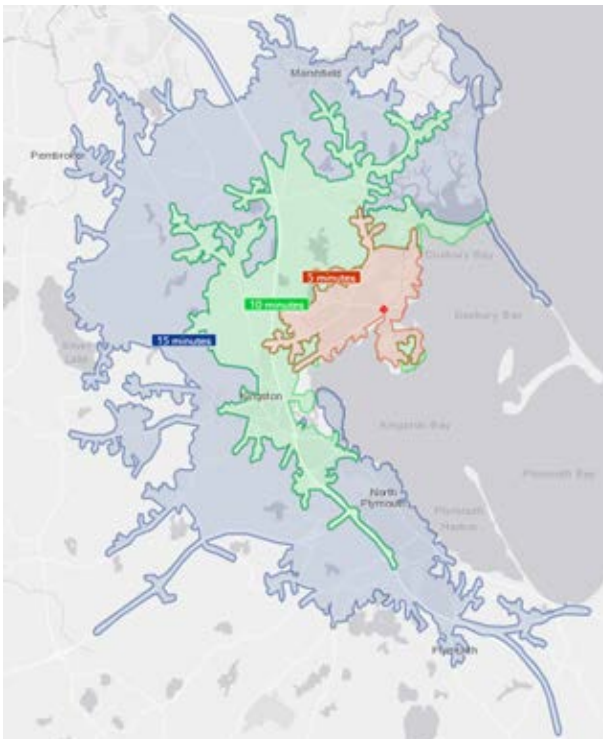


Figure: *Duxbury Local Primary and Secondary Trade Area Drive Times (from 5 Chestnut Street with 5, 10, and 15 minute drive times in red, green, and blue, respectively) Source: ESRI*

	2018 Trade Areas (From 5 Chestnut Street)			2018 Townwide ESRI Summary	2023 Townwide ESRI Projection
	Local 5 minute drive	Primary Regional 10 minute drive	Secondary Regional 15 minute drive		
Population	4,019	11,566	37,954	16,317	17,072
Number of Households	1,405	4,492	14,631	12,429	13,359
Median Household Income	$167,280	$108,578	$86,046	$142,828	$152,259
Median Disposable Income	$117,354	$82,249	$64,581	$105,711	N/A
Per Capita Income	$82,852	$56,264	$44,823	$68,298	N/A

Table: *ESRI Tapestry Demographics on Household Spending Habits Source: ESRI*

According to ESRI (Environmental Systems Research Institute) data, Duxbury's population is projected to increase by 755 in the year 2023. Additionally, median household income will grow by just under $10,000 in the same time period (not adjusted for inflation). The population within the local trade area (4,019) is one-quarter of the size of the town as a whole. The median income of those living within the local trade area is higher than that of those living within the primary and secondary trade areas, as well as the town as a whole, presenting a potential opportunity for businesses in the local trade area to capture those customers should they specialize in the services and products that they need. However, the population within the local trade area is substantially lower than the other areas.

The ESRI Tapestry Segmentation provides geo-demographic intelligence on how clusters of people make lifestyle choices. It profiles consumers into 68 distinct market segments in the United States. These market segments are typical lifestyle choices that each cluster of people are more likely to make. This could be anything from the type of car they're likely to buy or if they are more likely to have their newspaper delivered or to read online.

In addition to the opportunities for specific types of potential retail establishments identified by the retail sales gap figures, the ESRI Tapestry consumer spending habits listed below can potentially offer insight to existing and prospective businesses, zoning regulatory bodies, and the local Chamber of Commerce, and inform **a local-business outreach strategy** for permitting **and attracting specific types of retail investment.**

The following table highlights the four main tapestry segments in the Duxbury trade areas: Top Tier, Exurbanites, Savvy Suburbanites, City Lights and Pleasantville. The Top Tier, Exurbanites, and Savvy Suburbanites groups all fall under the Affluent Estates category,

Local 5 Minute Drive	Primary 10 minute drive	Secondary 15 minute drive
1% or 1 household	25% or 1,129 households	24% or 3,570 households
"Savvy Suburbanites" – Segment 1D "…are well educated, well read, and well capitalized and include empty nesters. Located in older neighborhoods, their suburban lifestyle includes home remodeling and gardening plus the active pursuit of sports and exercise. They enjoy good food and wine, amenities and cultural events."		
90% or 1,260 households	10% or 430 households	8% or 1,123 households
"Top Tier" – Segment 1A "… a highly educated, successful consumer market. Socially responsible consumers who aim for balanced lifestyle, they take an interest in the fine arts; read to expand their knowledge; and consider the internet, radio, and newspapers as key media sources. They regularly cook their meals at home, attentive to good nutrition"		*"City Lights" – Segment 8A "… a more densely populated urban market. Household types range from single person to married-couple families. A blend of owners and renters."*
9% or 144 households	26% or 1,180 households	17% or 2,824 households
"Exurbanites" – Segment 1E "…are active in their communities, generous in their donations, and seasoned travelers that take advantage of their proximity to large metropolitan centers to support the arts, but prefer a more expansive home style in less crowded neighborhoods. Consumers are more interested in quality than cost."		*"Pleasantville" – Segment 2B "…are spenders… fashion-conscious residents that shop for essentials at discount and warehouse stores but buy branded apparel. They also shop online and in a variety of stores, from upscale to discount, and use the Internet largely for financial purposes."*

Table: *ESRI Business Tapestry Segmentation for Duxbury Trade Areas Source: ESRI*

educated homeowners with established wealth and generally married couples with children ranging from grade school to adulthood. Spending habits include purchasing high-quality items, investing in time-saving services, and enthusiasm for community participation and traveling.

Pleasantville and City Lights households are located within a fifteen minute drive of Hall's Corner and include the most populous and fast-growing group in the nation, consisting of one-third of the population. They are general commuters that value low-density living, but demand proximity to jobs, entertainment, and the amenity of an urban center. They are well-educated, two-income households, accept long commute times to raise their children in these family-friendly neighborhoods.

Retail Gap Analysis

A retail gap analysis provides a snapshot of potential opportunities for retailers to locate within an area. MAPC analyzed ESRI Business Analyst data within the defined trade area in order to conduct a retail gap analysis. A retail opportunity or gap analysis looks at the overall demand for retail goods and services within a designated trade area based on the spending potential of the households (demand), and the actual sales for those goods and services within the market area (supply).

The difference between the demand and supply is called the retail "gap." If the demand exceeds the supply, there is "leakage" (a positive number in the table), meaning that residents must travel outside the area to purchase those goods. In such cases, there is an opportunity to capture some of this spending within the market area to support new retail investment. When there is greater supply than demand, there is a "surplus" (a negative number in the table), meaning consumers from outside the market area are coming in to purchase these good and services. In such cases, there is limited or no opportunity for additional retail development. Thus, the retail gap analysis provides a snapshot of potential opportunities for retailers to locate within an area.

The following table provides a summary of the retail opportunity gap analysis by industry group and trade area. In addition to information on the primary and secondary trade areas, data on the retail gap for the local trade area (or a fifteen minute walk time) is also included as a comparison. Figures in red are negative numbers that indicate there is a surplus of sales within the trade area. In other words, there are a significant number of establishments in the trade area within that industry group. Figures in green are positive numbers that indicate a retail gap or leakage and represent potential opportunities for more retail in the area. It should be noted that the gap analysis does not include competition from online retail sales.

The table indicates that the local and primary trade areas present some opportunities for additional mixed-use oriented retail. When considering a fifteen minute drive time (or secondary trade area), the ability to support additional retail establishments downtown substantially decreases due to there being more businesses within the trade area, which reduces residential spending power. Instead, increasing the amount of residential units within the local trade area would help to bolster retail market opportunities. Some exceptions to this are clothing stores and food and drinking establishments, for which there is an opportunity for development.

Additionally, business types that would fit well within a mixed-use development were compared as well. These include auto parts stores, clothing stores, food and beverage stores, and supply shops. Included in Miscellaneous Store Retailers were florists, office supplies, stationaries, and gift stores.

Industry Summary	Local Trade Area	Primary Trade Area	Secondary Trade Area
	5-minute drive time	*10-minute drive time*	*15-minute drive time*
Total Retail Trade and Food and Drink	$87,410,923	-$30,383,730	-$228,479,579
Total Retail	$78,568,576	-$41,773,614	-$190,908,169
Total Food and Drink	$8,842,347	$11,389,885	-$37,571,409
Mixed-Use Oriented Industry Groups	*5-minute drive time*	*10-minute drive time*	*15-minute drive time*
Motor Vehicle Parts Dealers	$22,739,003	-$17,688,192	-$105,664,297
Furniture and Home Furnishings Stores	$3,362,003	$5,491,899	-$11,282,686
Electronics and Appliance Stores	$3,861,354	$8,519,700	-$2,859,401
Building Materials, Garden Equip. and Supply Stores	$8,206,710	-$9,320,052	$878,752
Food and Beverage Stores	$19,475,318	-$54,381,242	-$17,113,405
Health and Personal Care Stores	$1,453,350	-$1,698,661	-$8,188,987
Clothing and Clothing Accessories Stores	$6,411,831	$4,631,541	-$12,686,694
Sporting Goods, Hobby, Book and Music Stores	$2,426,051	$3,011,509	-$8,338,348
General Merchandise Stores	$14,787,787	$815,720	-$20,032,466
Miscellaneous Store Retailers	$3,263,631	$7,675,781	-$14,365,107
Nonstore Retailers	$4,937,781	$10,297,942	$24,632,140
Special Food Services	$336,293	-$1,305,231	$368,400
Drinking Places - Alcoholic Beverages	$814,827	$1,577,556	-$2,510,775
Restaurants/Other Eating Places	$7,691,227	$11,117,560	-$35,429,035

Table: *Duxbury Retail Opportunity Gap Analysis Source: ESRI*

The primary local retail trade area, a five minute drive (or fifteen minute walk) from 5 Chestnut Street in Hall's Corner is an area that lends itself to mixed-use oriented industries, given its centralized location and relative density. The local trade area largely contains the main roadways in Hall's Corner, from Gammons Road to Westgate Lane. As highlighted in the bullets below and in the table above, Duxbury's experiences leakages (green figures in the table) and surpluses (red) in the following:

- **All three trade areas are underserved in Nonstore Retailers.** Nonstore retailer establishments engage in the direct sale (i.e., nonstore) of products, such as party planners, home delivery sales, and home heating oil

dealers. This includes members of the creative economy, internet sellers, and home-based retailers.

• **Within the Local and Primary Trade Area, Duxbury is underserved in Restaurants, Drinking Establishments.** This shows an opportunity for the food and drink service industry in town that could cater to a local populace.

• **Within the Local Trade Area, there are opportunities for smaller-scale businesses that can serve the local market, making an argument for a walkable, livable town center with additional housing options.** Whereas the Secondary Trade Area has more opportunities for what can be considered larger-scale businesses (clothing, furniture, and electronics stores), the Local Trade area has greater opportunity for niche clothing stores, food and beverage stores, and general merchandise stores. Although the two trade areas did will with electronics retailers, competition with online retailers paints an uncertain future for the electronics industry, not only in Duxbury, but in the region and the nation as a whole. General merchandise stores include retail stores which sell a number of lines of merchandise, such as dry goods, apparel and accessories, furniture and home furnishings, small wares, hardware, and food.

• **The Town has the most potential in Specialty Food Services when it comes to the larger Secondary Trade Area.** This would be within a fifteen minute drive, where certain parts in town can be driven to within 15 minutes during non-peak or low traffic hours. Given that this area of Duxbury generally doesn't have many different types of commuters passing by, these businesses need to be able to catch consumers if they are given a reason to stop by.

• **Duxbury's economy has many strengths, particularly given the median income, the concentration of higher income individuals near the local trade area and the current business mix.** Given the relatively small amount of developable land, the Town has some key decisions to consider regarding future investments to attract businesses for which there is currently a gap, as well as ways to build on the existing small and medium-sized businesses in the Town. According to the town open house, there is a strong draw towards keeping and expanding retail and dining options in Hall's Corner.

Community Input

Public outreach included one-on-one interviews, an economic development table at two open houses, presentations at Planning Board meetings, and a short business survey. In the October Open House, participants were asked to select which type of mixed-used oriented industries listed from the retail opportunity gap analysis they think would be needed in Duxbury, and those they did not. They were instructed to select as many industry groups they supported and all those they opposed.

The results showed broad support for restaurants and eating places, particularly by Snug Harbor and Hall's Corner. Furthermore, in light of the recent closure of Foodie's, there was also large support for specialty food stores, and small scale sporting goods stores, particularly those that specialized in outdoor water sports.

Conversely, electronics stores, auto parts stores, and large-scale retailers such as boat dealers and furniture stores did not rank well with the Open House participants.

Additionally, local businesses stated their ideas for Duxbury via one-on-one conversations. Many stated the need to keep Duxbury aligned to its current state, with emphasis of development on current businesses within town, and not necessarily on expansion. One business said that "Duxbury has always been a South Shore jewel unlike the towns around it because of its charm without the big box stores, and billboards, and lots of small owner/operated businesses." They also acknowledged that although this lack of development does not help with increasing tax revenue, it is what draws people to the town and keeps real estate values up.

Local businesses also sought to have the zoning and permitting process sped up. One business would like the signing of permit requests to increase from the current one-month process, perhaps having a sub-committee of the Board of Selectmen streamline these processes. Another stated that digital infrastructure needed to improve, especially cell phone service, which can be unreliable.

Mixed-Use Oriented Industry	For	Against	Total Score (+/-)
Restaurants/Eating Places	10	3	7
Specialty Food Stores	8	1	7
Sporting Goods/ Hobby Stores	7	1	6
Book Stores	6	1	5
Used Merchandise Stores	4	1	3
Home Furnishings Stores	3	1	2
Clothing Stores	2	0	2
Drinking Places	2	1	1
Shoe Stores	1	2	-1
Florists	0	1	-1
Office Supply/Gift Stores	0	1	-1
Nonstore Retailers	0	1	-1
General Merchandise Stores	1	3	-2
Furniture Stores	0	3	-3
Other Motor Vehicle Dealers	0	4	-4
Auto Parts and Tire Stores	0	5	-5
Electronics/Appliance Stores	0	6	-6

Table: Open House Industry Types Exercise Results *Source: MAPC*

Multiple businesses stated that there was a need for parking to be alleviated, especially during the summertime, and that a parking study to be created in town. Some stated that Snug Harbor needed more parking for weekends and holidays from the 15th of May through mid-October and that the town landing parking lot is full all summer long due to the success of the oyster aquaculture. Similar concerns were mentioned for Hall's Corner and Millbrook. That is a good thing for Duxbury but it does increase the parking dilemma. That being said, other businesses stated that parking lots that are safe are essential. With improved drainage now available all parking lots should be paved.

Recommendations

The following goals and strategies are intended to support continuing efforts to sustain Duxbury's local economy and provide local services and amenities for residents. Particularly, they are focused on the efforts to create a distinct identity for each business district while addressing concerns regarding additional traffic, parking, pavement and environmental impact of intensified uses in business districts. Recommendations are developed with available statistical data, input through the community open house, and interviews with local businesses. Furthermore, recommendations are ranked by the results of the March Open House, where participants selected the goals in order of priority.

Goal 1: Focus on distinct neighborhood business district-based economic development.

- **Strategy 1.1:** Develop a comprehensive marketing strategy to develop a brand identity for major districts to attract new visitors, residents, and businesses.

- **Strategy 1.2:** Improve wayfinding signage to better guide visitors to Duxbury's existing business districts and many amenities and create a façade improvement program for these districts. Attract commuter rail passengers with marketing campaigns and improvements in connectivity.

- **Strategy 1.3:** Increase residences within and near the business districts by working with property owners to determine priority underutilized sites for mixed use redevelopment.

- **Strategy 1.4:** Encourage office and medical uses in existing districts that will yield net tax revenues to the town.

- **Strategy 1.5:** Create a pedestrian and bicyclist friendly environment in each district.

Goal 2: Expand maritime businesses and industries, including tourism, research and education opportunities.

• **Strategy 1.1:** Work with state and regional education and economic development agencies to bolster marine educational programs/facilities, the marine aquaculture industry, and recreation programs/facilities, by creating a Snug Harbor Economic Development Plan to grow jobs and revenue.

• **Strategy 1.2:** Increase retail, restaurants, and expansion of cultural offerings to attract year-round visitors, such as water-based recreation (sight-seeing boat tours, charters and kayak sales/rentals). Further develop off-peak season programming to attract visitors including festivals (food, music, and film), shopping events, restaurant weeks, and more. Continue to support, but increase the promotion of, Holly Days, with improved marketing and outreach.

• **Strategy 1.3:** Consider incorporating an open space element into any new development that occurs near the harbor.

Goal 3: Strategically plan for resilience and leveraging of limited resources.

• **Strategy 3.1:** Incorporate resilience and climate change into economic development planning through cost benefit analyses or other evaluations. The Town has received grant funding to study Snug Harbor for resilience in 2019.

• **Strategy 3.2:** Consider infrastructure investments that could address multiple issues (for example, wastewater treatment plants in certain locations could strengthen redevelopment opportunities, improve Duxbury Bay water quality, and improve coastal resiliency).

• **Strategy 3.3:** Leverage and optimize infrastructure to support more intense use of land in neighborhood business districts.

Goal 4: Assist local home-based nonstore businesses.

• **Strategy 4.1:** Create a home-based business development and management program.

• **Strategy 4.2:** Create a Center for Entrepreneurship Incubator, perhaps by partnering with local coworking space Co-WorkDux, which would educate, support, and assist in the successful development of local entrepreneurs who are committed to building a vibrant community.

• **Strategy 4.3:** Through the incubator, create a retail store with an exclusive focus on local products. The marketplace would help build local businesses and connect businesses to regional customers and be a hub for locally made goods.

• **Strategy 4.4:** Hold networking events for existing and future home-based, entrepreneurial businesses.

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Master Plan Implementati

Land Use and Zoning Implementation Plan

Chapter 12
Land Use and Zoning

Key Findings

The land use patterns of the Town of Duxbury reach back to the initial settlement of the Town and have been thoughtfully preserved and adapted to each generations' needs while respecting the heritage of the town. The town's combination of predominantly residential uses, conservation of open space, preservation of historic resources, and clearly defined neighborhood business districts have limited the amount of disturbance to these patterns of initial settlement and define the community character. The future land use patterns should be consistent and continue the established patterns of the town while allowing investment and adaptation to respond to future needs and improve upon current conditions. The zoning regulations will continue to play a major role in guiding investment to strengthen these patterns in the town through support for preservation, improvement and enhancement in the neighborhood business districts, and through safe and sustainable residential neighborhoods.

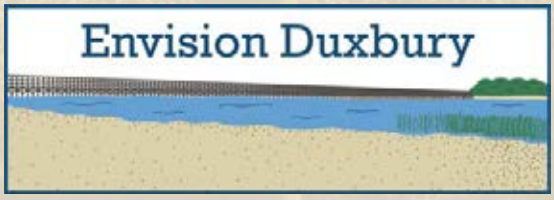


Image: *The scenic residential landscape of Duxbury Source: John Phelan*

Introduction

"Land Use" is a general term used to describe the primary use (or combination of uses) occurring on a parcel of land at any given time. Typical land uses include residential, retail, commercial, office, industrial, open space, transportation, mixed use, and others. Land use patterns are influenced by a number of factors including the history of settlement, industry, and transportation in a town, and the population, economic growth, infrastructure, natural resources and environmental constraints. The land use patterns have a direct impact and influence on the quality of life of residents and impact the character and convenience of the town. It is important to note that land use is not static and that it can and does change over time. A very familiar example from the last half century is the change of land use from farmland to residential subdivision. Depending on changes to the context of a property, the ownership of the property, value of the land, and larger trends in real estate or the economy, changes to land use will occur. This change is typically regulated and guided through zoning.

"Zoning" is the legal framework for regulating land use and other characteristics of a property, such as the appropriate height, density, placement and massing of structures, the amount of open space required, and parking requirements, among other features. The legal standing of locally enacted zoning regulations has been established and upheld in court cases in the United States since the 1920s. Land use and zoning patterns are not identical and sometimes require realignment or reconsideration as patterns evolve. Some uses may not conform to the zoning district they are in, these "nonconforming" uses may have existed before land was zoned. These types of uses are always "grandfathered" to allow the current uses to continue even when the zoning context has changed. If such a parcel redevelops in the future it would need to conform to the current zoning at that time. Even while zoning is the

regulation mechanism for changes on properties, it cannot create change on properties. Under certain circumstances, a community may desire a specific type of use to occur on a property, and it may be zoned to allow or even encourage such a use, but such investments in changes on a property are ultimately decided by private owners, institutions, or the entities that own or control the property. Unless the Town owns or controls a property and is willing to make an investment, it cannot mandate change through zoning.

Local zoning bylaws are defined by a community and should respond to the community's vision for the future and preferences for how the land use patterns of the Town should evolve. The Envision Duxbury Master Plan process provided a unique opportunity for the community to reflect on the land use patterns and zoning regulations holistically and to proactively craft land use and zoning recommendations that will guide the future evolution of the Town's policies and regulations to align them with the Envision Duxbury vision, goals, and strategies.

