

CHAPTER 11

Energy & Sustainability

The community cares about the environment, as evidenced by Newburyport stakeholders' proposal to become a zero net energy community by 2050. Long term visioning and planning is needed to reach this lofty goal. In addition to reducing energy consumption and increasing the renewable energy generation, the community must look toward future sea level rise and implement resiliency plans in order to protect public infrastructure as well as private property.

In addition to planning for sea level rise and reducing consumption of non-renewable energy, the community expressed, through public comments during the preparation of this Master Plan, concern for preserving natural resources, limiting trash and wastes, increasing residential and commercial recycling and composting, and generating clean and renewable energy. Another facet of this theme is environmental conservation – reducing what we use and preserving what we have. This includes pursuing and preserving more open space and parks, and conserving water through smarter irrigation practices and water resource protection policies.

The community recognizes that human activity interacts with the natural systems and that the volume and type of activity today exceeds the assimilation capacities of natural systems. A sustainable community meets the needs of the present without compromising the ability of future generations to meet their own needs.

The City has already taken steps toward a more sustainable future:

- In 2005, then-Mayor John Moak signed the U.S. Mayors Climate Protection Agreement, urging the federal and state governments to enact policies to reduce global warming pollution, lessen U.S. dependence on fossil fuels, and accelerate the development of clean energy and energy efficient technologies, while pledging to measure greenhouse gas (GHG) emissions, set reduction targets and create an action plan; adopt land-use policies that reduce sprawl, preserve open space, and create walkable, bikeable and public transit-oriented communities; increase use and development of clean, renewable energy; make energy efficiency a priority; promote sustainable building practices; conserve water; increase recycling; maintain healthy urban forests and promote tree planting to increase shade, decrease energy use, and absorb CO₂; and help educate the public, including students, about reducing global warming pollution.
- In 2006, the City established the Energy Advisory Committee to make recommendations regarding energy conservation, energy efficiency, and converting to cleaner energy sources.
- In 2010, the City was designated as a “Green Community” by the Massachusetts Department of Energy Resources, and since then has almost met its goal of reducing municipal energy consumption by 20%.
- In 2011, the City signed a 20 year agreement to purchase 4.2 megawatts of solar energy; previously, the City installed approximately 500 kilowatts of solar on municipal buildings, including the Rupert A. Nock Middle School.
- In 2012 the City was chosen to participate in the “Solarize Mass” program, which resulted in an additional 423 kilowatts of solar capacity on 46 residences and businesses in the community.
- In 2013, the City received a grant from the Department of Energy Resources (MassDOER) and the Massachusetts Clean Energy Center (MassCEC) to establish local clean energy goals and develop strategies to increase the use of renewable energy, building energy efficiency, and sustainable

transportation. This extensive work resulted in the City's first *Clean Energy Roadmap* – a detailed 55-page master plan for clean energy use. The recommendations set forth in the "*Roadmap*" are incorporated herein; a copy of the *Roadmap* is on the City's website and there is also a hard copy of the document at City Hall.

In order for a city to be sustainable, it must have, in addition to clean energy sources, sufficient water, clean air, sufficient food, biological diversity to support natural systems, safe disposal or reuse of its wastes, and be able to adapt to environmental changes. Sustainability is a way of life and we must be sustainable in order to survive. Because sustainability applies to all aspects of our lives, this Energy and Sustainability chapter includes goals, objectives, and recommended actions that overlap virtually every other chapter in this Master Plan. The predominant goal for this chapter is to ensure that the long-term livability and resiliency of the City in the face of environmental challenges of our time.

Section A: Energy

Newburyport has a history of success in implementing clean energy projects, with a strong commitment to innovation and a track record of robust community engagement. Among its many successes, the City of Newburyport is home to several megawatts of solar photovoltaic (PV) installations on some of its schools, businesses, and residences. In 2008, the City was one of the founding members of the Newburyport EcoCollaborative, an organization created to foster collaboration and support city planning for sustainability initiatives. In 2010, Newburyport became a Commonwealth of Massachusetts Green Community after meeting strict criteria, including adopting a strategy to reduce energy consumption by 20%, and becoming eligible for yearly competitive energy efficiency grants for its municipal buildings. The City is also an active member of the Merrimack Valley Planning Commission (MVPC), where it regularly collaborates with MVPC cities and towns on clean energy projects and programs.

