Wastewater Infrastructure's Effects on Economic Opportunity in Yarmouth

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UMASS DONAHUE INSTITUTE
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Economic & Public Policy Research Group

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Executive Summary

Due to environmental concerns related to elevated nitrogen levels in the waters of Cape Cod, there is an imperative for Yarmouth and other towns on Cape Cod to address wastewater treatment and the ramifications of building (or not building) wastewater infrastructure.

The purpose of this study is to: (1) examine the role of wastewater infrastructure as a driver of economic growth; and (2) assess the potential growth that may be unlocked in Yarmouth with the introduction of a municipal wastewater treatment system.

Yarmouth's underlying **Economic and Demographic Backdrop** creates concerns for the town, both as a place to live and to conduct business.

- While Massachusetts showed relatively strong population growth between 2010 and 2017, Yarmouth and Barnstable County lost residents.
- Job numbers have recovered in Yarmouth since the Great Recession but growth lags both the state and Barnstable County.
- While Yarmouth reaps the second highest rooms tax revenue on Cape Cod, a closer look indicates it underperforms compared to Barnstable and Brewster on a per establishment basis.
- Meal tax revenues in Yarmouth are relatively low, especially compared to Barnstable and Falmouth.
- Yarmouth's tax base is becoming increasing reliant on residential properties, demonstrating a potential opportunity to diversify further through the expansion of commercial and industrial enterprises.

There is a range of **Economic Advantages** for introducing municipal wastewater services.

- Generally, businesses do not want to be in the wastewater treatment business, companies looking to expand will not even consider sites with septic, and wastewater infrastructure provides the capacity for larger-scale businesses to operate.
- Wastewater infrastructure allows for more compact, higher density development and thus enables the building of more modern lodging and accommodations establishments that are attractive to today's tourists and vacationers.
- With municipal sewerage, homeowners can more easily expand or add bedrooms, and avoid costly septic system upgrades.

Conversely, there are **Negative Potential Consequences** for not addressing the need for wastewater treatment in Yarmouth.

- Poor water quality resulting in beach closures and an onerous traffic situation can turn visitors off from future visits to Yarmouth. People can also choose to travel to competitor destinations – Maine, New Hampshire, and New Jersey.

- Restaurants, hotels, and motels are constrained from reaching their market potential due to the lack of municipal wastewater treatment.

- With uncertainty over wastewater, existing lodging owners may be unwilling to invest in their properties and allow them to deteriorate. Antiquated and obsolete lodging facilities join traffic congestion and water pollution as threats to Yarmouth's and the mid-Cape's image as a destination. At least one major hotel investment is on hold due to concern that other commercial property owners are not similarly investing in their properties. Other potential major projects have difficulty getting serious consideration without wastewater treatment.

- Cost burdens for upgrading septic systems discourages homeowners from investing in their properties and can lead some to move if they need additional space.

- Without municipal wastewater treatment, almost 10,000 single-family properties could be faced with a combined, up-front cost of $193.6 million to install on-site nitrogen removal systems. Additionally, these homeowners could incur almost $26.5 million in annual operating and maintenance costs.

Wastewater infrastructure may introduce numerous **Benefits** to Yarmouth.

- Identified prospective projects in Yarmouth could bring hundreds of millions of dollars in new investment to the Town, adding significantly to the tax base. Conservatively, if these projects added $100 million in assessed value to the Town, then that could generate over $1 million per year to Yarmouth's revenues, providing a means to defray the water infrastructure costs and maintain/add to public services.

- Tastes have changed – people (tourists and residents, alike) increasingly are showing a preference for denser, more walkable areas that provide better access to a variety of amenities and activities. These types of areas need wastewater infrastructure.

- The high price of housing on Cape Cod has led to a worker shortage, notably in occupations that provide services to an aging population. Wastewater infrastructure could lead to more affordable, higher-density housing which would help retain or attract labor and defray Cape Cod's high costs.

- Other Cape towns are benefiting from municipal wastewater treatment. Hyannis, today, is able to build higher density development than Yarmouth due to wastewater infrastructure. Bourne

also is seeing the possibility of substantial investment, as well as higher property tax revenues, being unlocked by municipal wastewater treatment. Wastewater treatment has unlocked bedroom additions and housing investments in Chatham.

- Municipal wastewater treatment would encourage a large capital infusion (commercial, hotel, motel, and residential) and this would help with cost recovery for the improved infrastructure. Today, commercial and industrial growth tends to be headed to Hyannis and business owners also indicate that they are concentrating more of their investments off-Cape to realize more attractive growth opportunities.

- A 2002 study of 87 sewer and water projects found that every dollar (1990$) spent on construction of a sewer/water project:

    - Resulted in nearly $15 of private investment
    - Generated $2 in public investment
    - Increased the property tax base by $14
    - Every $10,000 in construction costs saved or created 5.75 jobs

Introduction

In 2010, the Conservation Law Foundation filed a lawsuit suing the U.S. Environmental Protection Agency (EPA) for failing to address the issue of elevated nitrogen levels in the waters of Cape Cod. As a result of this, and other lawsuits, the Cape Cod Commission updated its Area-wide Water Quality Management Plan and developed a Regional Wastewater Management Plan. Even before this, individual towns on Cape Cod started their own wastewater planning processes, including the Town of Yarmouth.

After developing a plan for municipal wastewater treatment, the Town of Yarmouth brought its plan up for a vote at a Town Meeting in 2011. In part because of resident concerns about a funding plan based on property taxes and concerns about to whom the benefits of the sewer system would accrue, the proposed plan was soundly defeated. Now, the Town is preparing a new plan for a municipal sewer system that may include a regional partnership with Dennis and Harwich. As part of this process, the Town called for an investigation of the potential economic benefits of implementing a municipal wastewater treatment system. The University of Massachusetts Donahue Institute's Economic and Public Policy Research group was retained to provide an initial understanding of:

1) The types of benefits that other municipalities have experienced from implementing municipal wastewater treatment;

2) What the options are, including what might happen if Yarmouth chooses to do nothing to address wastewater infrastructure; and

3) What economic benefits Yarmouth might expect from implementing a municipal wastewater system.

This study reviews underlying demographic and economic trends that serve as a backdrop and provide a socioeconomic context for introducing municipal wastewater treatment in Yarmouth. It then reviews, generally, the types of benefits that accrue economically and for the environment that are linked to introducing wastewater infrastructure. Finally, through interviews conducted by the UMass research staff, the study goes into more specifics about the options facing the town and how wastewater treatment could introduce greater economic opportunities for the Town of Yarmouth, including for homeowners. The findings of this study, although emphasizing the conditions of the Town of Yarmouth, also translate to much of the mid-Cape region.

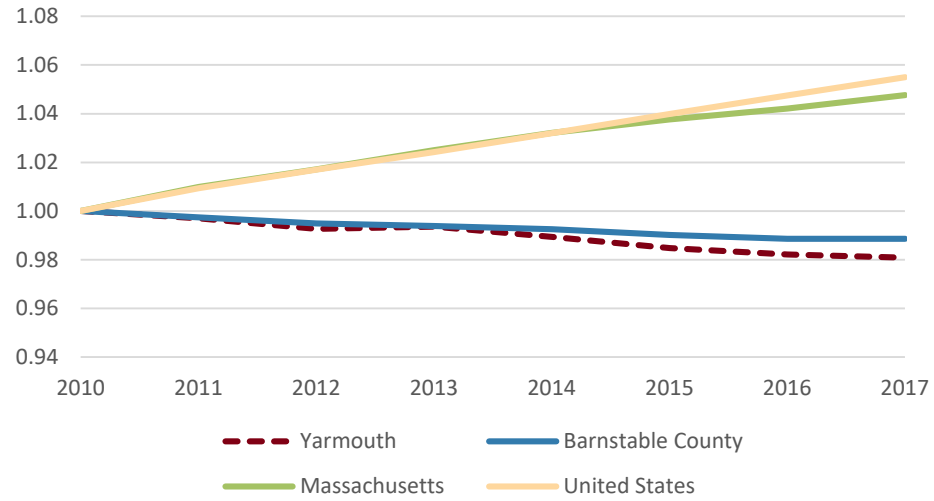
Socioeconomic Context for Introducing Municipal Wastewater Treatment to Yarmouth

Local Population and Economic Trends

While not a direct indicator of economic conditions, trends in population change can be indicative of the underlying fundamentals that make a place an attractive place to live. This is particularly true in seasonal tourist locations such as Cape Cod, where the summertime population may be expanding concurrent with an actual decrease in the number of full-time residents. In some instances, this may be the result of the conversion of residences from full-time, year-round homes to seasonal second homes. In others, it can be indicative of an economy that is not strong enough to support a year-round population as large as previously was the case, or even changing tastes in locations where people choose to make their permanent home.

When comparing Yarmouth and Barnstable County to the state and nation, the change in population between 2010 and 2017 tells a tale of two diverging trends (**Figure 1**). While both Massachusetts and the U.S. grew in population by between four and five percent between 2010 and 2017, both Yarmouth and Barnstable County have seen population declines of about one and two percent, respectively. The lack of population growth in Yarmouth and Cape Cod is of concern because it translates to a declining labor supply and that, in turn, can make the region less appealing for business expansions and investments. As will be shown later in this study, a lack of wastewater treatment can negatively affect population growth by making housing more expensive and by not providing the necessary infrastructure for larger-scale business establishments to move in, or for smaller establishments to grow in place.

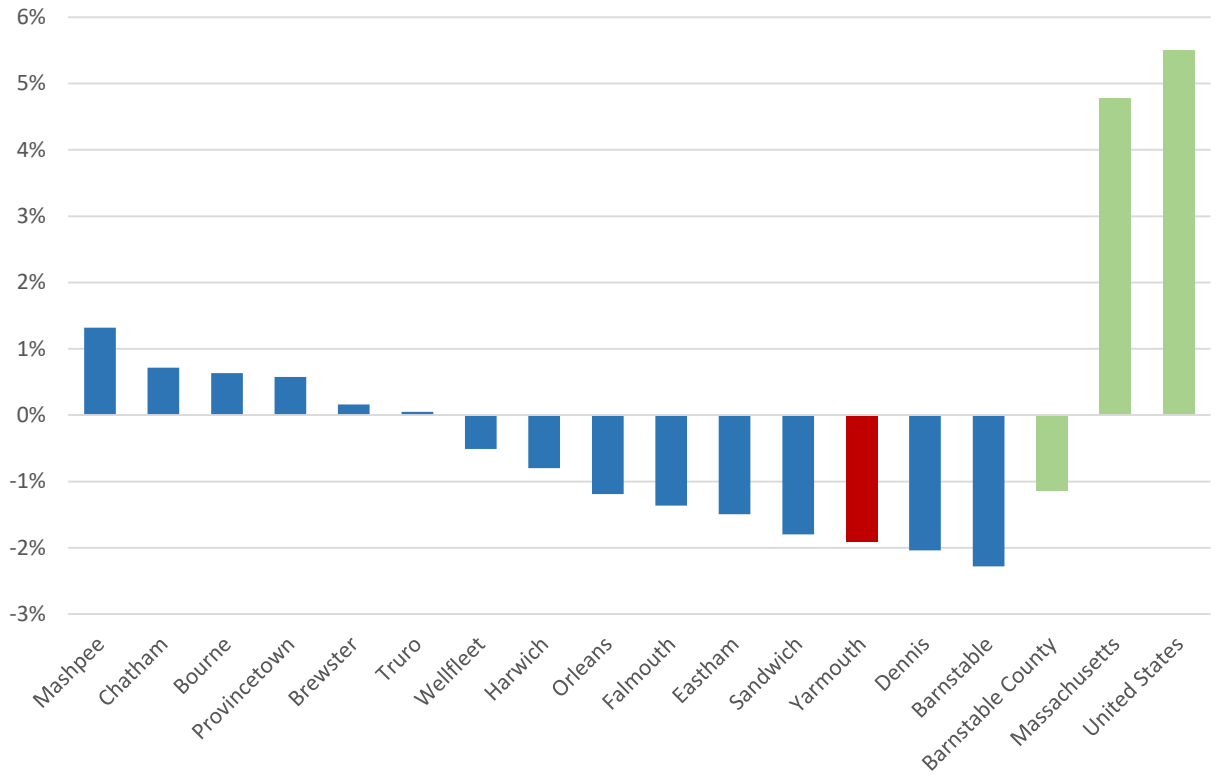
Figure 1: Population Growth, 2010 to 2017 (2010=1.00)



Source: U.S. Census Bureau, Population Division

When compared to other communities on the Cape, only Barnstable and Dennis have lost population at a faster rate than Yarmouth since 2010. As a whole, Cape Cod has lost over one percent of its population between 2010 and 2017 at a time when Massachusetts, the fastest growing state in the Northeast, as a whole has gained almost five percent in population. Since 2010, Yarmouth has posted declines in the young (less than 24) and working age (25 to 64) populations while seeing increases in the older population (65 and older). The population declines are concerning and reveal possible weaknesses that Yarmouth (and the entire Cape) face in its attractiveness as a place to live and maintain a business.

