ENVIRONMENTAL ACTION PLAN

Prepared for: The Town of Princeton, Massachusetts

Prepared by: The Environmental Action Committee

January 2020

INTRODUCTION

In the fall of 2017, the Princeton Selectboard formed a new seven-member town committee, the Environmental Action Committee (EAC). This committee was formed in response to voter approval at the May 2017 Annual Town Meeting of Article 29, which called for an EAC that would create "an Environmental Action Plan that would advise and set goals and recommendations for the Town with regard to energy and environmental considerations." The appointed EAC members included the original authors of Article 29, Corey Burnham-Howard, Claire Golding, and Phoebe Moore, as well as Phil Gott, Brett Gibbs, Susan Hardenbrook, and Mike Knapp. The latter three members eventually retired from the committee, and Chris Samoiloff was appointed as a new member in late winter, 2018.

In the two years since our formation, the EAC has conducted a town survey, researched the environmental plans of towns and cities in New England and elsewhere, hosted and interviewed municipal and state employees, attended seminars, webinars, and environmental site visits, and spent many hours engaged in online research. The EAC has met twice a month at posted public meetings since September 2017, outlining, detailing, and creating an Environmental Action Plan (EAP). A draft of the EAP was completed in June 2019, accepted by the Selectboard, and then released for public comment in September 2019.

Although creation of the EAP has taken longer than expected, we believe that it is a thorough, professional, detailed roadmap of recommendations on environmental actions for the Town. We would like readers to understand that we see this document not as a list of tasks to be tackled immediately and completely, but as a map that will help us and others find our way forward over time. Like the town's Master Plan, which we studied, our plan is aspirational, but its forward movement depends to a large extent on the support of Princeton's government and the will of Princeton voters. While the EAP is not a mandate, we hope many of its recommendations will be achieved, and we hope to be instrumental in that achievement. Every recommended action must be accomplished through continuing inquiry, advocacy, and diligence.

Notably, the order of sections of the EAP aligns with the priorities expressed by respondents to the EAC's Fall 2017 survey (see Appendix 2): Energy issues were identified as respondents' highest priority, followed by Waste Management, Natural Resources Management, and Land Use.

Finally, we wish to make clear the essential foundation and intention of this plan: to enable the Town of Princeton and its residents to make informed choices and take meaningful action in support of environmental and human health.

Town Common in Winter, photo courtesy of CS

ACKNOWLEDGEMENTS

This report was prepared by Environmental Action Committee members Claire Golding, Corey Burnham-Howard, Phil Gott, Phoebe Moore, and Chris Samoiloff, with written contributions by prior members Brett Gibbs and Mike Knapp.

The EAC wishes to thank the Town of Princeton and the Princeton Selectboard for their support of the committee's formation; Stan Moss and Harry Pape for advice on preparing and presenting a warrant article; former Town Administrator Nina Nazarian and former Town Clerk Lynne Grettum for advice and responses to questions; Deb Cary, Cindy Dunn and Elizabeth Broughton of Mass Audubon's Wachusett Meadow for providing meeting space; Mike Howard for signage assistance. Many others, too numerous to mention, have also offered insight and inspiration during Plan writing—we thank them, too.

Photographs courtesy of pixabay.com and EAC members, unless otherwise noted. The Creative Commons (CC) license can be found here: creativecommons.org/licenses/by-nc-nd/2.0/. Bullet icons courtesy of FlatIcon. Compass icon by flaticon.com/authors/srip. Thumbs up icon by flaticon.com/authors/freepik. Hand with plant icon by flaticon.com/authors/darius-dan. Cover photo: Wachusett Meadow, courtesy of CS.

Crocker House Meeting Room, photo courtesy of CS

EXECUTIVE SUMMARY

Mission of the Environmental Action Committee

The 2017 Princeton Town Meeting directed the Selectboard (SB) to establish an Environmental Action Committee (EAC) to develop a plan that would advise the town as to how to move forward and achieve the following objectives:

- Maximize energy and resource use efficiency with Town operations, purchasing decisions, construction of capital assets, and community planning;
- Promote energy and resource use efficiency for Town residents, businesses, and institutions;
- Preserve and enhance the ecological systems and diversity of the town of Princeton;
- Share environmental information with the community and through active and meaningful community participation;
- Provide for sustainable development (development that uses no level of input resources and creates no levels of waste output that can be perpetually provided or accommodated);
- Achieve carbon dioxide emission reductions in compliance with the Global Warming Solutions Act; and ensure Town compliance with environmental regulations." [1]

Four Areas of Assessment, Two Key Findings

Over the past two years, the EAC has assessed the current status of four environmental areas within Princeton, identified key objectives in each area, researched possible solutions where needed and identified actions necessary for Princeton to achieve the objectives set forth in the 2017 town meeting.

The 4 focus areas are:

1. Energy and Transportation (use reduction, efficiency, renewable energy, climate change/ CO_2 reduction)
2. Waste Materials Management (waste reduction and recycling)
3. Natural Systems and Natural Resources Management (water conservation, wells, septic systems)
4. Land Use (preservation of vistas and rural qualities; recreational trails; agriculture (ecological maintenance) (all identified in Master Plan)

While assessing the current status of Princeton's environmental footprint within these four areas, the EAC came to two major conclusions. These conclusions are:

1. **Conversion from fossil-based to electrically powered systems is cost effective and achievable.** Both the Town operations and Princeton residents can reduce their operating costs and/or environmental footprint by taking full advantage of recent developments in electricity power generation and electric substitutes for fossil-fuel based heating and transportation systems. A reduction in the rates paid by Princeton for electric power would help incentivize the required investment in capital equipment needed to minimize operating costs and environmental impacts.

[1] Town Meeting Warrant, Town of Princeton, 2017.

2. **Princeton will benefit both financially and ecologically by becoming a designated Green Community.** A Green Community meets certain minimum requirements in the four areas studied. By becoming a Green Community, Princeton will qualify for grant funding of environmental, operational and infrastructure improvements. Many of the grant programs available do not require matching funding, while others demand commitments of labor hours invested in achieving established objectives. The required labor hours can be contributed by Town employees and/or citizen volunteers.

Conversion from fossil-based to electrically powered systems is cost-effective and achievable.

Princeton will benefit both financially and ecologically by becoming a designated Green Community.

Objectives and Recommendations

Objectives for each of the four areas and recommendations as to how they may be achieved are listed in the tables below, as are their links to Green Community designation and impact on electric power carbon emissions and rates. It will be noted that a number of recommendations cut across several objectives and focus areas. A comprehensive discussion of each recommendation, resources needed and specific benefits to the Town appear in the body of this report. Detailed discussions of related topics appear in the Additional Background section, beginning on page 86.

These findings and recommendations are the result of both individual as well as joint research by members of the Environmental Action Committee. The research included a needs analysis of survey answers provided by participating Town residents, studies of currently available programs in which the Town can participate, current status of Town operations provided by the Town Administrator and her colleagues, in-person as well as on-line participation in meetings of a variety of Town and Massachusetts-based organizations, interviews with selected State and Town employees and the in-depth knowledge and experience of EAC members themselves.

The body of this report contains a series of detailed recommended actions needed to achieve the objectives set out for each of the four focus areas, identification of resources needed to execute those recommendations, and the benefits expected to come from those actions.

Trees in Winter, photo courtesy of Jean Green

Recommendations Summary

Topic	Energy and Transportation Goals								
Category	Powering Buildings			Heating and Cooliing			Transportation		Access Support Resources
Recommended Actions	Incentivize switch from fossil fuel to electricity	Increase sustainable energy options	Decrease energy use	Replace fossil-fuel with alternative sources	Increase energy conservation	Decrease greenhouse gas emissions	Encourage electric vehicle use	Decrease vehicle emissions	Achieve "Green Community" designation
Through Town policy, work with PMLD to provide options for customers to reduce the cost of their power	✓			✓					
Assess alternative models for the provision of electric power to Princeton		✓				✓			
Work with PMLD to provide customers with options to purchase power from sustainable options	✓	✓		✓		✓			
Encourage customer-owned renewable energy options	✓	✓		✓		✓			
Adopt zoning ordinances designating "as-of-right" siting									✓
Adopt an expedited application and permitting process for as-of-right energy facilities									✓
Establish an energy baseline for town infrastructure			✓		✓				✓
Adopt an energy reduction plan to achieve a 20% reduction in Town energy demands			✓		✓	✓			✓
Provide energy conservation education and information to town residents and businesses			✓		✓		✓	✓	✓
Continue PMLD energy audits			✓		✓	✓		✓	✓
Encourage behavioral changes toward reduced energy use			✓		✓	✓	✓	✓	✓
Encourage electric heat pumps/replace fossil heating systems	✓		✓	✓	✓	✓			
Adopt advanced energy building codes ("Stretch" or "Net Zero")			✓		✓	✓			✓
Adopt a fuel-efficient vehicle purchasing policy for the Town	✓		✓		✓	✓	✓	✓	✓
Develop and maintain a vehicle inventory									✓
Designate car-pool parking in town			✓		✓	✓		✓	
Encourage electric vehicle purchase	✓	✓		✓		✓	✓	✓	
Install EV charging stations in town	✓	✓		✓		✓	✓	✓	

Recommendations Summary

Topic	Land Use Goals					Waste Materials Mgmt Goals		
Category	Rural Character, Vistas, Open Space, Recreation		Agriculture, Pest, Landscape Management			Landfill Waste	Recycling	Reduce Impact of Waste Hauling
Recommendations	Maintain Rural Character of Princeton	Maintain or improve public & environmental health	Support sustainable local agriculture	Reduce use oif toxic chemicals	encoourge control of invasive pests and disease in sustainab le ways	Reduce landfill-bound waste generated by Town buildings, residences and busiinesses	Increase percentage of waste recycled	Reduce waste truck ton-miles driven
Consider adopting Community Preservation Act	✓							
Consider adopting Scenic Roads Bylaw	✓							
Adopt a Wildlife Corridor Management Policy and/or overlay district	✓	✓						
Adopt an outdoor lighting ordinance	✓	✓						
Adopt a noise ordinance	✓	✓						
Adopt and implement a landscaping manual and integrated pest and weed management for Town-owned properties			✓	✓	✓			
Educate the Town and residents wrt invasive species and chemical pest control		✓	✓	✓	✓			
Consider designating some Town-owned land for public gardens	✓	✓						
Determine amount of residential and municipal waste generated and recycled and set future goals for reduction						✓	✓	✓
Explore waste hauling options such as single hauler, pay-as-you-throw						✓	✓	✓
Install and maintain recycling and trash containers in all Town-managed buildings and recreation areas	✓	✓					✓	
Educate businesses and residences about waste reduction and recycling						✓	✓	✓
Explore the establishment of shared community resources such as tool libraries, repair cafes, etc.						✓	✓	✓
Educate residents about Wachusett Recycling Center						✓	✓	✓
Explore opportunities for diversion and use of unused food from schools and restaurants						✓	✓	✓
Determine waste wood use opportunities						✓	✓	

Recommendations Summary

Topic	Natural Resource Management Goals					
Category	Water Quality	Water Use	Air Quality			Cliimate Change Resilience
Recommendations	Protect Quality of town aquifers, watersheds and wells	Reduce Town, resident and business use of water	Reduce exposure to Radon and unhealthy levels of indoor air pollutants	Reduce exposure to outdoor air pollutants	Reduce greenhouse gas emissions	Increase resilience to extreme weather, natural and climate-related hazards
Educate Town, residents and businesses about contaminant testing	✓					
Create and adopt a "green" Town winter road management policy	✓					
Implement "green" stormwater retrofits on Town buildings	✓					
Facilitate the sale and use of rain barrels for residents and Town buildings		✓				
Test Town buildings for radon and remediate as necessary			✓			
Educate resdents and businesses about Radon health effects, testing and remediation			✓			
Test indoor air in Town buildings for indoor ait pollutants and remediate as necessary			✓			
Educate residents and businesses about indoor air pollutant health effects, testing and remediation			✓			
Draft and implement a Town vehicle idling policy and/or bylaw				✓	✓	
Educate residents and businesses about outdoor air pollutant health effects and their reduction				✓		
Apply for Municipal Vulnerability Planning (MVP) and Action Grants						✓

ENERGY & TRANSPORTATION

OVERALL GOALS

BECOMING A DESIGNATED GREEN COMMUNITY

Obtain financial and technical support for energy efficiency and renewable energy initiatives

Decrease energy use / increase energy conservation

Increase fuel efficiency of Town vehicles

POWERING TOWN BUILDINGS, HOMES, AND BUSINESSES

Incentivize a switch to electric power for heating, cooling, and transportation through reductions in the cost of electric power

Decrease greenhouse gas emissions

Increase access to sustainable energy options

Decrease energy use

HEATING AND COOLING

Replace fossil fuel- and wood-based heat energy sources with alternative sources (e.g., electricity and/or geothermal)

Increase energy conservation

Decrease greenhouse gas emissions

TRANSPORTATION

Decrease vehicle (greenhouse gas) emissions

Encourage increased use of electric vehicles

BECOMING A DESIGNATED GREEN COMMUNITY

PRESENT SITUATION

Massachusetts' Green Community Designation and Grant Program provides financial and technical support for energy efficiency and renewable energy initiatives to municipalities that meet five specific criteria (detailed below).[2] The program is implemented by the Division of Green Communities within the Massachusetts Department of Energy Resources (DOER).

Generally, designation as a Green Community provides a municipality with access to grant funding that can support all or a portion of the cost of clean energy projects and energy use reduction projects. Among other things, grant funds can be utilized for: energy efficiency measures and projects; procuring energy management services; adopting energy efficiency policies; and siting activities related to and construction of renewable energy generating facilities on municipally-owned property.

As of September 2019, 240 of the total 351 Massachusetts communities have achieved Green Community designation, accessing grants of over $118 million for energy projects.[3] Neighbors of the Town of Princeton that have achieved Green Community designation include Rutland, West Boylston, Westminster, Barre, Ashburnham, Fitchburg, Gardner, and Leominster. Currently, the Town of Princeton has neither applied for nor achieved Green Community designation.

Environmental Action Committee (EAC) Fall 2017 Survey

Princeton residents who responded to the EAC's Fall 2017 Survey expressed interest and enthusiasm around energy issues related to green energy. **Access to green energy** was rated as a top environmental priority for over 50% of respondents. Clear majorities favored Town application to money-saving clean-energy grant programs (82%) and expressed a desire for improved access to and use of renewable energy options both for residential properties and for Town/municipal buildings (70%). There was also a focus on **efficiency and reduction in greenhouse gas emissions** with 67% of respondents in favor of adopting the Commonwealth of Massachusetts' goal of reducing greenhouse gas emissions and 71% noting the importance of **fuel-efficiency** being considered in the process of purchasing Town vehicles. In the areas for additional comment on the survey, 63 respondents (31%) specifically noted their interest in green energy, with many expressing concern at the difficulty in gaining access to greener options.

See EAC Fall 2017 Survey at Appendix 2.

[2] Massachusetts General Laws Chapter 25A, Section 10. See also mass.gov/green-communities-designation-grant-program.

[3] Baker-Polito Administration Awards $14.9 Million in Green Communities Grants (September 17, 2019) at mass.gov/news/baker-polito-administration-awards-149-million-in-green-communities-grants.

The Town of Princeton meets the prerequisites necessary for it to begin the Green Community designation process under the Green Community Designation and Grant Program.[4] In order to achieve Green Community designation, the Town must meet specified criteria. Those criteria address:

- zoning for as-of-right siting of, and expedited permitting of, renewable or alternative energy facilities;
- municipal energy use reduction;
- municipal vehicle fuel efficiency;
- adoption of the Massachusetts' Board of Building Regulations Standards Stretch Code (Stretch Code).

The Town's present situation related to those criteria is as follows:

- The Town's zoning bylaws allow for as-of-right manufacturing or industrial facilities in the Business-Industrial District. They also allow for expedited site plan review;[5]
- Town building managers reduce use of energy by shutting off lights and turning down heat.[6] It is unknown when or if Town buildings have had energy audits, but no such energy audits have been performed in at least the past five years.[7] For Fiscal Year 2019, the Town expended $49,010 on electricity, $33,300 on heating oil, and $6,400 on propane;[8]
- Town purchase of vehicles has focused on cost more than fuel efficiency.[9] For Fiscal Year 2019, the Town expended $66,825 on vehicle fuels;[10]
- The Town has not adopted the Stretch Code.

Wind Power, photo courtesy of Pixabay

[4] See "Additional Background, Becoming a Green Community" at page 86 for more information regarding municipal light plant eligibility for Green Community designation at page 86.

[5] See Town of Princeton, Massachusetts Zoning By-laws, Section V and Section XII, June 2019.

[6] Email correspondence from Nina Nazarian to EAC, December 26, 2018.

[7] Ibid., December 13, 2018.

[8] Ibid., January 8, 2019.

[9] Ibid., December 26, 2018.

[10] Ibid., January 8, 2019.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS

- Obtain financial and technical support for energy efficiency and renewable energy initiatives
- Decrease energy use / increase energy conservation
- Increase fuel efficiency of Town vehicles

To become a designated Green Community, the Town of Princeton must apply to DOER's Green Communities Division for designation, demonstrating through required documentation that the Town meets five specific designation criteria. To achieve these five criteria, the **Town must take the seven "actions" described below.** Once these actions are fulfilled, the Town is eligible for Massachusetts Green Communities Designation—a designation that would give the Town access to financial and technical support related to energy efficiency and/or renewable energy initiatives.

Benefits of Actions:

Generally, **designation as a Green Community would provide the Town with access to grant funding**[11] that can support all or a portion of the cost of green energy projects and energy use reduction projects. The energy efficiency upgrades achieved through the use of Green Community grants provide the added benefits of:

- long-term cost savings in annual energy costs (thanks to reduced energy use);
- strengthening of the local economy because of Town support for renewable or alternative energy generating facilities, research and development facilities, or manufacturing facilities (including tax revenue from such facilities);
- reduction of municipal greenhouse gas emissions;[12]
- the promotion of energy-efficient building construction that drives the market for better built and lower-cost homes;
- Town leadership in the fostering of renewable energy and clean energy technologies;
- improved coordination between municipal staff and departments with regard to facility operations and maintenance;
- increased communication and engagement with the community about energy-related issues and actions.

[11] See, e.g., mass.gov/doc/map-of-240-gcs-and-grant-summaries/download.

[12] See Energy, "Additional Background, Powering Town Buildings, Homes, and Businesses, Greenhouse Gases and Climate Change" at page 86 for more information on greenhouse gas emissions.

Action #1: Ensure existing (or adopt as needed) zoning bylaw designating locations for as-of-right siting of renewable or alternative energy generating facilities, research and development facilities, or manufacturing facilities.[13]

In order to achieve Green Community designation, the Town must adopt such a bylaw. As-of-right siting allows for development without need for a special permit, variance, amendment, or other discretionary approval.

Benefits of Action:
(See details above at page 14.)

Steps & Strategies:

1. Review existing bylaw to ensure criteria is met.
2. If criteria is not met, adopt zoning bylaw and town voters must vote to approve bylaw.

Resources Needed:
Volunteer time and effort, including by members of the Town Planning Board and the Town Environmental Action Committee.

Note: Funded through the Commonwealth of Massachusetts' District Local Technical Assistance (DLTA) Program, the Central Massachusetts Regional Planning Commission (CMRPC) provides technical assistance to member communities, including the Town of Princeton. The CMRPC can assist the Town in receiving Green Communities designation.[14] DOER's Green Community Regional Coordinators can also assist the Town in application and achievement of Green Community Designation.[15]

Field, photo courtesy of Pixabay

[13] See guidance documents at the Green Communities Division webpage, including the following guidance documents: "Criterion 1 Guidance for All 3 Methods;" "R & D or Manufacturing AOR Guidance 2013;" "Solar Model Bylaw;" "Wind Model Bylaw Mar 2012;" Adopted As-of-Right Siting Through RE Generation" at mass.gov/guides/becoming-a-designated-green-community#-criterion-1-.

[14] For more information, see cmrpc.org/energy-initiative.

[15] As of January 2020, the DOER Regional Coordinator for the Town of Princeton was Kelly Brown at (508) 767 2703 or (617) 780-8144 or Kelly.Brown@state.ma.us.

Action #2: Ensure (or adopt if needed) an expedited application and permitting process under which as-of-right energy facilities may be sited within the Town.[16]

In order to achieve Green Community designation, the Town must also have a bylaw that provides that all local permitting decisions applicable to siting and construction of sustainable energy facilities within the relevant, designated zoning district(s) can be issued within one year of submission of a completed application.

Benefits of Action:
(See details above at page 14.)

Steps & Strategies:
1. Review bylaws.
2. If needed, draft such a bylaw, and town voters must vote to approve bylaw.

Resources Needed:
Volunteer time and effort, including by members of the Town Planning Board and the Town Environmental Action Committee.

Note: In regard to this action, the Town might also obtain free assistance from CMRPC and DOER.

Photo courtesy of Pixabay

[16] For more information on this action/criteria, see the Green Communities Division's "Guidance Criterion 2: Guidance for Expedited Permitting Processes" at mass.gov/doc/guidance-for-expedited-permitting-options/download.

Action #3: Establish an energy use baseline inventory for the Town.[17]

In order to achieve Green Community designation, the Town will need to establish an energy use baseline inventory for Town buildings and facilities, street and traffic lighting, and vehicles. The Town will then need to develop a plan to reduce Town energy usage by 20% from this established baseline within an approximate five years' time (see Action # 4, below).

The inventory will need to be conducted through a tool such as DOER's MassEnergyInsight (MEI), which is a free, Web-based tool. MEI would allow for Princeton Municipal Light Department (PMLD) to load monthly electric usage and cost data. The use and cost of other fuels, such as oil and propane that may be used for heating, and gasoline and diesel used to power vehicles, would have to be loaded into MEI manually by Town staff or volunteers, or a vendor.[18]

Benefits of Action:

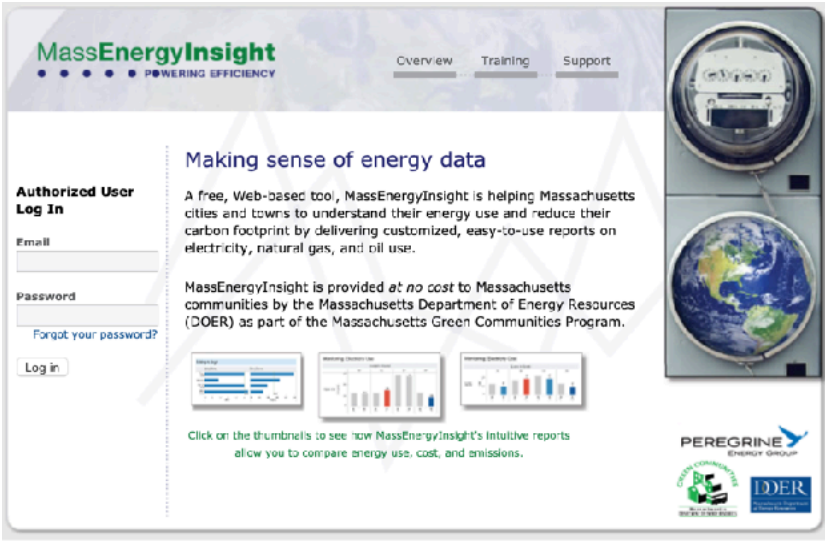
(See details above at page 14.)

Steps & Strategies:

Conduct an energy use baseline inventory to include all municipal buildings, municipal vehicles, street and traffic lighting, and open spaces owned by the Town.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee. Time and effort by municipal employees.



Source: https://www.massenergyinsight.net/home

[17] For more information on this action/criteria, see the Green Communities Division's "Guidance Criterion 3: Energy Reduction Plan (ERP) Guidance and Outline" at mass.gov/doc/guidance-for-criterion-three/download.

[18] American Council for an Energy Efficient Economy, "Massachusetts Green Communities: A Model Program for Energy Efficiency" (2014). For more information, see mass.gov/service-details/massenergyinsight.

Action # 4: Adopt an Energy Reduction Plan (ERP) demonstrating a reduction of 20 percent energy use after five years of implementation.[19]

To achieve Green Community designation, the Town is required to create an ERP to document both the baseline energy consumption and the comprehensive program to reduce total energy use by 20% within the five-year period following the Baseline Year (as established in Action # 3, above). This will require collection of data (see Action # 3), analysis of data, goal and strategy setting, and writing the ERP.

Benefits of Action:

(See details above at page 14.)

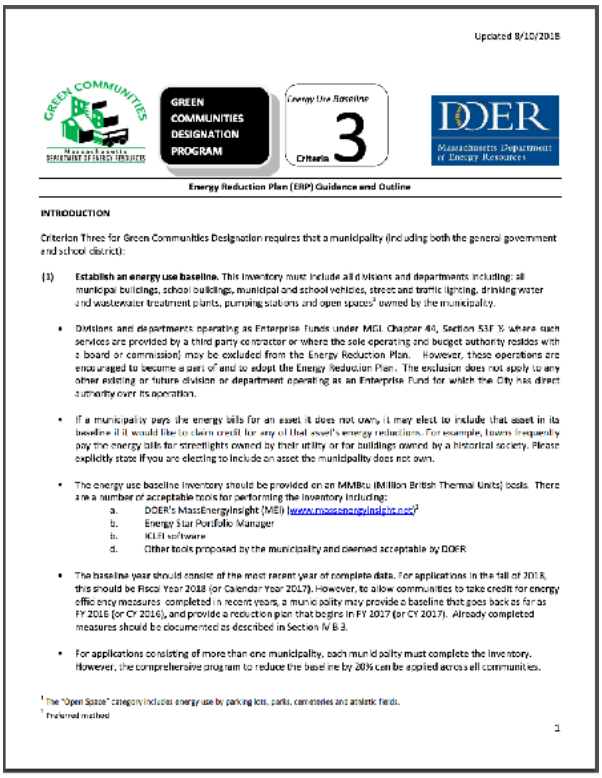
Steps & Strategies:

1. Create an ERP.
2. Implement the ERP.
3. Assess progress toward the 20% energy reduction, and report annually to DOER.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee. Time and effort by municipal employees.

Note: DOER's website provides an ERP "Guidance and Outline" as well as samples of ERPs.[20] CMRPC may be instrumental in creating an ERP.



Updated 8/10/2018

GREEN COMMUNITIES DESIGNATION PROGRAM

Energy Use Baseline 3 Criteria

DOER Massachusetts Department of Energy Resources

Energy Reduction Plan (ERP) Guidance and Outline

INTRODUCTION

Criterion Three for Green Communities Designation requires that a municipality (including both the general government and school district):

(1) **Establish an energy use baseline.** This inventory must include all divisions and departments including: all municipal buildings, school buildings, municipal and school vehicles, street and traffic lighting, drinking water and wastewater treatment plants, pumping stations and open spaces[1] owned by the municipality.

- Divisions and departments operating as Enterprise Funds under MGL Chapter 44, Section 53F ½ where such services are provided by a third party contractor or where the sole operating and budget authority resides with a board or commission) may be excluded from the Energy Reduction Plan. However, these operations are encouraged to become a part of and to adopt the Energy Reduction Plan. The exclusion does not apply to any other existing or future division or department operating as an Enterprise Fund for which the City has direct authority over its operation.
- If a municipality pays the energy bills for an asset it does not own, it may elect to include that asset in its baseline if it would like to claim credit for any of that asset's energy reductions. For example, towns frequently pay the energy bills for streetlights owned by their utility or for buildings owned by a historical society. Please explicitly state if you are electing to include an asset the municipality does not own.
- The energy use baseline inventory should be provided on an MMBtu (Million British Thermal Units) basis. There are a number of acceptable tools for performing the inventory including:
  a. DOER's MassEnergyInsight (MEI) [www.massenergyinsight.net](2)
  b. Energy Star Portfolio Manager
  c. ICLEI software
  d. Other tools proposed by the municipality and deemed acceptable by DOER
- The baseline year should consist of the most recent year of complete data. For applications in the fall of 2018, this should be Fiscal Year 2018 (or Calendar Year 2017). However, to allow communities to take credit for energy efficiency measures completed in recent years, a municipality may provide a baseline that goes back as far as FY 2016 (or CY 2016), and provide a reduction plan that begins in FY 2017 (or CY 2017). Already completed measures should be documented as described in Section IV B 3.
- For applications consisting of more than one municipality, each municipality must complete the inventory. However, the comprehensive program to reduce the baseline by 20% can be applied across all communities.

[1] The "Open Space" category includes energy use by parking lots, parks, cemeteries and athletic fields.
[2] Preferred method

1

Source: mass.gov/doc/guidance-for-criterion-three/download

[19] For more information on this action/criteria, see the Green Communities Division's "Guidance Criterion 3: Energy Reduction Plan (ERP) Guidance and Outline" at mass.gov/doc/guidance-for-criterion-three/download.

[20] See the Green Communities Division's "Guidance Criterion 3: Energy Reduction Plan (ERP) Guidance and Outline" at mass.gov/doc/guidance-for-criterion-three/download. See also additional resources: "Samples of Energy Reduction Plans;" "Guidance Tables for Criterion Three;" "Guidance for Building Stock Change;" and "Audit Recommendations for Municipalities" at mass.gov/guides/becoming-a-designated-green-community.

Action #5: Adopt Massachusetts' Board of Building Regulations and Standards (BBRS) Stretch Code (780 CMR 115.AA).[21]

A criteria for achieving Green Community designation is that the Town adopt the BBRS Stretch Code,[22] requiring new residential construction and large commercial buildings (over 100,000 square feet) and buildings with a high-energy usage intensity (over 40,000 square feet) (i.e., supermarkets, laboratories, and conditioned warehouses) follow the Performance Path of the standard Building Code and achieve a Home Energy Rating System (HERS) of 55 and/or a HERS Energy Rating Index (ERI) compliance alternative.[23] The Stretch Code is not applicable to additions, alterations, renovations, or repairs of existing residential and commercial buildings.[24] Under the Performance Path required under the Stretch Code, builders need not install specific energy efficiency measures, but rather have flexibility to choose energy efficiency measures for installation that will meet the ERI target of 55 and/or a HERS ERI compliance alternative for homes, Energy Star certified homes, Residential Energy Services Network (RESNET) certified homes, and Passive House Method certified homes.[25]

DOER predicts that Stretch Code compliance will add an additional cost of approximately $700 to $1300 to new home construction, but will typically result in significant annual energy bill savings.[26] As of November 2018, the Stretch Code has been adopted by 250 Massachusetts municipalities.[27]

Benefits of Action:

(See details above at page 14.)