Building on these and other clean energy accomplishments, Newburyport stakeholders have proposed a long-term vision to become a zero net energy community by 2050. Newburyport has defined this goal to mean that the City will significantly reduce energy use in the governmental, residential, and commercial building and transportation sectors via energy efficiency and energy conservation measures and additionally provide the balance of energy needs from renewable energy resources. There are various types of incentive programs that may be explored to determine if participation is advisable. Programs include utility incentives, state and federal incentives, and rebate programs. There are also residential and commercial renewable energy programs such as the Massachusetts Clean Energy Center's (Mass CEC) Solarize campaign that the City participated in in 2012, adding 423 kilowatts on 43 rooftops. To the extent possible, Newburyport will also generate renewable energy from local projects. Through the Community Energy Strategies Program (CESP), Newburyport developed this long-term vision Clean Energy Roadmap, and has pledged to create a five-year action plan to support its implementation.

In addition to clean energy initiatives and thanks to the efforts of the Newburyport Energy Advisory Committee and residents, and through a grant with National Grid, Newburyport was able to reduce carbon emissions by 340 metric tons during a yearlong energy efficiency program, which represented an estimated savings of \$88,000 for residents. Newburyport residents learned about energy efficiency and were connected to specialized loan programs, rebates, and incentives for weatherization and efficient heating and hot water systems through the Mass Save Program. Residents completed more than 422 home energy assessments in that one year and looks to continue that trend.

Section B: Waste

While great progress has been made in decreasing Newburyport's solid waste through single stream curbside recycling, solid waste management is a drain on the City's budget, resources and environment. The City spends \$1.1 million annually on solid waste and recycling services. Just over one half of the cost is for curbside collection of trash and recyclables and the rest is spent on disposal.

For more than a decade, the City has been on a waste reduction course (see Figure ES-1):

- Mandatory recycling with enforcement,
- A three, 35-gallon barrel trash limit,
- Fees on bulky items,
- Automated single stream recycling collection,
- A comprehensive electronics recycling program,
- A zero waste pilot program, where we learned that organics constitute the largest weight in a typical week's residential trash, which led to
- An organics collection pilot program.

Based on Newburyport's organics pilot program, an organics diversion program (backyard or curbside or ideally, combination) could divert as much as 50-80% of a household's waste, by weight (after recycling). An additional incentive to explore residential organics diversion is the possibility that it could become mandatory through state action as an extension of the current commercial organics ban. The pilot aims to discover and mitigate roadblocks and challenges of a potential citywide rollout if it looks financially viable. If the City wanted to reduce waste even further a trash metering program such as Pay as you Throw (PAYT) could be instituted. A PAYT program involves users being charged for the disposal of waste based on how much waste they present for collection to the municipality. Decreasing waste also will decrease air emissions as noted below in *Section E: Air Quality*.

