Metro West Climate Equity Project

CLIMATE EQUITY MEMORANDUM

Prepared by the Metropolitan Area Planning Council
JANUARY 2022

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Introduction

The towns of Ashland and Natick and the City of Framingham have partnered on a project focused on the intersection of climate change and equity. *The Metro West Climate Equity Project* aims to reduce the social, environmental, and economic vulnerabilities that affect Environmental Justice communities across the three municipalities and to build local resilience to climate change.

The project has three objectives:

- Learn from and build lasting relationships with Metro West Environmental Justice communities that will facilitate long-term engagement on climate change resilience issues
- Update local plans and direct funding to reflect Environmental Justice priorities
- Increase staff's knowledge of climate equity and improve their capacity to support and engage **Environmental Justice populations**[1] through training

Support for this project comes from the Municipal Vulnerability Preparedness (MVP) program, which "provides support for Massachusetts cities and towns to begin the process of planning for climate change resiliency and implementing priority projects."[2]

This memorandum will help establish an initial understanding of the priority Environmental Justice neighborhoods, including relevant history, sociodemographic characteristics, climate risk factors and assets. The memo analysis will serve as a reference for discussions with residents and will be updated to reflect findings from project research and engagement activities.

Memorandum Outline

- Grounding Climate Action in Equity
- Climate Equity Analysis
- Community-Driven Climate Planning
- Assets for Climate Action in Metro West

[1] Throughout the memo, terms defined in the glossary will be bolded.
[2] To learn more about the MVP program visit: https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program

Grounding Climate Action in Equity

Communities that have least contributed to the climate crisis are disproportionately burdened by its impacts. Centering equity in climate action is critical to achieving a future where all people are protected from environmental harm and benefit from the transition to a less **carbon intensive** society and economy.

Absent one universal definition for climate equity, climate practitioners and social movements for climate action have described some consistent elements. Climate equity:

- Acknowledges that residents of communities predominantly home to Black, Indigenous, and People of Color (BIPOC) and low-income individuals experience the worse effects from pollution and climate change, including poor air and water quality, extreme weather events, displacement, and the rising cost of essential resources.[3]
- Promotes a critical analysis of and changes in policies and practices to remedy the historic and ongoing oppression by governments, industries, and other institutions that is at the root of these disparate impacts.
- Prioritizes solutions identified by the most impacted communities and strengthens the capacity of these communities to lead the implementation of those solutions. Capacity building processes include knowledge sharing, increasing social connectedness, and investing in community institutions and networks.
- Facilitates a 'just transition' away from fossil fuels and towards a society and economy that centers community health and wellbeing, self-determination, meaningful work, equitable distribution of resources and power, and the cultural wealth and ecological wisdom of communities.[4]

Climate Equity Analysis

Priority Neighborhoods

The *MetroWest Climate Equity Project* centers the residents of designated Environmental Justice (EJ) areas. These neighborhoods are more likely to be home to people of color, lower-income households, and people who experience **linguistic isolation**.[5, 6]

A map of the EJ block groups in Ashland, Framingham, and Natick shows the areas south of I-90 in Framingham and abutting areas of western Natick and eastern Ashland as designated EJ

[3] EPA. (2021). *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts.*
[4] Climate Justice Alliance. *Just Transition: A Framework for Change.* https://climatejusticealliance.org/just-transition/
[5] In Massachusetts, a neighborhood is defined as an Environmental Justice population if one or more of the following four criteria are true: 1) the annual median household income is not more than 65 per cent of the statewide annual median household income; 2) minorities comprise 40 per cent or more of the population; 3) 25 per cent or more of households lack English language proficiency; or 4) minorities comprise 25 per cent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 per cent of the statewide annual median household income.
[6] Mass EEA. (2022). Environmental Justice Populations in Massachusetts

Populations (Figure 1).[7] Almost all of this area meets the EJ **minority** criteria, meaning that people of color comprise at least 25 percent of the population.[8] Additionally, areas of Framingham also meet the EJ English isolation and/or income criteria – these neighborhoods are more likely to be home to lower-income households and people who experience linguistic isolation. The South Framingham neighborhood meets all three EJ criteria.

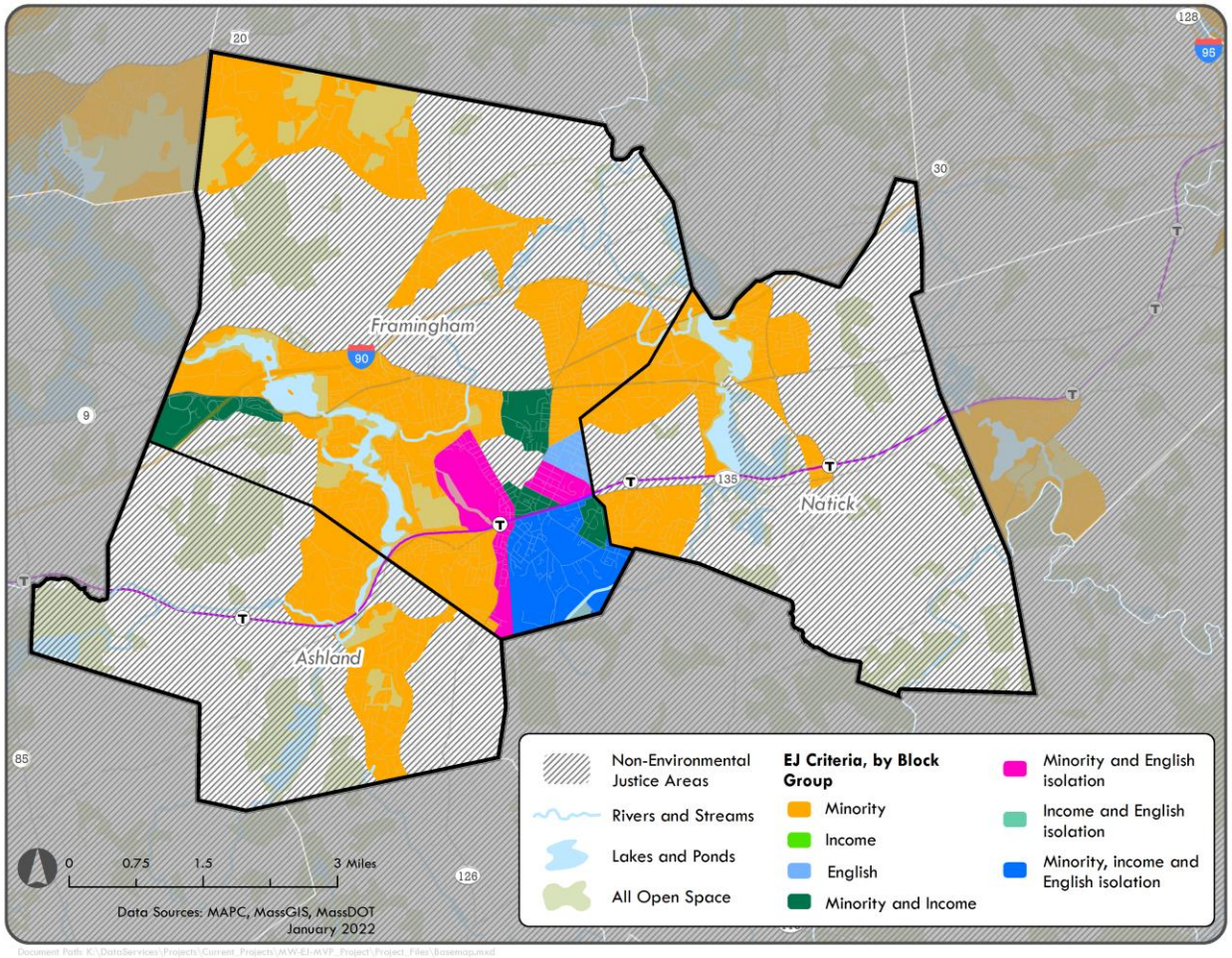

Figure 1. Environmental Justice populations in Ashland, Framingham, and Natick.

As the EJ designation encompasses both social and economic factors, it speaks to a community's **climate vulnerability**. Racist systems and institutions have concentrated climate risks in communities of color, and both linguistic isolation and income affect individuals' ability to avoid

[7] The Executive Office of Energy and Environmental Affairs (EEA) creates and maintains a statewide dataset of Census block groups designated as Environmental Justice Populations by meeting one of the above criteria. These criteria were evaluated with three American Community Survey 2015-2019 5-year-estimate tables.

[8] The EEA Environmental Justice Policy defines "minority" as individuals who identify themselves Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white. We use the term "minority" for consistency with the EJ Policy and criteria, but otherwise use "Black, Indigenous, and People of Color (BIPOC) or "people of color." The term minority can be misleading and has fallen out of favor among climate and EJ advocates; in some communities people of color comprise the majority of the population and are otherwise part of the global majority.

and/or adapt to climate impacts. We will look at other indicators of climate vulnerability in a later section.

Historic Roots of Environmental and Climate Impact in Metro West

Low-income and BIPOC communities' disproportionate exposure to the harms of environmental pollution and climate change is not accidental. As Atlantic reporter Vann R. Newkirk II details succinctly in the video, *Environmental Racism is the New Jim Crow*, "Pollution and the risk of disaster are assigned to Black and Brown communities through generations of discrimination and political neglect."[9] The forceful displacement of indigenous communities, weak workplace protections for jobs held primarily by immigrants and people of color (jobs that typically carry higher environmental risks), residential discrimination through **red lining** and **racial covenants**, and the siting of low-income housing near toxic facilities, highways, and within wetlands all represent institutional decisions that have undermined the safety and wellbeing of these communities.[10, 11, 12] These **frontline communities**, who experience the "first and worst" impacts of climate change, have been disadvantaged by generations of racist systems and institutions.

Understanding Metro West's ecological, economic, and social history – essentially, how we got here - is a necessary first step in the process of reducing Environmental Justice communities' vulnerability to climate change, because it helps us understand the origins of harm-generating policies and practices. The summary below presents relevant milestones in the region's history, gathered from municipal planning documents and local historical organizations' resources.