Steps & Strategies:

1. Draft Warrant Article for Annual Town Meeting or Special Town Meeting seeking to adopt BBRS Stretch Code.
2. Town voters will need to vote to pass the Warrant Article and adopt the Stretch Code.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and/or the Selectboard.

Note: A sample article, sample motion, and sample bylaw/ordinance can be found on DOER's webpage for "Criterion 5 Guidance."[28] DOER provides free Stretch Code training for municipal building officials.

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[21] For more information see Green Communities Division's "Guidance Criterion 5: Stretch Code Adoption Process" at mass.gov/files/documents/2018/08/10/guidance-5-criterion.pdf.

[22] Note that in accordance with the Green Communities Act of 2008, Massachusetts must update its building code every three years to be consistent with the most recent version of the International Energy Conservation Code (IECC). The effective date of the most recent energy provisions in 780 CMR is August 12, 2016. (See Green Communities Division, "Building Energy Codes, Summary of State Building Energy Codes including the Stretch Code" at mass.gov/info-details/building-energy-code.)

[23] See 780 CMR 115.AA; see also at mass.gov/info-details/building-energy-code.

[24] Ibid.

[25] See Mass Save, "Massachusetts Energy Code Technical Support" at masssave.com/learn/partners/tools-and-resources. The HERS rating is a measure based on a home's total expected energy use and 25 overall efficiency. It is calculated by a certified HERS rater using accredited software, which uses information on the design of the energy systems in a home to calculate the annual energy needs of the home and give it a rating score. (See Green Communities Division "2017 Stretch Energy Code" (October 2017) at mass.gov/files/documents/2017/11/21/stretch-energy-code-overview.pdf.)

[26] Green Communities Division "2017 Stretch Energy Code" (October 2017) at mass.gov/files/documents/2017/11/21/stretch-energy-code-overview.pdf.

[27] Green Communities Division, "Building Energy Codes: Summary of State Building Energy Codes including the Stretch Code" at mass.gov/info-details/building-energy-code.

[28] See Green Communities Division's "Guidance Criterion 5: Stretch Code Adoption Process" at mass.gov/files/documents/2018/08/10/guidance-5-criterion.pdf.

Action #6: Adopt a Fuel-Efficient Vehicle Policy requiring all Town departments and divisions to purchase fuel-efficient vehicles (with exemptions) whenever such vehicles are commercially available and practicable.[29]

To achieve Green Community designation, the Town will need to adopt such a written Fuel-Efficient Vehicle Policy. Such a policy will essentially state the Town's policy of: (i) purchasing only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable; (ii) maintaining an annual vehicle inventory for all vehicles; and (iii) providing a plan for replacing any non-exempt vehicles with vehicles that meet, at a minimum, DOER's most recent fuel efficiency ratings. Such a policy would not require the Town to proactively replace existing vehicles with fuel efficient vehicles, but would require the Town, when replacing existing vehicles or purchasing additional vehicles, to purchase only fuel efficient vehicles (as defined below).[30]

DOER defines "fuel-efficient vehicles" based on minimum miles per gallon (MPG). For example, "fuel-efficient" four-wheel drive cars must achieve at least 24 MPG, and four-wheel drive pick-up trucks must achieve at least 16 MPG.[31]

Notably, many types of municipal vehicles are exempt from the municipal Fuel-Efficient Vehicle Policy, including: motorcycles; heavy-duty vehicles defined as having a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds (e.g., fire engines, ambulances, and some public works vehicles); police cruisers; passenger vans; and cargo vans. However, municipalities must commit to purchasing fuel-efficient cruisers, passenger vans, and cargo vans when they become commercially available. (Currently, none are commercially available.) Police and fire department *administrative* vehicles must meet fuel efficiency requirements.[32]

Benefits of Action:
(See details above at page 14.)

Steps & Strategies:

1. Write and adopt a Fuel-Efficient Vehicle Policy.
2. Draft and send letter to DOER stating that Town Selectboard has adopted the Fuel-Efficient Vehicle Policy.
3. Conduct annual review of Fuel-Efficient Vehicle Policy to ensure the policy reflects DOER's most recently published MPG minimums.

Resources Needed:
Volunteer time and effort, including by the Environmental Action Committee and/or the Selectboard.

Note: DOER, on its website, provides a "model" fuel-efficient vehicle policy. [33] It also provides sample "Fuel-Efficient Vehicle Policy" adoption letters.[34]

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[29] For more information, see Green Communities Division's "Criterion 4 Guidance" at mass.gov/guides/becoming-a-designated-green-community#-criterion-4-.

[30] Ibid.

[31] Ibid.

[32] Ibid.

[33] A model policy can be found at Appendix A of Green Communities Division's "Criterion 4 Guidance" at mass.gov/guides/becoming-a-designated-green-community#-criterion-4-.

[34] See Appendices B and C of Green Communities Division's "Criterion 4 Guidance" at mass.gov/guides/becoming-a-designated-green-community#-criterion-4-.

Action #7: Develop and maintain a vehicle inventory for all four- or more-wheeled Town vehicles, and provide a plan for replacing non-exempt vehicles with vehicles that meet specified fuel efficiency ratings.[35]

For Green Community designation, as specified in the Town's Fuel-Efficient Vehicle Policy (see Action #6 above), the Town would need to develop and maintain a vehicle inventory for all Town-owned four-wheeled vehicles, both exempt and non-exempt. A plan for replacing non-exempt vehicles with vehicles that meet specified fuel efficiency ratings must also be developed and maintained.[36]

Benefits of Action:
(See details above at page 14.)

Steps & Strategies:

1. Develop a vehicle inventory of all Town-owned four-wheeled vehicles, both exempt and non-exempt.
2. Draft a plan for replacing non-exempt vehicles with vehicles that meet specified fuel efficiency ratings.
3. Implement vehicle replacement plan by replacing non-exempt vehicles with vehicles that meet specified fuel efficiency ratings.

Resources Needed:
Volunteer time and effort, including by the Environmental Action Committee and/or the Selectboard. Time and effort of municipal employees.

Note: Under the Commonwealth's $7.5 million Volkswagen Settlement Open Solicitation Grant Program, applicants may apply for up to $500,000 in competitive funding to replace either an older medium-duty or heavy-duty diesel vehicle or a piece of non-road equipment with an equivalent new diesel, alternate fuel or electric version, or replace the engine of a diesel vehicle or non-road piece of equipment.[37] Funding is also available for municipalities to purchase electric vehicles and install electric vehicle charging stations through the Mass EVIP Fleet Incentives program[38] as well as rebates and incentives available through PMLD.[39]

[35] For more information, see Green Communities Division's "Criterion 4 Guidance" at mass.gov/guides/becoming-a-designated-green-community#-criterion-4-.

[36] Ibid., fuel efficiency information.

[37] For more information see Massachusetts Department of Environmental Protection's guide "Volkswagen Diesel Settlements & Environmental Mitigation" at mass.gov/guides/volkswagen-diesel-settlements-environmental-mitigation#settlement-funded-grant-incentive-programs.

[38] See Massachusetts Department of Environmental Protection's guidance "Apply for MassEVIP Fleets Incentives" at mass.gov/how-to/apply-for-massevip-fleets-incentives.

[39] pmld.com/incentives-rebates.html

POWERING TOWN BUILDINGS, HOMES, AND BUSINESSES

PRESENT SITUATION

Currently, **the Princeton Municipal Light Department (PMLD) distributes electric power** to all Town of Princeton residents, businesses, and Town buildings.[40] PMLD is a non-profit municipal power company which operates separately and autonomously from the Town's Selectboard, Town Administrator, and other Town Boards and Committees, but is guided in its operation and investments for the benefit of the Town by a Town-elected 3-member Board of Light Commissioners.

The current total electric rate paid by Princeton residents is 24.75 cents per kilowatt hour (kWh), among the highest in the Commonwealth.[41]

Currently, **PMLD purchases electric power from Nextera Energy, Inc. (Nextera)**. Power purchased from Nextera is produced by predominantly conventional sources, with natural gas and nuclear generating 65% of the town's power in 2018.[42] The average carbon footprint of PMLD's power in 2018 was 312 grams of carbon dioxide (CO_2) equivalent per kWh.[43]

Although not applicable to small municipal light departments like PMLD, state law (Mass. Gen. L. c. 298) and state regulations (310 CMR 7.74) require large electric generating facilities in the Commonwealth to decarbonize electricity

EAC Fall 2017 Survey

On the EAC's Fall 2017 Survey, **the lack of access to net metering was mentioned by numerous respondents**, with residents expressing hope for a fair policy which would allow some terms of sale of unused solar energy back to the grid/PMLD (this unused power is simply being absorbed by PMLD at this time with no compensation).

Some survey respondents believed that they were not eligible to install solar panels at all; this is likely due to the non-responsiveness of solar installation companies to Princeton inquiries, which could be a direct result of the net metering policy or PMLD prohibition of third-party-owned solar systems.

One respondent wrote, "**A focus on a sensible net metering proposal for PMLD** which allows for at least some value being given to solar owners (residential) in the town, maybe [with a] separate user fee or connection fee to cover the maintenance costs for those who choose to install solar, would allow PMLD to manage their material and labor costs even if large numbers of residents chose to install PV [photovoltaic] panels."

See EAC Fall 2017 Survey at Appendix 2.

[40] Note, the exception of the Mount Wachusett Ski Area, which is served by National Grid. (See Appendix 3, Supporting Documents: January 18, 2018 letter from William Isaksen of National Grid to Nina Nazarian, Town of Princeton, confirming that the Mount Wachusett Ski Area at 499 Mountain Road in Princeton is a National Grid customer.)

[41] Per private survey conducted May 2018 by Kevin Lindemer, Groton Electric Light Commissioner.

[42] PMLD Power Portfolio, 2018.

[43] See "Additional Background, Powering Town Buildings, Homes and Businesses" at page 86 for a table detailing PMLD's electricity sources and carbon footprint. There are additional greenhouse gases emitted from electric power sources, which contribute to climate change.

generation, obtain a percentage of the electricity sold to customers from qualifying renewable energy facilities, and use clean energy to generate a specified portion of electricity sales.[44] **PMLD could similarly further decrease its carbon footprint and greenhouse gas emissions** in the near-term with clean energy procurements and renewable energy certificates (RECs).

PMLD operates two wind turbines with a total capacity of 1.5 megawatts (mW), and sells the wind-generated power to the towns of Sterling, West Boylston, and as needed at market prices to other municipal power companies.[45] While most of the energy from these wind turbines goes directly to Princeton buildings, environmental credit for this renewable energy follows the complicated financial accounting methods used by the power industry. As this is being written, PMLD is working with the Massachusetts Municipal Wholesale Electric Company (MMWEC) to sell the electricity from the windmills directly to PMLD customers.[46] PMLD also sells the RECs associated with the power generated by the wind turbines to help pay down the debt generated by the current wind farm installation and early repairs. (Because PMLD sells these RECs instead of retiring them, PMLD does not get full credit for being a generator of renewable energy.) **PMLD is exploring the potential for its customers to opt for the purchase of sustainable sources of electricity**, including the purchase of RECS.[47]

As of fall 2018, **twenty-six residential homes in town produced solar power**,[48] and it has been estimated that a total of 15% of town electricity users (about 225 in total) have solar-suitable sites. [49]

Most cities and towns in Massachusetts offer a net metering policy for solar energy production, in which excess energy generated by residential solar panels during daytime hours is "sold" back to the grid,[50] purchased by the energy company at a rate that is generally somewhat lower than the retail rate. These policies can serve to offset non-solar-generated energy purchased by the same household during non-daylight hours. However, at this time, PMLD is one of only a very few municipalities in the state that offer zero compensation to customers for net excess power generation. **Under current PMLD policy, PMLD net metering is not permitted.**[51]

In addition, PMLD is offering a **HELPS program that offers rebates** for installation of Energy Star appliances, high efficiency heat pumps and EV chargers. In cooperation with MMWEC, WiFi curtailable heat pumps, EV charging stations, thermostats and hot water heaters and battery system qualify for rebates as well. Curtailable devices can be shut off by MMWEC during times of peak power consumption. As such, they help reduce the region's peak power demand while reducing homeowner electricity demand. They have the potential to cut the cost of Princeton's electric power overall by reducing grid capacity charges.[52]

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[44] See Mass. Gen. L. c. 298 and 310 CMR 7.74.

[45] pmld.com.

[46] Phil Gott attendance at PMLD meetings.

[47] Personal Conversation, Brian Allen, General Manager of PMLD and Claire Golding and Phil Gott of the Princeton EAC, August 31, 2018.

[48] Jim Whitman, Princeton Light Commissioner, September 12, 2018.

[49] Meeting presentation, Brian Allen, General Manager of PMLD at EAC meeting on December 6, 2017.

[50] See, e.g., Net Metering in Massachusetts at news.energysage.com/net-metering-massachusetts-top-solar-incentive/.

[51] PMLD, Requirements for Interconnection of Non-Utility Generators And Distributed Generation (Revised November 2018) at pmld.com/docs/policies-terms/pmld-interconnect-generator-policy-for-residential-solar-installations.pdf.

[52] pmld.com; Phil Gott attendance at PMLD meetings.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS Incentivize a switch to electric power for heating, cooling, and transportation through reductions in the cost of electric power

Decrease greenhouse gas emissions

Increase access to sustainable energy options

Decrease energy use

Photovoltaic, photo courtesy of Pixabay

Action #1: Incentivize a switch to electric power for heating, cooling, and transportation through reductions in the cost of electric power.

A Town policy that encourages PMLD and collaborates with PMLD to provide electric customers with options to reduce their cost of electricity could incentivize town residents to switch from conventional energy sources to sustainable energy sources.

Princeton Windmill, photo by CS

Benefits of Action:

The lower the cost of electricity, the more cost-effective (lower operating costs, reduced payback period) will be a switch from conventional to sustainable heating and cooling and transportation energy use. A switch to sustainable energy use would bring the benefits of greenhouse gas emission reductions,[53] and improved environmental and human health.

Steps & Strategies:

1. Gather information on options.
2. Evaluate information and determine viable options.
3. Develop related Town policy.
4. Pursuant to developed Town policy, encourage and collaborate with PMLD to implement viable cost-reducing options for electric power, which may include, for example, the following possible initiatives:
   - Demand-side management through PMLD-controlled circuits in residences;
   - Demand-side management through voluntary curtailment of power demand when needed;
   - Time-of-day rates, giving discounts to off-peak users;
   - Exploration of installation of battery or other proven energy storage systems to enable peak load shaving and the capture and storage of excess energy produced by PMLD- and customer-owned renewable energy sources.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and/or the Board of Light Commissioners. Cooperation and collaboration with PMLD.

[53] See "Additional Background, Powering Town Buildings, Homes, and Businesses: Greenhouse Gases and Climate Change" at page 86 for more information on greenhouse gas emissions.

Action #2: Assess alternative models for the provision of electric power, and increase access to sustainable energy options, for the Town, town residents, and town businesses.

As more homeowners and businesses install solar or wind-powered electricity generation systems, the national energy supply is moving from traditional twentieth-century centralized power to customer-owned generation, using the electric grid for backup electricity supply. A majority of respondents to the EAC's Fall 2017 Survey indicated that access to green energy was a top environmental priority, with 82% agreeing or strongly agreeing that they would like improved access to renewable energy options.[54] Allowing the Town, town residents, and town businesses to avail themselves of present and future options for electric power, including the purchase of electricity from sustainable sources, will allow for more cost-effective installations of home- or business-based electric power generation and storage systems, and will provide the benefits outlined below. In addition, PMLD could decrease its carbon footprint and greenhouse gas emissions in the near term with sustainable energy procurements.[55]

Benefits of Action: Decreased electricity costs for those customers; increased sustainable energy portfolio for Town/PMLD; decreased greenhouse gas and other emissions; improved environmental and human health; increased resiliency to power supply disruptions.

Steps & Strategies:

1. Gather information on currently available and foreseeable future electric power supply and local generation and storage options, including options for sustainable electricity purchase.
2. Work with PMLD to assess currently available and foreseeable electric power supply and local generation and storage options and their impact on municipal light plants' (PMLD's in particular) ability to provide or accommodate these new approaches.
3. Develop recommendations for PMLD and/or the Town of Princeton to best take advantage of the evolving approaches to future power supply, generation and storage.
4. Explore options for sustainable sources of electricity to replace or modify the current contract with Nextera. These options may include:
   - Provision of power from sustainable energy sources to the entire town, including purchase or retirement of RECs from PMLD wind turbines; and/or
   - Enabling individual customers to purchase electricity from Independent Power Producers (IPPs) using only sustainable energy sources; and/or
   - Generation and storage of sustainable electric power within the town grid to enable residents to use locally-produced power directly; and/or
   - Incentivizing solar installations through a reasonable net metering policy.[56]

Resources Needed: Volunteer time and effort, including by the Environmental Action Committee and/or the Board of Light Commissioners. Cooperation and collaboration with PMLD.

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[54] EAC Fall 2017 Survey, at Appendix 2.

[55] Although not applicable to small municipal light departments like PMLD, state law (Mass. Gen. L. c. 298) and state regulations (310 CMR 7.74) require large electric generating facilities in the Commonwealth to decarbonize electricity generation, obtain a percentage of the electricity sold to customers from qualifying renewable energy facilities, and use clean energy to generate a specified portion of electricity sales.

[56] The EAC recommends that solar panels be purchased from manufacturers who have a policy and/or procedure for responsibly recycling solar panels at the end of their life. (See e.g., EnergySage, "Recycling Solar Panels in 2018," at news.energysage.com/recycling-solar-panels/.)

Action #3: Encourage energy use reduction by the Town, town residences, and town businesses.

Reducing energy use and using energy more efficiently can result in monetary savings and reduced greenhouse gas emissions (a contributor to climate change).[57] There are many state and local educational and funding opportunities that help energy consumers reduce their energy usage.

Benefits of Action:
Energy use cost savings; reduced greenhouse gas emissions.

Steps & Strategies:

1. Provide education/information to town residents and businesses with regard to energy conservation.
2. Continue PMLD participation in HELPS program and/or identify other energy audit service and rebate programs for Town participation.
3. Encourage behavioral changes toward reduced energy use which may include through:
   - **Tiered pricing:** Encourage and collaborate with PMLD to utilize tiered pricing to flatten peak demand for heavy energy consumers and to encourage users to conserve. This could take the form of variable electric rates and associated meter monitoring and software that encourage use of power during off-peak times when power cost is less expensive, and negotiating with power source providers (i.e., Nextera) to collaborate as relevant. This would enable PMLD customers to opt for low cost power for high energy demand operations such as clothes drying, pool or hot tub heating, water heating, etc.;
   - **Consumption-based comparisons in billing:** Encourage and collaborate with PMLD to provide its customers with comparative feedback on relative energy use, such as: comparisons to other similar users; comparisons to median and mean, etc. such as offered to customers of National Grid, Eversource and others.

Resources Needed:
Volunteer time and effort, including by the Environmental Action Committee and/or the Board of Light Commissioners. Cooperation and collaboration with PMLD.

With regard to energy use reduction in Town of Princeton buildings and facilities, street and traffic lighting, and vehicles, see Action #s 3, 4, and 5 of Becoming a Designated Green Community at pages 17 - 19.

[57] See "Additional Background, Powering Town Buildings, Homes, and Businesses: Greenhouse Gases and Climate Change" at page 86 for more information on greenhouse gas emissions.

HEATING AND COOLING

PRESENT SITUATION

Currently, the Town, as well as its residents and businesses, are **largely dependent on fossil fuel- and wood-based sources of heat energy**. Over 80% of homes are heated with fuel oil, 10% with wood, while the balance of homes are heated with propane, natural gas or electricity.[58]

Currently, **town residents have several accessible resources for energy savings**. The Home Energy Loss Prevention Services (HELPS) program, through its association with PMLD, provides information about residential energy conservation, in-home energy audits to qualifying customers, and heating and cooling rebates including:

- **Home Efficiency Incentive Program** to assist PMLD customers with the cost of installation for the most cost-effective measures recommended in a home energy audit, including projects such as installation of new heating systems or insulation;
- **Cool Homes rebates** for Energy Star qualifying cooling equipment; and
- **rebates for Wi-Fi smart thermostat** purchases and installations.[59]

In addition to the HELPS program, town residents have access to the **Home Energy Market Value Performance (Home MVP) Program**,[60] which offers home energy assessments as well as incentives, rebates, and interest-free loans on energy-saving home projects including switching to cleaner heating/cooling technologies (e.g. mini-splits), insulation, window replacement, and smart thermostats. These programs are applicable only to improvements within existing homes, not to new construction.

NEST thermostat, photo by NEST via Flickr, CC license

[58] United States Census Bureau, American FactFinder, Physical Housing Characteristics for Occupied Housing Unites 2013-2017 American Community Survey 5-Year Estimates.

[59] Princeton Municipal Light Department at pmld.com. See also munihelps.org.

[60] See mass.gov/guides/home-mvp.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS

Replace fossil fuel- and wood-based heat energy sources with alternative sources (e.g., electricity and/or geothermal)

Increase energy conservation

Decrease greenhouse gas emissions

Wachusett Windmills in the Fall, photo by CBH

Action #1: Encourage the replacement of combustion-based heating systems with alternative, more sustainable heat energy sources (i.e., electricity with or without geothermal enhancement).

Heating homes and buildings with fossil fuel- and wood-based heat energy sources results in emissions of greenhouse gas and unhealthy gasses and particulates.

According to the United States Environmental Protection Agency (EPA), the largest source of greenhouse gas emissions from human activities in the USA is from burning fossil fuels for electricity, heat, and transportation. The EPA estimates that 11 percent of 2016 greenhouse gas emission came from commercial and residential buildings including via the burning of fossil fuels for heat.[61]

The burning of wood in older non-EPA-approved woodstoves also results in unacceptable levels of gaseous and particulate pollution. Wood smoke can contain harmful air pollutants, including benzene, formaldehyde, acrolein and polycyclic aromatic hydrocarbons.[62] Fine particulate matter from the burning of wood can trigger health issues, including asthma attacks, heart attacks, stroke, irregular heart rhythms, and heart failure, especially in people who are already at risk for these conditions.[63]

Greenhouse gas and pollutant emissions can be reduced by converting combustion-based heating systems to more sustainable heat energy sources. For example, an air- or geothermal-source heat pump, which utilizes electricity, will produce fewer greenhouse gas emissions per unit of heat delivered than fossil fuel-based heating systems.[64]

Benefits of Action:

Increased electricity demand, which could result in decrease in electricity cost and/or investment in local sources of sustainable power; decreased greenhouse gas emissions; improved environmental and human health.

Steps & Strategies:

1. Gather information.
2. Research, collect, analyze, and compile information related to alternative, sustainable heat energy source options.
3. Share information with town residents, as well as the benefits of utilizing those options, including environmental, health, cost-savings, and the funding sources available to assist with heat source energy conversions.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and/or the Board of Light Commissioners. Possible collaboration with PMLD.

Note: PMLD currently offers HELPS Heat Pump Rebates for up to $1,000.[65]

See the "Additional Background: Operating Cost Savings with Heat Pumps" section of this report (page 89) for a break-even analyses of the use of high-efficiency heat pumps as replacements for oil and propane furnaces.

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[61] United States Environmental Protection Agency "Greenhouse Gas Emissions: Sources of Greenhouse Gas Emissions, Overview" at epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

[62] United States Environmental Protection Agency "Burn Wise: Wood Smoke and Your Health" at epa.gov/burnwise/wood-smoke-and-your-health. (Note: The more efficiently you burn wood (e.g., using an EPA-certified wood stove and dry, seasoned wood) the less smoke is created.)

[63] Ibid. For more information about soot, see "Additional Background, Heating and Cooling: Soot" at page 89.

[64] See HeatSmart Northampton, Massachusetts "FAQs: How will converting to an air source heat pump effect greenhouse gas emissions?" at northamptonma.gov/Faq.aspx?QID=230. See also "Additional Information, Heating and Cooling: Operating Cost Savings With Heat Pumps" at page 89 for a an analysis of operating costs of electric heat pumps versus oil and gas home heating systems.

[65] See munihelps.org/rebates-incentives/princeton-municipal-light-department/.

Action #2: Encourage conservation in heating and cooling energy related use.

In addition to greater efficiency and environmental sustainability achieved through choice of heat source,[66] energy used for heating and cooling can be conserved through various actions including: utilizing the most efficient heating, ventilating, and air conditioning (HVAC) equipment/systems; utilizing programmable thermostats; insulating and air sealing the building envelope; and behavioral changes.

Benefits of Action:
Energy cost savings; decreased greenhouse gas emissions.

Steps & Strategies:
Provide education/information to relevant Town committees, town residents and businesses with regard to energy conservation options and audit, rebate, and grant opportunities.

Resources Needed:
Volunteer time and effort, including by the Environmental Action Committee and/or the Board of Light Commissioners. Possible collaboration with PMLD.

Note: See also the related Action #3 in Powering Town, Homes, and Businesses at page 27.

Additionally, with regard to energy use reduction in Town of Princeton buildings and facilities, street and traffic lighting, and vehicles, see Action #s 3, 4, and 5 of Becoming a Green Community at pages 17 - 19.

Air Conditioning Units, photo courtesy of Pixabay

[66] See Heating and Cooling Action #1 at page 30.

TRANSPORTATION

PRESENT SITUATION

Personal observation suggests that **the vast majority of vehicles owned and operated by the Town and town residents are fueled by gasoline and/or diesel**. Many vehicles are flex-fuel capable, but the lack of local E85 (an ethanol-gasoline blend) fueling stations[67] suggests that this capability is not utilized. As of spring 2019, the owners of some conventionally-fueled hybrid cars[68] and eight plug-in capable electric vehicles[69] in Princeton have applied for EV rebates. In May, 2019, two ClipperCreek Level 2 EV chargers were installed at Mass Audubon's Wachusett Meadow Sanctuary on Goodnow Road.[70] More recently, a number of homeowners have installed EV chargers.[71]

While the Town is a member of the Worcester Regional Transit Authority (WRTA), **regular bus service is not available in town**. There are some public transit options for town residents in particular physical need. The SCM Elderbus, a WRTA contractor, is available to town residents who are 60 years or older and for residents with disabilities.[72]

Town residents may take advantage of carpooling, including state-sponsored shared van services, employer-sponsored plans, and informal private arrangements.

The closest commuter rail service to Boston is at Wachusett Station in Fitchburg, where passengers can board the Fitchburg Line to North Station (a 90-minute ride) and many communities in between.[73] The Framingham/Worcester line is accessible via Worcester's Union Station (also about a 90-minute ride). An express train runs twice per day during rush hour between Worcester and South Station.[74]

EV Chargers at Wachusett Meadow, photo courtesy of PG

[67] The nearest E85 stations are on the Mass Pike in Westborough and Charlton, per Alternative Fuels Data Center: Ethanol Fueling Stations. See afdc.energy.gov.

[68] Personal observation, Phil Gott, EAC member.

[69] See MOR-EV.org.

[70] facebook.com/pg/MassAudubonWachusettMeadow/posts/.

[71] EAC member communication with PMLD.

[72] SCM Elderbus schedule, scmelderbus.org/disabled-elderly-transportation-servicearea.html.

[73] Massachusetts Bay Transportation Authority, Fitchburg Line timetable: mbta.com/schedules/CR-Fitchburg/timetable.

[74] Massachusetts Bay Transportation Authority Back Bay / South Station Commuter Rail Schedule at mbta.com/schedules/CR-Worcester/timetable?facets=&from=global-search&query=south+station+worcester.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS Decrease vehicle (greenhouse gas) emissions

Encourage increased use of electric vehicles

Prius recharging, photo by Alex Samoiloff

Action #1: Encourage use of carpooling and public transportation by town residents.

According to the United States Environmental Protection Agency (EPA), the transportation sector generates the largest share of greenhouse gas emissions: 28.5 percent of 2016 greenhouse gas emissions.[75] Greenhouse gas emissions related to transportation result primarily from the burning of fossil fuels for our vehicles. Over 90 percent of the fuel used for transportation is petroleum-based, which includes gasoline and diesel.[76]

Greenhouse gas emissions related to transportation can be reduced in a variety of ways such as through fuel switching (see Transportation, Action #2 below), fuel efficiency, and reducing travel demand.[77] The latter option can be achieved through carpooling, working at home, and the use of public transportation.

Benefits of Action:

Reduced greenhouse gas emissions; reduced wear and tear on town roads; reduced traffic; reduced noise.

Steps & Strategies:

1. Gather information related to carpool options and public transportation options within a designated distance of town.
2. Share information with town residents as to carpool and public transportation options, as well as the benefits of utilizing those options.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee.

Commuters on bus, photo courtesy of Pixabay

[75] United States Environmental Protection Agency "Greenhouse Gas Emissions: Sources of Greenhouse Gas Emissions, Overview" at epa.gov/ghgemissions/sources-greenhouse-gas-emissions. See Energy, "Additional Background, Powering Town Buildings, Homes, and Businesses, Greenhouse Gases and Climate Change" at page 86 for more information on greenhouse gas emissions.

[76] Ibid.

[77] United States Environmental Protection Agency "Greenhouse Gas Emissions: Sources of Greenhouse Gas Emissions, Transportation Sector Emissions" at epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

Action #2: Encourage purchase and use of electric vehicles (EVs) by town residents, businesses, and the Town.

Electric vehicles produce no tailpipe emissions. The electricity used to charge the battery of electric vehicles may produce some greenhouse gases, however total emissions associated with driving electric vehicles are less than those for fossil-fueled vehicles. If the electricity used to charge the electric vehicle is generated from sustainable energy sources, then the reduction in greenhouse gas emissions will be even greater.[78]

DOER reestablished the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV), making at least $27 million in rebates available per year in 2020 and 2021 for eligible EV purchases and leases.[79]

Benefits of Action:

Reduced fossil fuel demand; decreased greenhouse gas emissions; reduced fuel costs; increased electricity demand, which could result in decrease in electricity cost and/or investment in sources of sustainable local power; improved environmental and human health.

Steps & Strategies:

1. Gather information related to EV statistics, costs, benefits, rebate opportunities, etc.
2. Share collected information with town residents, town businesses, and the Town.
3. Install charging stations for EVs.

Resources Needed:

Volunteer time and effort, including that of the Environmental Action Committee and the Board of Light Commissioners.

Note: With regard to Town purchase of EVs, see also Action #s 6 and 7 of Becoming a Green Community at pages 20 - 21.

Electric Vehicle, photo courtesy of Pixabay

[78] United States Environmental Protection Agency "Green Vehicle Guide: Explaining Electric and Plug-In Hybrid Vehicles" at epa.gov/greenvehicles/explaining-electric-plug-hybrid-electric-vehicles.