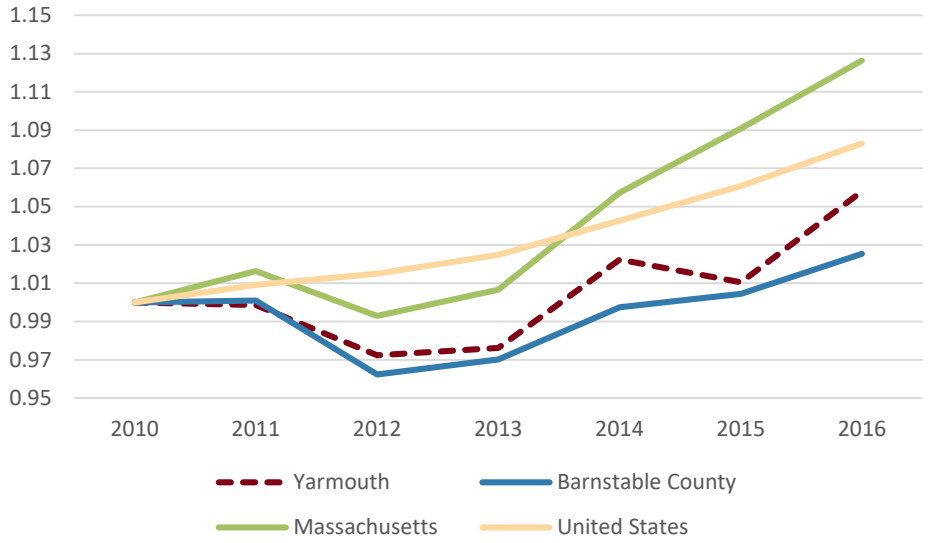
Figure 2: Population Growth 2010 to 2017, Yarmouth Compared to Other Cape Cod Towns



Source: U.S. Census Bureau, Population Division

Similar to the population trends, Yarmouth and Barnstable County have also diverged from the state and the nation in terms of business establishment growth (**Figure 3**). While Massachusetts and the United States have experienced strong growth in the numbers of businesses since 2010 when the country was beginning to recover from a severe economic downturn, Cape Cod has seen relatively flat growth. The Town of Yarmouth actually outpaced the growth in establishments compared to the Cape overall, increasing at double the rate of Barnstable County. Still, by comparison, the state's growth was double that of Yarmouth's. Again, as with population, the (relatively) sluggish performance with business establishments points to a lack of dynamism, with water infrastructure likely being one of several possible contributing factors.

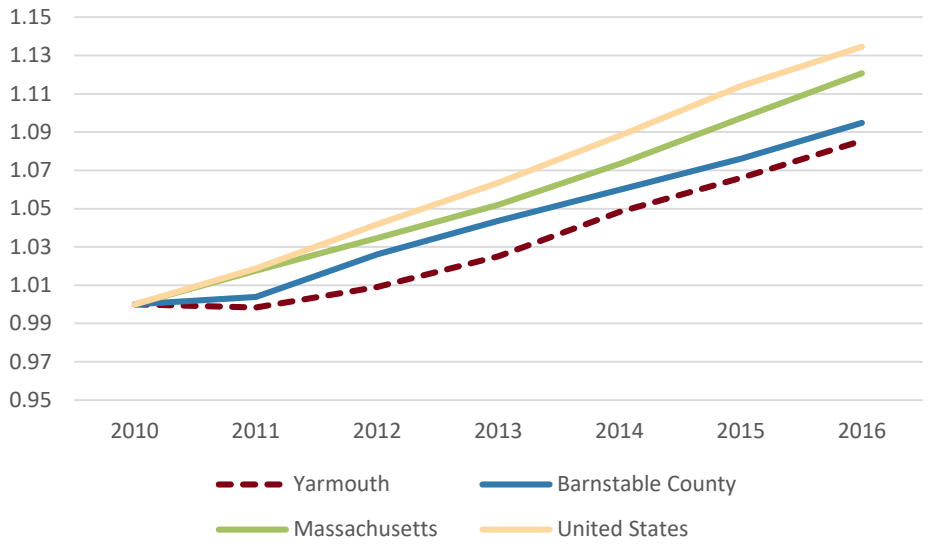
Figure 3: Growth in Business Establishments, 2010 to 2016 (2010=1.00)



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

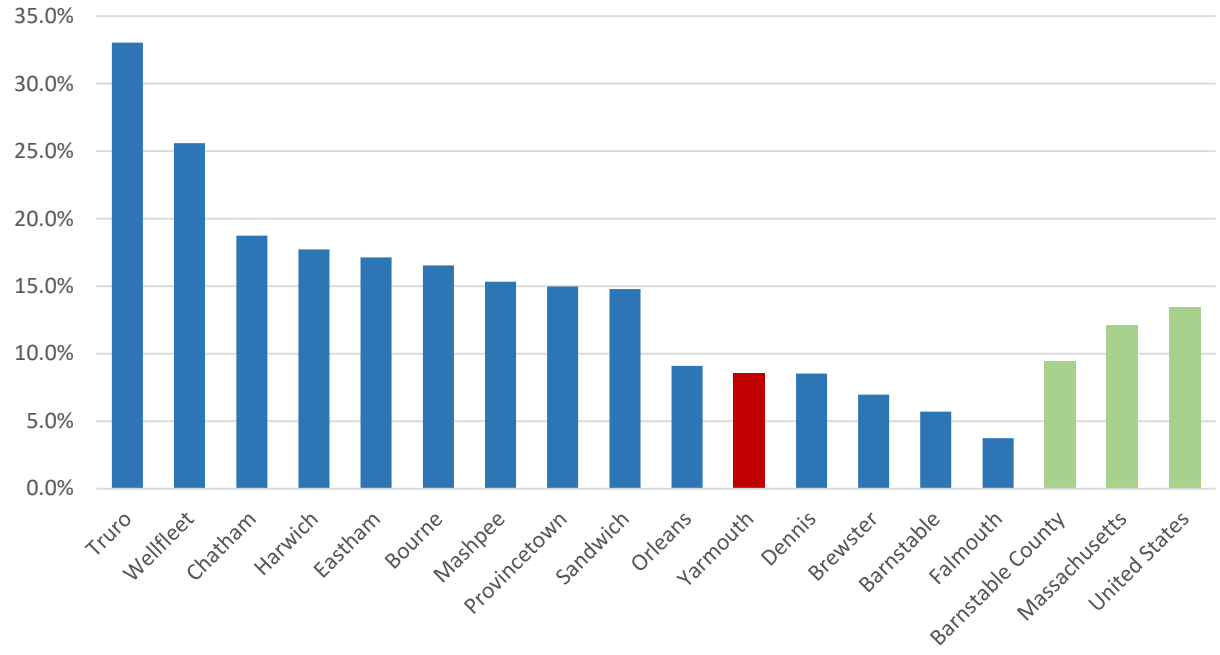
In terms of employment, Yarmouth along with Cape Cod, the state, and the U.S. are all showing jobs increases, much of it due to a cyclical rebound following the Great Recession (**Figure 4**). Nevertheless, neither Yarmouth nor Barnstable County are seeing their job numbers increase as quickly as Massachusetts or the United States, though the difference in growth rates is much smaller than for population or establishment numbers. Comparing the change in employment between all Cape communities (**Figure 5**), the stand-outs are Truro and Wellfleet, both with employment gains in excess of 25 percent between 2010 and 2016, though this is due to the fact these are the two Cape communities with the smallest employment numbers, meaning a relatively small shift in employment results in a large percentage change. Holding those aside, Yarmouth trails behind Bourne, which has similar employment levels, and Mashpee, which has moderately less employment.

Figure 4: Employment Growth, 2010 to 2016 (2010=1.00)



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

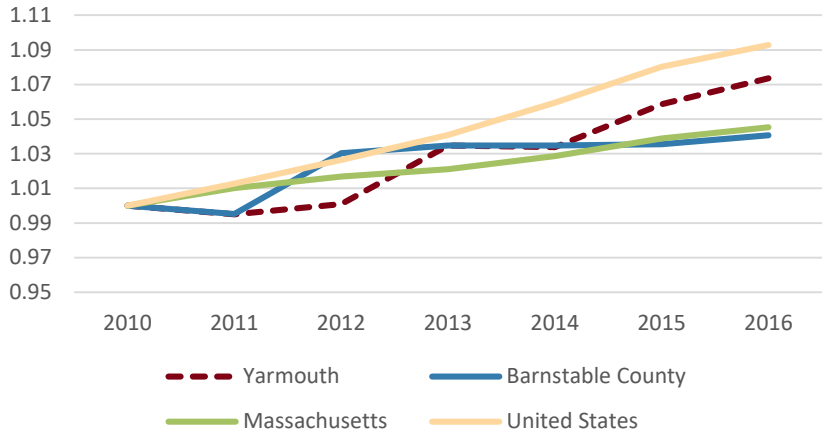
Figure 5: Jobs Growth 2010 to 2016, Yarmouth Compared to Other Cape Cod Towns



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

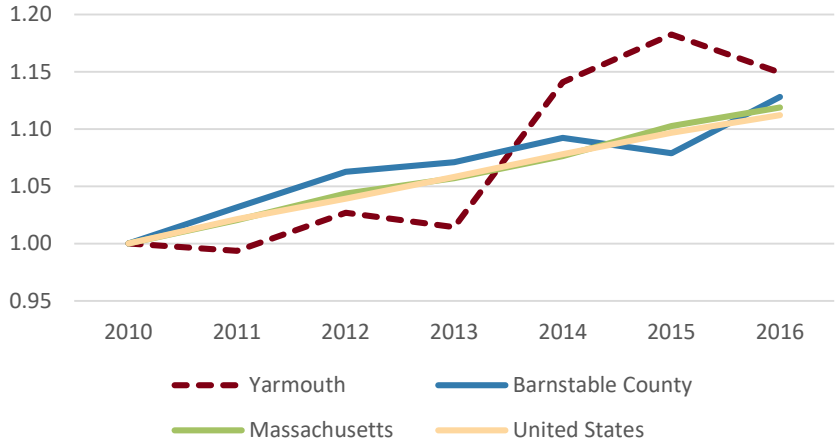
Drilling down into some of the key industry sectors most relevant to Cape Cod's economy, we can see some interesting trends. For example, employment in the retail sector has grown faster in Yarmouth than in Barnstable County and the state, but is below the national average (**Figure 6**). Meanwhile, employment in the accommodation and lodging sector (**Figure 7**) was sluggish between 2010 and 2013, but then jumped strongly between 2013 and 2015 and falling slightly in 2016. The other three geographies have shown steady rises in employment in this sector.

Figure 6: Change in Retail Sector Employment, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

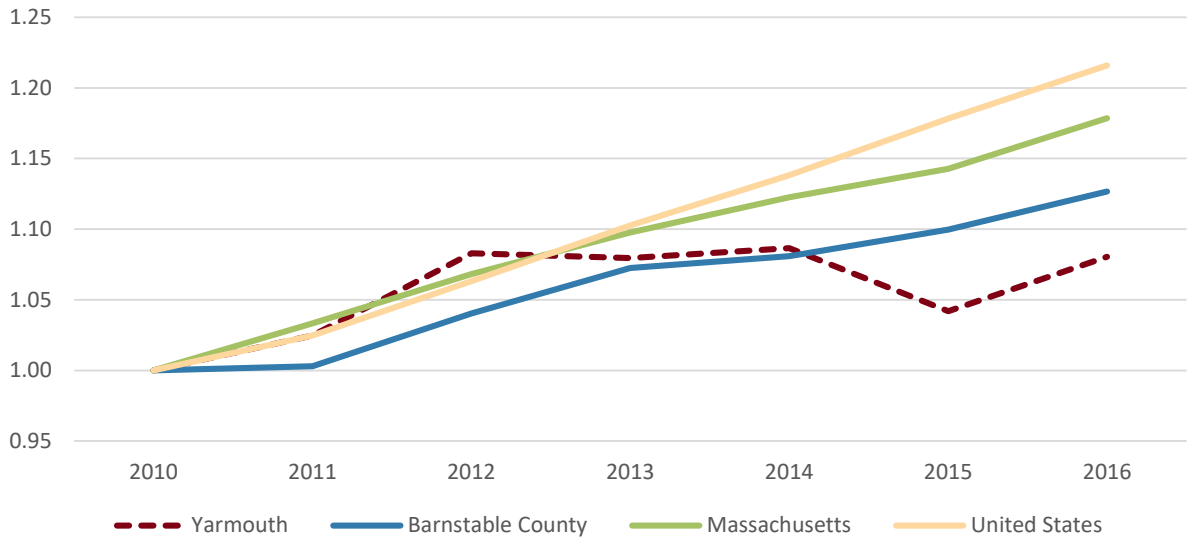
Figure 7: Change in Employment in the Accommodation and Lodging Sector, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Lastly, employment in eating and drinking places (an industry sector very sensitive to economic cycles) has trended higher for all Yarmouth, Cape Cod, the state, and nation (**Figure 8**) since 2010. In the last two years, however, Yarmouth has underperformed the other four geographies in employment growth in this sector. This is particularly important as food and drinking jobs are particularly vital in an economy that is led by tourism, as in the case of Yarmouth and Cape Cod. Through interviews, it was evident that some food establishments (or places that serve food as part of their business) could not grow to scale or could not even clean dishes (forcing the use of paper and plastic disposables) due to the lack of municipal wastewater treatment services. There are many other factors that may be contributing to the slower growth but the lack of infrastructure is a clear hindrance.

Figure 8: Change in Employment in the Food Services and Drinking Places Sector, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Appendix 1, at the back of this study includes the full set of tables comparing Yarmouth to the 14 other communities on Cape Cod for each of the demographic and economic concepts covered in this section. It should be noted that of all of these towns, only Barnstable, Chatham, Falmouth, and Provincetown currently offer municipal wastewater treatment services.

Over the last seven years, Yarmouth has generally lagged behind the state and Barnstable County in population and employment growth. Yarmouth did outperform, however, in terms of employment growth in both the retail and accommodations and lodging sectors, the latter picking up significantly since 2013 while dropping between 2015 and 2016. Meanwhile, employment in the town's restaurants and bars has been flat since 2012, while employment in the same sector in the state and county has continued to climb steadily. Wastewater treatment may be the key to unlocking the investments needed to see more sustained and consistent growth in these key tourism-related sectors.