The area comprised of Ashland, Framingham, and Natick is the ancestral land of the Nipmuc, Massachusett, and Wampanoag. Prior to European contact, these communities migrated seasonally to take advantage of prime hunting, fishing, and gathering opportunities and established permanent settlements, following the development of agriculture in the region.[13, 14] In the mid-1600s, Puritan missionaries - with the cooperation of some tribal leaders - established "Praying Towns" in the region to convert and assimilate Indigenous people. According to the Natick Historical Society, Native people joined praying town communities for several reasons, including "a desire for land security; a need for economic survival; the possibility of English legal protection; and a curiosity about the Puritan faith at a time of tremendous upheaval due to epidemics and English expansion." During King Phillip's War, Praying Town Indigenous populations were forcibly displaced to Deer Island, where many died from the cold and lack of food and medical care. Those who later returned found their villages and homes destroyed. By

[9] Newkirk, V.R. (2017). Environmental Racism is the New Jim Crow. The Atlantic. https://www.theatlantic.com/video/index/529137/environmental-racism-is-the-new-jim-crow/
[10] Ibid.
[11] Plumer, B. and Popovich, N. (2020). How Decades of Racist Housing Policy Left Neighborhoods Sweltering. The New York Times. https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html
[12] Henderson, K. (2020). Why Millions of Workers in the US are Denied Basic Protections. OXFAM America. https://politicsofpoverty.oxfamamerica.org/why-millions-workers-us-are-denied-basic-protections/
[13] Natick Historical Society. *12,000 Years of Local History*. https://www.natickhistoricalsociety.org/12000-years
[14] Town of Natick. (2020). *Open Space and Recreation Plan (OSRP)* and Town of Ashland. (2017). *Open Space and Recreation Plan (OSRP)*.

the first half of the 18th century, most of the Indigenous landowners had been driven into debt and their lands deeded to various White settlers.[15, 16, 17]

The region later became a hub for industrial activity. The Sudbury River and its tributaries helped power local factories, and the expansion of railroad lines in the mid-1800s catalyzed a dramatic growth in manufacturing. Manufacturing activity remained strong through the early to mid-20th century.[18, 19] Today, each municipality is reckoning with the impacts of industrialization on the region's soils and waters. Some of these impacts are documented within municipalities' Open Space and Recreation Plans (OSRP). Legacy pollutants, such as heavy metals and volatile organic compounds, have been found in the Sudbury River and in lakes and ponds across each of the three municipalities, including places used by the community for recreation (stormwater runoff is another major source of water pollution).[20] BIPOC and immigrant households are also more likely to risk exposure to pollutants through consumption of fish from local water bodies. The Natick OSRP identified pollution in Lake Cochituate as an important equity issue due to the number of people who use it to fish as part of their diets.[21] Stormwater runoff, which is worsened by paving over natural surfaces, is another major source of pollution in local water bodies.[22] During one heat wave in 2021, all public beaches in Framingham were closed due to contamination (most likely harmful algae blooms or cyanobacteria), depriving the community of a free cooling resource.[23]

In the 1950's and 1960's, the region experienced a post-war housing boom. The region's proximity to highways and a commuter rail line, open space assets, and character of mostly single-family homes has contributed to the area's suburbanization and enduring popularity. At the peak of this growth, families of color faced widespread discrimination in their attempts to move to the suburbs. In Natick, a group of residents formed the Natick Fair Housing Practices Committee in 1957 in response to this discrimination. They engaged in organizing, advocacy, and helped connect home sellers directly with homebuyers, circumventing racist realtors. The Committee was the first of its kind in MA and among the first in the country.[24, 25]

More BIPOC households have since moved to these municipalities, contributing to their growing diversity. However, people of color still experience barriers to making a home within the region.

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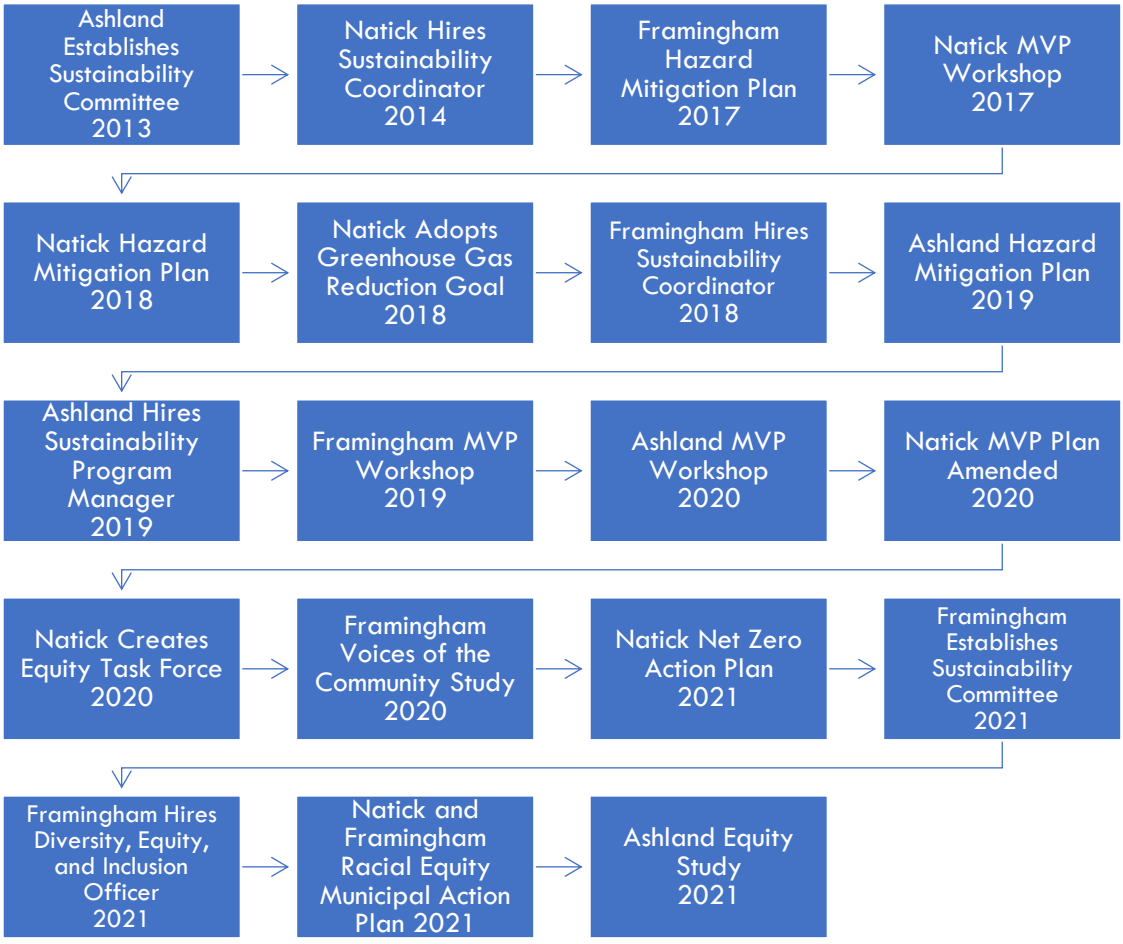
[15] Natick Historical Society. *Natick's Beginnings*. https://www.natickhistoricalsociety.org/naticks-beginnings
[16] Nipmuc Nation. *A Brief Look at Nipmuc History*. https://www.nipmucnation.org/our-history
[17] Nipmuc Indian Association of Connecticut. (1995) The "Praying Towns." Historical Series – Number 2. http://www.nativetech.org/Nipmuc/praytown.html
[18] Ashland OSRP, 2017., Natick OSRP, 2020., and City of Framingham. (2020). *Open Space and Recreation Plan (OSRP)*.
[19] Natick Historical Society. *19th-Century Natick*. https://www.natickhistoricalsociety.org/19th-centurynatick
[20] Ashland OSRP, 2017., Framingham OSRP, 2020., and Natick OSRP, 2020.
[21] Natick OSRP, 2020.
[22] EPA. (2021). *Sources and Solutions: Stormwater*. https://www.epa.gov/nutrientpollution/sources-and-solutions-stormwater "Stormwater runoff is often worsened by human activities, and can contain nitrogen and phosphorus pollutants from fertilizers, pet and yard waste. Because stormwater flows over hard surfaces directly into a water body or storm drain, there is no opportunity for soil and plants or a water treatment facility to filter out pollutants. Urban and suburban areas produce much more stormwater runoff due to the high amount of paved and hard surfaces."
[23] Shared by City of Framingham during a fall 2021 Accelerating Climate Resiliency (ACR) Resilience Community of Practice (RCOP) meeting.
[24] Natick Historical Society. 20th-Century Natick. https://www.natickhistoricalsociety.org/20th-century
[25] Ashland OSRP, 2017., Framingham OSRP, 2020., and Natick OSRP, 2020.

With limited access to credit across most of the state and rising home values, low- and moderate-income (LMI) homebuyers have few options regarding where they can buy. According to the UMass Donohue Institute, "In 2019, 50 percent of the loans to LMI borrowers were located in just 20 municipalities, 17 of which were Gateway Cities." Borrowers of color are still more likely to be denied for a home loan than White borrowers, even when controlling for income and several measures of credit worthiness. Across the three project communities, only 25 loans were given to Black borrowers and 127 loans were given to Hispanic/Latinx borrowers out of a total of 1,378 loans in 2019 (about 1 in 10 home loans overall).[26] Discriminatory housing practices and the high cost of land push low-income households (and affordable housing development) to less desirable locations, such as near industrial facilities, within flood plains, and places underserved by trees or open spaces. Consistent with patterns across the country, local EJ communities are more likely to reside near brownfield sites. Conversely, some of these neighborhoods also enjoy fewer acres of green space per capita than their neighbors in other parts of the city.[27]

Climate Action and Equity in Metro West



[26] Bernstein, C., Waterhouse, G., Raisz, A. Cakir, E., McNally, M. (2021). Mortgage Lending Trends in Massachusetts: FY 2021 MA Community Banking Council Report. UMass Donahue Institute Economic & Public Policy Research Group. http://mcbc.info/wp-content/uploads/2021/06/MCBC-FY21-Mortgage-Lending-Report.pdf. Measures of credit-worthiness: debt-to-income ratio, income, loan-to-value ratio.

[27] Framingham OSRP, 2020.

Climate Vulnerability in Metro West

Climate vulnerability is described by the Intergovernmental Panel on Climate Change (IPCC) as "the propensity of predisposition to be adversely affect by the impacts of climate change."[28] A group's exposure to climate hazards, access to resources, and ability to plan for and rebuild after a climate event all factor into a group's vulnerability to climate change.

Even in **frontline communities**, social context, economic situation, and aspects of the built environment can buffer climate impacts by providing communities a means to cope or adapt. These same factors can also amplify climate impacts, especially among communities that have been subjected to structural racism and other inequities. Understanding what makes a community more or less vulnerable is critical to mitigating the negative impacts of climate change and to building resiliency.

More than exposure to a hazard, climate vulnerability is characterized by encompassing three dimensions:

- **Exposure:** How close is an individual or group to a hazard
- **Sensitivity:** The pre-existing social, economic, and political conditions of a given community influence access to resources and exposure to hazards
- **Adaptive capacity:** A group's ability to plan for and adapt to changing conditions

This framework emphasizes that investing in social infrastructure is just as important as making the built environment more resilient.

In the following sections, we explore data representing the three dimensions of vulnerability. Data for the state was divided into five equal groups (quintiles) and mapped (methods and technical documentation for this data available at https://climate-vulnerability.mapc.org/). We focused on Ashland, Framingham, and Natick to better understand which neighborhoods are more vulnerable to climate hazards and to help identify populations to center in climate preparedness and resiliency work.