[79] mor-ev.org.

WASTE MANAGEMENT

OVERALL GOALS

- Reduce waste generated in Town buildings, private residences, and businesses
- Reduce negative impacts of multiple waste haulers on Town infrastructure and environment
- Increase overall rates of reuse and recycling
- Support efforts to reduce the waste stream, including by limiting single-use plastics and rescuing food waste
- Expand opportunities for Town, residents, and businesses to dispose of waste

Garbage, photo courtesy of Pixabay

PRESENT SITUATION

Every year, Massachusetts disposes of enough waste to fill 74 Fenway Parks.[80] **Waste disposal is expensive for towns and hard on the environment**, whether through the odor and toxic leaching of landfills,[81] the sludge and particulate matter created by incineration[82], or the emissions of haulers' trucks.[83] Solid waste management also contributes to greenhouse gas emissions, which the Commonwealth is bound by law to reduce.[84] Massachusetts' Solid Waste Master Plan, "Pathway to Zero Waste," establishes a goal of reducing annual waste disposal in the Commonwealth by 30% between 2008 and 2020,[85] and by 80% by 2050.[86]

The disposal of certain wastes is banned under Massachusetts Department of Environmental Protection (MassDEP) regulation, 310 CMR 19.017. These regulations prohibit the disposal or incineration of: glass and metal containers; recyclable paper, cardboard and paperboard; single-resin narrow-necked plastic containers; leaves and yard waste; cathode ray tubes; clean gypsum wallboard; ferrous and non-ferrous metals; lead acid batteries; commercial food material; large appliances; whole tires; and wood waste (banned from landfills only).[87]

EAC Fall 2017 Survey

Over 40% of respondents to the Princeton EAC Fall 2017 Survey placed trash and recycling second on their list of environmental priorities, and nearly 80% of respondents agreed with the following statement: "I would like the Town to support environmentally responsible trash and recycling options." In free-text comment areas on the Survey, many residents mentioned the idea of reducing the number of haulers locally, with an aim of reducing road traffic and impact as well as potentially reducing costs via a direct arrangement with the Town. It was also noted by Survey respondents that costs for local waste hauling options seem to be rising much faster than inflation.

See EAC Fall 2017 Survey at Appendix 2.

[80] Massachusetts 2010-2020 Solid Waste Master Plan, 2013, p. iii.

[81] See Appendix 3, Supporting Documents, Letter from Princeton Selectboard to State Senator Harriette Chandler and State Representative Kimberly Ferguson expressing opposition to proposed expansion of the Fitchburg-Westminster Landfill (Jan. 22, 2019). See also, e.g., Toxics Action Center, "Cassella- Coming to a Community Near You?", "Chapter 5 - The Environmental and Operational Problems at Casella Facilities."

[82] Massachusetts Public Interest Research Group (MassPIRG), "Trash in Massachusetts, State of the State," August, 2018. masspirgedfund.org/reports/maf/trash-massachusetts-state-state.

[83] See Massachusetts 2016 Diesel Particulate Matter Inventory (Massachusetts Department of Environmental Protection, Bureau of Air and Waste) at mass.gov/files/documents/2018/04/24/Massachusetts-2016-Diesel-Particulate-Matter-Inventory-Report-April-23-FINAL.pdf.

[84] Massachusetts 2010-2020 Solid Waste Master Plan, 2013, p. iii. For a discussion on" Greenhouse Gases and Climate Change," including Commonwealth of Massachusetts greenhouse gas emission reductions goals, see "Additional Background, Powering Town Buildings, Homes, and Businesses" at page 86.

[85] Mass DEP 2016 Solid Waste Data Update, p. 2.

[86] Massachusetts 2010-2020 Solid Waste Master Plan, 2013, p. iii.

[87] 310 C.M.R. 19.017.

Thus, **by law, the Town, town residents, and business are required to recycle certain materials curbside and/or take such materials to collection facilities**. Hazardous waste management is also regulated.[88]

Recycling not only reduces the amount of waste sent to landfills and incinerators, but depending on the type of item recycled (e.g., paper or plastic or metal, etc.) it also saves energy, water, trees, and other resources, and it reduces the amount of toxins and pollutants released in mining operations and/or new product production.[89]

Recent changes in the recycling marketplace have created a national waste crisis, as recyclable materials that once had value for export are now being refused, and domestic processing facilities have closed.[90] **The Commonwealth and its residents need new ways to address recycling challenges**, including the limitation of products made from hard-to-dispose-of materials, encouraging reduced packaging, and promoting reuse of a wide range of materials.[91]

The Town of Princeton currently contracts with three waste haulers.[92] Town residents and businesses may only contract with these licensed haulers.[93] Hauler contracts, which insure that haulers offer curbside recycling and abide by certain baseline requirements for safety and service, allow haulers to offer their services to residents in town.[94] All of Princeton's non-recycled waste is transported by these contracted haulers to the Wheelabrator Millbury "waste-to-energy" facility in the Town of Millbury, where it is incinerated.[95] Princeton's current contract with Wheelabrator Millbury guarantees a specified residential acceptable waste tonnage amount every year.[96] (For more information about where our recyclables go, see "Additional Information, Waste Management" at page 92.)

Additional regional recycling services are provided to town residents by Wachusett Watershed Regional Recycling (WWRR) Center in West Boylston. The Town of Princeton pays an annual fee to allow residents access to these services, which include hazardous waste collection, appliance, electronic, and furniture disposal, and a swap shop.[97] It is unclear how many residents are aware of WWRR; it mails a schedule and guidelines annually to residents in seven towns, and maintains a website with updated information.[98]

Exact statistics about annual trash and recycling amounts in Princeton are not easily available, but could be compiled through consultation with Town employees.[99] According to

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[88] See M.G.L. c. 21C, Massachusetts Hazardous Waste Management Act and 310 CMR 30.00 Massachusetts Hazardous Waste Regulations.

[89] See Boston Building Resources, "Recycling: Where Does it All Go?" at bostonbuildingresources.com/advice/recycling-where-does-it-all-go.

[90] See Massachusetts Municipal Association, Resolution Supporting a Local-State-Federal Partnership to Address the Challenges to the Recycling Marketplace, January 19, 2019.

[91] Ibid.

[92] EAC member conversation with Terri Longtine, Princeton Board of Health, April, 2018.

[93] Princeton Board of Health.

[94] EAC member conversation with Terri Longtine, Princeton Board of Health, April, 2018.

[95] Wheelabrator Millbury website at wtienergy.com/plant-locations/energy-from-waste/wheelabrator-millbury.

[96] Wheelabrator Millbury Waste Disposal Agreement (June 15, 2006) (copy obtained from Terri Longtine, BOH), page 8. See "Additional Background, Waste Management: Princeton-Wheelabrator Millbury Contract Language" at page 93 for more details on the contract and tonnage requirements.

[97] EAC member conversation with Terri Longtine, Princeton Board of Health, April, 2018.

[98] EAC member meeting with Terri Longtine, Mass Municipal Waste Assistance Coordinator Irene Congdon, and Mark Koslowske, Wachusett Earthday Treasurer, May 30, 2018.

[99] See MassDEP 2018 Municipal Solid Waste & Recycling Survey Responses.

data collected by the WWRR, from July 2018 to July 2019, Princeton resident participation comprised 10.5% of the seven-town-participation total at the facility.[100] Statistics available for *all* materials received by Wheelabrator Millbury in 2016 indicates that well over 50% of the materials received at the waste-to-energy facility could be recycled and/or diverted (e.g., organics, paper, plastics, metals, and glass).[101]

In January 2016, the Town of Princeton adopted a "Buy Recycled" policy that requires the Town to purchase recycled paper products and energy efficient office equipment "to the maximum extent practicable," engage in waste reduction efforts such as duplex printing and reuse of paper, and "incorporate waste prevention and recycling in daily operations."[102] Although the policy requires each Town department to report purchases of recycled products to the Town Administrator on July 30 for the previous fiscal year, no such reports have ever been submitted.[103]

The Town does not have a policy or plan for composting food or wood residue.[104] The carbon sequestered in these organic resources will be released back into the atmosphere as carbon dioxide (a greenhouse gas) as they decompose. If left to decompose anaerobically, as in a pile, the sequestered carbon will be released in methane, which is 30 times more powerful a greenhouse gas than carbon dioxide. When properly handled these residues can be put to good use while displacing fossil fuel carbon emissions.

Photo courtesy of CS

[100] WWRR Collection Summary FY 2019 (provided to EAC by Arthur Allen).

[101] Whelabrator Millbury, Inc. Waste Characterization Study Report at mass.gov/files/documents/2017/09/zk/wcs16mil.pdf.

[102] Town of Princeton 2016-1-25 Buy Recycled Policy; pdf via Town Administrator. See Appendix 3, Supporting Documents.

[103] Correspondence from Town Administrator Nina Nazarian to EAC (Jan. 8, 2019).

[104] Ibid.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS

Reduce waste generated in Town buildings, private residences, and businesses

Reduce negative impacts of multiple waste haulers on Town infrastructure and environment

Increase overall rates of reuse and recycling

Plan for climate change resiliency and Support efforts to reduce the waste stream, including by limiting single-use plastics and rescuing food waste

Expand opportunities for Town, residents, and businesses to dispose of waste responsibly

Expand opportunities for Town, residents, and businesses to compost, reuse and recycle a wide range of materials

Recycle in Princeton, photo courtesy of CG

Action # 1: Determine the amount of residential and municipal waste generated in town, and the amount recycled; establish goals, methods, and a timetable for reduction.

The Town of Princeton can potentially save taxpayer money and contribute to environmental health by changing the way it approaches and manages waste. An important first step is to determine how much waste is generated in town, and how much is recycled. Once that information is obtained, the Town can start to set goals for reduction. In addition, the Town has a civic responsibility to contribute to the achievement of the goals[105] of the Commonwealth regarding reduction of waste and concomitant reductions in greenhouse gas emissions.[106]

Benefits of Action:

Accurate statistics will provide a baseline against which to measure any improvement; realistic goals and deadlines encourage sustained and consistent progress. The desired benefit would be lower waste disposal costs for the town as a whole, as well as a decreased environmental and aesthetic impact related to waste disposal.

Steps & Strategies:

1. Apply for grant funding through MassDEP's Sustainable Materials Recovery Program (SMRP), if appropriate.[107]
2. Gather information:
   - Work with Board of Health, haulers, and Wheelabrator Millbury to determine present waste and recycling statistics.
3. Establish goals:
   - Work with Town officials to determine appropriate waste reduction goals.
   - Determine related costs and benefits.
4. Develop timeline:
   - In conjunction with Town officials and Municipal Assistance Coordinator (MAC),[108] establish a realistic timeline for implementation of reduction goals.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Board of Health. Time and effort by municipal employees.

Note: MassDEP has Municipal Assistance Coordinators (MACs) who provide technical assistance on waste reduction and recycling to municipalities. MassDEP offers Sustainable Materials Recovery Program (SMRP) Municipal Grants, which support local recycling, composting/organics, reuse, source reduction, policy development and enforcement activities that increase diversion and reduce disposal. MassDEP also offers SMRP Municipal Technical Assistance Grants which provide municipal applicants with up to 80 hours of recycling/solid waste planning assistance from a MassDEP Municipal Assistance Coordinator (MAC).[109]

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[105] Massachusetts 2010-2020 Solid Waste Master Plan (2013).

[106] Massachusetts Global Warming Solutions Act, Mass. Gen. L. c. 298. See also Massachusetts Clean Energy and Climate Plan for 2020 (2015 update).

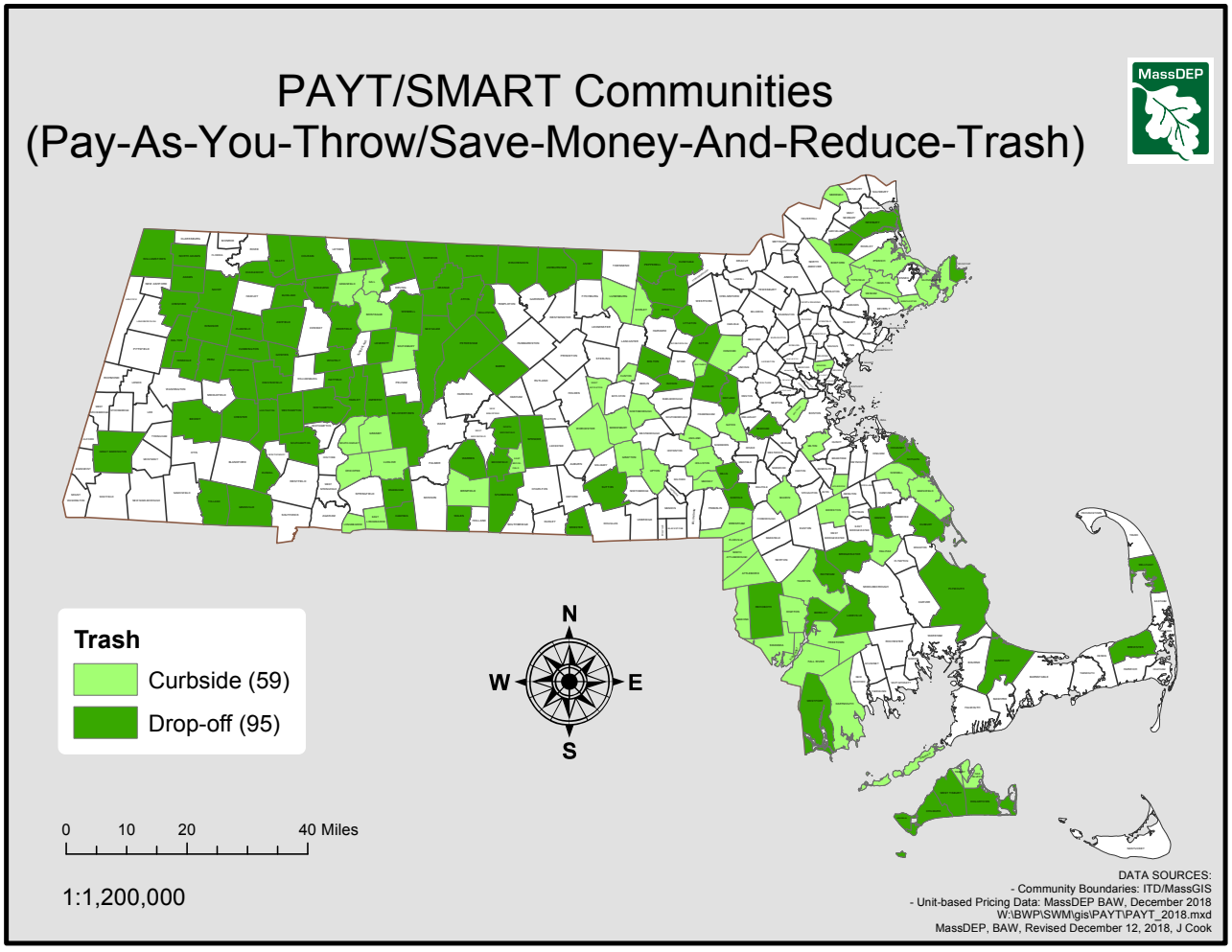
[107] MassDEP Programs at mass.gov/service-details/massdep-waste-recycling-grants-assistance.

[108] MassDEP has Municipal Assistance Coordinators (MACs) who provide technical assistance on waste reduction and recycling to municipalities. Irene Congdon is the MAC for the Town of Princeton (978-597-9191; irene_congdon1@yahoo.com).

[109] MassDEP Programs at mass.gov/service-details/massdep-waste-recycling-grants-assistance.

Action # 2: Explore establishment of a single-hauler, Pay-As-You-Throw (PAYT) waste disposal program.

The daily presence of multiple haulers' trucks in town fouls the air, strains the roadway infrastructure, and causes unnecessary noise and traffic, according to many respondents to the EAC's Fall 2017 Survey.[110] Next-door neighbors may put out vastly different amounts of trash every week, yet pay the same quarterly fee. Over 40% of Massachusetts municipalities have implemented PAYT/Save-Money-And-Reduce-Trash (SMART) programs,[111] including Central Massachusetts neighbors in the municipalities of West Boylston, Clinton, Ashburnham, Lunenburg, Spencer, Barre, and Petersham.



Source: mass.gov/doc/map-of-massachusetts-municipalities-with-paytsmart-programs-may-2019/download

[110] EAC Fall 2017 Survey, at Appendix 2.

[111] MassDEP, Massachusetts Municipalities with PAYT/SMART Programs, April 2019. See also MassDEP PAYT/SMART Fast Facts at mass.gov/lists/pay-as-you-throw-paytsave-money-and-reduce-trash-smart.

With a PAYT solid waste program, residents would pay a per-unit fee for disposal of household trash. Most such programs utilize pre-printed trash bags or stickers, with the price of the bag or sticker reflecting the cost to dispose of waste. With a PAYT program, residents are not charged a direct fee for recycling. Since residents pay directly for the amount of trash they dispose, they have a financial incentive to reduce their waste including through recycling and composting.[112]

A PAYT program could save town residents money[113] and reduce environmental impacts;[114] statistics reveal that PAYT/SMART communities produce significantly less waste than non-PAYT/SMART communities.[115]

> The daily presence of multiple haulers' trucks in town fouls the air, strains the roadway infrastructure, and causes unnecessary noise and traffic, according to many respondents to the **EAC's Fall 2017 Survey**.

Benefits of Action:

Possible lower, fairer waste hauling prices for all residents; reduced wear and tear on town road infrastructure; reduced traffic, noise, and greenhouse gas emissions.

Steps & Strategies:

1. Gather information:
   - Work with local MAC to seek advice on best approaches to haulers.
   - Contact other similarly-sized towns, such as East Brookfield or West Boylston, to determine how one-hauler PAYT systems are established for smaller towns, and what costs are involved;
   - Approach potential haulers to determine level of interest and likely proposals;
   - Survey residents to determine level of interest, and to offer estimated costs.
2. Evaluate information:
   - Evaluate hauler proposals;
   - Assemble case studies as informational examples for residents;
   - Tabulate survey results.
3. Next steps:
   - Apply for grant funding for survey or other outreach activity through MassDEP's SMRP, if appropriate/necessary;
   - Work with Town government to establish appropriate next steps.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Board of Health. Time and effort by municipal employees.

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[112] MassDEP Fact Sheet: PAYT/SMART Basics for Municipalities at mass.gov/lists/pay-as-you-throw-paytsave-money-and-reduce-trash-smart.

[113] Per MassDEP, if all Massachusetts municipalities implemented PAYT/SMART programs, municipalities would save over $42 million (assuming average $68 per ton disposal cost). (See MassDEP PAYT/SMART Fast Facts at mass.gov/lists/pay-as-you-throw-paytsave-money-and-reduce-trash-smart.)

[114] See MassDEP Fact Sheet: PAYT/SMART Basics for Municipalities ("By diverting waste from disposal, PAYT/SMART programs extend the life of landfills, decrease air pollution from trash incinerators, and reduce the need for new disposal facilities. As communities increase reuse, recycling, and composting, natural resources such as land, air, and water, are protected and preserved and greenhouse gas emissions are reduced.")

[115] Mass.gov: Pay as You Throw, Maps: How Much Did We Throw Out, 2011-2017. See also MassDEP PAYT/SMART Fast Facts, which notes that if all households in Massachusetts utilized PAYT/SMART, it would "reduce statewide trash by over 478,00 tons per year." See also MassDEP Fact Sheet: PAYT/SMART Basics for Municipalities ("PAYT/SMART programs conducted in conjunction with curbside recycling programs have been shown to increase a community's recycling tonnage by 20 to 35 percent in Massachusetts.")

Action # 3: Work with Town government to install and maintain recycling containers in all Town-managed buildings and lands, including playing fields.

While recycling is in crisis as an industry, keeping recyclables out of the waste stream remains a priority for the Commonwealth of Massachusetts, and new markets for recyclables will be established over time.[116] Recycling plastic water bottles (as an example) is stipulated by law, but rarely enforced.[117] The absence of accessible recycling containers in or near all Town buildings and on playing fields makes proper disposal less likely, and adds to the tonnage of waste the Town pays Wheelabrator Millbury to incinerate.

Benefits of Action:

Encourage recycling, resulting in related environmental benefits; reduce incinerated waste and thereby possibly cost to Town, as well as related air pollution; reduce litter; beautify Town properties.

Trash can at library, photo courtesy of CG

Steps & Strategies:

1. Gather information:
   - Determine present location and maintenance procedure of all trash/recycling containers in Town buildings and on Town-owned properties;
   - Determine financial and human resources needed to add and maintain containers in all locations;
   - Research other towns' recycling container programs.
2. Obtain resources:
   - Work with Town officials and MAC to establish eligibility for MassDEP SMRP Municipal Grant and/or SMRP Municipal Technical Assistance Grant, if appropriate/necessary;
   - Apply for SMRP grant funding as necessary/appropriate.
3. Develop plan for long-term maintenance of waste and recycling containers.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Board of Health. Time and effort by municipal employees. Funding for recycling and/or waste containers (possibly via SMRP grant).

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[116] Massachusetts Municipal Association, Resolution Supporting a Local-State-Federal Partnership to Address the Challenges to the Recycling Marketplace, January 19, 2019.

[117] Massachusetts Public Interest Research Group (MassPIRG), "Trash in Massachusetts, State of the State," August, 2018. masspirgedfund.org/reports/maf/trash-massachusetts-state-state. See 310 CMR 19.017 (Waste Ban).

Action # 4: Inform and advise residents of waste reduction, reuse, recycling, and composting opportunities and best practices, and create such opportunities when possible.

Many waste problems--including the current recycling crisis--stem in part from a simple lack of understanding of waste management expectations, regulations, and opportunities.[118] Through regular communication with Princeton residents, businesses, and municipal employees, EAC can serve as an information source, helping raise consciousness about waste reduction and alternatives to disposal, including reuse, recycling, and composting. A reduction in waste produced may also bring a concomitant reduction in costs to the Town, residents, and businesses. When possible, EAC may also work to make waste reduction opportunities and waste disposal alternatives more available to and convenient for town residents.

Kitchen Composting, photo courtesy of CS

Benefits of Action:

Reduce waste and its related monetary and environmental costs; make waste-disposal-related-environmental issues more visible; save Town resources; engage the community.

Steps & Strategies:

1. Research and create a comprehensive residential and commercial waste reuse, reduction, recycling and composting outreach guide, including construction and demolition (C&D) waste guidelines. Distribute, publicize, and update the guide regularly.
2. Coordinate and consult with WWRR to help publicize its services more visibly and regularly.
3. In coordination with WWRR, consider planning annual town cleanup days to reduce litter, make alternative waste management options more visible and convenient for residents, and make waste goals and reduction achievements more apparent.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Board of Health. Funding for production/distribution of guide through online and in-person opportunities (possibly via SMRP grant).

Note: MassDEP provides a Recycling IQ Kit to all municipalities to utilize in educating residents with regard to recycling. Funding and technical assistance to help implement the Recycling IQ Kit are available through MassDEP SMRP Municipal Technical Assistance Grants.

[118] See Massachusetts Municipal Association, Resolution Supporting a Local-State-Federal Partnership to Address the Challenges to the Recycling Marketplace, January 19, 2019 at mma.org/advocacy/proposed-resolution-supporting-a-local-state-federal-partnership-to-address-the-challenges-to-the-recycling-marketplace-2019/.

Action #5: Explore the possibility of establishing community resources such as Tool Libraries, Repair Cafes, etc.

Tool Libraries and Repair Cafes aim to help reduce waste by providing residents with alternatives to purchasing new products. These lending or repairing services can be organized around any commodity, large or small, if there is community interest and enough volunteer labor to organize and maintain them.

Benefits of Action:

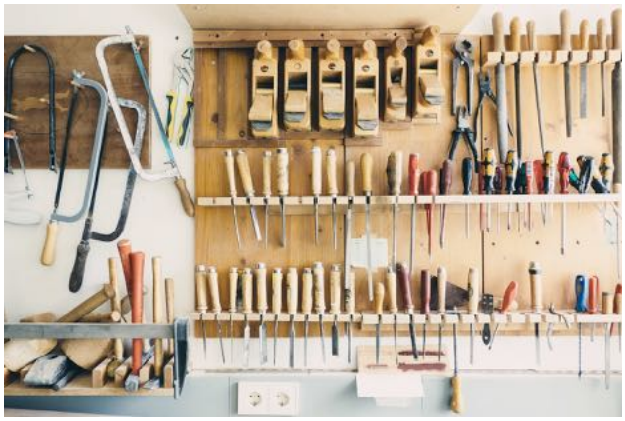
Reduce redundant purchases of household tools that are used infrequently (also resulting in reduction of resource use and environmental consequences of tool manufacturing); reduce likelihood of tools being discarded unnecessarily; reduce purchase or rental costs of needed tools for residents; increase community interactions.

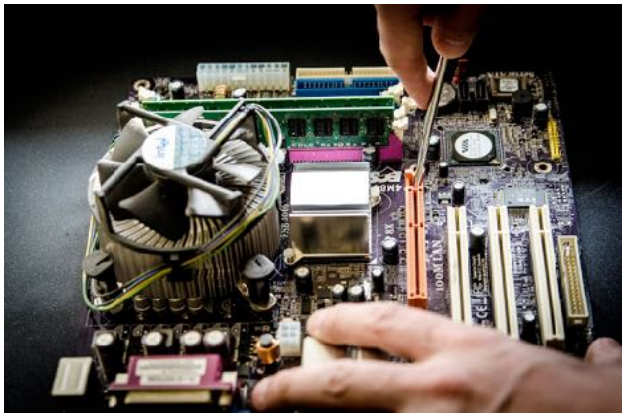
Steps & Strategies:

1. Gather information:
   - Research other towns' development of such community resources (for example, Town of Northfield Tool Lending Library[119]);
   - Work with local MAC to identify available resources;
   - Work with Town officials to identify available resources, space, etc.
2. Develop plan for establishment of resources:
   - Solicit volunteers to help establish and operate the resources;
   - Solicit/obtain tools and materials;
   - Identify location for resources;
   - Develop rules and waiver language for users.
3. Launch new resources.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Board of Health, as well as other volunteers. Funding to establish resources (possibly via SMRP grant), if appropriate/necessary. Donations of tools and materials.





Photos courtesy of Pixabay

[119] transitionnorthfieldma.org/tool-lending-library.php.

Action #6: Work with Thomas Prince School (TPS) and local restaurants/businesses to explore opportunities for diversion and beneficial reuse of food waste.

Over a quarter of Massachusetts' waste is food waste, which, when sent to landfills, contributes to greenhouse gas emissions.[120] Such food waste could, alternatively, be consumed by humans or livestock, or composted for beneficial reuse. Notably, MassDEP regulations ban disposal of food and other organic wastes from businesses and institutions that dispose of more than one ton of these materials per week.[121] While we don't know how much food is sent as waste to Wheelabrator Millbury from TPS or local businesses, it is likely that it approximates state percentages. Given Princeton's agricultural community, we might explore ways to connect farmers, gardeners, and others to these sources in order to reduce unnecessary food waste.[122]

Benefits of Action:

Reduce amount of waste unnecessarily incinerated, including a related reduction in incinerator-related air pollution; reduce related costs for decreased solid waste disposal; educate TPS community and local businesses about the benefits and importance of waste reduction as well as the management and benefits of compost.

Steps & Strategies:

1. Gather information:
   - Determine any existing food waste reduction and/or food donation program in place at TPS or town restaurants;
   - Assess interest and capacity for TPS and/or town restaurants to engage in a food waste diversion program;
   - Conduct a food waste audit[123] at TPS;
   - Explore with TPS the possibility of a "sharing table" for pre-packaged food and drink items that are not consumed;
   - Work with Town Agricultural Committee to identify local farms that would be willing to accept food waste;[124]
   - Research other towns' food waste diversion programs (e.g., Quabbin Regional High School[125] and Gardner – Gardner Ale House[126]).
2. Organize and plan food waste diversion program with interested partners.
3. Initiate food waste diversion programs.

Resources Needed:

Volunteer time and effort, including by the Environmental Action Committee and Agricultural Commission. If needed, funding for food waste diversion/reduction program (possibly via SMRP grant).

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[120] Massachusetts Public Interest Research Group (MassPIRG), "Trash in Massachusetts, State of the State," August, 2018 at masspirgedfund.org/reports/maf/trash-massachusetts-state-state.

[121] 310 CMR 19.000: Commercial Organic Material Waste Ban Amendments.

[122] See, for example, Quabbin Regional High School Composting and Organic Gardening Program. See also MassDEP map of Sites Accepting Diverted Food Material at mass.gov/doc/map-list-of-massachusetts-sites-accepting-diverted-food-material-june-2019/download.

[123] Guide to Conducting Student Food Waste Audits at epa.gov/sustainable-management-food/guide-conducting-student-food-waste-audits-resource-schools.

[124] See also MassDEP map of Sites Accepting Diverted Food Material at mass.gov/doc/map-list-of-massachusetts-sites-accepting-diverted-food-material-june-2019/download.

[125] Quabbin Regional High School Composting and Organic Gardening Program.

[126] See Recycling Works Massachusetts, Gardner Ale House Case Study at recyclingworksma.com/gardner-ale-house/. See additional food waste diversion case studies at recyclingworksma.com/case-studies/.

Action #7: Determine the beneficial commercial opportunities for collecting and reusing or cleanly burning wood residue and waste wood products from Princeton.

Clean wood residue is being produced in Princeton. Examples include trees cut for environmental or safety reasons, used pallets or crating, construction leftovers, and the like. This wood, called "available wood," cannot be left in place or made into boards. But it can be burned cleanly to produce thermal energy for heating buildings or powering industrial processes. Biomass researchers estimate that about one million tons of available wood is produced in Massachusetts each year.[127]

Benefits of Action:

Princeton is currently paying outside contractors or Town employees to cut trees. The wood produced from this investment is either given away, left in place to rot, or removed at Town expense. If there is sufficient available wood in Princeton, local fuel or other markets for this resource could be developed. If used for residential or municipal heat, it could reduce fossil fuel carbon emissions, keep energy dollars in the local community, and lower Town costs.

Steps & Strategies:

1. Determine the quantity and consistency of available wood by source within the Town.
2. Identify the current fate of available wood and any current processing of this wood for fuel or other beneficial purposes.
3. Identify and assess plausible end markets for current and potential available wood.
4. Determine the investment needed to prepare available wood for each end market and assess the commercial viability of and likely costs/income from Princeton's available wood sources.
5. Determine the best approach for handling Princeton's available wood while putting that residue to its best and highest practical use.