Existing Conditions

Historical Context[1]

The history, pattern of settlement, and earliest industries in Duxbury have historically focused development activity near the coastline. The historical homes, centers of activity, and industries such as shipbuilding were all focused on Washington Street, closely paralleling the coastline of the Town. The historic village centers of Snug Harbor and Hall's Corner are connected by Washington Street and offer close connections to Duxbury Bay. The Myles Standish Monument sits atop Captain's Hill and is a prominent landmark from the sea. Development activity in the town has moved westward over generations aided by investments in the local and regional roadway infrastructure. This migration westward and a stronger connection to the surrounding region grew with population of the town after development of Route 3 in the 1960s. Even through changes, the idyllic town of Duxbury has maintained a pattern of development consistent with its historic scale and character through the management and protection of natural resources, commitment to historic residential neighborhoods, and support for neighborhood business districts.

Before arrival of Colonists, the region of what would become Duxbury was inhabited by the Wampanoags, Native Americans who farmed, hunted and fished in the area long before Europeans arrived. Colonists arrived in Plymouth to the south in 1620, and by 1627 Colonists began moving north along the coast from Plymouth and establishing farms. In 1629 a land grant gave about one third of the Colonists land to the north of Plymouth by Native Americans. This settlement included notable figures in the Town history such as John Alden, Captain Myles Standish, William Brewster the

1. Historical information from the Duxbury Historical Commission, for more on Duxbury's history, see the Duxbury Historic Commission webpage at https://www.town.duxbury.ma.us/historical-commission/pages/town-history as well as the Duxbury Rural and Historical Society webpage at http://duxburyhistory.org/

Elder, and Thomas Prence. The settlement grew large enough to support a parish, and build a meetinghouse on what is now Chestnut Street, next to the Old Burying Grounds. In 1637 Duxborough was incorporated and became the second town in the Commonwealth. For many of its early decades, the Town was a farming and fishing community.

In the early 1800s, Duxbury became a powerful center of the shipbuilding industry. The majority of the decades of the 1800s saw growth of local shipyards with a peak of 20 shipyards producing at least 180 vessels. The shipbuilding era established Duxbury as a community of great wealth with many landmark estates built on Washington Street and on Powder Point including the King Caesar House. The Town's location at Duxbury Bay and nearby Plymouth Bay played a key role in the development of this industry. This period of industry and growth saw many other landmarks in the Town's land use including the first department store in the United States in 1826 and the first bank in 1833. The shipping era in Duxbury began to decline in the 1860s. An era of summer vacationing emerged in the Town attracting summer visitors to resorts, rooming houses, inns, and hotels. The Boston and Cohasset railroad was extended to Duxbury in 1871 to support this seasonal visitation. The rail service ended as the number of summer visitors later declined.

The era of summer resorts slowed and the next major shift in the local economy and land use context was the design and construction of Route 3 along the South Shore. With the decline of rail travel in the latter half of the 20th century, most of modern Duxbury's growth is tied to construction of the new Route 3 highway (called Pilgrim Highway) in the 1960s, which allowed additional tourism traffic and commuter traffic to employment in greater Boston. The re-establishment of commuter passenger rail service between Kingston or Plymouth and downtown Boston in 1997 further cemented the connection to Boston. Anticipating rapid growth with highway access, the Town created one acre zoning for residential uses to maintain responsible growth. Additional land regulations, restrictions, and conservation efforts have resulted in hundreds of acres open space and conservation land that serves conservation, recreation purposes and aquifer protection purposes. Historic preservation, conservation, and coastal amenities remain priorities in the picturesque residential community today.

Development Patterns

Duxbury has a pattern of predominantly residential development throughout the town today with about 48% of the land devoted to residential uses. The next largest category of land use in the town today is public or semi-public land used for recreation, open space, or other activity with about 33% of the land devoted to these uses. About 9% of the land is undeveloped or agricultural uses. About 8% of the land is devoted to transportation systems such as roadway rights-of-way. Only 2% of the land in the town is devoted to commercial uses. The patterns of land use are shown in the following land use map of the Town of Duxbury. The mapping includes residential uses, mixed use, commercial, industrial, open space, public, institutional, and vacant or undeveloped land. The predominant yellow tones would be associated with the land devoted to residential uses.

The following chart shows the overall distribution of land uses across the Town of Duxbury with the amount of acres devoted to each use. The chart also shows the accounting of land uses that was recorded in Duxbury's 1999 Comprehensive Plan. This comparison highlights the substantial growth in land used for residential development and the likely related decrease in land used for agriculture and classified as undeveloped. While the comparison is useful a few discrepancies are noted from the 1999 Plan that do not align with

Duxbury Comprehensive Plan 1999		
Land Use	*Acres*	*% Total Area*
Residential	**4,430.1**	**28.6%**
Multifamily	73.0	0.5%
Single family	4,357.1	28.2%
Commercial	**74.5**	**0.5%**
Public/Semi-Public	**4,106.5**	**26.6%**
Recreation	299.0	1.9%
Other	147.1	1.0%
Protected open space	3,660.4	23.7%
Transportation	**1,384.3**	**9.0%**
Total Developed	**9,995.4**	**64.7%**
Agriculture	836.8	5.4%
Other undeveloped	4,188.9	27.1%
Total Undeveloped	**5,025.7**	**32.5%**
Water	432.9	2.8%
Total Town Area	**15,454.0**	**100.0%**

Envision Duxbury Master Plan 2019		
Land Use	*Acres*	*% Total Area*
Residential	**7,316.1**	**47.6%**
Multifamily/Other Res.	1,415.8	9.2%
Single family	5,900.3	38.4%
Commercial	**267.7**	**1.7%**
Public/Semi-Public	**5,149.6**	**33.5%**
Recreation	412.7	2.7%
Other	780.1	5.1%
Protected open space	3,956.8	25.8%
Transportation	**1,239.6**	**8.1%**
Total Developed	**13,973.0**	**91.0%**
Agriculture	229.5	1.5%
Other undeveloped	1,160	7.6%
Total Undeveloped	**1,389.6**	**9.0%**
Water	*Not calculated*	*NA*
Total Town Area	**15,362.6**	**100%**

current data, such as the area of water and total area of the town. The current calculations are based on Geographic Information Systems (GIS) databases that may be more reliable than the techniques used in the previous plan.

Residential Uses

The residential uses are distributed throughout the Town and are predominantly comprised of single family homes. In fact, single family homes represent about 38% of the total land use in the town the largest single subcategory of uses. An addition of about 9% of the total land area is comprised of other types of residential uses, including multifamily, duplexes, or other types of residential facilities. The largest concentrations of multifamily uses are near Route 3's Exit 10 with Island Creek and The Village at Duxbury the largest and most recognizable among them. Generally, the residential uses have an older year built date the further east you move in the Town with the most historic homes approaching and along the coastline, consistent with the historic development of the town. The average year built of all single family properties is 1953. The average lot size of all single family properties is 1.2 acres. The zoning requirement for a minimum 1-acre residential lot began in 1954.

Commercial Uses

The commercial uses in the town are concentrated in the neighborhood business districts of which there are (6) six distributed across the town. The six neighborhood business districts are Hall's Corner, Snug Harbor, Millbrook, Cox Corner, Bennett's Corner/Island Creek, and Tarkiln/ Bongi's. A few other modest single commercial properties are located on major streets throughout the town such as Bailey's Corner and Osborne's, among others. The historic evolution of these districts follows the patterns of residential growth with the most historic districts located furthest to the east and along the coast. Hall's Corner is the largest of the districts, located in the southeast of the town. It offers many of the local retail shopping and professional services available. Snug Harbor is located directly on

Duxbury Bay and supports general services and water-related activity. Millbrook has seen recent investment activity and is located near the Duxbury schools and library campus. Cox Corner includes several commercial properties at the intersection of Route 3A and Route 139. Bennett's Corner includes several commercial properties on Route 3A near Route 3's Exit 10 and adjacent to the Island Creek development. Bongi's includes a commercial property on Route 53, the only commercial district west of Route 3. The Village at Duxbury and Bay Path Rehabilitation Center are both nearby. As a portion of the overall land area, these districts are small at less than 2%. The average parcel size in these districts is also relatively small at just over 2 acres.

Industrial Uses

Industrial uses in the town are negligible. Traditional industrial uses do not exist. Even past industrial factory or mill buildings do not exist. The dominant industry of shipbuilding has left little evidence in terms of structures or buildings. Some may be classified as commercial, with water dependent and marine uses in Snug Harbor that include boat storage lifts and racks.

Nonprofit, Educational, and Religious Uses

Nonprofit uses are distributed throughout the Town and include a range of property sizes that are owned by a variety of entity types. Among these are nonprofit charitable organizations, private schools, camps, and retreat sites, churches, and private clubs. Several of these nonprofit land holdings are directly linked to conservation and preservation efforts in the Town such as the Duxbury Beach Reservation, Duxbury Rural and Historic Society, Historic O'Neil Farm, and Wildlands Trust of Southeastern Massachusetts. The average parcel size of these uses is about 12 acres.

Public uses

Public uses include Town-owned land and facilities, as well as other public or semi-public entities, such as State Agencies or utilities. The public uses include all town-owned facilities listed in the public facilities and services element, such as Town Hall, Library, schools, and others. It also includes town-owned cemeteries and open land. Other public uses include the Department of Conservation and Recreation owned Miles Standish Monument State Reservation.

Protected agricultural and conservation uses

Duxbury has a strong history of active conservation and open space protection activity that has resulted in a substantial amount of land protected from development. These uses include assets such as the Keene's Brook Area Conservation Land, Ashdod Forest, Knapp Town Forest, Thaddeus Chandler Sanctuary, Waiting Hill Preserve Duxbury Bogs, Old Garside Bogs, Feinberg Bogs, Whiton Woods, Merry Land, Cow Tent Hill Preserve, Back River Conservation Land, and Duck Hill River Salt Marsh, among others. Most of the agricultural land, Town-owned conservation land, or Chapter 61 conservation land is located in the central and western portions of the Town. Chapter 61 is a state program offering tax benefits and conservation protections. The average parcel size of these uses is about 14.5 acres.

Undeveloped Land

Any of the land use not accounted for in the above categories is considered undeveloped. Agricultural uses, unprotected by deed or conservation restriction, also fall into this category. This category remains at 9% of the total area of the Town. This area has decreased dramatically since the previous Comprehensive Plan which had placed total undeveloped land at about 32% of the undeveloped land. Much

of the land that remains undeveloped in the Town is impacted by the presence of streams, water bodies, wetlands, floodplains, unsuitable soil types, topography, or other development or use constraints.

Growth opportunity areas/sites

No new growth or opportunity areas were identified by the community or others during the Envision Duxbury Master Plan process. Consistent with the commentary throughout this land use and zoning element of the master plan, growth opportunities should be targeted to those parts of town that are already developed and specifically to the Neighborhood Business Districts located throughout the Town. The growth opportunity areas are discussed in greater detail with the Future Land Use Diagram included in the following section of this land use and zoning element.

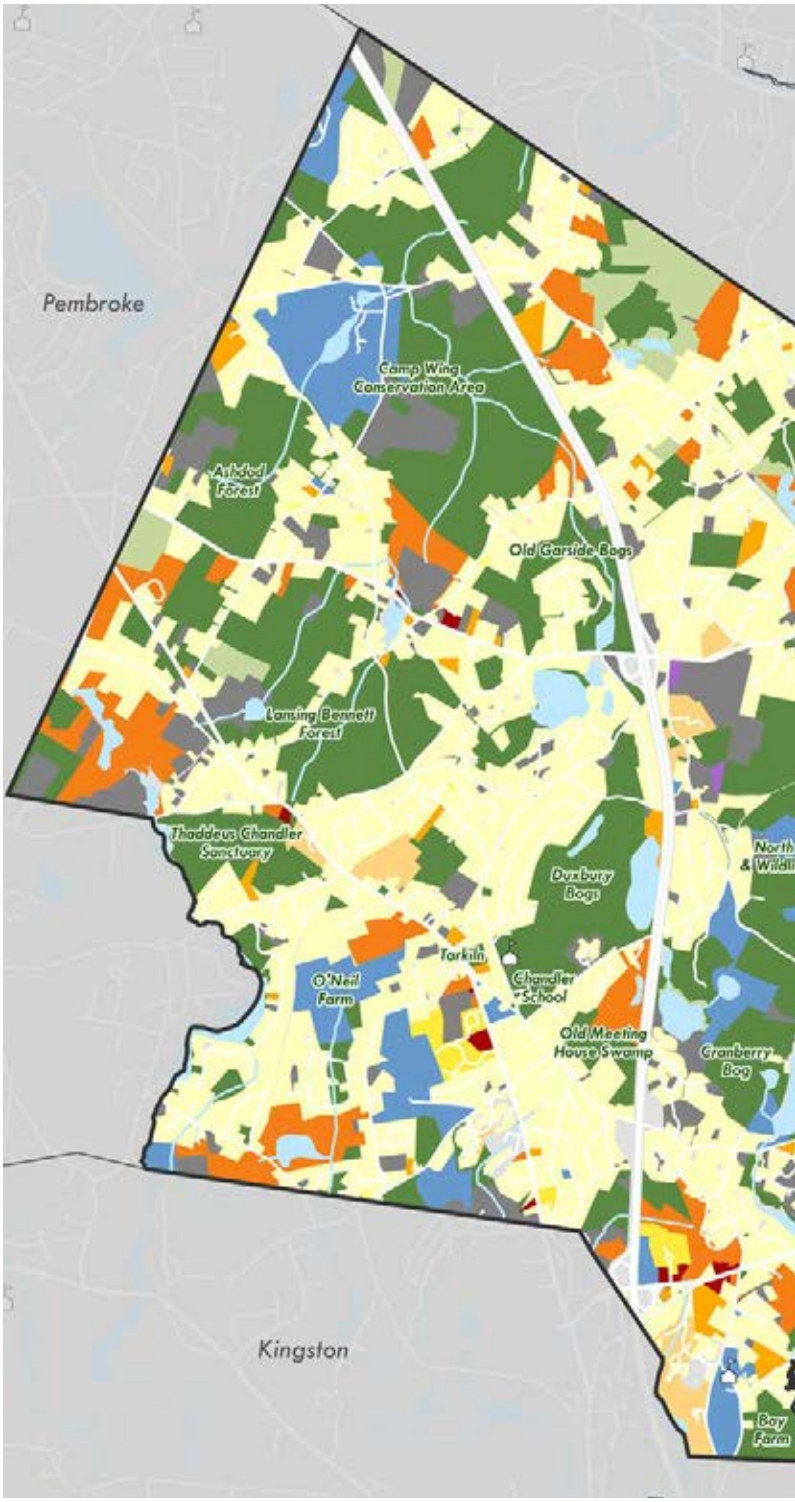
Zoning Review

The Zoning Bylaws include regulations that establish the zoning districts, provide definitions, define use, intensity, dimensional and coverage regulations for all districts, define requirements for land division, land development, and inclusionary housing, define special regulations, provide design standards and regulations for planned developments, and define administrative procedures. The Zoning Bylaw will be incrementally improved based on recommendations of the Zoning Bylaw Review Committee commencing in 2019.

The Zoning Bylaws include the following classes of underlying zoning districts:

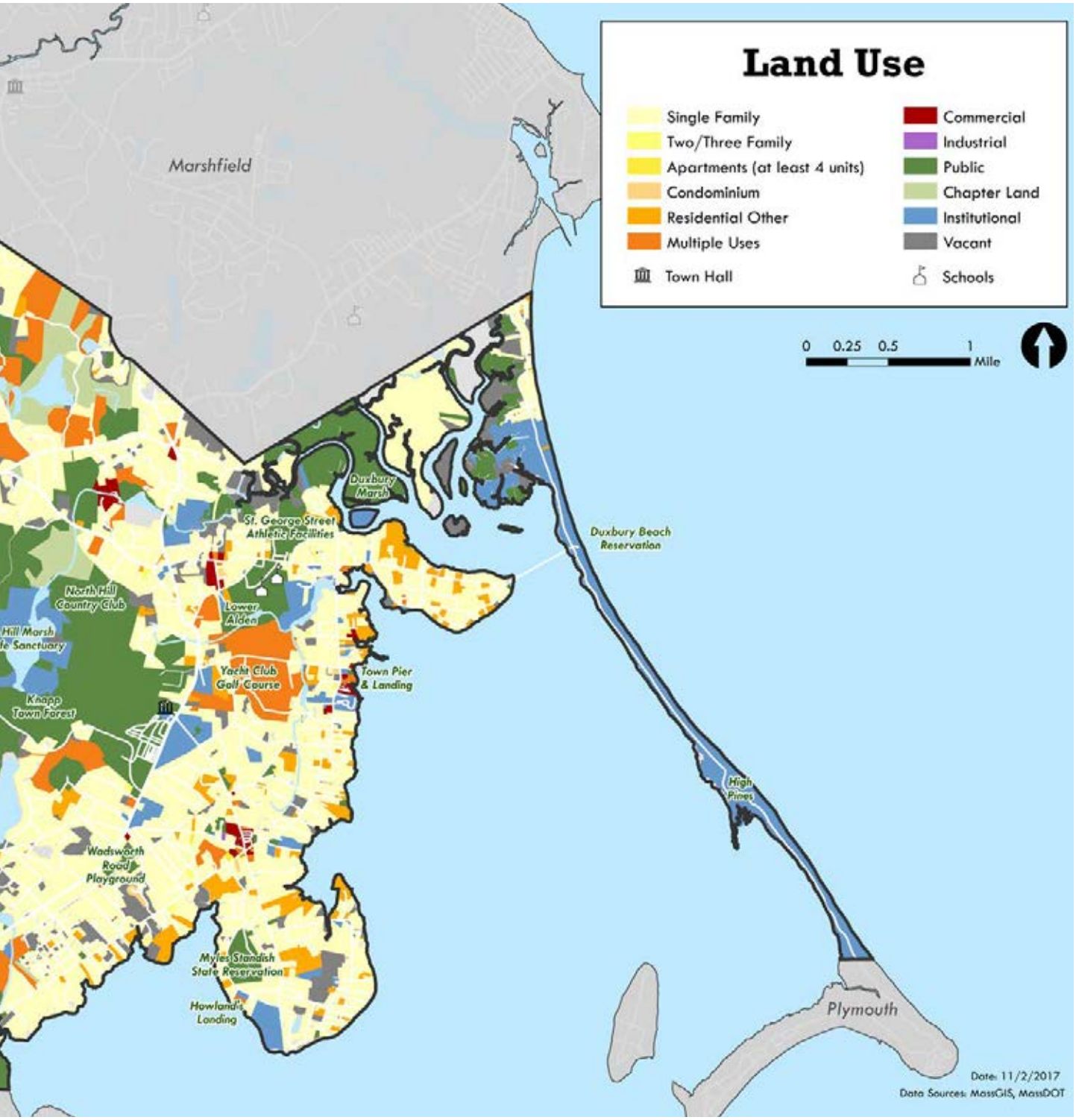
- DP – Dunes Protection District
- RC – Residential Compatibility District
- NB-L – Neighborhood Business Light District
- NB-1 – Neighborhood Business District 1
- NB-2 – Neighborhood Business District 2
- PD-1 – Planned Development District 1
- PD-2 – Planned Development District 2
- PD-3 – Planned Development District 3

In addition to the underlying zones, the Town of Duxbury is regulated by the following classes of zoning overlay districts:



- FHAOD – Flood Hazard Areas Overlay District
- WPOD – Wetlands Protection Overlay District
- POL – Publicly-Owned Land Overlay District
- APOD – Aquifer Protection Overlay District
- WSA – Waterfront Scenic Overlay District
- GMSP – Ground-Mounted Solar Photovoltaic Installations Overlay District
- MMOD - Medical Marijuana Overlay District

The majority of land in the town is within the



RC – Residential Compatibility District. This district matches the predominantly single family residential land use pattern found throughout the Town. The commercial activity in Town is located within the Neighborhood Business Districts and those zones correlate with the historic centers of the Town including Hall's Corner, Snug Harbor, Millbrook, and others. Other higher density residential areas are located within the Planned Development Districts, such as The Villages at Duxbury and Island Creek. The Dunes Protection District is located on Duxbury Beach. The overlays have been established to provide additional protections or opportunities beyond that defined by the underlying zones including requirements for flood protection, wetland and aquifer protection or solar photovoltaic installations.

Development Standards and Permitting Regulations

The procedures and regulations around permitting place responsibility for project review with both the Board of Appeals and Planning Board depending on the type of project application. Where site plan review is required it is with the Planning Board. Where a Special Permit is required it is generally with the Board of Appeals, although for some types of project applications it is with the Planning Board. Some project applications require both review by the Planning Board and Board of Appeals, or require that the Board of Appeals refer the project to the Planning Board, Conservation Commission, Board of Health, Duxbury Bay Management Commission, Water Advisory Board, and, or Design Review Board for comments.