Factors of Climate Vulnerability: Key Takeaways:

1. The entire region has experienced inland flooding in the past; extreme precipitation will likely lead to flooding in the future, particularly in areas with high impervious surface.
2. Most of the EJ neighborhoods in the region are also heat islands; however, this impacts the most residences (opposed to businesses) in southern Framingham.
3. Ashland, northern Framingham, and southern Natick have a demographic, social, and built environment characteristics that make them less sensitive and more capable of adapting to changing conditions. This is consistent with trends we see in many of the Greater Boston area suburban communities, where – even within EJ communities - higher adaptive capacity can reduce vulnerability to heat and flood impacts.
4. While factors that would make a neighborhood sensitive and unable to easily adapt are present across the region, they most consistently and acutely occur in the EJ neighborhoods

[28] IPCC Fifth Assessment Report, 2014

south of I-90, particularly in the South Framingham Neighborhood and in Framingham Centre.

Exposures

Heat

As our climate warms, Ashland, Framingham, and Natick can all expect hotter summers and more frequent and severe **heat waves**. Rising temperatures are a growing threat for the health of our communities, as heat is already among the deadliest weather hazards.[29] Areas covered by dark and impervious surfaces, such as roads and parking lots, heat up more than areas covered in reflective surfaces and vegetation, resulting in even more extreme "heat islands" on days that are already very hot. While hot days affect the entire region, people who live in areas prone to **heat island** effects can be exposed to even greater temperatures.

A large proportion of southern Framingham is a heat island, but there are smaller pockets of extreme heat throughout the region (Figure 2). These cluster around the commuter rail stations in Ashland and Natick, along Route 9, and in large commercial or retail areas (e.g., The Framingham Technology Park, Shaw's Plaza in Ashland).

[29] Michelle Samuels (2020). Heat May Kill More People in the US than Previously Reported. Boston University School of Public Health. https://www.bu.edu/sph/news/articles/2020/heat-may-kill-more-people-in-the-us-than-previously-reported/

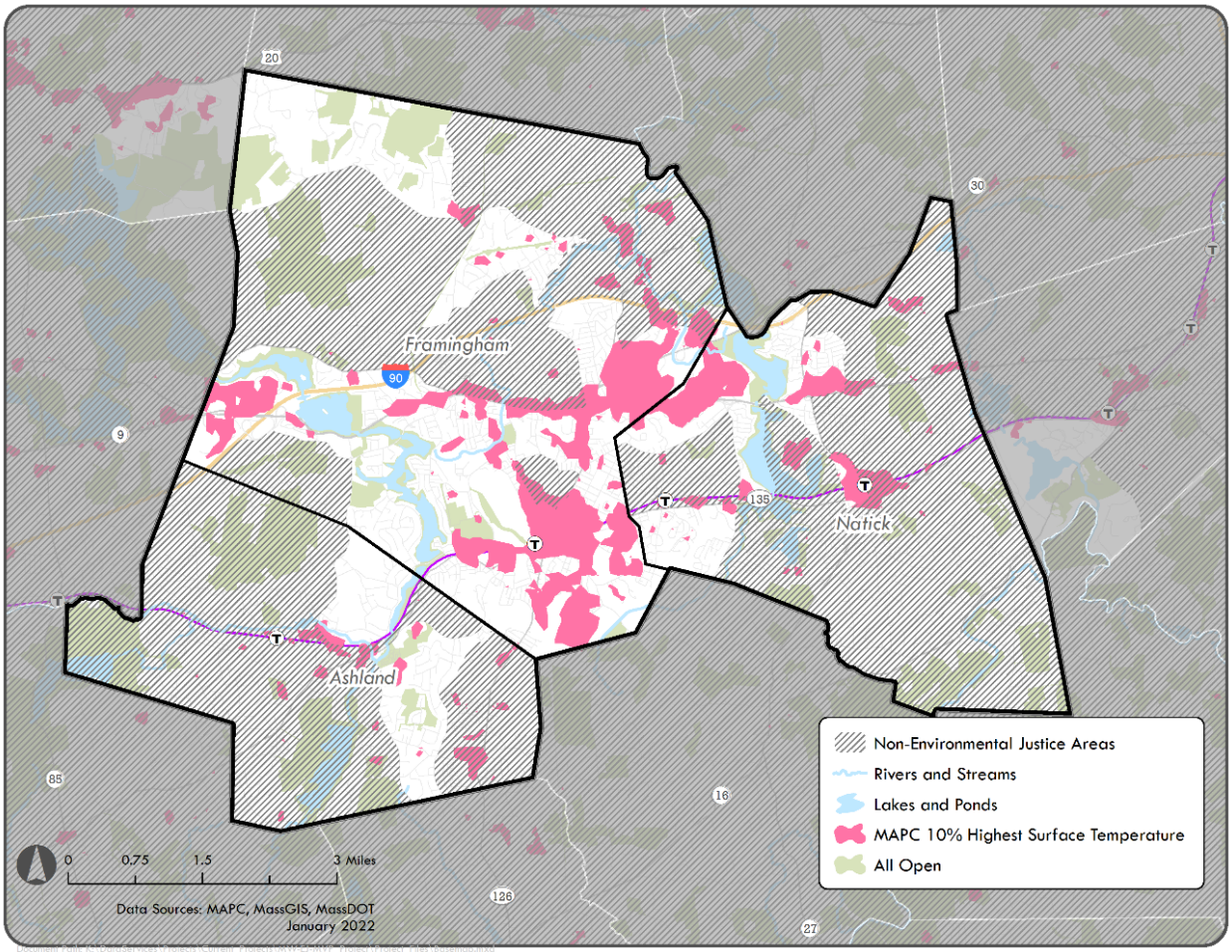


Figure 2. Areas highlighted in pink represent areas with highest ground surface temperatures (top 10th percentile of recorded temperatures). Surface temperature monitoring is a common method of documenting the location urban heat islands.

Since several of these heat islands are in areas with dense commercial, retail, or transit services, we also looked at the severity of the heat island effect on housing units to better understand residential heat exposure (Figure 3).[30]

Housing units in southern Framingham and the abutting area of western Natick experience, on average, land surface temperatures 25% to 50% higher than the regional air temperature for that day. The percent increase is much smaller (0-11%) for northern Framingham, Ashland and southern Natick.

[30] This indicator looks at the difference between land surface temperature and the regional air temperature within each parcel. This metric reflects an estimate of the degree to which surface properties cause local temperature increase. We then multiplied the number of housing units on the parcel by the temperature increase at that parcel, summed the results over all parcels, and divided the sum by the total number of housing units in that census tract. The result is the average heat island temperature increase for housing units in that census tract.

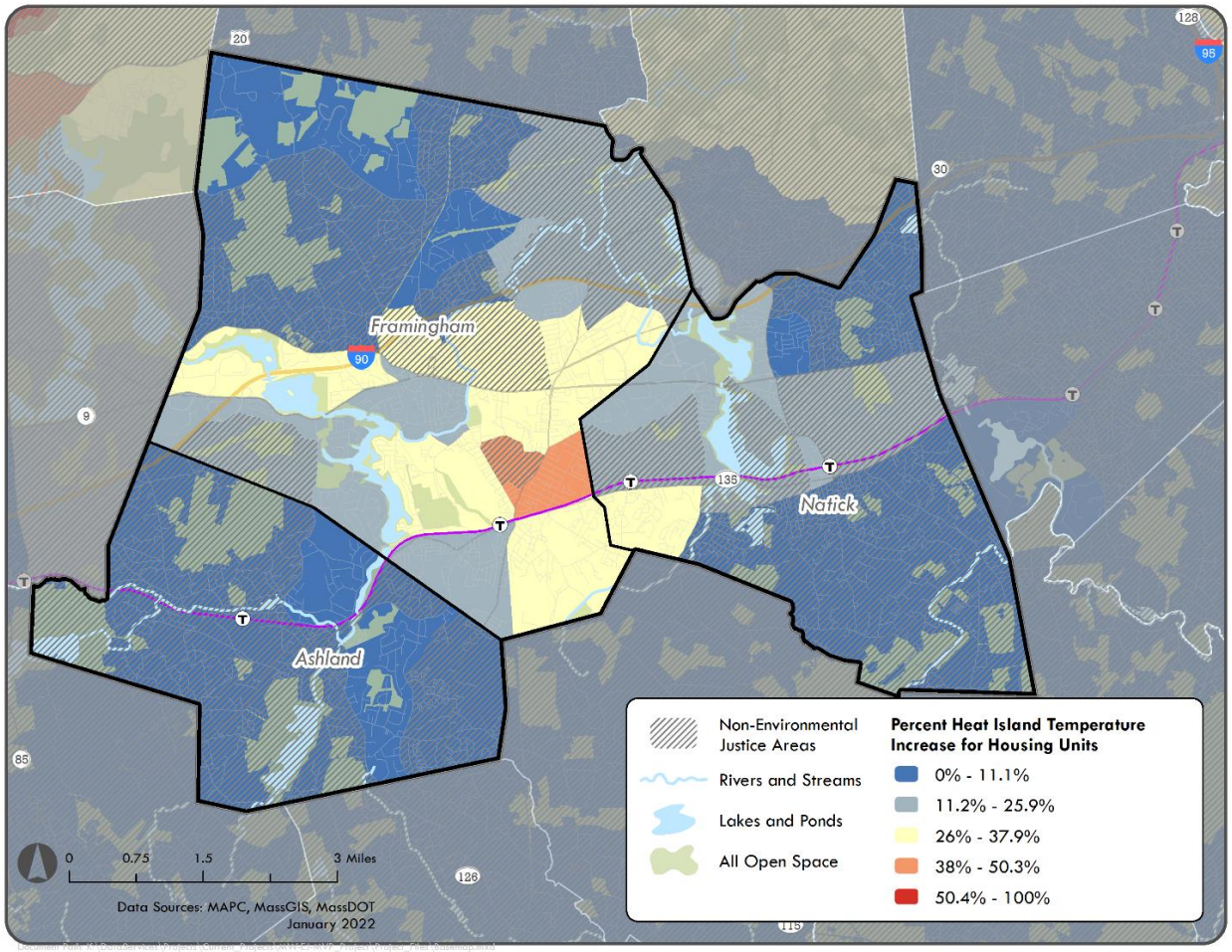


Figure 3. Percent heat island temperature increase for housing units relative to regional air temperatures.

Flooding

Extreme precipitation can cause damaging flooding along rivers, streams, coasts, wetlands, and areas with high proportions of impervious surfaces. A warmer atmosphere can hold more moisture; as atmospheric circulation patterns change, the region can expect more extreme storms, resulting in more frequent and severe flooding.[31]

To understand flooding in the region, we looked at the areas the Federal Emergency Management Agency (FEMA) has identified as a Special Flood Hazard Areas (SFHAs) and property damage claims from flooding that occurred in March 2010 (Figure 4).[32] Together, these data sources indicate where riverine flooding and storm surges have a more than a 1% chance of occurring each year (this is often referred to as the 100-year floodplain) and where inland flooding has happened in the past.

[31] Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs and Adaptation Advisory Committee, 2011

[32] In March 2010, eastern Massachusetts experienced heavy rains totaling 17.7 inches over 19 days as recorded at the Blue Hill Observatory in Milton. The rains caused significant flooding across the region and led to a federal disaster declaration.