Figure ES-1: Timeline of Recycling Initiatives

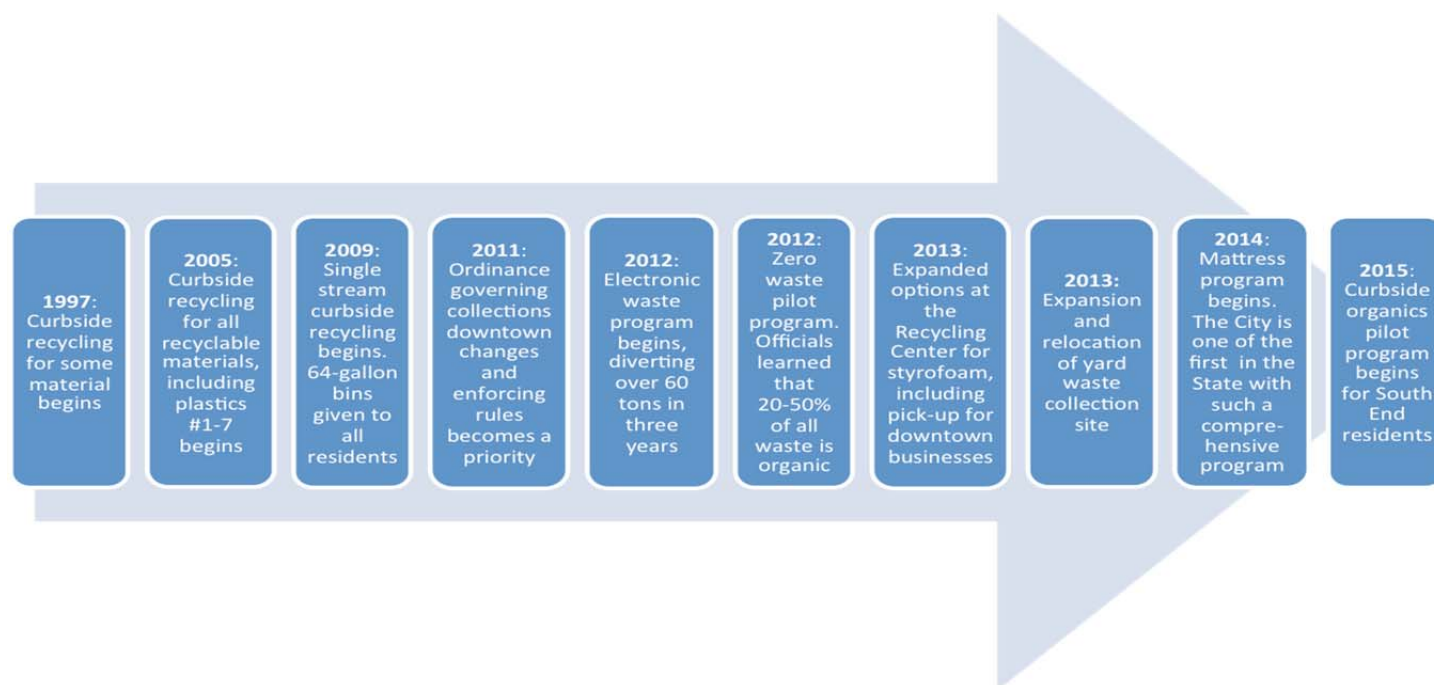


Table ES-1: Newburyport Recycling and Trash Tonnage Figures

Calendar Year	Solid Waste (Tons)	Recycling (Tons)	
		Single-Stream Curbside Pick-up	Drop-off at Recycling Center
2011	5,918	2,914	678
2012	5,106	2,922	633
2013	5,150	2,948	532
2014	5,359	2,695.42	4,423*
2015	5,235	2,603.78	2,939.15

* Increase due to yard waste and electronics recycling increases. Source: Newburyport Office of Recycling, Energy and Sustainability

Where we rank in Essex County

Below is a snapshot of Merrimack Valley towns and pounds per household that show the differences between towns with and without waste reduction programs.

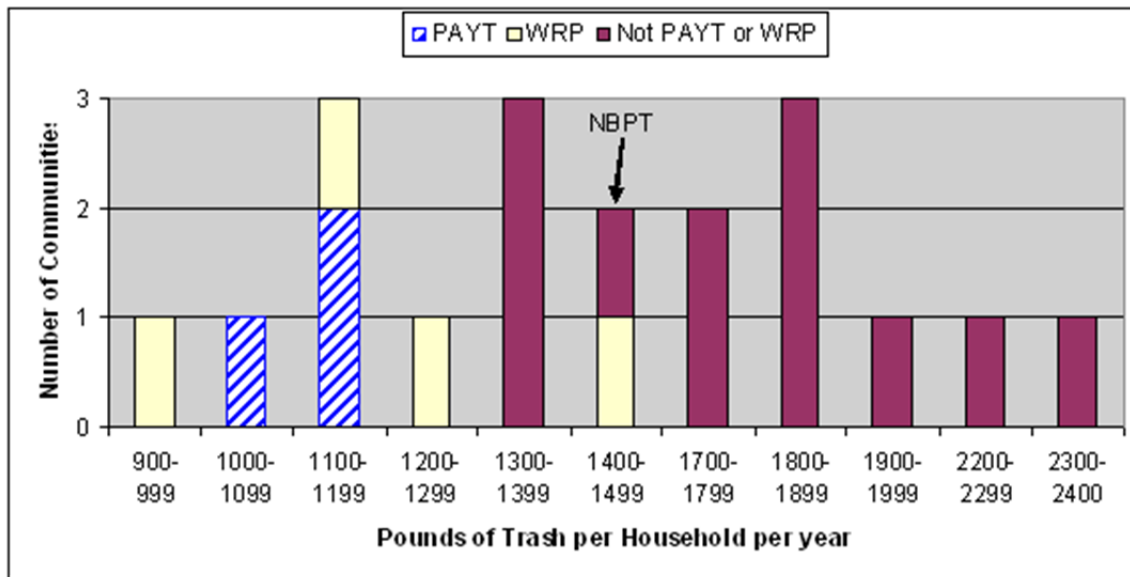
Table ES-2: Regional Recycling and Trash Tonnage Figures