Issues and Opportunities

While the Neighborhood Business districts are small relative to the total town land, they are strategically located across Duxbury and represent a clustering of access and activity that has already occurred. Because the Neighborhood Business districts are so small, they do not offer much opportunity for new development, but do offer opportunities for redevelopment at a higher density. Redevelopment of this kind is an opportunity for growth and increased concentration of activity in Duxbury, but it also faces several challenges. First, this type of redevelopment requires a property that has the right combination of size, location, and access characteristics with an owner that has the desire and ability to undertake a redevelopment process. Additionally, the lack of public sewage or district wastewater treatment is a limiting factor for expanding the number of uses in the Neighborhood Business districts. The scale of the likely redevelopment projects in neighborhood business districts is likely to make the costs of individual package wastewater treatment infeasible. A shared, district-wide approach to wastewater treatment is more likely a better solution to support and encourage investment.

Future Development Potential

Future development potential and build-out calculations for the Town of Duxbury have been performed in the past and were performed as part of the 1999 Comprehensive Plan process. Those types of calculations are not being performed as part of the Envision Duxbury process. While mathematically possible, these types of build-out calculations inevitably overestimate the possible future development potential and suggest total numbers for future housing units and commercial square feet that can become controversial and distracting for the Town. No matter how these projections are created, it is very difficult to account for the detailed parcel-by-parcel constraints that would impact future development yields and the real estate market realities that will impact the ability to reach those projected yields.

In 2018, the Duxbury Affordable Housing Trust hired a consultant, Dodson and Flinker

Landscape Architecture and Planning to provide an inventory and assessment of town-owned and privately-owned parcels with a focus on identifying developable land suitable for affordable housing. This study can be used as a direct investigation into developable land more generally, as parcels that may be developable for affordable housing would be potentially feasible for other types of development as well. This study determined that potentially one Town-owned parcel is suitable for development. An assessment of privately owned land was not completed for affordable housing development.

Opportunities for future development that are within or near an existing neighborhood business district would be the most desirable to provide additional residents and activity near existing centers of local businesses and amenities. Hall's Corner has been the subject of recent studies in 2014 and 2019 to evaluate the type of redevelopment and improvements best suited to unlocking the potential of this neighborhood business district.

Other smaller scale opportunities for future development are distributed throughout the town as subdividable "approval not required" parcels that include single family homes on a parcel that is currently larger than minimum lot size zoning requirements. In many circumstances this type of land division could create a modest densification of existing residential areas that would be consistent with the surrounding context.

Future Land Use

The future land use plan is a diagram intended to provide a visual representation of the goals and strategies outlined in this element and others in the Envision Duxbury Master Plan. It is best considered a conceptual road map that approximates the geographic location of goals and strategies. It is not intended to map every asset or strategy, nor provide a parcel by parcel land use plan, but rather visually illustrates the guidance of future land development that is offered in this plan. Given that the majority of recommendations, activity, and changes are being directed toward the activity clusters and activity core, the majority of the Town is shown to remain largely the same as it is today over the near and long term future. The focus of future investments and improvements should be concentrated in and near neighborhood business districts to increase activity in these centers.

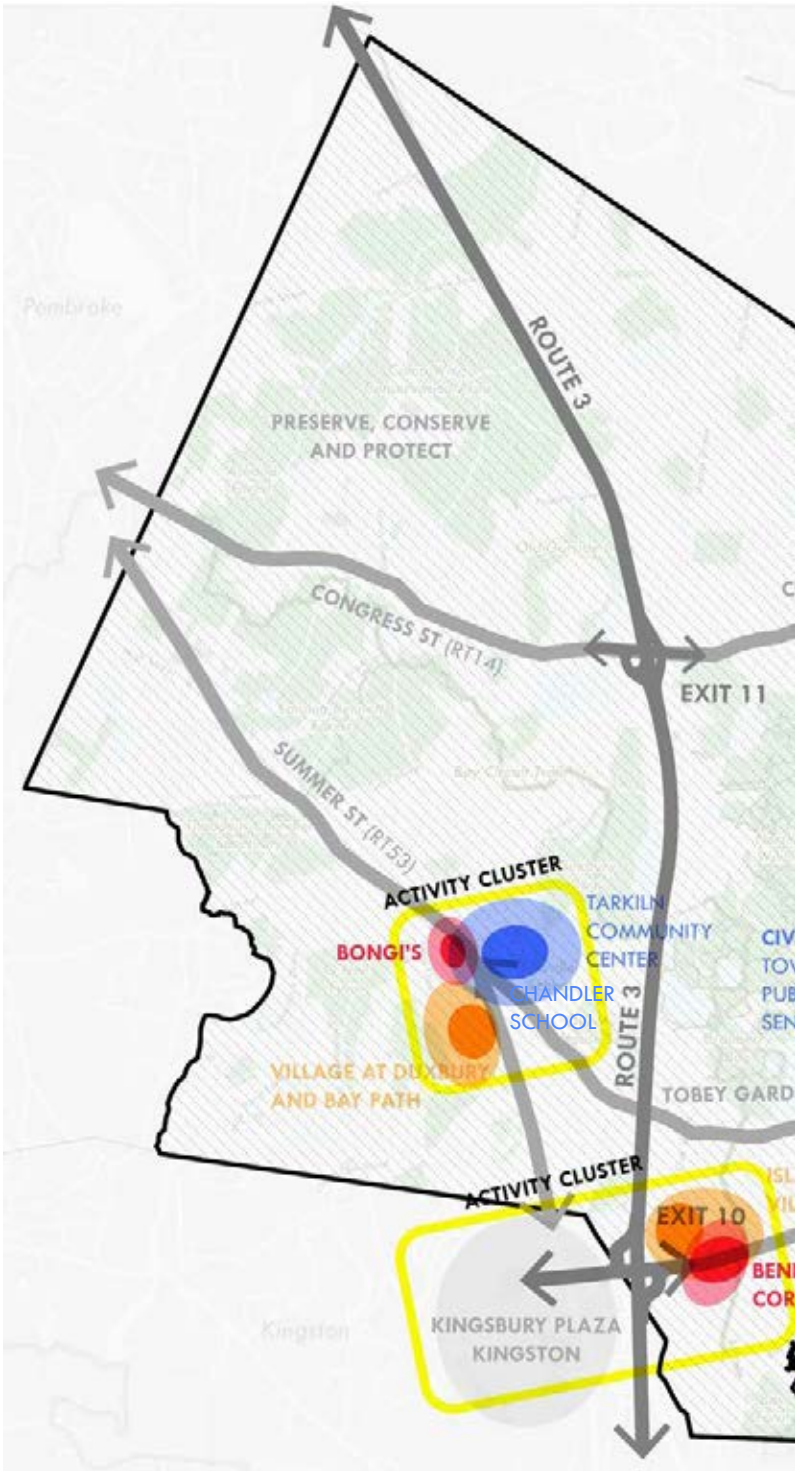
The diagram highlights the geographic relationship between three of the primary neighborhood business districts, Hall's Corner, Snug Harbor and Millbrook. The area framed by these three districts is the primary activity core in the Town of Duxbury and includes many of the municipal facilities, civic assets, and historic resources in the town. This activity core also has a direct relationship with Duxbury Bay the Town's "Blue Town Green", a shared and common natural feature that is central to many aspects of the community.

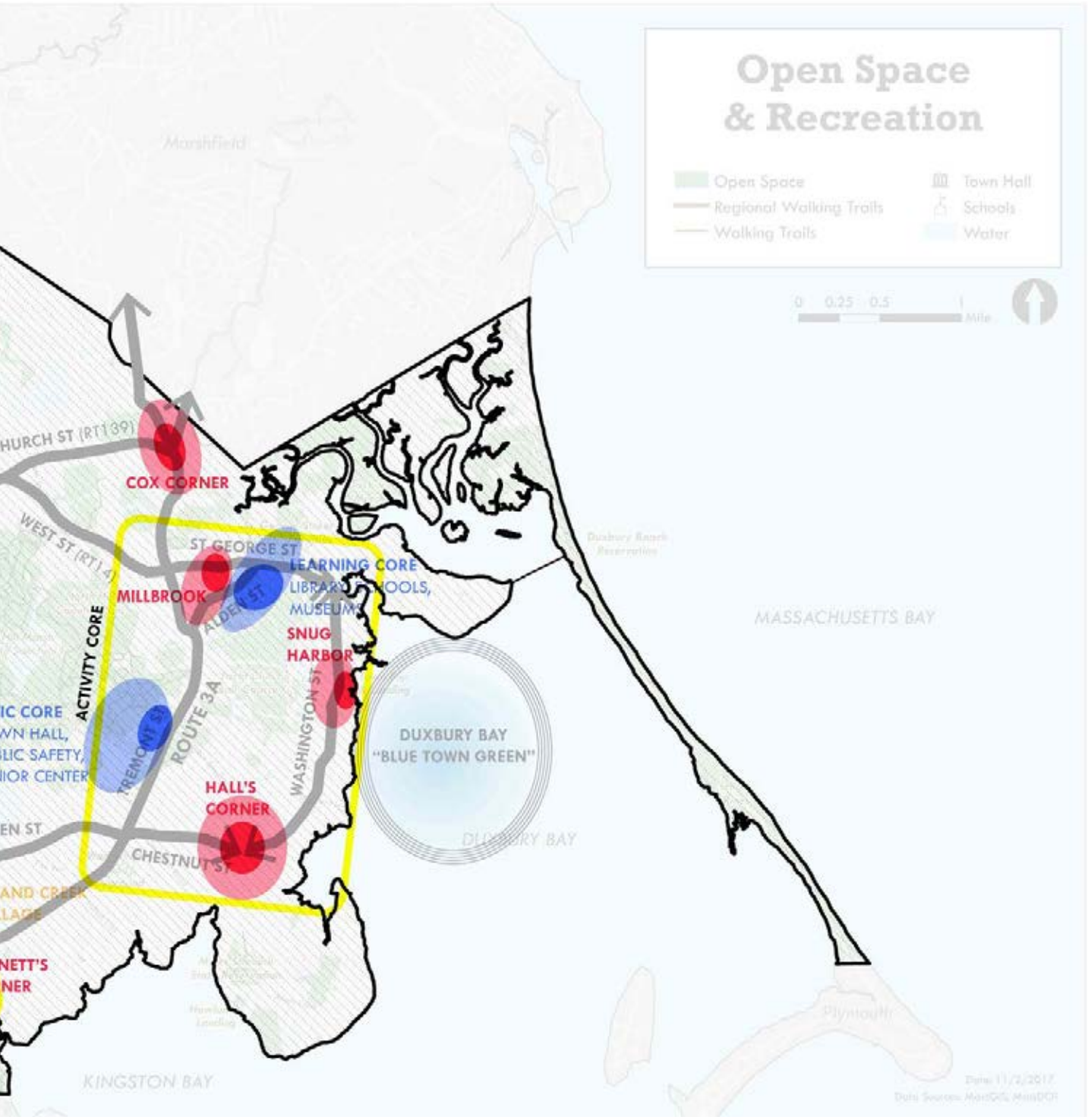
In this activity core, preservation should be balanced with investment in new and diverse housing types, new economic development activity to support local businesses, and strengthened walkability. Similar strategies should be applied to two additional activity clusters in Duxbury. The clusters of existing activity occur in one additional cluster near Island Creek Village and Bennett's Corner, and a second additional cluster near Bongi's, the Tarkiln Community Center and the Chandler School. In these activity cores support should be offered for investment in new and diverse housing types, new economic development activity to support local businesses, and strengthened walkability. Near Island Creek Village, walkability, bicycle and vehicular safety should be improved around Exit 10 on Route 3A to enhance connections to nearby Kingsbury Plaza in Kingston.

In this simplified diagram, the red circles highlight the Neighborhood Business Districts.

The blue circles highlight municipal facilities assets such as the Town Hall, Public Safety, Senior Center, Schools, and Community Center facilities. The orange circles highlight other private uses that offer different types of housing in the community including the Village at Duxbury, Bay Path Rehabilitation Center, and Island Creek Village. In addition to these locations and clusters, the major corridors of the roadway network are highlighted. The diagram is overlayed on a map of the open space and recreation resources of Duxbury. By allowing for change and improvement in these areas of concentrated activity, the remaining areas of the Town will be better positioned for the continued preservation, conservation, and protection of natural resources.

This diagram clearly shows primary assets of the Town and the locations of shared community resources and social interactions. Duxbury Bay is a primary shared resource. The conservation lands are another. The commercial and institutional spaces are another. These shared assets support a strong sense of community in Duxbury. These activity cores and clusters are where residents come together to socialize, and to celebrate. These clusters need to evolve with the Town to facilitate this positive and community building activity.




Open Space
& Recreation
Open Space
Regional Walking Trails
Walking Trails
Town Hall
Schools
Water
0 0.25 0.5 1 Mile
Marshfield
HURCH ST (RT139)
COX CORNER
WEST ST (RT 14)
ST GEORGE ST
LEARNING CORE
LIBRARY, SCHOOLS,
MUSEUMS
MILLBROOK
ALDEN ST
SNUG
HARBOR
ACTIVITY CORE
IC CORE
WN HALL,
LIC SAFETY,
IOR CENTER
TREMONT ST
ROUTE 3A
WASHINGTON ST
DUXBURY BAY
"BLUE TOWN GREEN"
HALL'S
CORNER
EN ST
CHESTNUT ST
DUXBURY BAY
MASSACHUSETTS BAY
NETT'S
NER
KINGSTON BAY
Plymouth

Community Input

The coordinated land use and zoning approaches of the Town of Duxbury are touched upon by most of the other elements of the Master Plan and so indirectly land use and zoning has been a part of much of the discussion that this process has created through its community engagement. Land use was more specifically and directly addressed in the 2017 Community Survey and at the March 2019 Community Forum.

Community Survey 2017

The community survey showed that defining new locations for appropriate growth or development was not a priority of the community. Therefore the response of this element has been to focus more on opportunities for strengthening the centers of activity that already exist. Supporting a strong local economy was more of a priority and would be supported by this approach.

Two of the top three challenges identified through the survey are directly related to Land Use and Zoning Recommendations. The business districts were identified as the second greatest priority by 1,127 responses in terms of their size, character, quality, and mix of uses. Housing options were identified as the third greatest priority in by the respondents to the community survey.

The survey also indicated a sentiment among respondents that the Town could do more to support the aging population. Only about 36% of 1,131 respondents thought the Town is preparing to support our aging population." Similarly, respondents indicated that more could be done to support commercial development in the existing neighborhood business districts. Only about 34% agreed that the Town supports commercial development in the existing business districts. Lastly, only about 22% agreed that the town supports the private development of affordable housing for low and moderate income households.

In another survey question, about 50% of 1,099 respondents agreed that commercial development of a scale not currently present can be designed to strengthen community with the example of increasing density in Hall's Corner used.

March 2019 Community Forum

In March of 2019 a Community Forum was facilitated by MAPC to present and discuss draft recommendations for all elements of the Master Plan including Land Use and Zoning Recommendations. The draft Land Use and Zoning recommendations were well-received based upon the discussion and comments that evening. One comment repeated from several attendees was to push for clarity in the current and future regulations. Clarity was described as important in everything, including clean and clear language in future Town Meeting articles to for zoning changes that may flow out of these Master Plan recommendations.

Recommendations

The following goals and strategies are intended to support the Community Vision for Duxbury and guide investments and improvements to align with the goals and strategies of this townwide Master Plan.

Goal 1: Continue to protect, conserve and enhance the natural and historic assets of the Town.

• **Strategy 1.1:** Strengthen zoning, preservation requirements and design standards for historic residential neighborhoods through refinements to regulations and zoning incentives.

Strengthening zoning includes refining dimensional requirements to provide limitations on the change in grade or topography on a property, introducing floor area ratio to limit the bulk of new buildings or additions, and refining lot coverage requirements to encourage low impact development techniques. This may include requiring design review by a Design Advisory Team for any development or redevelopment with a major impact, potentially measured by size of project or project location. The Design Advisory Team could be appointed by the Planning Board and consist of one Planning Board Member, other relevant Boards, design professionals, and residents.

• **Strategy 1.2:** Protect scenic vistas and resources through targeted conservation restrictions, management agreements, incentives and regulations for bogs, farms, significant trees, view sheds or other features important to the community.

• **Strategy 1.3:** Refine zoning to preserve character while allowing for more housing type options in specific locations, e.g. refine open space cluster development which could include incentives for cooperative housing or other models that support identified housing needs in the community.

Goal 2: Incrementally transform nodes of current activity into walkable, amenity-rich neighborhood centers.

• **Strategy 2.1:** Provide zoning modifications to strengthen support for home occupations.

• **Strategy 2.2:** Explore zoning options to enhance incentives for affordable housing where suitable and near nodes of current activity.

• **Strategy 2.3:** Develop strong walking and bicycle connections to nearby open spaces, community facilities, amenities, businesses and services where suitable.

Such connections or improvements to existing amenities should be required as part of the permitting and approval of future development or redevelopment projects. These improvements will help to mitigate other impacts, such as traffic. Maintenance of these improvements should also be considered as part of the approval and development agreement.

Goal 3: Clarify regulations and permitting to encourage appropriate investment.

• **Strategy 3.1:** Continue the work and recommendations of the Zoning Bylaw Review Committee to improve the Zoning Bylaw including recodifying the Bylaw to give it a unified, coherent structure, clarifying special permit criteria, and standardizing and consolidating definitions.

• **Strategy 3.2:** Clarify existing zoning overlays, underlying zoning, and mapping of zoning districts.

Current overlay districts such as the Water Protection Overlay District WPOD have not been updated since the 1970s. This overlay may benefit from an update, but potentially also an expansion of its scope to include other aspects of sustainability or resilience that the Town should encourage in future investments that occur in environmentally sensitive locations throughout the Town.

• **Strategy 3.3:** Create a permitting guide to assist applicants and streamline the approval process.

• **Strategy 3.4:** Streamline permit filing requirements including encouraging electronic filing, consolidating required hearings, clarifying design review and Special Permit Granting Authority roles.

Goal 4: Strengthen the sustainability and resilience of future development and redevelopment investments.

• **Strategy 4.1:** Explore zoning requirements or incentives to encourage or require sustainable building, site design, and construction.

• **Strategy 4.2:** Explore net zero zoning requirements or incentives to advance the Town's sustainability and energy goals.

• **Strategy 4.3:** Strengthen zoning requirements for low impact development techniques and stormwater management strategies to improve quality of stormwater runoff.

• **Strategy 4.4:** Strengthen zoning requirements for coastal locations in flood zones or flood-prone areas.

Zoning considerations should be given to building massing and bulk for structures that are elevated to mitigate flooding impacts. Elevating the occupiable levels of a building improve resilience, but may impact other zoning considerations for building height, roof forms, roof pitch, and overall bulk.

Goal 5: Focus public and private investments to strengthen existing neighborhood business districts.

• **Strategy 5.1:** Explore zoning modifications in each neighborhood business district to align investment with the vision to expand mixed-use development and walkability.

This may follow the model of recent efforts in Hall's Corner where specific district focused planning study results in recommendations for improvements that may include zoning modifications. Locations such as Millbrook may benefit from a district parking study and potential recommendations around shared parking.

• **Strategy 5.2:** Focus public realm investments to strengthen walkability, bikability, streetscape and character in neighborhood business districts.

• **Strategy 5.3:** Explore wastewater infrastructure systems in neighborhood business districts to support redevelopment and mixed-uses.

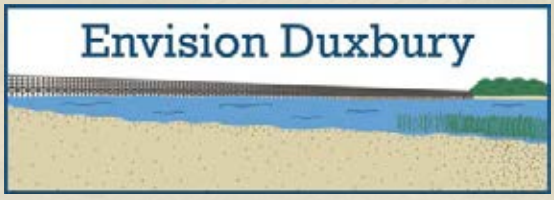
• **Strategy 5.4:** Target accessory housing unit creation in the vicinity of neighborhood business districts.

Chapter 13
Implementation Plan

Key Findings

The recommendations of the Envision Duxbury Comprehensive Master Plan have been developed by the Town of Duxbury with the support of the Metropolitan Area Planning Council (MAPC) and under the direction of the Duxbury Planning Director, Planning Board, and a group of dedicated local volunteers called Master Plan Ambassadors.

The vision, goals, and objectives outlined in the Master Plan are the voice of the residents of Duxbury compiled from one-on-one conversations, community meetings, resident connections, online surveying, and meetings with boards and committees. Duxbury wrote this plan with the involvement of an estimated 1,500 participants who shared their time, expertise, and ideas through this process.



The recommendations outlined in the plan frame a variety of efforts that the Town should undertake over the next 10 years to align the Town more closely with the community vision that was articulated through this process. None of the actions in this plan are required to be performed, some may not occur, but the more progress that can be made the recommendations, the more proactive the Town will be in defining the future that it wants. Processes of change will continue within Duxbury and outside of Duxbury. The Master Plan and its recommendations and actions represent a way to guide that change proactively instead of reacting to changes as they happen or after they have already created an issue.

Image: *Duxbury Town Hall Source: MAPC*

Introduction

The following implementation tables are organized in the same order as the Master Plan document with the recommendations, including goals and strategies, repeated for each element in the Master Plan. New information in the implementation tables includes actions, responsibilities (lead and support), timeframe and potential resources.

Implementation Plan Table

The following table identifies the specific actions that are recommended to implement the Master Plan. Each recommended goal and strategy is paired with an action. The Town may decide to advance these actions, or other actions relative to a goal or strategy. The action provided are offered as a viable starting point for implementation.