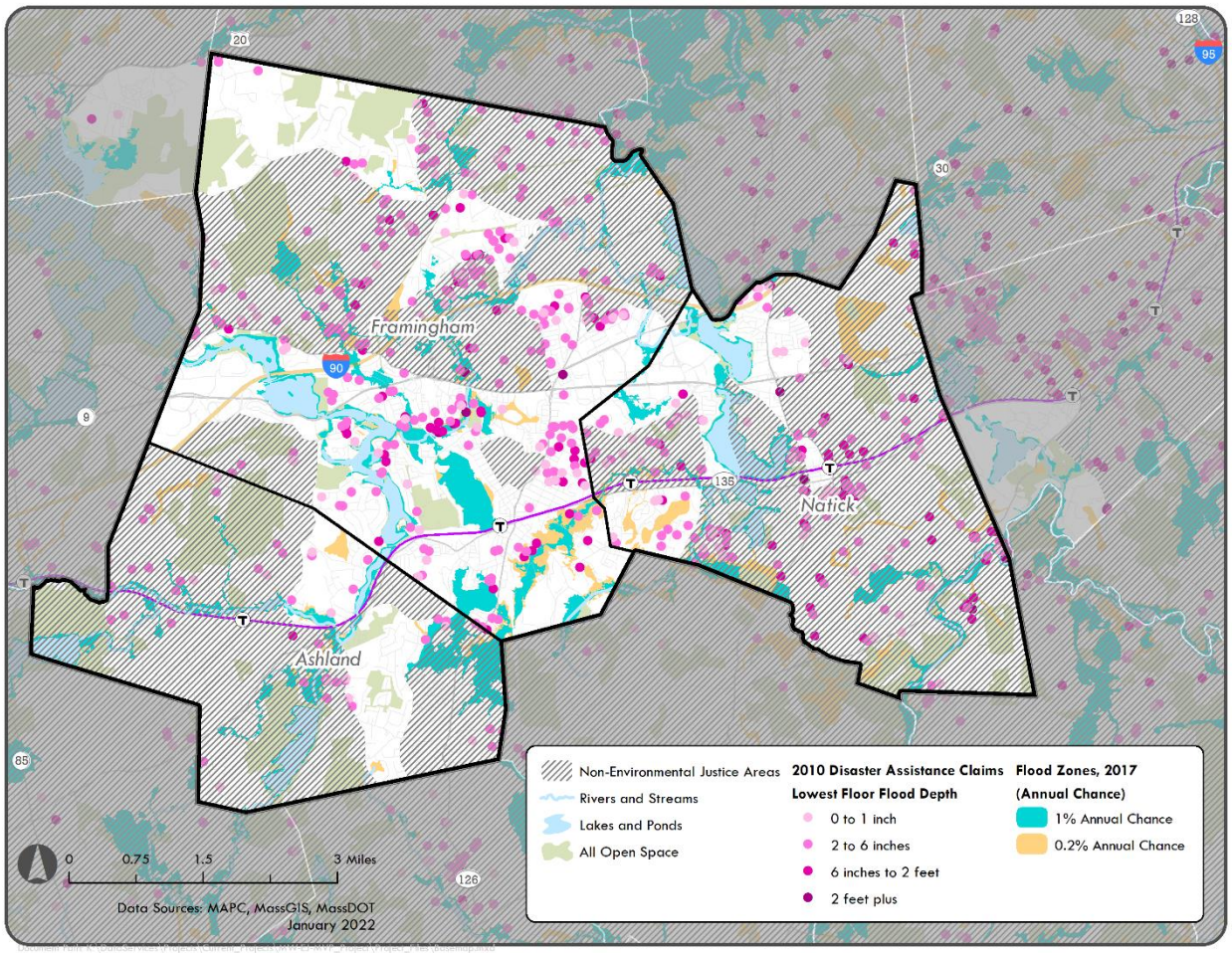


Figure 4. FEMA flood zones and property damage claims from flooding that occurred in March 2010.

Across Ashland, Natick, and Framingham, over 600 residents filed property damage claims in March 2010. These claims are concerning not only because of the large number of residents impacted, but also because mapping of the claims reveals that flood damage was widespread across all three municipalities, particularly Framingham and Natick. While some claims clustered near the Sudbury River and other FEMA flood zones, wetlands, and streams, many were located outside the FEMA 1% and .2% chance flood hazard zone. Moreover, the reported claims may underrepresent the extent of the damage and not accurately capture impacts to all households, especially renter households.

Sensitivity

Health

The proportion of the population with pre-existing health conditions is an important indicator of a neighborhood's sensitivity to extreme heat and floods. There is evidence that heat increases the risk of cardiovascular disease, respiratory disease, and diabetes-related hospital visits and deaths during heat waves. Acutely stressful events, such as flooding, can increase blood pressure and contribute to increases in cardiovascular-associated **morbidity** and **mortality**. Furthermore,

disruptions to medication and diet due to floods and other extreme weather events can increase diabetes-related morbidity and mortality.[33]

Looking at data on the presence of pre-existing health conditions in the region, we see higher rates of asthma hospitalizations and a greater proportion of the population with heart disease and diabetes in the EJ population neighborhoods south of I-90, particularly in South Framingham and around Framingham Centre (Figures 5, 6, and 7).

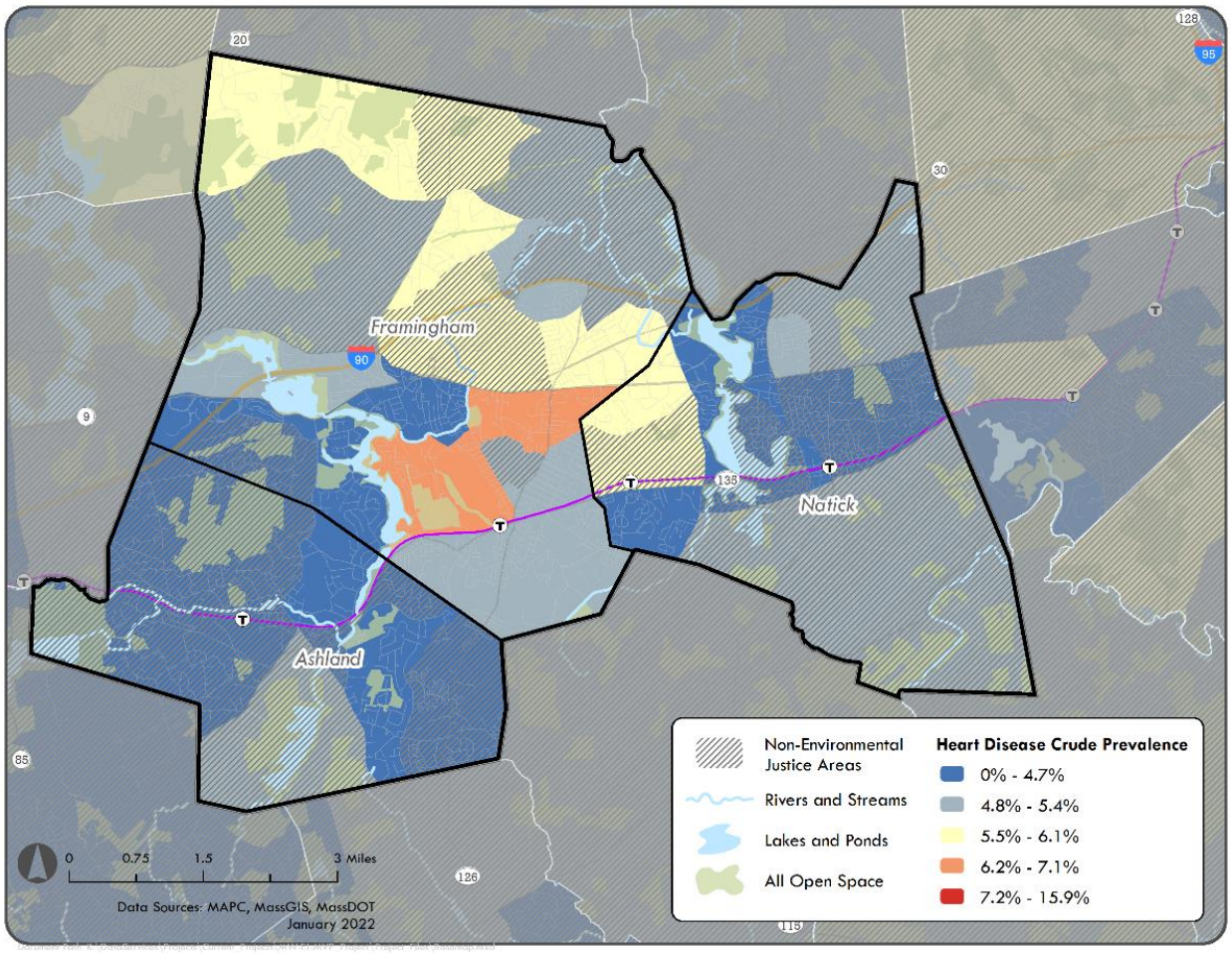


Figure 5. **Prevalence** of (or share of population with) heart disease across Ashland, Framingham, and Natick.

[33] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation

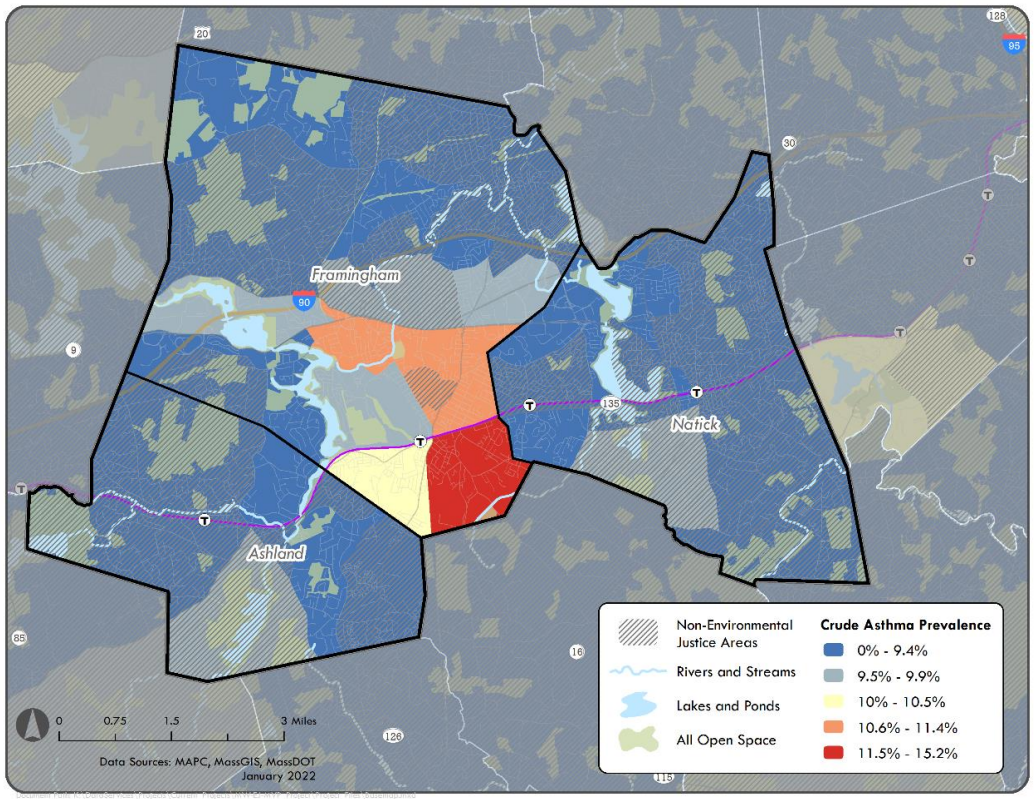


Figure 6. Prevalence of asthma across Ashland, Framingham, and Natick.