Resources Needed:

Volunteer time and effort to research available wood markets, quantify the amount of available wood produced in Princeton annually through data collection. Highway Department and PMLD time to collect data. Advice and counsel from commercial waste wood processors/users.

Typical Available Wood, photo courtesy of PG

[127] Mike Fallon, Dave Breger; "The Woody Biomass Supply in Massachusetts: A Literature-Based Estimate," Massachusetts Biomass Energy Working Group Supply Subcommittee, May 2002. (mwcc.edu/wp-content/uploads/blogs.dir/33/files/2012/01/WoodyBiomassReport.pdf).

NATURAL RESOURCES

OVERALL GOALS

WATER QUALITY

Protect quality of local aquifers, waterbodies, watersheds, and drinking water

WATER USE

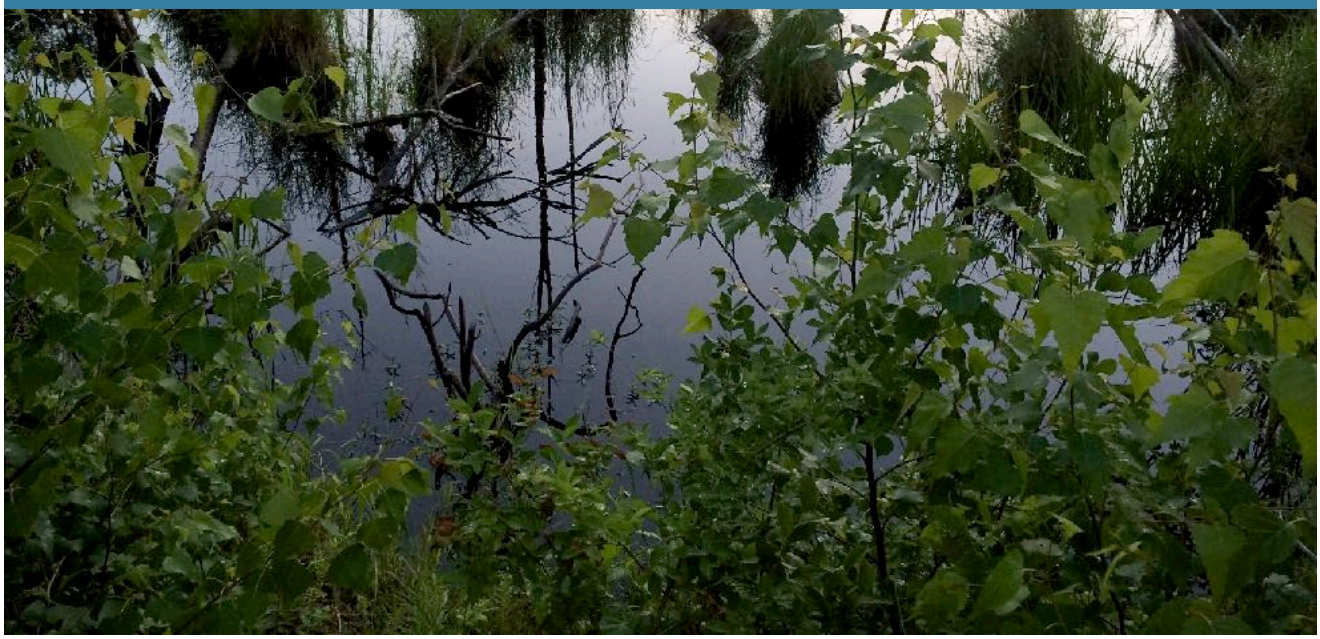
Conserve water supplies

AIR QUALITY

Reduce human and environmental exposure to indoor and outdoor air pollutants

CLIMATE CHANGE PREPAREDNESS

Plan for climate change resiliency and implement related priority projects



Pond, photo courtesy of CS

WATER QUALITY

PRESENT SITUATION

Water sustains life. Uncontaminated drinking water is essential to human and animal health, and uncontaminated water bodies are essential to the life of aquatic organisms and those that rely on water ecosystems and water sources. Recreational use of water resources also requires uncontaminated water bodies. For these reasons, **the protection of surface water quality and ground water quality is important.**

There are various state and federal laws that regulate water resources in the Commonwealth.[128] Activities in the Town of Princeton that could affect water quality are regulated under these regulations, including: the Massachusetts Surface Water Quality Standards;[129] the Wetlands Protection Act[130] and its regulations;[131] Massachusetts Waterways regulations;[132] Massachusetts Watershed Protection regulations;[133] and Massachusetts Drinking Water Regulations.[134]

Water bodies and water resources located in the town of Princeton are detailed in the Town's Open Space and Recreation Plan Update.[135] MassGIS's Online Mapping Tool, "Oliver," details areas in the Town that are designated as Zone I, Zone II, or Interim Wellhead Protection Areas, which are deemed important areas for protecting the recharge area around public water supply (PWS) groundwater sources.[136]

EAC Fall 2017 Survey

On the EAC's Fall 2017 Survey, 50% of respondents were interested in learning more about common threats to well water quality. Water was mentioned by several respondents in the qualitative feedback portion of the survey, with these respondents generally requesting that the EAC "study and develop proposed actions to ensure a clean/safe water supply."

See EAC Fall 2017 Survey at Appendix 2.

The town of Princeton itself has no central public water supply; all water supplies in town come from private wells.[137]

Well water in the town can be contaminated as the source water travels over the surface of the land or through the ground. Contamination

[128] See "Additional Background, Water Quality" at page 95.

[129] 310 CMR 4.00.

[130] M.G.L. c. 131, § 40.

[131] 310 CMR 10.00.

[132] 310 CMR 9.00.

[133] 313 CMR. 11.00.

[134] 310 CMR 22.00.

[135] Town of Princeton Open Space and Recreation Plan Update (August 2014), pages 10, 11.

[136] MassGIS Data: MassDEP Wellhead Protection Areas (Zone II, Zone I, IWPA) (January 2019).

[137] Town of Princeton Open Space and Recreation Plan Update (August 2014), page 10.

can be through naturally occurring minerals, radioactive material, and/or contamination from animal or human activity. Contaminants that may be present in source water include microbes, inorganic compounds, pesticides and herbicides, organic chemicals, and radioactive materials.[138]

According to a water quality study of New England, New York, and New Jersey conducted by the US Geological Survey, areas such as Princeton with lower population density (less than 50 people/square km) and those classified as undeveloped (forested), agricultural, or mixed land use generally have less contaminated well water than areas of higher population density.[139] However, Princeton has been identified as having a high or medium probability of exceeding maximum recommended arsenic and/or uranium levels.[140]

One well serves the following Town buildings: Bagg Hall, Princeton Public Library, Public Safety Building, and Town Hall Annex.[141] The quality of water from, and integrity of, this well is unknown.[142] In late 2018/early 2019, it was determined that this well system "should be a Public Water Supply as defined by the Massachusetts Department of Environmental Protection (MassDEP)."[143] Funds were designated at the May 14, 2019 Annual Town Meeting "to address costs associated with a new Public Water Supply at Town Hall Drive."[144] **The Town does not currently have any water quality testing policy or protocols with regard to Town wells, source waters or water bodies.**[145] With the new designation for the Town Hall Drive well, routine water quality testing will be required of that well.[146] Additionally, the drinking water system at the Thomas Prince School (TPS) is a non-transient non-community (NTNC) public water system,[147] which requires routine water quality testing. Such routine testing of the well at TPS is conducted by the Wachusett Regional School District (WRSD).[148]

The Massachusetts Department of Conservation and Recreation's Division of Water Supply Protection continuously monitors water quality at surface water sites in the Quabbin Reservoir, Ware River, and Wachusett Reservoir watersheds.[149] **The Town of Princeton is a Wachusett Watershed community** that has properties regulated by the Massachusetts Watershed Protection Act,[150] which limits certain land use and activities in watershed protection zones.[151]

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[138] See Town of Westminster, Massachusetts, Water Department, 2017 Annual Drinking Water Quality Report.

[139] United States Geological Survey, National Water Quality Assessment Program, 2011 pubs.usgs.gov/sir/2011/5220/.

[140] MassDEP, Private Well Guidelines, updated 2018, page 78. mass.gov/doc/private-well-guidelines/download.

[141] Town of Princeton Needs Assessment and Buildings Master Plan pg. 27.

[142] Ibid. pg. 8.

[143] May 14, 2019 Annual Town Meeting Warrant, Article 13.

[144] Ibid.

[145] Email correspondence from Nina Nazarian, Town Administrator to EAC (December 26, 2018).

[146] See 310 CMR 22.00.

[147] An NTNC public water system supplies potable water to a least 15 service connections or regularly serves at least 25 of the same persons or more approximately four or more hours per day, for four or more days per week, more than six months or 180 days per year. (See TPS 2017 Drinking Water Quality Report For the period January 1, 2016 to December 31, 2016 at Appendix 3, Supporting Documents.)

[148] See TPS 2017 Drinking Water Quality Report For the period January 1, 2016 to December 31, 2016 at Appendix 3, Supporting Documents.

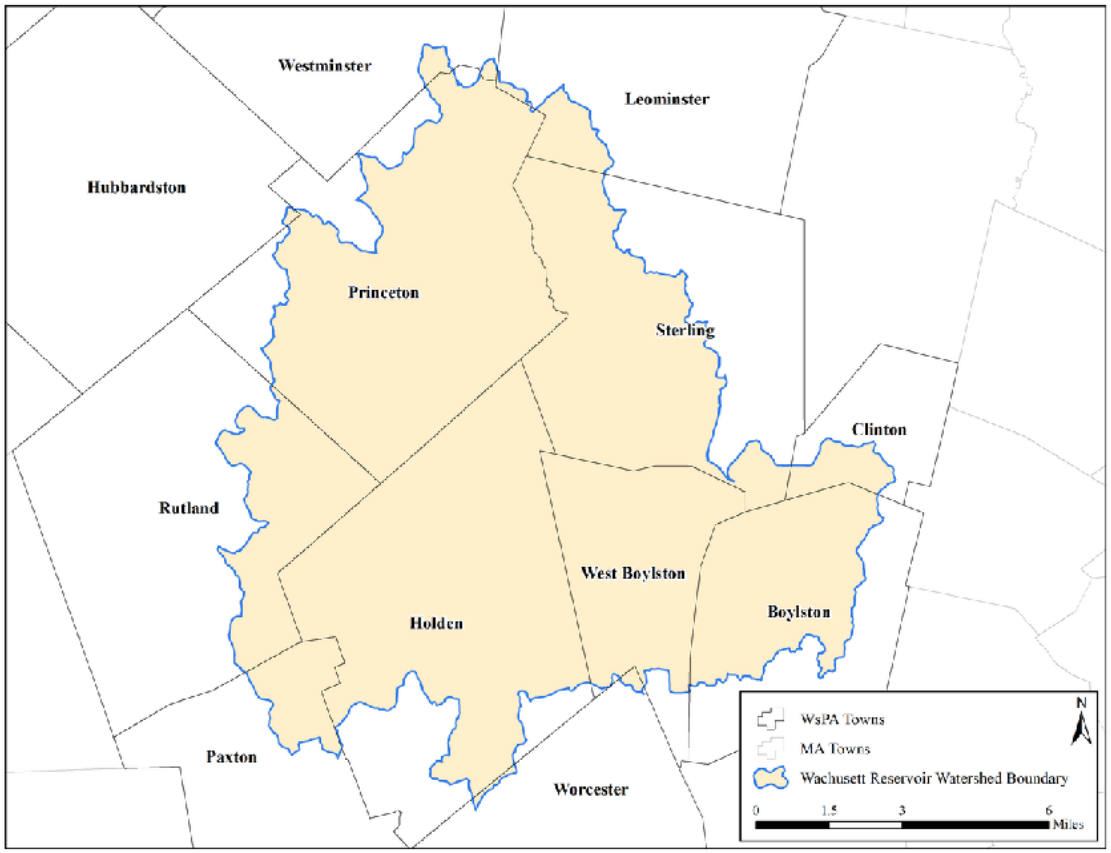
[149] See Massachusetts Department of Conservation and Recreation Watershed Water Quality Reports.

[150] 313 CMR 11.00.

[151] Massachusetts Executive Office of Energy and Environmental Affairs, " Towns Affected by the WsPA" at mass.gov/service-details/towns-affected-by-the-wspa.

The Town's Board of Health Agriculture Regulations provide minimum standards which are, in part, aimed at protecting water quality.[152] **The Town's Conservation Commission** administers the Wetlands Protection Act, with appellate oversight by the MassDEP.

With regard to Town activities that may impact water quality, the Town does not currently have formal policies or protocols with regard to landscape management and pest management, and has only an informal philosophy with respect to winter road maintenance.[153] Landscape management and pest management are addressed in this EAP's Land Use Section.[154] With regard to winter road maintenance, the Town's Highway Department "uses the best possible judgment to reduce the use of materials used on roads by pre-treating wherever possible and/or allowing traffic to naturally address snowfall, where safe to do so."[155]



Wachusett Reservoir Watershed Communities
Source: https://www.mass.gov/service-details/towns-affected-by-the-wspa

[152] Town of Princeton Board of Health Agriculture Regulations.

[153] Email correspondence from Nina Nazarian, Town Administrator to EAC (December 26, 2018).

[154] See EAP Land Use Section at page 70.

[155] Email correspondence from Nina Nazarian, Town Administrator to EAC (December 26, 2018).

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOAL

Protect quality of local aquifers, waterbodies, watersheds, and drinking water

Action # 1: Adopt and implement a water quality testing policy/protocol for wells that supply drinking water to Town properties.

The drinking water supply in town, including for Town buildings and at Town properties, comes from wells which could become contaminated. For the protection of public health, the Town should institute a policy/protocol that requires regular testing of all Town-owned drinking water wells.

Benefits of Action:

Protect human health.

Steps & Strategies:

1. Gather information.
2. Analyze recommendations for well water testing.
3. Draft policy/protocol.
4. Selectboard adopts policy/protocol.
5. Implement policy/protocol.

Resources Needed:

- Volunteer time and effort, including by members of the Environmental Action Committee and/or Board of Health members. Time and efforts of Town employees.
- Money for cost of well-testing.

Glass of Water, photo courtesy of Pixabay

Action # 2: Adopt and Implement a Winter Maintenance Operations Policy and Plan for all Town facilities/properties/roads.

Winter snow and ice control often involves the use of road salt and sand. As snow melts, road salt, sand, and other pollutants are transported into surface water. Salt and other pollutants may pass through the soil where they may eventually reach the groundwater. Road salt may contaminate water supplies, and is toxic to aquatic life at certain levels. In the Town of Princeton, where residential drinking water is supplied by wells, **the use of road salt and its migration to drinking water supplies presents a health risk**, particularly for individuals on sodium-restricted diets. In addition to the negative impacts to aquatic organisms, road salt can also impact wildlife, whose ingestion of the salt can lead to salt toxicity and death. Road salt also kills vegetation and can lead to soil erosion.[156] Road sand can accumulate in wetlands and ponds, impacting aquatic life, causing flooding, and affecting use of these resources.[157] Given these negative consequences related to winter maintenance, the MassDEP regulates, and offers guidance on, snow disposal and road salt storage.[158]

Storm Drain Clogged with Sand, photo courtesy of CBH

A winter maintenance policy and plan concerning snow and ice control on roads, sidewalks, and at Town-owned properties would help to ensure safety and coordination and preparation prior to the winter season. It may also help to set standards for certain activities and applications for certain materials with consideration of the balance of public safety and the environmental impact of sand and salt.

Benefits of Action:

Protect health of humans, wildlife, water ecosystems, and vegetation. Reduce the impacts of road salt and sand on water resources, including flooding risks. Ensure compliance with related state laws on snow disposal and road salt storage.

Steps & Strategies:

1. Gather information:
   - Analyze existing policies and activities of other municipalities;
   - Analyze United States Environmental Protection Agency (EPA) and/or MassDEP guidance;
   - Identify and understand the requirements of any related laws.
2. Write policy and plan.
3. Selectboard adopts policy and plan.
4. Implement policy and plan.

Resources Needed:

Volunteer time and effort, including by members of the Environmental Action Committee and/or Conservation Commission and/or Board of Health members. Time and efforts of Highway Department employees.

[156] The Patriot Ledger, "Despite environmental damage, road salt reigns in winter storms," by Mary Whitfill (Jan. 4, 2019).

[157] MassDEP, Snow Disposal Guidance.

[158] Ibid.; MassDEP Guidelines on Road Salt Storage; 310 CMR 22.21(2)(b) (restricting deicing chemical storage); 310 CMR 22.20C (prohibiting, through local bylaw, uncovered or uncontained storage of road or parking lot de-icing and sanding materials within Zone A at new reservoirs and at those reservoirs increasing their withdrawals under MGL Chapter 21G, the Water Management Act).

Action # 3: Provide information to the Town, town residents, and town businesses with regard to water well and water contaminate testing, and watershed protection.

Given that all entities in town get their drinking water from wells, which can be contaminated, it's important to public health to ensure that property owners understand well-testing recommendations and options, as well as information on why watershed protection is important for public drinking water safety. It is additionally important for residents and visitors to understand how **watershed protection is crucial for environmental health**, including productive fisheries and outdoor recreation. Furthermore, a record of periodic water quality tests can be helpful in tracing the cause of water quality changes.

Water Faucet, photo courtesy of Pixabay

EAC Fall 2017 Survey

50% of the EAC's Fall 2017 Survey respondents expressed interest in learning more about common threats to **well water quality**.

See EAC Fall 2017 Survey at Appendix 2.

Benefits of Action:
Protect human and environmental health.

Steps & Strategies:
1. Gather information.
2. Evaluate and summarize information.
3. Disseminate information on a continuing basis.

Resources Needed:
- Volunteer time and effort, including by members of the Environmental Action Committee and/or Conservation Commission and/or Board of Health members;
- Time and efforts of Town employees to post information to Town's website and/or disseminate via alternative methods.

Action # 4: Provide information to the Town, town residents, and town businesses with regard to stormwater management best practices.

Stormwater runoff, resulting from rainfall and snow melt, represents the largest source of water quality impairment to our Massachusetts water bodies.[159] Impervious surfaces "alter natural drainage features, increase peak discharge rates and volumes, reduce recharge to wetlands and streams, and increase the discharge of pollutants to wetlands and water bodies."[160] For these reasons, the **MassDEP has established Stormwater Management Standards** which are "aimed at encouraging recharge and preventing stormwater discharge from causing or contributing to the pollution of the surface waters and groundwaters of the Commonwealth."[161]

The EPA, MassDEP, and local conservation commission may require permits for certain activities that result in stormwater and point source discharges.[162] Over 200 Massachusetts communities (not including the Town of Princeton) are required to comply with federal municipal separate storm sewer system (MS4) stormwater permits.[163] The MS4 permit requires those municipalities to implement a public education and outreach program.

In an effort to reduce stormwater runoff contamination of our local water bodies, the Town of Princeton should implement a similar public outreach program. Such an **educational outreach program** might provide information such as:

- **for homeowners:** better stormwater management practices for homeowners, including related to lawn care and fertilizer/herbicide/pesticide use, the creation of rain gardens, proper management of pet waste;
- **for commercial and industrial entities:** better management of salt and de-icing materials, stormwater management for small businesses, and pollution prevention for businesses;
- **for developers:** common and effective construction best management practices, and low-impact development principles and technologies.

Town officials should also be fully educated in stormwater management best practices, and implement them as feasible.[164] A stormwater management bylaw or policy might be considered for future adoption.

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[159] Massachusetts Stormwater Handbook and Stormwater Standards available at mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards.

[160] Ibid.

[161] Ibid

[162] See Massachusetts Stormwater Handbook Vol. 1, Ch. 2, Legal Framework at mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards.

[163] EPA, "Regulated MS4 in Massachusetts Communities" (providing a map and list of all traditional and non-traditional MS4 communities and entities in Massachusetts) at epa.gov/npdes-permits/regulated-ms4-massachusetts-communities.

[164] See the Massachusetts Stormwater Handbook, which describes how to follow Massachusetts regulations governing stormwater pollution, available at mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards.

Benefits of Action:

Protect water quality, human and environmental health, and recreational opportunities.

Steps & Strategies:

1. Gather information.
2. Evaluate and summarize information.
3. Disseminate information.

Resources Needed:

- Volunteer time and effort, including by members of the Environmental Action Committee and/or Conservation Commission and/or Board of Health members;
- Time and efforts of Town employees to post information to Town's website and/or disseminate via alternative methods.

Note: MassDEP provides a guide that includes stormwater outreach materials, which can be distributed to the public.[165] The Massachusetts Statewide Municipal Stormwater Coalition also offers educational materials via their "Think Blue Massachusetts" website.[166] The Central Massachusetts Regional Stormwater Coalition also offers related educational materials.[167]

Related: Massachusetts' Division of Ecological Restoration provides Municipal Assistance Grants for municipalities interested in replacing an undersized, perched, and/or degraded culvert located in an area of high ecological value.[168]

Road Sand Infiltrating Waterway, Mirick Road, photo courtesy of CBH

[165] MassDEP, "Guide: Stormwater Outreach Materials to Help Towns Comply with the MS4 Permit" at mass.gov/guides/stormwater-outreach-materials-to-help-towns-comply-with-the-ms4-permit.

[166] thinkbluemassachusetts.org/.

[167] See centralmastormwater.org.

[168] See Massachusetts Division of Ecological Restoration "Culvert Replacement Municipal Assistance Grant Program" at mass.gov/how-to/culvert-replacement-municipal-assistance-grant-program.

WATER USE

PRESENT SITUATION

Drought and other strains on the water table can lead to water supply shortages and the depletion of local water bodies. Climate change is predicted to increase the frequency and severity of drought in Massachusetts.[169] Water supply shortages can negatively impact our water quality, wildlife habitats, ecosystems, and even our economy and quality of life. For these reasons, it's important to preserve water resources and sustain water supplies on a continuing basis, not just in times of water shortages.

There is no current Town water conservation policy or protocol. [170]

Note: the Wachusett Mountain Ski Area, which is located partially in Princeton, purchases its 100 million gallons water per year for snowmaking from the City of Fitchburg.[171]

Heron, photo courtesy of Pixabay

[169] Massachusetts Water Conservation Standards (July 2018) at pg. 2, available at mass.gov/doc/massachusetts-water-conservation-standards-2/download.

[170] Email correspondence from Nina Nazarian, Town Administrator to EAC (December 26, 2018).

[171] Worcester Business Journal, "Drought Impact Extends to Wachusett Mountain," September 26, 2016 at wbjournal.com/article/drought-impact-extends-to-wachusett-mountain.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOAL

Conserve water supplies

Action # 1: Draft and adopt a Town water use reduction policy and/or guidelines.

The Commonwealth of Massachusetts' Water Resources Commission issues Water Conservation Standards, which are statewide goals for water conservation and water-use efficiency, and provide guidance on effective conservation measures. The most recent Water Conservation Standards were issued in July 2018.[172]

The Town of Princeton should be guided by these standards, and should draft a water use reduction policy to include actions such as: regularly alerting Town employees regarding water use reduction opportunities; identifying and repairing leaks in Town-owned infrastructure; using high-efficiency plumbing fixtures and appliances in retrofits and new construction; implementing best practices for reduction of water use in garden and landscaping at Town-owned properties, including through the utilization of captured stormwater and the implementation of "green" stormwater retrofits on Town buildings as feasible and cost-effective.

Benefits of Action:

Protection of water supplies and associated water quality, wildlife habitats, ecosystems, recreational opportunities, and quality of life.

Steps & Strategies:

1. Gather information:
   - Analyze existing water use;
   - Identify measures where the greatest efficiencies and potential savings can be realized.
2. Draft policy/protocol.
3. Selectboard adopts policy/protocol.
4. Implement policy/protocol.

Resources Needed:

- Volunteer time and effort, including by members of the EAC and/or Board of Health members;
- Time and efforts of Town employees;
- Money for implementation of policy actions, as available.

Note: The Massachusetts Water Resources Authority (MWRA) provides water conservation educational brochures (bill stuffer sized) for local distribution. PDFs of the brochures are also available for free download.[173]

[172] Massachusetts Water Conservation Standards, available at mass.gov/doc/massachusetts-water-conservation-standards-2/download.

[173] Massachusetts Water Resources Authority "Water Conservation and Efficiency"--"Indoor Water Conservation Bill Insert" and "Outdoor Water Conservation Bill Insert" available at www.mwra.com/comsupport/waterconservationmain.htm.

Action # 2: Provide information to Town, town residents, and town businesses regarding water conservation benefits and options.

Water use can lead to water supply shortages that can negatively impact water quality, wildlife habitats, ecosystems, recreational opportunities, and quality of life. **Town residents and the environment will benefit from educational outreach** regarding state and local water drought levels, the risks and negative consequences of low water supply, as well as water conservation measures and related benefits. Such Town outreach might also include facilitation of and/or information regarding local sale of rain barrels to town property owners.[174]

Benefits of Action:

Protection of water supplies and associated water quality, wildlife habitats, ecosystems, recreational opportunities, and quality of life.

Steps & Strategies:

1. Gather information about water conservation options and benefits.
2. Evaluate and summarize information.
3. Disseminate information to Town, plus residents and businesses.

Resources Needed:

- Volunteer time and effort, including by members of the Environmental Action Committee and/or Conservation Commission and/or Board of Health members;
- Time and efforts of Town employees to post information to Town's website and/or disseminate via alternative methods.

Rain Barrels, photo courtesy of Jennifer C. via Flickr, CC license

[174] See, for example, Town of Rutland Rain Barrel Program at greatamericanrainbarrel.com/community/rutland/.

AIR QUALITY

PRESENT SITUATION

Outdoor and indoor air pollution can increase the risk of stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma.[175] Outdoor air pollutants also contribute to smog, acid rain, and other environmental problems. Outdoor air pollutants are regulated under the federal Clean Air Act[176] with National Ambient Air Quality Standards[177] established for six common air pollutants: ground level ozone; particle pollution; carbon monoxide; lead; sulfur dioxide; and nitrogen dioxide. MassDEP outlines and implements plans for how the Commonwealth will meet federal standards, and it also enforces its own ambient air quality standards.[178]

Contributors of outdoor air pollutants in town include fossil-fuel and wood-burning energy sources, vehicle emissions, and emissions from other fossil-fueled machinery and tools. Some of these emissions are addressed in the EAP's Energy Section.[179] Air pollutants from out-of-town contributors also impact the air quality in town, including from, among many other sources, the Fitchburg-Westminster Landfill and Pinetree Power Fitchburg Inc. (a biomass burning power plant).

Potential sources of indoor air pollution include: improper storage or usage of chemicals; bird waste; indoor ozone; radon; latex; mold, moisture, and mildew; mercury spills; construction/renovation pollutants in occupied buildings; ventilation system issues; PCBs (Polychlorinated Biphenyls) in (older) building materials; pressure-treated wood used in playground equipment; TCE (Trichloroethylene) - found in adhesives, paint removers, varnishes, etc.[180]

The age and condition of Town-owned buildings, including stone foundations, water damage, and lack of ventilation,[181] indicates a potential risk of indoor air pollution. It is uncertain whether there has been air quality testing performed in Town buildings (other than TPS) at any time in the past, however, it is known that there has not been air quality testing in Town-owned buildings (other than TPS) in at least the last five years.[182] In light of a 2011 detection of PCBs in

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[175] World Health Organization, "Ambient (Outdoor Air) Quality and Health" at who.int/airpollution/ambient/health-impacts/en/.

[176] United States Code, Title 42, Chapter 85.

[177] See NAAQS Table at epa.gov/criteria-air-pollutants/naaqs-table.

[178] 310 C.M.R. 6.00.

[179] See, e.g., EAP "Energy & Transportation" section at page 11.

[180] See MassDEP, Indoor Air Quality Program, "Sources of Indoor Air Pollution" at mass.gov/sources-of-indoor-air-pollution.

[181] Town of Princeton Needs Assessment & Buildings Master Plan, March 2018 at pg.19 (Bagg Hall water damage, peeling paint), pg. 30 (Bagg Hall, no ventilation system), pg. 44 (Annex, water damage, possible mold in carpet), pg. 47 (Annex, water leaks into interior wall), pg. 49-50 (Annex, has a ventilation system but meeting room needs better ventilation), pg. 59 (Public Safety Building, could be soil contamination from years of vehicle use), pg. 67 (Public Safety Building, some water damage in vehicle bays), pg. 68 (Public Safety Building, rotted wood), pg. 69 (Public Safety Building, chloride damage and humidity), pg. 76-77 (Public Safety Building, substandard or lacking ventilation (lacking fresh air)).

[182] Email correspondence from Nina Nazarian, Town Administrator to EAC (July 18, 2018).

building materials at the Town-owned TPS, annual air quality monitoring for PCB contaminants is conducted at TPS.[183] This air quality monitoring is coordinated through the WRSD (not the Town).[184]

The Town does not otherwise have a policy or protocol for regular indoor air quality testing in Town-owned buildings.[185]

Town Hall and Library, photo courtesy of CS

[183] See Plans & Documents: Thomas Prince PCB Information at wrsd.net.

[184] Ibid.

[185] Email correspondence from Nina Nazarian, Town Administrator, to EAC (December 26, 2018).

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOAL

Reduce human and environmental exposure to indoor and outdoor air pollutants

Action # 1: Test indoor air quality of Town-owned buildings for indoor air pollutants, and remediate / address as necessary and cost-effective

With short- and long-term health effects related to indoor air pollutants ranging from irritation to aggravation of respiratory diseases, to heart disease, and cancer,[186] **potential sources of indoor air pollution in Town buildings should be identified and eliminated as possible**.

Benefits of Action:

Protect the health of Town employees, town volunteers, town residents, and town visitors using Town-owned buildings from exposure to unhealthy levels of indoor air pollutants.

Steps & Strategies:

1. Gather information:
   - Via the Board of Health, contact the Radon Assessment Unit (RAU) of the the Massachusetts Department of Public Health's (MDPH) Bureau of Environmental Health (BEH), which advises on radon testing;[187]
   - Via the Board of Health, contact MassDEP Indoor Air Quality Program (IAQ) to perform an inspection of air quality in Town-owned buildings. (IAQ will then provide a report with air quality results and recommended remedial actions.)[188]
2. Test for indoor air pollutants:
   - Appoint and educate Town employee(s) to conduct radon testing, and conduct radon testing;
   - IAQ to perform inspection of air quality in Town-owned buildings.
3. Remediate any actionable radon levels and/or other indoor air pollutant issues, as necessary and cost-effective.

Resources Needed:

- Fees for RAU consultation;
- Town Board of Health employee, volunteer or consultant to perform radon testing;
- Cost of remediation if necessary.