For the responsibilities, both lead and support roles, are populated with a party or parties that have been identified as the best positioned to undertake the activities for the Town. The parties with responsibilities are listed below in alphabetical order, for Town Boards or Committees:

- Agricultural Commission
- Alternative Energy Committee
- Community Preservation Committee
- Conservation Agent
- Conservation Commission
- Duxbury Affordable Housing Trust
- Duxbury arts and culture organizations
- Duxbury Assessing Department
- Duxbury Bay Management Committee
- Duxbury Board of Health
- Duxbury Board of Selectmen
- Duxbury Building Department
- Duxbury Council on Aging
- Duxbury Climate Task Force
- Duxbury Cultural Council
- Duxbury Design Review Board
- Duxbury DPW
- Duxbury Facilities Manager

Implementation

- Duxbury Finance Committee
- Duxbury Historical Commission
- Duxbury Local Historic Districts Commission
- Duxbury Rural and Historical Society
- Duxbury Seawall Committee
- Duxbury Sidewalk and Bike Path Committee
- Duxbury Shellfish Committee
- Duxbury Sustainability Committee
- Duxbury Town Meeting
- Duxbury Water Department
- Duxbury Zoning Board of Appeals
- Facilities Department
- Fiscal Advisory Committee
- Harbormaster
- Municipal Services Department
- Open Space Committee
- Planning Board
- Planning Department
- Recreation Activities Committee
- Town Highway Safety Advisory Committee
- Town Manager
- Town Website Administrator
- Water Advisory Board
- Water and Sewer Advisory Board
- Zoning Bylaw Review Committee

The external parties with responsibilities are listed below in alphabetical order:

- Duxbury Bay Maritime School
- Duxbury Beach Reservation, Inc.
- Duxbury Business Association
- GATRA
- Historic O'Neil Farm
- Island Creek Oysters
- Local Architects and Architectural Historians
- MA EOHHS
- MAPC
- Mass. Audubon Society
- MassDOT
- Old Colony Planning Council (OCPC)
- South Shore Economic Development Corporation
- South Shore Chamber of Commerce
- Wildlands Trust

For each action, a timeframe for when the proposed action should be taken is listed. Short-term actions fall within the 2019-2021 timeframe, mid-term actions fall within the 2022-2024 timeframe, and long-term actions fall within the 2025-2030 timeframe. Recommendations that are ongoing are marked accordingly.

For each action, a potential external funding source is given, if available. Not all actions will be pursued by the Town and staff time, funds available, and prioritization of Town resources will all contribute to the actions that are pursued.

One approach to Master Plan implementation that is available as an option for Duxbury is to appoint a Master Plan Implementation Committee. A Master Plan Implementation Committee could be established by the Board of Selectmen for the purpose of reviewing the implementation plan within the Town's Master Plan. The committee would report to the Planning Board and the Board of Selectmen with recommendations on the actions necessary to implement the plan. A similar model of a committee is used in the Town of Milton where they have established a five member committee appointed jointly by the Planning Board and Board of Selectmen for terms that are renewed annually. One member is a member of the Planning board and one member is a member of the Board of Selectmen, the other members have expertise in planning, architecture, economic development, landscape architecture, civil engineering, real estate, or other relevant fields. The committee will exist for 10 years from the date of its establishment.

Implementation Tables

	Page Range
Natural and Cultural Heritage	
Open Space and Recreation	236-242
Sustainability - Energy	243-245
Historic And Cultural Resources	246-249
Sustainability - Climate	250-254
Social and Community Well-being	
Transportation and Connectivity	255-266
Housing	265-270
Public Facilities And Services	271-273
Economic Development	274-278
Implementation	
Land Use And Zoning	279-283

Duxbury Master Plan
Implementation Table of Goals, Strategies and Actions

OPEN SPACE AND RECREATION RECOMMENDATIONS

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
O1: Protect Duxbury's water resources.	**O1.1:** Protect drinking water quality by preventing contamination, runoff, and diversion of water that directly contributes to aquifer recharge.	**1. Continue to monitor and assess nitrogen loading and contamination in groundwater.**	**Duxbury Water Department**	None	**Ongoing**	None
		2. Support efforts by the Water Department to update the Water Master Plan.	**Duxbury Water Department**	None	**Ongoing**	None
	O1.2: Pursue a variety of land acquisition strategies for protecting sensitive groundwater recharge areas.	**1. Request appropriation from Town Meeting to the Conservation Fund to support conservation land management for aquifer protection. Future land acquisitions should be prioritized based on their ability to protect groundwater resources and meet other goals for recreation and habitat conservation.**	**Conservation Commission**	None	**Ongoing**	**Grant funds from the MA Division of Conservation Services**
	O1.3: Continue to educate residents about the influence of surface water on the town's groundwater.	**1. Prepare and distribute a best practices guide for local land owners, residents, and businesses.**	**Conservation Agent**	**Conservation Commission**	**Short-term**	None
		1. Host programs to share best practices for care of properties with homeowners and property owners with a focus on water conservation measures and demand reduction.	**Conservation Commission, Water Department, Water Advisory Board, Duxbury DPW**	**Open Space Committee, Duxbury Bay Maritime School**	**Short-term**	None
	O1.4: Develop and implement stormwater management strategies such as low-impact development (LID).	**1. Develop a town-wide Stormwater Management Bylaw and Stormwater Design Guidelines that encourage small-scale hydrologic controls such as rain gardens, green roofs, or porous pavement, among others.**	**Planning Board**	**Conservation Commission**	**Short-term**	None

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **O1:** Protect Duxbury's water resources.	**O1.5:** Evaluate climate change impacts on the aquifer and develop long-term strategies to protect this resource.	**1. Identify proper monitoring technique to prepare for monitoring if sea level rise increases concern for intrusion.**	**Conservation Agent**	**Conservation Commission**	**Long-term**	None
		2. Explore adapting the Wetlands Protection Overlay District (WPOD) into a climate resilience district.	**Conservation Commission, Planning Department**	None	**Mid-term**	None
	O1.6: Evaluate street drainage systems that discharge into Duxbury Bay.	**1. Monitor and identify discharge locations that contain fecal coliform or other contaminants into Duxbury Bay.**	**Water and Sewer Advisory Board**	**Duxbury DPW**	**Short-term**	None
		2. Identify repairs or improvements necessary to eliminate contaminant discharge.	**Duxbury DPW**	**Water and Sewer Advisory Board**	**Short-term**	None
		3. Prioritize repairs and identify capital improvement funds for projects.	**Duxbury DPW**	**Duxbury Finance Committee**	**Mid-term**	None
O2: Protect Duxbury's natural areas and environment.	**O2.1:** Strategically acquire and protect land based upon past planning efforts and smart growth principles.	**1. Identify parcels that would further protect Duxbury's natural areas and environment and offer consistency with recent planning efforts and recommendations.**	**Open Space Committee, Conservation Agent**	**Conservation Commission**	**Short-term**	None
		2. Prioritize the parcels with the highest priorities providing the most opportunity for synergy among Town goals and objectives.	**Open Space Committee, Conservation Agent**	**Conservation Commission**	**Mid-term**	None
		3. Define and approach to acquisition or protection of the highest priority parcel.	**Conservation Commission**	None	**Ongoing**	**Grant funds from the MA Division of Conservation Services**
	O2.2: Preserve ecologically valuable habitat and natural resources through acquisition and/or local regulation.	**1. Identify parcels of salt marsh and freshwater wetland areas that would benefit from either town acquisition or additional regulations (an example is the area around North Hill Marsh).**	**Open Space Committee, Conservation Agent**	**Conservation Commission**	**Short-term**	None
		2. Prioritize the parcels with the highest priorities providing the most opportunity value for sensitive habitats or species and for synergy among other Town goals and objectives.	**Open Space Committee, Conservation Agent**	**Conservation Commission**	**Mid-term**	None

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **O2:** Protect Duxbury's natural areas and environment.	(Continued) **O2.2:** Preserve ecologically valuable habitat and natural resources through acquisition and/or local regulation.	**3. Define and approach to acquisition or protection of the highest priority parcel.**	**Conservation Commission**	None	**Ongoing**	**Grant funds from the MA Division of Conservation Services**
	O2.3: Minimize habitat fragmentation to help protect Duxbury's species diversity.	**1. Continue working with volunteers to undertake annual fish counts and utilize the restored fish run as an educational tool for minimizing habitat fragmentation.**	**Conservation Commission**	None	**Ongoing**	None
		2. Identify parcels or improvements that would expand contiguous protected land areas to support connected habitats and wildlife migration.	**Open Space Committee, Conservation Agent, Community Preservation Committee**	**Conservation Commission**	**Ongoing**	**Grant funds from the MA Division of Conservation Services**
	O2.4: Preserve the connectivity of inland wetlands and riparian corridors.	**1. Prioritize land acquisitions in areas that protect the Town's aquifer and groundwater resources.**	**Conservation Commission and Water Department**	None	**Ongoing**	**Grant funds from the MA Division of Conservation Services**
	O2.5: Protect Duxbury's coastal resources.	**1. Support implementation of the Duxbury Beach Management and Habitat Conservation Plan to protect the beach's dune, intertidal areas, and wildlife habitat.**	**Duxbury Beach Reservation, Inc.**	None	**Ongoing**	None
	O2.6: Identify natural resources in Duxbury that are vulnerable to the effects of climate change, and develop long-term strategies to protect those resources.	**1. Support implementation of the recently completed Duxbury Climate Vulnerability Assessment and Action Plan.**	**Duxbury Planning Department**	**Duxbury DPW**	**Short-term**	**MVP Action Grant**
	O2.7: Consider creating shoreline development guidelines to protect the waterfront and Duxbury Bay.	**1. Explore shoreline development guidelines to improve the resilience of coastal development including shoreline treatments, natural flood mitigation techniques, increased building setbacks and elevated buildings.**	**Duxbury Planning Department**	**Conservation Commission**	**Mid-term**	**MVP Action Grant**

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
O3: Preserve the unique, semi-rural character of Duxbury.	**O3.1:** Continue to identify and protect important areas, vistas, historic buildings, archaeological sites, and open spaces that contribute to Duxbury's character.	**1. Continue to provide support for Community Preservation Act (CPA) projects.**	**Open Space Committee, Community Preservation Committee**	**Conservation Commission**	**Ongoing**	**CPA Funds**
		2. Identify CPA projects consistent with Town planning documents.	**Open Space Committee, Community Preservation Committee**	**Conservation Commission**	**Ongoing**	**CPA Funds**
	O3.2: Protect and preserve agricultural land.	**1. Promote permanent protection of farmland as an ongoing town-wide objective and support owners in providing protection assistance and guidance.**	**Agricultural Commission**	**Conservation Commission**	**Ongoing**	None
	O3.3: Support and preserve agriculture, horticulture, silviculture, and aquaculture in Duxbury.	**1. Promote farm-related events and publicize ways local residents can support local growers.**	**Agricultural Commission**	**Historic O'Neil Farm, Island Creek Oysters, others**	**Ongoing**	None
		2. Encourage local growers to participate in Chapter 61 programs or Agricultural Preservation Restrictions.	**Agricultural Commission**	None	**Mid-term**	None
	O3.4: Continue to protect the aesthetic character of Duxbury's scenic roads and landscapes.	**1. Identify locations of scenic roads, landscapes, or features that may be at risk.**	**Open Space Committee, Community Preservation Committee**	**Planning Board and Conservation Commission**	**Short-term**	None
		2. Explore ways to protect scenic vistas through zoning, Conservation Restrictions, or easements.	**Planning Board and Conservation Commission**	**Open Space Committee, Community Preservation Committee**	**Mid-term**	None

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **O3:** Preserve the unique, semi-rural character of Duxbury.	**O3.5:** Educate town residents on how the CPA contributes to and protects Duxbury's unique characteristics.	**1. Provide inventory of CPA funded projects with project location, description, and community benefits.**	**Community Preservation Committee**	None	**Short-term, ongoing**	None
		2. Improve public access and signage identification of projects funded with CPA funds.	**Community Preservation Committee, Open Space Committee**	None	**Short-term, ongoing**	None
O4: Provide recreational opportunities with minimal impact to the environment.	**O4.1:** Increase awareness of passive and active recreational opportunities.	**1. Work with nonprofit partners to design public programs and events to highlight recreational resources offered in the Town.**	**Conservation Commission, Open Space Committee**	**Duxbury Bay Maritime School, Duxbury Beach Reservation, Wildlands Trust, others**	**Short-term**	None
		2. Develop and distribute an inventory, brochure, and website of recreational resources offered in the Town.	**Conservation Commission, Open Space Committee**	**Duxbury Bay Maritime School, Duxbury Beach Reservation, Wildlands Trust, others**	**Short-term**	None
	O4.2: Strive to improve access to Duxbury's natural resources and recreational facilities for the physically challenged.	**1. Implement the ADA Transition Plan of the Open Space and Recreation Plan to make town recreation facilities fully ADA-compliant.**	**Open Space Committee, Duxbury DPW, Duxbury Facilities Manager**	None	**Short-term**	None
		2. Expand on-the-water programs for people with disabilities and provide opportunities for seniors.	**Open Space Committee**	**Duxbury Bay Maritime School**	**Short-term**	None
	O4.3: Add additional recreational facilities like playing fields and playgrounds as resources become available.	**1. Develop Recreational Facilities Plan that will analyze current use patterns and determine future needs, such as investigating additional fields and/or field upgrades.**	**Recreation Activities Committee**	**Open Space Committee**	**Mid-term**	None

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **O4:** Provide recreational opportunities with minimal impact to the environment.	**O4.4:** Support a maintenance and improvement program for the Town's open spaces, recreation areas, athletic facilities, and programs.	**1. Develop and implement a town athletic fields maintenance and improvement plan.**	**Recreation Activities Committee, Duxbury Facilities Manager**	**Open Space Committee**	**Short-term**	None
		2. Identify maintenance and improvement needs for Town open spaces.	**Recreation Activities Committee, Duxbury Facilities Manager**	**Open Space Committee**	**Short-term**	None
		3. Study parking use and needs at Town open spaces and recreation facilities. Consider improvements where needs are identified (additional parking, parking management, resident permit/parking fee programs, etc.) to appropriately manage parking and access.	**Conservation Commission, Planning Department**	**Duxbury DPW**	**Mid-term**	None
	O4.5: Continue working with local nonprofits in Duxbury to provide high-quality recreational opportunities.	**1. Continue partnerships and support for educational programming, local events, and summer education programs as part of the network of open space and recreation resources in Duxbury.**	**Duxbury Bay Maritime School, Duxbury Beach Reservation, Wildlands Trust, Mass Audubon Society, others**	**Open Space Committee, Recreation Activities Committee**	**Ongoing**	None
	O4.6: Improve opportunities for water-based recreation in Duxbury Bay, at Duxbury Beach, and in other surface waterways while mitigating potential negative impacts.	**1. Continue partnerships and support for water-based programming including the Adult Sailing Program, on-the-water programs for people with disabilities, and opportunities for boaters of all ages.**	**Duxbury Bay Maritime School**	**Open Space Committee, Recreation Activities Committee**	**Ongoing**	None
	O4.7: Improve appropriate public access to Duxbury's waterfront through land acquisitions and improved signage.	**1. Identify and implement locations for improved signage and wayfinding to increase awareness of publicly-accessible areas along the waterfront for residents and visitors.**	**Conservation Commission, Duxbury DPW**	**Open Space Committee**	**Ongoing**	None
		2. If any coastal properties become unused due to increased impacts of sea level rise, the Town should prioritize that the areas be returned to pen space for public use and coastal resilience.	**Conservation Commission, Duxbury Planning Department**	None	**Long-term**	None

OPEN SPACE AND RECREATION RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
O5: Provide opportunities for safe walking and biking in Duxbury.	**O5.1:** Consider future maintenance and upkeep needs in the planning and design of new improvements.	**1. Integrate all new open space and recreation facilities into the integrated facilities maintenance plan to support annual maintenance activities.**	**Conservation Commission, Open Space Committee**	**Facilities Management**	**Short-term**	None

SUSTAINABILITY - CLEAN ENERGY RECOMMENDATIONS

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
SE1: Develop a community-wide Climate Action Plan that sets the community on a path towards becoming net-zero, including buildings, transportation, and waste sectors.	**SE1.1:** Extend the Ad-Hoc Alternative Energy Committee's goals to include considering a feasibility analysis of net-zero commitment and supporting a long-term GHG reduction plan.	**1. Alternative Energy Committee update its goals to include net-zero feasibility and long-term GHG reduction planning, adopt goals with Board of Selectmen.**	**Alternative Energy Committee**	**Board of Selectmen**	**Short-term**	None
	SE1.2: Establish a GHG baseline for community to better understand usage across residential, commercial and industrial, transportation and waste sectors.	**1. Identify funding to hire a consultant conduct the GHG baseline and inventory.**	**Alternative Energy Committee**	None	**Short-term**	None
	SE1.3: Explore targets for GHG reductions and Net-Zero goals, including interim targets for every decade (i.e. 2030 and 2040) and near-term targets for reduction.	**1. Identify funding to hire a consultant to create net-zero or climate action plan.**	**Alternative Energy Committee**	None	**Mid-term**	**MA Department of Energy Resources (DOER) Pathways to Zero Net Energy Program**
	SE1.4: Once targets have been established develop a strategy for reaching GHG reductions and launch projects and initiatives that balance greatest impact and costs.	**1. Identify funding to hire a consultant and engage the community to create net-zero or climate action plan.**	**Alternative Energy Committee**	None	**Mid-term**	None
SE2: Increase access for local residents and businesses to clean energy for electricity and heating/cooling needs.	**SE2.1:** Encourage the development and participation in Community Shared Solar (CSS), in which multiple subscribers can benefit from a single, large solar array (within the same utility load-zone). CSS helps provide access to solar to those who are unable to install it on their own property, whether they have roofs that aren't appropriate or are renters who don't own their home.	**1. Explore options of CSS models and release RFI for local solar developers.**	**Alternative Energy Committee**	None	**Short-term**	**"Community Shared Solar Implementation Guidelines for Massachusetts Communities"**

SUSTAINABILITY - CLEAN ENERGY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **SE2:** Increase access for local residents and businesses to clean energy for electricity and heating/cooling needs.	**SE2.2:** Host a Solarize plus or Heat Smart campaign to promote and reduce costs of air source heat pumps and the electrification of heating/cooling systems, while also reducing costs for solar through bulk purchasing of rooftop solar (Solarize).	**1. Explore grant funding from the state to run a solarize campaign.**	**Alternative Energy Committee**	None	**Short-term**	**MA Clean Energy Center and MA Department of Energy Resources (DOER) Solarize Massachusetts programs**
		2. Establish group of volunteers to run campaign.	**Alternative Energy Committee**	None	**Short-term**	
SE3: Reduce municipal greenhouse gas emissions.	**SE3.1:** Continue projects to reduce energy usage at municipally-owned buildings, including schools through energy efficiency measures, retrofitting HVAC and boilers, and behavioral changes.	**1. Maintain Green Communities designation annually and apply for competitive grants to reach 20% reduction goal.**	**Facilities Manager and School Facilities Manager**	None	**Ongoing**	None
		2. Track costs savings from energy efficiency projects to establish funding for future projects and/or staff time.	**Facilities Manager and School Facilities Manager**	None	**Ongoing**	None
	SE3.2: Continue to reduce energy use from municipally-owned vehicles including investing in fuel efficient and alternative fuel vehicles, and tracking vehicle usage.	**1. Maintain Green Communities designation and consider state grants for EV charging stations and fuel efficient vehicles.**	**Facilities Manager and Department of Public Works**	None	**Mid-term**	None
	SE3.3: Install and purchase renewable energy for municipal use, either through direct ownership or power purchase agreements (PPA's) with solar and wind sources nearby.	**1. Assess town owned property and buildings for suitability of roof-top and/or ground mounted solar. Including parking canopies.**	**Facilities Manager and Department of Public Works**	None	**Mid-term**	None
	SE3.4: While a majority of the streetlights in Duxbury are owned by Eversource, the town should continue working towards municipally owned streetlights and lights at facilities, and consider retrofitting to LED's and/or dimming lights where appropriate (as identified in the 2017 Energy Reduction Plan).	**1. Identify municipally owned streetlight locations and lights at facilities to retrofit to LED's.**	**Facilities Manager and Department of Public Works**	None	**Mid-term**	**MA Department of Energy Resources (DOER) grant funding for 30% cost of LED streetlight materials and installation**