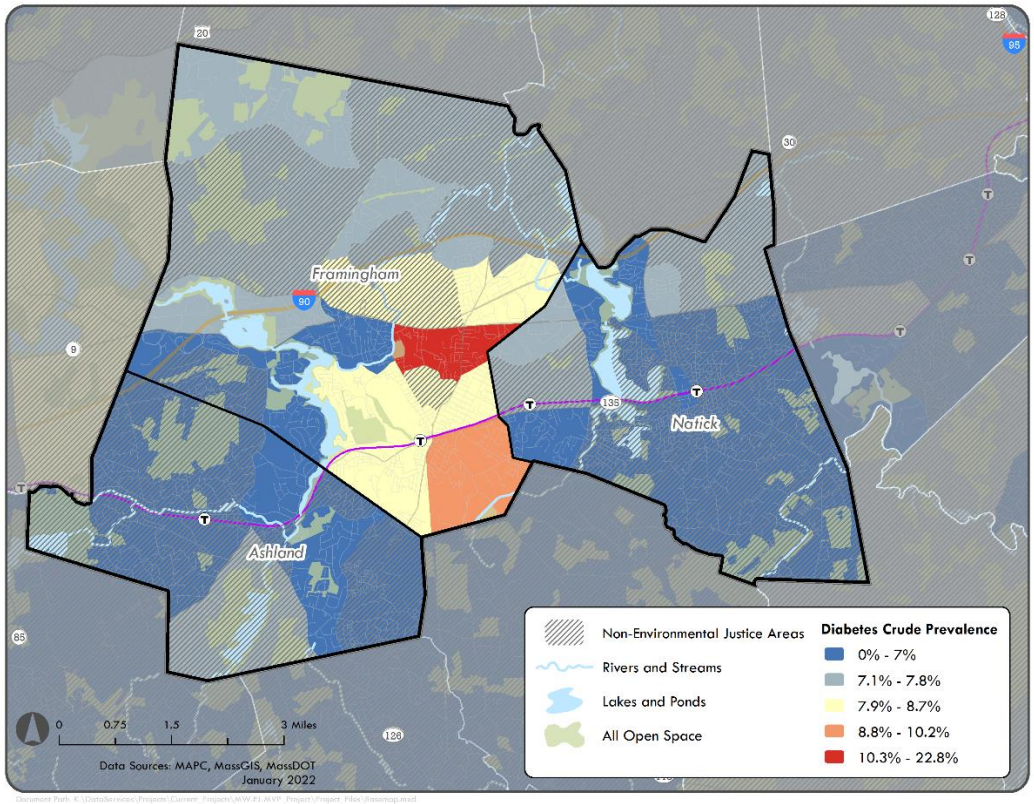


Figure 7. Prevalence of diabetes across Ashland, Framingham, and Natick.

Age

Both children and older adults are more sensitive to heat- and flood-related health impacts. Young children have relatively naïve immune systems and reduced heat-regulating mechanisms. They are therefore at increased risk for heat- and flood -related illnesses, especially those with pre-existing health conditions (e.g., asthma, diabetes). Older adults, too, have reduced heat-regulating mechanisms and are more likely to have pre-existing health conditions that affect their body's response to heat.[34, 35]

The share of young children (under 5 years old) and older adults (over 65 years old) is high across the three communities (Figures 8 and 9). Young children make up the highest proportion of the South Framingham and northern Natick populations. Older adults make up the highest proportion of northern Framingham, west of Framingham center, and West Natick.

Under 5 Years Old:

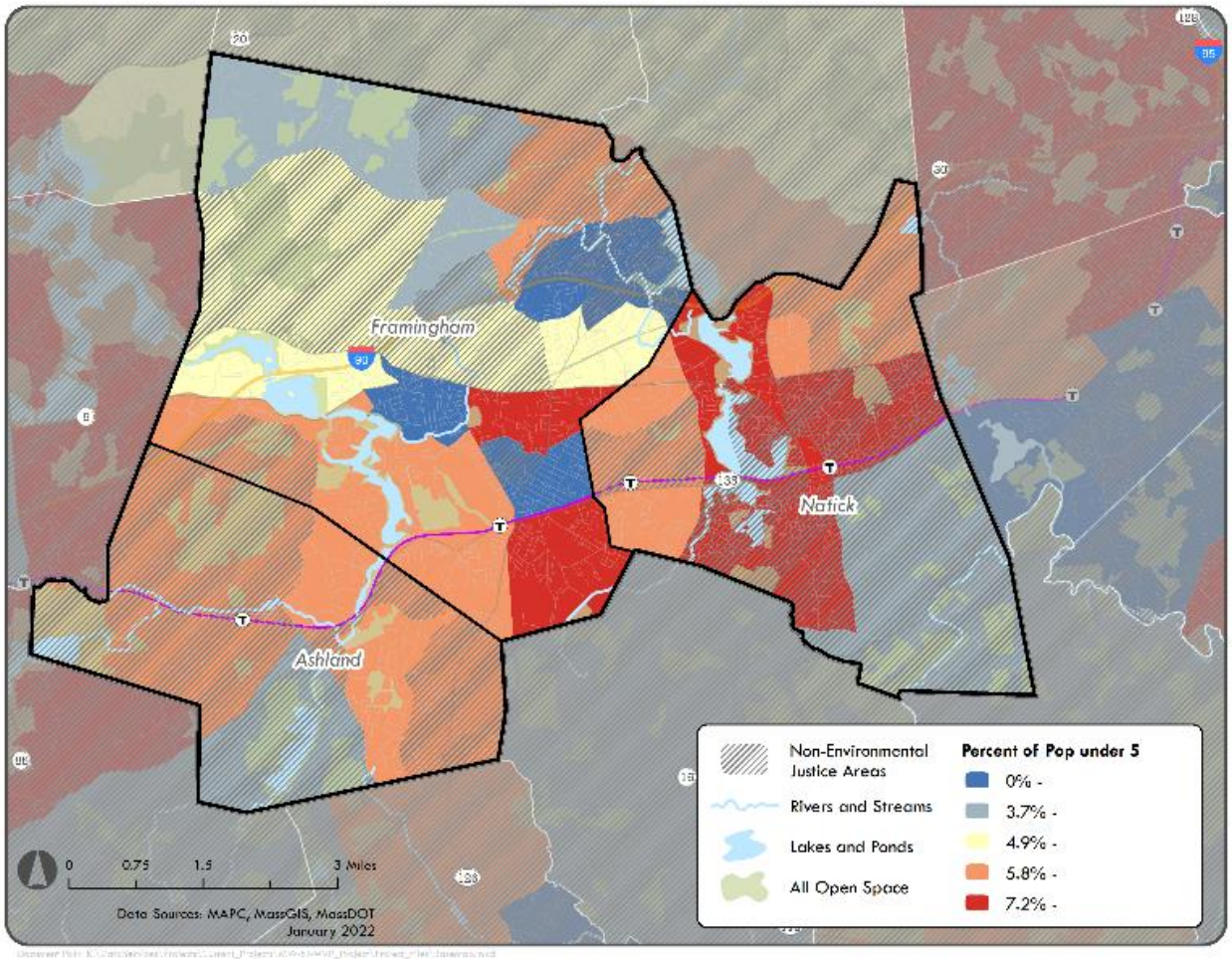


Figure 8. Share of population under the age of 5 across Ashland, Framingham, and Natick.

[34] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation

[35] MAPC (2021) MMC Heat Preparedness Plan Heat Health Research Briefs: Community and Social Cohesion

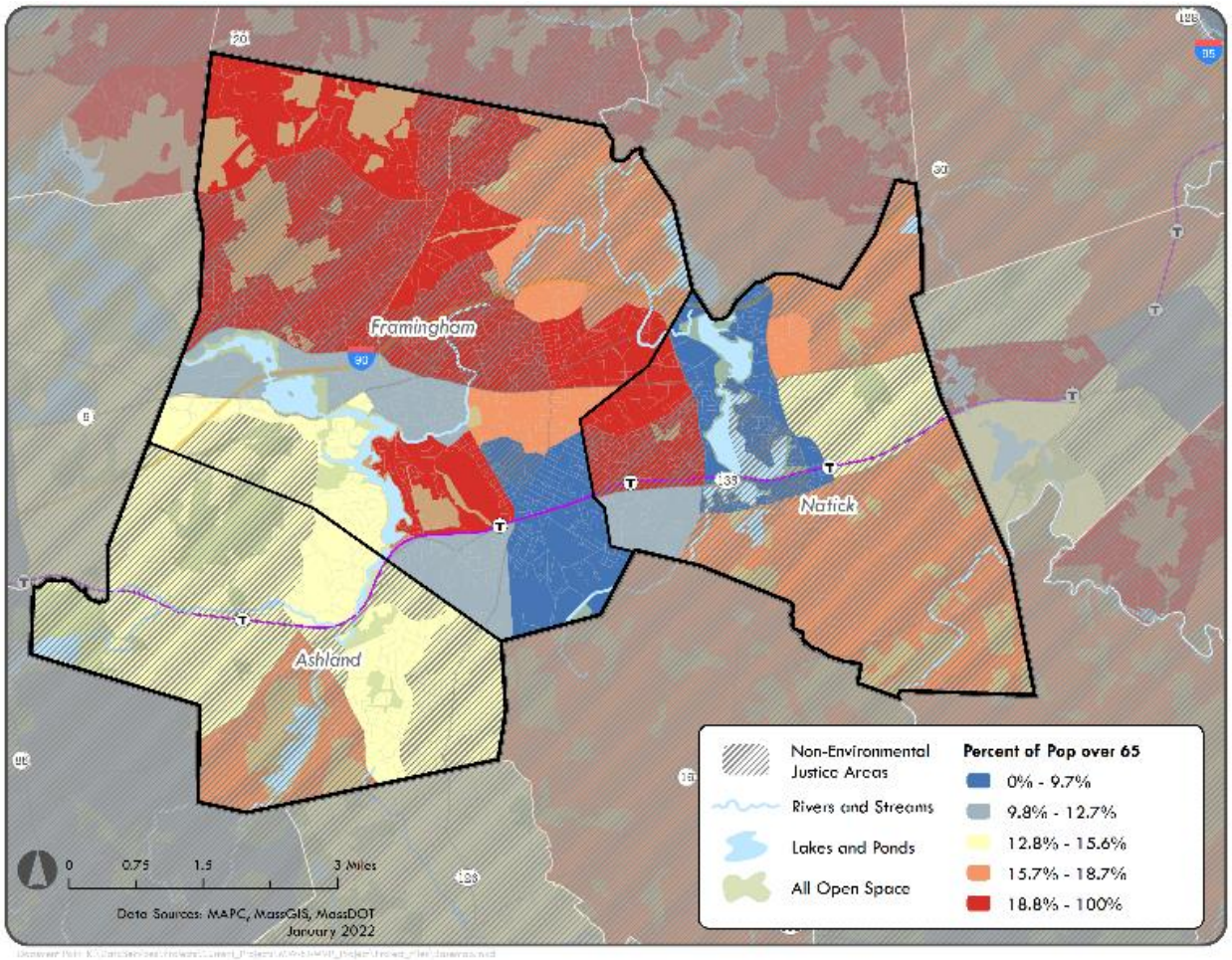


Figure 9. Share of the population over the age of 65 across Ashland, Framingham, and Natick.