Community	Households (HH) Served	Business Served	Trash Tonnage	Trash lbs/ HH	Paper, Bottles & Cans Tonnage	Recycling lbs/ HH	Food Waste	Recycling Rate	Year	Trash Limit?
Amesbury	5,526	380	4,462	1,615	2,091	754		32%	2015	3 barrel
Boxford	2,916	--	1,703	1,150	1,108	704	--	39%	2015	PAYT
Groveland	2,034	--	2,242	2,204	495	487	--	18%	2014	3 barrel
Haverhill	22,651	300	21,057	1,835	4,465	394	--	17%	2015	3 barrel
Merrimac	1,444	--	622	861	414	573	--	40%	2015	PAYT
Newbury	--	--	1,454	--	423	--	--	23%	2010	PAYT
Newburyport	7,549	387	5,235	1,387	2,604	690	25	33%	2015	3 barrel
West Newbury	1,518	12	1,357	1,788	768	1,012	--	36%	2014	2 barrel

PAYT = Pay As You Throw

Source: MassDEP, Northeast Region

Chart ES-1 below illustrates that communities who have instituted a PAYT or waste reduction program have less household trash than those who have not.

Chart ES-1: Pounds of Trash per Household in Neighboring Communities

Source: MassDEP, Northeast Region

Section C: Water

As a coastal city located at the mouth of the Merrimack River, the region's largest river, Newburyport's relationship with water is complex. Proactively protecting and conserving the City's drinking water supplies is the first priority. But the City must also work to ensure that its impact on the Merrimack River, the Great Marsh, and the Atlantic Ocean is at least benign and ideally positive. These bodies of water contribute mightily to the beauty and livability of our City.

Newburyport's drinking water comes from both surface water and groundwater supplies. The surface supplies, which make up 80% of the City's drinking water supply, are the Indian Hill Reservoir in West Newbury, the Upper and Lower Artichoke Reservoirs in both West Newbury and Newburyport, and the Bartlett Spring Pond in Newburyport. Groundwater, which accounts for 20% of the drinking water, is supplied by two gravel-packed wells located along Newburyport's Ferry Road. The watersheds for our sources are primarily a mixture of residential, agricultural, recreational and forestland.

The City adopted a Water Resource Protection District ordinance to protect our public water supplies. Additionally, the City adopted a Stormwater Management ordinance in 2010. The City has also developed a Surface Water Supply Protection Plan to help monitor and preserve the public surface water supply sources. Even with these protections in place, it is important for the City to actively work on this Plan and further integrate sustainability goals into its' planning in order to protect and conserve the City's water quality and supply.

An issue of particular concern for Newburyport is preventing saltwater intrusion of our drinking water supply at the Lower Artichoke Reservoir due to intense rainfall events (for example, the Mother's Day Storm of 2006), storm surge, and sea level rise. The heavy rains from the Mother's Day Storm caused the Merrimack River to rise so high that it almost overtopped the reservoir's dam. Unfortunately, forecasted scenarios show that even a small level of sea level rise may compromise the dam. In addition, surge from a significant hurricane could also cause salt water to inundate the reservoir.

Newburyport's location at the mouth of the Merrimack River provides the community with many recreational and commercial opportunities. It also means that the water that flows along the waterfront and out to the Atlantic is cumulatively impacted by the many towns and cities upriver. Water testing done by volunteers over that past several years shows that contamination levels in the River vary greatly throughout the year. Today, the river is classified primarily as B waters, meaning that the water is intended to be both fishable, swimmable, and boatable, but all 50 miles in Massachusetts are still considered non-supporting for Class B waters (EOEA, 2001). The main environmental problems currently impacting the Merrimack River's water are the following: pathogens; nutrients, primarily phosphates; increasing amounts of impervious surfaces; flooding; loss of private forested lands in southern New Hampshire due to sprawl; and climate change, which will increase both flooding and polluted runoff (Merrimack River Watershed Council).

The City tests the river's water under the Commonwealth's regulations regarding the testing of all public bathing beach areas. The Newburyport Health Department collects samples for testing to send out to the state Department of Public Health's contractor, Biomarine, to perform this testing. It is important for the City to know the quality of the water and communicate it to residents and visitors on an ongoing basis. The City must also ensure that its own impact on the River is benign, which can be done through educating citizens and City leaders on preventing harmful runoff into the River as well as strengthening the City's water use, wastewater, wetlands protection and storm water policies, regulations and ordinances. By taking these actions, Newburyport will lessen its impact on ocean waters and on the Great Marsh, an area particularly vulnerable to human impact.