SUSTAINABILITY - CLEAN ENERGY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
SE4: Support local residents and business in reducing their energy use through energy efficiency programs and initiatives.	**SE4.1:** Educate property owners about the benefits and programs to conduct a home energy audit and partner with existing programs through Eversource and Mass Save.	**1. Host local educational events, link information on municipal website, and explore mailers/social media to residents.**	**Alternative Energy Committee**	None	**Mid-term**	**Mass Save resources**
	SE4.2: Establish a weatherization program for home-owners and business owners, or explore partnerships with existing programs.	**1. Host local educational events, link information on municipal website, and explore mailers/social media to residents.**	**Alternative Energy Committee**	None	**Mid-term**	**Mass Save resources and MA Weatherization Assistance Program (WAP)**
SE5: Increase energy resilience at critical facilities and public safety buildings.	**SE5.1:** Identify critical facilities ideal for resilient energy systems, including facilities that may be used as emergency shelters or command centers.	**1. Review Comprehensive Emergency Management Plan for critical facilities used as shelters and command centers (ideally out of the flood plain) that would be appropriate for energy resilience upgrades.**	**Facilities Manager and Department of Public Works**	**Alternative Energy Committee**	**Short-term**	None
	SE5.2: Explore the technical and financial feasibility of installing islanding capabilities at municipally-owned solar energy systems to be used during power outages (such as at the schools).	**1. Conduct study for high school and performing arts center, which have existing solar for possible islanding abilities.**	**Facilities Manager and Department of Public Works**	**Alternative Energy Committee**	**Long-term**	**MA Community Clean Energy Resiliency Initiative (CCERI)**
	SE5.3: Explore the technical and financial feasibility of installing battery storage with solar either at existing solar arrays, or building a new solar array plus storage.	**1. Include schools, Town Hall (DPW) and Fire and Safety buildings as part of the study to install additional solar and storage projects.**	**Facilities Manager and Department of Public Works**	**Alternative Energy Committee**	**Long-term**	**State grant money may apply, including MVP Action grants. Utilize state incentives including SMART to finance project.**

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
HC1: Preserve the historic residential character of Duxbury.	**HC1.1:** Document histories and record inventories for structures that retain historic character and significance.	**1. Based on analysis of MACRIS Inventory in HC1.1.3, establish plan for inventory efforts that address gaps in existing inventory.**	**Duxbury Historical Commission**		**Mid-term**	**MHC Survey and Planning Grants**
		2. Adopt use of historic context statements for consistent documentation of historic character and significance to be used by the Duxbury Historical Commission in prioritizing preservation efforts and identifying appropriate preservation approaches.	**Duxbury Historical Commission**	**Duxbury Rural and Historical Society**	**Mid-term**	None
		3. Prioritize properties listed on the National Register of Historic Places for preservation restriction and eligibility for tax credit and other funding programs.	**Duxbury Historical Commission**	**Duxbury Local Historic District Commission**	**Mid-term**	**CPA, Historic Preservation Tax Credits, MCC Cultural Fund**
	HC1.2: Identify regulatory hurdles to adaptive reuse of historic buildings to support housing needs.	**1. Establish architectural and urban form typography for residential and commercial architecture and urban design (i.e. lot size and geometry, setbacks, landscaping, etc.) by area of town, style, and time period.**	**Duxbury Historical Commission and Duxbury Rural and Historical Society**	**Design Review Board, local architects, and historians**	**Short-term**	None
		2. Identify key challenges to maintenance, modernization, and sustainability of historic residential and commercial structures.	**Duxbury Building Department**	**Planning Board, Design Review Board, Historical Commission, Zoning Board of Appeals**	**Short-term**	None
		3. Evaluate zoning code to identify areas of incompatibility where the allowed building massing would not be sensitive to the scale and design of the surrounding historic built form.	**Duxbury Planning Department**	**Planning Board, Design Review Board, Historical Commission**	**Mid-term**	None
		4. Consider incentives, such as expedited permitting, allowance of accessory dwelling units, or others, for maintenance, sustainability upgrades, adaptive reuse, and design of new construction that enhances historic character of residential and commercial districts with form-based code zoning overlays.	**Duxbury Planning Department**	**Duxbury Planning Board, Duxbury Historical Commission**	**Mid-term**	None
	HC1.3: Incentivize preservation of historic structures on the waterfront to enhance Duxbury's identity as a maritime and shipbuilding center.	**1. Document lot sizes, setbacks, and building envelopes for contributing historic structures within Old Shipbuilder's Historic District.**	**Duxbury Historical Commission, Duxbury Local Historic Districts Commission**	**Duxbury Assessing Department, Duxbury Planning Department**	**Mid-term**	

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **HC1:** Preserve the historic residential character of Duxbury.	**HC1.3:** Incentivize preservation of historic structures on the waterfront to enhance Duxbury's identity as a maritime and shipbuilding center.	**2. Using data collected during documentation, establish preferred ranges to maintain compatibility with historic fabric in new construction.**	**Duxbury Historical Commission, Duxbury Local Historic Districts Commission**	**Duxbury Planning Department**	**Mid-term**	None
		3. Review zoning in Old Shipbuilders Historic District to evaluate whether current requirements respect historic building form, lot size, and lot layout.	**Duxbury Historical Commission, Duxbury Planning Department**	None	**Mid-term**	None
		4. Recommend zoning approach in Old Shipbuilders District that encourages compatible new development and incentivizes preservation.	**Duxbury Historical Commission, Duxbury Planning Department**	**Planning Board, Board of Selectmen, Town Meeting**	**Mid-term**	None
	HC1.4: Develop specific and precise design guidelines for Local Historic Districts.	**1. Define architectural elements that determine historic building character in Duxbury Local Historic Districts.**	**Duxbury Local Historic Districts Commission**	**Local Architects and Architectural Historians**	**Short-term**	None
		2. Use drawings to illustrate critical design elements and restrictions for Local Historic District Properties.	**Duxbury Local Historic Districts Commission**	None	**Short-term**	None
		3. Amend design guidelines to include narrative descriptions and illustrations of design elements.	**Duxbury Local Historic Districts Commission**	**Duxbury Town Meeting**	**Short-term**	None
	HC1.5: Establish validation program for historic homes retaining historic architectural character.	**1. Establish historic character and significance validation program within the Duxbury Historical Commission.**	**Duxbury Historical Commission**	**Duxbury Board of Selectmen**	**Long-term**	None
		2. Adopt criteria for inclusion and application process based on Historic Preservation Plan recommendations.	**Duxbury Historical Commission**	**Duxbury Board of Selectmen**	**Long-term**	None
		3. Establish local preservation funding program opportunities applicable to validated properties.	**Duxbury Historical Commission**	**Duxbury Board of Selectmen, Duxbury Town Meeting, Duxbury Community Preservation Committee**	**Long-term**	None

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **HC1:** Preserve the historic residential character of Duxbury.	**HC1.5:** Establish validation program for historic homes retaining historic architectural character.	**4. Establish incentives such as expedited review of accessory dwelling units or home occupation permits for validated properties.**	**Duxbury Historical Commission; Duxbury Planning Department**	**Duxbury Planning Board; Duxbury Zoning Board of Appeals, Duxbury Board of Selectmen, Duxbury Town Meeting**	**Long-term**	None
HC2: Develop local capacity to manage and enhance historic and cultural resources.	**HC2.1:** Expand partnerships among historic and cultural organizations through development of a Historic Preservation Plan.	**1. Establish narrative of Duxbury history from Native settlement to present day with eras delineated by key changes in economic activity and development patterns.**	**Duxbury Historical Commission**	**Duxbury Rural and Historical Society**	**Short-term**	**MassHumanities grants**
		2. Establish narrative of history of historic preservation in Duxbury, documenting significant preservation accomplishments and challenges.	**Duxbury Historical Commission**	**Duxbury Rural and Historical Society, Duxbury Local Historic District Commission**	**Short-term**	None
		3. Analyze existing inventory of structures in MACRIS to identify gaps in historic era represented and gaps in geographic areas of town, designated properties, preservation restrictions, and group inventory entries by era of potential historic significance and designation.	**Duxbury Historical Commission**	None	**Short-term**	None
		4. Conduct public outreach as part of municipal preservation plan to identify residents' concerns and priorities related to historic preservation.	**Duxbury Historical Commission**	**Duxbury Rural and Historical Society**	**Short-term**	None
		5. Adopt guiding principles for preservation in Duxbury, potentially using or combining with the Design Review Committees new Guidelines.	**Duxbury Historical Commission, Design Review Committee**	**Duxbury Local Historic District Commission**	**Short-term**	None

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **HC2:** Develop local capacity to manage and enhance historic and cultural resources.	(Continued) **HC2.1:** Expand partnerships among historic and cultural organizations through development of a Historic Preservation Plan.	**6. Develop set of criteria for evaluating inventoried properties for application of preservation tools using historic documentation and civic priorities as well as other potential factors.**	**Duxbury Historical Commission**	**Duxbury Local Historic District Commission, Duxbury Rural and Historical Society**	**Short-term**	None
		7. Compile above into municipal preservation plan that prioritizes tasks for Duxbury Historical Commission over the next five years.	**Duxbury Historical Commission**	**Duxbury Local Historic District Commission**	**Short-term**	**MHC Survey and Planning Grants**
		8. Publicize principles, tools and plan through Duxbury Town Website.	**Duxbury Historical Commission**	**Website Administrator**	**Short-term**	None
		9. Develop clear language available in print and on Town website to explain the roles and responsibilities of the Historical Commission as the public body charged with preservation planning and demolition delay vs. the Local Historic District Commission as the public body charged with regulatory review within local historic district.	**Duxbury Historical Commission, Duxbury Local Historic District Commission**	**Website Administrator**	**Short-term**	None
	HC2.2: Cultivate partnerships among organizations within historic and cultural asset clusters for programming, maintenance, fundraising and promotion.	**1. Engage arts and culture organizations, historic museums and heritage sites, schools, and maritime organizations and businesses in cultural plan for Duxbury.**	**Duxbury Planning Department**	**Duxbury Cultural Council, Duxbury Art Association**	**Short-term**	None
		2. Establish new events and programming that highlight historic and cultural resources. Highlight existing activities such as DRHS partnership with Duxbury Public Schools to engage schools with an interdisciplinary Duxbury history curriculum.	**Duxbury Planning Department, Duxbury Public Schools, Duxbury Cultural Council**	**Duxbury Rural and Historical Society, Duxbury arts and culture organizations**	**Short-term**	None

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **HC2:** Develop local capacity to manage and enhance historic and cultural resources.	(Continued) **HC2.2:** Cultivate partnerships among organizations within historic and cultural asset clusters for programming, maintenance, fundraising and promotion.	**3. Establish interpretive signage program in partnership with historic and cultural organizations.**	**Duxbury Planning Department**	**Duxbury Rural and Historical Society, Historic Commission, Duxbury Local Historic District Commission, Duxbury arts and culture organizations**	**Short-term**	None
		4. Coordinate with Plymouth 2020 to create complementary events and programming and build partnerships with broader historic and cultural community.	**Duxbury Planning Department**	**Duxbury Rural and Historical Society**	**Short-term**	None
	HC2.3: Support resident efforts to maintain historic assets, especially the beach and town landings, through improved access and signage, increased DPW maintenance, waste collection procedures, and recognition of volunteer efforts.	**1. Initiate program to recognize outstanding volunteer efforts to maintain and preserve historic sites and assets.**	**Duxbury Rural and Historical Society**	**Duxbury Historical Commission, Duxbury Beach Committee, Duxbury Planning Department, Duxbury DPW**	**Short-term**	**Duxbury Cultural Council**
		2. Establish preservation and maintenance protocol for DPW for Town landings and other publicly owned historic properties.	**Duxbury Historical Commission**	**Department of Planning; Department of Public Works**	**Short-term**	None
		3. Install interpretive signage to educate residents about historic resources and encourage local stewardship	**Duxbury Historical Commission, Department of Public Works**	**Duxbury Rural and Historical Society, Duxbury Beach Committee; Duxbury Sidewalk/Bike Path Committee**	**Mid-term**	None
HC3: Protect Duxbury's historic and cultural resources.	**HC3.1:** Expand CPA funding for the acquisition, preservation, rehabilitation and restoration of historic properties and resources.	**1. Review accomplishments of CPA Funding for preservation of Duxbury historic buildings and open space resources.**	**Duxbury Historic Commission, Duxbury Local Historic District Commission**	**Duxbury Community Preservation Committee**	**Short-term**	None
		2. Increase CPA surcharge from 1% to fund historic preservation, open space and recreation, and affordable housing priorities.	**Duxbury Community Preservation Committee**	**Duxbury Board of Selectmen, Duxbury Town Meeting**	**Mid-term**	None

HISTORIC AND CULTURAL RESOURCES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **HC3:** Enhance Duxbury's historic and cultural resources.	**HC3.2:** Explore funding mechanisms for maintenance of privately owned historically significant homes.	**1. Explore options for establishing a Preservation Loan Fund for owner-occupied historic properties.**	**Duxbury Historical Commission; Duxbury Rural and Historic Society**	None	**Short-term**	None
		2. Explore potential for historic home tours and local history tours to fund preservation of historic homes.	**Duxbury Historical Commission; Duxbury Rural and Historic Society**	None	**Short-term**	None
	HC3.3: Provide information through the Town's Historical Commission about how to research house histories, and strategies for preserving and restoring historic character.	**1. Review web pages of Arlington Historical Commission, Hingham Historical Commission for examples of homeowner resources.**	**Duxbury Historical Commission**	None	**Short-term**	None
		2. Develop web content for Duxbury homeowner building on Duxbury Historic Preservation Plan; historic character and significance evaluation, and provide links to web-based resources for maintenance and preservation of historic homes.	**Duxbury Historical Commission**	None	**Mid-term**	None
HC4: Enhance creative and cultural economic development.	**HC4.1:** Encourage private land conservation in support of semi-rural heritage and economic activities including agriculture, horticulture, and aquaculture.	**1. Conserve open space for agriculture, horticulture, and aquaculture activities.**	**Duxbury Agricultural Commission, Duxbury Conservation Commission, Duxbury Community Preservation Committee**	**Wildlands Trust**	**Ongoing**	None
		2. Support local agriculture, horticulture, and aquaculture through local food systems planning.	**Duxbury Planning Department**	**Duxbury Agricultural Commission, Duxbury Bay Mgmt Committee; Duxbury Shellfish Committee**	**Mid-term**	None
		3. Explore economic development strategies that highlight local artists, history, and food producers.	**Duxbury Planning Department**	**Duxbury Economic Advisory Committee, Duxbury Agricultural Commission, Duxbury Bay Management Committee; Duxbury Shellfish Committee**	**Mid-term**	None

SUSTAINABILITY - CLIMATE RECOMMENDATIONS

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
SC1: Incorporate climate resiliency into all local and regional planning efforts.	**SC1.1:** Establish a Climate Resilience Task Force/municipal committee which oversees the implementation of Duxbury Climate Vulnerability Assessment and Action Plan, Natural Hazard Mitigation Plan and the Envision Duxbury Master Plan Sustainability element.	**1. Appoint a representative from multiple boards and commissions such as Board of Health, Planning Board, Open Space Committee, Conservation Commission, ZBA, and two residents at large.** **2. Work with the municipal staff to seek funding and implement climate resilience actions in all climate-related plans.**	**Board of Selectmen**	**Other Relevant Duxbury Boards, Departments, and Committees**	**Short-term and Ongoing**	None
	SC1.2: Maintain the Town's MA Executive Office of Energy and Environmental Affairs Municipal Vulnerability Preparedness Designation every five years.	**1. Ensure Town completes one or more climate resilience action items to maintain designation.** **2. Complete annual reports.** **3. Complete a Community Resilience Building Workshop every five years.**	**Duxbury Planning Department**	**Board of Selectmen**	**Every five years**	**EEA MVP Planning Grant and MVP Action Grant**
	SC1.3: Continue to leverage local funds with state and federal climate resilience and natural hazard mitigation funding opportunities to implement resilience measures across the Town.	**1. Identify locally funded or planned projects that advance climate resilience and natural hazard mitigation. Seek supplemental funding through state and federal programs.**	**Duxbury Planning Department**	**Other Relevant Duxbury Departments**	**Short-term and Ongoing**	**EEA MVP Action Grant**
	SC1.4: Explore zoning that prohibits and/or regulates building in high hazard areas to strengthen resilience.	**2. Review Duxbury wetland bylaw to create greater buffers between coastal and inland wetlands and shorelines.**	**Duxbury Conservation Agent**	**Duxbury Conservation Commission**	**Ongoing**	**MA Coastal Erosion Commission, MA Emergency Management, MA Association of Conservation Commissions; Office of Coastal Zone Management**

SUSTAINABILITY - CLIMATE RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **SC1:** Incorporate climate resiliency into all local and regional planning efforts.	**SC1.5:** Ensure capital improvements (such as transportation, stormwater systems, park improvements, municipal buildings, etc.) incorporate design standards that will mitigate climate change impacts and strengthen resilience.	**1. Add climate change and resilience to review and prioritization of capital improvements.**	**Board of Selectmen**	**Town Manager, Finance Committee**	**Short-term**	None
	SC1.6: Create climate resiliency regulations or incentives related to increasing safety and minimizing damage related to coastal storms.	**1. Identify locations and types of recurring damage related to coastal storms and the types of regulations that could increase safety and prevent loss.**	**Duxbury Climate-Task Force; Duxbury Sustainability Committee**	**Duxbury Planning Department, Municipal Services Department**	**Short-term and Ongoing**	**Metropolitan Area Planning Council, Green Communities, MA Clean Energy Council**
SC2: Create a resilient shoreline.	**SC2.1:** Support the health of existing living shorelines such as salt marshes and eel grass meadows. Engage in restoration projects that enable ecosystem services and adaptive capacity of living shorelines.	**1. Perform a study on existing salt marshes-geographic extent, species composition, erosion/growth, and stressors. Monitor over five year period to determine loss and/or need for restoration.** **2. Work with MA DEP on restoring eel grass beds.**	**Conservation Agent**	**Conservation Commission**	**Ongoing**	**The Nature Conservancy Massachusetts, MassBays, Coastal Zone Management, MA DEP**
	SC2.2: Practice and support beach nourishment and sacrificial dune opportunities to increase coastal infrastructure protection, wildlife habitat, and recreation opportunities.	**1. Identify beach nourishment and sacrificial dune opportunities annually.**	**Duxbury Beach Reservation and Conservation Agent**	**Duxbury Planning Department**	**Ongoing**	**Duxbury Beach Reservation, Office of Coastal Zone Management. NOAA Coastal Resilience Grants, NFWF National Coastal Resilience Fund**
	SC2.3: Create a plan to manage sea walls. Plan sea wall investments to be able to withstand future sea level rise and coastal inundation for the projected lifetime of the sea wall (approximately 30-50 years).	**1. Perform a structural, maintenance, restoration, and/or replacement assessment and inventory.**	**Duxbury Seawall Committee**	**Town Manager**	**Short-term and Ongoing**	**MVP Action Grant**

SUSTAINABILITY - CLIMATE RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **SC2:** Create a resilient shoreline.	(Continued) **SC2.3:** Create a plan to manage sea walls. Plan sea wall investments to be able to withstand future sea level rise and coastal inundation for the projected lifetime of the sea wall (approximately 30-50 years).	**2. Identify ownership of sea walls**	**Town Manager**	**Duxbury Seawall Committee**	**Short-term and Ongoing**	**MVP Action Grant**
		3. Create a plan for cost-sharing sea wall maintenance and restoration with coastal landowners.	**Town Manager**	**Duxbury Seawall Committee**	**Short-term and Ongoing**	**MVP Action Grant**
	SC2.4: Explore voluntary coastal buy-back programs for residences and businesses in high hazard or repetitive loss areas. Utilize state funding through the Environmental Bond Bill H.4835 or FEMA Coastal BuyBack program (when active).	**1. Perform community outreach and engagement with residents in coastal zones on planning for the future.**	**Duxbury Planning Department**	None	**Long-term**	**MVP Action Grant, Metropolitan Area Planning Council, Consensus Building Institute**
		2. Perform a cost/benefit analysis of coastal buy backs.	**Duxbury Planning Department**	None	**Long-term**	**MVP Action Grant, Metropolitan Area Planning Council, Consensus Building Institute**
	SC2.5: Investigate the use of earthen berms for increased shoreline protection along coastal roads with persistent coastal flooding such as Bay Road, King Caesar Road, Washington Street in Snug Harbor, Powder Point Road, Gurnet Road, Duxbury Beach Access Road, Pine Point Road and Marginal Road.	**1. Identify potential locations and impacts of earthen berms.**	**Duxbury Planning Department and Duxbury DPW**	None	**Mid-term**	**MVP Action Grant**
	SC2.6: Explore opportunities to acquire and protect land along the shoreline to enhance coastal flood management, increase public access to the shoreline, and reduce infrastructure vulnerability.	**1. Identify potential locations and potential acquisition costs.**	**Duxbury Planning Department and Conservation Agent**	**Conservation Commission, Planning Board**	**Long-term**	**MVP Action Grant**

SUSTAINABILITY - CLIMATE RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
SC3: Position Duxbury's coastal economy to remain vibrant through climate change.	**SC3.1:** Engage in a community-led district resilience planning and development effort of Snug Harbor that includes resilience zoning, development, migration (where applicable), and resilience project prioritization.	**1. Pursue grant and perform study.**	**Duxbury Planning Department**	None	**Short-term**	**Metropolitan Area Planning Council**
	SC3.2: Work with the commercial fishing industry and other coastal business (yacht club, Duxbury Bay Maritime School, etc.) to create a sustainable coastal access area resilient to sea level rise and coastal flooding.	**1. Identify shared interests and specific improvements that could be accomplished through partnerships.**	**Duxbury Planning Department**	None	**Short-term**	None
	SC3.3: Commit and realize Net Zero goals to minimize local contributions to ocean warming (detrimental to marine ecosystem function) and ocean acidification (threatening commercial fish and shellfish industries).	**1. Perform a greenhouse gas inventory.** **2. Work with residents and Town leaders to secure commitment.** **3. Create a plan toward achieving NetZero by 2050.**	**Duxbury Climate-Task Force; Duxbury Sustainability Committee**	**Duxbury Planning Department; Municipal Services**	**Short-term and Ongoing**	**Metropolitan Area Planning Council, Green Communities, MA Clean Energy Council**
	SC3.4: Strengthen the viability and resilience of the Powder Point Bridge to withstand coastal storms and ice jams to protect recreational access to Duxbury Beach.	-	-	-	-	-

SUSTAINABILITY - CLIMATE RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
SC4: Protect Duxbury's water resources from the impacts of climate change.	**SC4.1:** Reduce stormwater runoff into Duxbury's waterways by using green infrastructure and other natural filtration systems.	**1. Require 100% onsite stormwater capture with new and redevelopment using natural infiltration.**	**Duxbury Planning Department**	**Planning Board**	**Short-term and Ongoing**	**MA DEP MS4 Municipal Assistance Grant Program**
		2. Minimize impervious surface requirements in parking lots and driveways.				
		3. Require Low Impact Development in site plan approvals.				
		4. Participate in regional stormwater management partnerships and infrastructure improvements.				
	SC4.2: Ensure that investments in wastewater systems are climate resilient to prevent contamination of Duxbury's waterways from storm surge, coastal flooding and riverine flooding.	**1. Evaluate efficacy of onsite wastewater treatment during coastal storms and periods of extreme precipitation.**	**Duxbury Board of Health**	None	**Long-term**	**MA Department of Public Health**
		2. Consider wastewater treatment alternatives such as septic and regional management.				
	SC4.3: Explore salt water intrusion vulnerability of Duxbury's aquifers with sea level rise.	**1. Identify proper monitoring technique to prepare for monitoring if sea level rise increases concern for intrusion.**	**Conservation Agent**	**Conservation Commission**	**Long-term**	None
	SC4.4: Promote actions for sustaining and improving water quality in Duxbury Bay to ensure healthy marine ecosystems such as salt marshes, eel grass beds, and marine life habitat.	**1. Prepare and distribute a best practices guide for local land owners, residents, and businesses.**	**Conservation Agent**	**Conservation Commission**	**Short-term**	None

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
T1: Develop a traffic safety prioritization plan.	**T1.1:** Study high crash locations to develop a safety prioritization plan that includes vehicular traffic calming measures to reduce speeds.	**1. Conduct Road Safety Audits and Bicycle and Pedestrian Audits for high crash locations.**	**Duxbury Planning Department**	**Old Colony Planning Council**	**Short-term**	**FHWA Road Safety Audit guidelines: https://safety.fhwa.dot.gov/rsa/resources/ Bicycle and pedestrian safety audit and other resources: http://www.pedbikeinfo.org/resources/pbic_resources.cfm**
	T1.2: Coordinate the traffic safety prioritization plan with pedestrian and bicycle priorities.	**1. Incorporate findings into the town wide multimodal network planning and the street improvement prioritization.**	**Duxbury Planning Department**	None	**Short-term**	None
	T1.3: Monitor autonomous vehicle adoption, specifically in the South Shore, including what infrastructure might be needed to promote safety.	**1. The Town should monitor the adoption of autonomous vehicles and follow best practices for street design, lane markings and signage that will help safely accommodate this new technology, with particular attention to how these vehicles can safely operate in a multimodal environment with pedestrians and cyclists.**	**Duxbury DPW**	**Duxbury Planning Department**	**Long-term**	**MAPC resources on AVs: https://www.mapc.org/resource-library/autonomous-vehicles/**
T2: Move into implementation of previous studies and recommendations.	**T2.1:** Create a policy and prioritization plan for multi-modal and safety improvements that reflects and maintains the rural and small town character.	**1. Conduct a multi-modal street improvement plan effort and explore adopting a complete streets policy, as outlined by the MassDOT guidelines, with an emphasis on maintaining the small town and rural character of Duxbury. Passing a complete streets policy will make the Town eligible to receive funds from the state for roadway improvements.**	**Duxbury Planning Department**	**Town Highway Safety Advisory Committee** **Town Sidewalk and Bike Path Advisory Committee** **MAPC***	**Short-term**	**(See below)**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **T2:** Move into implementation of previous studies and recommendations.	(Continued) **T2.1:** Create a policy and prioritization plan for multi-modal and safety improvements that reflects and maintains the rural and small town character.	**2. After adopting the complete streets plan and policy, develop a multi-modal streets prioritization plan.**	**Town Sidewalk and Bike Path Advisory Committee**	**Town Highway Safety Advisory Committee** **MAPC***	**Short-term**	**MassDOT complete streets portal, including training, guidance, and funding: https://masscompletestreets.com/** **MAPC's Local Access Score website (localacess.mapc.org) includes tools that can help in prioritizing routes.** **FHWA Small Town and Rural Multimodal Network Guide: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/**
		3. Consider a benefits improvement district to implement recommendations in key nodes and other additional local funds, to also match state and federal funding.	**Duxbury Planning Department**		**Mid-term**	
	T2.2: Continue "safe routes to schools" efforts to identify and improve priority corridors and actions that will support safe cycling and walking for children.	**1. These efforts can be done in conjunction with the evaluation of routes to connect key nodes and the development of a multi-modal streets prioritization plan.**	**Town Sidewalk and Bike Path Advisory Committee**	**Duxbury Public Schools, Duxbury Planning Department**	**Short-term**	**Massachusetts Safe Routes to Schools: https://www.mass.gov/safe-routes-to-school** **Safe Routes to Schools online guide: http://guide.saferoutesinfo.org** **Safe Routes to Schools National Partnership: https://www.saferoutespartnership.org/**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **T2:** Move into implementation of previous studies and recommendations.	**T2.3:** Create a single town transportation committee to concentrate on roadside paths, sidewalks, traffic safety, and bicycle needs to ensure coordinated prioritization and implementation.	**1. Currently, the Town has three advisory committees that impact transportation -- highway safety, sidewalks and bike paths, and open space (which includes trails). Evaluate whether a single transportation advisory committee, with subcommittees, will allow for greater coordination and planning for projects that accommodate all modes – vehicular, pedestrian, and bicycles.**	**Town Advisory Committees – Highway Safety, Sidewalk and Bike Paths, and Open Space**	**Duxbury Planning Department**	**Mid-term**	None
		2. If separate advisory committees remain, ensure committee are required to coordinate among projects, and in the end of year committee reports, include specific information on how the committees coordinated efforts and establish periodic joint meetings and sharing of meeting notes and agenda items between the Highway Safety Committee, Conservation Commission, Planning Board, and Sidewalk and Bike Path Committee to help coordinate efforts of all supporting members to achieve the designated goals.	**Town Advisory Committees – Highway Safety, Sidewalk and Bike Paths, and Open Space**	**Duxbury Planning Department**	**Short-term**	None
	T2.4: When feasible, conduct temporary infrastructure pilot projects with movable bollards and temporary paint to evaluate the effectiveness of recommended projects.	**1. After adoption of an area or corridor plan, when moving to design, consider using temporary infrastructure (sometimes called "tactical urbanism") to do a demonstration project and evaluate design options. Using temporary infrastructure such as signs, movable bollards, and temporary paint are ways to test various alternatives and monitor people's reactions and opinions before embarking on a final design and implementation.**	**Duxbury DPW and Duxbury Planning Department**	**MAPC**	**Mid-term**	**Examples of tactical urbanism demonstration projects: https://www.street-plans.com/tactical-urbanism-projects/**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **T2:** Move into implementation of previous studies and recommendations.	(Continued) **T2.4:** When feasible, conduct temporary infrastructure pilot projects with movable bollards and temporary paint to evaluate the effectiveness of recommended projects.	**2. Conduct surveys and other data collection methods, such as video, to determine how well the design meets the goals outlined in the plan, and adjust designs as needed.**	**Duxbury DPW and Duxbury Planning Department**	**MAPC**	**Mid-term**	**Interim design strategies guideline: https://nacto.org/publication/urban-street-design-guide/interim-design-strategies/from-pilot-to-permanent/** **Smart Growth America demonstration projects: https://smartgrowthamerica.org/safe-streets-academy-cities-launch-demonstration-projects/**
T3: Create a town-wide multimodal network connecting key nodes.	**T3.1:** Consider roadside paths, including trails separated from the roads by several feet, with an aim for creating a multimodal network to connect key destinations such as schools, neighborhood business districts, regional bike trails, and nearby transit stations.	**1. Create a single town map of existing town trails.** **2. Create map showing key nodes such as schools, economic centers, etc. that need connectivity as identified in the Master Plan. New trails or improvements to existing trails that help connect to these key nodes should be given priority.**	**Town Sidewalk and Bike Path Advisory Committee**	**Duxbury Planning Department, Open Space Committee**	**Short-term**	**MAPC Trail Implementation Toolkit: https://www.mapc.org/resource-library/trail-implementation-toolkit/** **Shared Use Path Planning and Design Guide: https://www.mass.gov/guides/shared-use-path-planning-and-design-guide**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **T3:** Create a town-wide multimodal network connecting key nodes.	**T3.2:** Evaluate roadway and streets for pedestrian and bicycle improvements, such as wide shoulders, shared-use paths, traffic calming, and develop specific projects to create the network, including pilot projects to test new ideas.	***This should be done as part of the Town's efforts to adopt a multimodal street policy and prioritization plan.***				
	T3.3: Plan a bicycle network connecting key destinations such as schools and neighborhood business districts (may include bicycle facilities on or parallel to roads and roadside paths).	**1. Hold planning workshop with MAPC and MassDOT to develop preferred alignment of LandLine trail, and develop action plan to construct trail.**	**Duxbury Planning Department**	**Town Sidewalk and Bike Path Advisory Committee Town Open Space Committee MAPC* and MassDOT**	**Mid-term**	**The LandLine: (https://www.mapc.org/transportation/landline) MAPC Trail Implementation Toolkit: https://www.mapc.org/resource-library/trail-implementation-toolkit/ Shared Use Path Planning and Design Guide: https://www.mass.gov/guides/shared-use-path-planning-and-design-guide MassTrails Grants: https://www.mass.gov/guides/masstrails-grants**
		2. For Bay Circuit Trail, develop action plan to add sidepaths or expanded shoulders, and marking on segments of trail along Town Streets.	**Duxbury Planning Department**	**Town Sidewalk and Bike Path Advisory Committee Town Open Space Committee MAPC* and MassDOT**	**Short-term**	
	T3.4: Explore potential bicycle share options and benefits, in coordination with adjacent communities, to allow cyclists to ride between communities, particularly during summer tourism periods.	**1. Work with adjacent municipalities (e.g., Marshfield, Pembroke, Kingston) on developing a multi-town bicycle share agreement that promotes connectivity.**	**Duxbury Planning Department and Town Sidewalk and Bike Path Advisory Committee**	None	**Long-term (should be implemented only when a larger bicycle infrastructure network is in place)**	**MAPC can provide examples of similar inter-municipal agreements and contracts with vendors**
		2. If desired, work with cost-free bicycle share vendor on a pilot program to collect data on usage and origins/destinations.				

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **T3:** Create a town-wide multimodal network connecting key nodes.	**T3.5:** Plan for "micro-mobility" battery powered non-motorized options such as Segways, scooters, and e-bicycles, and how the Town's transportation infrastructure could accommodate them.	**1. Follow statewide efforts of other municipalities on adopting ordinances whether to allow scooters and other micro-mobility options on Town sidewalks, or streets, and off-road trails.**	**Duxbury Planning Department and Duxbury DPW**	**Town Sidewalk and Bike Path Advisory Committee**	**Short-term**	**MAPC can provide with examples of ordinances, multi-municipality agreements and vendor contracts**
		2. If desired, work with cost-free micro-mobility vendor on a pilot program to collect data on usage and origins/ destinations.			**Mid-term**	
	T3.6: Plan for expanded ride-hailing services (Uber, Lyft, taxis) and autonomous vehicle with pick-up/drop-off areas at key destinations.	**1 Monitor data from Massachusetts Department of Public Utilities on the number of ride-hailing (also known as Transportation Network Companies, or TNCs) trips in Duxbury and the South Shore subregion to see if ride-hailing growth may warrant specific curbside signage and curbside management ordinance.**	**Duxbury Planning Department and Duxbury DPW**	**Town Highway Safety Advisory Committee**	**Short-term**	**DPU Ride-Hailing/ TNC data and Massachusetts TNC legislation: https:// tnc.sites.digital.mass.gov/ ITE Curbside Management Practitioners' Guide and Curbside Management Resources page: https://www.ite.org/technical-resources/topics/complete-streets/curbside-management-resources Autonomous vehicles resources: https:// www.mapc.org/resource-library/autonomous-vehicles/**
		2. Monitor availability of best practices for regulating on-street and off-street curb space in key areas such as neighborhood business districts and schools to minimize negative impacts to pedestrian, bicycle, and vehicular traffic flow.			**Mid-term**	
		3. Monitor MassDOT and other sources to see how quickly autonomous vehicles may be adopted in the Boston region, including adoption and use by ride-hailing services.			**Mid-term**	

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **T3:** Create a town-wide multimodal network connecting key nodes.	(Continued) **T3.6:** Plan for expanded ride-hailing services (Uber, Lyft, taxis) and autonomous vehicle with pick-up/ drop-off areas at key destinations.	**4. If desired, consider joining with MassDOT and municipalities on MOU to facilitate testing of autonomous vehicles within Duxbury.**	**Duxbury Planning Department and Duxbury DPW**	**Town Highway Safety Advisory Committee**	**Short-term**	
T4: Create walkable economic centers.	**T4.1:** Design safe pedestrian and bicycle connections in key neighborhood business districts including Snug Harbor and Railroad Avenue, similar to recent designs being discussed for Hall's Corner.	**1. Conduct planning and visioning efforts for neighborhood business districts, working with businesses and residents.**	**Duxbury Planning Department**	**Town Economic Development Advisory Committee** **Town Sidewalk and Bike Path Advisory Committee** **OCPC and MAPC***	**Short-term**	**MassDOT complete streets portal, including training, guidance, and funding: https:// masscompletestreets. com/**
		2. These planning efforts should include elements of Road Safety Audits and Bicycle/Pedestrian safety audits, as outlined by MassDOT's Complete Street Guidelines and FHWAs Safety Audit Guidelines; they should also evaluate where there is excess pavement that encourages speeding, and how the areas can be redesigned to encourage slower driving speeds with sidewalk and crosswalk extensions, better lighting, and on-street parking.	**Duxbury Planning Department**	**Town Economic Development Advisory Committee** **Town Sidewalk and Bike Path Advisory Committee** **OCPC and MAPC***	**Short-term**	**FHWA Road Safety Audit guidelines: https://safety. fhwa.dot.gov/rsa/ resources/** **Bicycle and pedestrian safety audit and other resources: http://www. pedbikeinfo.org/ resources/pbic_ resources.cfm**
	T4.2: Conduct parking studies in neighborhood business districts to determine parking needs, including ways to ensure parking turnover for commercial establishments, and ensure safe pedestrian connections through parking lots.	**1. Before implementing improvements in neighborhood business districts, a comprehensive parking study should be completed that measures existing parking resources, typical parking needs and turnover, with recommended strategies to ensure adequate parking while making other changes to accommodate non-motorize uses.**	**Duxbury Planning Department**	**Town Economic Development Advisory Committee** **Town Highway Safety Advisory Committee** **MAPC***	**Short-term**	**(See below)**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **T4:** Create walkable economic centers.	(Continued) **T4.2:** Conduct parking studies in neighborhood business districts to determine parking needs, including ways to ensure parking turnover for commercial establishments, and ensure safe pedestrian connections through parking lots.	**2. Parking studies should also address the safety issues of areas that have front-in parking that require vehicles to back into oncoming street traffic, which is an unsafe maneuver that can lead to collisions.**	**Duxbury Planning Department**	**Town Economic Development Advisory Committee** **Town Highway Safety Advisory Committee** **MAPC***	**Short-term**	**Examples of similar downtown parking studies by MAPC include Marlborough and Maynard. See https://www.mapc.org/transportation/ and look under "Learn More" and Parking".**
		3. After studies are completed, develop an implementation plan, including signage, and revise parking and street design ordinances as needed, to support parking study recommendations.			**Mid-term**	
	T4.3: Create placemaking pedestrian and bicycle infrastructure and (where needed) transit infrastructure in the existing neighborhood business districts, such as bicycle racks, wayfinding, seating, and dedicated pick-up/drop-off areas.	**1. After planning/vision studies of neighborhood business districts include design of improvements.**	**Duxbury DPW, Duxbury Planning Department**	None	**Mid-term**	None
		2. Consider a Parking Benefit District to fund elements; will require charging for parking.	**Duxbury DPW, Duxbury Planning Department**	None	**Long-term**	None
T5: Expand transit options and transit supportive infrastructure.	**T5.1:** Evaluate ridership and on time performance of the GATRA route serving Duxbury to determine whether to keep the route along Washington Street or return the routing to Route 3A, or other changes to improve transit access.	**1. The Town should review ridership and on/off data with GATRA to see if the summer routing options have increased performance. If possible, the routing evaluation should consider impacts to vulnerable populations including households without automobiles, seniors, and lower-income families, and ways the routes can best connect these individuals with daily needs including shopping, medical, and education.**	**Duxbury Planning Department**	**GATRA, OCPC**	**Mid-term**	**OCPC has completed comprehensive transit planning efforts for GATRA, and may be able to complete a route and stop evaluation for Duxbury.**
	T5.2: Implement infrastructure to support transit use such as seating at bus stops, and considering signage with bus schedules.	**1. Once the evaluation of the bus route is complete and the bus route finalized, an infrastructure plan for the Town's bus stops should be developed that prioritizes the busiest stops.**	**Duxbury Planning Department, Duxbury DPW**	**GATRA, OCPC**	**Long-term**	None
		2. Include bus stop infrastructure improvements when developing street improvements and placemaking.	**Duxbury Planning Department, Duxbury DPW**	**GATRA, OCPC**	**Long-term**	None

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **T5:** Expand transit options and transit supportive infrastructure.	**T5.3:** Include access to bus stops in pedestrian project prioritization.	**1. Ensure the prioritization plan includes access to bus stops as a key metric.**	**Duxbury Planning Department**	**Town Sidewalk and Bike Path Advisory Committee**	**Short-term**	**MassDOT complete streets portal, including training, guidance, and funding: https://masscompletestreets.com/**
	T5.4: Long-term, evaluate with GATRA the feasibility of a single bus route connection from Duxbury to the Kingston commuter rail.	**1. Explore with GATRA in their next long-range transit plan whether extending the Duxbury bus route to the Kingston commuter rail station is feasible, or what other connecting transit services might be reasonable.**	**Duxbury Planning Department**	**GATRA**	**Long-term**	**www.gatra.org**
	T5.5: Evaluate senior transportation services in nearby towns of Plymouth, Kingston and Marshfield to determine if a coordinated dispatch would create a more efficient and effective service.	**1. Work with MAPC, MassDOT, the Massachusetts Executive Office of Health and Human Services and nearby Towns to conduct a study of the senior transportation needs and resources to determine if a consolidated or coordinated senior shuttle service would be beneficial.**	**Duxbury Council on Aging**	**MAPC, MassDOT, MA EOHHS**	**Short-term**	None
	T5.6: Explore the feasibility of copying replicating the new Attleboro partnership for subsidized Uber and Lyft rides to help fill the gaps in GATRA services.	**1. Work with GATRA to see if Community Accessing Rides (CAR) program could be expanded into Duxbury. These partnerships allow for a lower cost way to expand the reach of transit for those who do not have access to an automobile, and could help fill gaps in transit services.**	**Duxbury Council on Aging**	**Duxbury Planning Department, GATRA**	**Short-term**	**www.gatra.org**

TRANSPORTATION AND CONNECTIVITY RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
T6: Include climate resiliency in developing changes to transportation infrastructure.	**T6.1:** Ensure that new transportation infrastructure is able to accommodate climate change impacts such as rising sea levels and stronger storms.	**1. During planning and design of transportation projects, use tools such as online mapping to view potential flooding impact, etc. and design projects to be resilient to impacts of climate change.**	**Duxbury Planning Department**	None	**Short-term**	None
	T6.2: Reduce impervious surfaces where possible when redesigning economic centers and street improvements.	**1. As key areas or corridors are reimagined, look for ways to reduce the amount of pavement where possible.**	**Duxbury DPW**	None	**Mid-term**	**A Better City guidelines on pavement and asphalt: https://challenge.abettercity.org/toolkits/climate-resilience-toolkits/urban-heat-island/paving-and-asphalt**
	T6.3: Add Electric Vehicle (EV) charging stations in Duxbury.	**1. Take advantage of state programs to install public (EV) charging stations.**	**Duxbury DPW**	None	**Short-term**	**MAPC resources on EV charging stations: https://www.mapc.org/planning101/roadmap-how-to-install-electric-vehicle-charging-stations-in-your-community/**
		2. Consider requirements that new developments install charging stations.	**Duxbury Planning Department**	None	**Mid-term**	