Adaptive Capacity

Housing

Most heat-related deaths occur within people's homes. We know that risk factors for indoor heat exposure include poor access to indoor cooling, high energy cost burdens, occupant behavior, lack of enforceable (or evidence-based) temperature standards, building characteristics, and location.

The proportion of housing units built before 1960 is used a proxy for housing units without central air conditioning, a key factor in the reduction of heat-related morbidity and mortality.[36] A higher percent of housing in Natick and a smaller area of southern Framingham were built before central air conditioning was a norm (Appendix).

High energy bills resulting from increased use of air conditioning put households at risk for high **energy cost burdens**, which can lead to utility arrearages and shutoffs for non-payment of utility bills. Many households ration indoor cooling and maintain their homes at unsafe temperatures to compensate for high energy costs.[37] Households who devote higher proportions of their income to utility bills may have to make trade-offs between cooling their homes and other necessities. We

[36] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation
[37] MAPC (2021) MMC Heat Preparedness Plan Heat Health Research Briefs: Housing

look at energy burden to understand how many households in this region may be making similar trade-offs (Figure 10).

A large area of Framingham and northern Natick as well as a smaller portion of southern Ashland are estimated to be energy burdened. The South Framingham neighborhood has the highest percent of households who are energy burdened in the area.

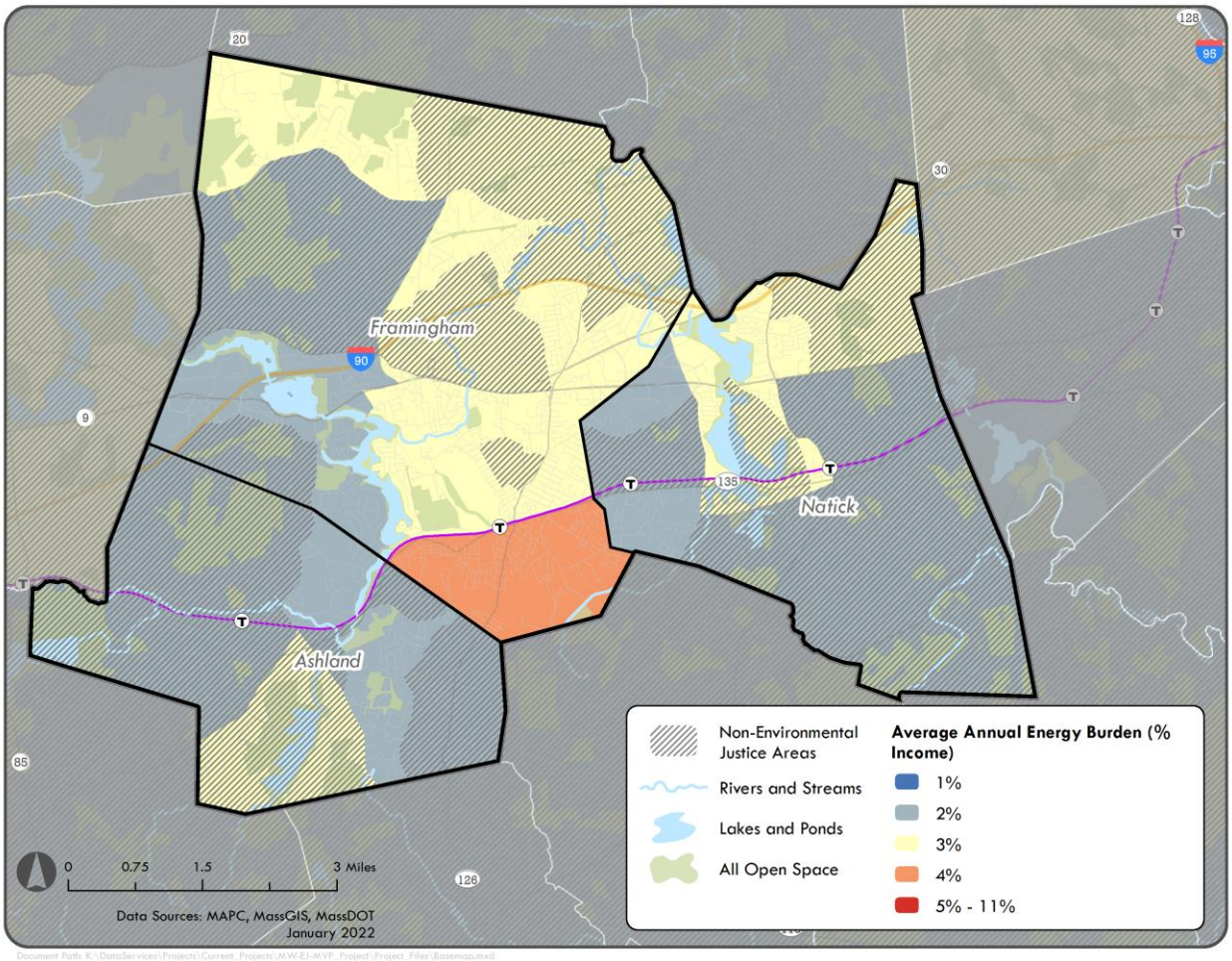


Figure 10. Average share of household income spent on energy costs (energy burden) across Ashland, Framingham, and Natick.

Housing is also a factor in vulnerability to flooding. With the adoption of the Wetlands Act in 1972 and many communities getting their first FEMA flood zone maps in the decade following, the 1980s marked when states and communities began updating policies to regulate building in wetlands. Today, housing units in the 1% chance flood zone are required to have their lowest floor above the base flood level (i.e., elevation at least some level above the ground – fewer basements) and, as such, are less susceptible to flooding.[38] A large proportion of housing in Ashland has been built since 1980 (Figure 11). The housing in much of Framingham and pockets of Natick is older, with a larger proportion built before the requirement. The neighborhood of South Framingham and the area abutting the commuter rail in western Framingham have some of the lowest proportions of new housing units in the region.

[38] Anne Herbst, MAPC, internal correspondence

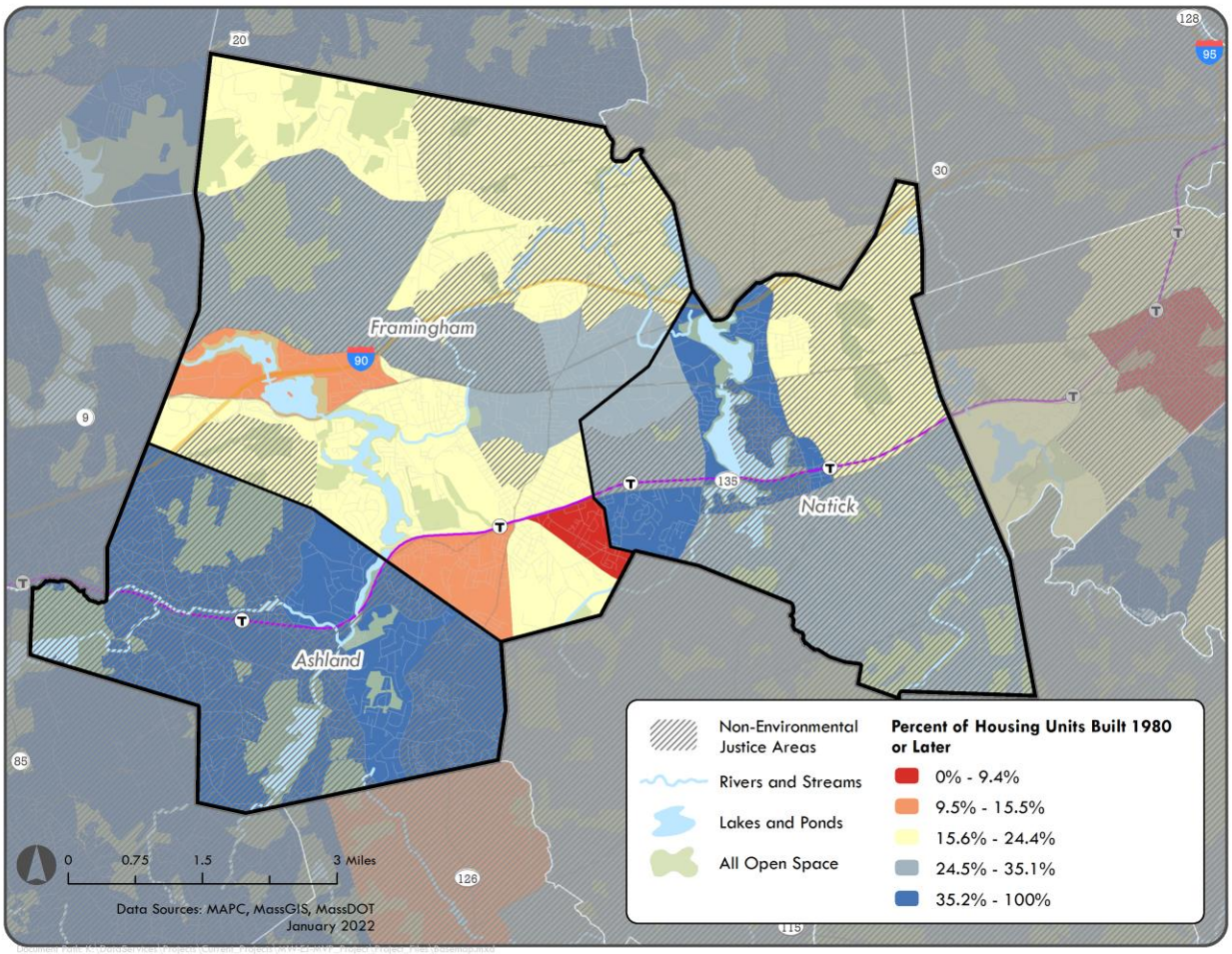


Figure 11. Percent of housing units built in 1980 or later.