Section D: Food Production

An important part of any community's long term sustainability is the security of its food supply. In New England's agricultural past, food supply was local; now, our food comes from across the country and from all over the globe. But these far-flung food supply systems can contribute to environmental degradation, and are subject to disruption from drought and other climate-related stressors. Therefore, it is necessary to "strengthen our local and regional food systems and support and encourage an economically viable, environmentally sound and socially equitable food system throughout the food production, use and disposal cycle."¹

Food and agriculture is also an important sector of the local and regional economy. Within five miles of Newburyport, there are six Community Supported Agricultural ("CSA") farms, one dairy farm, two Farmers Markets, and seven farm stands. Although local statistics are not readily available, in Essex County alone, according to the Massachusetts Department of Agriculture, there are 522 farms, covering 22,397 acres, with annual sales of over \$25 million. Although agriculture declined in the United States from 2002-2012, Massachusetts experienced a 1% growth in number of farms and acres of farmland, as depicted in Table ES-4 below.

There are many food-related businesses in the City, including restaurants and institutions such as the local hospital, the schools and grocery stores that make significant purchasing decisions about food. Using more locally and regionally grown, organic food instead of food shipped over long distances and grown with pesticides and chemical fertilizers will reduce the amount of energy used to transport our food, provide us with healthier, more nutritious food, and help our local and regional economy and environment.

¹ STAR Community Index (2010). Retrieved from: www.icleiusa.org/star on September 9, 2015.

In October 2014, the Massachusetts Department of Environmental Protection imposed a ban on the disposal of commercial organic wastes by businesses and institutions that dispose of one ton or more of these materials per week. There are no currently known businesses or restaurants that meet this threshold in Newburyport; however, the City's Recycling, Energy and Sustainability Department encourages restaurants to compost when possible to divert waste from the disposal stream. Additionally, the City has established a School Food Recovery program by developing a standard operating procedure to collect and divert foods from the Newburyport schools to local food pantries, which is one of the first programs of its kind in the Commonwealth.

To this end, the City supports efforts of groups like "Nourishing the North Shore" (NNS), a collaborative effort of the Greater Newburyport YWCA, the City of Newburyport Board of Health, and the Newburyport Learning Enrichment Center, to grow more food locally and distribute it more equitably. Specifically, the City supports backyard and community gardens and greenhouses for growing fruit and produce; raising small food animals such as chickens; encouraging local farms and sustainable agriculture; and helping ensure access to locally grown food for all its residents.

Table ES-3: Farming in Massachusetts

Year	Number of Farms	Total Acreage	Average Size of Farms (Acres)	Number of Farmers (Principal Occupation)	Total Sales
2002	5,075	518,570	85	3,283	\$384M
2012	7,755	523,517	68	3,878	\$492M
Growth from 2002 to 2012	+28%	+1%	-20%	+18%	+28%

Source: MA Department of Agriculture

Section E: Air Quality

Newburyport is fortunate in that it does not have significant air quality issues that afflict other, more heavily industrialized communities. Nevertheless, Newburyport is home to industries, primarily located in the Business Park, which are the source of reportable amounts of toxic chemicals that may be released to the air, water or land. The federal Toxics Release Inventory (TRI) tracks the management of over 650 toxic chemicals that pose a threat to human health and the environment. Industries located in Newburyport were the source of on-site releases of 7,139 pounds of toxic chemicals (EPA, 2014 dataset, released October 2016 and updated November 29, 2016). The City's Department of Health is responsible for tracking these emissions and reporting any emissions of concern to residents.

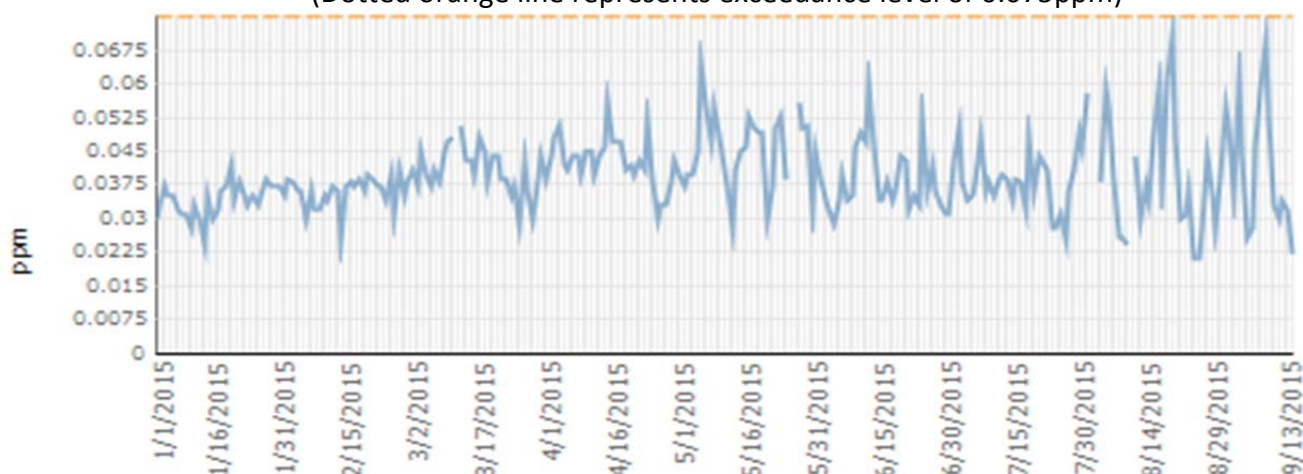
The solid waste generated in Newburyport is shipped to the North Andover waste combustor, which is across the Merrimack River from another waste combustor in Haverhill. According to the Massachusetts DEP, despite pollution controls and monitoring, municipal waste combustors may still contain levels of pollutants that, when combined with air emissions from other sources, may adversely affect our health and the environment. In addition, the North Andover facility, which burns Newburyport's waste, is 11th among the top 20 largest greenhouse gas (GHG) sources in Massachusetts. Reducing waste will directly contribute to better air quality and fewer climate-disrupting GHGs in our atmosphere.