HOUSING RECOMMENDATIONS

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
H1: Diversify housing options to support affordability and a more diverse population	**H1.1:** Foster new housing types, such as mixed-use housing at neighborhood business districts.	**1. Modify Neighborhood Business District to encourage upper level housing units by removing the Special Permit requirement and the maximum two-bedroom restriction, but retaining Site Plan Review.**	**Planning Board**	**Duxbury Planning Department**	**Short-term**	None
	H1.2: Explore adaptive reuse options to create multiple housing units in existing and historic structures.	**1. Define a pilot program for the conversion of a larger historic or older home into multiple affordable housing units.**	**Planning Board, Duxbury Affordable Housing Trust**	**Duxbury Planning Department**	**Mid-term**	None
		2. Identify a property or properties that could participate in the program to evaluate and refine its effectiveness.	**Planning Board, Duxbury Affordable Housing Trust**	**Duxbury Planning Department**	**Mid-term**	None
	H1.3: Support the Affordable Housing Trust, cooperative housing, or other models to diversify housing offerings and options.	**1. Continue to complement Affordable Housing Trust activity with support from other Town Boards and Committees and external partners such as South Shore Habitat for Humanity.**	**Board of Selectmen**	**Community Preservation Committee, Council on Aging, Duxbury Housing Authority, Planning Board**	**Ongoing**	**Community Preservation Act funds**
	H1.4: Explore a policy or program to permit previously un-permitted housing units and add them to the roster of affordable housing options in the Town.	**1. Identify an inventory of un-permitted accessory dwelling units.**	**Planning Board**	**Duxbury Building Department, Duxbury Assessing Department**	**Short-term**	None
		2. Provide a low-cost or no-cost and streamlined permitting opportunity to make these units permitted and legal.	**Planning Board**	**Duxbury Building Department, Duxbury Assessing Department**	**Mid-term**	None
		3. Where the unit would be eligible, offer support to property owners to formalize deed restrictions and document the unit with the Local Initiative Program (LIP) of the MA Department of Housing and Community Development to count toward the Town's Subsidized Housing Inventory (SHI).	**Planning Board**	**Duxbury Affordable Housing Trust**	**Mid-term**	None

HOUSING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **H1:** Diversify housing options to support affordability and a more diverse population	**H1.5:** Identify Town-owned or privately owned land that would be well suited to additional affordable housing production that aligns with other Master Plan goals.	**1. Identify priority list of properties identified by the recently completed Duxbury Affordable Housing Trust Dodson and Flinker Study.**	**Duxbury Affordable Housing Trust**	**Duxbury Planning Department**	**Short-term**	**Community Preservation Act funds**
		2. Create an action plan for the highest priority properties.	**Duxbury Affordable Housing Trust**	**Duxbury Planning Department**	**Mid-term**	**Community Preservation Act funds**
	H1.6: Preserve existing affordable housing units that may require deed-restriction renewals.	**1. Identify current affordable housing units in Duxbury that may have long-term deed restriction issues as currently structured.**	**Duxbury Affordable Housing Trust**	None	**Short-term**	**Community Preservation Act funds**
		2. Approach property owners to discuss replacing deed restrictions with identified issues with the State's standard Local Initiative Program Deed Rider.	**Duxbury Affordable Housing Trust**	None	**Short-term**	**Community Preservation Act funds**
	H1.7: Continue to add all existing eligible affordable housing units to the Subsidized Housing Inventory.	**1. Document all Local Initiative Program (LIP) housing units with the MA Department of Housing and Community Development to count toward the Town's Subsidized Housing Inventory (SHI).**	**Duxbury Affordable Housing Trust**	**Duxbury Building Department**	**Short-term**	**Community Preservation Act funds**

HOUSING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **H1:** Diversify housing options to support affordability and a more diverse population	**H1.8:** Maintain updates to the Housing Production Plan most recently updated in 2019.	**1. The Duxbury Housing Production Plan was updated in April 2019. The next update should occur in 5 years, or sooner if some significant change in housing occurs in the Town.**	**Duxbury Affordable Housing Trust**	**Duxbury Planning Board**	**Mid-term**	**MassHousing Grants, MAPC Technical Assistance Grants**
H2: Preserve and strengthen the Town's established and historic residential neighborhoods and semi-rural and coastal character.	**H2.1:** Identify and develop design guidelines for each established and historic residential neighborhood to strengthen the character and features of each.	**1. Identify the distinct historic residential neighborhoods that would benefit from design guidelines, including evaluating guidelines for waterfront development and identify the highest priority.**	**Duxbury Planning Board, Design Review Board**	**Duxbury Planning Department**	**Short-term**	None
		2. Create a set of design guidelines for the highest priority district as a pilot for other districts to follow.	**Duxbury Planning Board, Design Review Board**	**Duxbury Planning Department**	**Short-term**	None
	H2.2: Create local historic districts in the most historically significant residential neighborhoods.	**1. For the three existing local historic districts, follow actions in Historic and Cultural Resources Recommendations under HC1.6.**	**Duxbury Local Historic Districts Commission**	**Duxbury Town Meeting**	**Short-term**	None
		2. For the four additional districts that have been explored in the past, define priorities and guide the Town through adoption modeled on the other districts in place.	**Duxbury Local Historic Districts Commission**	**Duxbury Town Meeting**	**Mid-term**	None
	H2.3: Reduce the likelihood of removal of historic homes through both regulations, such as increased dimensional controls, and incentives, such as historic tax credits.	**1. In historic residential districts where homes experience redevelopment pressure for demolition, modify zoning to include Floor Area Ratio (FAR) set at an amount that would allow additions, but discourage full demolition.**	**Duxbury Planning Board, Design Review Board**	**Duxbury Planning Department**	**Short-term**	None
	H2.4: Encourage additions, conversions, or accessory dwellings that enhance the economic viability of preservation while maintaining neighborhood character.	**1. Establish incentives such as expedited permitting, waiver or reduction of filing fees, building and occupancy permits, and/or utility connection fees.**	**Duxbury Planning Department**	**Duxbury Building Department**	**Short-term**	None

HOUSING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **H2:** Preserve and strengthen the Town's established and historic residential neighborhoods and semi-rural and coastal character.	**H2.5:** Explore opportunities to allow income-producing historic properties to expand tax credit opportunities.	**1. Support property owners who seek to become eligible for the 20% Historic Rehabilitation Tax Credit for a historic structure that is not owner-occupied.**	**Duxbury Historical Commission**	None	**Short-term**	**National Park Service, U.S. Department of the Interior, Technical Preservation Services and Tax Incentives**
H3: Strengthen walkability within existing compact nodes of residential development and mixed-use centers.	**H3.1:** Use redevelopment as an opportunity to encourage private investment to increase pedestrian and bicycle connections.	**1. Consider modifications to the Residential Conservation Cluster (RCC) zoning to increase the attractiveness of this district for development, such as allowing by right with Site Plan Review, instead of requiring a Special Permit.**	**Duxbury Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
		2. Consider modifications to the RCC zoning to strengthen compact design guidelines to support pedestrian and bicycle connections.	**Duxbury Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
	H3.2: Encourage redevelopment to occur in existing, compact, mixed-use clusters that support walkability.	**1. Review and approval of proposed residential development should emphasize whether the proposed location, design, and amenities are consistent with strengthening walkability in the Town as a primary criteria for approval.**	**Duxbury Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
	H3.3: Require or incentivize development to add amenity or access to adjacent public resources or to contribute to improving the conditions of the district in which they are located.	**1. Identify amenities, benefits, or other contributions that may be associated with development in specific locations. Cross reference this list with properties that have a higher potential for redevelopment.**	**Duxbury Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
		2. Consider modifications to the RCC zoning to strengthen compact design guidelines to strengthen adjacent open space or conservation areas while adding amenity and supporting pedestrian and bicycle connections.	**Duxbury Planning Board**	**Duxbury Planning Department**	**Mid-term**	None

HOUSING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
H4: Encourage independent living for seniors, people with disabilities and other special needs.	**H4.1:** Identify targeted locations near existing clusters, such as The Village at Duxbury, to add age-restricted and special needs housing units and additional amenities.	**1. Identify priority list of properties identified by the recently completed Duxbury Affordable Housing Trust Dodson and Flinker Study.**	**Duxbury Affordable Housing Trust**	**Duxbury Planning Department**	**Short-term**	None
	H4.2: Streamline zoning and permitting approvals for senior and special needs housing including exploring opportunities for incentives.	**1. Establish incentives such as expedited permitting, waiver or reduction of filing fees, building and occupancy permits, and/or utility connection fees.**	**Duxbury Building Department**	**Duxbury Building Department**	**Short-term**	None
	H4.3: Explore tax benefits to assist senior residents.	**1. Explore an increase in the exemption amount for the property taxes for seniors, people with disabilities and other special needs.**	**Board of Selectmen, Finance Committee, Assessing Department**	None	**Short-term**	None
H5: Integrate new housing into existing neighborhood business districts.	**H5.1:** Encourage conversion of upper-story commercial space with residential units where appropriate.	**1. Modify Neighborhood Business District to encourage upper level housing units by removing the Special Permit requirement and the maximum two-bedroom restriction, but retaining Site Plan Review.**	**Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
	H5.2: Encourage the redevelopment of single-story commercial buildings into multiple story buildings that include ground floor commercial uses and upper floor residential units in the neighborhood business districts of Hall's Corner, Snug Harbor, and Millbrook.	**1. Undertake a district planning process in each Neighborhood Business District to determine characteristics of zoning modifications for each district, similar to recent studies in Hall's Corner.**	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	**Massachusetts Downtown Initiative (MDI), MAPC Technical Assistance**
		2. Modify Neighborhood Business Districts to expand opportunity for mixed-use redevelopment integrating input from district planning processes.	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	**Massachusetts Downtown Initiative (MDI), MAPC Technical Assistance**

HOUSING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **H5:** Integrate new housing into existing neighborhood business districts..	**H5.3:** Streamline zoning and permitting approvals for projects that include residential uses and amend the zoning bylaw to encourage mixed uses in existing neighborhood business districts.	**1. Modify Neighborhood Business District to encourage upper level housing units by removing the Special Permit requirement and the maximum two-bedroom restriction, but retaining Site Plan Review.**	**Planning Board**	**Duxbury Planning Department**	**Short-term**	None
	H5.4: Explore targeted infrastructure investments, such as wastewater, to support additional mixed-use activity in neighborhood business districts.	**1. Study district wastewater treatment options for Neighborhood Business District including potential build-out that could be supported by wastewater system capacity.**	**Planning Board, Duxbury DPW**	**Duxbury Planning Department**	**Mid-term**	None
		2. Explore Business Improvement District or other funding mechanisms that could share joint district infrastructure costs and benefits across properties.	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	None
		3. Align Neighborhood Business District zoning modifications with the characteristics of build-out supported by shared infrastructure.	**Planning Board**	**Duxbury Planning Department**	**Mid-term**	None
	H5.5: Focus regulations and incentives on the creation of both smaller units and rental units to diversify housing options in existing neighborhood business districts.	**1. Establish incentives such as expedited permitting, waiver or reduction of filing fees, building and occupancy permits, and/or utility connection fees.**	**Duxbury Planning Department**	**Duxbury Building Department**	**Short-term**	None

PUBLIC FACILITIES AND SERVICES RECOMMENDATIONS

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
P1: Leverage public facilities to provide professional and recreational opportunities to town residents.	**P1.1:** Consider how town facilities, such as the library, can accommodate individuals who work remotely or in home occupations.	**1. Prepare a survey for persons who work from home to better understand how town resources could support their work.**	**Economic Development Committee**	**-**	**Short-term**	**-**
	P1.2: Expand on trainings and support available in the town for support of home businesses.	**1. Based on survey responses, develop a programming or encourage private enterprises to develop programming to support persons who work from home and small businesses.**	**Economic Development Committee**	**South Shore Chamber of Commerce, South Shore Economic Development Corp.**	**Short-term**	**-**
	P1.3: Evaluate town owned and operated waterfront facilities, e.g. public docks and waterfront parks, and identify improvements to allow for appropriate and improved public access to the town's water resources.	**1. Pursue additional district planning study work in Snug Harbor.**	**Planning Department**	**Planning Board**	**Short-term**	**MAPC Climate Resilience Grant**
		2. Study usage and capacity needs for waterfront parking, moorings, boat launches, marina space, etc. to determine how resources could best improve efficiency and availability of access.	**Harbormaster, Planning Department**	**Planning Board**	**Mid-term**	**-**
		3. Study and monitor water quality with a focus on bay health and its impact on bay usage over time. Engage the communities of Plymouth and Kingston who also share the bay's waters.	**Harbormaster, Planning Department**	**Planning Board**	**Mid-term**	**-**
P2: Continue developing capacity to plan and implement long term, proactive infrastructure and facilities improvements.	**P2.1:** Identify and establish additional best practices for capital improvement planning for long term maintenance and infrastructure needs including establishing a fund to cover the local share of TIP or other shared funding projects.	**1. Prioritize the major investments identified (Exit 10 roadway and connectivity improvements, Washington Street connectivity and safety improvements, etc.)**	**Board of Selectmen**	**Finance Committee**	**Short-term**	**-**
		2. Develop project estimates and identify potential available resources for each priority.	**Town Manager**	**Departments of Public Works and Planning**	**Mid-term**	**-**
		3. Create a budget line item to begin building town funds available to support the identified priorities.	**Board of Selectmen**	**Finance Committee**	**Mid-term**	**-**
		4. Consider establishing a construction request procedure for municipal building projects, per the Government Study Committee's Final Report recommendations.	**Town Manager, Fiscal Advisory Committee**	**Board of Selectmen, Department Heads**	**Mid-term**	**-**
		5. Establish processes so that long term budgeting is consistent across Town Departments.	**Town Manager, Finance Committee**	**Fiscal Advisory Committee, Department Heads**	**Short-term**	**-**

PUBLIC FACILITIES AND SERVICES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **P2:** Continue developing capacity to plan and implement long term, proactive infrastructure and facilities improvements.	**P2.2:** Examine options for providing additional engineering expertise to respond to Town infrastructure needs.	**1. Develop a cost/benefit analysis of staff engineering expertise compared to a consultant engineer to advise roadway and other improvement projects.**	**Town Manager**	**Department of Public Works, Planning Department**	**Short-term**	**-**
	P2.3: Continue to prioritize and implement recommendations from prior planning efforts, such as the Town's Climate Vulnerability Assessment Plan and Hazard Mitigation Plan, to protect Town facilities and infrastructure threatened by the present and anticipated effects of climate change, e.g. increased storm intensity and sea level rise. The Town received an MVP implementation grant to prioritize and assess infrastructure needs where vulnerable to flood and wave damage.	**1. Establish a Climate Resilience Task Force - composed of representatives from relevant Boards, Committees, and Departments - to oversee the implementation of Duxbury Climate Vulnerability Assessment and Action Plan, Natural Hazard Mitigation Plan, and the Envision Duxbury Master Plan Sustainability elements.**	**Board of Selectmen**	**Relevant Boards, Committees, and Departments**	**Short-term**	**-**
P3: Identify opportunities to collaborate and coordinate regionally	**P3.1:** Continue, and consider expanding, participation in collective purchasing programs for capital equipment, e.g. police, fire and public works vehicles, to benefit from economies of scale and save staff time.	**1. Conduct a comprehensive fleet management study to understand current Town wide practices and to identify potential improvements.**	**Town Manager, Fiscal Advisory Committee**	**Department of Public Works**	**Short-term**	**-**
		2. Using the Fleet Management Study as a guide, check future apparatus, equipment, and services needs against available collective purchasing agreements using MAPC municipal collaboration and procurement services as support.	**Board of Selectmen, Fiscal Advisory Committee**	**MAPC**	**Ongoing**	**MAPC Municipal Collaboration support**
	P3.2: Collaborate with neighboring communities to encourage preservation of green spaces and to identify locations of possible shared use paths and other connections between adjacent green spaces.	**1. Leverage MAPC's South Shore Coalition meetings and subregional coordinator to advance shared interests.**	**Duxbury Planning Department**	**MAPC**	**Ongoing**	**-**
	P3.3: Create processes and cultivate relationships to better coordinate with neighboring towns in addressing the impacts of development related to infrastructure, road safety, emergency access, and climate vulnerability.	**1. Leverage MAPC's South Shore Coalition meetings and subregional coordinator to advance shared interests.**	**Duxbury Planning Department**	**MAPC**	**Ongoing**	**-**
P4: Strengthen effective communication and collaboration within Town government and with the public.	**P4.1:** Clarify roles, responsibilities, and communication between boards, committees, and professional staff and the way information should be shared.	**1. Create a one-page template to consistently display role, responsibility, charge, relationship to other boards or committees, and current priorities.**	**Board of Selectmen**	**Town Manager**	**Short-term**	**-**

PUBLIC FACILITIES AND SERVICES RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
(Continued) **P4:** Strengthen effective communication and collaboration within Town government and with the public.	(Continued) **P4.1:** Clarify roles, responsibilities, and communication between boards, committees, and professional staff and the way information should be shared.	**2. Develop standard practices for file storage, active recording of files, file retention guidelines, and dates for document destruction.**	**Board of Selectmen**	**Town Manager**	**Short-term**	**-**
	P4.2: Continue to disseminate important information through a variety of channels and refine outreach strategies when appropriate.	**1. Town officials and leadership keep the residents apprised of progress toward Master Plan Goals and Strategies, particularly related to climate change adaptation efforts. Reporting should occur at least annually so that progress can be assessed at Town Meeting, Board of Selectmen meetings, through the schools and press.**	**Board of Selectmen**	**Town Manager**	**Ongoing**	
		2. Ensure the Town website is regularly updated and easily navigable. Evaluate the present use of social media tools and potentially expand effective use.	**Town Manager, Town Clerk**	**Committee Chairs and Department Heads**	**Ongoing**	
	P4.3: Develop approach to assist residents with engaging federal or state resources or agencies, e.g. FEMA	**1. Provide regularly updated information on the Town website regarding storm events, resources available, and contact information.**	**Planning Director, Town Clerk**	**-**	**Ongoing**	**-**
P5: Ensure that town and school facilities meet patterns of community use and departmental operations needs.	**P5.1:** Plan for the replacement or substantial improvement of facilities whose characteristics of size, condition, or location inhibit the efficient operation of the departments which rely on them.	**1. Revisit and continue efforts to construct a new DPW Operations facility. Consider the factors contributing to the unsuccessful Town Election vote and evaluate strategies to address them.**	**Board of Selectmen**	**Department of Public Works, Fiscal Advisory Committee**	**Short-term**	**-**
	P5.2: Provide sufficient resources to support thorough and timely operational maintenance activities, including responses to corrective and preventive maintenance work orders.	**1. Provide consistent and predictable funding to the Facilities Department through the annual operating and capital budget**	**Town Manager, Board of Selectmen**	**Facilities Department, Fiscal Advisory Committee**	**Ongoing**	**-**
	P5.3: Consider the long term future needs of cemetery expansion as part of town facilities planning.	**1. Identify suitable and higher elevation areas for potential expansion that are adjacent to existing cemetery land.**	**Cemetery Department and Trustees**	**-**	**Mid-term**	**-**
		2. Identify current cemetery areas at risk for climate change impacts and account for these areas in long term future needs.	**Cemetery Department and Trustees**	**-**	**Mid-term**	**-**

ECONOMIC DEVELOPMENT RECOMMENDATIONS

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
E1: Focus on distinct neighborhood business district-based economic development.	**E1.1:** Strengthen the identity for major districts to attract residents, new visitors, and businesses.	**1. Brand neighborhood business districts and market it to potential tenants and patrons.**	**Duxbury Economic Development Committee, Duxbury Business Association, private businesses**	**South Shore Chamber of Commerce, Duxbury Planning Department**	**Short-term**	**DHCD Massachusetts Downtown Initiative Grant**
		2. Utilize digital advertising to market the districts and promote on the Town website.			**Mid-term**	
		3. Develop a business recruitment and support program and downtown organizational bylaws.			**Mid-term**	
		4. Form a working group/committee comprised of stakeholders including the Business Association and Chamber, business and property owners, and other interested parties to strategize and conduct a marketing strategy using a consultant.			**Short-term**	
	E1.2: Improve wayfinding signage to better guide visitors to Duxbury's existing business districts and amenities and create a façade improvement program for these districts.	**1. Invest in signage for the entrances to neighborhood business districts.**	**Duxbury Economic Development Committee**	**Duxbury Planning Department**	**Mid-term**	**MAPC Technical assistance funding (DLTA or PMTA), DHCD Massachusetts Downtown Initiative Grants**
		2. Develop a wayfinding plan to guide motorists (but also bicyclists and pedestrians) to neighborhood business district services and amenities.				
	E1.3: Increase residences within and near the business districts by working with property owners to determine priority underutilized sites for mixed use redevelopment.	**1. Identify and activate vacant sites through rehabilitation and infill development to encourage the location of new mixed-use development.**	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Long-term**	**Chapter 40R Smart Growth Zoning Overlay**
		2. Review current zoning and identify potential modifications (either to mapped district or text) to encourage the mixed-use development desired in these areas.				

ECONOMIC DEVELOPMENT RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **E1:** Focus on distinct neighborhood business district-based economic development.	**E1.4:** Create a pedestrian and bicyclist friendly environment in each district.	**1. REFER TO T3.1: Incorporated into Transportation and Connectivity Recommendations for Complete Streets.**	-	-	-	-
		2. Encourage property owners to enhance pedestrian and bicycle amenities on the property.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Short-term**	None
		3. Integrate pedestrian and bicycle enhancements into site plan review and development approvals in neighborhood business districts.	**Duxbury Planning Department**	None	**Short-term**	None
E2: Expand maritime businesses and industries, including recreation, research and education opportunities.	**E2.1:** Work with state and regional education and economic development agencies to bolster marine educational programs/facilities, the marine aquaculture industry, and recreation programs/facilities, by creating a Snug Harbor Economic Development Plan to grow jobs and revenue.	**1. Identify and pursue funding for district resilience planning.**	**Duxbury Planning Department**	None	**Short-term**	**MAPC Technical assistance funding**
		2. Undertake planning for district resilience plans, including further developing the Snug Harbor Action Plan to encourage appropriate development, placemaking and marketing strategies suitable to the unique characteristics of each district asset.	**Duxbury Planning Department**	None	**Mid-term**	
	E2.2: Increase complements to maritime activity including retail, restaurants, and expansion of cultural and recreational offerings to attract year-round visitors, such as water-based recreation (tours, charters and kayak sales/rentals).	**1. Look for opportunities to cross market harbor with other attractions, such as Island Creek Oyster or the various Plymouth points-of-interest.**	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Short-term**	None
		2. Review increasing parking for trailers at Duxbury Town Landing and Howland's Landing, with way-finding signage to each ramp.	**Duxbury Planning Department**	**Duxbury Harbormaster**		

ECONOMIC DEVELOPMENT RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **E2:** Expand maritime businesses and industries, including recreation, research and education opportunities.	**E2.3:** Further develop off-peak season programming to attract visitors including festivals (food, music, film), shopping events, restaurant weeks, and more. Continue to support, but increase the promotion of, Holly Days, with improved marketing and outreach.	**1. Increase the maximum tie-up time (currently at 30 minutes) at the town dock during the off-season.**	**Duxbury Harbormaster**	None	**Short-term**	None
		2. Promote recreational shellfishing information and activities during allowable months (Sept-May). Use technology to market events. Apps, social media, and other technologies can help artists and business owners to engage with potential customers in more exciting ways.	**Duxbury Economic Development Committee**	**South Shore Chamber of Commerce**	**Short-term**	None
		3. Geo-linked apps can help interested visitors learn about the Town's history, assets, and events in real time as they move about Town.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Mid-term**	None
	E2.4: Consider incorporating an open space element that will enhance amenity and resilience into any new development that occurs near the coast.	**1. Identify coastal open space and resilience projects that could be implemented with Community Preservation Act funds.**	**Duxbury Community Preservation Committee**	None	None	**Community Preservation Act (CPA) funds**
		2. Encourage property owners to enhance resilience and open space amenities on coastal property.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Short-term**	**Community Preservation Act (CPA) funds**
		3. Integrate resilience considerations into site plan review and development approvals for coastal property.	**Duxbury Planning Department**	None	**Short-term**	**Community Preservation Act (CPA) funds**
E3: Strategically plan for resilience and leveraging of limited resources.	**E3.1:** Incorporate resilience and climate change into economic development planning through cost benefit analyses or other evaluations. The Town has received grant funding to study Snug Harbor for resilience in 2019.	**1. Incorporate strategies from the Town Natural Hazard Mitigation Plan, and Climate Vulnerability Assessment and Action Plan and update plans every five years.**	**Duxbury Planning Department**	None	**Short-term**	**MA EEA Grants, MAPC Technical Assistance**
		2. Establish and maintain a Climate Resilience Task Force that works to support a comprehensive approach toward climate resilience.	**Board of Selectmen**	None	**Short-term**	

ECONOMIC DEVELOPMENT RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **E3:** Strategically plan for resilience and leveraging of limited resources.	**E3.2:** Consider infrastructure investments that could address multiple issues (for example, wastewater treatment plants in certain locations could strengthen redevelopment opportunities, improve Duxbury Bay water quality, and improve coastal resiliency).	**1. Define an inventory of municipal infrastructure investments that could improve coastal resilience and encourage other positive investments by property owners.**	**Duxbury Planning Department**	None	**Short-term**	None
		2. Explore opportunities to create a municipal sewer system or other district-based alternative wastewater systems engineered for climate resilience to alleviate concerns and risk to drinking water contamination and failures with sea level rise and coastal flooding.	**Duxbury Planning Department**	None	**Mid-term**	None
		3. Explore the benefits of Business Improvement Districts (BID's) for the neighborhood business districts. This self-funded and managed organization would allow property owners to address issues and improvements collectively.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Short-term**	None
	E3.3: Leverage and optimize infrastructure to support more intense use of land in neighborhood business districts.	**1. Discuss support for district infrastructure needs with property owners in each neighborhood business district.**	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Mid-term**	None
		2. Explore feasibility of district wastewater solutions for neighborhood business districts. Revisit previous studies such as the Hall's Corner Wastewater Treatment Study.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Mid-term**	None
		3. Explore funding options for district wastewater solutions based on potential support expressed by district property owners.	**Duxbury Planning Department**	**Duxbury Economic Development Committee**	**Mid-term**	None

ECONOMIC DEVELOPMENT RECOMMENDATIONS *(continued)*

Goal:	Strategy:	Action(s):	Responsibility - Lead:	Responsibility - Support:	Timeframe:	Potential External Resources:
E4: Assist local home-based non-store businesses.	**E4.1:** Create a home-based business development and management program to support a growing employment base.	**1. Create guidelines on how to start and operate a home-based business based on the Small Business Development Center.**	**Duxbury Economic Development Committee**	None	**Short-term**	None
		2. Identify a staff member to act as a liaison between businesses and community officials to streamline the development process.	**Duxbury Economic Development Committee**	**Duxbury Planning Department**	**Short-term**	None
	E4.2: Create a Center for Entrepreneurship Incubator, perhaps by partnering with local co-working space Co-WorkDux, which would educate, support, and assist in the successful development of local entrepreneurs who are committed to building a vibrant community.	**1. Support co-working shared work spaces in Duxbury, by connecting local entrepreneurs to town services, and supporting the businesses with the appropriate parking and infrastructure in the neighborhood business districts.**	**Duxbury Planning Department, Duxbury Economic Development Committee**	**Property owners or businesses such as Co-Work Dux**	**Mid-term**	None
		2. Study feasibility of Town support for an entrepreneurship incubator by offering support, mentorship, or other tools to support locally grown businesses.	**Duxbury Planning Department, Duxbury Economic Development Committee**	**Volunteers and property owners or businesses such as Co-Work Dux**	**Mid-term**	None
	E4.3: Through the incubator, support the creation of a retail store with an exclusive focus on local products. The marketplace would help build local businesses and connect businesses to regional customers and be a hub for locally made goods.	**1. Maintain an inventory of local vacant storefronts and consider a temporary incubator program to activate vacant spaces.**	**Duxbury Planning Department, Duxbury Economic Development Committee**	None	**Mid-term**	None
	E4.4: Hold networking events for existing and future home-based, entrepreneurial businesses.	**1. Along with the South Shore Chamber of Commerce, the Duxbury Business Association, and Co-Work Dux, Duxbury could hold networking events for existing and prospective home-based business owners in Duxbury.**	**Duxbury Economic Development Committee, South Shore Chamber of Commerce, Co-Work Dux**	None	**Mid-term**	None

LAND USE AND ZONING RECOMMENDATIONS

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
L1: Continue to protect, conserve and enhance the natural and historic assets of the Town.	**L1.1:** Strengthen zoning, preservation requirements and design standards for historic residential neighborhoods through refinements to regulations and zoning incentives.	**1. Study existing Floor Area Ratio (FAR) ranges of historic residential properties in a district and determine an appropriate FAR for new development and redevelopment that would reduce the incentive for tearing down existing structures, but allow for modest additions and improvements.**	**Duxbury Planning Department, Historic District Commission**	**Planning Board**	**Short-term**	**-**
	L1.2: Protect scenic vistas and resources through targeted conservation restrictions, management agreements, incentives and regulations for bogs, farms, significant trees, view sheds or other features important to the community	**1. Develop an inventory of the priority properties that provide scenic vistas.**	**Open Space Committee, Conservation Commission**	**Historic District Commission**	**Short-term**	**-**
		2. Based on the inventory of priority properties, develop a set of strategies and incentives in an effort to work with property owners to ensure protection and preservation.	**Open Space Committee, Conservation Commission**	**Historic District Commission**	**Mid-term**	**-**
	L1.3: Refine zoning to preserve character while allowing for more housing type options in specific locations, e.g. refine open space cluster development which could include incentives for cooperative housing or other models that support identified housing needs in the community.	**1. Revisit Inclusionary Housing provision of the Zoning Bylaw to broaden use and applicability, and ensure compliance legally.**	**Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**
		2. Explore a density bonus for Residential Conservation Cluster Development to create additional lots that to which the Inclusionary Housing provision of the Zoning Bylaw would be applicable.	**Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**
L2: Incrementally transform nodes of current activity into walkable, amenity-rich neighborhood centers.	**L2.1:** Provide zoning modifications to strengthen support for home businesses.	**1. Host a focus group meeting with home business owners to better understand how they could be supported.**	**Duxbury Planning Department**	**Planning Board**	**Short-term**	**-**

LAND USE AND ZONING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **L2:** Incrementally transform nodes of current activity into walkable, amenity-rich neighborhood centers.	(Continued) **L2.1:** Provide zoning modifications to strengthen support for home businesses.	**2. Based on input, propose regulatory modifications to address issues and streamline home business operation.**	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	**-**
	L2.2: Explore zoning options to enhance incentives for affordable housing where suitable and near nodes of current activity.	**1. Explore a geographically targeted amendment to zoning to increasing lots eligible for the Affordable Housing Provision, reduce setbacks and increase buildable area.**	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	**-**
	L2.3: Develop strong walking and bicycle connections to nearby open spaces, community facilities, amenities, businesses and services where suitable.	**1. Define priority connections for walking and bicycle connections, then begin with low cost improvements to create or improve connections.**	**Duxbury Planning Department, Duxbury DPW**	**-**	**Mid-term**	**-**
L3: Clarify regulations and permitting to encourage appropriate investment.	**L3.1:** Continue the work and recommendations of the Zoning Bylaw Review Committee to improve the Zoning Bylaw including recodifying the Bylaw to give it a unified, coherent structure, clarifying special permit criteria, and standardizing and consolidating definitions.	**1. Define a priority list and sequence of modifications for the Zoning Bylaw**	**Zoning Bylaw Review Committee Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**
	L3.2: Clarify existing zoning overlays, underlying zoning, and mapping of zoning districts.	**1. Complete study of districts to update data and mapping, develop new zoning maps based on updated information.**	**Duxbury Planning Department**	**Planning Board**	**Short-term**	**-**
		2. Adopt new map and update online digital resources.	**Duxbury Planning Department**	**Planning Board**	**Mid-term**	**-**
	L3.3: Create a permitting guide to assist applicants and streamline the approval process.	**1. For each permit type define the process of review and approval with a step-by-step guide including flow charts and contact information for relevant departments.**	**Duxbury Planning Department, Building Department**	**Planning Board**	**Short-term**	**-**

LAND USE AND ZONING RECOMMENDATIONS *(continued)*

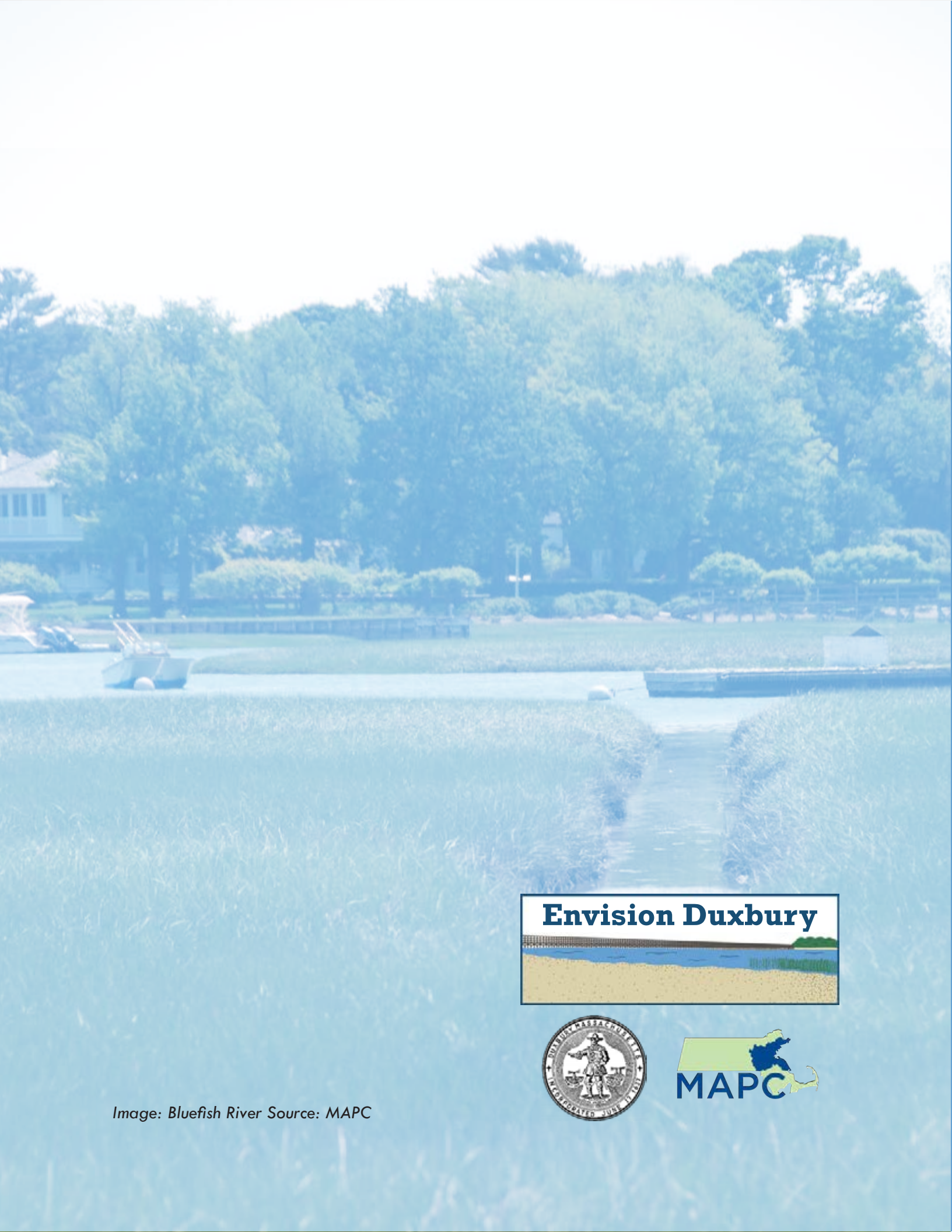
Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **L3:** Clarify regulations and permitting to encourage appropriate investment.	**L3.4:** Streamline permit filing requirements including encouraging electronic filing, consolidating required hearings, clarifying design review and Special Permit Granting Authority roles.	**1. Use the permitting guide information to identify ways in which the review process could be shortened or made more efficient or convenient for applicants and prioritize changes.**	**Building Department, Zoning Board of Appeals, Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**
		2. Adopt changes to permitting processes.	**Building Department, Zoning Board of Appeals, Planning Board**	**Duxbury Planning Department**	**Mid-term**	**-**
L4: Strengthen the sustainability and resilience of future development and redevelopment investments.	**L4.1:** Explore zoning requirements or incentives to encourage or require sustainable building, site design, and construction.	**1. Create a Task Force to define zoning recommendations for sustainability.**	**Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**
		2. Develop and adopt a green building zoning amendment that addresses green building standards, such as compliance with LEED.	**Planning Board**	**Duxbury Planning Department**	**Mid-term**	**-**
		3. Explore adoption with zoning incentives (additional building height or density), if design meets specified sustainability standards.	**Planning Board**	**Duxbury Planning Department**	**Mid-term**	**-**
	L4.2: Explore net zero zoning requirements or incentives to advance the Town's sustainability and energy goals.	**1. Develop a process, as part of permitting, that would require owners to calculate annual greenhouse gas emissions produced by building operations.**	**Planning Board and Building Department**	**Duxbury Planning Department, Alternative Energy Committee**	**Mid-term**	**-**
		2. Develop a sliding scale of emissions reductions through improved energy efficiency and increased renewable energy supply to incrementally approach net zero.	**Alternative Energy Committee**	**Duxbury Planning Department**	**Mid-term**	**-**
		3. Explore incentives, such as property tax reduction, for achieving net zero on the property.	**Board of Selectmen, Finance Committee**	**Planning Board**	**Mid-term**	**-**

LAND USE AND ZONING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **L4:** Strengthen the sustainability and resilience of future development and redevelopment investments.	**L4.3:** Strengthen zoning requirements for low impact development techniques and stormwater management strategies to improve quality of stormwater runoff.	**1. Review Zoning Bylaw for consistency with LID principles. Inventory inconsistencies that may require modification.**	**Planning Board**	**Duxbury Planning Department**	**Short-term**	**MAPC Low Impact Development Toolkit** **MA Smart Growth/ Smart Energy Toolkit Modules - Low Impact Development (LID)**
		2. Develop a new Low Impact Development (LID) Bylaw that would encourage LID techniques.	**Planning Board/ Conservation Commission**	**Duxbury Planning Department**	**Mid-term**	
	L4.4: Strengthen zoning requirements for coastal locations in flood zones or flood-prone areas.	**1. Study coastal districts, Snug Harbor or other locations, to determine potential zoning modifications or other policies to strengthen resilience.**	**Duxbury Planning Department**	**Planning Board**	**Short-term**	**-**
		2. Based on further study, develop new flood resilience requirements or zoning overlays for new development and redevelopment in flood zones.	**Planning Board, Conservation Commission**	**Duxbury Planning Department**	**Short-term**	**-**
		3. Develop a zoning overlay or other incentives that would encourage new development outside of flood zones.	**Planning Board, Conservation Commission**	**Duxbury Planning Department**	**Mid-term**	**-**
L5: Focus public and private investments to strengthen existing neighborhood business districts.	**L5.1:** Explore zoning modifications in each neighborhood business district to align investment with the vision to expand mixed-use development and walkability.	**1. Complete the development of district plans to support zoning modifications specific to each Neighborhood Business District that would strengthen investment and mix of uses in the districts.**	**Duxbury Planning Department**	**Planning Board**	**Short-term**	**-**
		2. Amend the Neighborhood Business Districts to encourage upper level residential uses consistent with district studies.	**Planning Board**	**Duxbury Planning Department**	**Short-term**	**-**

LAND USE AND ZONING RECOMMENDATIONS *(continued)*

Goal:	Strategy:	*Action(s):*	*Responsibility - Lead:*	*Responsibility - Support:*	*Timeframe:*	*Potential External Resources:*
(Continued) **L5:** Focus public and private investments to strengthen existing neighborhood business districts.	**L5.2:** Focus public realm investments to strengthen walkability, bikability, streetscape and character in neighborhood business districts.	**1. Define priority street segments for public realm investments.**	**Duxbury Planning Department, Duxbury DPW**	**-**	**Short-term**	**-**
		2. Complete low cost improvements to pedestrian, bicycle, and vehicle safety (striping, signs, etc.)	**Duxbury Planning Department, Duxbury DPW**	**-**	**Short-term**	**-**
	L5.2: Focus public realm investments to strengthen walkability, bikability, streetscape and character in neighborhood business districts.	**3. Using tools like the Complete Streets Prioritization Study, define and plan for more substantial investments in priority street segments.**	**Duxbury Planning Department, Duxbury DPW**	**-**	**Mid-term**	**-**
	L5.3: Explore wastewater infrastructure systems in neighborhood business districts to support redevelopment and mixed-uses.	**1. Discuss need and benefit of district-based wastewater system with district property owners.**	**Duxbury Planning Department, Duxbury DPW**	**-**	**Mid-term**	**-**
		2. If supported, explore and propose a mechanism to develop infrastructure with property owners (Business Improvement District, Tax Increment Financing, or others).	**Duxbury Planning Department, Duxbury DPW**	**-**	**Long-term**	**-**
	L5.4: Target accessory housing unit creation in the vicinity of neighborhood business districts.	**1. Define a distance from districts (for example 1/2 mile), and develop an accessory housing unit incentive overlay zone.**	**Duxbury Planning Department**	**Planning Board**	**Short-term**	**-**



Envision Duxbury

MAPC

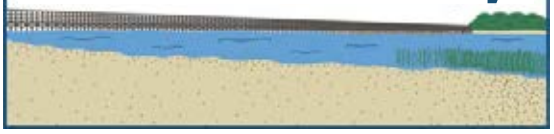
Image: Bluefish River Source: MAPC

DRAFT FOR REVIEW

Town of Duxbury
Master Plan

August 2019 - *Public Review and Comment*

Envision Duxbury



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