Transportation

During extreme heat events, those who walk, bike, or wait for transit are more exposed to unsafe temperatures. Research shows that if an individual can shift travel behavior (e.g., use a car or take an air-conditioned transit option) during a heat event, they will. This highlights the importance of ensuring populations most vulnerable to heat have redundant, heat-safe transportation options.[39] Lack of alternative transportation options may also reduce ability to evacuate coastal storms and floods.[40]

Most households in Ashland and much of Natick have at least one personal vehicle (Figure 12). Southern Framingham is home to the greatest proportion of no-vehicle households (17.5-20.8%), but percent of ownership is lower (7.3%-14.9%) across Framingham and in southwestern Natick.

[39] MAPC (2021) MMC Heat Preparedness Plan Heat Health Research Briefs: Transportation
[40] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation

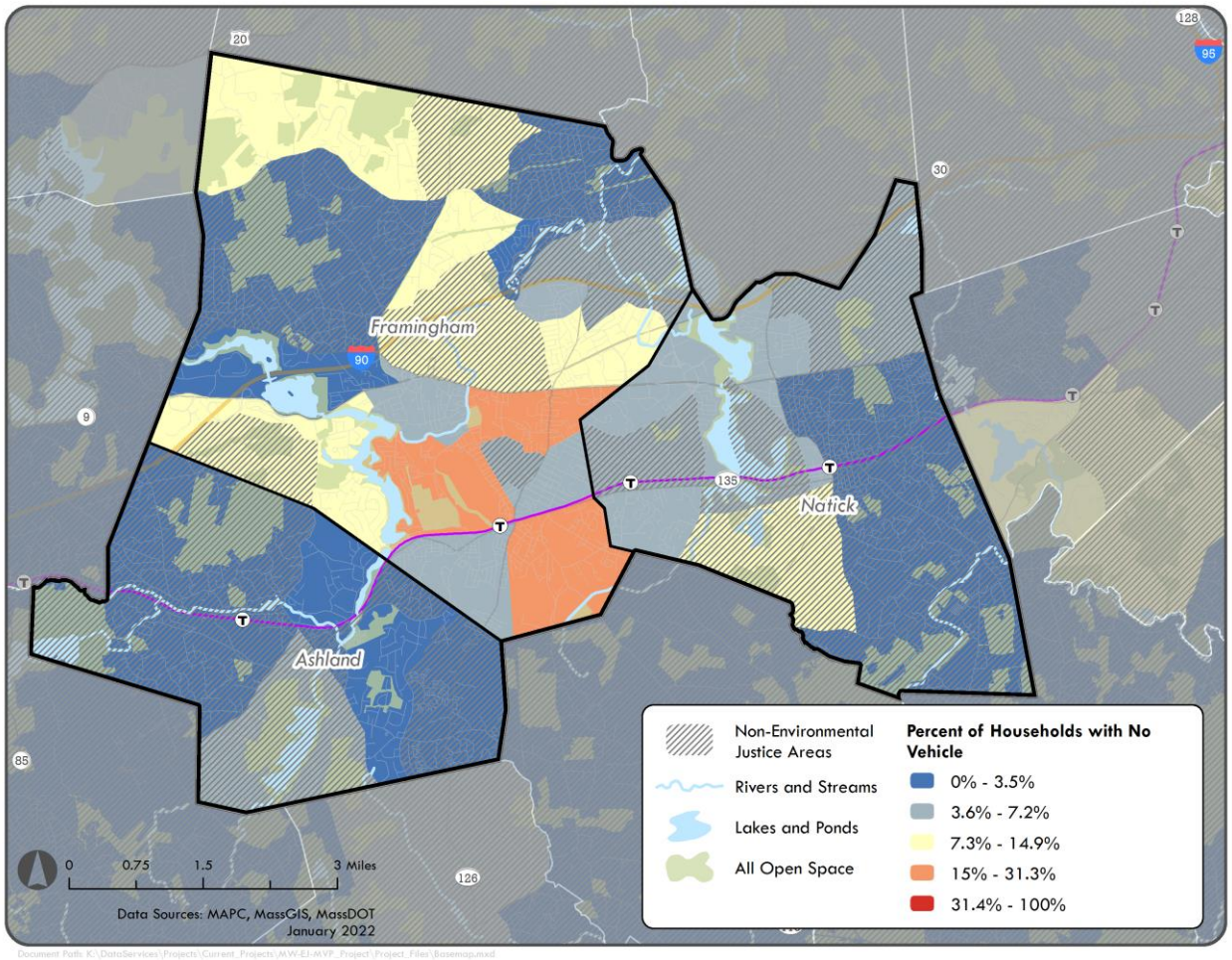


Figure 12. Percent of households with no vehicle across Ashland, Framingham, and Natick.

Community and Social Cohesion

Social cohesion refers to the strength of relationships and the sense of solidarity among members of a community. Social isolation has the potential to reduce community cohesion, reducing adaptive capacity, increasing sensitivity, and ultimately yield disjointed personal and place-based networks. Social isolation can also catalyze numerous health risks that can make an individual more sensitive to climate impacts. [41]

Living alone and limited contacts with family and friends may impact an individual's capacity to adapt (e.g., evacuate, manage chronic disease, adopt protective behaviors, or resource share) during extreme weather events. The population of adults over the age of 65 is the most susceptible to heat-related social and environmental health risks, in part because of their increased likelihood of living alone – a risk factor for social isolation. During extreme weather events, socially isolated adults may need assistance with evacuation and access to medical services.[42] As seen in the section on Age, the percentage of older adults is high across the three communities (Figure 9). Older adults make up the highest proportion of northern Framingham, west of Framingham center, and West Natick.

[41] MAPC (2021) MMC Heat Preparedness Plan Heat Health Research Briefs: Community and Social Cohesion
[42] Flingai, S. & Spence, C., 2019

Employment

According to the Occupational Safety and Health Administration (OSHA), heat stress killed 815 U.S. workers and seriously injured more than 70,000 between 1992 and 2017. Other sources estimate that five to ten million workers are exposed to outdoor heat beyond safe levels every year, not accounting for workers exposed to indoor heat.[43] About 7% of Framingham's workforce, 5% of Ashland's, and 3% of Natick's work outside.

Populations working outside (firefighters, construction workers, farmers, fishers, and forestry workers) are typically the focus of this type of research, but hazardous heat exposures can occur in both outdoor and indoor work environments. Workplace conditions that increase risks for heat health impacts include heavy physical activity, warm or hot environmental conditions, high humidity, clothing and personal protective equipment that holds in body heat, and radiant heat sources, such as ovens, furnaces, and open fire.

Climate events, like floods, can result in economic disruptions or the loss of employment. In addition to the economic impact, the interruption to employment can increases stress (which increases risk of certain health impacts) and slow the recovery from a disaster.[44]

Education

Lower education levels may reduce economic opportunities that would enable adaptation and recovery capabilities.[45] Education is the primary pathway to better, more stable jobs that pay higher incomes and that allow families to accumulate wealth. Education is also associated with greater adherence to health-promoting behaviors and longer, healthier lives.

The vast majority of Ashland, Natick, and Framingham residents have received a high school diploma or higher. However, the percentage is much lower across southern Framingham, particularly in the South Framingham neighborhood where, in one census tract, 31% of residents have not received a high school diploma or equivalent.

[43] MAPC (2021) MMC Heat Preparedness Plan Heat Health Research Briefs: Employment

[44] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation

[45] Flingai, S. & Spence, C. (2019). Climate Vulnerability in Greater Boston Technical Documentation

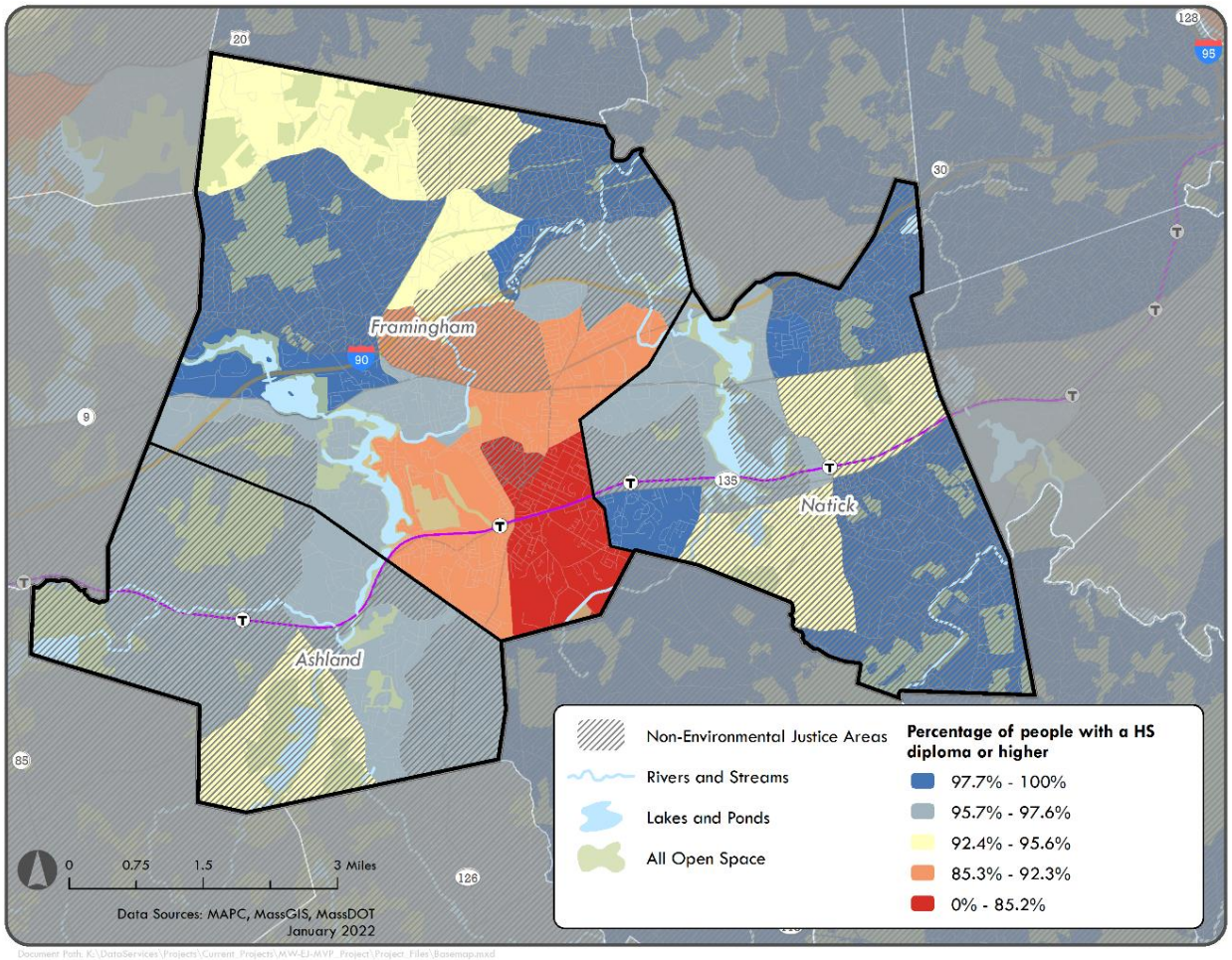


Figure 13. Percentage of people with a high school diploma or higher.