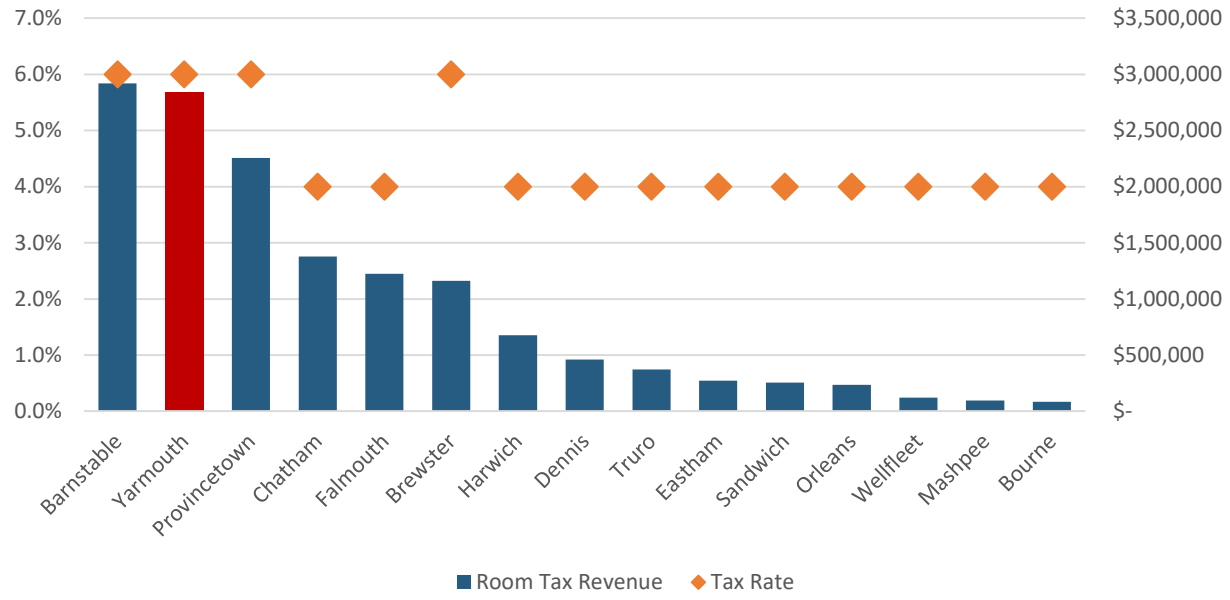
Tax Revenues

A measure of Yarmouth's overall competitiveness on Cape Cod and a reflection of progress in diversifying revenue sources, is its ability to generate tax revenues and reduce its dependence on residential property taxes to support municipal services. Beyond property taxes, towns and cities in Massachusetts can levy local option taxes, including meal and room occupancy taxes to help generate revenues to support city and town services. This section analyzes three types of tax revenues—meal, hotel room, and property—and compares Yarmouth with the 14 other communities on Cape Cod.

The Massachusetts Department of Revenue allows municipalities to levy room occupancy taxes of up to six percent. On Cape Cod, Yarmouth, Provincetown, Brewster, and Falmouth are the six communities that levy a room tax of six percent; all other communities have a four percent tax. As **Figure 9** shows, Yarmouth and Barnstable generate almost the same amount of room tax revenue at just under $3 million in 2017, far exceeding that of all other towns. Provincetown is the next closest with $2.3 million in revenue. Yet, while Yarmouth may be a leader in room tax revenues on Cape Cod, the opportunity to significantly grow this revenue source through the building/expansion of more modern lodging and accommodation venues, as shown in a later section of this report, is currently constrained by the lack of wastewater treatment infrastructure. So, while the magnitude of occupancy tax revenues in Yarmouth stands out on Cape Cod, it masks that Yarmouth, through infrastructure investments, could be reaping significantly more revenue following improvements in its hotel and motel accommodations building stock.

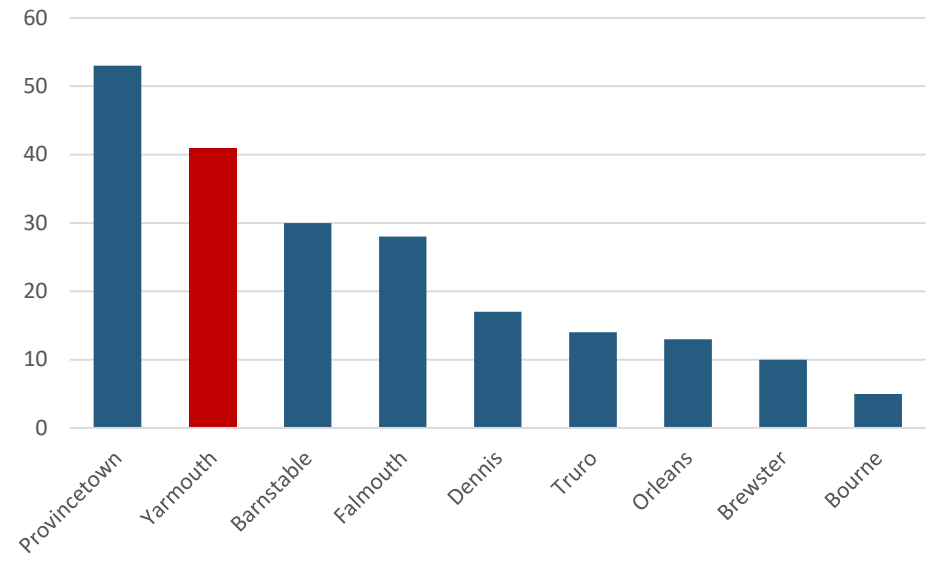
This conclusion is further reinforced when considering the number of establishments in the Accommodations industry each town has (**Figure 10**). While Yarmouth and Barnstable have similar overall rooms tax revenues, Yarmouth has 11 or (36%) more accommodations establishments than Barnstable, meaning that Barnstable receives about $95,500 per establishment in rooms tax revenue, while Yarmouth only makes $71,800. If Yarmouth were able to increase its tax revenue per establishment to the same level as Barnstable's, Yarmouth would reap an additional $260,000 in rooms tax revenue annually. Such an increase would require a combination of changes, including larger and/or busier hotel/motel accommodations – both now challenges with Yarmouth's current water infrastructure situation.

Figure 9: Rooms Tax Revenue and Tax Rate, Yarmouth Compared to Other Cape Cod Towns 2017



Source: Massachusetts Department of Revenue.

Figure 10: Number of Accommodations Establishments by Town, 2016

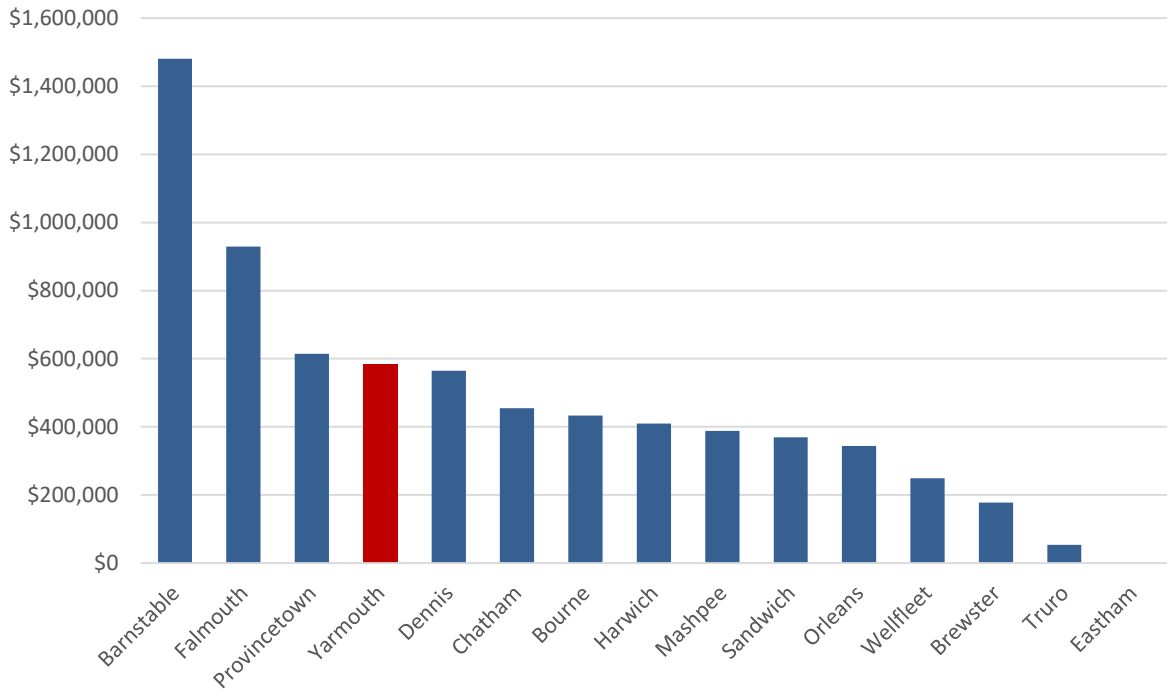


Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages. Note: Due to data disclosure issues, not all towns have a reported number of establishments.

Meals taxes are an additional source of revenue for the Commonwealth and its cities and towns. The meals tax rate in Massachusetts maxes out at 7.0 percent and is divided into two parts. One is the 6.25 percent that goes to the Commonwealth's coffers, and the other is a local option 0.75 percent going to the community in which the restaurant resides. The "local option" meals tax provides an additional means for bringing in additional revenues to communities. With the exception of Eastham, all towns on Cape Cod have elected to institute the local option meals tax. In terms of meal tax revenue, Yarmouth reaped almost $585,000 in 2016, slightly more than Dennis and less than Provincetown as shown on **Figure 11**.

Meals taxes, like hotel room taxes, are an important source of revenue for all Cape Cod communities (Eastham was the last Cape community to approve instituting the meals tax, doing so at the Town meeting in May 2018). However, just as hotels are restrained in their growth and investment opportunities by the lack of wastewater treatment, restaurants are perhaps even more encumbered by the absence of sewerage services that limit their capacity to expand or force practices that create other problems (e.g., increased trash volumes from using disposable utensils in lieu of metal flatware to reduce water consumption from dishwashing). By increasing options and providing the impetus for eating places to invest and expand (today, even adding outdoor dining space can be a problem for Yarmouth restaurants), wastewater treatment in Yarmouth would be a means for increasing revenues via the local sales tax on meals.

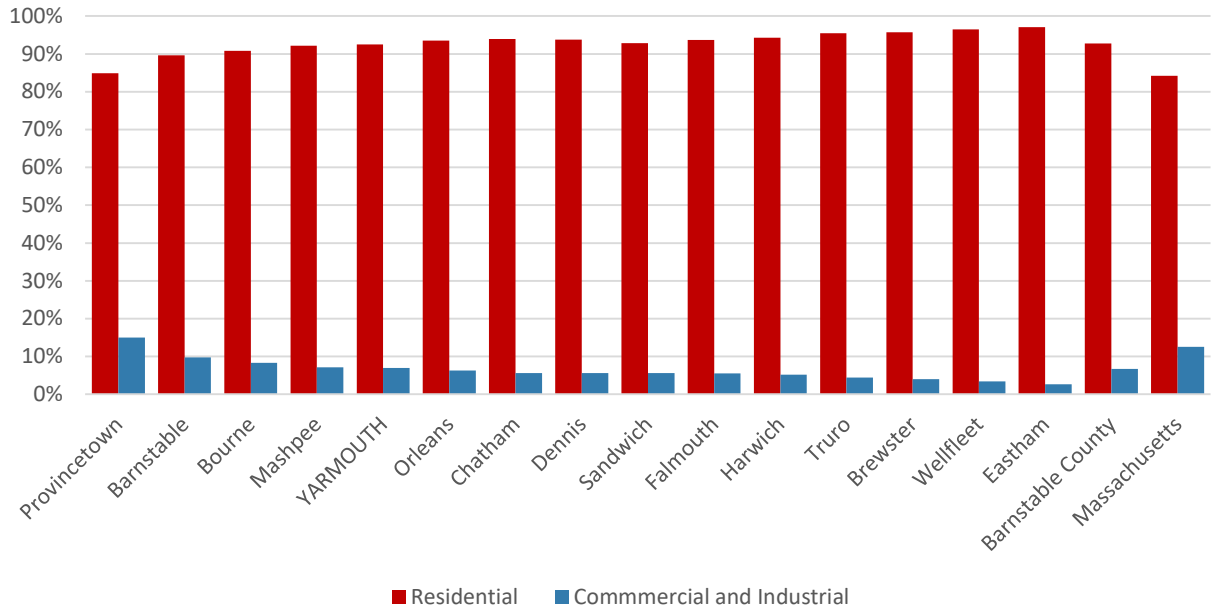
Figure 11: Meal Tax Revenues by Cape Cod Town, 2016



Source: Massachusetts Department of Revenue.

Like other towns on Cape Cod and reflective of a visitor-oriented economy dependent on second homes and tourism, Yarmouth is reliant on residential property taxes as a primary source of tax revenues. In terms of assessed value, residential property types accounted for 92 percent of Yarmouth's total property valuation in 2018, with commercial/industrial property contributing only seven percent (see **Figure 12**). By comparison, Barnstable and Provincetown's commercial/industrial properties account for 10 percent and 15 percent, respectively, of total assessed property values. Cities with diversified economies with extremely strong business and office presence, like Waltham, can see commercial/industrial properties comprise upwards of 30 percent of total assessed property values. While few towns or cities have as diversified a property tax base as Waltham, an expansion of retail businesses, office buildings and other commercial entities in Yarmouth would help shift the tax burden from homeowners to other sources and better allow the Town to embark upon capital projects and expansions or improvements in services. However, as will be discussed in a later section of this report, the lack of wastewater treatment can stymie interest from investors in expanding (or updating existing properties) and prevent the needed scale and densities to make projects economically justifiable. The suppression of these types of investments represents a missed opportunity in Yarmouth and will limit the possibilities for diversifying the town's tax base in the future.