Newburyport, like much of Eastern Massachusetts, has summer ozone levels that can exceed the health-based standard set by the EPA under the federal Clean Air Act. Ozone and other air pollutants are monitored at the MassDEP air quality monitoring station on the northern tip of Plum Island, at 261 Northern Boulevard. In

addition to ozone, the station monitors levels of nitrogen oxides (NO_x) and volatile organic compounds (VOCs). NO_x and VOCs are ozone precursors and contribute to ozone formation, especially in the hot summer months. These pollutants come primarily from tailpipe emissions from on- and off-road vehicles, including cars, trucks, buses, boats, RVs and construction and lawn equipment.

Chart ES-2: Ozone Levels in Newburyport

Ozone levels recorded at the Newburyport monitoring station in 2015
(Dotted orange line represents exceedance level of 0.075ppm)



Source: Newburyport Monitoring Station

Ozone is a powerful oxidant that can irritate airways and is a serious health problem, affecting primarily children, people with lung disease, older adults, and people who are active outdoors. Ozone is a pollutant that can travel many miles; so emissions produced elsewhere affect air quality here in the City. In that sense, it is a regional problem and the MassDEP, Mass Highway Department and the 13 regional planning commissions continuously update air quality attainment and emissions reduction plans. The City needs to encourage the community to reduce vehicle miles traveled within the City, especially automobile trips under five miles. These shorter trips are significant sources of air pollution because they are made in vehicles that are not operating at peak efficiency and emit significant pollution at start up. For action items aimed at reducing personal vehicle miles and increasing access to transportation options see **Chapter 7: Transportation**.

As the City grows and develops, and adds more people, homes and vehicles, the City can expect to experience decreasing air quality. The land use patterns of future development can greatly help to reduce short automobile trips through encouraging compact development with mixed uses, pedestrian walkways, protection of open space and supporting the use of public transportation and alternative modes of transportation (including hybrid and electric vehicles). If implemented these development techniques will have significant, positive impacts on air quality in the City.

Section F: Habitat Preservation

Newburyport is host to an Audubon Wildlife center, the Parker River National Wildlife Refuge, Maudslay State Park, and a variety of smaller parks and open space. This unique complex of natural systems adds ecological, economic, recreational, and cultural value to residents' daily lives both on the coast and inland where land is connected by networks of rivers and streams. Degradation of the local habitat will simultaneously degrade all of these economic, recreational, and quality of life issues for residents throughout the region.

Newburyport is centered in a critical environmental region at the corner of the Atlantic Ocean and the Merrimac River. The natural features of this area drive the local economy and quality of life, from sitting on the beach, boating, birding, water sports and sport fishing, to tourism, commercial fishing, marinas and ecotourism. The habitat includes the Great Marsh, which is the largest continuous stretch of salt marsh in New England, extending from Cape Ann to New Hampshire. The Great Marsh includes over 20,000 acres of marsh, barrier beach, tidal river, estuary, mudflat and upland islands. Massachusetts designated a portion of this area in 1979 as the Parker River/Essex Bay Area of Critical Environmental Concern. The Great Marsh is an internationally recognized Important Bird Area (IBA) as it contributes to the preservation of many breeding and migratory birds.