A Way Forward: Community-Driven Climate Resilience Planning

Guiding Principles

The following list of guiding principles originate from *Community-Driven Climate Resilience Planning: A Framework*, which was developed by the National Association of Climate Resilience Planners in association with the Movement Strategy Center and community-based organizations leading climate resilience efforts across the country. These principles can provide some direction on how best to approach an equitable climate planning process.

- ***Whole Systems Thinking***: Planning draws upon local wisdom and the adaptive capacity that communities have built over generations of hardship. It engages in cross-sector and cross-community strategy and learning and develops collaborative solutions responsive to the multiple, diverse causes of climate vulnerability.
- ***Desired Outcomes Reflected at Every Step:*** Planning processes are grounded in community assets and seek to demonstrate the impact of community-derived solutions. Equity and

wellness are integrated in every step to ensure planning is consistently inclusive and causes no harm.

- ***Planning Processes as Learning Processes:*** Using climate science and popular education approaches, planning clearly communicates the causes and consequences of climate change to build the capacity of residents to participate and lead. Information flows both ways because residents are positioned as leaders to inform decision-makers.
- ***Planning into Action:*** Implementation is integrated early in the planning process by identifying and/or developing resources for implementation and organizing residents and other stakeholders. Systems changes are built into advocacy efforts.[46]

Metro West Climate Equity Project Activities

Various elements of this project resonate with the stated principles listed above. The project has also been developed to align with the principles of **Participatory Action Research (PAR)**. The PAR approach is founded on two concepts: 1) the people who are most impacted by a problem are in the best position to understand and solve that problem, and 2) the best way of understanding a complex problem is by trying to solve it. Research on climate change and its impacts on Environmental Justice communities will be led by the people who live in these neighborhoods and will focus on their experiences and expertise. A desired outcome of this process is to establish and strengthen community relationships to allow for deeper partnership geared towards implementation of the climate actions identified.

The following elements of this project most reflect the CDCR principles and PAR approach:

- ***Community Liaisons:*** Municipalities will engage community partners to recruit trusted representatives from Environmental Justice neighborhoods to serve as community liaisons and onboard the liaisons as members of the project team. With their guidance, the team will co-design and help implement a community outreach plan to collect quantitative and qualitative data from their fellow residents.
- ***Equity Consultant:*** This work will also be supported by partnering with a professional consultant who specializes in culturally appropriate community engagement.
- ***Community Climate Conversations:*** The project team, including the community-liaisons, will share the research findings directly with residents living in the Environmental Justice communities and will work with them to interpret meaning from the results at Community Climate Conversation picnics. Findings and recommendations identified during the picnics will be summarized in short briefs in the language spoken by participants and a summary infographic will be shared with participants and residents in the priority neighborhoods once again, The Municipalities will work to update relevant plans and funding recommendations to reflect feedback from the research and Community Climate Conversation picnics.

[46] Gonzalez, R. (2020). *Community-Driven Climate Resilience Planning: A Framework*. National Association of Climate Resilience Planners. https://movementstrategy.org/resources/community-driven-climate-resilience-planning-a-framework/

Community Assets for Climate Action

Diversity and Languages Spoken[47, 48]

	Ashland	Framingham	Natick
Population	18,832	72,362	37,006
Race and Ethnicity			
Non-Hispanic White	77.9%	63%	78.9%
Black or African American	2.2%	7.3%	1.9%
Native American	0.2%	0.5%	0.1%
Asian	11.3%	7.9%	12.9%
Hispanic or Latino	7.0%	16.1%	4.1%
Immigrant Population			
Foreign-Born persons	21.9%	28.4%	18.8%
Languages Spoken			
Most common languages spoken among people who speak English "less than very well"	Portuguese or Portuguese Creole; Indo-European Languages; Russian; Chinese; Spanish or Spanish Creole	Portuguese or Portuguese Creole; Indo-European Languages; Spanish or Spanish Creole; Chinese; Vietnamese	Portuguese or Portuguese Creole; Indo-European Languages; Chinese; Russian; Spanish or Spanish Creole

Local Institutions and Community Groups

Enterprise Community Partners developed a Cultural Resilience Assessment tool to support planning efforts that take an asset-based approach to strengthening community and cultural resilience. The assessment tool asks practitioners to identify community assets or institutions that are already supporting resident needs or that might be partners and/or contributors during planning and implementation.

Community organizations identified by municipal staff and community partners:

Organization	Type of Organization
Natick Desi	Community, Cultural
Natick is United	Community, Equity
Natick Black Lives Matter	Community, Equity
Ashland Residents for Equity and Action	Community, Equity
Ashland is United	Community, Equity

[47] US Census Bureau. 2020 Census.
[48] US Census Bureau. 2019 ACS 5-Year Estimates, ACS 2011-2015 5-Year Estimates. 2019 data does not include "Portuguese or Portuguese Creole." Portuguese included in table if appears among top 5 in 2011-2015 data. Languages listed otherwise among top 4 in 2019 data.

Wayside Youth and Support Center	Youth, Social Service
MetroWest YMCA	Recreation, Youth, Health
Hoops and Homework	Education, Youth
Mass Audubon, Broadmoor	Environment, Youth
GreenUp Ashland	Environment
Edward M. Kennedy Community Health Center	Health
Latino Health Insurance Program	Health
MetroWest Health Foundation	Health
Framingham Interfaith Community Association	Faith-based
Natick Interfaith Group	Faith-based
Sri Lakshmi Temple	Faith-based
Framingham University	Education
Framingham Adult ESOL	Education
MetroWest Nonprofit Network	Social Services
South Middlesex Opportunity Council	Social Services
Framingham Arts Center	Arts, Culture
Center for Arts Natick	Arts, Culture
Natick Center Cultural District	Arts, Culture, Community
Downtown Framingham, Inc.	Business

Strengths and Assets Identified in MVP Workshops

Ashland	Framingham	Natick
• Emergency notification system • State parks and a town forest • Short-term heating and cooling centers • Emergency shelter at the high school • Handshake agreement with American Red Cross • Faith-based organizations • Three pharmacies and two grocery stores • MBTA commuter rail station • Meals on Wheels program • Eversource's life support program • ADA self-evaluation and transition plan	• Strong sense of community • School-based communications network, situational awareness practice, outreach programs, air conditioning in some buildings • Emergency shelters • MetroWest Medical Center and Framingham University • Commuter rail and MWRTA public transportation • Certified Green Community • Resources available in multiple languages, including multi-lingual City website, radio stations, and	• Resident social connectedness and mutual support, sense of pride • Open spaces, such as Broadmoor Wildlife Sanctuary, Lookout Farm, Natick Community Farm • Social and transportation services • Council on aging • Faith-based organizations • Natick Mall provides a common place for interaction and emergency shelter

• Homelessness vulnerability study	translation capacity in Mayor's office	

Glossary

Climate Change: a long-term change in the average weather patterns that have come to define Earth's local, regional, and global climates.

Environmental Justice (MA Definition): the equal protection and meaningful involvement of all people and communities with respect to the development, implementation, and enforcement of energy, climate change, and environmental laws, regulations, and policies and the equitable distribution of energy and environmental benefits and burdens. It is based on the principle that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment regardless of race, color, national origin, income, or English language proficiency.

Environmental Justice Population (MA Definition): (A) a neighborhood that meets 1 or more of the following criteria: (i) the annual median household income is not more than 65 per cent of the statewide annual median household income; (ii) minorities comprise 40 per cent or more of the population; (iii) 25 per cent or more of households lack English language proficiency; or (iv) minorities comprise 25 per cent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 per cent of the statewide annual median household income; or (B) a geographic portion of a neighborhood designated by the Secretary as an environmental justice population in accordance with law.

Frontline Community: Those that experience "first and worst" the consequences of climate change. These are communities of color and low-income, whose neighborhoods often lack basic infrastructure to support them and who will be increasingly vulnerable as our climate deteriorates. These are Native communities, whose resources have been exploited, and laborers whose daily work or living environments are polluted or toxic (Ecotrust).

Greenhouse Gases (GHG): Gases that trap heat in the atmosphere including water vapor, CO2, methane, nitrous oxide, and ozone. The burning of fossil fuels emits CO2 (carbon dioxide) and other gases to the atmosphere, thus increasing the greenhouse gas effect.

Carbon Intensive: The amount of carbon dioxide that is emitted proportional to the amount of energy generated. Electricity generated using fossil fuels, such as coal or oil, is more carbon intensive than electricity generated using renewable sources of energy, such as solar or wind.

Climate Mitigation: Reducing the amount of GHG emissions in order to slow and mitigate the impacts of climate change.

Climate Resilience: the ability of a community to address the needs of its built, social, and natural environment in order to anticipate, cope with, and rebound stronger from events and trends related to climate change hazards, including temperature changes, extreme weather, sea level

rise, coastal and inland flooding, changes in precipitation, and other impacts. (Office of Energy and Environmental Affairs).

Climate Adaptation: "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities." (IPCC).

Climate Preparedness: Preparing for the impacts of climate change, including emergency preparedness and community preparedness.

Community Resilience: a community's ability to withstand, adapt, and recover from a disaster or public health emergency (NACCHO).

Climate Vulnerability: the propensity or predisposition to be adversely affected by the impacts of climate change. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC).

Social Vulnerability: refers to the resilience of communities when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks.

Linguistic isolation: households that are English Language Isolated according to federal census forms, or do not have an adult over the age of 14 that speaks only English or English very well (EEA).

Minority: as individuals who identify themselves Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white (EEA).

Redlining: to refuse a loan or insurance to someone because they live in an area deemed to be a poor financial risk. In the US, redlining is a discriminatory practice in which services are withheld from potential customers who reside in neighborhoods classified as 'hazardous' to investment; these residents largely belong to Black, Indigenous, and Communities of Color.

Racial covenants: Contractual agreements that prohibit the purchase, lease, or occupation of a piece of property by a particular group of people, usually African Americans. Racially restrictive covenants were not only mutual agreements between property owners in a neighborhood not to sell to certain people, but were also agreements enforced through the cooperation of real estate boards and neighborhood associations (Fair Housing Center of Greater Boston)

Morbidity: the condition of suffering from a disease or medical condition

Mortality: death, especially on a large scale as of from disease or war

Heat Wave: an extended period of extreme heat, or period of three or more days above 90 degrees Fahrenheit.

Urban Heat Island Effect: when urban areas are hotter than the surrounding non-urban areas. This urban heat occurs because of human-made heat and from the physical landscapes of cities.

Energy cost burden: the average annual housing energy costs divided by the average annual household income.

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Appendix

Housing Built before 1960: