



**Town of Wayland  
Community Resilience Building  
Workshop  
Summary of Findings  
April 2019**



# Town of Wayland

## Community Resilience Building Workshop

### Municipal Vulnerability Preparedness Program

#### Summary of Findings

#### OVERVIEW

Recent years have seen notable weather extremes in Wayland. The winter of 2015 brought record-breaking snow, resulting in power outages. The following year, the Wayland area was under a drought warning from July to November 2016. The winter of 2018 once again brought severe winter storms with a succession of four nor'easters pummeling the town in March. In March 2010 rainfall was so significant that a federal disaster was declared for eastern Massachusetts, resulting in \$59 million in assistance to individual households and \$26 million in reimbursements to the state and municipalities. During that storm, Duck Boats were required to transport residents across flooded roads. Globally, the years 2012 through 2017 all rank among the ten hottest on record.

In 2017, the Commonwealth of Massachusetts inaugurated the Municipal Vulnerability Preparedness (MVP) program to assist municipalities in planning for and implementing strategies to adapt to predicted changes in our warming climate. The predicted changes include both increased flooding from large rain events and a greater likelihood of drought, increased extreme heat days and heat waves, and increased flooding from sea level rise.

The Town of Wayland, seeking to be proactive in addressing future climate threats, applied for a state grant to complete the Community Resilience Building (CRB) Workshop under the MVP program. Concurrent with the MVP program, Wayland is updating its Hazard Mitigation Plan (HMP). The HMP is a five-year plan, developed under the auspices of FEMA that identifies strategies to address natural hazards. Upon completion of the projects, the Town of Wayland will be eligible to apply for state and federal grant funds to address identified natural hazards and climate risks.

The Town of Wayland is partnering with the Metropolitan Area Planning Council (MAPC) to complete the MVP program and the Hazard Mitigation Plan. The MVP Core Planning Team identified and recruited community stakeholders to participate in the one-day CRB Workshop. Twenty-nine people representing Wayland town staff, members of Wayland Boards and Commissions, and representatives of Wayland community organizations gathered on April 3 (see Workshop Participants page 8). The Workshop's central objectives were to:

- Define top local natural and climate-related hazards of concern;
- Identify existing and future strengths and vulnerabilities;
- Develop prioritized actions for the Community;
- Identify immediate opportunities to collaboratively advance actions to increase resilience.

Materials provided for the workshop included local and regional data for changes in temperature, precipitation, and sea level recorded to date, as well as future projections to the end of the century. Posters provided data and mapping specific to Wayland infrastructure, demographics, and natural resources (see Appendix).



The participants considered Wayland's strengths and vulnerabilities focusing on infrastructure, society, and the environment. Working in small groups, and then together as a large group, they prioritized actions designed to increase Wayland's resilience to future extreme weather events.

## TOP HAZARDS AND VULNERABLE AREAS

The Core Planning Team identified the top natural hazards. Based on the recent work on the Hazard Mitigation Plan and review of workshop materials, the team identified flooding, heat waves, severe storms (wind, snow, ice) and drought as the climate hazards of greatest concern facing Wayland. Flooding, drought, and severe storms have all affected Wayland in recent years. Considering town demographics, the team also included extreme heat as a top hazard.

### Top Hazards

- Flooding
- Severe Storms (wind, snow, ice)
- Drought
- Heat Waves

## CURRENT CONCERNS AND CHALLENGES PRESENTED BY HAZARDS

Participants and town officials noted the increasing frequency and intensity of storms, including heavy rain events, the recent period of drought, and nor'easters that brought damaging winds and snowfall. The principal challenges of the nor'easters are the threat of power outages from falling trees and limbs, as well as travel restrictions due to heavy snow. Large rain events result in flooding when the Sudbury River, and local streams and ponds, exceed their banks, as well as when stormwater drainage capacity is exceeded and when groundwater levels are high. The status and capacity of Snake Brook dam is a concern during extreme rain events. Droughts are harmful to local aquatic resources and vegetation. Participants expressed concern for water

quality and quantity as Wayland relies on groundwater resources for water supply. As these issues are not new, the Town of Wayland through its emergency management activities and hazard mitigation planning, has taken many steps to prepare for extreme weather and prevent harm to people and property. Workshop participants shared concerns that climate projections will heighten current challenges, particularly flooding and water quality and supply.

## AREAS OF CONCERN

### **Geographic:**

Participants focused attention on flooding that occurs at the center of town in the area surrounding the intersection of Routes 20 and 27. Flooding impacts roadways including Routes 20 and 27 and Pelham Island Road. In 2010 and other significant rainstorms, Duck Boats were needed to provide residents of Pelham Island access to their homes. Town Offices, the Town Library and the Public Safety Building are all located in this area and have suffered flood damage. The source of flooding is the Sudbury River, Mill Brook, and high groundwater levels. Research into flood claims from 2010 reveal that flooding to residential properties widespread across the town and not limited to locations adjacent to waterways.



**Wayland Free Public Library, March 2010**

### **Societal:**

Potential vulnerable populations identified include: seniors and seniors who live alone and residents of nursing homes and assisted living facilities. Participants prioritized ensuring that

emergency communications reach newer residents, older adults, and residents who do not speak English. Participants also noted the need to provide transportation services for seniors. The Council on Aging was highlighted as a town strength for the services they provide.

**Environmental:**

The need for tree management due to storm damage was a significant concern. Climate impacts on the resilience of local forests was also identified. Concern for potential impacts to town water supply included pollutants associated with flooding and lack of supply due to drought.

**Infrastructure:**

Snake Brook Dam was highlighted as infrastructure of key concern. The earthen dam is in poor condition and failure would result in flooding to residences located downstream. Facilities of concern include the Public Safety Building, Town Library and Town Hall. All are subject to periodic flooding from the Sudbury River, Mill Brook, and high groundwater associated with the area. Roadways in the town center area are also subject to inundation during large rain events.

## CURRENT STRENGTHS AND ASSETS

Workshop participants identified numerous Wayland strengths and assets that will support resilience to future climate impacts. As shown below, town strengths identified include town facilities, services, and staff; protective natural resources; and strong community connections and organizations.

- The Council on Aging was highlighted for its outreach, resources, wellness checks, van services, and (along with Public Safety) maintaining a list of seniors at risk.
- Emergency Management was noted for: Community Emergency Response Team, Local Emergency Planning Committee, emergency drills and shelter operations, and Reverse 911.
- Public Works and Public Safety received notice for strong staff and good communication.
- Facilities and equipment identified include: backup generators, new domestic water pump, Middle School Emergency and Cooling center, Fire Department Emergency Center, boats for emergencies, and solar installations.
- Environmental strengths include: good tree cover, lack of extreme heat areas, extensive preserved land, and the local Wetlands Bylaw and functioning wetlands.
- Social strengths included: strong connections among community and resident groups, neighborhood watch groups, Wayland Neighborhood Brigade, Carriage House Traditions of Wayland Memorandum of Agreement with the Town, Dudley Pond Association, Food Pantry, OARS watershed organization, and Sudbury Valley Trustees.
- Other strengths noted included: public wells protected by summer water bans, few private wells, hospital care is generally accessible, Public Works capacity to stockpile dead trees, and strong snow and ice removal; large number of gas stations; and multiple sources of utilities.

## TOP RECOMMENDATIONS TO IMPROVE RESILIENCE

Each of the four workshop groups identified vulnerabilities and suggested solutions. The solutions were prioritized as High, Medium, or Low. Each group then identified their four highest priorities. There was overlap in the top priorities of the four groups. The sixteen identified highest priorities resulted in nine distinct items. The participants then voted for their top four priorities (see Appendix). The issues identified as the highest priorities listed below reflect the top nine issues listed in order of the number of votes they received.

### Highest Priorities

**Tree and Forest Management:** Develop a tree inventory and management plan. Participants expressed concern about the health of trees due to their environmental importance, and for concern that unhealthy trees are a safety hazard and a risk for causing power outages. A management plan should consider public and private trees, invasives, the impact of a warming climate and overall resilience. Develop and implement a plan, consider the open space plan and Green Plan. Public Works and Utilities should be involved in tree maintenance in the right of ways. This priority included a focus on the need to study potential threats to the resilience of town forests, including pests and warming temperatures.

**Address flooding in the Route 20/Route 27 area:** This includes roadways as well as Town Offices, the Public Safety Building and the Town Library. Suggestions included: abandoning the Public Safety Building basement, addressing ventilation and finding permanent alternate storage; study library flooding and consider relocation; relocation of Town Offices or flood mitigation plan; capital investment and culvert improvements.

**Repair the Snake Brook Dam:** The earthen dam is in poor condition and failure could lead to significant flooding. Suggestions included repairing the dam or restoring stream flow, adopting town warrant language and studying repair options, and doing an inundation study.

**Update and Implement Wellhead Protection:** The town relies on wells for drinking water supply. Concern for flooding impacts on water quality led to the suggestion to update the Wellhead Protection Plan to ensure proper protection of drinking water supply.

**Develop a Continuity of Operation plan for the Town:** Develop a plan to ensure capacity to provide services in the case of an emergency, including document access and protection, and alternate physical operations.

**Transportation upgrades:** Improve mobility for older adults by expanding daily service and increasing emergency transportation capacity. The need to upgrade Council on Aging vans and recruit additional drivers was identified as an additional need.

**Communication plan:** Develop an emergency information communication plan particularly targeted to new residents, older adults, and residents who do not speak English.

**Generators:** Ensure that generators can provide for continuity of service for IT, Board of Health (medications), and communications.

**Drinking Water:** Evaluate the feasibility of receiving water supply from the Metropolitan Water Resources Authority.

### High Priorities

- Upgrade regulations and keep Open Space plan up-to-date in order to restrict loss of open space to development.
- Restrict fertilizer and pesticide use to lessen the prevalence of aquatic invasives.
- Increase the Community Preservation Act funding to 3%.
- Raise public awareness of mosquito breeding areas. Treat catch basins, use larvicide for treatment. Do public outreach and education on mosquito and tick risk.
- Update the Master Plan for what Wayland wants to be.
- Open Space and Land Management plans need to consider plant migration as the climate changes.
- Consider water re-use, rainwater collection, and greywater use, to address low river flow and low groundwater table during droughts.
- Study and implement improvements to increase overland flow.
- Implement water demand management and regulate private well use.
- Develop backup drinking water supply in the event flooding causes contamination.
- Study the potential for increased wildfire.
- Finish connecting Town Offices refrigerator to a generator to protect vaccines.
- Create a regular maintenance plan for the Dudley Pond outlet to prevent flooding. Work with the Dudley Pond Association.
- Make sure culvert work at the library prevents future flooding. Tie into the town phone system.
- Maintain catch basins around Pelham Island, Town Offices, and key intersections that flood.
- Town Hall needs a generator and backup battery to store solar.
- Implement the Wellhead Protection Plan and demand management to protect water supply from higher temperatures and drought risks.
- Build a second water storage tank to create redundancy for the municipal water system.
- Fund rehabilitating or removing Snake Brook and Mill Brook Dams. Do an inventory of local public and private dams.

### Medium Priorities

- To reduce tree impacts on solar power, create large shared solar sites and replant solar friendly trees.
- To address power outages caused by trees, evaluate the tree budget and work with utilities to be more proactive.
- Improve communication between applicants and town boards, to ensure impervious permits are in place.
- Conduct a town septic study to address flooding and the need for replacement. Determine areas vulnerable to septic systems (e.g. Dudley Pond).
- Do education on tick and mosquito dangers, institute natural controls, trail maintenance and best practices.
- Use beaver deceivers and controls to reduce flooding.

- Promote alternative landscaping to reduce fertilizer, pesticide, and high water use.
- Use public education and volunteer efforts to address invasive species (bittersweet, garlic mustard). Develop a strategic management plan.
- Develop a zero waste plan.
- Work proactively with National Grid to reduce gas leaks.
- Work with the state to address flooding at Route 27 and 20. Enhance transportation there.
- Develop flooding mitigation for the access road to the DPW.
- Study water capacity of town wells. Find backup supply, consider the MWRA.
- Relocate the town trailers and medical emergency supplies to higher ground.
- Enforce the summer water ban to protect town well supply.
- Work with the Conservation Commission to remove trees that have fallen due to high water levels at Dudley Pond.
- Work with the Department of Conservation and Recreation to address flooding at Cochituate Fields/Bradford Road.
- Map the location of private wells to be prepared in case of drought.
- Add outside outlets for mobile generators. Create solar with storage at the Middle School.
- Repair or upgrade Lake Cochituate outfalls (work with the state).
- For Wayland Center roadway flooding: extend elevated roadway, and consider reconstruction of town center to elevate the road.
- Consider impacts of future flooding on Title 5 permits. Do enforcement upon renewal of permits.
- Develop and communicate an evacuation plan (underway).
- Create a communication and evacuation plan for seniors.
- Have a transportation and dispatch plan to shelters and to area hospitals.
- Have refrigeration for medication at shelters.
- Establish auxiliary power for shelters.
- Consider expanding access to sewage treatment as town plant has excess capacity, and explore privately owned plants.
- Improve power grid: in the short-term focus on tree-pruning. Long-term – consider microgrids and underground utilities.
- Evaluate flood barriers or retrofits for the municipal buildings that flood.
- Add outside outlets for mobile generators for wastewater treatment plants.

### Low Priorities

- Golf courses can store water – consider this in open space planning.
- Need management plan for blackthorn (invasive).
- Keep the Open Space plan and Cluster Development regulations updated.
- Conservation regulations for tree cutting are being updated, community outreach is needed.
- Have redundant wastewater treatment infrastructure.
- Add battery backup for the Middle School shelter (funds being raised).
- Update Conservation Commission regulations (ongoing).



- Include removal of snow from Loker and Claypit School roofs in facility maintenance plans.
- Establish neighborhood cooling centers – use the schools.
- Purchase equipment with EMP protection.
- Improve tree management, use healthier trees, prioritize post-event tree removal.
- Provide flood protection for the wastewater treatment plant.
- Develop and publicize a plan for managing pets during emergencies.
- Continue public education on climate change and regional flooding.
- Continue to improve communications.
- The Council on Aging needs a better facility. Consider move to town center?
- Improve communication between environmental non-profits and the Conservation Commission and town departments.
- Look for outreach and communication opportunities with Asian residents.
- Explore other shelter facilities that are more central than the Middle School.
- Provide overnight facilities for town emergency employees who do not live locally.
- Study impacts of golf course flooding.

#### No Priority Listed

- Develop land management plan for heightened risk of fire due to drought.
- Implement a plan to address invasives along local streams.
- Develop and publicize a plan so that residents know what to do during emergencies.
- Study the state plan for response to pandemics.

### LISTENING SESSION

On April 16, 2019, the Town hosted a “Listening Session” to share climate information and the workshop results. As in the MVP Workshop, those attending the Listening Session considered solutions to vulnerabilities and identified their top three priorities. All of the participants voted for items from the Highest Priorities chosen at the workshop. Access to drinking water was a key concern with votes for Updating and Implementing Wellhead Protection and for considering connecting to MWRA water supply. Addressing flooding at Routes 20/27, repairing the Snake Brook Dam, and Developing a Continuity of Operations plan also received votes. An additional suggestion included evaluating resident vulnerability to heat stress including assessing who is vulnerable, developing prevention and response planning.

Additional strengths identified included the town’s engaged volunteer ethos, and soon-to-be available backup solar power at the Middle School. Participants also noted important connections between climate resilience and the work being done by the Climate and Energy Committee to reduce town reliance on fossil fuels.

## CRB WORKSHOP INVITED PARTICIPANTS

\* = representative attended

State Senator

State Representatives

Wayland Building Department\*

Wayland Conservation

Wayland Council on Aging

Wayland Facilities\*

Wayland Fire\*

Wayland GIS\*

Wayland Health\*

Wayland Planning

Wayland Public Works\*

Wayland Police\*

Wayland Recreation\*

Wayland Schools\*

Wayland Town Administrator\*

Wayland Library

Wayland Youth and Family Services

Wayland Board of Selectmen\*

Wayland Community Preservation Committee

Wayland Conservation Commission\*

Wayland Council on Aging Board

Wayland Energy and Climate Committee\*

Wayland Finance Committee

Wayland Historical Commission\*

Wayland Local Emergency Planning Committee\*

Wayland Planning Board

Wayland Recreation Commission

Wayland School Committee

Wayland Surface Water Committee\*

Transportation Advisory Committee

Wastewater Management District Commission

Wayland Housing Authority\*

MWRA

350 Mass

Carriage House\*

Russell's Garden Center

Traditions of Wayland\*

Great Meadows

Dudley Pond Association\*

Wild and Scenic River Council

Sudbury Valley Trustees\*

OARS (watershed organization)\*

Department of Conservation and Recreation  
Residents\*

## CRB WORKSHOP PROJECT TEAM

### Wayland Core Team

Neil McPherson	Assistant Fire Chief, Project Lead
Tom Holder	Public Works
Linda Hansen	Conservation
Patrick Swanick	Police Chief
Lisa Newton	Surface Water Quality Committee
Kaat Vander Straeten	Energy and Climate Committee

### Facilitation Team

Anne Herbst	Metropolitan Area Planning Council (Lead Facilitator)
Sam Cleaves	Metropolitan Area Planning Council
Courtney Lewis	Metropolitan Area Planning Council
Martin Pillsbury	Metropolitan Area Planning Council
Iolando Spinola	Metropolitan Area Planning Council
Ralph Wilmer	Metropolitan Area Planning Council

Citation

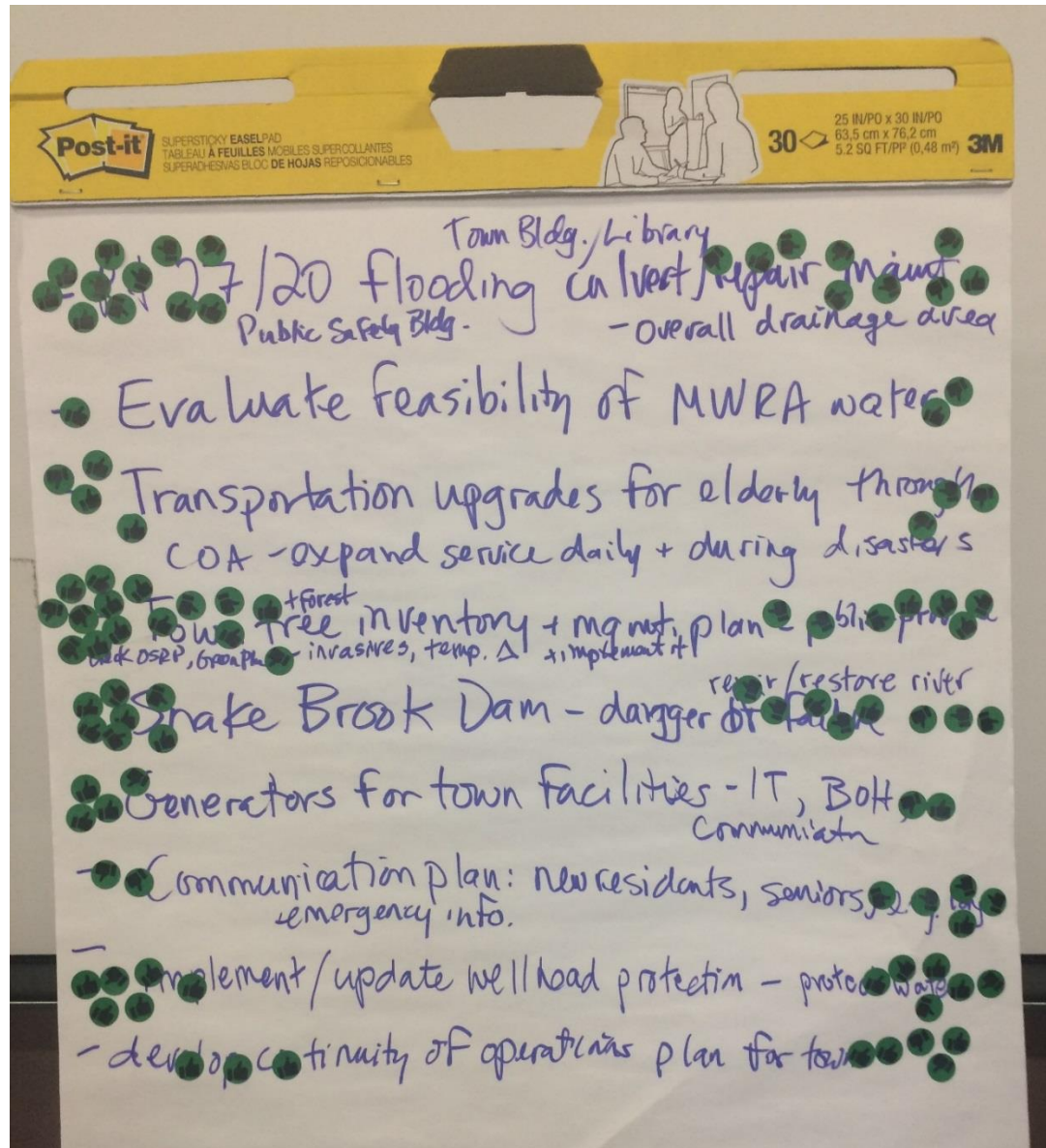
Metropolitan Area Planning Council. 2019. Town of Wayland Municipal Vulnerability Preparedness Program. Community Resilience Building Workshop Summary of Findings. Wayland, Massachusetts

Acknowledgements

Thanks to the MVP Core Team members, CRB workshop participants, and to Assistant Fire Chief Neil McPherson who served as local Project Coordinator. Thank you to town Administrator Louise Miller who addressed the workshop. Funding for the CRB Workshop was provided by the Commonwealth of Massachusetts through a grant from the Municipal Vulnerability Preparedness program.



## Actions Prioritization



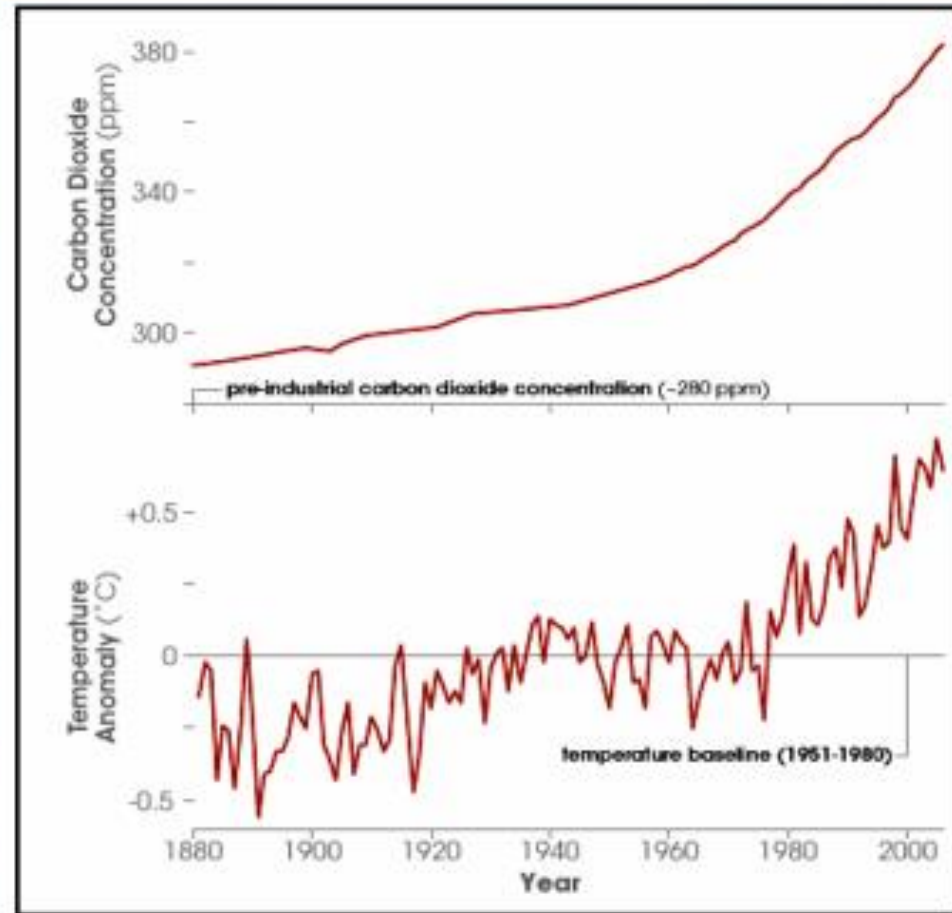
# Base Map



## PowerPoint



# Global Temperature and CO<sub>2</sub> Trends

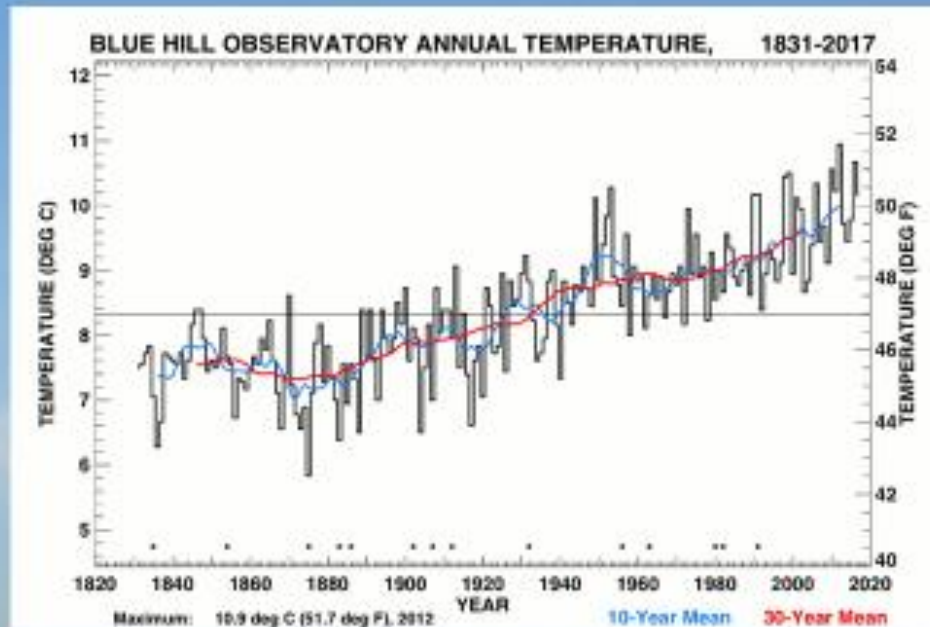


Source: MA Climate Change Adaptation Report 2011



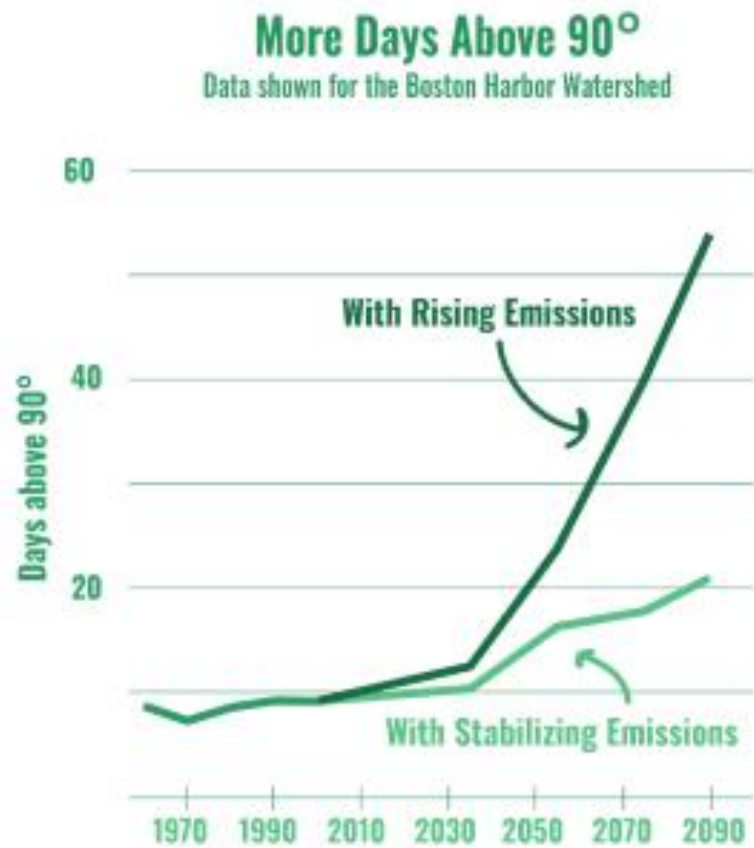
# Temperature change: observed

Nearly 3° F since 1831



Blue Hill Observatory Annual Temperature, 1831-2017

Temperature  
change:  
projected

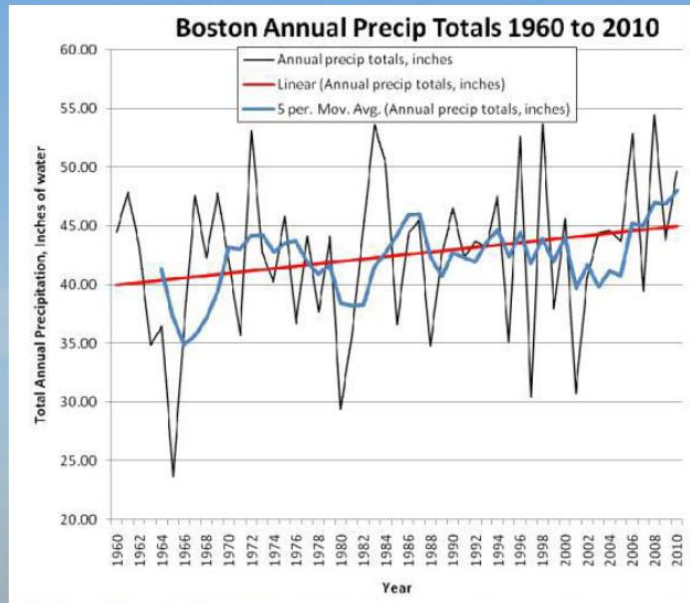
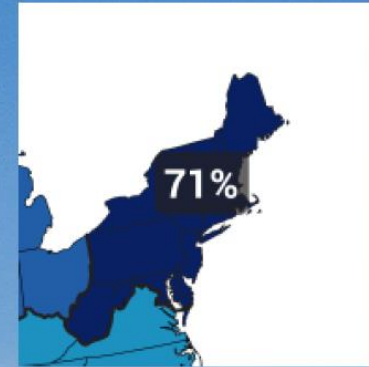


Source: Northeast Climate Adaptation Science Center

# Precipitation change: observed

For the Northeast United States: 71% increase in the amount of rain that falls in the top 1% events from 1958 – 2012.

Source: US National Climate Assessment 2014

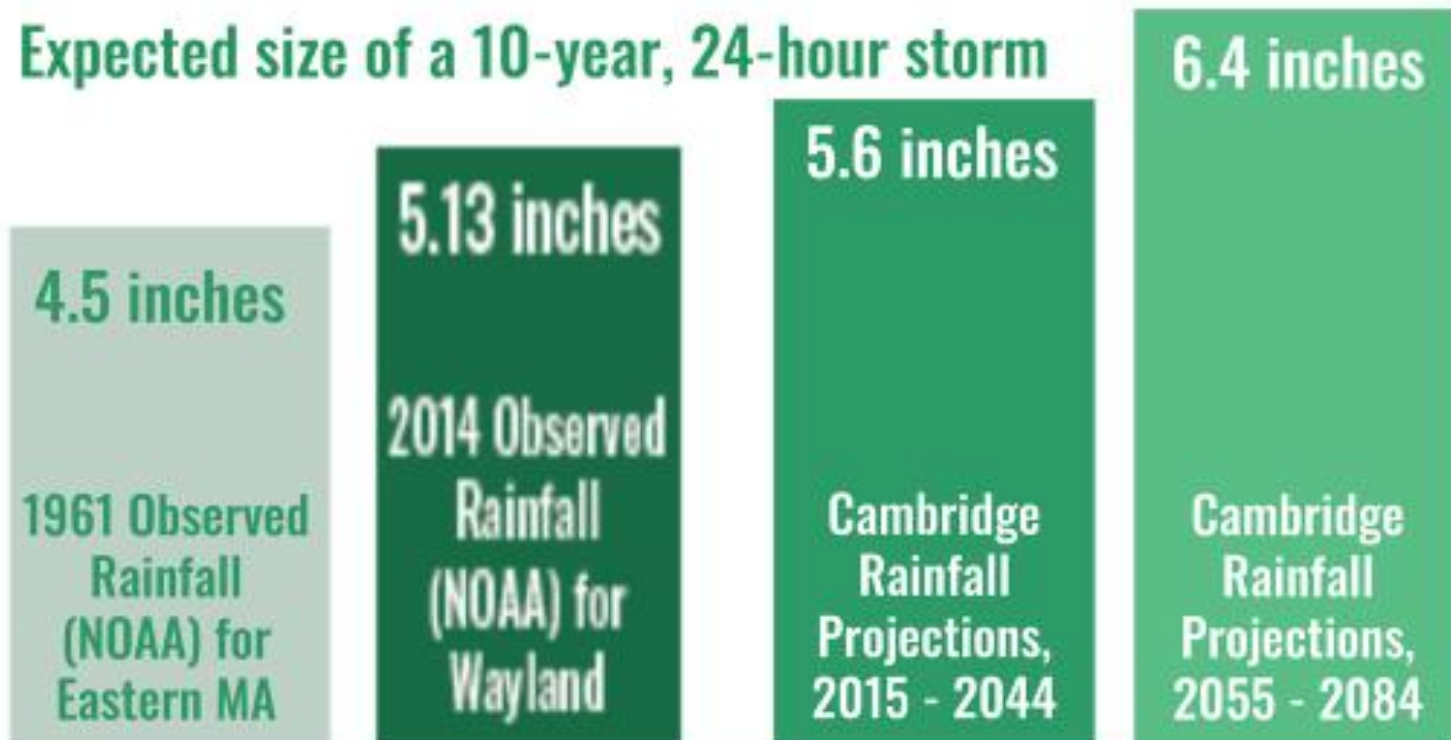


Source: MA Climate Change Adaptation Report 2011

For Boston area: 10% increase over the past 50 years

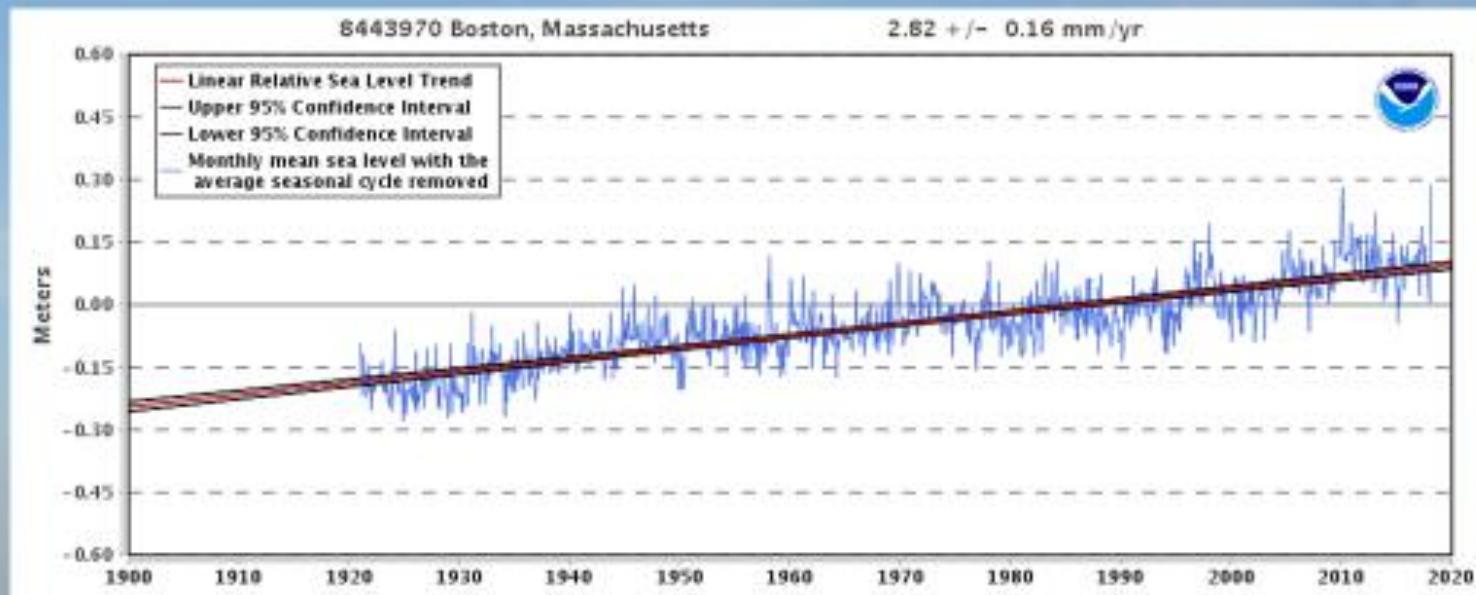
## Precipitation change: projected

**Expected size of a 10-year, 24-hour storm**

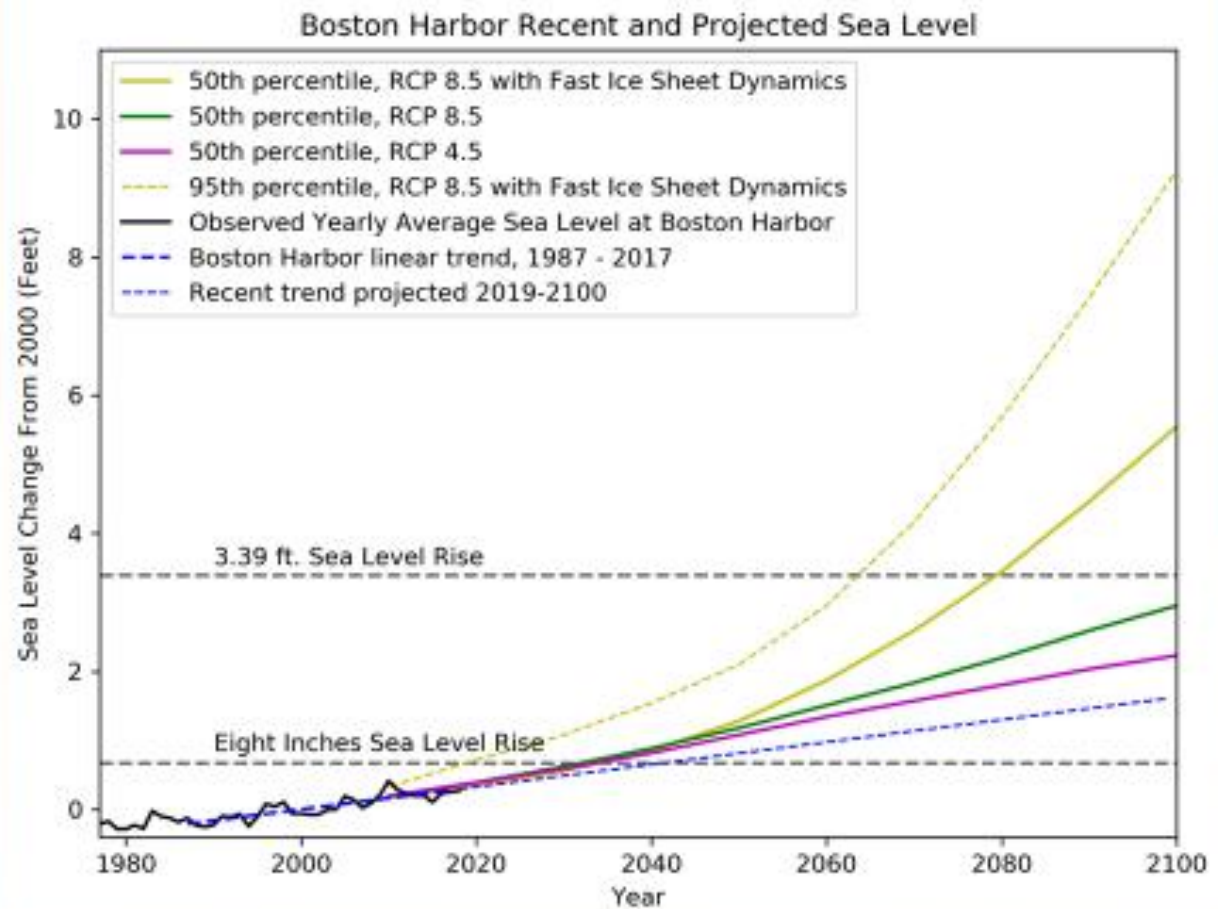


# Sea level rise: observed

- Boston tide station
- Record from 1921-2017
- Equivalent to 11 inches in 100 years



# Sea level rise: Projected to 2100 for Boston Harbor



Source: Northeast Climate Adaptation  
Science Center and MAPC

# POSTERS

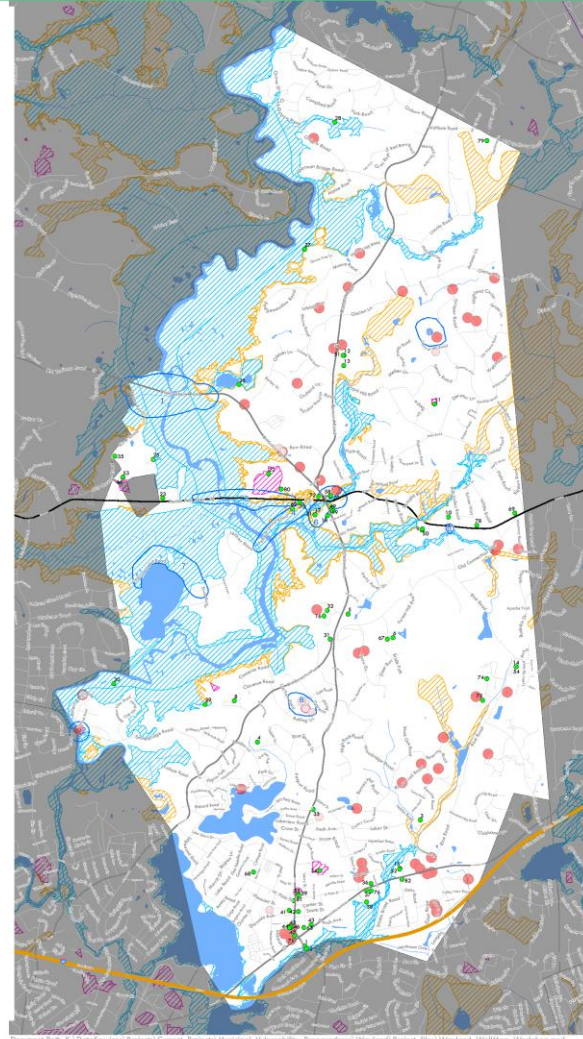
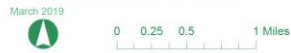
## WAYLAND Critical Infrastructure

Infrastructure will be at risk to damage from flooding, and loss of function due to power outages. Increasing large rainfall events may subject roads, bridges, dams and buildings to more frequent or severe flooding. Areas that don't flood today may become vulnerable. FEMA flood zones reflect only current conditions, although the 2% (500-year) flood zones may indicate where future flooding will occur. FEMA flood zones also do not generally capture stormwater flooding. That is, flooding that exceeds the capacity of current stormdrains and culverts. We don't currently have models that project where future flooding from larger rain events will occur. Power outages affecting infrastructure and communications may become more frequent as result of high energy demand during heat waves. Winter outages could be caused by ice storms if warming results in temperatures hovering around freezing. The potential for more intense hurricanes could cause outages due to falling trees. Finally, buildings, roadways, and railways can be stressed by extreme heat. Heat can cause damage to expansion joints on bridges and highways, and may cause roadways to deteriorate more rapidly.



Label	Facility
1	Sunoco Gas
2	MWFA Cushman Aqueduct
3	Lake Elementary School
4	Happy Hollow School
5	St. Ann's Church
6	Revere Hill Water Tank and Receiver Site
8	Wayland High School
9	Temple Site Three
10	Islamic Center of Boston
11	Clough Hill School
12	Peace Lutheran Church
13	Congregation Oz Ark
14	Grasshopper Church
15	Celebration International Church
16	Trinitas of Wayland
17	Town Hall
18	Trinitas Congregational Church
19	First Parish Church
20	Public Safety Building
21	The Clerk's Way
22	Rivers Edge
23	Wayland-Subury Septage Treatment
25	Wayland Landfill
26	Baldwin Pond Treatment Plant
27	Chamberlain Well
28	Campbell Road Well and Receiver Site
29	Happy Hollow Treatment Plant
30	Meadowbrook Well
31	Wester Aqueduct
32	Greenway Treatment Plant
33	MWFA Hulman Aqueduct
34	Wayland Middle School/ Shelter
35	Wayland Highway Dept
36	Wayland Sunco
37	Wayland Hotel
38	Seneca of Wayland
39	Alvarado ICK - Station 2
41	Wayland Housing Authority
42	St. Zaphar's Catholic Church
43	Wayland Housing and Family Center
44	Boral Montessori School
45	Community Nursery School
46	Libby Methodist Church
47	Boral Montessori School
48	Community Nursery School of Wayland
49	Wayland Creative Fine School
50	JCC Friendship-Wayland
51	Little Dove Early Childhood Center
52	Little Lamb Nursery School
53	Langhorne Children's Center
54	Truitt-Loring Care, Inc.
55	Wayland Fire Department Station 8
56	Wayland Fire Department Station 1
57	Public Safety Building
58	Wayland Police Department
62	CVS Pharmacy
63	Wayland Animal Clinic
66	Langhorne Health Club
67	Communication Tower
68	Base Park Apartments
69	Wayland Excon
70	US Post Office - Wayland Branch
71	US Post Office - Cushman Branch
72	Phoenix Veterinary Hospital
73	Brownstones
75	Meadow Brook Maintenance Treatment Facility
76	Anglo-Heritage in Wayland
78	Carriage House
79	Carroll School
80	Beit Israel Urgent Care
81	CVS Pharmacy
82	Goodland School

Data Sources:  
Metropolitan Area Planning Council (MAPC)  
Massachusetts Geographic Information System (MassGIS)  
Massachusetts Department of Transportation (MassDOT)  
Federal Emergency Management Agency (FEMA)



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# Wayland

## Social Vulnerability

Social vulnerability refers to social, economic, demographic, or health factors that may make groups of people less resilient to climate change impacts. Certain vulnerabilities tend to be correlated; for example, older adults are more likely to have a disability and live alone than younger adults.

# Who is most at risk from climate change impacts?

**People who may be more susceptible to negative health effects:** These can include older adults, young children, pregnant women, people with disabilities, and people with pre-existing health conditions, as they are more likely to be physically vulnerable to the health impacts of extreme heat and poor air quality. Individuals with physical mobility constraints, such as people with disabilities and seniors, may need additional assistance with emergency response.

**People who may have more difficulty adapting to, preparing for, or recovering from extreme weather events:** Socioeconomic characteristics such as income and race can influence vulnerability to climate change. Low-income people are often more susceptible to financial shocks, which can occur after extreme weather and which can impact financial security and the ability to secure safe shelter, access sufficient food, and meet medical needs. Social isolation can also influence vulnerability, as it limits access to critical information, municipal resources, and social support systems. People at the most risk for social isolation include those living alone and people with limited English language proficiency.

**People who live or work in vulnerable locations:** Historic or predicted floodplain, urban flooding locations, areas prone to wildfire, heat islands, neighborhoods prone to power outages, outdoor workers, first responders, those working in hot indoor environments.

## Low Income Households

**24% ± 3.5%** Households in Wayland that are low-income

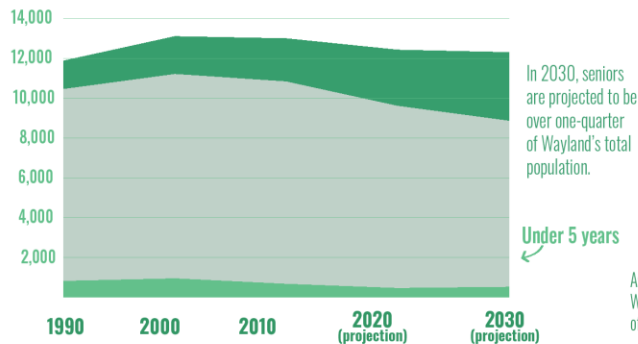
**7% ± 2%** Households in Wayland that are below poverty level

\*A four-person household earning less than \$78,150 is considered low-income; a four-person household earning less than \$24,563 is below poverty level

## Older Adults and Young Children

Adults over 65 and children under 5 are more likely to develop health problems on very hot days or during heat waves. Older adults are also more likely to have disabilities or mobility constraints and may need additional assistance during emergencies. They are also more likely to live alone than younger adults.

## Wayland Recent and Projected Population by Age

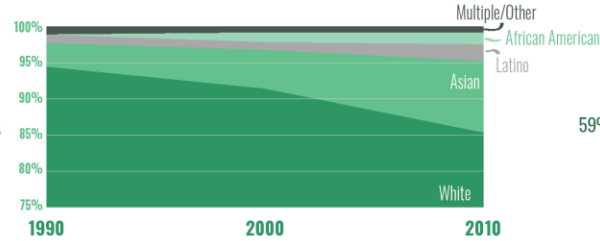


## Communities of Color

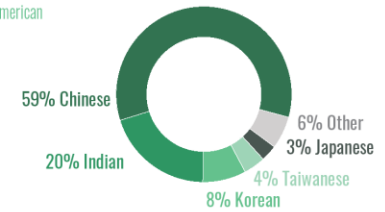
Particular racial or ethnic groups may also be more likely to have certain social vulnerabilities than others. For example, Black and Latino populations have a much higher rate of asthma hospitalizations than other groups.

### Wayland is becoming more diverse...

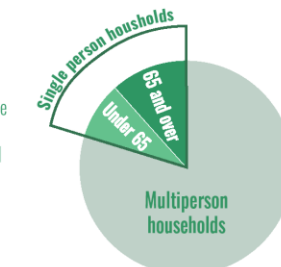
Although over 85% of the town's population is white, populations of color have increased since 1990.



## Asian Populations in Wayland



## People Living Alone



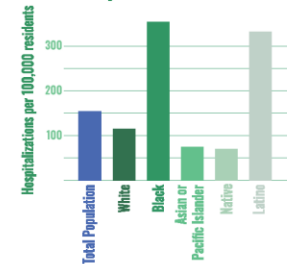
## People Who Work Outside



People who work outside on the land or on water, including first responders and other town employees, construction workers, or landscapers, may be at added risk from extra exposure to extreme weather and poor air quality.

## People with Health Conditions

### Massachusetts Asthma Hospitalizations



Sources: American Community Survey (ACS) 2012-2016; United States Census 1990, 2000, 2010; MAPCO Projections; Massachusetts Department of Public Health Asthma Data, 2008-2012



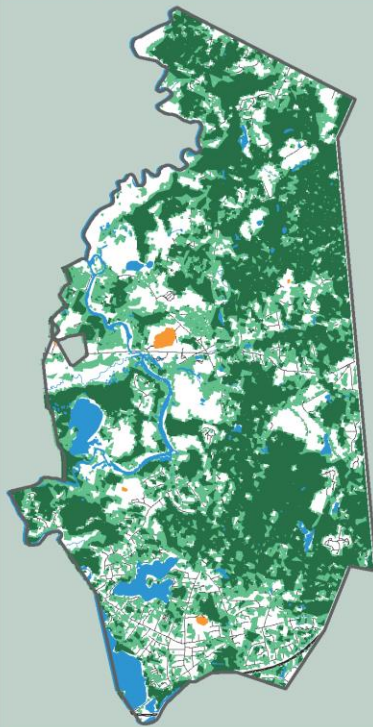
# Wayland

## Natural Resources

Natural resources lessen climate impacts by absorbing and storing carbon dioxide and by serving vital protective functions. Forests, open space, wetlands, rivers, and streams protect drinking water quality and quantity, provide flood control, and give relief from extreme heat. Healthy ecosystems are more resistant to stresses from a changing climate and better able to protect against heat and flooding.

### Trees

Trees are important in mitigating the impact of heat waves. According to the EPA, suburban areas with mature trees are 4-6 degrees cooler than new suburbs without trees. Shaded surfaces can be 25-40 degrees cooler than the peak temperatures of unshaded surfaces. Trees also absorb remarkable quantities of precipitation. Research has shown that a typical medium-sized tree can intercept as much as 2,380 gallons of rain per year (USDA Forest Service).

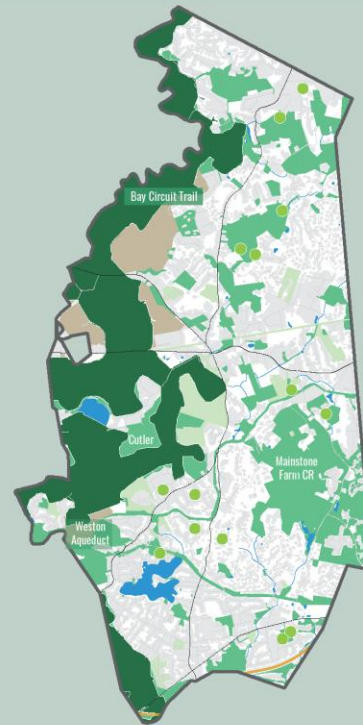


- 50% – 75% Tree Cover
- 75% – 100% Tree Cover
- Developed Land
- Hot Spots
- Water Bodies

Risk	Impact
<b>Warming</b>	Expected to shift forest type from Maple/Birch/Beech forest to Oak/Hickory forest similar to New Jersey. New pests and diseases
<b>Flooding, Drought, Wildfire, Ice Storms</b>	Impaired waters, toxic exposure, contaminant leaching

### Valuable Habitat

Core Habitat and Critical Natural Landscapes are state-identified intact landscapes, or exemplary natural communities, that are better able to withstand climate stresses, and support the long-term survival of rare species and natural habitats.

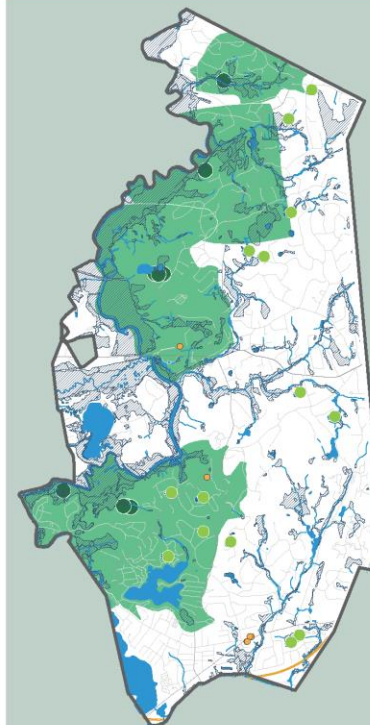


- Core Habitat
- Critical Natural Landscape
- Permanently Protected Open Space
- Other Open Space

- Water Bodies
- Developed Land
- Vernal Pools

### Freshwater Resources

Wayland contains healthy, intact freshwater wetland systems that sustain critical ecosystem functions in climate change. These ecological assets protect drinking water quality and quantity, provide flood control, and maintain overall ecosystem health for climate resilience.



- Water Bodies
- Wellhead Protection Areas (Zone I)
- Wellhead Protection Areas (Zone II)
- Wetlands
- Vernal Pools
- AUL Sites

Risk	Impact
<b>Drought/Warming</b>	Seasonal no-flow/ low-flow, reduced absorption capacity, diminished fish habitat, algal blooms, low dissolved oxygen, reduced drinking water supply
<b>Flooding</b>	Impaired waters, toxic exposure, contaminant leaching
<b>Extreme Precipitation</b>	Scouring, impaired waters, sewer overflows

## APPENDIX B – TABLE MATRIX RESULTS

Participants were divided into small groups identified as Blue, Green, Purple, or Red. Concerns were categorized as Environmental, Infrastructure, or Societal. Participants identified climate-related strengths and vulnerabilities for Wayland. Solutions were proposed for the vulnerabilities. Solutions were then prioritized as High, Medium, or Low. Each table was asked to identify their top three priorities. The information was recorded in a matrix for each table and is reproduced in the chart below.

Table	Topic	Strengths (S) & Vulnerabilities (V)	S/V	Solutions	Priority	Top Priority
Blue	Environment	Deer are eating young trees and vegetation	V	study this and then act	H	Yes (w/ other town forestry items)
Blue	Environment	Forest resiliency is a problem	V	need to have more active forest mgmt. start w/ study	H	Yes (w/ other town forestry items)
Blue	Environment	Lots of dead trees/fast changing	V	study this and then act	H	Yes (w/ other town forestry items)
Blue	Environment	finding locations to plant trees is difficult (DPW)	V	land management	H	
Blue	Environment	Losing open space to development	V	upgrade regulation/keep open space plan up to date	H	
Blue	Environment	Need a plan for what Wayland wants to be	V	Update the Master Plan	H	
Blue	Environment	protect the future plants that will migrate here	V	land management/open space planning	H	
Blue	Environment	town has limited overland flow	V	study/implement improvements	H	
Blue	Environment	Wells might get contaminated during a flood	V	Develop backup drinking water supply	H	

Blue	Environment	wildfire could become an issue	V	study this	H	
Green	Environment	CPA funding is at 1.5%	V	raise to 3%?	H	
Green	Environment	mosquito breeding areas	V	raise public awareness, treat catch basins, larvacide spraying	H	
Purple	Environment	trees are a benefit, but lots fall and take down wires/private tree removal	S/V	ID vulnerable trees, development a mgmt plan	H	Yes
Red	Environment	forest cover climate impacts	S/V	implement OSRP, review "Green Plan" - climate resilience	H	Yes
Red	Environment	Aquatic invasives: milfoil, water chestnut	V	restrict fertilizer, pesticide lawn use	H	
Red	Environment	River low flow/gw table low - droughts	V	watershed mgmt. water re-use, rainwater collection, greywater use	H	
Red	Environment	watershed scale flows and water quality issues	V	general water demand mgmt	H	
Red	Environment	well use for irrigation	V	regulate private wells	H	
Purple	Environment	mosquitos and ticks - due to changing conditions	V	public outreach and education	H	
Blue	Environment	Two golf courses are able to take on water	S/V	consider this in open space planning	L	
Blue	Environment	Enforcement of state law (2 poles) w/ utilities	V	work with the utilities	L	
Green	Environment	invasives management	S/V	OARS/Dudley Pond: handles milfoil. Blackthorn needs comprehensive plan	L	
Green	Environment	Open space/cluster development	S/V	used widely, update as needed	L	

Green	Environment	conservation regulations regarding tree cutting	V	updating them now, need community outreach	L	
Purple	Environment	golf course floods	V	study impacts	L	
Blue	Environment	tree impact on solar power	V	site large sites that people can share in, replant solar friendly trees	M	
Blue	Environment	trees cause power outages	V	evaluate budget for tree removal/work w/ utilities to be more proactive	M	
Green	Environment	Site preparation: impervious permits in place	S/V	improve communications between applicants and town boards	M	
Green	Environment	septic: flooding, lack of replacement	V	conduct town septic study. Determine vulnerable areas (Dudley Pond) priorities	M	
Green	Environment	tick management	V	education, natural control, trail maintenance, best building practices (tree cover)	M	
Green	Environment	water ban compliance (lack of)	V	public education and outreach	M	
Purple	Environment	lots of preserved land	S	acquire new when financially feasible, develop criteria of purchase, concom list	M	
Purple	Environment	flooding from beaver dams	V	beaver controls/deceiver	M	
Red	Environment	rivers/floodplains	S/V	work at river basin scale. Coordinate w/other towns	M	
Red	Environment	fertilizers, pesticide and high water use	V	promote alternative landscaping	M	
Red	Environment	Invasive species: bittersweet, garlic mustard	V	Public education, volunteer efforts	M	
Red	Environment	Soil management - old landfills, waste mgmt.	V	zero waste plan	M	

Red	Environment	Wetlands - tick, mosquito borne disease (more heat, rain, shorter winters)	V	public education and engagement	M	
Purple	Environment	invasive species	V	strategic invasives mgmt plan	M-H	
Blue	Environment	Good tree cover	S			
Blue	Environment	Lack of extreme heat areas	S			
Blue	Environment	Not many private wells	S			
Blue	Environment	well-functioning wetlands	S			
Blue	Environment	Wetlands bylaw is strong	S			
Blue	Environment	Long drought could cause a fire issue	V	land management/open space planning		
Blue	Environment	lots of invasives near streams	V	make/implement a land management plan		
Blue	Environment	research on health of forest needed	V	land management		
Green	Environment	MA bldg. code may not address flooding	S	continue good communication between building and facilities, and full staffing.		
Purple	Environment	heat island at town center	V	needs tree replacement		
Purple	Environment	wetland provide buffer	S	include buffer in town bylaw?		
Red	Environment	beavers - town center area	V			
Blue	Infrastructure	Snakebrook Dam needs immediate repair	V	repair dam, or restore river to original flow	H	Yes
Blue	Infrastructure	Town building subject to flooding	V	Possible relocation, or flood mitigation plan for town center	H	Yes (w/ other town center bldgs.)

Blue	Infrastructure	town building access road culvert floods	V	Redesign or repair	H	Yes (w/ other town center bldgs.)
Blue	Infrastructure	Library is subject to flooding	V	study issue/relocate if necessary	H	Yes (w/ other town center bldgs.)
Blue	Infrastructure	Water tank	V	build 2nd tank	H	
Green	Infrastructure	Backup generator at town hall for vaccines	S	finish connecting refrigerator to generator	H	
Green	Infrastructure	Police station basement floods	V	Abandon basement, address ventilation, find permanent storage	H	Yes
Green	Infrastructure	Power outages due to tree limbs	V	work w/ utility and DPW. Update tree ROW maintenance plan	H	Yes
Green	Infrastructure	Snake Brook Dam	V	Adopt language on town warrant. Study options to fix it.	H	Yes
Green	Infrastructure	Dudley Pond outlet clogs and causes flooding	V	create regular maintenance plan w/ Dudley Pond Assoc./DPW, maintain beaver deceivers	H	
Green	Infrastructure	Library basement floods	V	keep testing mitigation (culvert), update as needed, tie into town phone system	H	
Green	Infrastructure	Town Hall lacks generator backup	V	generator and backup battery to store solar, incl. refrigerator	H	
Purple	Infrastructure	MWRA aqueduct	S	evaluate feasibility of connect w/ MWRA for water	H	Yes
Purple	Infrastructure	Town offices and Public Safety bldgs. cut off due to flooding	V	Town center (Rt. 27/20 need capital investment/culvert improvement	H	Yes

Purple	Infrastructure	Pelham Island, Town office, key intersections flood	V	maintenance/catch basin clean out (on-going)	H	
Purple	Infrastructure	Snake Brook Dam and Mill Brook Dam (possibly others?)	V	funding to rehab (remove?) and local inventory of public and private dams	H	
Red	Infrastructure	drinking water wells - flooding impact	V	update and implement wellhead protection plan	H	Yes
Red	Infrastructure	Rice Road (Snake Brook) Dam	V	inundation study	H	Yes
Red	Infrastructure	Dudley/Heard/Mill Ponds flood when Sudbury River floods	V	study dam mgmt/schedule releases based on hydrologic triggers	H	
Red	Infrastructure	Water supply risks from temperature and drought	V	implement Wellhead Protection Plan, demand mgmt.	H	
Blue	Infrastructure	Wastewater treatment plant - flow and flooding concerns	V	have redundant infrastructure	L	
Green	Infrastructure	Middle School shelter	S	add battery backup, Energy Cttee. Is raising money	L	
Green	Infrastructure	Wetlands provide buffers, but flood	S/V	Update ConCom regulations (ongoing, being addressed)	L	
Green	Infrastructure	Concern for snow loads at Loker and Claypit Schools	V	remove as needed, add to facility maintenance plans	L	
Red	Infrastructure	No cooling center except Middle School	V	establish neighborhood cooling centers (schools)	L	
Red	Infrastructure	Power Grid - EMP	V	purchase equipment with EMP protection	L	
Red	Infrastructure	Transportation - microbursts, etc.	V	better tree mgmt, healthier trees, prioritize tree clearance post-event	L	
Red	Infrastructure	WWTP flooding potential	V	flood protection on site	L	

Red	Infrastructure	Municipal buildings flood	V	evaluate flood barriers, retrofits	L/M	
Blue	Infrastructure	Public Safety building basement floods	V	fill/remove basement/ move materials from the basement	M	Yes (w/ other town center bldgs.)
Blue	Infrastructure	Gas leaks in town	V	be proactive in working with National Grid	M	
Blue	Infrastructure	Rt. 27 and 20 might flood in big storms	V	Work w/ state, enhance transportation	M	
Green	Infrastructure	Access road to DPW (Rt. 20) floods	V	address flooding mitigation	M	
Green	Infrastructure	Concern for capacity of town water wells	V	study the wells, find backup supply, consider MWRA	M	
Green	Infrastructure	trailers and medical emergency supplies	V	find higher area for trailers	M	
Purple	Infrastructure	4 public wells are subject to summer water ban	S	enforce water ban (WMA permit)	M	
Purple	Infrastructure	Dudley Pond (and elsewhere) rising water levels cause trees to fail	S/V	work w/ ConCom on access and tree removal	M	
Purple	Infrastructure	Town sewage plant at high school has excess capacity	S/V	consider feasibility of new connections (Dudley Pond) explore privately owned plants	M	
Purple	Infrastructure	Cochicuate Fields - Bradford Rd. flood due to culvert on state land	V	work with DCR on solution	M	
Purple	Infrastructure	need knowledge of private wells and 2016 drought	V	map the location of private wells	M	
Red	Infrastructure	Generator in town buildings (except town hall)	S/V	add outside outlets for mobile generators. Solar w/ storage at the middle school	M	



Red	Infrastructure	Lake Cochituate: stormwater outfalls need repair	V	repair/upgrade. State role?	M	
Red	Infrastructure	roadway flooding: Wayland Ctr./Pelham Island/Old Sudbury Rd./ Boston Post Rd. (Rt 20) at Sudbury River	V	Extend elevated roadways; consider reconstruction of town center to elevate road	M	
Red	Infrastructure	Septic systems: flooding and water table	V	consider climate scenarios in Title 5 permits. Enforcement up renewal	M	
Red	Infrastructure	2 Wastewater treatment plants - gas for generators	V	add outside outlets for mobile generators. Solar w/ storage at the middle school	M	
Red	Infrastructure	Power grid - microbursts, etc.	V	long term - underground utilities, microgrid neighborhoods/storage. Short-term - tree pruning	M/H	
Blue	Infrastructure	Brand new domestic water pump	S			
Blue	Infrastructure	Capacity of town to manage stockpile of dead trees	S			
Blue	Infrastructure	Portable generator is ready for use	S			
Blue	Infrastructure	Town has boats for emergencies	S			
Blue	Infrastructure	Town shelter has its own generator	S	maintain it		
Blue	Infrastructure	Well-rounded DPW and Public Safety staff	S			
Blue	Infrastructure	good number of gas stations (storage)	S			
Blue	Infrastructure	Utilities come from many sources	S			
Green	Infrastructure	DPW and Public Safety has generator	S			

Green	Infrastructure	Reverse 911	S			
Green	Infrastructure	Snow and ice removal	S			
Green	Infrastructure	Solar installations at town facilities	S			
Purple	Infrastructure	town has private septic systems	S/V			
Purple	Infrastructure	does Framingham well impact Wayland?	V	hasn't been activated yet		
Purple	Infrastructure	Public Safety building basement floods, Town offices have some mold	V	part of high priority		Yes
Red	Infrastructure	Solar at Middle School (shelter)	S			
Red	Infrastructure	Communications - ice, wind, EMP	V			
Blue	Society	Communication with new residents and senior citizens	V	Develop a communication plan for vulnerable populations. Do community education	H	Yes
Purple	Society	COA van (and other services available)	S	Newer equipment, drivers needed	H	Yes (w/other)
Purple	Society	Regional transit authority service is limited	V	explore options to expand service	H	Yes (w/COA transport)
Purple	Society			overarching recommendation: public outreach and education	H	
Red	Society	Lack of Continuity of Operations Plan	V	Develop plan, consider implementation	H	Yes
Blue	Society	Concern for pets in emergencies	V	come up with a plan and share it with the public	L	
Blue	Society	public education on climate change/regional flooding	V	it is ongoing	L	

Blue	Society	room to improve communications	V	it is ongoing	L	
Green	Society	Council on Aging - great outreach	S	need better facility - move to town center?	L	
Green	Society	Food pantry (private)	S	investigate new location? access issues	L	
Green	Society	OARS/Sudbury Valley Trustees	S	improve communication w/ ConCom and departments	L	
Green	Society	Asian population, takes care of their own seniors, but less communications	S/V	look for outreach and communication opportunities	L	
Purple	Society	Middle school has generators, but it's the only one, not central/others have generators but not evacuation	S	explore new facilities	L	
Red	Society	Many employees (police/fire/waste mgmt) live out of town - access issue	V	provide facilities for employees to stay overnight	L	
Blue	Society	Lack of evacuation plan/understanding. Wayland will be a drive through area	V	Come up with a plan to move people and share it with the public (town is working on this)	M	
Blue	Society	Many senior citizens on landlines - concern for power outages	V	come up with a plan and share it with the public	M	
Blue	Society	Need for evacuation of seniors may be challenging	V	come up with a plan and share it with the public	M	
Blue	Society	No local hospital in town	V	have transportation plan, look into dispatch system	M	
Blue	Society	No refrigerator for medication at town shelters/emergency areas	V	Get new refrigeration for medication	M	
Purple	Society	Cooling centers (COA, Middle School, Public Safety)	S	need auxiliary power	M	
Purple	Society	Fire Dept. emergency center	S	maintain facilities and services	M	

Red	Society	Transportation to shelters. Town and Asst. Living have vans	S/V	ID populations in need, work on communications	M	
Blue	Society	COA has good resources and ability	S			
Blue	Society	strong communication with Public Works and Safety	S			
Blue	Society	town Medical Reserve Corps	S			
Blue	Society	Residents need to know what to do in an emergency	V	come up with a plan and share it with the public (town is working on this)		
Blue	Society	what is the state plan on pandemics	V	study the state plan		
Green	Society	Community, NGO and resident groups all well-connected, social media	S			
Green	Society	Dudley Pond Assoc. communication and outreach	S			
Green	Society	LEPC quarterly meetings and regional training	S			
Green	Society	Med. Res. Corp, CERT, Clinics, SDS drill, Shelter Operations	S			
Green	Society	Public Safety/COA has list of seniors at risk	S			
Green	Society	Wayland Neighborhood Brigade - neighbor help	S			
Purple	Society	area hospital generally accessible	S			
Purple	Society	COA - has good outreach to vulnerable populations	S			
Purple	Society	COA wellness checks	S			

Purple	Society	Reverse 911	S			
Purple	Society	one health clinic/no hospital	S/V			
Red	Society	Assisted Living Carriage House Traditions of Wayland (MOU for emergencies)	S			
Red	Society	CERT and LEPC	S			
Red	Society	Council on Aging	S			
Red	Society	Med. Res. Corp,	S			
Red	Society	neighborhood watch	S			
Red	Society	Shelter in public safety building	S			