Note: The EPA provides State Indoor Radon grants. If radon remediation is necessary, the Town might pursue information through RAU about any possible funding opportunities.[189]

[186] EPA, "Introduction to Indoor Air Quality: Indoor Air Pollution and Health" at epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality.

[187] RAU contact information is available at mass.gov/radon.

[188] IAQ contact information is available at mass.gov/orgs/indoor-air-quality-program.

[189] EPA State Indoor Radon Grant Program with information available at epa.gov/radon/state-indoor-radon-grant-sirg-program.

Action # 2: Draft and adopt a townwide vehicle idling reduction policy and best management practices for Town-owned vehicles in order to improve fuel efficiency and reduce driver and citizen exposure to emissions.

Massachusetts statutory law and MassDEP regulations prohibit, with exemptions, the idling of all vehicle engines for a "foreseeable period of time in excess of five minutes."[190] **Vehicle idling can be a significant source of air pollution** with vehicle emissions of carbon monoxide, sulfur dioxide, nitrogen dioxide, benzenes, formaldehyde, polycyclic hydrocarbons, and particulate matter.[191] These vehicle emissions are a large contributor to ground-level ozone and global warming. They also can cause serious health effects ranging from lung irritation to aggravation of respiratory diseases such as asthma.[192] Vehicle idling also wastes fuel (and money), and it can cause damage to vehicles.[193]

Adoption of a townwide vehicle idling reduction policy that includes institution of best management practices for Town-owned vehicles will not only help to reduce local air pollution, global warming, and emissions-related health issues, but will also establish the Town as an example and leader in these efforts.

Benefits of Action:

Reduced ambient air pollution; decrease in greenhouse gas emissions; public health protection.

Steps & Strategies:

1. Gather information.
2. Draft policy and best management practices.
3. Present to Selectboard for adoption.
4. Implement policy and best management practices.

Resources Needed:

Volunteer time and effort, including by members of the Environmental Action Committee and/or Board of Health members. Time and efforts of Town employees.

Note: As a relevant resource, the EPA provides a "Compilation of State, County, and Local Anti-Idling Regulations."[194] MassDEP also provides communities with "Idling Reduction Toolkits."[195]

Cars idling at Thomas Prince School, photo by CBH

[190] Mass. Gen. L. c. 90, sec. 16A and 310 CMR 7.00.

[191] University of Massachusetts Motor Vehicle Idling Policy at ehs.umass.edu/motor-vehicle-idling-policy.

[192] See MassDEP Fact Sheet: "Engine Idling: Impacts on Your Health & the Environment" at mass.gov/doc/massdep-fact-sheet-engine-idling-impacts-on-your-health-the-environment/download.

[193] MassDEP, "Vehicle Emissions & Inspections: Engine Idling Reduction" at mass.gov/guides/transportation-air-quality#engine-idling-reduction.

[194] EPA, "Compilation of State, County, and Local Anti-Idling Regulations" at epa.gov/sites/production/files/documents/CompilationofStateIdlingRegulations.pdf. See also the Pioneer Valley Planning Commission publication entitled "Idling Reduction Campaign & Program," which provides a step-by-step guide for local government anti-idling action, available at pvpc.org/sites/default/files/files/PVPC-Idling%20Reduction%20Campaign%20%26%20Program.pdf.

[195] See MassDEP Idling Reduction Toolkit at mass.gov/files/documents/2016/08/uj/depirkit.pdf.

Action # 3: Provide information to Town, town residents, and town businesses on indoor and outdoor air pollutants, health effects of indoor and outdoor air pollutants, indoor air pollutant testing, and indoor and outdoor air pollutant remediation / reduction.

Given the impacts of indoor and outdoor air pollution on human and environmental health,[196] town residents and the environment will benefit from educational outreach regarding such impacts and how to avoid and remediate them. Such Town outreach might also include an idling reduction campaign.

Benefits of Action:
Reduced indoor and ambient air pollution; decrease in greenhouse gas emissions; public health protection.

Steps & Strategies:
1. Gather information.
2. Evaluate and summarize information.
3. Disseminate information.

Resources Needed:
- Volunteer time and effort, including by members of the Environmental Action Committee and/or Board of Health members;
- Time and efforts of Town employees to post information to Town's website and/or disseminate via alternative methods.

Wood burning, photo courtesy of Pixabay

[196] See discussion on health impacts from air pollution in "Air Quality, Present Situation" at page 61.

CLIMATE CHANGE PREPAREDNESS

PRESENT SITUATION

The Intergovernmental Panel on Climate Change (IPCC), an objective source of international scientific information, has concluded that "**climate change is real and human activities are the main cause**."[197] Human activities from industrialization, deforestation, and large scale agriculture contribute to, and result in, a cumulative level of greenhouse gas emissions (including, among other gases, carbon dioxide, methane, nitrous oxide, and ozone). In the Earth's atmosphere, these accumulated greenhouse gases absorb and reradiate the Earth's outgoing heat radiation,[198] causing a rise in the average global temperature on Earth.[199] (This is similar to how a greenhouse works, and is why gases that exhibit this effect are called "greenhouse gases.") This increase in the average global temperature is resulting in, and will result in, climate change.[200] Among the many observed and projected impacts from climate change are negative impacts to freshwater resources, ecosystems, sea level rise, coastal erosion, human health, and more frequent and more intense extreme weather events.[201]

In Princeton, it is expected that total precipitation in 2050 will increase by about 10% compared to the early 2000s, and the average temperature will increase by about 6° F, with Princeton experiencing 5 to 8 days over 95° F compared to less than one day over that temperature today.[202] For a table of current and projected climate statistics for Princeton, see "Additional Background, Climate Change" (page 101).

In order to limit these negative consequences, international,[203] national, state,[204] and local governments are working to address climate change through several means, including the reduction of greenhouse gas emissions, as well as climate change vulnerability preparedness.[205] (See EAP, Energy & Transportation Section for more information regarding greenhouse gas emission reduction related to energy at page 11.) **In Massachusetts, the Municipal Vulnerability Preparedness grant program (MVP) provides support for municipalities "to begin the process of planning for climate change resiliency and implementing priority projects**." Through this

[197] See IPCC Sixth Assessment Report at ipcc.ch/assessment-report/ar6/.

[198] United Nations Framework Convention on Climate Change, "Fact Sheet: Climate Change Science--the status of climate change science today" at unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf.

[199] See United Nations "Climate Change" at un.org/en/sections/issues-depth/climate-change/index.html.

[200] Ibid.

[201] Ibid.

[202] resilientma.org/map/; For a table of current and projected climate statistics for Princeton, see "Additional Background, Climate Change" at page 101.

[203] See, for example, the Kyoto Protocol and the Paris Agreement.

[204] See, for example, the Massachusetts Global Warming Solutions Act, Mass. Gen. L. c. 298. See also Governor Baker's Executive Order 569 which directs state agencies "coordinate efforts across the Commonwealth to strengthen the resilience of communities, prepare for the impacts of climate change, and proactively plan for and mitigate damage from extreme weather events, including publishing a climate adaptation plan that outlines a statewide strategy to address these impacts through adaptation and resiliency measures and policies." See also the 2018 Environmental Bond Bill, Mass. Gen. L. c. 209, "An Act Promoting Climate Change Adaptation, Environmental and Natural Resource Protection, and Investment in Recreational Assets and Opportunity." See also Massachusetts State Hazard Mitigation and Climate Adaptation Plan (September 2018) at mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan.

[205] See EAP, "Energy & Transportation" Section for more information regarding greenhouse gas emission reduction related to energy at 11.

program, the Commonwealth provides communities with funding to complete vulnerability assessments and develop action-oriented resiliency plans. Communities who complete the MVP program become certified as an MVP community and are eligible for MVP Action grant funding and other opportunities.[206] Among other things, **the MVP program helps communities to:**

- Define extreme weather and natural and climate-related hazards;
- Understand how their community may be impacted by climate change through a Massachusetts-specific climate change clearinghouse with the latest science and data;
- Identify existing and future vulnerabilities and strengths;
- Develop and prioritize actions for the community;
- Identify opportunities to take action to reduce risk and build resilience;
- Implement key actions identified through the planning process.[207]

As of October 2018, of the 351 Massachusetts communities, there are 74 designated MVP communities, with another 83 completing MVP planning grants for FY 18-19. **In 2018, the state awarded more than $2 million in state grant funding to 82 municipalities through the MVP program**. Among those 2018 grant award recipients were the Central Massachusetts communities of Auburn, Brookfield, Clinton, Harvard, Hudson, Leicester, Marlboro, Sutton, Uxbridge, West Boylston and Worcester.[208]

In December 2016, Princeton's Selectboard certified the "**Princeton Hazard Mitigation Plan**," prepared by CMRPC. This plan "identifies the natural hazards facing the Town of Princeton, assesses the vulnerabilities of the area's critical facilities, infrastructures, residents, and businesses, and presents recommendations on how to mitigate negative effects of typical natural hazards." The plan addresses how climate change is projected to impact Princeton, including through the impacts of more severe weather.[209]

Storm damage, photo courtesy of CS

[206] See Massachusetts Executive Office of Energy and Environmental Affairs Municipal Vulnerability Preparedness (MVP) program at mass.gov/municipal-vulnerability-preparedness-mvp-program.

[207] Ibid.

[208] Government Technology, "11 Massachusetts Communities Receive Grants to Prepare for Climate Change" at govtech.com/em/disaster/11-Central-Mass-Communities-Receive-Grants-to-Prepare-for-Climate-Change.html.

[209] See "Princeton Hazard Mitigation Plan," Certified by Board of Selectmen, December 27, 2016, Prepared by CMRPC.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOAL

Plan for climate change resiliency and implement related priority projects

Action # 1: Apply for a planning grant and/or action grant through Massachusetts' Municipal Vulnerability Preparedness grant program.

With observed and projected impacts of global climate change, **the Town should begin the process of planning for climate change resiliency** by: identifying how climate change might impact the Town, town residents, town businesses, and town visitors; assessing climate change-related vulnerabilities; and developing action-oriented resiliency plans.

An MVP Planning Grant can be used to complete a Town climate change assessment and resiliency plan, and become certified as an MVP Community. Once certified as an MVP Community, the Town is eligible for an MVP Action Grant.[210] An MVP Action Grant can fund projects such as: a detailed vulnerability and risk assessment; public education and communication on climate change impacts; the development of local bylaws and management measures; redesign and retrofit of vulnerable Town facilities and infrastructure; nature-based green infrastructure projects to address storm-damage protection, drought prevention, water quality, and water infiltration; green infrastructure projects to reduce vulnerability to extreme heat and poor air quality; nature-based projects to address other climate change impact vulnerabilities; and ecological restoration and habitat management to increase resiliency such as right-sizing culverts, invasive species removal, and other natural resource management projects.

Ice Storm Repair, photo courtesy of CS

[210] For a discussion on these grant opportunities, see "Climate Change Preparedness, Present Situation" at page 66.

ENVIRONMENTAL ACTION PLAN, PRINCETON, MA

Benefits of Action:

Reduce the impact of climate change to humans and the environment. Reduce the economic impact of municipal climate change impact-related vulnerabilities.

Steps & Strategies:

1. Apply for grants:
   - For Planning Grants: Respond to the Massachusetts Executive Office of Energy and Environmental Affairs (EOEA) Request for Responses (RFR) with a proposal that includes RFR-specified information such as: a statement of commitment; a summary of community support and partners; a description of ongoing planning efforts such as the Town's open space plan and master plan; a description of the Town's need to address climate change and expected impacts; etc.[211]
   - For Action Grants: Respond to the EOEA RFR with a proposal that includes RFR-specified information such as: a copy of priority actions identified in MVP plans/reports; a narrative describing the MVP process; a project timeline and priorities; project budget and deliverables.[212]
2. If a grant recipient, implement grant proposal:
   - If a Planning Grant recipient, provide quarterly reporting and a final report.
   - If Action Grant recipient, provide monthly updates, project deliverables, a yearly progress report, a final project report, and a brief project summary communicating lessons learned.

Resources Needed:

- Volunteer time and effort, including by members of the Environmental Action Committee and Selectboard;
- Time and efforts of Town employees;
- For MVP Action Grant projects, a match of 25% of the total project cost using cash or in-kind contributions.

Note: Much information to guide in these endeavors can be found at "Resilient MA—A Climate Change Clearinghouse for the Commonwealth."[213] The Town can choose and utilize an MVP Certified Provider who can provide the Town with technical assistance.

Ice Storm 2008, photo courtesy of CBH

[211] mass.gov/service-details/mvp-planning-grant.

[212] Ibid.

[213] resilientma.org.

LAND USE

OVERALL GOALS

RURAL CHARACTER, VISTAS, OPEN SPACE, AND OUTDOOR RECREATION

Maintain the rural character of Princeton

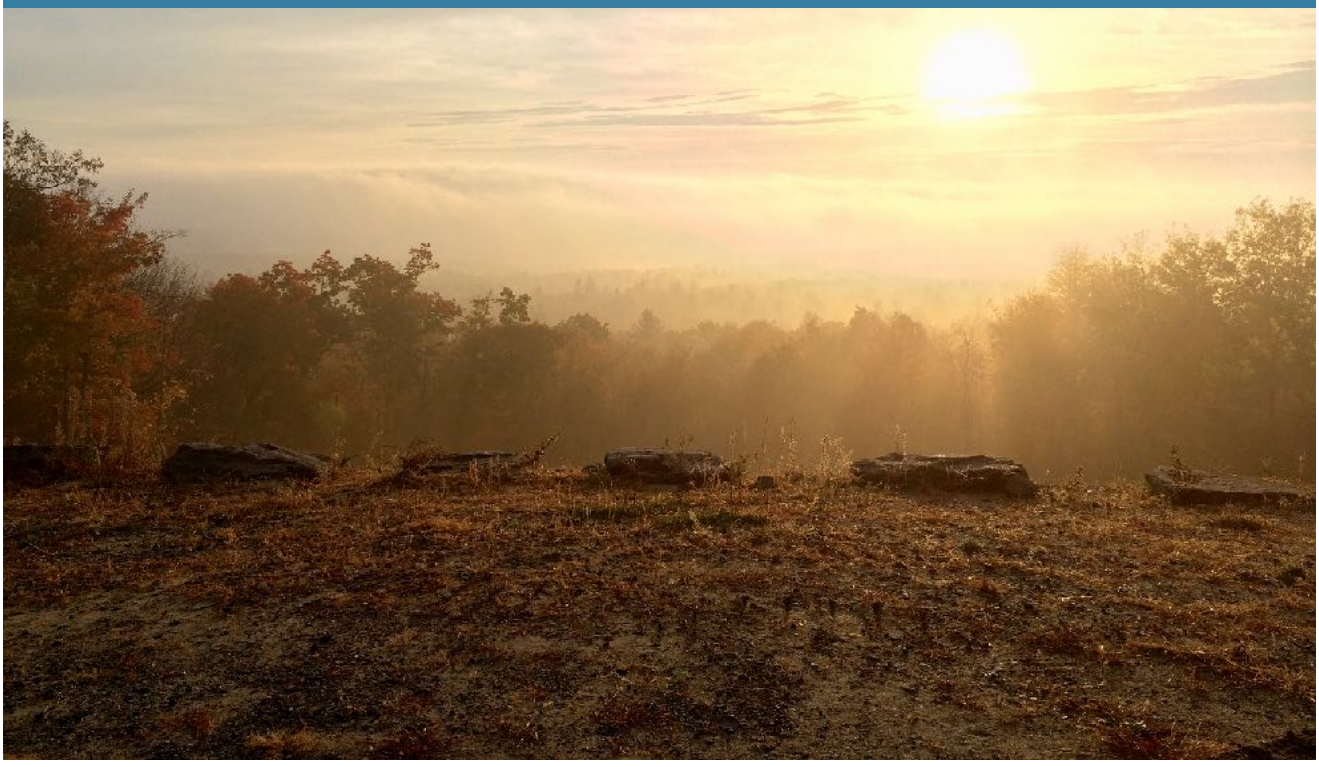
Maintain or improve public and environmental health

AGRICULTURE, PEST, AND LANDSCAPE MANAGEMENT

Support sustainable local agriculture

Reduce the use of toxic chemicals on public and private lands

Encourage the control of invasive pests and disease in sustainable ways



Sunrise from Mountain Road, photo courtesy of CS

RURAL CHARACTER, VISTAS, OPEN SPACE, AND OUTDOOR RECREATION

PRESENT SITUATION

The town of Princeton has rural character composed of forest, trees, agricultural fields, stone walls, and vistas. The Princeton Town Plan (2007) (the Town Plan) identifies "rural character" as the main defining characteristic of the town.[214] The Town Plan seeks to "[m]aintain the country qualities of Princeton" by preserving this character. Land use goals identified in the Town Plan include: maintenance of scenic vistas; physical use of connected hiking trails; protection of an environment that "sustains wildlife;" and "[s]trengthen[ing] Princeton's role as a leader in ecological and environmental concern."[215]

As of 2005, available data suggested that about 9,000 acres, or 40% of the town, was subject to some form of restriction that prohibits or severely limits the potential for future development.[216] The Massachusetts Department of Conservation and Recreation (MassDCR), Mass Audubon, the Princeton Land Trust, and the Town own much of the Town's designated open space land.

With regard to land use and open space and natural resources, the Town Plan provides an analysis of existing conditions, local and regional trends, past research, challenges and opportunities, and recommendations.[217] **The Town of Princeton Open Space and Recreation Plan Update** (2014) provides both a detailed "Environmental and Cultural Inventory and Analysis" of land within the town and a thorough "Inventory of Lands of Conservation and Recreation Interest" within the town.[218] It also identifies community goals with regard to open space and recreation.[219]

Land use in the town is governed by both state and local regulations. Locally, the following Town committees are tasked with land-use related governance: Planning Board; Zoning Board of Appeals; Board of Health; Parks and Recreation Department; Agricultural Commission; Open Space Commission; Conservation Commission.

EAC Fall 2017 Survey

Results of the EAC Fall 2017 Survey indicate that **town residents continue to wish to maintain the town's rural character**. More than 30% of Survey respondents identified "rural character" and "open space" as one of their "top three priorities" for Town action under a Town Environmental Action Plan (EAP). Nearly 70% of Survey respondents said they "valued" and wanted to preserve open space, nature and wildlife in town.

See EAC Fall 2017 Survey at Appendix 2.

[214] Princeton Town Plan (Adopted by the Princeton Planning Board on September 19, 2007).

[215] Ibid., Chapter 1, Introduction.

[216] Princeton Town Plan (2007), Chapter 2, Land Use Element, page 11.

[217] Ibid., Chapters 2 and 3.

[218] Town of Princeton Open Space and Recreation Plan Update (2014), Section 4 and Section 5.

[219] Ibid., Sections 6 to 9.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS Maintain the rural character of Princeton

Maintain or improve public and environmental health

Mount Wachusett Goldfish Pond, photo courtesy of CS

Action #1: Consider adopting the Community Preservation Act (CPA).

The Town Plan also recommends adoption of the Community Preservation Act (CPA).[220] The CPA (Mass. Gen. L. c. 44B) is a smart growth tool that helps communities preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities.[221] Adoption of the CPA would allow Princeton to create—through the imposition of a surcharge of the tax levy against real property—a local Community Preservation Fund for open space protection, historic preservation, affordable housing and outdoor recreation.[222]

Once Princeton adopts the CPA, it would be entitled to distributions from the Commonwealth's Community Preservation Trust Fund.[223] As of November 2018, 175 (of 351 total) Massachusetts communities had adopted the CPA, including the neighboring municipalities of Hubbardston, West Boylston, Templeton, Phillipston, and Royalston.[224] In November 2018, 172 communities received $24.48 million in distributions from the Community Preservation Trust Fund.[225]

Hiking on Mt. Wachusett, photo courtesy of Jean Green

Benefits of Action:

Help maintain rural character of town. Preserve open space. Develop outdoor recreational facilities.

Steps & Strategies:

1. Gather information on pros and cons of CPA adoption.
2. Provide information to town residents on pros and cons of CPA adoption.
3. Gather information on town resident opinion on adoption of CPA.
4. Reach conclusion and recommendation on CPA adoption. If recommend:
   - Adopt CPA through passage of a ballot question at the voting booth, accomplished by either (a) Town Meeting Warrant Article vote, or (b) citizen's ballot question petition;
   - Create a five-to-nine-member local Community Preservation Committee to make recommendations on CPA projects to the Town Selectboard.

Resources Needed:

Volunteer time and effort, including by Planning Board and/or Environmental Action Committee members and/or Open Space Committee members.

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[220] Princeton Town Plan (2007), Chapter 3, page 55.

[221] See. Mass. Gen. L. c. 44B.

[222] Ibid.

[223] Ibid.

[224] See Community Preservation Coalition at communitypreservation.org.

[225] Ibid. See also the Wildlands and Woodlands regional initiative that "calls for a 50-year effort to conserve 70 percent of New England as forest permanently free from development, plus at least 7 percent of New England as farmland" in an effort to conserve lands that "will continue to power the region's traditional land-based economy and provide irreplaceable environmental and social benefits for current and future generations." (wildlandsandwoodlands.org/home).

Action #2: Consider adoption of the Scenic Roads Act and related bylaws to implement it.

The Town Plan identifies the goals of "maintaining the country qualities of Princeton by preserving the trees, stone walls, agriculture fields, tree-lined roads, vistas and historic homes."[226] The Town Plan also recommends consideration of adoption of the Scenic Roads Act.[227] By adopting the Scenic Roads Act (Mass. Gen. L. c.40, Section 15C), the Town would gain authority to classify roads as "scenic roads" (through Town Meeting vote) and to regulate tree or stone wall removal along such designated ways.[228]

Benefits of Action:
Help maintain rural character of town. Prevent or reduce tree cutting. Prevent or reduce stone wall removal.

Steps & Strategies:

1. Gather information on pros and cons of Scenic Roads Act adoption.
2. Provide information to town residents on pros and cons of Scenic Roads Act adoption.
3. Gather information on town resident opinion on adoption of Scenic Roads Act adoption.
4. Reach conclusion and recommendation on Scenic Roads Act adoption. If recommend:
   - Adopt Scenic Roads Act via Town Meeting Warrant Article vote;
   - Draft and Adopt Scenic Roads Bylaw via Town Meeting Warrant Article vote.

Resources Needed:
Volunteer time and effort, including by Planning Board and/or Environmental Action Committee members and/or Open Space Committee and/or Historical Commission members.

Westminster Road, photo courtesy of CG

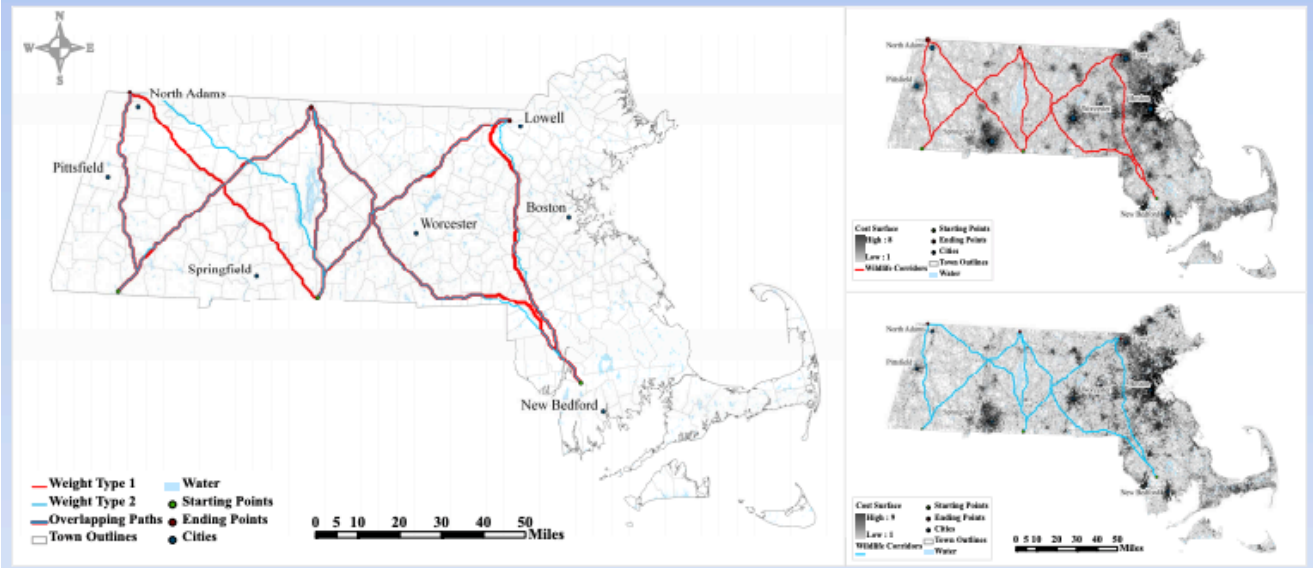
[226] Princeton Town Plan (2007), Chapter 1, page 6.

[227] Ibid., Chapter 3, page 56.

[228] See Mass. Gen. L. c. 40, Section 15C.

Action #3: Investigate need for adoption of a Wildlife Corridor Management Policy and/or Overlay Zoning District.[229]

The Town Plan identifies a land use goal of providing an environment that "sustains wildlife."[230] Wildlife depends on conservation, protection, and management of habitats of species.[231] Due to the town's relatively rural nature and large tracts of connected land, the town has an important wildlife presence. Wildlife in town includes all the largest mammals present in the state, from moose to bear and bobcat to deer. Eagles and loons can be found where there are bodies of water large enough to support them. Massachusetts Division of Fisheries and Wildlife (MassWildlife) has documented 23 rare, threatened, or endangered species in the town, including plants, birds, amphibians, reptiles, insects, and mammals.[232] The Town's Open Space Plan has recognized the importance of wildlife corridors of "adequate size to enhance the survival of Princeton's wildlife."[233] In planning for an expected migratory response of species to climate change, a Tufts University study has identified potential wildlife corridors in Massachusetts, including corridors that bypass through the land in the town of Princeton.[234]



The maps above show wildlife corridors travelling from three points in the south of the state to three points in the north of the state. The red corridors weight population density as 50% of the calculation whereas the blue corridors weight land cover as 50% of the calculation. The smaller maps display the cost surfaces that were used to derive the corridors. While the paths are often extremely similar they do differ in a number of places, such as the two paths travelling from the south-central point to the north-western point, which are extremely different.

Source: sites.tufts.edu/gis/files/2013/02/Hardy_Abby.pdf, cartographer, Abby Hardy

[229] See for example, Town of Falmouth Massachusetts, Wildlife Corridor zoning ordinance (ecode360.com/9075574).

[230] Princeton Town Plan (2007), Chapter 1, page 6.

[231] 2015 Massachusetts State Wildlife Action Plan.

[232] Massachusetts Division of Fisheries and Wildlife, "Rare Species by Town Viewer", Town of Princeton. See also MassWildlife's Natural Heritage and Endangered Species Program, List of Endangered, Threatened, and Special Concern Species at mass.gov/info-details/list-of-endangered-threatened-and-special-concern-species.

[233] Town of Princeton Open Space and Recreation Plan Update 2014, page 13.

[234] Tufts University Department of Urban and Environmental Policy and Planning, "Identifying potential wildlife corridors in Massachusetts: Planning for migratory response to climate change" (April 30, 2008).

Adoption of a Wildlife Corridor Management Policy and/or Wildlife Corridor Overlay Zoning District by the Town would serve the purpose of establishing and protecting permanent and contiguous corridors and special areas for wildlife habitat, range, and migration.

Benefits of Action:

Increase protection for wildlife, wildlife habitats, ranges, and migration corridors.

Steps & Strategies:

1. Gather information on, and review examples of municipal Wildlife Corridor Management policies and/or Wildlife Corridor zoning.
2. Work with entities such as MassWildlife, the MassDEP, the MassDCR, Tufts University, other local universities, Mass Audubon, etc. to identify and specify potential and significant wildlife corridors in the town of Princeton.
3. If deemed necessary/desired, draft and adopt Wildlife Corridor Management policies and/or Wildlife Corridor zoning via Town Meeting Warrant Article vote. (Such policy and/or zoning might identify wildlife corridors, suggest or limit uses in such identified corridors, identify parcels for potential purchase for protection and/or provide information to property owners.)

Resources Needed:

Volunteer time and effort, including by Environmental Action Committee members and/or Open Space Committee members and/or Conservation Commission members.

View from Crow Hill, photo courtesy of CG

Bull Moose, Mirick Rd, photo courtesy of CBH

Action #4: Adopt an Outdoor Lighting Ordinance.

Certain lighting technologies and installations may result in excessive glare, light trespass, high energy use, and nighttime light pollution. Maintaining the town of Princeton's "rural character" includes ensuring minimal light pollution in the night sky. Nighttime light pollution not only limits visibility of the night sky and enjoyment of outdoor activities, but may interfere with circadian rhythms of plants and animals, including humans.[235] Adoption of an Outdoor Lighting Ordinance would provide restrictions such as that on lighting wattages and lumens, the direction of lighting, and the area that certain kinds of outdoor lighting fixtures can illuminate.[236] Forty-one percent of EAC Fall 2017 Survey respondents expressed concern about light pollution in Princeton.[237]

Benefits of Action:

Increase protection for wildlife and human health. Maintain town's rural character.

Steps & Strategies:

1. Gather information on, and review examples of, outdoor lighting ordinances.
2. Draft Outdoor Lighting Ordinance.
3. Adopt Outdoor Lighting Ordinance via Town Meeting Warrant Article vote.

Resources Needed:

Volunteer time and effort, including by Environmental Action Committee and Board of Health members.

Sunset Near Wachusett Meadow, photo courtesy of CBH

[235] nationalgeographic.com/science/2019/04/nights-are-getting-brighter-earth-paying-the-price-light-pollution-dark-skies/.

[236] See for example, Town of Nantucket, Massachusetts, Outdoor Lighting ordinance (Chapter 102). (ecode360.com/11470851).

[237] EAC Fall 2017 Survey at Appendix 2.

Action #5: Adopt a Noise Ordinance.

MassDEP regulates noise at 310 CMR 7.10. Those regulations are broad and reference certain "prolonged unattended" sounds.[238] A MassDEP policy more specifically provides for enforcement of the MassDEP noise regulation against sources that increase the broadband sound level or sound pressure level by certain specified decibels (dB).[239] The MassDEP regulations are enforceable by municipal police departments, fire departments, and boards of health.[240] Decibel level compliance may be difficult to measure and enforce. Perhaps for this reason, among others, many Massachusetts municipalities also have their own noise ordinances. Such noise ordinances commonly restrict, among other things, hours for loud noises. For example, some municipal ordinances provide for restrictions on "unnecessary, loud, excessive, or unusual noises" in the operation of certain devices and during specified hours.[241] Restricting to specified hours certain loud noises, with exceptions, would help to protect the "rural character" of the town of Princeton and the health, safety, and quality of life of residents and visitors, as well as the health of wildlife.