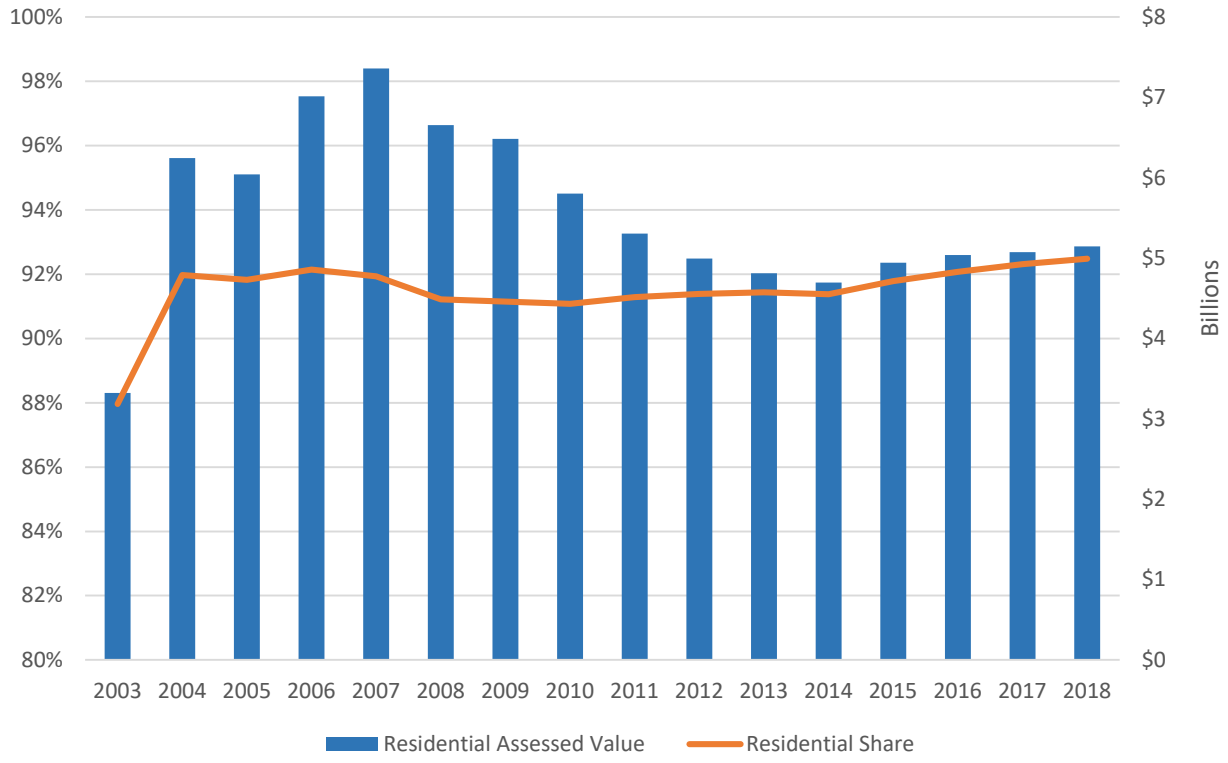
Figure 12: Total Assessed Property Value by Property-Type (Residential vs. Commercial/Industrial), Yarmouth Compared to Other Cape Cod Towns, 2018



Source: Massachusetts Department of Revenue.

Looking at the longer-term trends in Yarmouth, since the re-assessment of 2003, the residential share of the town's total assessed value has stayed fairly flat at 91 to 92 percent (**Figure 13**) for years. Since peaking at $7.4 billion in 2007, just before the Great Recession, and then falling to $4.7 billion in 2014, the total value of residential property in Yarmouth has slowly risen to $5.1 billion in 2018. With the combination of fairly tepid economic and population growth, Yarmouth has been unable to compensate for the decline in assessed values with new development, and the high share of the total tax burden carried by homeowners cannot be significantly reduced without new growth and larger-scale investments in commercial and industrial properties.

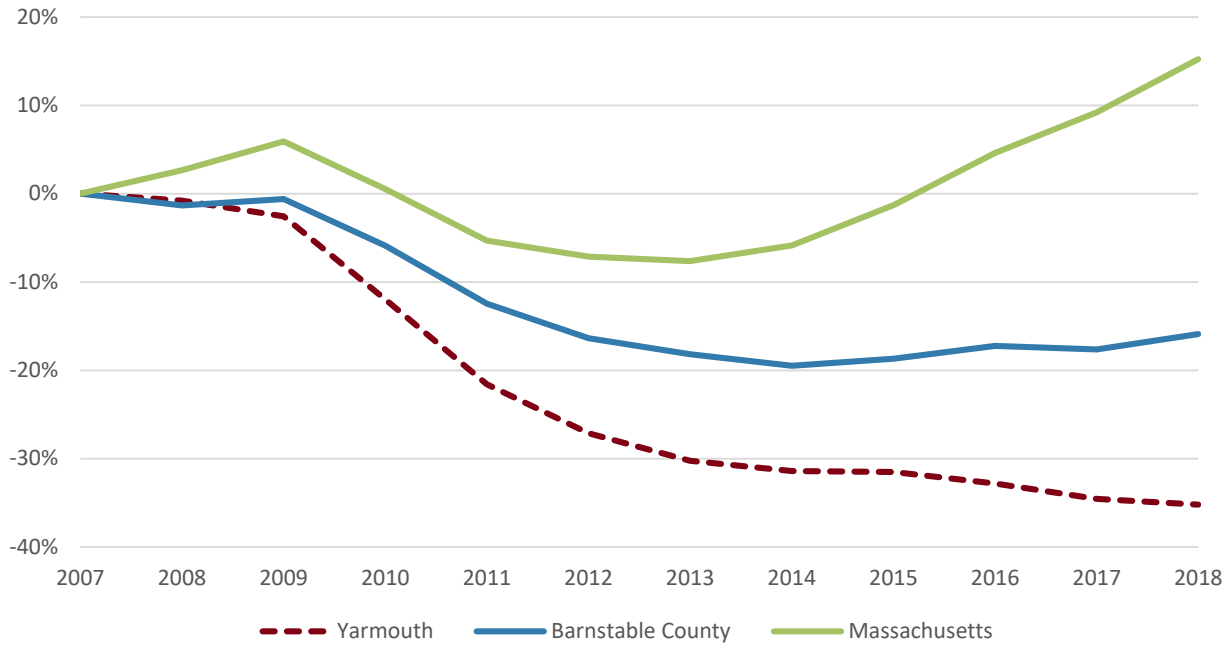
Figure 13: Residential Share of Total Assessed Real Estate Value vs. Total Assessed Value of Residential Property ($2017), Yarmouth



Source: Massachusetts Department of Revenue. Assessed property valuations adjusted to 2017 dollars.

Figure 14, showing the change in the assessed values for commercial and industrial (non-residential) property in Yarmouth since 2007 compared to Cape Cod and Massachusetts, underscores the challenges that Yarmouth is confronting in diversifying its property tax base. The values of these properties in the town are eroding at a faster clip than Cape Cod's, overall, and are running counter to a recent surge in value that Massachusetts is experiencing. During the 2007-2018 period, the State has witnessed a 15 percent *increase* in the assessed values of non-residential properties (in inflation-adjusted dollars), while the Cape has seen a 16 percent *decline* in the total assessed values for its commercial and industrial properties. In Yarmouth, this decline has been even more extreme, with the total of commercial and industrial real estate in the town dropping by 35 percent since 2007.

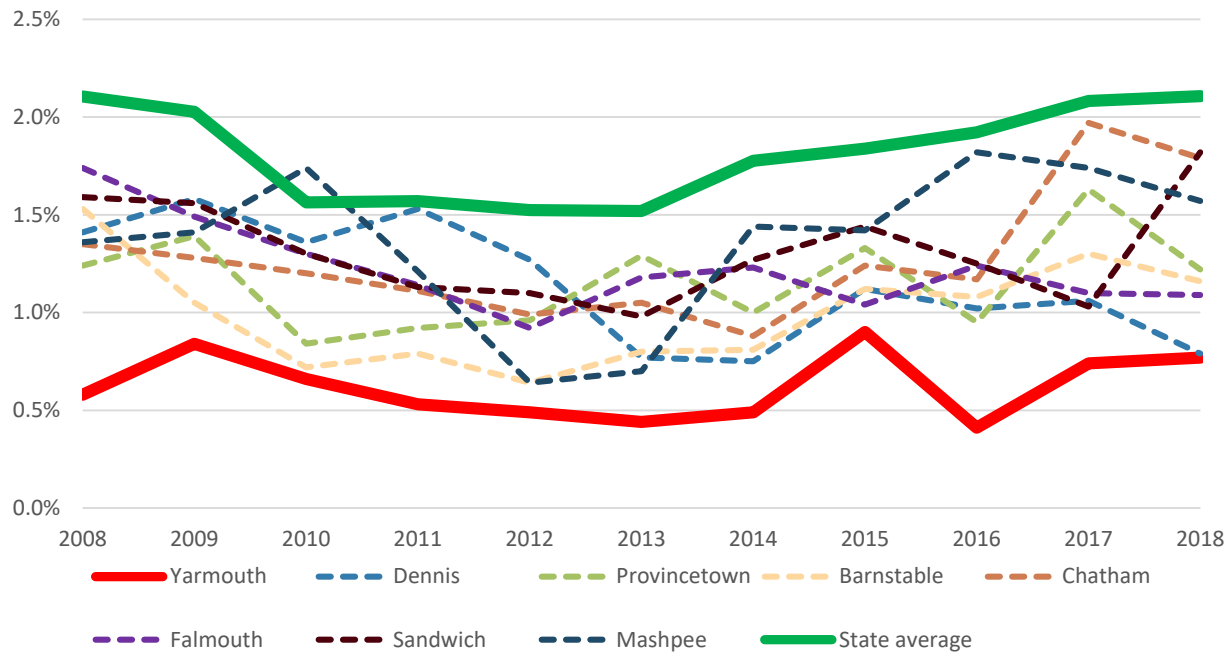
Figure 14: Real Change in the Assessed Value of Commercial and Industrial Property, Yarmouth Compared to Cape Cod and Massachusetts, 2007-2018 (2007=1.00)



Source: Massachusetts Department of Revenue. Changes in value are based on assessed property valuations adjusted to 2017 dollars.

On both the residential and commercial/industrial sides, the value of new investments (whether for improvements, expansions, or new buildings), is an indicator of a location's desirability to live and to conduct business. **Figure 15** compares Yarmouth with other municipalities and Massachusetts in the value of "new growth" (annual investments in major improvements and/or new structures) as a share of the total municipal property tax levy. High percentages, as can be seen for Massachusetts (over 2.0 percent in recent years), demonstrate significant property investments and are reflective of people seeing gainful market opportunities to invest in housing and commercial/industrial real estate. In Yarmouth, on the other hand, the value of new growth was only 0.77 percent of the total assessed property value in 2018 and has ranked among the lowest on Cape Cod for years as can be seen in **Figure 15**. If Yarmouth could double its growth to be more in line with the averages (between 1.2 and 1.7 percent) of Barnstable, Falmouth, Sandwich, and Mashpee, it would result in an additional $420,000 in property tax revenue each year. If growth in investment and total assessed property values could be sustained for several years at this level, there would be a compounding effect which could translate to quite a bit more revenue for the Town of Yarmouth. The lack of wastewater infrastructure in the Town of Yarmouth and the costs it puts on property owners to comply with septic regulations, as reinforced through interviews, constrains building activity and new investment in the town.

Figure 15: Annual Change in New Growth in Tax Levy as a Share of Municipal Property Tax Levy, Yarmouth Compared to Cape Cod Towns, 2008-2018



Source: Massachusetts Department of Revenue.

Cape Cod Wastewater Treatment – What Is Happening in Other Towns

Like all towns on Cape Cod, Yarmouth must reduce the amount of nitrogen flowing primarily from septic systems into estuaries, embayments, and ocean waters and degrading the marine environment. Too much nitrogen can result in algae blooms that choke out eelgrass and other pond organisms and can lead to fish kills. Eel grass is crucial to the Cape Cod ecosystem by providing a habitat for oysters and a wide range of other organisms. Cape Cod communities, per the Regional Wastewater Management Plan, need to address this issue which requires alternative technology nitrogen removal systems to be installed in areas declared nitrogen sensitive. With these clean water challenges, towns across Cape Cod are considering building or expanding existing municipal wastewater treatment systems. While it is relatively straightforward process to clean up water discharged by a water treatment plant, it is far harder to remove nitrogen when the source of the pollution is individual septic systems spread across a town.

Examples of wastewater treatment initiatives taking place in other communities on Cape Cod include the following:

- **Chatham.** Chatham has been moving towards expanding its municipal wastewater treatment system since the town approved its final comprehensive wastewater management plan in 2009. Chatham first installed its sewer system more than 40 years ago to serve the downtown area, but has recently undertaken construction to build an expanded treatment plant and to expand sewer service, with a goal of covering two-thirds of the town by 2030.

- **Orleans.** The town is moving forward with adding a sewer system and a wastewater treatment facility that would initially cover its downtown area as well as a large residential district. Initial pipe-laying has started as of March 2018.

- **Harwich.** In May 2017, Harwich voters approved $11 million to fund the next phase in the town's comprehensive wastewater management plan, which involves installing sewer mains to connect East Harwich to Chatham's wastewater treatment plant. A month later, both towns reached a 25-year intergovernmental agreement under which Harwich paid a portion of the costs for Chatham's newly expanded wastewater treatment facility in exchange for having wastewater treated at the plant. In May 2018 Harwich voters approved another $25 million to start constructing sewers in East Harwich.

- **Mid-Cape.** Yarmouth, Dennis, and Harwich were awarded a state grant in early 2018 to further study a regional solution to the towns' collective wastewater treatment needs. At Town Meetings in the spring of 2018, each towns' voters approved filing legislation to form a joint partnership with the other two towns to further explore creating a regionalized wastewater treatment system.

- **Bourne.** In October 2017, Bourne voters approved funding the construction of a new wastewater treatment facility to provide the capacity needed to allow for a number of new

developments to take place on Main Street. As of May 2018, Bourne was waiting for the approval of a Federal grant that would cover approximately a third of the project's costs.

- **Provincetown.** After declaring a state of limited sewer capacity in 2015, Provincetown is exploring options for expanding the town's tightly constrained sewer system. Restaurant and marina owners are pleased to see the town looking into a wastewater treatment expansion as it will help accommodate future economic growth.

- **Falmouth.** The town has a wastewater treatment facility with more treatment capacity than it is allowed to discharge. The imbalance is due to the amounts of nitrogen the facility is permitted to discharge locally. To accommodate future growth, Falmouth is looking into either finding a remote discharge location (e.g., at Joint Base Cape Cod in Bourne) or introducing new nitrogen filtration technologies (e.g., a membrane treatment system) at the plant.

The imperative for the improvement and preservation of water resources on Cape Cod has pushed the region's towns into a very active period of planning to address wastewater treatment issues. Towns reliant on septic systems are looking into introducing sewerage systems while other towns with existing wastewater infrastructure are exploring ways to expand capacity. By addressing wastewater issues, particularly with regards to nitrogen discharges, Cape Cod's towns can help to ensure a more pristine environment as well as increase economic development opportunities in coming years. The economic and environmental arguments for introducing municipal wastewater treatment are reviewed in the next section of this report.

The Case for Municipal Wastewater Treatment

The lack of a municipal wastewater treatment and sewerage system in Yarmouth has two main effects; the first is economic and the second is on the environment. While these effects are focused on Yarmouth, they can also affect the larger mid-Cape region as well.

The Economic Case

The economic effects of wastewater treatment are wide-ranging, but can generally be summarized as:

1. Septic systems put wastewater treatment responsibility and compliance on the owner.
2. Septic systems are expensive to upgrade/repair/replace
3. Generally, businesses do not want to be in the "wastewater treatment business," but a lack of sewerage forces them to operate septic systems or more expensive package treatment plants. Commercial property owners can spend hundreds of thousands of dollars to install one of these systems, and pay annual operating costs of tens of thousands of dollars to operate and maintain such systems and provide testing to ensure compliance with environmental regulations.
4. Enables reuse of vacant/underutilized properties and more compact, dense downtown areas
5. Enables homeowners to expand/add bedrooms to their homes, allowing more families to stay invested in their local communities
6. Provide viable wastewater treatment options for residential properties on lots too small for modern system
7. Prevent the need for expensive and unsightly raised septic systems
8. Attract property and business owners who want to live/operate a business in the area but do not want to be in the wastewater treatment business.

More generally, the construction and operation of municipal wastewater treatment systems has its own direct and indirect economic benefits.

In a 2002 study,[1] the author studied the economic impact of 87 sewer and water projects financed by the Economic Development Association (EDA). The projects were completed in 1989 and 1990 and spread across 30 states, with 33 projects located in rural areas and 54 in urban areas. These projects were built for specific firms or businesses, with the express goal of promoting economic development in

[1] Bagi, Faqir. Economic Impact of Water-Sewer Facilities on Rural and Urban Communities. Rural America. 2002

the host communities. Clearly these firms and businesses were direct beneficiaries of the sewer/water project, but the study found a host of other businesses benefitted indirectly from the same project; from companies that supplied or serviced the direct beneficiary of the project, to new businesses that moved into the area to hook up to the new sewer/water system, to existing businesses that used the increased water or sewerage capacity to expand their own business. Together, these direct and indirect benefits result in more investment, jobs, and wages in the local economy. Specifically, the study found that every dollar (1990$) spent on construction of a sewer/water project:

- Resulted in nearly $15 of private investment
- Generated $2 in public investment
- Increased the property tax base by $14
- Every $10,000 in construction costs saved or created 5.75 jobs

In Massachusetts, Mansfield, Foxboro, and Norton are seeing clear economic development benefits from an ongoing project to introduce sewerage into new areas and expand its regional wastewater treatment plant. The expansion project, designed to accommodate growing commercial and residential neighborhoods in the three towns, likely has already had a major impact on encouraging development according to Lee Azinheira, the executive director of the MFN Regional Wastewater District.[2] Local officials indicate the wastewater treatment expansion is now resulting in:

- Growth at many businesses in Norton;
- Construction of residential and commercial buildings in downtown Mansfield;
- Retail, residential, and commercial/industrial activity as well as growth prospects are seen as improving in Foxboro. The expansion of wastewater treatment is also expected to jumpstart the town's downtown area.

The Environmental Case

On Cape Cod, perhaps the biggest problem stemming from a lack of municipal wastewater treatment is the presence of elevated levels of nitrogen in lakes, ponds, rivers, and streams. Yarmouth has three embayments that are at risk due to nitrogen loading—the Bass River, Parkers River, and Lewis Bay. Excess nitrogen levels in surface water can lead to excessive growth of aquatic plants and algae and reduced oxygen levels. Because even properly maintained and functioning septic systems emit significant amounts of nitrogen, a municipal wastewater treatment and sewer system would prevent much of this nitrogen from entering the ecosystem in the first place, thus preventing these negative environmental effects. In Yarmouth, there is a cost to the town if bay putrefaction results in the

[2] "Expansion of wastewater treatment plant serving Mansfield, Norton and Foxboro progressing," The Sun Chronicle, July 17, 2017.

lowering of the assessed values of adjoining, often expensive, residential homes. Lower water quality and bad smelling bays and ponds means lower assessments and declining property tax revenues.

Other environmental benefits to municipal wastewater treatment include[3]:

1. Fewer beach closures due to poor water quality, high bacteria levels, algal blooms, or other similar events. The economic impact of beach closures, which often coincide with the peak tourist season, can range into the millions of dollars. A study in Washington State estimated that the local economy lost $6.4 million in spending impact when four beaches were shut down for a period of two to five days. A study from Florida has estimated that almost $10.6 million was lost, per month, in the lodging and restaurant industries along a 10-mile stretch of beach during closures from red tide events (2017$)[4]. Further, the economic impacts to tourism can linger even after the beach closures are over, as tourists may be turned off or negatively associate the beach closures with the Cape as a destination overall and decide to vacation elsewhere in subsequent years.

2. Fewer closures of commercial fishing grounds and shellfish beds. In 2005, a red tide event shut down shellfish beds in Massachusetts (as well as New Hampshire and Maine). It is estimated that this closure alone cost the Massachusetts shellfish industry $22.4 million. Numerous other studies have been conducted that confirm the economic impact of algal blooms on the commercial fishing industry.

3. Lower drinking water treatment costs. Because almost all drinking water on Cape is supplied from one single aquifer, any contaminants, including excess nitrogen, can end up in the water supply. Additional equipment, supplies, and processes are required to remove these excess nutrients, which in turn increases the cost of providing clean, safe, drinking water.

4. Reduced impacts on health. Whether through contact in surface water or consumed through drinking water or contaminated shellfish, algal blooms and elevated nitrogen levels can cause a number of negative health impacts for both humans and animals. Infants are particularly susceptible to nitrates in drinking water, which can reduce oxygen levels in the blood. Horses, dogs, and other animals that consume surface water can be at risk as well.

5. Lower environmental impact from pollution from leaking/failing septic systems, cesspools, or other outdated or ineffective wastewater treatment systems.

6. During a flooding event, municipal wastewater treatment would reduce the risk of floodwater being contaminated by untreated sewage leaking from raised septic systems or backed-up underground septic systems.

[3] All dollar values updated to 2017$ using CPI-U.

[4] U.S. EPA. A Compilation of Cost Data Associated with the Impacts and Control of Nutrient Pollution. 2015.

The Case for Introducing Wastewater Treatment in Yarmouth

The UMass Donahue Institute study team spent a day and a half touring Yarmouth and meeting with town officials, property owners, developers, and other stakeholders to document first-hand about the challenges they confront due to the lack of wastewater treatment and the opportunities that may emerge with the advent of improved wastewater infrastructure. The in-person interviews were followed-up by a number of telephone conversations between the research team and additional stakeholders. Findings from these discussions are summarized in the next sections.

What Are the Options?

1) The Costs of Doing Nothing – The Do-Nothing Alternative

One option the Town of Yarmouth could choose is to simply do nothing to advance wastewater treatment in the town. Having been rebuffed by voters at the 2011 Town Meeting vote on a previous attempt to pass and implement a sewer plan, the town could consider that a mandate from the voters to leave municipal wastewater treatment aside and not address it any further. While the "do-nothing alternative" is theoretically possible, there a number of costs that would accrue to the town for doing nothing.

Effects on Businesses and Tourism

There is a sense that Cape Cod, and Route 28 in particular, needs quality redevelopment and reinvestment in order to both maintain and strengthen its status as a first class vacation destination for the Northeast and beyond. Cape Cod already has an onerous traffic situation and people can choose to vacation in numerous other destinations, with locations in Maine, New Hampshire, and the New Jersey Shore being the primary competitors for tourism.

Without a municipal wastewater treatment system, owners of large commercial properties are forced to provide their own on-site treatment systems. In many cases a septic system cannot handle the volume of wastewater generated, forcing developers and property owners to build package treatment plants, which are essentially miniature wastewater treatment plants. Depending on the size and design, the installation of a new system can cost anywhere from $500,000 to $750,000 and, depending on the size of the project, rise further still. Furthermore, operating and maintaining these systems is costly, with annual maintenance, operation, and equipment costs of up to $100,000. Much of these costs would be avoided with municipal and wastewater treatment and replaced instead with a monthly sewer bill.

One shopping center in Yarmouth has had a consistent number of vacancies for more than seven years. Despite constant efforts to lease the space, wastewater restrictions have limited the pool of potential tenants. Space limitations due to the lot size prevent the owner from upgrading and expand the on-site septic system to handle the needs of potential tenants, meaning the spaces simply remain vacant. The vacant spaces translate to lower property values (and, thus, lower property tax revenues for Yarmouth),

connote blight, and stymy investments for improvements. The evidence for this negative dynamic and its effects on real estate investment in Yarmouth can be clearly seen in **Figure 15** on page 15.

One property owner summed it up thus "it is definitely a detriment to commercial development to not have sewer, 100%".

An oft-repeated concern is about the current state of Route 28 and the number of commercial properties and motels that give the strip an obsolete and shabby appearance that does not make a compelling option even for price-conscious visitors. Accommodations are a major expense for travelers, along with transportation and meals, and if people do not perceive value it is an impetus to go elsewhere. It is widely recognized that today's tourists expect a level of accommodation that exceeds the level of service that is provided by the exterior corridor motel business model – a building type that is largely pre-1970. Hotel/motel guests, today, also expect larger rooms and some level of on-site food service. Full-service hotels with larger rooms and restaurants would also help Yarmouth achieve another economic goal – increasing business during the spring and fall shoulder seasons.

The poor condition of Yarmouth's hotel stock also translates, negatively, to their Yelp and TripAdvisor ratings, where properties frequently receive low ratings – a deterrent for people who are researching their trips. An interviewee indicated that, "Overall occupancy is down; now there are 6-8 sell-out days per season, as opposed to 60+ days in the 'good years'" and this could be a reflection of the condition of many of Yarmouth's hotel/motel offerings. Many Yarmouth motel properties are also likely to remain derelict without wastewater investments as they are very difficult to sell without it.

Upgrades of hotel properties poses a challenge in Yarmouth as it is very hard to capitalize the costs of a new or upgraded on-site disposal system for a renovation or expansion. Generally, the total investment needed to bring a hotel/motel property up-to-date greatly exceeds the added value if the owner cannot add extra rooms and/or a restaurant. In some cases, lodging establishment owners must make a choice when upgrading as to whether they reduce the total number of rooms on-site (and related water consumption) in order to provide enough wastewater "flow" in order to adequately accommodate the needs of a restaurant on-site. Given these conditions, without wastewater infrastructure in Yarmouth, motel owners are in a pincer where the economics of their property neither supports improvements or an expansion.

One interviewee indicated that Yarmouth is not going to get a new, full-service hotel without sewers. These types of hotels, to be operated with adequate returns for their investors, need more than 150 rooms plus on-site restaurants/food service and other large water-consuming uses (spas, fitness clubs, laundry), which is not possible on septic and frequently not economically feasible with miniature on-site wastewater systems. Major branded hotels would likely become much more interested in redeveloping Route 28 properties if municipal sewer hookups were to become available.

While it is much easier to accommodate the significant costs of on-site wastewater treatment during a total redevelopment of a property, the wastewater restrictions coupled with the Cape Cod Commission limitations mean that it is still difficult to be able to build a large enough hotel to make back the investment in a timely manner. The returns for a new hotel/motel investment in Yarmouth and

elsewhere on Cape Cod are often likely to stretch out many more years than is the norm in other areas, a waiting period that many hotel developers will not tolerate. This is exacerbated by the seasonal nature of Cape Cod, where the bulk of a tourist-oriented business's profits are made in the course of a short summer season.

Additionally, the lack of investment can also take a visual toll on Route 28 as older properties slowly deteriorate. Like other Cape Cod communities, Yarmouth needs to maintain its appeal for both residents and visitors, and any property degradation can erode the town's ability to draw the people it needs to sustain its economy and provide opportunities for growth.

In 2017 the Urban Land Institute Boston/New England chapter convened a Technical Assistance Panel (ULI TAP) of experts to assist the Town of Yarmouth to develop a strategy and recommendations to re-invigorate the Route 28 corridor. That report corroborated that the lack of wastewater treatment represented a large-scale detriment to future investment on the corridor:

> "the number one impediment to any significant redevelopment for the Town of Yarmouth is clearly the absence of a wastewater treatment facility – or even an actionable plan. There is virtually zero probability that any large-scale developers will invest in a community without wastewater treatment, and smaller businesses are reluctant to redevelop properties until a plan is in place."[5]

Limitations in septic system capacity also constrain small businesses in Yarmouth. Function and special event space is currently fairly limited in Yarmouth. New and existing conference and meeting venues that could otherwise accommodate larger groups are prevented from reaching more optimal or maximum capacity due to septic systems and inadequate wastewater treatment capacity. In some instances, the lack of wastewater treatment creates the unintended consequence of increased trash and landfill volumes. Some restaurants and bars, particularly in the Zone II/wellhead protection area near Exit 8 must serve food with disposable plates and utensils because they do not have adequate septic system capacity to handle the wastewater generated by commercial-volume dishwashing. The costs for restaurants to add their own wastewater treatment systems can reach $200,000 to $300,000 which many operators find economically prohibitive. Owners of restaurant properties can also find it difficult to secure long-term leases or to sell their properties without being able to offer adequate wastewater capacity.

Effects on Residential Property

Businesses are not alone in bearing the side effects of not having municipal wastewater treatment. Because of the high cost of bringing older septic systems up to code, many homeowners have found that they cannot substantially renovate or expand their homes without incurring prohibitive costs. The cost burdens for updating residential septic systems discourages property owners from investing in their properties. Without the ability to add an extra bedroom or an in-law suite, many families find it hard to stay on Cape Cod when they have another child or need to move their parents into the same home.

[5] "Yarmouth, Massachusetts: A Technical Assistance Panel Report" Pg. 20

Further, residential properties within the Zone II/wellhead protection area are restricted to the existing volume of their on-site septic systems. This means that even if zoning allowed a homeowner to add another bedroom, they would not be able to do so as it would necessitate additional septic treatment capacity. Additionally, wastewater concerns have led to an increasing number of residential properties being required to add deed restrictions limiting the number of bedrooms a house can legally have, essentially locking them from future expansions or conversions.

Regulatory Ramifications of the Do-Nothing Alternative

Finally, besides all the demonstrated costs of inaction and corresponding lost opportunities, the "do-nothing" pathway which has also been referred to as the "sticking our head in the sand" option, may not be even viable given the political, regulatory, and legal context surrounding the issue of water quality and wastewater treatment on Cape Cod.

First, the Massachusetts Department of Environmental Protection (MassDEP) has made it clear that it will designate certain portions of communities that are not moving forward to address wastewater treatment infrastructure in an expedient manner, as "nitrogen sensitive watershed" areas. These areas would then be subject to additional regulations that would likely require every property with a septic system to upgrade their system to full Title 5 compliance, and likely could also require more advanced systems that would mitigate and remove nitrogen from septic tank effluent before being discharged into leach fields. These on-site nitrogen removal systems are much more complex and sensitive than a standard Title 5 septic system and would require additional, costly operation, maintenance, and reporting costs to ensure the system functions appropriately and removes the necessary amount of nitrogen as dictated by the MassDEP. As part of its sewer planning effort, the Town of Harwich estimated the cost to a homeowner for an on-site nitrogen removal system upgrade to an existing Title 5 system would be approximately $20,000 and would require an additional $2,600 in annual operating and maintenance costs for a total annualized cost (amortized) of $4,525, more than three times the comparable annual cost ($1,335) of installing and hooking up to a municipal wastewater treatment system, amortized over 15 years, and including usage fees.

Based on the cost estimates provided by Harwich, UMDI approximated the burden to Yarmouth homeowners should on-site nitrogen removal systems became mandated. Utilizing geographic information systems (GIS) software, UMDI estimated the number of single-family properties (**Table 1**) in the three embayments (Bass River, Lewis Bay, and Parkers River) that would, otherwise, be able to connect to a municipal sewer and wastewater treatment system through a phased plan. Without these infrastructure improvements, approximately 9,680 single-family homes may confront a requirement to upgrade their septic systems to include on-site nitrogen removal. If the actual costs were similar to those estimated by Harwich, the combined up-front costs to these homeowners in Yarmouth would be $193.6 million. After building the on-site nitrogen removal systems, homeowners would then incur, in total, almost $26.5 million in operating and maintenance costs on an annual basis.

Table 1: Potential Costs for On-Site Nitrogen Removal Systems and Annual Operating and Maintenance Costs

		Average System Costs	
Embayment	**Single-Family Parcels**	**Upgrade to On-Site Nitrogen Removal**	**Annual O&M**
Bass River	5,137	$102,740,000	$14,049,695
Lewis Bay	1,676	$33,520,000	$4,583,860
Parkers River	2,867	$57,340,000	$7,841,245
Total	**9,680**	**$193,600,000**	**$26,474,800**

Source: UMDI analysis using data from MassGIS, Cape Cod Commission, CDMSmith, Town of Harwich. Note: analysis does not take into account the approximately 150 I/A systems currently in Yarmouth as it cannot easily be determined where in town they are located and the extent to which they would meet the need for on-site nitrogen removal.

Second, advocacy and legal organizations have begun to intervene where they sense the State or Towns are not being sufficiently assertive to address the water quality issue as well. The Conservation Law Foundation (CLF) filed the original lawsuit that led to a settlement agreement with MassDEP in 2014 that requires the towns and the Cape Cod Commission to develop plans to ameliorate water quality issues. Along the way, the CLF has warned that it would take further action if progress was not made soon, and in June 2018 the CLF filed suit against two beachfront resorts for not doing enough to reduce nitrogen pollution into nearby waters.[6] This move was widely seen as an indication by the CLF that it was ready to move into a new phase of effort that could target more individual property owners in order to speed progress.

Lastly, without municipal wastewater treatment, the environmental ramifications of Yarmouth's existing effluent flows and leakages will continue to compound, leading to deteriorating conditions in the waterways that are so important in making Yarmouth (and Cape Cod) an attractive place to live and visit.

2) Go It Alone

Another possible option is that the Town could decide to build an entire wastewater treatment system for just Yarmouth. This approach would give the Town the greatest control over the system, but also leaves the Town responsible for the entire cost of building out such a system. This is the approach that

[6] http://www.capecodchronicle.com/en/5326/harwich/3201/Resorts-Threatened-With-Lawsuits-Alleging-Pollution-Groundwater-protection.htm

was presented to residents at a Town Meeting in 2011 and which was roundly defeated, meaning the results of another such effort may not be different.

3) Multi-Town Effort

The third option for the Town of Yarmouth is to pursue a regionalized wastewater treatment system. While doing so limits the Town's ability to exert full and complete control over the wastewater system, the upside is that a larger, regionalized system takes advantage of economies of scale and spreads the cost out amongst multiple municipalities and thus reduces the costs for each individual town compared to the cost of going it alone. Currently, Yarmouth, along with Dennis and Harwich, are considering such a regionalized approach and are in the process of fully formulating such a plan.

The Benefits Municipal Wastewater Treatment Can Provide to Yarmouth

An investment in municipal wastewater treatment has the potential to generate outsize returns when it comes to land use and development patterns in Yarmouth. Perhaps one of the greatest challenges facing Cape Cod right now is the need for more workforce housing. Per a 2017 Cape Cod Commission study on the issue, Cape Cod is short 22,000 housing units that would be affordable to those households earning under $90,000 a year. Furthermore, as portions of the Cape's economy become more dependent on services and occupations like landscaping, housekeeping, and healthcare that cater to an aging population, this workforce housing crisis, if not addressed, could lead to a worker shortage in these critical services because there is not an adequate supply of affordable housing options. A worker shortage also leads to higher wages to attract labor which further perpetuates already high costs on Cape Cod. The only way to provide a very large number of affordable housing units is to enable higher density development to occur in areas that have the infrastructure to handle it, and currently wastewater treatment is often the missing piece in most areas that is needed to make such developments feasible.

As an example, Cape Built is currently working on a project in Hyannis called Sea Captain's Row. With the municipal sewer in place there, they are able to build 60 units on 2.5 acres with a mix of workforce and market rate housing. In contrast, at another Cape Built development in Dennis, Heritage Sands, was built at a density of 63 units on eight acres. The Sea Captain's Row development in Hyannis accommodates the same number of units on one-third the amount of land as the Dennis project. This housing density would not be feasible without the municipal wastewater infrastructure that is available in Hyannis.

There has also been a profound shift in the types of places people want to live and visit, with people increasingly showing a preference for denser, more walkable neighborhoods that provide better access to a variety of amenities and activities. This type of development, often called "New Urbanism", requires levels of density that can only be accommodated through infrastructure, including sewerage systems. The lack of wastewater treatment is a limiting factor that prevents the building of developments that better meet changing tastes in living styles.

A New Urbanism, higher density development initiative is now in its early stages in Bourne. Three owners of vacant or underutilized properties on Main Street in downtown Buzzards Bay want to develop their properties, but need the town to provide wastewater treatment capacity to accommodate the higher density style of development. The potential value of the proposed development exceeds $100 million and is expected to provide several hundred jobs. The proposed treatment plant would include sufficient capacity to treat wastewater from these developments as well as other potential projects downtown. If these developments were assessed at 75 percent of their development costs, they would generate almost $800,000 in property taxes for the town of Bourne.

A number of interviewees noted that current wastewater regulations at the State and regional level discourage the consolidation of lots that would allow some of these larger, denser developments to take place. Now, a development which exceeds 10,000 gallons per day in wastewater flow is required to provide a more expensive wastewater treatment facility or package plant on-site and undergo more stringent permitting through MassDEP; both of these items add substantially to a development's cost and schedule. Further, MassDEP considers multiple adjacent lots owned by the same owner to be a single "facility" for the purpose of wastewater flow calculations, making it much more likely that any development of such parcels, even with unrelated uses, would be required to build a treatment plant. Relatedly, the Cape Cod Commission (CCC) considers a development of 10,000 square feet or more to be a Development of Regional Impact (DRI), which carries additional permitting and review regulations and runs a higher risk of the project being denied at the CCC level. While most of the motels along Route 28 fall under Yarmouth's Growth Incentive Zone (GIZ) and some larger projects may be able to move forward on these properties without a DRI, these regulations significantly, taken together, discourage developments that would meet the market need for denser, more walkable, mixed-use communities and instead incentivize owners to build smaller buildings on individual lots, which only perpetuates the existing land use patterns and consumes more land area.

Additionally, a number of developments were cited that would become feasible and move forward through the planning stages if municipal wastewater treatment were to be built in Yarmouth.

The Red Jacket Resorts on South Shore Drive has reached a 20-year development agreement with the Cape Cod Commission to demolish and replace four resorts between the Parkers River and Bass River with two, new hotel resort properties. This development, representing $75 million or more in investment, is on hold as there is concern about making such a large investment while other commercial property owners are not investing similarly in their properties. The lack of reinvestment and redevelopment of existing commercial properties along Route 28 is a clear problem and cannot improve without municipal wastewater treatment given the concerns for estuary, bay, river, and aquifer quality. Reinvestment is a key pillar for economic vitality and a lack of municipal wastewater treatment puts Yarmouth and most of the mid-Cape in a "chicken and egg" situation; wastewater treatment is needed for reinvestment and reinvestment is needed to fund wastewater treatment infrastructure. Wastewater treatment is an indicator to property owners and developers that it is safe to invest. This lack of investment sends a signal that the market in and around Yarmouth is not vibrant enough to generate the economic activity needed to make such a substantial investment pay off.

Similar to Red Jacket Resorts, the prospects for investment in other hotel properties in Yarmouth would become much stronger with the provision of municipal wastewater treatment. Proximity to natural attractions, the Cape Cod Airport, and the Cape Cod Healthcare are all locational advantages that Yarmouth offers. These attributes have not gone unnoticed by potential investors. However, interviewees indicated that out-of-town developers and investors are interested in projects in Yarmouth, but are scared off once they find out there is no sewer system in town. One property owner has been looking to develop his property for years, but the lack of wastewater has and continues to be a major obstacle as potential investors and financiers *are* interested and see sufficient demand to justify building on the site, but end up walking away once they see the costs required for on-site wastewater. People "walking away" from potential investments in Yarmouth represents a significant loss in opportunity.

Municipal wastewater treatment would likely encourage a large capital infusion (commercial, hotel, motel, and residential) in Yarmouth and this would help with cost recovery for the improved infrastructure. Identified prospective projects in Yarmouth could bring hundreds of millions of dollars in new investment to the Town, adding significantly to the tax base. Conservatively, if these projects added $100 million in assessed value to the Town, that could generate over $1 million per year to Yarmouth's revenues, providing a means to defray the water infrastructure costs and maintain/add to public services. Today, Yarmouth is unable to leverage its proximity to Cape Cod Healthcare and commercial growth tends to be headed to Hyannis. Business owners also indicate that they are concentrating more of their investments off-Cape to realize growth opportunities and see adequate investment returns. Commercial users, as well, are attracted to Hyannis' airport-adjacent industrial areas that also have sewer connections already in place. Today, high water use businesses like dentist offices, car washes, fish processing, and commercial laundromat are almost impossible to operate in Yarmouth.

Homeowners would also likely see a number of benefits from the implementation of a municipal sewer system. One of the most substantial benefits to homeowners would be the ability to recover some or all of the maximum allowable building area on their properties. As outlined in the report *Sewers and Smart Growth: Challenges, Opportunities and Strategies* by Ridley and Associates, Inc.,[7] homeowners on smaller lots (less than 10,000 square feet) must dedicate a relatively significant portion of their property to their septic tank and leach field for Title 5 systems. The smaller the lot, the larger the share of the lot that is dedicated to the septic system and therefore cannot be utilized for building area. By connecting to a sewer system and eliminating the need for a Title 5 system, homeowners could use that ground to build an addition and expand their homes up to the maximum amount of square footage allowed by zoning. The Ridley report indicates that for lots of 6,000 square feet, homeowners could more than double the building footprint (from 474 to 1,099 square feet) of their homes, while owners of a 10,000 square foot parcel could see their maximum allowable building footprint size increase by 16 percent over the current maximum 2,149 square feet. The ability to expand their homes could encourage families to stay in their homes, or could provide an incentive for seasonal homeowners to convert their

[7] Sewers and Smart Growth: Challenges, Opportunities and Strategies (https://sp.barnstablecounty.org/ccc/public/Documents/Herring%20River/CCWPC%20smart_growth_-_final_report.pdf)

homes to full-time residences. Additionally, the fact that this additional space could be provided on the ground floor opens up the possibility of making homes more comfortable and accessible for elderly or disabled residents, which is of particular concern for Cape Cod's retirees and overall ageing population.

Along these lines, Chatham, under section 4A of its sewer regulations, allows any single family home that connects to its sewer system to add one additional bedroom.[8] Homeowners in Chatham with municipal sewer hookups are now adding value and living space (and the greater flexibility that entails) to their homes by investing in the additional bedroom space. While Yarmouth has not made a decision whether or not a similar blanket approval would be offered, the Chatham experience is a solid example of the how sewer implementation can directly and immediately impact homeowners.

Another benefit to homeowners, notably in low-lying areas, is that the ability to access a municipal sewer eliminates the need to install costly (e.g., frequently $30,000 to $40,000) and aesthetically unpleasing raised-bed septic systems. In areas where groundwater levels are close to the surface, there may not be enough depth to allow the installation of traditional underground septic systems. In these instances, the septic system is raised partially or completely above ground and is covered by a mound of soil. Frequently, these systems are an unsightly, unnatural intrusion into a neighborhood. Particularly on smaller lots, these systems can be especially difficult to site in an unobjectionable way and can end up in front lawns or in place of a patio. In Yarmouth, raised septic systems are particularly prominent in high ground water areas close to the coast. The introduction of wastewater in lieu of raised septic could raise property values, notably on coveted coastal properties. Longer-term, this would add to the Town's property tax revenues as home values increase.

[8] https://www.chatham-ma.gov/sites/chathamma/files/uploads/sewerregulationsmay2016.pdf

Conclusion

In conclusion, this study helps to inform the Town of Yarmouth as it weighs options for the building of a municipal wastewater treatment system. Through the information and data collected over the course of the study, evidence shows that water infrastructure has the potential to unlock development and increase investment in the community, both commercially and residentially.

While Yarmouth is one of the top towns on Cape Cod in terms of gross revenue from the room occupancy tax, a closer look reveals that both Barnstable and Brewster (with the same room tax rate of six percent) outperform Yarmouth in terms of revenue generated per establishment, indicating hotels, motels, and inns in these towns are able to achieve either higher nightly rates, higher occupancy rates, or both. Similarly, both Provincetown and Barnstable are also less dependent on residential property for their tax bases. In Bourne, the passage of funding for a wastewater facility is expected to stimulate significant investment on that town's Main Street. Numerous other Cape Cod communities are also pursuing initiatives to introduce municipal wastewater infrastructure. Outside of Boston, a shared wastewater treatment expansion in Foxboro, Mansfield, and Norton is now seen as underpinning retail, residential, and commercial activity and new downtown construction, notably in Mansfield.

The provision of a municipal wastewater treatment system, as shown in this study, could result in a number of enhancements that would encourage future residential and commercial investment in Yarmouth. Homeowners could save a substantial amount of money over the cost of having to install upgraded septic systems, and many homeowners could be allowed to expand their properties for children and aging parents. Restaurants and venue operators could accommodate larger numbers of people and improve their service, and motel/hotel owners would see a greater impetus to upgrade or redevelop their facilities. The combination of these types of improvements would be further complemented by higher density development than is currently possible without municipal wastewater infrastructure. Higher densities are crucial for stimulating the building of more affordable housing, creating walkable neighborhoods and downtown/village areas, and accommodating the workers needed to make a tourism- and retiree-based economy function.

Without municipal wastewater treatment, Yarmouth residents and property owners will likely bear the brunt of increased legal and regulatory action from the Massachusetts Department of Environmental Protection and organizations like the Conservation Law Foundation. Additionally, Yarmouth will have more limited policy levers to help guide its own future and it will be less able to capitalize on economic opportunities as they arise without wastewater infrastructure. Needed residential and commercial investments would continue to be intermittent and the Route 28 corridor is unlikely to see the level of investment and redevelopment so many stakeholders desire. Additionally, continued deterioration of estuary, bay, river, and aquifer quality due to leaching and poorly maintained septic systems would undermine the natural attributes that make Yarmouth and Cape Cod attractive to visitors and residents, alike. Left unaddressed, this combination of factors would damage Yarmouth's tourism economy and continue to put increased pressure on residential property owners to fund the Town's operations.

Appendix 1: Population and Economic Indicators

Table A1.2: Population

	2010	2011	2012	2013	2014	2015	2016	2017
Barnstable	45,193	44,857	44,741	44,592	44,469	44,261	44,156	44,163
Bourne	19,754	19,786	19,750	19,734	19,733	19,848	19,880	19,879
Brewster	9,820	9,841	9,822	9,802	9,939	9,880	9,842	9,836
Chatham	6,125	6,119	6,125	6,137	6,139	6,137	6,148	6,169
Dennis	14,207	14,166	14,110	14,073	14,037	13,994	13,964	13,917
Eastham	4,956	4,941	4,927	4,924	4,918	4,903	4,891	4,882
Falmouth	31,531	31,559	31,491	31,462	31,347	31,252	31,132	31,101
Harwich	12,243	12,209	12,174	12,167	12,164	12,134	12,119	12,145
Mashpee	14,006	13,967	13,924	13,943	13,980	14,046	14,104	14,191
Orleans	5,890	5,877	5,861	5,851	5,849	5,823	5,818	5,820
Province-town	2,942	2,939	2,940	2,944	2,944	2,956	2,962	2,959
Sandwich	20,675	20,613	20,565	20,549	20,476	20,377	20,317	20,303
Truro	2,003	2,003	2,001	2,011	2,006	1,998	2,003	2,004
Wellfleet	2,750	2,741	2,738	2,736	2,738	2,733	2,735	2,736
Yarmouth	23,793	23,722	23,618	23,641	23,540	23,431	23,369	23,339
Barnstable County	215,888	215,340	214,787	214,566	214,279	213,773	213,440	213,444
Massachusetts	6,547,629	6,612,178	6,659,627	6,711,138	6,757,925	6,794,002	6,823,721	6,859,819
United States	308,745,538	311,644,280	313,993,272	316,234,505	318,622,525	321,039,839	323,405,935	325,719,178

Source: U.S. Census Bureau, Population Division

Table A1.3: Average Monthly Employment

	2010	2011	2012	2013	2014	2015	2016
Barnstable	23,020	22,965	23,571	23,781	23,830	24,021	24,332
Bourne	5,373	5,377	5,768	5,826	5,948	6,118	6,262
Brewster	2,251	2,209	2,296	2,310	2,332	2,320	2,408
Chatham	2,439	2,470	2,547	2,641	2,703	2,774	2,896
Dennis	4,083	4,178	4,173	4,244	4,311	4,332	4,431
Eastham	928	930	981	1,046	1,085	1,111	1,087
Falmouth	11,623	11,754	11,784	11,886	12,040	11,942	12,057
Harwich	2,943	2,990	3,089	3,157	3,275	3,437	3,465
Mashpee	3,947	3,962	4,008	4,176	4,298	4,441	4,552
Orleans	3,318	3,321	3,332	3,469	3,551	3,619	3,620
Provincetown	2,195	2,229	2,307	2,353	2,421	2,533	2,524
Sandwich	4,318	4,287	4,395	4,488	4,577	4,772	4,957
Truro	351	371	374	394	403	420	467
Wellfleet	797	839	848	892	940	958	1,001
Yarmouth	7,109	7,097	7,173	7,287	7,453	7,579	7,717
Barnstable County	74,691	74,978	76,644	77,950	79,167	80,377	81,776
Massachusetts	2,735,423	2,783,380	2,830,344	2,877,741	2,936,461	3,001,599	3,065,893
United States	106,201,232	108,184,795	110,645,869	112,958,334	115,568,686	118,307,717	120,504,622

Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Table A1.4: Average Monthly Employment, Retail Trade

	2010	2011	2012	2013	2014	2015	2016
Barnstable	5,112	5,052	5,207	5,021	5,086	5,038	5,103
Bourne	859	854	1,204	1,347	1,256	1,274	1,256
Brewster	197	175	190	194	168	165	164
Chatham	383	403	419	423	426	476	460
Dennis	925	937	924	952	928	994	1,066
Eastham	115	124	120	115	107	103	101
Falmouth	1,920	1,906	1,856	1,839	1,869	1,813	1,805
Harwich	694	664	666	656	691	707	690
Mashpee	1,116	1,131	1,108	1,126	1,107	1,110	1,128
Orleans	1,135	1,147	1,119	1,151	1,171	1,165	1,153
Provincetown	604	602	610	627	626	622	619
Sandwich	654	642	700	725	722	676	678
Truro	38	32	32	37	45	49	49
Wellfleet	130	144	177	150	160	157	141
Yarmouth	1,007	1,002	1,008	1,042	1,041	1,066	1,081
Barnstable County	14,887	14,814	15,339	15,404	15,403	15,415	15,493
Massachusetts	340,145	343,583	345,836	347,318	349,919	353,374	355,531
United States	14,481,324	14,666,625	14,864,946	15,073,504	15,343,711	15,642,116	15,824,396

Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Table A1.5: Average Monthly Employment, Accommodations and Lodging

	2010	2011	2012	2013	2014	2015	2016
Barnstable	643	663	664	680	657	615	650
Bourne	46	43	43	41	42	40	40
Brewster	326	327	358	354	353	333	343
Chatham	353						
Dennis	103	100	100	103	111	114	100
Eastham							
Falmouth	325	364	396	414	430	404	411
Harwich	190						
Mashpee	14				46	45	
Orleans	74	72	69	73	70	71	68
Provincetown	324	337	339	341	321	338	353
Sandwich							
Truro	63	61	61	65	67	71	77
Wellfleet	35	32					
Yarmouth	482	479	495	489	550	570	554
Barnstable County	3,216	3,318	3,418	3,445	3,513	3,470	3,628
Massachusetts	31,851	32,505	33,241	33,671	34,285	35,123	35,640
United States	1,747,254	1,784,558	1,815,617	1,849,249	1,883,761	1,916,634	1,943,467

Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Table A1.6: Average Monthly Employment, Food Services and Drinking Places

	2010	2011	2012	2013	2014	2015	2016
Barnstable	2,631	2,605	2,709	2,771	2,634	2,762	2,764
Bourne	821	844	933	987	988	965	997
Brewster	187	172	159	153	127	119	137
Chatham	403	385	393	417	424	447	438
Dennis	901	939	937	957	1,001	993	1,037
Eastham	177	151	179	206	205	212	172
Falmouth	1,566	1,532	1,578	1,587	1,681	1,690	1,736
Harwich	486	515	560	565	573	590	596
Mashpee	572	571	550	601	651	715	701
Orleans	588	579	579	609	620	655	686
Provincetown	647	672	721	741	788	831	826
Sandwich	664	664	702	714	686	661	792
Truro		73	66	63	62	69	78
Wellfleet	282	291	272	332	348	341	347
Yarmouth	1,168	1,197	1,265	1,261	1,269	1,217	1,262
Barnstable County	11,154	11,188	11,603	11,964	12,057	12,267	12,567
Massachusetts	226,750	234,320	242,209	248,918	254,545	259,112	267,257
United States	9,355,821	9,587,402	9,947,844	10,316,259	10,648,180	11,023,331	11,375,236

Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Table A1.7: Rooms Tax Revenue

	2010	2011	2012	2013	2014	2015	2016	2017
Barnstable	$1,579,398	$2,420,876	$2,498,953	$2,694,017	$2,723,641	$2,735,464	$2,864,427	$2,920,947
Bourne	$79,601	$81,122	$80,339	$90,078	$86,562	$102,412	$94,762	$83,223
Brewster	$791,540	$925,521	$1,012,370	$1,077,021	$1,119,275	$1,165,840	$1,151,284	$1,161,504
Chatham	$1,114,840	$1,127,563	$1,206,754	$1,214,195	$1,299,431	$1,347,155	$1,425,188	$1,377,315
Dennis	$358,097	$366,531	$375,227	$387,157	$418,266	$430,892	$474,501	$459,718
Eastham	$257,168	$252,651	$283,881	$278,785	$286,602	$314,534	$328,938	$271,230
Falmouth	$803,479	$853,838	$994,787	$1,021,287	$1,066,412	$1,165,700	$1,232,059	$1,225,326
Harwich	$446,812	$490,936	$540,206	$547,872	$586,564	$630,798	$692,815	$677,090
Mashpee	$69,229	$58,754	$66,458	$69,986	$75,758	$80,439	$95,335	$96,666
Orleans	$188,428	$212,138	$208,571	$207,609	$215,712	$228,290	$235,087	$235,279
Provincetown	$1,343,923	$1,712,858	$1,723,158	$1,878,894	$1,970,872	$2,066,003	$2,083,940	$2,255,306
Sandwich	$189,520	$184,898	$214,974	$195,104	$217,362	$241,171	$229,596	$254,709
Truro	$326,785	$331,265	$348,885	$337,493	$363,994	$455,547	$377,709	$372,620
Wellfleet	$122,777	$119,985	$119,252	$108,387	$122,070	$126,908	$117,072	$120,203
Yarmouth	$2,081,997	$2,385,007	$2,460,119	$2,508,965	$2,670,006	$2,893,093	$2,941,116	$2,842,794
Barnstable	$9,753,594	$11,523,943	$12,133,934	$12,616,850	$13,222,527	$13,984,246	$14,343,829	$14,353,930
Massachusetts	$120,046,523	$134,073,091	$149,537,196	$162,324,012	$177,656,238	$194,639,172	$202,043,155	$208,857,729

Source: Massachusetts Department of Revenue

Table A1.8: Meals Tax Revenue

	2010	2011	2012	2013	2014	2015	2016	2017
Barnstable	$1,215,168	$1,188,115	$1,269,255	$1,315,324	$1,364,812	$1,408,037	$1,481,434	$1,526,397
Bourne	$315,835	$315,172	$335,891	$376,917	$395,858	$405,293	$432,962	$433,605
Brewster	$133,969	$149,228	$150,478	$157,605	$164,646	$144,767	$177,353	$162,167
Chatham	$285,751	$302,669	$336,599	$347,715	$374,942	$401,820	$454,399	$435,867
Dennis	$406,904	$411,479	$468,618	$476,613	$501,256	$555,112	$564,267	$585,683
Eastham	$90,603	$87,297	$98,848	$105,682	$126,946	$113,775	$117,299	$0
Falmouth	$697,753	$685,716	$746,830	$778,501	$825,635	$854,267	$929,251	$925,545
Harwich	$274,617	$298,972	$334,178	$333,071	$343,040	$376,552	$409,465	$413,901
Mashpee	$283,996	$288,117	$306,049	$343,639	$367,292	$380,489	$388,326	$30,162
Orleans	$271,379	$278,944	$297,019	$296,614	$321,051	$333,082	$344,018	$330,753
Provincetown	$453,097	$471,868	$521,486	$515,443	$553,192	$588,300	$614,321	$634,855
Sandwich	$277,046	$291,559	$300,300	$318,213	$318,598	$339,892	$368,874	$393,754
Truro	$29,810	$39,752	$41,002	$42,367	$44,425	$48,678	$53,179	$56,335
Wellfleet	$180,120	$187,651	$207,423	$213,823	$220,765	$258,313	$248,698	$237,739
Yarmouth	$481,104	$492,944	$506,728	$547,612	$552,969	$568,619	$584,729	$607,986
Barnstable County	$5,397,153	$5,489,484	$5,920,703	$6,169,140	$6,475,426	$6,776,999	$7,168,575	$6,774,749
Massachusetts	$98,147,984	$102,224,285	$109,074,837	$113,431,785	$119,712,169	$126,382,836	$130,893,878	$129,737,423

Source: Massachusetts Department of Revenue. Note: Eastham figure for 2017 likely represents a reporting error in the source data.

Table A1.9: Assessed Property Valuation - Residential

Residential	2010	2011	2012	2013	2014	2015	2016	2017	2018
Barnstable	$13,290,222,484	$12,503,962,665	$12,110,248,316	$11,806,745,491	$11,507,867,882	$11,590,332,598	$11,806,248,231	$11,609,385,779	$11,966,381,614
Bourne	$4,592,817,798	$4,217,234,271	$3,820,210,219	$3,764,764,127	$3,732,011,948	$3,708,760,224	$3,777,365,250	$3,847,498,941	$3,928,574,951
Brewster	$3,979,085,228	$3,516,529,989	$3,366,825,988	$3,222,659,297	$3,228,028,812	$3,289,383,154	$3,339,037,624	$3,410,315,173	$3,608,486,595
Chatham	$6,688,366,579	$5,928,135,219	$5,828,913,635	$5,661,829,402	$5,563,046,470	$5,731,224,919	$5,902,043,780	$5,998,136,930	$6,316,190,918
Dennis	$6,566,496,792	$6,091,581,151	$5,763,064,795	$5,666,257,199	$5,622,866,747	$5,799,799,038	$5,780,538,759	$5,974,715,354	$6,155,994,052
Eastham	$3,126,039,297	$2,883,834,916	$2,776,468,199	$2,706,144,014	$2,626,286,689	$2,639,781,295	$2,675,628,364	$2,673,655,590	$2,731,088,472
Falmouth	$11,565,846,267	$11,110,789,869	$10,418,475,602	$10,294,031,701	$10,277,940,476	$10,511,170,144	$10,487,724,495	$10,384,849,550	$10,660,098,706
Harwich	$5,155,629,509	$4,688,277,758	$4,545,073,744	$4,371,061,091	$4,354,669,425	$4,511,352,005	$4,556,735,885	$4,617,995,392	$4,931,447,716
Mashpee	$4,806,592,247	$4,441,049,360	$4,349,111,493	$4,235,876,650	$4,175,558,408	$4,337,096,691	$4,420,699,572	$4,516,609,730	$4,722,382,219
Orleans	$3,926,839,995	$3,619,369,589	$3,543,120,235	$3,441,121,031	$3,424,940,383	$3,443,409,259	$3,511,761,364	$3,538,643,766	$3,659,753,722
Provincetown	$2,229,277,559	$2,019,847,895	$1,989,514,684	$1,987,026,391	$2,067,580,966	$2,107,225,041	$2,198,803,357	$2,271,996,437	$2,390,267,116
Sandwich	$3,919,722,811	$3,608,001,468	$3,483,128,617	$3,336,178,249	$3,272,605,002	$3,333,111,842	$3,431,897,327	$3,455,914,216	$3,622,132,918
Truro	$2,265,623,919	$2,047,248,245	$1,992,168,711	$1,979,984,616	$1,927,780,508	$1,975,980,723	$2,006,430,728	$2,000,407,581	$2,041,978,186
Wellfleet	$2,340,395,967	$2,269,325,087	$2,220,492,752	$2,166,157,343	$2,140,897,027	$2,137,347,149	$2,197,857,694	$2,216,708,889	$2,250,981,495
Yarmouth	$5,803,005,364	$5,306,173,203	$4,994,123,857	$4,812,230,790	$4,695,211,152	$4,944,244,729	$5,038,227,214	$5,075,332,224	$5,148,260,995
Barnstable County	$80,255,961,815	$74,251,360,684	$71,200,940,848	$69,452,067,392	$68,617,291,895	$70,060,218,811	$71,130,999,642	$71,592,165,552	$74,134,019,675
Massachusetts	$868,562,938,774	$815,452,837,260	$794,776,634,579	$780,767,515,423	$778,817,234,424	$820,084,123,178	$859,814,671,712	$892,559,462,282	$943,185,515,623

Source: Massachusetts Department of Revenue

Table A1.10: Assessed Property Valuation - Commercial

Commercial	2010	2011	2012	2013	2014	2015	2016	2017	2018
Barnstable	$1,438,026,169	$1,346,559,880	$1,286,941,701	$1,287,042,912	$1,249,258,228	$1,245,899,274	$1,293,842,073	$1,291,731,901	$1,304,032,686
Bourne	$443,547,449	$426,240,696	$403,872,137	$393,789,883	$380,129,428	$367,969,918	$363,469,470	$353,622,119	$359,054,119
Brewster	$185,062,413	$165,288,684	$156,222,232	$149,264,832	$152,223,731	$152,109,196	$153,717,431	$147,314,177	$149,800,015
Chatham	$391,077,382	$373,464,192	$361,993,509	$374,256,553	$361,421,547	$360,065,415	$366,688,300	$370,959,845	$379,128,807
Dennis	$416,330,802	$402,832,009	$382,902,895	$373,393,222	$370,884,372	$377,781,715	$376,227,673	$368,556,883	$369,655,454
Eastham	$93,796,944	$86,987,065	$82,155,172	$79,438,989	$76,039,205	$74,318,713	$73,514,365	$72,583,420	$73,643,428
Falmouth	$687,301,938	$643,571,939	$607,071,568	$605,001,168	$599,274,418	$626,366,099	$617,639,132	$607,421,068	$631,222,433
Harwich	$296,032,347	$277,779,037	$271,749,115	$250,026,574	$247,841,357	$254,173,280	$257,031,686	$259,151,168	$269,676,804
Mashpee	$358,338,100	$321,951,724	$312,980,981	$298,949,539	$298,861,892	$311,666,331	$344,183,611	$347,787,210	$366,107,131
Orleans	$268,222,481	$254,020,075	$246,263,697	$241,003,190	$241,500,145	$241,132,244	$241,388,521	$240,165,194	$244,565,358
Provincetown	$468,240,410	$418,447,941	$405,619,643	$401,117,950	$407,433,475	$407,451,418	$412,053,349	$408,879,463	$423,541,314
Sandwich	$224,607,708	$208,114,249	$203,248,074	$190,987,721	$192,276,304	$200,935,959	$206,445,896	$209,467,366	$218,270,392
Truro	$116,744,592	$108,008,206	$105,155,984	$107,661,515	$99,193,451	$94,128,265	$94,277,576	$94,915,609	$95,488,594
Wellfleet	$90,924,511	$87,997,197	$84,431,461	$82,772,396	$79,756,480	$79,484,387	$79,306,953	$80,070,561	$80,321,655
Yarmouth	$525,648,921	$468,925,439	$435,948,205	$418,005,017	$411,188,378	$410,230,446	$404,346,052	$393,342,576	$389,352,425
Barnstable County	$6,003,902,167	$5,590,188,330	$5,346,556,375	$5,252,711,463	$5,167,282,411	$5,203,712,659	$5,284,132,090	$5,245,968,560	$5,353,860,615
Massachusetts	$118,660,832,122	$112,253,633,202	$110,418,755,383	$110,167,436,657	$113,025,988,164	$119,164,771,990	$126,954,275,257	$132,994,780,463	$140,209,148,153

Source: Massachusetts Department of Revenue

Table A1.11: Assessed Property Valuation - Industrial

Industrial	2010	2011	2012	2013	2014	2015	2016	2017	2018
Barnstable	$91,930,567	$89,648,129	$84,952,527	$84,482,891	$82,137,917	$81,278,961	$81,522,083	$80,275,500	$78,707,200
Bourne	$37,516,784	$36,182,887	$33,581,570	$32,885,498	$31,011,497	$34,709,088	$34,674,787	$35,127,500	$39,539,360
Brewster	$11,337,935	$10,134,592	$9,487,438	$10,264,743	$9,451,371	$9,502,528	$10,910,790	$11,642,000	$11,727,100
Chatham	$39,407,686	$39,199,345	$38,908,714	$21,718,416	$21,501,650	$21,565,616	$25,724,650	$25,807,625	$25,370,345
Dennis	$26,784,511	$25,881,012	$26,352,156	$25,141,538	$26,130,457	$33,111,268	$29,862,405	$39,058,000	$40,318,800
Eastham	$9,160,412	$8,586,212	$8,183,870	$8,216,298	$7,945,878	$7,890,643	$7,803,065	$9,341,700	$9,416,700
Falmouth	$85,813,021	$78,521,567	$75,553,809	$76,324,886	$76,457,527	$82,107,035	$79,338,536	$80,184,800	$87,507,900
Harwich	$36,433,126	$33,210,780	$24,539,758	$19,118,365	$20,156,527	$20,486,839	$27,064,442	$28,645,900	$30,490,100
Mashpee	$30,275,337	$26,005,349	$26,209,842	$25,745,718	$24,006,614	$26,603,024	$40,866,644	$37,404,500	$34,406,600
Orleans	$9,219,428	$8,470,048	$8,219,955	$8,426,740	$8,528,403	$8,348,892	$7,254,830	$7,990,700	$8,169,000
Provincetown	$2,007,444	$1,752,048	$1,700,191	$1,695,007	$1,769,938	$1,772,184	$2,026,981	$2,038,600	$1,846,400
Sandwich	$77,469,390	$65,530,171	$60,217,074	$55,926,086	$55,736,699	$57,047,226	$58,370,766	$58,400,698	$60,576,180
Truro	$2,003,847	$1,836,392	$1,792,967	$1,718,577	$1,670,228	$1,674,867	$1,673,202	$1,678,600	$1,693,700
Wellfleet	$1,288,910	$1,249,579	$1,224,244	$1,206,571	$1,173,643	$1,172,251	$1,162,754	$1,150,400	$1,150,400
Yarmouth	$42,865,312	$37,398,892	$34,620,475	$32,399,482	$31,843,463	$32,084,527	$29,515,366	$29,352,400	$29,100,300
Barnstable County	$503,513,712	$463,607,006	$435,544,591	$405,270,813	$399,521,811	$419,354,948	$437,771,301	$448,098,923	$460,020,085
Massachusetts	$35,251,509,582	$32,740,233,628	$31,772,957,709	$31,285,933,824	$31,103,613,612	$31,962,338,703	$33,207,991,995	$34,239,490,980	$36,206,602,223

Source: Massachusetts Department of Revenue

Table A1.12: Tax Levy "New Growth"

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Barnstable	1.5%	1.1%	0.7%	0.8%	0.6%	0.8%	0.8%	1.1%	1.1%	1.3%	1.2%
Bourne	1.4%	1.4%	1.0%	0.7%	0.9%	1.0%	0.6%	1.5%	1.6%	1.6%	1.3%
Brewster	0.7%	1.5%	0.8%	0.6%	0.5%	0.7%	0.9%	0.6%	0.7%	1.3%	1.1%
Chatham	1.4%	1.3%	1.2%	1.1%	1.0%	1.1%	0.9%	1.2%	1.2%	2.0%	1.8%
Dennis	1.4%	1.6%	1.4%	1.5%	1.3%	0.8%	0.8%	1.1%	1.0%	1.1%	0.8%
Eastham	0.8%	0.9%	0.8%	0.5%	0.4%	0.5%	0.6%	0.8%	0.6%	0.7%	0.7%
Falmouth	1.7%	1.5%	1.3%	1.1%	0.9%	1.2%	1.2%	1.0%	1.2%	1.1%	1.1%
Harwich	1.3%	1.5%	0.9%	1.1%	1.2%	1.1%	1.1%	1.2%	1.2%	0.8%	0.9%
Mashpee	1.4%	1.4%	1.7%	1.2%	0.6%	0.7%	1.4%	1.4%	1.8%	1.7%	1.6%
Orleans	1.6%	1.2%	1.2%	0.9%	0.9%	0.8%	0.9%	1.0%	1.1%	1.0%	1.1%
Provincetown	1.2%	1.4%	0.8%	0.9%	1.0%	1.3%	1.0%	1.3%	1.0%	1.6%	1.2%
Sandwich	1.6%	1.6%	1.3%	1.1%	1.1%	1.0%	1.3%	1.4%	1.3%	1.0%	1.8%
Truro	1.7%	1.9%	1.4%	1.3%	1.0%	1.1%	0.9%	1.0%	1.0%	1.0%	0.9%
Wellfleet	1.1%	0.7%	0.8%	0.6%	0.5%	0.6%	0.6%	0.7%	0.8%	0.8%	1.0%
Yarmouth	0.6%	0.8%	0.7%	0.5%	0.5%	0.4%	0.5%	0.9%	0.4%	0.7%	0.8%
Barnstable County (Average)	1.3%	1.3%	1.1%	0.9%	0.8%	0.9%	0.9%	1.1%	1.1%	1.2%	1.1%
Massachusetts (Average)	2.1%	2.0%	1.6%	1.6%	1.5%	1.5%	1.8%	1.8%	1.9%	2.1%	2.1%

Source: Massachusetts Department of Revenue