Newburyport manages three reservoirs and two wells. These provide drinking water not only for Newburyport but also for Plum Island, the Old Town portion of Newbury and the Town of West Newbury. Preserving the local habitat is important to maintaining the quality of these water supplies, which are largely surface waters that come from land runoff.

Section G: Climate Resilience

A Public Health Issue

Climate change and its associated impacts is an environmental issue, but it is also a public health issue:

- Impacts from Heat Waves – heart attacks, heat stroke and exhaustion
- Impacts from Reduced Air Quality – Asthma and respiratory diseases
- Food and Water-Borne Diseases – Cross contamination of septic and public water supplies due to heavy run-off and flooding
- Animal-borne Diseases – Tick borne illnesses, mosquito-transmitted diseases
- Drought – Agricultural impacts, water supplies, wildfires²

Resiliency Planning

The complexity of climate change necessitates a two-pronged approach – first, reduce greenhouse gas emissions and second, prepare for the inevitable impacts of climate change that have already been set in motion.

The City of Newburyport is a leader in taking steps to reduce greenhouse gasses. As stated above, the City supported the U.S. Mayors Climate Protection Agreement in 2005, established an Energy Advisory Committee in 2006, became a Massachusetts’s “Green Community” in 2010, and adopted a *Clean Energy Roadmap* in early 2015. These efforts have led to reducing municipal energy consumption by almost 20% and increasing municipal solar energy production to over five megawatts to date. And, as previously stated, more can be done.

The second part of preparing for climate change is monitoring and reviewing data and preparing for climate change impacts. Due to the scale and complexity of climate change, forecasting exact impacts is impossible. The City must continually review data and reports from Federal and state agencies to ensure that decisions are based upon the most current scientific data and projections. While we do not know exactly what will happen, we do know that this region is expected to experience more intense rainfall events and storms as well as sea-level rise. Storm surges will increase flooding and erosion. Less snowfall may increase summer drought.

² Mike Morris, Storm Surge
2017 Master Plan
City of Newburyport, Massachusetts

Although the degree of these impacts cannot be determined precisely, Newburyport has concluded that the risk of not preparing for them is too high. Fortunately, the Federal Hurricane Sandy Coastal Resiliency Competitive Grant Program and the Massachusetts Office of Coastal Zone Management Community Resilience Grant Program have provided funding to help our City prepare. These grants are administered by the National Wildlife Federation and its' focus is on Newburyport and its five neighboring communities along the North Shore to develop a detailed Climate Change Vulnerability Assessment and Adaptation Plan. The City began participating in this grant-funded project in early 2015 and it is expected to be complete by the end of 2016.

Also in 2015, the City was awarded a grant from the EPA Building Blocks for Sustainable Communities program to participate in a two-day workshop on "Flood Resilience for Riverine and Coastal Communities" (workshop was held in September 2015, report dated January 29, 2016). Additionally, the Mayor's office created an ad hoc Community Resilience Committee to assist in development and implementation of the City's first Resiliency Plan.

To date, the work of these groups has helped identify the Climate Change vulnerabilities listed in **Table ES-4** below as identified by the Newburyport Screening Level Climate Vulnerability Assessment. **Table ES-5** lists the City's critical infrastructure located in flood hazard areas and areas deemed at high risk from future storm damage and sea level rise.

Table ES-4: Special Flooding Problems/High Hazard Concerns

High Hazard Concerns	Type of Hazard/Reason for Hazard Occurring
Plum Island & Beach	Erosion and overtopping
Plum Island Turnpike	Road flooding, ice cakes
Plum Island Center	Overtopping, flooding
Newburyport Turnpike north of Newbury Golf Course	Flooding from astronomical high-tides and storm surge, critical access point
Cashman Park	Tidal and riverine flooding
Hale Street	Flooding/inadequate infrastructure
Fox Run Road	Flooding/inadequate infrastructure
Henry Graf Road	Flooding
Business Park at Malcolm Hoyt Road	Flooding
Merrimack Street	Flooding
Ocean Avenue/Water Street	Flooding/ tidal capacity
Parker Street at Scotland Road	Flooding/inadequate capacity
Quail Run Hollow	Flooding/road maintenance
Downtown State Street/Market Square	Flooding/disconnect from sanitary sewer

Summary of Special Flooding Problems/High Hazard Concerns listed in Newburyport's FEMA Hazard Mitigation Plan prepared by MVPC. Order of list does not indicate priority or level of concern.

Table ES-5: Critical Infrastructure at Risk for Future Storm Damage and Flooding

Asset Name	Location	Hazard
Plum Island Turnpike	63 Joppa Flats Nature Center East to Sunset Dr.	Tidal and storm flooding
Waste Water Treatment Facility	157 Water Street Newburyport, MA 01950	Flooding from storm surge and SLR
Lower Artichoke Reservoir	Coordinates: 42.809102,	Salt-water intrusion

	70.930310	
Bartlett Spring Pond	742 Spring Ln Newburyport, MA 01950	Salt-water intrusion
Merrimack River Jetty System	Mouth of the Merrimack River	Deteriorates over time; potentially increases erosion

High-priority vulnerable assets identified by the Newburyport Resiliency Task Force

Section H: Newburyport's Energy & Sustainability Goals

Goal ES-1: Be a net zero energy community by 2050.

A net zero energy community is a community that has zero net energy consumption, meaning that the total amount of energy used on an annual basis is roughly equal to the amount of renewable energy created by the community. The objectives and actions listed to accomplish this goal represent a broad approach from exploring a community-wide electricity aggregation and clean energy purchase program to producing energy from renewable sources to launching an education campaign for residential and commercial property owners on ways to increase energy efficiency.

Goal ES-2: Work toward net zero waste by reducing solid waste, hazardous waste and toxic substances, increasing recycling and organic waste diversion.

The City has made great strides in increasing opportunities for both residents and businesses to reduce the amount of waste collected by the City's contractor. The objectives and actions supporting this goal continue to build upon this momentum through expanding the City's recycling program, incentivizing the reduction of household waste production, educating the public on local regulations targeting illegal dumping and also reducing the use of pesticides, herbicides and toxic chemicals.

Goal ES-3: Protect and conserve the City's water quality and supply. Integrate sustainability goals in water and sewer department planning.

Water is essential to human life and the health of the environment; its quality and quantity are closely linked and the health of one is often an indicator of the health of the other. Water quality is commonly defined by its physical, chemical, biological and aesthetic characteristics. A healthy environment is one in which the water quality supports a rich and varied community of organisms and protects public health. Many of the actions associated with this goal focus on regulatory measures to ensure proper protection of all water resources in the City: groundwater, surface water, resources used for public consumption and those used for wildlife and plant habitat. In addition to adjusting or creating regulatory measures for water protection, there is also a focus on reducing water use through potential tiered water pricing structures and educational campaigns for both residents and business owners, considering addition of wells for watering our parks and fields, and increasing opportunities for reuse through gray water recycling.

Goal ES-4: Increase and support local food production to begin to meet needs of residents.

There are many reasons why increasing and supporting local food production is important. Eating locally-produced food can be beneficial to both the environment and to public health; the local economy will also benefit as the community directly supports its farmers. The main objectives for this goal is to encourage local food production through turning currently-vacant land, backyards, rooftops and schools into places to grow food. The actions to support this objective focus on examining local regulations that may prohibit

local farming and adjusting them to create more opportunities to incorporate local food production (for both commercial and personal consumption) in the form of both agricultural land preservation and urban gardens.

Goal ES-5: Achieve and maintain good air quality for public health.

The quality of the air you breathe each day affects your health. Energy used to power homes, fuel vehicles and operate nearly every facet of our daily lives is most often created from the burning of fossil fuels. This process releases pollutants into the air, that when ingested may cause heart, lung and other health problems. The objective to support this goal focuses on continually exceeding the minimum Federal and state standards for air quality. Actions for this objective include researching policies to determine the most effective way to ensure good air quality, communicating information regarding air quality directly to the community and increasing non-vehicular travel opportunities through establishing auto-free zones and supporting an expanded infrastructure of bike and pedestrian paths.

Goal ES-6: Minimize habitat destruction and maximize habitat value to preserve biological diversity, sequester carbon, protect natural systems and enhance quality of life.

Preserving and maximizing habitat areas in Newburyport is important for several reasons: preserving biological diversity, sequestering carbon (capturing and holding carbon dioxide to defer global warming and climate change), and protecting natural systems. The objectives and actions for this goal focus on studying the City's current habitat areas, developing inventories and implementing the appropriate steps from the Open Space and Recreation Plan and from the Natural Resources, Open Space and Recreation chapter of the Master Plan to ensure that development pressures are not causing habitat destruction.

Goal ES-7: Plan for environmental resilience in the face of climate change through implementation of the Newburyport Coastal Adaptation Plan.

Newburyport has realized that the risk of not preparing for climate change associated impacts is high. Utilizing grant funding, the City is in the process of creating the Newburyport Coastal Adaptation Plan, which when implemented, will guide the municipality in ways to adequately prepare and protect its infrastructure as well as private properties that are most at risk of storm surge-related dangers.