Photo courtesy of Pixabay

EAC Fall 2017 Survey

Nearly half (48%) of EAC Fall 2017 Survey respondents expressed concern about noise pollution within the town. This was also a frequent topic mentioned in the free-text "further comment" areas of the survey (e.g., "Excessive road noise reduces my quality of life in Princeton" and "Motorcycle noise needs to be addressed" and "Motorcycles, argh!").

See EAC Fall 2017 Survey at Appendix 2.

Benefits of Action:
Increase protection for wildlife, human health, and quality of life. Help maintain town's rural character.

Steps & Strategies:
1. Gather information on, and review examples of noise ordinances.
2. Draft Noise Ordinance.
3. Adopt Noise Ordinance via Town Meeting Warrant Article vote.

Resources Needed:
Volunteer time and effort, including by Board of Health and Environmental Action Committee members.

[238] 310 CMR 7.10.

[239] Massachusetts Department of Environmental Protection, Division of Air Quality Control, Policy 90-001 (February 1, 1990).

[240] See 310 CMR 7.52.

[241] See, for example, Town of Plymouth, MA, Noise Ordinance, Chapter 120.

AGRICULTURE AND PEST AND LANDSCAPE MANAGEMENT

PRESENT SITUATION

Agriculture

The town's history, "rural character," and bucolic appeal includes agricultural land.[242] Attention to the town's agriculture is important for aesthetics, economics, public and environmental health.

Agriculture in the town is currently overseen by the Town's Board of Health, Conservation Commission, and Agricultural Commission.

The town is a Massachusetts Right-to-Farm Community with an Agriculture Preservation Restriction (APR) program for large farms that protects land from being developed for non-agricultural purposes.[243] The Town adopted a Farm Preservation By-Law at the October 2007 Special Town Meeting.[244] This by-law emphasizes citizen right to farm "with minimal conflict with abutters and local agencies."[245]

Farms in Princeton are generally small, and include hay farms and a variety of other niche farms and market gardens.[246] A mix of organic and traditional/chemical methods are being used by Princeton's farmers.[247] Overseen by the Town Agricultural Commission, a small farmer's market is held periodically in the center of town.

Photo courtesy of CS

[242] Princeton Princeton Town Plan (2007), page 42.

[243] Massachusetts Association of Agricultural Commissions, Map of Massachusetts Right to Farm Communities at massagcom.org/AgComs.php. Executive Office of Energy and Environmental Affairs, Agriculture Preservation Restriction (APR) Program Details at mass.gov/service-details/agricultural-preservation-restriction-apr-program-details.

[244] Town of Princeton Farm Preservation Bylaw at https://www.town.princeton.ma.us/sites/princetonma/files/uploads/farm_preservation_bylaw.pdf.

[245] Ibid. (Chapter XVIII), Section 1.

[246] EAC communication with Walt Gowey, Chair of Town of Princeton Agricultural Commission, May 21, 2018. See also: princetonagcom.wordpress.com/list-descriptions/.

[247] EAC communication with Walt Gowey, Chair of Town of Princeton Agricultural Commission, May 21, 2018.

Pest and Landscape Management

Town-owned land is managed by the Town's Highway Department, Parks and Recreation Commission, and the Cemetery Department/ Commission. A third-party vendor also manages some of the Town's public spaces, in consultation with the Town. **The Town does not currently have any formal policies or protocols with regard to landscape maintenance** (i.e., plantings and fertilizer application) or pest management (including herbicide, pesticide, or organic supplement application).[248] Town departments/ commissions report that they have conducted soil testing to determine amendments needed and have applied a mix of conventional and organic fertilizer, as well as pesticides and herbicides.[249] Limited fertilizer (but no pesticide) applications are allowed on the playing fields located at Thomas Prince School (TPS) because they are within the zone of protection for the school's public water supply.[250]

The Princeton Municipal Light Department (PMLD) has a Vegetation Management and High Risk Tree Removal Policy and Plan. To ensure safety and electric reliability, PMLD, in conjunction with the Highway Department, will mow to maintain the height of the vegetation directly beneath the electric system right-of-way.[251]

Massachusetts law requires that each municipality have a tree warden who is responsible for shade trees on public town lands.[252]

Mountain Road Cemetery, photo courtesy of CG

[248] Email correspondence to EAC from Nina Nazarian, Town Administrator, December 26, 2018.

[249] EAC email correspondence with: Lynne Grettum, Town of Princeton Cemetery Commission (March 27, 2018); Hollie Lucht, Town of Princeton Parks and Recreation Commission (March 29, 2018); and Nina Nazarian, Town Administrator (July 13, 2018).

[250] Ibid. See also Town bid spreadsheet for TPS ("2018BidSheetThomasPrinceFieldLittleLeagueOnly (1)Revised.xlsx"). Similar restrictions may now or soon be in place given new designation of public water system at the Town Hall Drive well. (See "Natural Resources Management, Water Quality: Present Situation" at page 51.)

[251] Princeton Municipal Light Dept. Vegetation Management and High Risk Tree Removal Policy and Plan.

[252] Massachusetts General Laws, Chapter 41, Section 1 and Section 106.

RECOMMENDED ACTIONS TO SUPPORT GOALS

GOALS

Support sustainable local agriculture

Reduce the use of toxic chemicals on public and private lands

Encourage the control of invasive pests and disease in sustainable ways

Three Hives, Princeton, photo courtesy of CG

Action #1: Adopt and implement a Landscaping Manual and Integrated Pest and Weed Management Policy for all Town-owned facilities/properties.

Invading non-indigenous plants, insects and diseases have the potential to profoundly impact the town's landscape, as well bring negative environmental, public health, and economic costs.[253] The Massachusetts Invasive Plant Advisory Group (MIPAG) recognizes that in Massachusetts there are 69 species of plants that are "Invasive," "Likely Invasive," or "Potentially Invasive." These species have been added to the Massachusetts Department of Agricultural Resources' list of noxious weeds, which are regulated with prohibitions on importation, propagation, purchase and sale in the Commonwealth.[254]

Massachusetts law regulates the application of pesticides and herbicides, requiring licensed applicators[255] and restricting applications to protect groundwater sources of public drinking water supplies[256] and to protect state-listed species habitat, wetlands, riverfront areas and certified vernal pools.[257] Massachusetts' law also seeks to protect families and children from harmful pesticides by promoting the implementation of Integrated Pest Management (IPM) Techniques and the establishment of standards, requirements and procedures regarding the use of pesticides within a school, daycare center or school age child care program facility, including "[t]he indoor and outdoor areas, lands or other real properties."[258]

IPM is a "comprehensive strategy of pest control whose major objective is to achieve desired levels of pest control in an environmentally responsible manner by combining multiple pest control measures to reduce the need for reliance on chemical pesticides." IPM may include "the use of monitoring techniques to determine immediate and ongoing need for pest control, increased sanitation, physical barrier methods, the use of natural pest enemies and a judicious use of lowest risk pesticides when necessary."[259]

Adopting and implementing a Landscaping Manual and IPM Policy for all Town-owned facilities/properties would, among other things, help to:

- guide the various entities charged with the maintenance of Town-owned land/properties;
- ensure a comprehensive strategy of weed and pest control in a manner that minimizes negative effects of pesticides, herbicides, and fertilizers to the environment and to human health;
- combat invasive and non-indigenous species and promote native species (which require minimal care, including fertilizer);
- set and monitor coordinated landscape/property maintenance budget expenditures.

[253] MassWildlife's Natural Heritage and Endangered Species Program, "Environmental Impacts and Economic Costs of Invasive Species."
[254] Ibid., "Invasive Plants."
[255] 333 CMR 10.00.
[256] 333 CMR 12.00.
[257] 333 CMR 11.00.
[258] 310 CMR 14.00.
[259] 310 CMR 14.02.

Benefits of Action:

Protect environmental and human health and water ecosystems. Ensure compliance with related state laws on pesticide use and application. Long-term monetary savings achieved through comprehensive and coordinated implementation, as well as low-cost and low-effort maintenance of native plantings. Position Town as leader, including by providing example for residents and businesses.

Steps & Strategies:

1. Gather information:
   - Analyze existing policies and activities;
   - Analyze United States Environmental Protection Agency (EPA) and/or MassDEP guidance on landscape and pest management;
   - Consult with other towns that use IPM for best practices and sample policies;
   - Understand the requirements of MA Law 333 CMR 14.00.
2. Write plan:
   - Consult with landscape professionals proficient in IPM;
   - Consult with UMASS Lowell's Toxic Use Reduction Institute (TURI).
3. Selectboard adopt plan.
4. Implement plan:
   - Consider creation of a groundskeeper position for the Town, to coordinate implementation of IPM;
   - If appropriate, (in accordance with public bidding requirements) hire landscaping company to maintain Town-owned land through implementation of IPM.

Resources Needed:

Volunteer time and effort, including by members of the Cemetery Commission/ Department, Parks and Recreation Commission, and/or Environmental Action Committee. Time and efforts of Highway Department employees.

Note: Through UMASS Lowell's TURI, community grants are available for community organizations and municipal departments "to create and promote healthier communities by implementing toxics use reduction projects and educating people about safer alternatives." The Town is eligible to apply for a $10,000 grant through TURI to implement a Landscaping Manual and Integrated Pest and Weed Management Policy that promotes a reduction in the use of toxic pesticides, herbicides, and fertilizers.[260]

Bee at flower, photo courtesy of CS

[260] University of Massachusetts Lowell, Toxic Use Reduction Institute Community Grants (turi.org/Our_Work/Apply_for_a_Grant/Community_Grants2).

Action # 2: Provide information to the Town, town residents, and town businesses with regard to the hazards of:

- **invasive plant and insect species, and the benefits of native and pollinator-friendly species;**
- **chemical pest control and the available alternative, more health- and environmentally-friendly options;**
- **chemical landscape maintenance products and the available alternative more health- and environmentally-friendly options.**

EAC Fall 2017 Survey

The EAC's Fall 2017 Survey revealed that **almost 60% of survey respondents would like to learn more about the impacts of pesticides,** herbicides, fertilizers, and common household products, as well as nontoxic alternative approaches to these chemicals. Additionally, **50% of respondents would like guidance and support on how to garden and farm at their homes in ways that are environmentally responsible**. Invasive species control was among the top three priorities for more than 30% of survey respondents.

See EAC Fall 2017 Survey at Appendix 2.

Benefits of Action:

Improved environmental and human health through reduced levels of toxic chemicals in town environments, and reduced pesticide, herbicide, and fertilizer run-off into the drinking water supply. Protect native species and reduce invasive and non-indigenous species.

Steps & Strategies:

1. Gather information:
   - Research information related to: invasive plant and insect species in our area; native plant species and beneficial pollinators in our area; chemical pest control benefits and hazards; the benefits and costs of alternative, more health- and environmentally-friendly options; to chemical fertilizer benefits and hazards; the benefits and costs of alternative, more health- and environmentally-friendly options.
2. Evaluate and summarize information.
3. Disseminate information:
   - Including through possible partnership with Northeast Organic Farming Association, Wachusett Garden Club, Worcester County Conservation District, Town library.

Resources Needed:

Volunteer efforts of Environmental Action Committee and/or Town Agricultural Commission and/or Town Conservation Commission members. Town employee efforts to post information to Town's website and/or disseminate via alternative methods.

Action #3: Consider designation of Town-owned land for community garden(s) and/or the planting of community-accessible fruit trees.

A community garden is a place where people can come together to grow a variety of vegetables, herbs, fruits and flowers. Community gardens provide benefits to both the environment and human health. A community garden provides health benefits of: providing fresh, safe, affordable herbs, fruits and vegetables; helping to relieve stress and increase sense of wellness; getting individuals active; providing social opportunities that build a sense of community and belonging; and giving people an opportunity to learn and share knowledge on gardening, nature, and cooking. A community garden provides benefits to the environment in that: locally grown food reduces greenhouse gases produced by long distance transportation of food;[261] gardens contribute to biodiversity of species and help to support populations of pollinators; and gardens can beautify and revive otherwise vacant and under-utilized lots.[262]

Although the town is a rural community with many property owners having sufficient space for a home-garden, many residents may still be interested in participating in a community garden that provides many of the benefits noted above.

Benefits of Action:

Improved human and environmental health.
Potential lease income to the Town.
Beautification of Town-owned property.

Steps & Strategies:[263]

1. Gather information on the opinion of town residents on designating Town-owned land for a community garden, and determining what kind of garden, whom it will involve and who will benefit.
2. Consult legal and insurance experts, and obtain information regarding necessity for public liability insurance, considerations for a lease of the land to a community garden organization, etc.
3. If public opinion warrants, form a planning committee to coordinate the community garden formation.
   - Identify specific Town-owned land for designation as community garden use;
   - Identify sources of funding, sponsorship, etc. and/or consider membership dues;
   - Prepare and develop the site through volunteer design and labor;
   - Organize the garden and draft related rules;
   - Solicit community garden memberships/ participants.

Resources Needed:

Volunteer efforts and time, including of members of the Environmental Action Committee and/or Town Agricultural Commission and/or Town Planning Board.

TPS Organic Garden Harvest, photo courtesy

[261] For more on greenhouse gases, see "Energy & Transportation" Section at page 11.

[262] Centers for Disease Control and Prevention, Healthy Places- Community Gardens at cdc.gov/healthyplaces/healthtopics/healthyfood/community.htm.

[263] See, for example, American Community Gardening Association, "10 Steps to Starting a Community Garden." (10stepsstart.pdf at communitygarden.org/resources/bba6e480-82a5-4ccf-870e-52af2038d307.)

ADDITIONAL BACKGROUND

BECOMING A DESIGNATED GREEN COMMUNITY

Municipal Light Plant Eligibility

Municipalities such as the Town of Princeton that are served by a municipal light plant are eligible to apply for Green Community designation under the Green Community Designation and Grant Program if: (i) they are also served by an investor-owned electric utility; or (ii) they adopt the renewable energy charge pursuant to Massachusetts General Law Chapter 25, Section 20 (i.e., a mandatory charge of 0.5 mill per kilowatt-hour for all electricity consumers, which is deposited into the Massachusetts Renewable Energy Trust Fund).[264] The Mount Wachusett Ski Area with an address in the Town of Princeton is served by an investor-owned electric utility, and therefore, the Town of Princeton is eligible to apply for Green Community designation under the Green Community Designation and Grant Program without need to adopt the renewable energy charge.[265]

POWERING TOWN BUILDINGS, HOMES, AND BUSINESSES

Greenhouse Gases and Climate Change

In 2008, the Commonwealth of Massachusetts enacted the Global Warming Solutions Act,[266] which sets forth a goal of reducing the state's greenhouse gas (GHG) emissions between 10% and 25% (from the 1990 baseline level) by 2020 and by 80% or more by 2050.[267] Reaching these goals, according to the state, is to be achieved "through the combination of reducing and electrifying energy demand and decarbonizing energy sources."[268]

The Massachusetts Clean Energy and Climate Plan for 2020 (2015 Update) emphasizes vehicle greenhouse gas emissions standards and additional clean energy as the "two most significant drivers" of the absolute amount of reductions in greenhouse gas emissions, with energy efficiency and fuel use efficiency also contributing to greenhouse gas emission reductions.[269]

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[264] Mass. Gen. L. Ch. 25A, Section 10(e).

[265] See Appendix 3, Supporting Documents: January 18, 2018 letter from William Isaksen of National Grid to Nina Nazarian, Town of Princeton confirming that the Mount Wachusett Ski Area at 499 Mountain Road in Princeton is a National Grid customer.

[266] Massachusetts Global Warming Solutions Act, Mass. Gen. L. c. 298.

[267] Massachusetts Executive Office of Energy and Environmental Affairs, "Global Warming Solutions Act Background" at mass.gov/service-details/global-warming-solutions-act-background.

[268] Massachusetts Global Warming Solutions Act, Mass. Gen. L. c. 298.

[269] Massachusetts Clean Energy and Climate Plan for 2020 (2015 update), pg. 9-10.

The Plan also identifies the following "predominant" sources[270] of direct greenhouse gas emissions related to energy:

- Buildings: combustion of fuels for space heating, with impacts related to weather, fuel prices;
- Transportation: passenger vehicles with significant contributions from diesel trucks and aviation;
- Electricity: coal-fired electric generation.

Therefore, reductions in greenhouse gas emissions from those sources may be best served as follows:

- Buildings: renewable thermal technologies; energy efficiency upgrades/retrofits;
- Transportation: fuel efficiency; reduced usage of passenger vehicles through the use of alternative transportation modes (such as public transit option); and fuel switching (i.e., to electricity and possible advanced low carbon biofuels);
- Electricity: energy efficiency resulting in decreased demand for electricity; "clean electricity" (i.e., renewable/sustainable electricity).[271]

Princeton's Power Situation

"The mission of the PMLD is to provide a safe, reliable, and economical source of electric power for [Town of Princeton] customers, to acknowledge and implement the need for renewable energy from within the diversity of available energy sources, and to enhance the benefits of municipal utility ownership for [Town of Princeton] customers."[272] Among other things, the cost of electric power in Princeton is dependent upon: PMLD's contract terms for electricity purchase for suppliers; the cost of the generating capacity to meet peak power demand for Princeton; PMLD revenue for electricity sold (i.e., from PMLD owned and operated windmills); PMLD electricity transmission and distribution costs; PMLD business and maintenance costs; PMLD debt. Princeton's wind turbine power is sold to local municipal light departments including those of Sterling and West Boylston.[273]

PMLD's Carbon Footprint

The power purchased from Nextera is produced by predominantly conventional sources, with natural gas and nuclear generating 65% of Princeton's power in 2018.[274] The overall mix of 2018 sources is shown below, as is the life cycle carbon footprint of each source per kilowatt hour (kWh). The net PMLD life cycle carbon equivalent footprint is estimated at 312 grams of carbon dioxide (CO_2) per kWh, based on the Nextera energy mix and estimates for each energy source developed by Benjamin K. Sovacool.[275]

Estimates for the full life cycle assessment (LCA) of the various fuel sources, rather than just the output at the source, are presented in the following table. This takes into account all of the greenhouse gas emissions emitted from all aspects of obtaining, refining, transporting, burning the fuel (or using the energy source) and maintaining the equipment. The determination of all these emissions is difficult and varies by process, geographic location and many other factors, and is not an exact science. However, the relative ranking of the various sources is generally consistent from one estimator to another.

[270] Massachusetts Clean Energy and Climate Plan for 2020 (2015 update), pg. 14-15.

[271] Ibid.

[272] See PMLD Mission Statement at pmld.com.

[273] Personal conversation with PMLD by EAC member PG.

[274] PMLD Power Portfolio, 2018.

[275] Benjamin K. Sovacool, "Valuing the greenhouse gas emissions from nuclear power: A critical survey" at nirs.org/climate/background/sovacool_nuclear_ghg.pdf. (Energy Policy 36 (2008): 2950–2963.)

PMLD Energy Sources and Life Cycle Assessment (LCA) Carbon Equivalent Footprint in grams of CO_2 per kWh

SOURCE	SHARE (%)	LCA CO_2
Natural Gas	35.8	443
Nuclear	29.426	66
Oil	6.86	778
Coal	6.96	960
Hydro	6.42	13
Wind	3.08	10
Trash	2.32	25
Biomass	1.96	25
Solar	2.77	32
Wood	1.45	25
Diesel	1.02	778
Muni Solid Waste	.64	25
Landfill Gas	0.52	11
Liquid Biofuel	.48	25
Fuel Cell	,29	664
Digester Gas	.08	11
Jet Fuel	.03	778
PMLD Total	100	312

PMLD Solar Policies

For more about PMLD solar policies, see PMLD Requirements for Interconnection of Non-Utility Generators and Distributed Generation (revised November 2018) available on the PMLD website.[276] Specific to net metering, this document notes: "PMLD is not a distribution company but a Municipal Light Department. Massachusetts G[en.] L[.] Chapter 164 section 139 pertains to net metering as it concerns distribution companies. Therefore, PMLD does not offer a net metering option. PMLD encourages customers that engage in interconnected generation to size their facilities appropriately to meet their own demand requirements. PMLD does not offer the option of a customer to 'run the meter backwards'. Customers will be charged full retail rates for all kilowatt hours delivered by PMLD."[277] Some early adopters of solar power in Princeton do have net metering, as they made the investment before PMLD adopted its current policy. As of this writing, about half of the solar power generated in town is net metered.[278]

[276] pmld.com.

[277] PMLD, Requirements for Interconnection of Non-Utility Generators and Distributed Generation (revised November 2018).

[278] Per Brian Allen, General Manager, PMLD.

HEATING AND COOLING

Soot

Soot is generated from a variety of sources. It is the result of incomplete combustion of fuel, whether it be coal, diesel fuel, propane, wood, or the steak on a barbecue grill. (Combustion of natural gas and petroleum products for heating (and cooking) needs emits carbon dioxide, methane, and nitrous oxide.[279]) While soot that falls to the ground is not immediately going to result in greenhouse gas emissions, soot particles that remain in the air or land on the ground have been linked to climate change.[280] Furthermore, there are significant health issues caused by soot. Fine soot particles (2.5 micrometers or less in diameter) have been found to be responsible for 20,000 deaths per year according to Joel D. Schwartz, a professor of epidemiology at Harvard.[281] Tiny soot particles, some of them as small as 1/30 the diameter of a human hair, are in the air and can cause cardiovascular problems, especially in older adults and others with heart disease, chronic obstructive lung disease and asthma.[282]

Operating Cost Savings With Heat Pumps

Heat pumps work very much like a refrigerator. They transfer (pump) heat energy from one mass to another. Because they move heat energy rather than create it by combustion or other means, heat pumps can put more heat energy into a home than they use in the process of transferring that heat. In other words, heat pumps can have operating "efficiencies" in excess of 100%.

Most heat pumps take energy from the outside air. Even though it is cold outside in the winter, there is sufficient energy in the outside air to warm a home. The performance of a heat pump does decline somewhat as the source of energy cools off. For this reason, some people in very cold climates use a heat pump system that draws energy from the ground or even lakes and ponds (i.e. "geothermal") because these sources maintain a more or less constant temperature year 'round.

Exact operating performance of heat pumps is dependent on the specific characteristics of each installation. However, it is possible to make some general expected performance calculations to compare the relative operating costs of heat pumps and other forms of home heating. The key parameter of heating system operating costs is the efficiency or Coefficient of Performance (COP) of a system. (Both efficiency and COP are defined as the ratio of energy output to energy input. COP is generally used when the ratio exceeds 1.) The U.S. Department of Energy[283] lists the ranges of various types of systems and MassSave lists minimum performance criteria for various systems under standardized tests.[284] These can all be used to calculate the relative operating costs of the various systems and the break even cost of electricity ($/kWh) needed to make a heat pump competitive with fossil fuel combustion. The efficiencies and COP (the latter used for heat pumps) of various systems used to compare the operating costs of typical systems

[279] United States Environmental Protection Agency "Greenhouse Gas Emissions: Sources of Greenhouse Gas Emissions, Commercial and Residential Sector Emissions" at epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

[280] U.S. Environmental Protection Agency, "Black Carbon Research" available at epa.gov/air-research/black-carbon-research.

[281] Bakalar, N., "Air Pollution Contributes to More Than 20,000 Deaths a Year," New York Times, December 27, 2017.

[282] U.S. Environmental Protection Agency, "Environmental Health Hazards weigh heavy on the heart" available at National Center for Environmental Publications (NSCEP).

[283] energy.gov/articles/energy-saver-101-infographic-home-heating.

[284] masssave.com/en/.

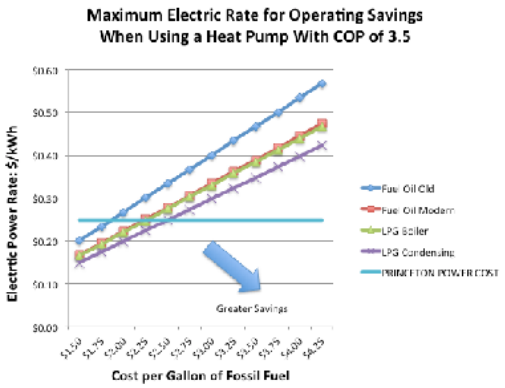
have been summarized from these two sources and are listed in the following table.[285]

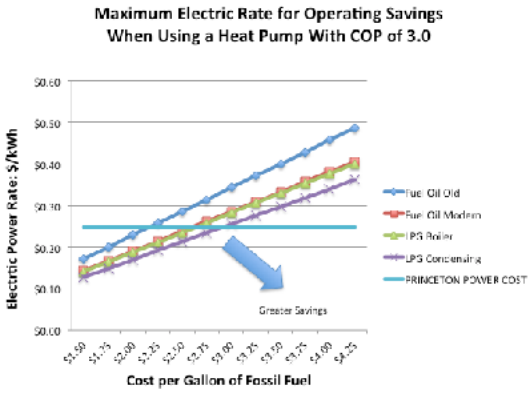
SYSTEM TYPE	EFFICIENCY
Fuel Oil (Old Technology System)	0.7
Fuel Oil Modern	0.84
LPG (Liquid Propane Gas) Boiler	0.85
LPG Condensing	0.94
Heat Pump (air @10 C or ground based)	3.5
Heat Pump (air @ -10C)	3

The system efficiencies in the table were used to calculate the maximum electric power rate for which the heat pump system would cost no more to operate than its fossil fuel equivalent. From the charts below,[286] it is apparent that a heat pump system with a COP of 3.5 is competitive at PMLD's current total electric power charge of 24.75 cents/kWh when LPG or heating oil costs are at $2.50/gallon or more when compared to an LPG condensing boiler, or about $2.25/gallon when compared to a modern oil-fueled system. If the COP were to drop to 3.0. as it could for an air-based system operating at -10 degrees Celsius, the break even cost per gallon would rise to between $2.85 and $2.65 per gallon.

Reduced electricity rates would drop the break even fossil fuel prices accordingly or increase the savings as fossil fuel prices rise. A homeowner would enjoy operating cost savings for any combination of electricity and fuel costs below and to the right of the intersection of the electric rate charge and the lines for the various heating systems.

(Note that these calculations are for operating costs only. Additional considerations such as the payback period and initial cost of the installation should be taken into account when deciding on a new heat pump system. Note also that heat pump systems are available to heat hot water as well as for home heating.)





[285] Table created by EAC member Phil Gott.

[286] Charts created by EAC member Phil Gott.

TRANSPORTATION

According to the Massachusetts Commission on the Future of Transportation, "in Massachusetts, almost 40% of greenhouse gas (GHG) emissions in 2015 came from transportation infrastructure and vehicles, with nearly half of the contribution coming from passenger vehicles alone."[287]

Options for Princeton Residents

The transport-related environmental footprint within Princeton is overwhelmingly linked to the cars and light trucks driven by residents. As such, it is helpful to review the options open to them. Residents have their choice of conventionally-fueled (gasoline, Diesel) vehicles as well as various levels of electrification-fueled vehicles ranging from mild to full hybrids and full electric cars. Residents could also take advantage of alternative fuels such as gasohol (flex-fuel), propane and hydrogen, but the lack of local fueling infrastructure precludes these as practical alternatives, at least for now.[288]

The type of vehicle that would be environmentally, financially and practically best for each resident depends upon the driving patterns of the resident and their expectations for vehicle availability.[289] For example, hybrids give their best payback when there are many opportunities for energy recovery such as in stop-and-go urban driving. Full electric vehicles offer practical, low-maintenance travel within their allocated range when recharge time is not an issue. (Recharge time is dependent upon both the ability of the battery to tolerate high rates of recharge and the amount of power available from the "wall socket." In any event, it is difficult to conceive of fully recharging a completely spent long range vehicle battery in less than 15-30 minutes when the total energy that must be transferred to the battery is taken in to account.) Emerging technologies such as wireless charging will improve the convenience of replenishing a spent battery. A good compromise for now might be a range-extended electric vehicle such as the Plug-in-Hybrid Prius or Pacifica.

New Vehicle Promotions

Note also that as of this writing, PMLD is part of three ongoing promotions with local Nissan and Chevrolet dealerships. There are up to $14,250.00 worth of rebates and incentives Princeton residents could use to reduce the cost of the purchase of a Nissan Leaf, Nissan Leaf Plus and Chevy Bolt Electric Vehicles. In addition, now that Princeton has access to reliable WI-FI, PMLD is excited to offer, in conjunction with the purchase of an Electric Vehicle, two additional incentives for a ChargePoint (Level 2) Charger when you enroll in PMLD's Scheduled Charging Program for an Electric or Plug-In Hybrid Electric Vehicle purchased. Validation of purchase and contract commitments will apply. If you have any additional questions, please call the office at 978-464-2815 during regular business hours. These promotions and incentives are a collaborated effort between PMLD and the Massachusetts Municipal Wholesale Energy Company (MMWEC) as part of the Municipal HELPS Energy Conservation Program.[290]

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[287] "Choices for Stewardship: Recommendations to Meet the Transportation Future" mass.gov/files/documents/2018/12/17/dot-board-2018Dec17-mtg-9-transp-commission.pdf.

[288] According to rebate applications, from June 2014 to January 2020, eight new cars that use some or all of their energy from the electric grid have been purchased by Town residents (compared to 1,368 in Worcester County and about 15,426 in the Commonwealth of Massachusetts in the same time period). See mor-ev.org.

[289] There are a number of websites that offer advice about which prime mover technology is best for an individual based on driving habits. One of them is fueleconomy.gov. Others offer user-customized scenarios to help determine what is best for each vehicle buyer. See, for example, the vehicle cost calculator at afdc.energy.gov/calc/.

[290] pmld.com.

Resident and Municipal Funding Assistance

Funding is available for municipalities to purchase electric vehicles and install electric vehicle charging stations through the MassEVIP Fleet Incentives program.[291] The Town could obtain up to 80% of the cost to install electric vehicle charging stations through this program.[292]

Funded by DOER and administered by the Center for Sustainable Energy (CSE), MOR-EV provides rebates of up to $1,500 for the purchase or lease of battery electric vehicles and fuel-cell electric vehicles and up to $450 for zero emission motorcycles.[293]

Federal tax credits for the purchase of electrified vehicles are still in effect for many but not all models of hybrid and electric vehicles. All-electric and plug-in hybrid cars purchased in or after 2010 may be eligible for a federal income tax credit of up to $7,500. The credit amount will vary based on the capacity of the battery used to power the vehicle.[294]

WASTE MANAGEMENT

What Happens to Waste in Massachusetts?

Depending on where you live in the Commonwealth of Massachusetts, disposed solid waste might go to a waste-to-energy facility, a landfill, a transfer facility, a material recovery facility, a construction and demolition processing facility, an organics processing facility, or an anaerobic digestion facility. In 2016, for example:

- 44% of total solid waste (3.25 million tons) was combusted in one of the state's 7 waste-to-energy facilities. (Wheelabrator Millbury, which receives Princeton's solid waste, is one of those facilities.);
- 17.1% (1.26 million tons) went to one of Massachusetts's 18 active-permit landfills. 10 are Municipal Solid Waste (MSW) landfills, 7 are ash landfills, and 1 is a sludge landfill. Massachusetts landfills are believed to be operating at or close to full capacity at this time. (The Fitchburg-Westminster landfill, on Princeton's doorstep, has the largest capacity in the state, 538,000 tons.);[295]
- 13.9% (1.02 million tons) went to transfer facilities for export;
- 8.5% (630,000 tons) of total solid waste (comprising plastic, glass, metal, and paper) was processed in Material Recovery Facilities (MRF);
- 9.1% (670,000 tons) of total solid waste went to Construction and Demolition (C&D) processing or transfer facilities;
- 6.8% (505,000 tons) of solid waste went to organics processing (composting and anaerobic digestion) facilities.[296]

What Happens to Recycling in Massachusetts

The specific fate of recycling in Massachusetts towns depends on who the local hauler is, and the current

[291] See Massachusetts Department of Environmental Protection's guidance "Apply for MassEVIP Fleets Incentives" at mass.gov/how-to/apply-for-massevip-fleets-incentives.

[292] Ibid.

[293] See Massachusetts Offers Rebates for Electric Vehicles at mor-ev.org.

[294] United States Department of Energy, Federal Tax Credits for Electric and Hybrid Vehicles, fueleconomy.gov/feg/taxevb.shtml.

[295] See Appendix 3, Supporting Documents: Letter from Princeton Selectboard to State Senator Harriette Chandler and State Representative Kimberly Ferguson expressing opposition to proposed expansion of the Fitchburg-Westminster Landfill (Jan. 22, 2019).

[296] Massachusetts DEP Materials Management Capacity Study, Final Report, Feb 11, 2019, pp. 2-1 to 2-9.

market for recyclables. According to a recent *New York Times* article, "curbside recycling is typically hauled by a private company to a sorting plant, where marketable goods are separated out. Companies or local governments then sell the goods to domestic or overseas processors. Some states and cities prohibit these companies from dumping plastic, paper and cardboard, but some local officials — including in Oregon, Massachusetts and various municipalities in Washington State — have granted waivers so that unmarketable materials can be sent to the landfill."[297]

Princeton-Wheelabrator Millbury Contract Language

Wheelabrator Millbury's contract with the Town of Princeton states that " . . . the Town shall deliver or cause to be delivered, and WMI agrees to accept, subject to the terms and conditions set forth herein, all Residential Acceptable Waste that is not Recycled in each Contract Year. . . . In the event that the Town does not directly provide for and control the collection and disposal of all its Residential Acceptable Waste, the Town shall deliver a number of Tons of Residential Acceptable Waste per Contract Year, designated by the Town by July 31 of each Contract Year . . . in an amount not less than 90% and not more than 110% of the average number of Tons of Residential Acceptable Waste delivered by the Town to the Facility and accepted by WMI in the three (3) calendar years immediately preceding the date hereof . . . ."[298]

The Current Recycling Crisis

On January 19, 2019 the Massachusetts Municipal Association (MMA) released a "Resolution Supporting a Local-State Partnership to Address the Challenges to the Recycling Marketplace."[299] The following are some of the findings set forth in the resolution:

- The recycling marketplace in Massachusetts faces serious challenges that have stretched municipal budgets and limited options for processing recyclable materials;
- The strength of China's purchasing power for recyclables has led to a decline in domestic markets for recyclable materials in the United States, and the closure of glass and paper processing facilities in Massachusetts;
- Contamination in the Massachusetts recycling stream has increased as a result of a transition to single-stream recycling and gaps in the understanding of residents and businesses as to how to recycle properly;
- China's National Sword Policy and the policies of other international purchasers of recyclables from the U.S. limiting the types and amount of recyclable materials exported from the U.S. has disrupted the financial landscape of recycling throughout the country, and in Massachusetts specifically;
- The United States faces a solid waste crisis stemming from overconsumption of material goods, excess packaging and reliance on single-use plastic, and a finite amount of landfill space and other disposal facilities.[300]

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[297] Livia Albeck-Ripka, "Your Recycling Gets Recycled, Right?" New York Times, May 29, 2018 nytimes.com/2018/05/29/climate/recycling-landfills-plastic-papers.html.

[298] Wheelabrator Millbury Waste Disposal Agreement (June 15, 2006) (copy obtained from Terri Longtine, Town of Princeton Board of Health), page 8.

[299] Massachusetts Municipal Association Resolution, January 19, 2019 at mma.org/advocacy/proposed-resolution-supporting-a-local-state-federal-partnership-to-address-the-challenges-to-the-recycling-marketplace-2019/.

[300] Ibid.

The MMA has proposed the following recommendations (among others) related to recycling:

- State and federal policy should support local efforts to reduce the waste stream by limiting or ending the use of hard-to-manage products and materials such as plastic bags, single-use plastic bottles, and Styrofoam and similar products;
- State and federal agencies and lawmakers should take steps to require that manufacturers and third-party sellers reduce the amount of packaging, both recyclable and non-recyclable, that accompanies products for sale;
- Cities and towns should review local procurement practices to explore opportunities to reduce excess packaging and materials and to develop minimal packaging standards;
- The state should continue its efforts to standardize rules and practices regarding what materials can be recycled, and should provide assistance to cities and towns in educating the public on what and how to recycle properly;
- The state should provide support to municipalities to aid in the enforcement of state and municipal recycling protocols with residents and businesses;
- Municipal officials and the MMA support diversion of materials from the solid waste stream, such as organics for composting and textiles for proper recycling;
- State and federal government policymakers, alongside academia and private industry, should support the development of new technologies for sustainable waste disposal, such as trash-to-energy, gasification and other innovations.[301]

Banning single-use plastic

As of April, 2019, 97 Massachusetts cities and towns (including the Central Massachusetts towns of Shrewsbury and Grafton), representing 45% of the Commonwealth's population, regulate single-use plastic shopping bags.[302]

Construction and Demolition (C&D) Debris Recycling

Construction and demolition debris is not collected at the curb. In Massachusetts, construction and demolition materials such as wood, metal, asphalt, clean gypsum wallboard, brick and concrete are banned from disposal at landfills.[303] Additional construction and demolition materials, such as asphalt shingles, carpeting and ceiling tiles, are currently under consideration for classification as waste ban materials.[304]

There are many recycling opportunities and markets for construction and demolition materials. Asphalt shingles can be recycled into hot-mix asphalt for paving. Drywall can be utilized for the manufacture of cement or gypsum wallboard. Wood can be re-milled or recycled into particle board, mulch, furniture, and other wood products. Concrete can be recycled into pavement aggregate, cinder blocks, and more. [305]

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[301] Massachusetts Municipal Association Resolution, January 19, 2019 at mma.org/advocacy/proposed-resolution-supporting-a-local-state-federal-partnership-to-address-the-challenges-to-the-recycling-marketplace-2019/.

[302] Sierra Club Massachusetts, sierraclub.org/massachusetts/plastic-bags-0.

[303] 310 CMR 19.017.

[304] Concord, MA Public Works Dept. web page: concordma.gov/499/Construction-Demolition-Recycling.

[305] Ibid.

WATER QUALITY

Regulations

Under Massachusetts law, M.G.L. c. 21, §§ 26 through 53, the MassDEP is charged with protecting the public health and enhancing the quality and value of the water resources of the Commonwealth.

In furtherance of those objectives, the MassDEP has adopted the Massachusetts Surface Water Quality Standards at 310 CMR 4.00. These regulations designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained and protected; prescribe the minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges. The federal Clean Water Act (33 U.S.C. § 1251 et seq.) also governs water quality through the regulation of the discharge of pollutants into waters of the United States.

Wetlands in the Commonwealth are further protected under the Wetlands Protection Act (M.G.L. c. 131, § 40) and its regulations (310 CMR 10.00). Wetland protection is aimed at the following interests: flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. In the Town of Princeton, the Town's Conservation Commission administers the Wetlands Protection Act, with appellate oversight by the MassDEP. Selected wetlands are also protected under permanent restriction orders pursuant to the Inland and Coastal Wetlands Restriction Acts (M.G.L. c. 131, § 40A, and M.G.L. c. 130, § 105) and their regulations (310 CMR 13.00 (inland) and 310 CMR 12.00 (coastal)). The Town of Princeton is not currently a community with an inland wetlands restriction.[306]

Massachusetts Waterways regulations (310 CMR 9.00) are intended to: protect and promote the public's interest in tidelands, Great Ponds, and non-tidal rivers and streams; preserve and protect the rights in tidelands of the inhabitants of the Commonwealth; protect the public health, safety, and general welfare as it may be affected by any project in tidelands, Great Ponds, and non-tidal rivers and streams; support public and private efforts to revitalize unproductive property along urban waterfronts, in a manner that promotes public use and enjoyment of the water; and foster the right of the people to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment under Article XCVII of the Massachusetts Constitution.[307]

Massachusetts Watershed Protection regulations (313 CMR. 11.00) regulate certain portions of watersheds, including the "Natural Basin" from which water drains or in the natural course would drain into the Wachusett Reservoir and the Quabbin Reservoir.[308] The Massachusetts Department of Conservation and Recreation has Watershed Plans, Public Access Management Plans, and Land Management Plans for areas within these watersheds, including areas within the Town of Princeton.

Massachusetts Drinking Water Regulations (310 CMR 22.00) are intended to promote the public health and general welfare by preventing the

[306] MassDEP, "Communities with Previously-Registered Wetlands."

[307] 310 CMR 9.01.

[308] 313 CMR 11.04.

pollution and securing the sanitary protection of all such waters used as sources of water supply and ensuring that the public water systems in Massachusetts provide to users water that is safe, fit and pure to drink.[309]

According to the Town's Open Space and Recreation Plan Update (2014), nearly all of the Town of Princeton (86%) lies within the Nashua River Watershed, with other portions of town lying within the Ware River Watershed and the Chicopee River Watershed.[310] These watersheds flow into four Class A public water supplies: the Quabbin Reservoir, the Wachusett Reservoir, the Quinapoxet Reservoir, and the Fitchburg reservoirs.[311]

Water Wells

Rain and snow that filters into the ground travels downward until it hits dense rock. The water trapped in the spaces and pores above this dense rock is called "groundwater," "aquifer," or "groundwater aquifer."[312]

The Town of Princeton is considered part of the glacial aquifer system, which spans the northern United States. Within that, Princeton's water derives from the New York-New England crystalline-rock aquifers, a group of aquifers spanning these states.[313]

Along the way to an aquifer, water can become contaminated. Factors that contribute to contamination include:

- bacteria;
- radon;
- arsenic;
- uranium;
- other minerals;
- industrial/commercial activities;
- improper waste disposal;
- application of fertilizers and pesticides;
- fueling of lawn equipment;
- road salting;
- residential septic systems.[314]

Well water contaminants from source water may include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems;
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.[315]

[309] 310 CMR 22.01.

[310] Town of Princeton Open Space and Recreation Plan Update (August 2014), page 10.

[311] Ibid.

[312] cdc.gov/healthywater/drinking/private/wells/index.html.

[313] water.usgs.gov/nawqa/studies/praq/necrys/index.html and pubs.usgs.gov/fs/2017/3055/fs20173055.pdf.

[314] mass.gov/service-details/protect-your-family-a-guide-to-water-quality-testing-for-private-wells.

[315] See Town of Westminster, Massachusetts, Water Department, 2017 Annual Drinking Water Quality Report.

The problematic contaminants in the New England crystalline aquifers include arsenic, fluoride, uranium, and radon, with specific contaminants dependent on the type of bedrock in the specific aquifer.[316] Studies have found that the crystalline aquifers contain highly variable water quality, with the detection of human-made and naturally occurring contaminants. This high variability highlights the importance of individual well-water testing.

The MassDEP's Bureau of Water Resources has put out a publication on Private Well Guidelines, which includes recommended water quality testing tables, including frequency of testing.[317] This guide lists the towns that have high probability of elevated arsenic and/or uranium levels. The guide recommends that existing wells be tested annually, or as recommended by the Board of Health, for elevated coliform bacteria and nitrate/nitrite. If coliform bacteria is detected, a second test for e. coli should be performed, and water not consumed or boiled first, until results come back from the lab. The guide recommends that water wells should be tested every ten years for other common contaminants.[318] This online resource also provides a searchable database of MassDEP certified water testing labs.[319]

Watersheds

A watershed is an area of land where all ground water and surface water flows to the same place. Massachusetts has 28 watersheds.

According to the Town's Open Space and Recreation Plan Update (2014), nearly all of the Town of Princeton (86%) lies within the Nashua River Watershed, with other portions of town lying within the Ware River Watershed and the Chicopee River Watershed.[320] These watersheds flow into four Class A public water supplies: the Quabbin Reservoir and the Wachusett Reservoir (together supplying drinking water for the Massachusetts Water Resources Authority water supply system),[321] the Quinapoxet Reservoir (supplying drinking water to the City of Worcester), and the Fitchburg reservoirs.[322]

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[316] USGS, National Water Quality Assessment Program, Quality of Water from Crystalline Rock Aquifers in New England, New Jersey, and New York, 1995-2007, page 17. (pubs.usgs.gov/sir/2011/5220/pdf/sir20115220.pdf.)

[317] Commonwealth of Massachusetts DEP Private Well Guidelines, Updated 7/2018, page 110. (mass.gov/files/documents/2018/07/27/prwellgd.pdf.)

[318] Ibid.

[319] Mass DEP Online Searchable Laboratory Certification Listing. (eeaonline.eea.state.ma.us/DEP/Labcert/Labcert.aspx.)

[320] Town of Princeton Open Space and Recreation Plan Update (August 2014), page 10. See also Nashua River Watershed Association at nashuariverwatershed.org/our-watershed/our-communities.html and Chicopee Comprehensive Watershed Assessment, 2003, page 26 at mass.gov/files/documents/2016/08/mu/assess-rpt-chicopee.pdf.

[321] Massachusetts Department of Conservation and Recreation Office of Watershed Management at mass.gov/locations/quabbin-reservoir.

[322] Town of Princeton Open Space and Recreation Plan Update (August 2014), page 10.

WATER USE

While Princeton residents rarely worry about water availability, changes in the region's climate are likely to increase our vulnerability. According to the National Climate Assessment's Northeast report,[323] "[u]nder current emissions scenarios, the frequency, intensity, and duration of heat waves is expected to increase…. Seasonal drought risk is also projected to increase in summer and fall as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt." These likely climate shifts make changes in our water use habits sensible, if not urgent.

If water efficiency measures can be made habitual, Princeton will be better prepared for climate change's worst effects. According to the Whole Building Design Guide, "Water efficiency is the planned management of water to prevent its waste, overuse, and exploitation. Effective water efficiency planning seeks to 'do more with less' without sacrificing comfort or performance."[324]

A wide range of technologies and measures can be employed to save water and associated energy consumption. These include:

- Water-efficient plumbing fixtures (ultra low-flow toilets and urinals, waterless urinals, low-flow and sensored sinks, low-flow showerheads, and water-efficient dishwashers and washing machines). Look for "WaterSense" labeling on fixtures and fittings—these products have been assessed by the EPA/MWRC as at least 20% more efficient than standard products, while offering equivalent or superior performance;
- Irrigation and landscaping measures (water-efficient irrigation systems, irrigation control systems, low-flow sprinkler heads, water-efficient scheduling practices, and Xeriscape);
- Water recycling or reuse measures (Gray water and process recycling systems); and
- Methods to reduce water use in HVAC systems.

Landscaping water usage often accounts for 20% or more of a building's water consumption, and is a key area to target for water use savings. To design a water-efficient landscape for a new building: (1) reduce the amount of turf and other irrigated areas; (2) ensure water-efficient design of irrigation systems; and (3) specify native or climate-appropriate landscape materials (Xeriscape). Reducing the amount of turf grass and overall irrigated areas will reduce water consumption and associated costs, and will result in time and money savings from mowing, fertilizing, waste removal, and maintenance.[325]

Princeton might also consider installing water catchment systems in any new municipal construction. Rooftop rainwater collection systems are becoming increasingly popular, and the captured water can be stored in architecturally aesthetic cisterns and used for landscape irrigation, single pass cooling, and toilet flushing.

Many water conservation strategies also reduce hot water requirements, resulting in cost savings from reduced energy use.

Water conservation also has a beneficial impact on carbon dioxide emissions (a greenhouse gas and contributor to global warming: ninety-five percent adoption of low-flow taps and shower heads by 2050 could reduce carbon dioxide emissions by 4.6

[323] NCA 2014, Northeast Region: nca2014.globalchange.gov/report/regions/northeast.

[324] Whole Building Design Guide, Water Conservation, 11/7.2016 wbdg.org/resources/water-conservation.

[325] Ibid.

gigatons, by reducing energy consumption for heating wasted water. Scaling other water-saving technologies would drive additional reductions.[326]

Massachusetts Water Conservation Standards (July 2018) recommends the following for municipalities:

- Build new buildings with equipment that reduces water use, such as faucet aerators, low-flow showerheads, composting or high-efficiency toilets (HETs) (or "dual-flush" models),34 and self-closing faucets. Water-saving devices and measures should be well identified to users of public buildings and facilities;
- Focus on replacing/retrofitting water-consuming equipment in buildings (e.g. bathrooms, boilers, chillers);
- Practice good, efficient lawn and landscape water-use techniques and meet Outdoor Water use standards as described in Chapter 9.0 on;
- Use public buildings as demonstration sites for innovative water conservation techniques such as composting, foam-flush and dual-flush toilets, cisterns for rain collection, and water-wise landscaping.[327]

AIR QUALITY

Radon

Radon is a radioactive gas produced by radioactive decay (when naturally occurring elements break down in rocks and soil). It is colorless and odorless, and can enter homes through cracks and other openings. It can also dissolve in well water and potentially be released indoors, although this is probably not a major source of indoor radon levels. High levels of radon can contribute to the incidence of lung cancer, and your risk is higher if you are, or have ever been, a smoker; quitting smoking will lower your risk.[328]

The Massachusetts Department of Public Health's (MDPH) Bureau of Environmental Health (BEH) has a Radon Assessment Unit (RAU). This is part of the Indoor Air Quality Program and is available to assist residents and facility managers (as well as realtors and business owners) with their radon questions: 1-800-RADON-95 (1-800-723-6695) or 1-413-586-7525 x 3185.

Testing since 1988 in Worcester County has revealed concerning levels of radon in some areas, and the county is considered to have likely radon screening levels greater than 4 pCi/L). Radon levels are random: one home can test high while homes around it test low or normal. The average indoor radon levels in Worcester County as of March 2019 are 4.8 pCi/L.[329] The average national radon level, by contrast, is 1.3 p/Ci/L and the EPA action level is 4 pCi/L.[330] Thirty-five percent of homes tested in Worcester County exhibit radon levels of 4 pCi/L and above.[331]

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[326] Project Drawdown: drawdown.org/solutions/materials/water-saving-home.

[327] Massachusetts Water Conservation Standards, Water Resources Commission, July 2018 at mass.gov/files/documents/2018/09/11/ma-water-conservation-standards-2018.pdf.

[328] EPA, A Citizen's Guide to Radon (2016) at epa.gov/sites/production/files/2016-12/documents/2016_a_citizens_guide_to_radon.pdf.

[329] Massachusetts Radon Awareness Program, Massachusetts Radon Fact Sheet at sosradon.org/files/sosradon/MA%20Radon%20Facts.pdf.

[330] Massachusetts Executive Office of Health and Human Services, Massachusetts Environmental Public Health Tracking, Radon at matracking.ehs.state.ma.us/Environmental-Data/radon/index.html.

[331] county-radon.info/MA/Worcester.html.

Free radon testing is provided to residents of Massachusetts. In Princeton, both indoor air and (well) water should be tested for radon concentrations. More information about radon is available in A Citizen's Guide to Radon, produced by the EPA.[332] (Massachusetts residents should use the 800-RADON-95 number rather than the numbers listed in the guide.) The RAU will work with residents (or facilities managers) to help them tailor testing to their home/building. Kits and testing are free for residents; town properties/businesses have to pay for kits and testing but the RAU will advise them on how to best do that testing.

The RAU is available to do presentations and provide publications and reading materials for the Town and its citizens.[333]

Indoor air quality, generally

The MassDEP conducts assessments of indoor air quality in public buildings, through their Indoor Air Quality Program (IAQ). Located in Boston, this program can be reached at 617-624-5757. Their process is as follows:

1. Municipality should contact the local Board of Health (BOH) if an air quality issue is suspected at a public building;
2. BOH can then invite IAQ to perform an inspection;
3. IAQ will then provide a report with air quality results and recommended remedial actions;
4. Municipality implements recommended actions.[334]

Potential sources of indoor air pollution include:

- improper storage or usage of chemicals;
- bird waste;
- indoor ozone;
- radon;
- latex;
- mold, moisture, and mildew;
- mercury spills;
- construction/renovation pollutants in occupied buildings;
- ventilation system issues;
- PCBs (Polychlorinated Biphenyls) in (older) building materials;
- Pressure-treated wood used in playground equipment;
- TCE (Trichloroethylene)—found in adhesives, paint removers, varnishes, etc.[335]

[332] epa.gov/sites/production/files/2016-12/documents/2016_a_citizens_guide_to_radon.pdf

[333] Conversation with Stefani Santoro, RAU, May, 2018.

[334] Ibid.

[335] Massachusetts Department of Public Health, Bureau of Environmental Health, Sources of Indoor Air Pollution, 2019. mass.gov/sources-of-indoor-air-pollution/need-to-know.

CLIMATE CHANGE

Current and Projected Climate Statistics, Princeton, MA, Early 2000s to 2050[336]

CLIMATE PHENOMENON	OBSERVED EARLY 2000S	PROJECTED 2050
Consecutive Dry Days	17-18	18-19
Days of Precipitation > 1”	5.4 - 6.5	7.2 - 8.8
Days of Precipitation > 2”	.6 - 1	.9 - 1.3
Days of Precipitation > 4”	0	0.02
Total Precipitation	45” - 46”	48” - 50”
Average Temperature	47° F	53° F
Days Below 0° F	9.6 - 13.3	4.8 - 5.6

Available Wood

Available wood is a competitive source of energy when properly gathered, processed and burned. The Fitchburg power plant Pinetree Power, for example, currently pays about $25 a ton for processed wood. A ton of this wood will produce about 8.3 million BTU (at 35% moisture content @75% efficiency) at a cost of about $3.00 a million BTU. In comparison, heating oil at current prices costs $20 for a million BTUs at $2.50 per gallon, while propane costs $23.00 a million BTU at $2.00 a gallon.[337]

While combustion still releases carbon dioxide into the air, useful work is obtained from the production of that CO_2, while avoiding the production of methane and additional carbon emissions from fossil fuels.

[336] resilientma.org and www.geo.umass.edu/climate/stateClimateReports/MA_ClimateReport_CSRC.pdf

[337] Conversation between EAC member Phil Gott and wood resource professional Charles Cary.

RURAL CHARACTER, VISTAS, OPEN SPACE, AND OUTDOOR RECREATION

Land in town is predominately zoned as "Residential-Agricultural." Areas zoned for "Business" exist on Worcester Road and on Route 140 in East Princeton. Areas zoned for "Business-Industrial" exist on Route 140 in East Princeton and on Route 62, northwest of the center of town. Additionally, a Rural Preservation Overlay District exists on Route 62 on either side of the center of town.[338]

AGRICULTURE AND PEST AND LANDSCAPE MANAGEMENT

Agriculture

Effective August 2007, the Board of Health's Agriculture Regulations provides "minimum standards for the protection of public health, animals, and the environment."[339] Agricultural activities that impact wetlands, watersheds and/or natural resources may fall within the jurisdiction of the Town's Conservation Commission.[340] The Agricultural Commission promotes agriculture in town via community activities. The Town's Agricultural Commission, Conservation Commission, Board of Health, Selectboard, Planning Board, and Zoning Board of Appeals each may be called upon to address grievances related to agricultural activities in town.[341]

Under the Town's Farm Preservation By-law, "farming" and "agriculture" are defined broadly to include cultivation, dairying, harvesting of forestland, and raising of livestock and other animals. "Farming" is also defined as including the control of pests and the application of fertilizers and pesticides.[342] Among other things, the Town's Agriculture Regulations require: permits for the keeping of animals if the property for keeping animals is less than or equal to the minimum required thresholds of suitable area per animal unit; minimal area requirements for the keeping of animals; composting of organic waste (including lawn clippings and/or leaves not generated on the property); manure management to protect the quality of surface and groundwater supplies, to control disease transmission and to minimize noisome odors and vermin; standards for maintenance of premises and animal care.[343]

[338] Town of Princeton Zoning By-Law.

[339] Town of Princeton Board of Health Agriculture Regulations (effective August 13, 2007).

[340] See Wetlands Protection Act, 310 C.M.R. 10.

[341] See Town of Princeton Farm Preservation By-law, Chapter XVII, Section 4.

[342] Ibid., Chapter XVIII, Section 2.

[343] Town of Princeton Board of Health Agriculture Regulations.

APPENDIX 1

DEFINITIONS, ACRONYMS, & ABBREVIATIONS

Alternative energy: Energy from solar, wood, alcohol, hydroelectric, biomass, and other renewable non-depletable energy sources.[344]

Conventional power: Includes the combustion of fossil fuels (coal, natural gas, and oil) and the nuclear fission of uranium.[345]

Energy conservation: Modification in the operation and/or management of property in a manner likely to improve the efficiency and/or reduction of energy use.[346]

Energy savings: A measured reduction in fuel, energy, operating or maintenance costs resulting from energy conservation measures or projects.[347]

Flex-fuel capable: A vehicle capable of burning a mix of motor fuel ranging from 100% gasoline to 85% ethanol/15% gasoline. Most cars and light trucks that use "pure" gasoline are actually burning a mixture of 90% gasoline and 10% ethanol.[348]

Fossil fuel-based energy: Energy from fossil fuels, including coal, natural gas, and oil.[349]

Green energy: A subset of renewable energy that represents renewable energy resources and technologies that provide the highest environmental benefit, and includes electricity produced from solar, wind, geothermal, biogas, eligible biomass, and low-impact small hydroelectric sources.[350]

Renewable energy: Energy that relies on fuel sources that restore themselves over short periods of time and do not diminish.[351]

Renewable Energy Certificates (RECs): A market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource.[352] These rights may be bought and sold, giving "credit" for the generation of renewable power to the owner of the certificate rather than the owner of the physical equipment.

Sustainable energy: Energy that is safe, can be maintained at certain supply levels, does not deplete natural resources, and does not result in lasting harm to the natural environment.[353]

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[344] Massachusetts General Laws Chapter 25A ("Division of Energy Resources"), Section 3 ("Definitions").

[345] United States Environmental Protection Agency "Green Power Partnership: What is Green Power?" at epa.gov/greenpower/what-green-power.

[346] See Massachusetts General Laws Chapter 25A ("Division of Energy Resources"), Section 3 ("Definitions").

[347] Ibid.

[348] See National Service Center for Environmental Publications, United States Environmental Protection Agency, "E85 and Flex Fuel Vehicles."

[349] See United States Environmental Protection Agency "Green Power Partnership: What is Green Power?" at epa.gov/greenpower/what-green-power.

[350] Ibid.

[351] Ibid.

[352] United States Environmental Protection Agency Green Power Partnership, Renewable Energy Certificate, epa.gov/greenpower/renewable-energy-certificates-recs.

[353] There are many definitions of "sustainable energy" used throughout the world. This definition was created by the EAC based upon, among other things, Oxford Dictionary's definition of "sustainable" and industry policy approaches to sustainability, which includes the need for safety (see, e.g., Michelin: "Launch Innovative Mobility to Drive Growth and Urban Well-being," Chengdu Global Summit, November 2014 at erticonetwork.com/wp-content/uploads/2014/11/ebooks.michelin.com_green-paper-mcb-2014_offline_download.pdf.

APR: Agriculture Preservation Restriction

BEH: Bureau of Environmental Health (of Massachusetts Department of Public Health)

BOH: Board of Health

BBRS: Massachusetts Board of Building Regulations and Standards

C&D: Construction and Demolition

CBH: Corey Burnham-Howard (member of EAC)

CG: Claire Golding (member of EAC)

CMR: Code of Massachusetts Regulations

CMRPC: Central Massachusetts Regional Planning Commission

CO_2: Carbon Dioxide

COP: Coefficient of Performance

CPA: Community Preservation Act

CS: Chris Samoiloff (member of EAC)

dB: Decibels

DLTA: Massachusetts District Local Technical Assistance

DOER: Massachusetts Department of Energy Resources

EAC: Town of Princeton Environmental Action Committee

EAP: Town of Princeton Environmental Action Plan

EOEA: Massachusetts Executive Office of Energy and Environmental Affairs

EPA: United States Environmental Protection Agency

ERI: Energy Rating Index

ERP: Energy Reduction Plan

EV: Electric Vehicle

GHG: Greenhouse Gas

GIS: Geographic Information System

GVWR: Gross Vehicle Weight Rating

HELPS: Home Energy Loss Prevention Services

HERS: Home Energy Rating System

HETs: High Efficiency Toilets

Home MVP: Home Energy Market Value Performance

HVAC: Heating Ventilating Air Conditioning

IAQ: Indoor Air Quality Program (of MassDEP)

IPCC: Intergovernmental Panel on Climate Change

IPM: Integrated Pest Management

IPP: Independent Power Producer

kWh: Kilowatt Hour

LCA: Life Cycle Assessment

MA: Massachusetts

MAC: Municipal Assistance Coordinator

MassDCR: Massachusetts Department of Conservation and Recreation

MassDEP: Massachusetts Department of Environmental Protection

MassEVIP: Massachusetts Electric Vehicle Incentive Program

Mass. Gen. L. (or M.G.L.): Massachusetts General Laws

MassWildlife: Massachusetts Division of Fisheries and Wildlife

MDPH: Massachusetts Department of Public Health

MEI: MassEnergyInsight

MIPAG: Massachusetts Invasive Plant Advisory Group

MMWEC: Massachusetts Municipal Wholesale Energy Company

MPG: Miles Per Gallon

MS4: Municipal Separate Storm Sewer System

MVP: Municipal Vulnerability Preparedness

MW: Megawatts

MWRA: Massachusetts Water Resources Authority

NTNC: Non-Transient Non-Community

PAYT: Pay-As-You-Throw
PCBs: Polychlorinated Biphenyls
pCiL: Picocuries Per Liter
PDF: Portable Document Format
PG: Phil Gott (member of EAC)
PM: Phoebe Moore (member of EAC)
PMLD: Princeton Municipal Light Department
PWS: Public Water Supply
RAU: Radon Assessment Unit
RECs: Renewable Energy Certificates
RESNET: Residential Energy Services Network
RFR: Request for Responses
SB: Town of Princeton Selectboard
SMART: Save-Money-And-Reduce-Trash
SMRP: Sustainable Materials Recovery Program
TCE: Trichloroethylene
TPS: Thomas Prince School
TURI: Toxic Use Reduction Institute
UMASS: University of Massachusetts
U.S.C.: United State Code
USA: United States of America
WRSD: Wachusett Regional School District
WRTA: Worcester Regional Transit Authority
WWRR: Wachusett Watershed Regional Recycling

APPENDIX 2

ENVIRONMENTAL ACTION SURVEY 2017

Background and summary

In order to ascertain energy and environmental priorities of Town residents, the EAC developed a measure of these priorities that was administered to a sample of residents, using both in-person and email recruitment approaches.

Methods

A sample of 202 Princeton residents responded in the Fall of 2017, answering questions in multiple formats (rating scales, forced ranked choice, open ended; see attached questionnaire) to provide information to guide the EAC in serving residents' interests going forward. The survey was optional for residents, who could access the survey either online (advertised through Town News, NextDoor, the Landmark) and on paper (available at tables by the post office and placed in the library and the town hall).

Results

The top three environmental priorities expressed by residents included: (1) improved access to green energy, (2) responsible trash and recycling policies, and (3) habitat and open space preservation. A majority of respondents favored cost-effective energy-efficient upgrades to Town buildings (82%); Town application for grant programs for cost-effective energy solutions (82%); environmentally responsible trash and recycling policy (79%); plan for renewable energy options/solutions for both private and municipal use (72%); consideration of fuel efficiency when purchasing Town vehicles (71%); improved access to renewable energy options (70%); preservation and enhancement of open space, nature and wildlife in town (69%); adoption of the Massachusetts goal to reduce greenhouse gas emissions (67%): opportunities to learn about impacts of chemicals such as pesticides/herbicides (59%), and community actions to reduce litter (56%). Fewer than half of respondents favored actions to minimize light pollution (41%) or noise pollution (48%). Half of the respondents expressed interest in opportunities to learn about threats to well water (50%); opportunities to learn how to garden/farm in an environmentally responsible way (50%). Analysis of qualitative data (open-ended responses) showed strong interest in renewable/clean energy options and energy efficiency, with a particular interest in improved access to solar energy; trash/recycling options and policies; concerns about environmental toxins, and conservation of open space. Concerns about the purview of the EAC were mentioned by 13 respondents (6.5%); the main themes were the possibility of burdensome regulations (9 comments) or increased fees/taxes (4 comments).

Graphic representations of survey results can be found on pages 107 - 113.

Conclusions

Town residents who responded to the EAC survey expressed positive views towards multiple areas of environmental action, with a strong expressed interest in accessing green or renewable energy options, particularly solar energy. Respondents favored Town actions to gain grant monies to access cost-effective energy solutions, and a large majority supported the Town's consideration of energy efficiency with respect to municipal buildings and transportation.

Limitations

As the survey was optional for Town residents, findings cannot be construed to represent the views of all Princeton residents, but instead must be considered as representative of a sample of Princeton residents who were motivated to respond to a survey on this topic. As such, we have likely sampled from two ends of the distribution of Princeton residents: those who have an active interest in environmental action, and those who may oppose it or feel concerned about financial or regulatory impacts of environmental action.

Notably, the responses in our survey were largely favorable around most environmental actions mentioned, and qualitative responses showed concerns in only a small sub-portion (6%) of the sample.

Details

The raw dataset, which is available to Princeton residents, may be accessed via written request to the EAC.

Princeton Environmental Action Committee Survey - Fall 2017
At the Annual Town Meeting in May, Princeton residents voted for the Board of Selectmen to establish an Environmental Action Committee (EAC). The EAC has now been established and is working on its mission of creating an Environmental Action Plan to set goals and recommendations for the Town of Princeton with regard to environmental and energy considerations.

Your answers to the questions below will help the EAC understand better the priorities of town residents in this area. Thank you for your time in answering the brief questionnaire.

This survey should only be completed by Princeton residents. Are you a resident of Princeton, MA? _____

Name of your street in Princeton:_____

How did you learn about this survey?

Please list up to 3 actions that you would like to see the Town take as part of an Environmental Action Plan

Please check your top 3 environmental/energy priorities for the Town.

- o Reduce greenhouse gas emissions
- o Improve air quality
- o Improve water quality
- o Responsible trash and recycling policies
- o Nontoxic options for household, garden, and farm
- o Management of invasive species/support of native species
- o Minimize light pollution
- o Minimize noise pollution
- o Habitat and open space preservation
- o Protection of Princeton's rural character as specified in the Town Master Plan
- o Improve access to green energy options
- o Other (fill in below):

(*survey continues on other side*)

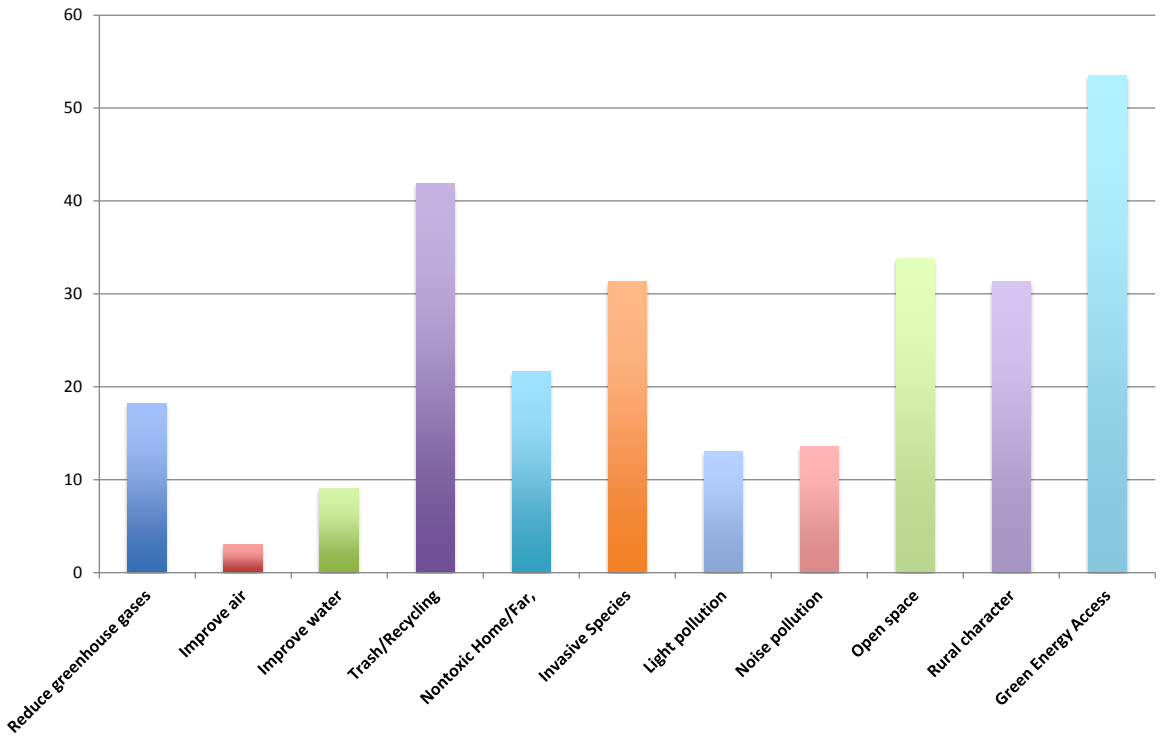
Rate your agreement with the following statements, by placing an X in the column to the right of each statement:

	Strongly disagree	Disagree	Neutral/ Neither agree nor disagree	Agree	Strongly agree
I believe that renovations and improvements to Town buildings should include cost-effective energy-efficient upgrades.					
I would like the Town to support environmentally responsible trash and recycling options.					
I think that the Town should apply for grant programs to find clean energy solutions to reduce long-term energy costs and strengthen the local economy.					
I would like improved access to renewable energy options.					
I believe that the Town should plan for renewable energy options/solutions for both private and municipal use.					
I think that the Town should adopt the Commonwealth's goal of reducing greenhouse gas emissions.					
It is important that the Town consider fuel-efficiency when purchasing vehicles.					
I am concerned about light pollution and believe we should work to minimize it in town.					
I would like to learn more about impacts of pesticides, herbicides, fertilizers, and common household products, as well as nontoxic alternative approaches.					
I value and want to preserve and enhance open space, nature and wildlife in town.					
I am concerned about litter in town and would favor community actions to reduce litter.					
I would like to learn more about common threats to well water quality.					
I would like guidance and support on how to garden and farm at my home in ways that are environmentally responsible.					
I am concerned about noise pollution and believe we should work to minimize noise pollution in town.					

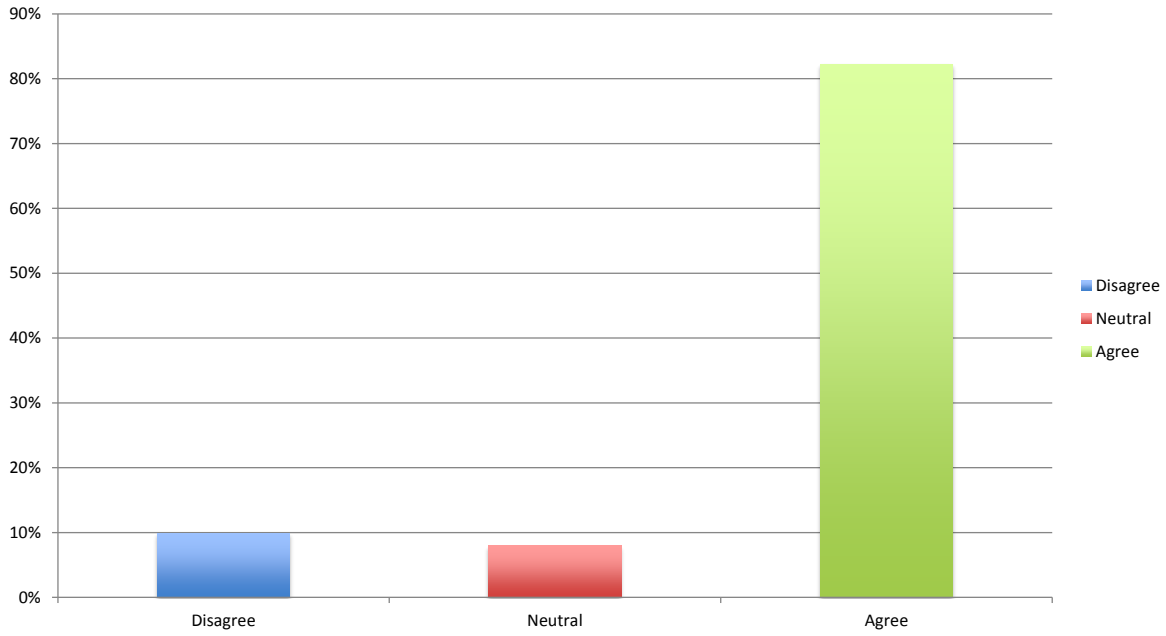
Any additional comments or thoughts to share with the Environmental Action Committee? Please write them below.

Town Environmental Priorities

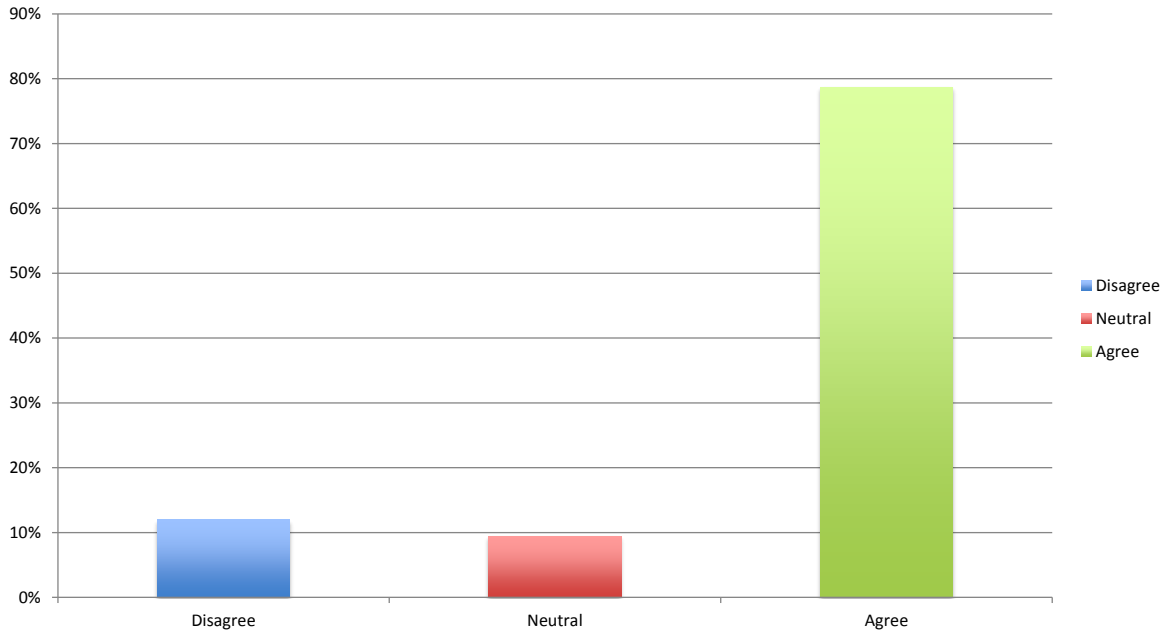
(Percent picking item as one of top 3)



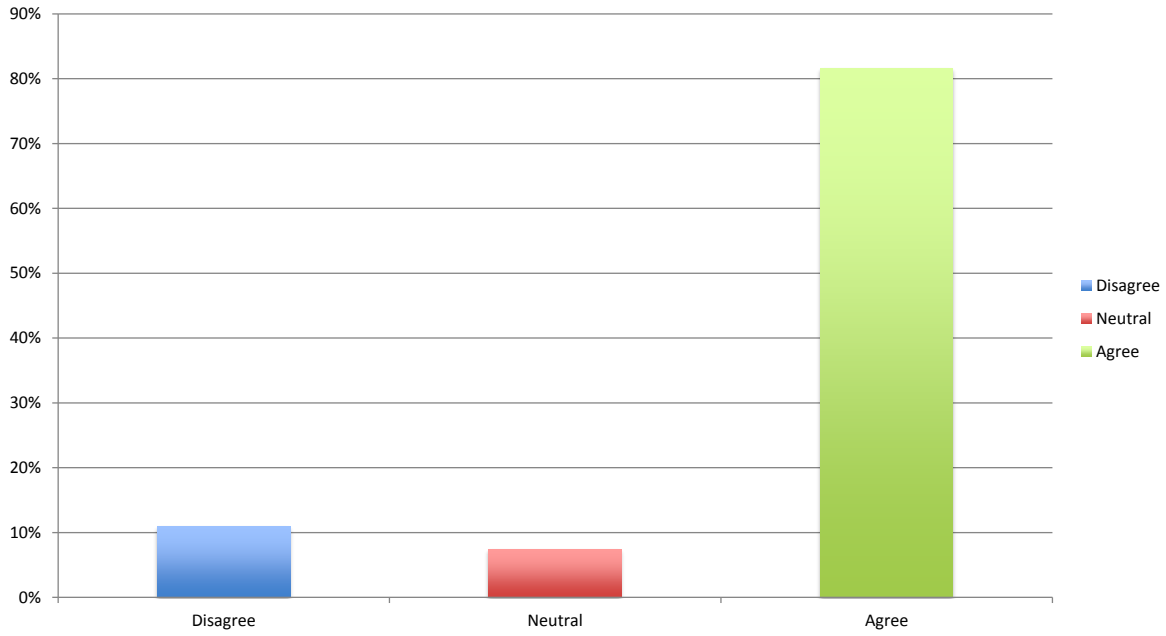
I believe that renovations and improvements to Town buildings should include cost-effective energy-efficient upgrades.



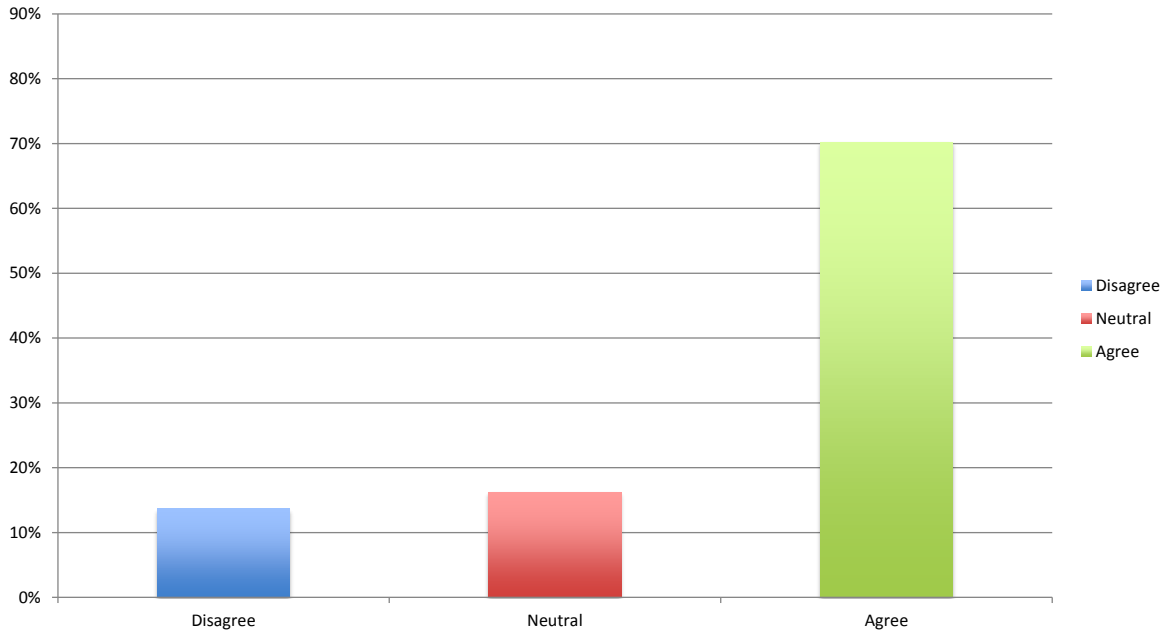
I would like the Town to support environmentally responsible trash and recycling options.



I think that the Town should apply for grant programs to find clean energy solutions to reduce long-term energy costs and strengthen the local economy.



I would like improved access to renewable energy options.



APPENDIX 3

SUPPORTING DOCUMENTS

Wachusett Mountain National Grid Customer Certification

nationalgrid

January 18th, 2018

Nina Nazarian
Town Administrator
Town of Princeton
6 Town Hall Drive
Princeton, MA 01541

Dear Ms. Nazarian,

I am writing to confirm that the Mount Wachusett Ski Area at **499 Mountain Rd., Princeton, MA** is indeed a National Grid customer.

Please let this notification on National Grid letterhead serve as formal notice to the MA DOER, yourself and any other interested parties that National Grid does provide electric service to this address while we do not ordinarily provide to the Town of Princeton. This is given due to their proximity to the Westminster border, where we *do* provide power.

Sincerely,

William K. Isaksen

William K. Isaksen
Channel Sales/Municipals
National Grid
939 Southbridge St.
Worcester, MA 01610

508-922-2698 cell

Page **1** of **1**

Source: January 18, 2018 letter from William Isaksen of National Grid to Nina Nazarian, Town of Princeton

Westminster/Fitchburg Landfill Letter from Selectboard

TOWN OF PRINCETON
Office of the Selectboard

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Princeton, MA 01541
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Richard C. Bisk, Chair
Edith M. Morgan, Clerk
Karen G. Cruise
selectmen@town.princeton.ma.us

Nina Nazarian
Town Administrator
townadministrator@town.princeton.ma.us

Honorable Harriette L. Chandler
24 Beacon Street, Room 333
Boston, MA, 02133

Honorable Kimberly N. Ferguson
24 Beacon Street, Room 473B
Boston, MA, 02133

January 22, 2019

Dear Senator Chandler and Representative Ferguson,

We are writing to express our strong opposition to the proposed expansion of the Fitchburg-Westminster Landfill. For this expansion, the Town of Westminster seeks to acquire 85 acres of Article 97-protected land currently within Leominster State Forest. The landfill is currently projected to reach capacity in 2024. The proposed expansion is estimated to extend capacity to 2034. As you are aware, this proposed expansion requires legislative approval.

At its closest point, the landfill is located approximately 4000 feet north of the Princeton/Westminster town line. The proposed expansion would bring the landfill to within approximately 2500 feet of the town line and destroy another beautiful natural habitat. Many Princeton residents report that they have suffered years of occasional noxious odors emanating from the landfill. During the past 6 months, the problem has become considerably worse. Many have filed complaints with the Department of Environmental Protection. They describe the smell as nauseating. The odors are clearly affecting quality of life for many of our residents. In addition to the nuisance odor and short-term health effects, it is unclear what long-term health effects Princeton residents may face due to air contamination from the landfill. Groundwater contamination from the landfill and its impact on the environment is also a concern since Princeton residents rely on wells for their water supply.

A group of residents attended the Princeton Selectboard meeting on Wednesday January 9 to seek our assistance. Also in attendance were four employees of Waste Management, the operator of the landfill. Fred Confalone, Senior Manager of Business Development for Waste Management, addressed us and acknowledged that they are having a problem with odors and that they are working to resolve it. Waste Management was aware that they had a problem, but did

not appear to be proactive in notifying surrounding communities of the problem. It is difficult to have confidence that an expanded landfill will be run in a manner that minimizes its impact on the Town of Princeton.

Unlike the Town of Westminster and the City of Fitchburg, the Town of Princeton receives no compensation in host fees or otherwise from this facility. An expanded landfill that is even closer to our town will likely continue to have a negative impact on the quality of life and health of our residents, as well as result in potential environmental consequences, infrastructure costs and decreased property values to the Town of Princeton and its landowners. For these reasons, we oppose any expansion of the landfill in favor of the utilization of alternative technologies for solid waste disposal, coupled with increased public education and efforts for waste reduction, composting, reuse, and recycling.

Sincerely,

The Princeton Selectboard

Richard C. Bisk, Chair

Edith M. Morgan, Clerk

Karen G. Cruise, Member

cc: Mr. Martin Suuberg, Commissioner, MassDEP
Ms. Mary Jude Pigsley, Regional Director, MassDEP Central Regional Office
Mr. Leo Roy, Commissioner, Massachusetts Department of Conservation and Recreation
Mr. Matthew A. Beaton, Secretary, Massachusetts EOEEA

Source: https://www.town.princeton.ma.us/sites/princetonma/files/minutes/lettertosenchandler-repferguson_westminlandfill.pdf
(Attached to Jan 23, 2019 Selectboard minutes.)

Buy Recycled Policy

TOWN OF PRINCETON

Office of the Town Administrator

6 Town Hall Drive
Princeton, MA 01541
(978) 464-2102 Phone (978) 464-2106 Fax
www.town.princeton.ma.us
townadministrator@town.princeton.ma.us

FROM: Nina Nazarian, Town Administrator

TO: Terri Longtine, Maureen Lynch, Susan Shanahan
All Departments

CC: Board of Selectmen

DATE: January 28, 2016

RE: Buy Recycled Policy

Last year, the Town applied and received a Targeted Small Scale grant from MassDEP which subsidized the purchase of compost bins from the Wachusett Watershed Regional Recycle Center for residents and funds to promote recycling.

As one of the conditions of that grant, the Town is required to have a Buy Recycled Policy. This policy ultimately requires the Town to purchase recycled products whenever such products meet quality requirements and are available at reasonable prices and terms.

Attached please find the Buy Recycled Policy adopted by the Board of Selectmen.

All personnel who purchase supplies for your respective offices/departments are asked to closely review the attached policy, including but not limited to the requirement under paragraph e), that each department shall report purchases of recycled products on or before July 30th for the prior fiscal year.

Please do not hesitate to contact me with any questions.

TOWN OF PRINCETON
Office of the Board of Selectmen

6 Town Hall Drive
Princeton, MA 01541
(978) 464-2102 Phone (978) 464-2106 Fax
www.town.princeton.ma.us

Purpose: The Board of Selectmen agree to establish standards to promote purchasing environmentally preferred products.

Policy: BUY RECYCLED POLICY

In recognition of the need to make more efficient use of our natural resources, create markets for the materials collected in recycling programs, reduce solid waste volume and disposal costs, and serve as a model for private and public institutions, the Town of Princeton is committed to purchasing products which are environmentally preferable, and/or made of recycled materials whenever such products meet quality requirements and are available at reasonable prices and terms.

To the maximum extent practicable, the following recommendations should be adhered to:

a) For all purchases of printing and writing paper for in-house use or custom Printed materials by professional printers, including copier paper, offset paper, forms, stationary, envelopes, tablets, notepads and file folders, the minimum content standards shall be no less than 30% post-consumer recycled materials to meet the current state and federal minimum standards.

b) For all purchases of janitorial paper products and trash bags, the minimum content standards shall be no less than 20% post-consumer recycled materials.

c) All office equipment purchases shall be deemed energy efficient.

d) Town departments shall ensure that all contracts for printing require the inclusion of an imprint identifying the recycled content of the paper whenever practicable, along with the recycling symbol.

e) For the purpose of measuring the progress of the program and success in meeting recycling goals of the Commonwealth, each department shall report purchases of recycled products to the Town Administrator on July 30 for the previous fiscal year.

f) Each department shall implement paper reduction techniques through the use of duplexing, sharing and circulating materials, use of electronic mail and reuse of discarded paper for draft works, scrap paper and internal messages.

g) Each department head shall incorporate waste prevention and recycling in daily operations.

h) The Town shall request its contractors and consultants to use and specify recycled products in fulfilling contractual obligations wherever practical.

Adopted on Monday, January 25, 2016 by vote of the Board of Selectmen.

TPS 2017 Drinking Water Quality Report

POSTED FOR CUSTOMER REVIEW AS REQUIRED BY THE MASSACHUSETTS DEP/DWP
Massachusetts Drinking Water Regulations 310 CMR 22.16A (23)

2017 DRINKING WATER QUALITY REPORT*
For the period January 1, 2016 to December 31, 2016

THOMAS PRINCE SCHOOL
PWS ID 2241003
RTE 62
170 STERLING ROAD
PRINCETON, MA 01541

The drinking water system at the facility noted above is registered in the Commonwealth as a non-transient non-community (NTNC) public water system. It is an NTNC public water system because it owns and/or controls its source of water and supplies potable water to at least 15 service connections or regularly serves at least 25 of the same persons or more approximately four or more hours per day, four or more days per week, more than six months or 180 days per year. Examples of NTNCs include: schools, and workplaces providing water to its employees such as factories and office buildings.

NTNC systems must routinely test for coliform bacteria, 18 inorganics, 26 synthetic organic compounds, and 35 volatile organic compounds. MassDEP may also require or a NTNC system may elect to conduct additional testing as needed. Below is a list of contaminants found in the water during the reporting period.

If the facility was required to monitor for Lead and Copper, the results are listed in the Lead and Copper (LCR) section of this report. If the facility was required by the U.S. Environmental Protection Agency (USEPA) to monitor for unregulated contaminants under the Unregulated Contaminant Monitoring Rule (UCMR), the results are listed in the Unregulated Contaminant Monitoring Rule 3 (UCMR3) section of this report.

Please be aware that "all drinking water, including bottled water, may contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk."

For more information please contact the persons listed at the end of this report.

MONITORING RESULTS TABLE

CONTAMINANT	HIGHEST DETECT VALUE[1]	MCL[2]	MCLG[3]	MCL VIOLATION[4] (YES or NO)	POSSIBLE SOURCES OF CONTAMINATION
RADON (PCI/L)	7760	10000 (ORSG)	N/A	N	Natural sources

[1] **Detect** – any levels found at or above the detection limits in the Massachusetts Drinking Water Regulations, 310 CMR 22.00.
[2] **Maximum Contaminant Level (MCL)** – the highest level of a contaminant that is allowed in drinking water.
Office of Research and Standards Guideline (ORSG) – MassDEP health-based guideline.
Secondary Maximum Contaminant Level (SMCL) – typically aesthetic standards that represent reasonable goals for drinking water quality. See 310 CMR 22.07D for situations that may warrant enforcement of these levels.
Treatment Technique (TT) – A required process intended to reduce the level of a contaminant in drinking water.
[3] **Maximum Contaminant Level Goal (MCLG)** – the level of a contaminant in drinking water below which there is no known or expected risk to health.
[4] **For any violations**, health effects language for these contaminants is available from the owner/operator of this Public Water System upon request and can also be found in Attachments C and D of Appendix M of the *Guidelines and Policies for Public Water Systems* (see link below).

For more information contact:

Shannon Conley, Principal — Owner/Responsible Person
[signature] — Signature of Owner/Responsible Person
978-464-2110 — Phone

DAVID PAPALE — Certified Operator Name
[signature] — Signature of Certified Operator
508-829-2537 — Phone

These results are on file with the Massachusetts Department of Environmental Protection Drinking Water Program (MassDEP/DWP). If you have any questions on the MADEP Drinking Water Program contact MassDEP at (617) 292-5770 or email Program Director-DWP@state.ma.us

You can refer to Attachments C and D of Appendix M of the *Guidelines and Policies for Public Water Systems* (see link below) for more information on contaminants and potential health effects or you can call the U.S. EPA Safe Drinking Water Hotline at (800) 426-4791.

Date This Was Posted: 7/19/17 Location of Posting: office

Appendix M - *Guidelines and Policies for Public Water Systems*
http://goo.gl/ONPYTo (700 KB)

Page 1 of 1

Source: thomasprince.wrsd.net/UserFiles/Servers/Server_216959/File/School%20Info/Building%20Information/water%20quality%20report%202017.pdf