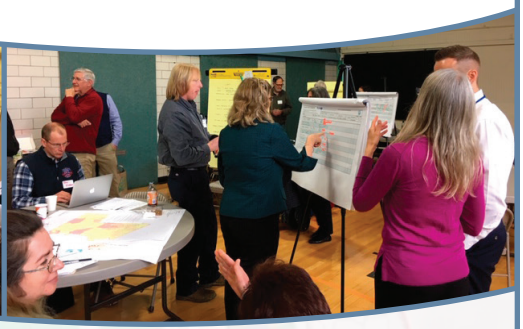
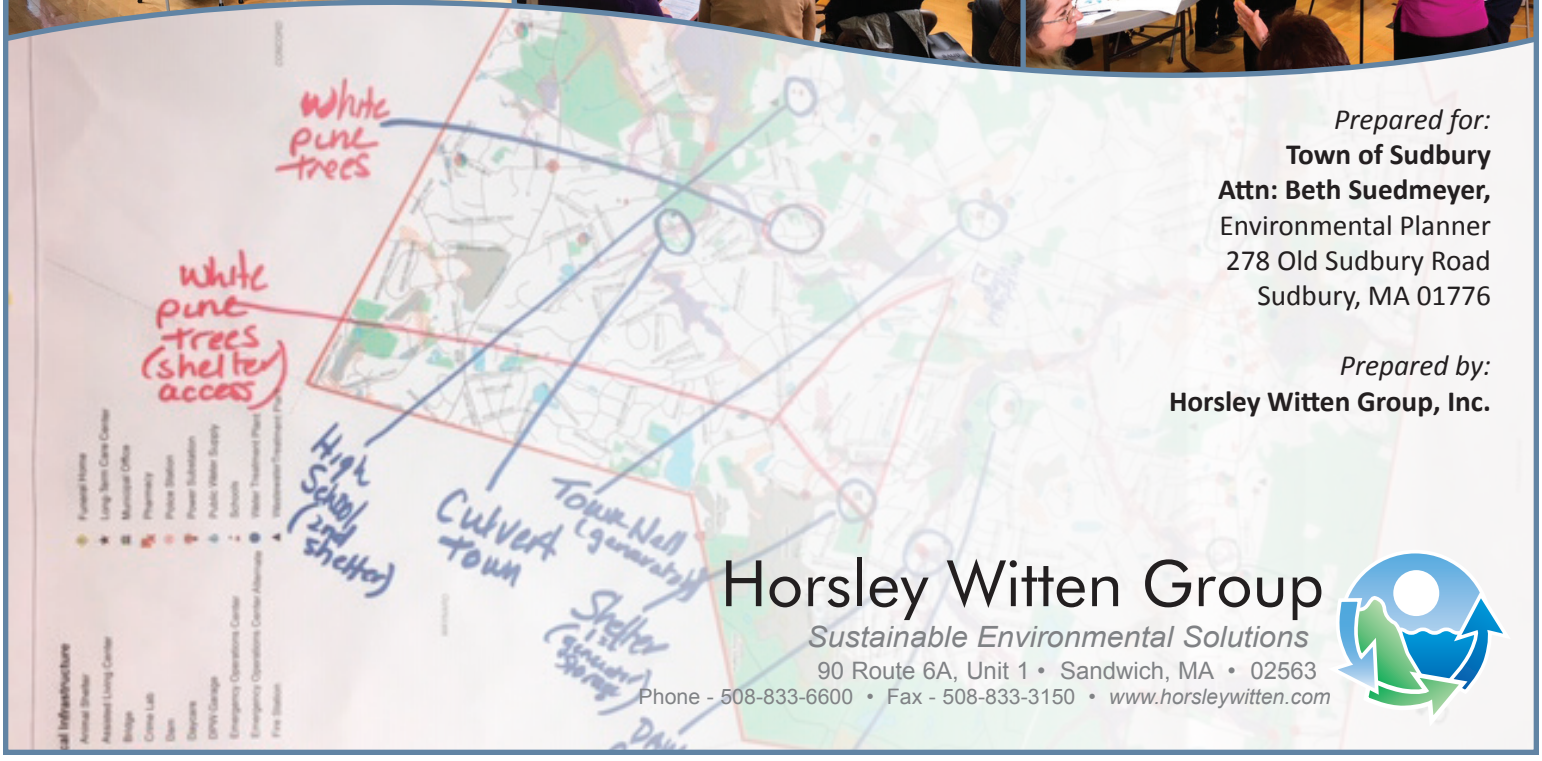
Summary of Findings

Sudbury Municipal Vulnerability Preparedness Workshop

Sudbury, Massachusetts

June 29, 2019





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Sudbury Municipal Vulnerability Preparedness Workshop/Code review *Summary of Findings*

Acknowledgements:

Funding to support the Sudbury Municipal Vulnerability Preparedness (MVP) Workshop and Policies/Regulatory Review (Code Review) was provided by the Massachusetts Executive Office of Energy and Environmental Affairs through an MVP Planning Grant, issued to the Town of Sudbury during the fiscal year of July 2018 through June 2019.

The Town of Sudbury contracted with the Horsley Witten Group, Inc., to provide MVP-certified staff to support the Town in planning and facilitating the workshop.

Suggested Citation:

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Sudbury Municipal Vulnerability Preparedness Workshop
Summary of Findings

Executive Summary

Extreme weather and climate-related impacts are an increasing concern for communities. Recent storm events affecting the Town of Sudbury and the region have drawn attention to the vulnerabilities municipalities face. Climate modeling indicates hazards are expected to increase in frequency and intensity. The Municipal Vulnerability Preparedness (MVP) Program, administered by the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), provides technical support and a prescribed process for municipalities to plan proactively for resiliency and prioritize climate change adaptation actions.

On May 14, 2019, the Town of Sudbury held an MVP workshop. The workshop's goal was to identify hazards that Sudbury faces that are being exacerbated by climate change, and to prioritize actions the Town can take to prepare for identified hazards. This workshop, planned by a core team of municipal organizers and the Horsley Witten Group, Inc. was a step towards MVP certification, which allows certified communities access to additional state grants for projects related to climate change resiliency. Fifty-six community members attended the workshop, representing a wide cross section of regional, state, and municipal officials, response partners, and other interested parties. Honored guests in attendance included Maryanne Bilodeau, Assistant Town Manager, Patricia Brown and Janie Dretler, both representing the Sudbury Board of Selectmen.

During the initial large-group discussion, participants concluded that the four categories of hazards most relevant to Sudbury are winter storms/extreme cold; wind/hurricanes/tornadoes/micro-bursts; flooding/intense rain; and drought/extreme heat. In five small discussion groups, participants identified features of Sudbury that are either vulnerable to climate change or could help strengthen the community's ability to cope with climate related hazards. Small groups then listed actions that could be taken to protect or mitigate the impact of prioritized hazards on the features they had identified. Following small and large group discussions and voting, participants prioritized the following six action items:

1. Tree Maintenance and Forest Management
    a.) Maintain trees at roadways/utility rights-of-way
    b.) Preserve existing tree canopy/plan for future species changes
        i.) Identify/remove dead and falling trees
        ii.) Develop plan for re-planting (native species, size, shape, and placement)
    c.) Purchase bucket truck for DPW

d.) Public education around trimming and planting

2. Power/Utility Lines Management
   a.) Bury lines underground as roads are repaved
   b.) Establish tree/buffer management
   c.) Evaluate funding resources
      i.) Rate-payer funding
      i) MA Surcharge Program
      ii) Solar facilities

3. Improve Emergency Response Planning and Communication
   a.) Increase capacity and support for Citizen's Emergency Response Team (CERT) and Medical Reserve Corps (MRC) recruitment
   b.) Training and communication protocol for hospitals and home healthcare agencies
   c.) Educate community on Reverse 911
   d.) Assess needs of vulnerable populations to understand sheltering needs (Know-Your-Neighbor)
   e.) Maintain database of vulnerable populations and address data privacy/sharing challenges

4. Update Existing Regulations
   a.) Stormwater regulations to reduce flooding and water quality impacts
   b.) Incorporate latest science and climate change projections
   c.) Private well restrictions and water bans during drought events

5. Improve Drainage Infrastructure and Capacity
   a.) Stormwater Infrastructure Assessment
      i.) Retrofits, replacement Low Impact Development (LID), and Green Infrastructure (GI)
   b.) Culvert Replacement
      i.) Repair, replace, engineering/design

6. Strengthen Emergency Shelters (Schools, Libraries, Community Center)
   a.) Generators
   b.) Air conditioning
   c.) Charging stations (cell phones)

Following the completion of the MVP workshop, members of the core team presented an overview of the science and findings from the workshop at a formal information and listening session on May 30, 2019 at the Sudbury Grange. An MVP page has been added to Sudbury's municipal website available here: https://sudbury.ma.us/pcd/2019/05/31/municipal-vulnerability-preparedness-mvp-planning/

These action items will be incorporated into ongoing municipal planning efforts and will inform the MVP core team and the town as a whole as it works to take action to improve the Town's resilience. In particular, these actions will be incorporated into the update to the Hazard Mitigation Plan and master Plan (currently underway with the Horsley Witten Group, Inc. as the consultants). Actions identified in

this process are eligible for future grant funding under the MVP Action Grants program administered by the EOEEA. By undertaking the MVP workshop and preparing this report, the Town is also initiating its certification as an MVP Certified Community, which enables the Town to apply for future MVP Program grants and elevates the scoring profile for related project proposals to other state grant programs.

As part of a separate task through the MVP process, the Horsley Witten Group, Inc. explored policy/regulatory changes that could contribute to the mitigation, adaptation, and the community's improved resilience based on strategies outlined in the MAGIC Climate Change Resiliency Plan, climate change projection data in the recently-released MA Climate Change Clearinghouse online, the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018), and guidance from the MVP core team. Findings from this effort have been included in Attachment G.

Fifty-six community members participated in the workshop on May 14, 2019 to develop and prioritize actions to make Sudbury more resilient to climate change.

Table of Contents

1. Introduction

Extreme weather and climate-related impacts are an increasing concern for communities. Recent storm events affecting the Town of Sudbury and the region have drawn attention to the vulnerabilities municipalities face. Climate modeling indicates hazards are expected to increase in frequency and intensity. The MVP Program, administered by the Commonwealth of Massachusetts EOEEA, provides support for municipalities to plan for resiliency and implement key climate change adaptation actions for resiliency. The MVP Program offers technical assistance to communities to define climate related hazards, identify existing/future vulnerabilities and strengths, develop and prioritize actions for the community, and identify opportunities to take action to reduce risk and build resilience. To develop an action-oriented resiliency plan, the program utilizes a workshop format and the Community Resilience Building (CRB) framework, focusing on a participatory, community-driven process that fosters engagement and collaboration among community stakeholders.

Sudbury applied for a grant and was selected by the Commonwealth to participate in the MVP Program in order to expand its prior resiliency planning efforts and develop a list of priority actions to improve resiliency.

Sudbury is also updating its Hazard Mitigation Plan (HMP) to fulfill FEMA guidelines and identify strategies to address natural hazards. Upon completion of the two projects, the Town of Sudbury will be eligible to apply for state and federal grants to address identified natural hazards and implement the plans. The Town of Sudbury partnered with the Horsley Witten Group, Inc. to complete the MVP plan/workshop and the HMP.

As part of a separate task through the MVP process, the Horsley Witten Group, Inc. explored policy/regulatory changes that could contribute to the mitigation, adaptation, and the community's improved resilience based on strategies outlined in the MAGIC Climate Change Resiliency Plan, climate change projection data in the recently-released MA Climate Change Clearinghouse online, the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018), and guidance from the MVP core team. Findings from this effort have been included in Attachment G.

Workshop Planning and Core Team

Following the award of the technical assistance grant, several town employees were identified to serve as a core organizing team. Team members included the following individuals, and were assisted by Craig Pereira, of the Horsley Witten Group (HW), Sudbury's MVP Provider:

- Beth Suedmeyer, Environmental Planner
- John Whalen, Sudbury Fire Chief
- Adam Duchesneau, Director of Planning and Community Development
- Dan Nason, Director of Public Works
- Bill Murphy, Health Director
- Bill O'Rourke, Deputy Director of Public Works

- Bill Barletta, Facilities Director
- Mark Herweck, Building Inspector
- Vin Roy, Executive Director Sudbury Water District

Core team members met on April 2, April 19, May 2, and again on May 6, 2019 and communicated via email and telephone as needed. Responsibilities of the core team included planning workshop logistics; reviewing workshop agenda; providing reference material, context and background for the MVP effort; reviewing maps and reference materials for use in workshop discussion groups; identifying a diversity of representative stakeholders to invite to the workshop; reaching out to invitees to encourage attendance; and participating in the workshop as discussion facilitators, note takers and stakeholders.

Workshop Attendees and Materials

The core team elected to complete the MVP workshop in one full day at the Fairbank Community Center. A total of 70 stakeholders were invited to the workshop with 56 attending. Participants represented a wide cross section of the Town's stakeholders and decision-makers, including Assistant Town Manager Maryanne Bilodeau, representatives from the Sudbury Board of Selectmen, utility providers, representatives from area hospitals and home healthcare agencies, regional transportation authorities, several local watershed authorities, local business owners, and a wide variety of municipal department staff and volunteers from local boards and commissions, among others. Honored guests in attendance included Maryanne Bilodeau, Assistant Town Manager, Patricia Brown and Janie Dretler, Board of Selectmen. See Attachment A for a full list of invited stakeholders, including their organizational affiliation.

Maryanne Bilodeau, Assistant Town Manager welcomes stakeholders to the MVP Workshop.

On the day of the workshop, participants were provided with a copy of the agenda for the day (see Attachment B) and a handout summarizing climate change resiliency measures that have been previously identified and recommended in recent municipal plans, including the Sudbury 2010 Hazard Mitigation Plan (see Attachment B). The following additional informational materials were located on each small group's table to be shared in order to encourage communication and collaboration throughout the workshop:

- Summary of climate projections for Sudbury/Assabet/Concord Basins provided by EOEEA and prepared by the Northeast Climate Science Center (see Attachment B).
- Example vulnerabilities and strengths excerpted from the CRB guidance document (see Attachment B).
- Summary of Sudbury demographic data (see Attachment B).
- Sudbury base map showing critical infrastructure and FEMA floodplain data (see Attachment C).

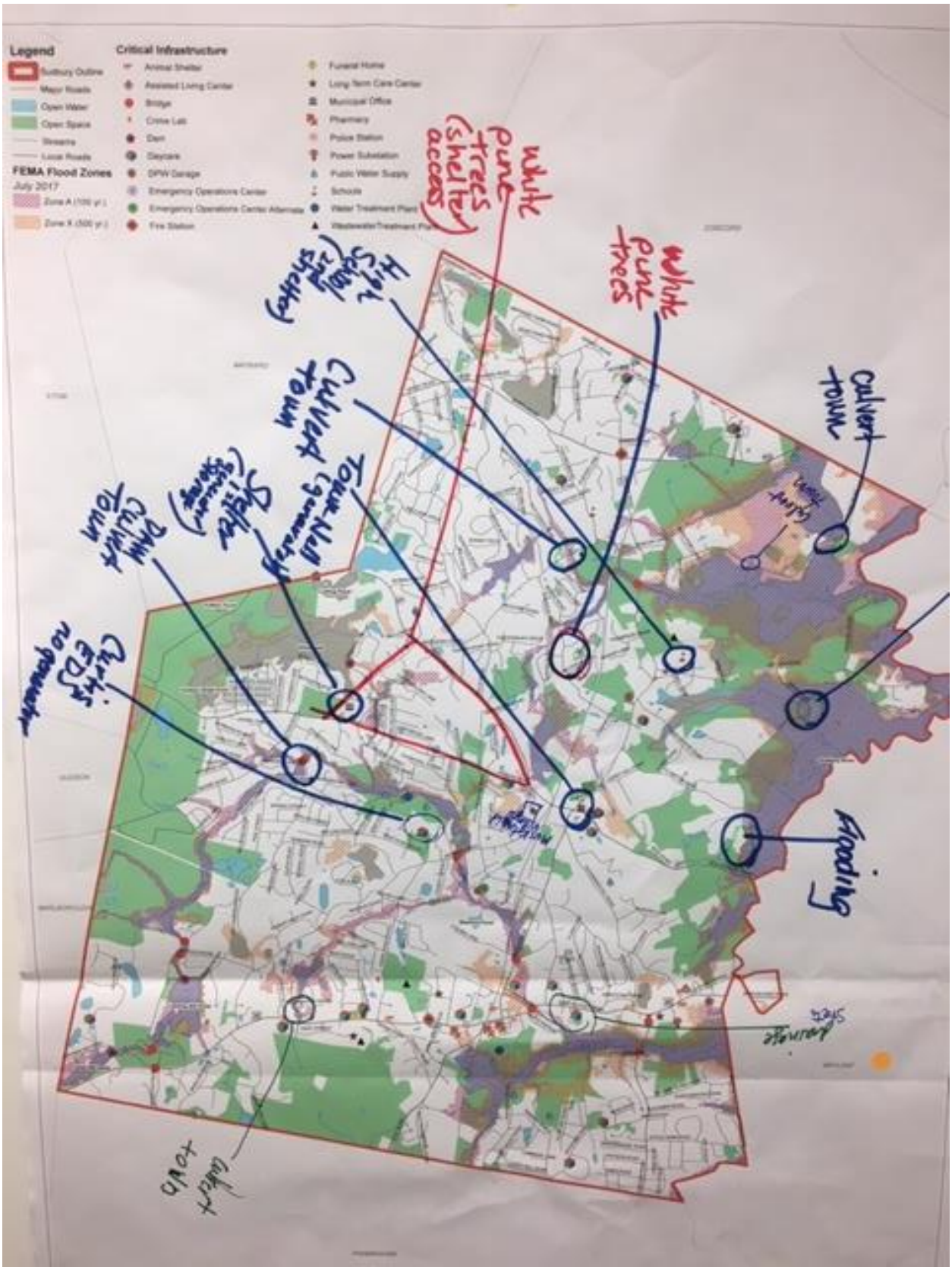
The Commonwealth of Massachusetts has established a Massachusetts-specific climate data clearing house, resilientma.org, to easily enable municipalities and stakeholders to access regional data for use in climate preparedness planning.

The Workshop Process

Following introductions and an overview of the MVP Program and workshop agenda, workshop participants listened to a presentation by MVP-Certified facilitator Craig Pereira, HW, about climate change projections and their current and potential future impacts on Sudbury. The presentation discussed specific infrastructural and environmental challenges facing the Town in light of climate change. Challenges discussed included the flooding that occurs after severe rain events, variations in temperature extremes, and the potential for increasing drought severity. Following this introduction, HW led a large group discussion in which participants focused in on four primary climate change hazards to frame the discussions for the remainder of the workshop.

The remainder of the morning portion of the workshop included small discussion groups. Groups were made up of a facilitator (either a HW staff member or member of the core planning team), a note taker, and approximately 10 - 12 workshop participants. Small group discussions began by listing infrastructural, societal, and environmental features that represent either vulnerabilities or strengths of the community in the face of anticipated climate change hazards. Features were marked on the base maps and listed on the risk matrix, a framework for note taking developed as a part of the CRB framework. Each group listed between 10 and 15 features for each category, along with information about their location, ownership, and if they are a strength or vulnerability for the Town. They also marked specific locations on the base map provided at the table, as appropriate.

Workshop participants worked in small groups to identify vulnerabilities and strengths associated with the four primary hazards impacting the community.



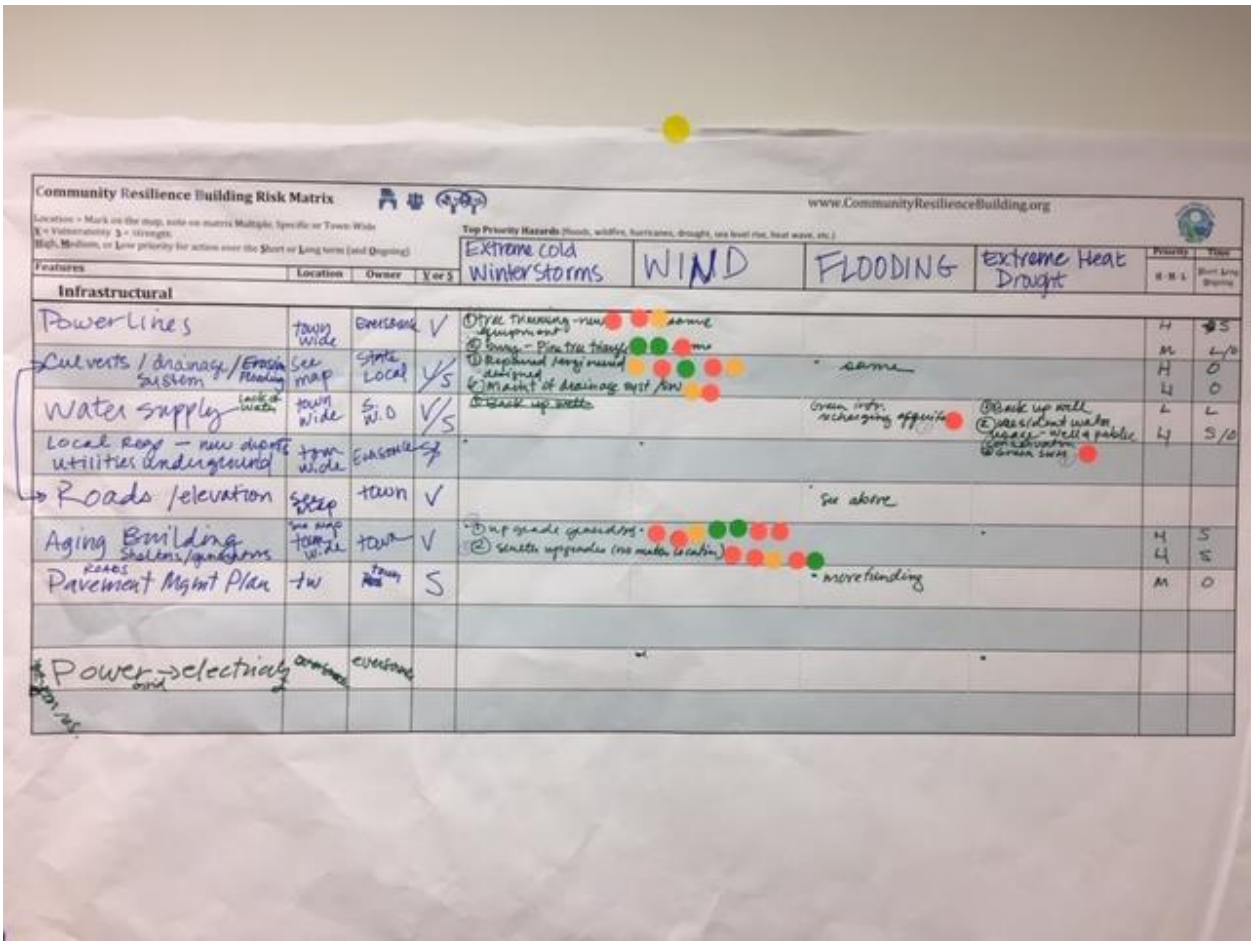
Small groups annotated maps to highlight strengths and vulnerabilities based on FEMA flood zones and other hazard events.

Following lunch, groups moved on to discussing action items that either mitigate the vulnerabilities posed by the priority hazards or enhance the strengths identified. Action items could either be a way to protect a vulnerable feature from a negative impact or how to better utilize one of Sudbury's strengths. Common action items listed included ensuring Town staffing levels are appropriate for existing/projected population, developing a plan for vulnerable/elderly population (registry, education, and communications), tree canopy maintenance, and backup power for water supply, shelters and cell phone charging. Throughout the small group discussions, the workshop's lead facilitator circulated between groups to ask questions and provide guidance.

Once complete lists of action items to address infrastructural, societal, and environmental vulnerabilities had been compiled, groups began the process of prioritizing actions. Groups completed this process in different ways, with some identifying the priority level for each suggested action item and others only determining which were of the highest priority. Groups prioritized items by discussion and/or by dot voting, in which each participant was given several dot stickers to place next to ideas they wished to prioritize.

After all groups had identified its top five-six priority action items, a representative of the group reported out to the full workshop, describing the prioritized items and presenting a brief summary of their group's discussion. Following the presentation of each group's priorities, workshop participants together with the workshop facilitator combined duplicative suggestions to create a final list of priority actions that the Town of Sudbury should work towards to increase the resilience of the community in the face of anticipated climate change impacts. Through this process, the group identified six overall priority action items.

The results of each stage of the workshop discussions are presented in the subsequent sections of this report. Attachment D includes a transcription of the summary matrices produced by each of the five discussion groups. Attachment E includes a matrix presenting a compilation of the recommended high priority actions from the five discussion groups. Action items prioritized during small or large group discussion are indicated with bolded and underlined font. Attachment F includes the maps that contain notations from each of the discussion groups.



An example completed 'Infrastructure' risk matrix. Colored dots indicate the small group participant voting to prioritize each action.

2. Top Hazards of Concern

The discussion of hazards tended to include both the hazard events as well as the impacts from those events, because the term hazard can be a bit confusing in its use; 'hazard' can refer to the cause and the impact. The presentation by HW included a list of hazards for consideration, as follows:

- Intense rain/flooding
- Wind events
- Hurricanes or Nor'Easters
- Winter Storms (snow, wind, cold)
- Extreme cold
- Heat waves, extreme heat
- Fire
- Drought

Following discussion among the full group of workshop participants, several hazards were combined together based on the common impacts expected from the hazards. Workshop participants came to consensus that the following climate change related hazards were the highest priority for Sudbury:

- Winter Storms/Extreme Cold
- Wind/Hurricanes/Tornadoes/Micro-Bursts
- Flooding/Intense Rain
- Drought/Extreme Heat

3. Current Concerns and Challenges Presented by Hazards

Sudbury has experienced several climate and weather-related challenges in recent years and can expect to experience more severe events in the years to come due to climate change. Localized flooding is a concern for the Town of Sudbury, particularly at Sherman Bridge, Lincoln Road, Concord Road, Water Row at Old County and Old Sudbury Water Row South. Severe winter storms continue to increase in frequency and severity in Sudbury, often accompanied by significant snow fall and high winds. In 2016 – 2017, Sudbury and the northeast in general experienced a severe drought that challenged the local water supplies. Sudbury was within the 'D-3 extreme drought' area which was compounded by record breaking high temperatures.

Sherman Bridge, periodic flooding.
Photo: Sudbury Dept. of Public Works

Localized flooding Water Row at Old County.
Photo: Sudbury Dept. of Public Works

Severe winter storms bring down trees and inhibit travel along roadways.
Photo: Sudbury Dept. of Public Works

Wind events are a frequent concern in Sudbury, often disrupting power to homes and businesses.
Photo: Sudbury Dept. of Public Works

Among the discussion groups at the workshop, a range of vulnerabilities were identified among the infrastructural, societal and environmental assets of the Town. These included:

Infrastructural

- Above-ground power lines (power outages)
- Drainage capacity/maintenance (Town-wide)
- Bridges (Rte. 20, Lincoln Road, Sherman)
- Tree maintenance
- Schools capacity as shelters
- Emergency shelter (capacity)
- Inadequate culverts (Lincoln/Concord Roads)
- Roads (narrow, difficult to maintain, tree cover)
- Dated public water supply/wells system
- Septic systems (Town-wide)
- Transportation systems/flooding (Town-wide)
- Fuel storage (DPW facility)
- Private homes/driveways (Town-wide)
- Dams (various)
- Potential for drought-related wildfires
- Downed trees/Power outages
- Private wells (power supply)
- Building accessibility/evacuation
- Aging buildings

Societal

- Need database of vulnerable populations
- Low-density population (Town-wide)
- Emergency Response Plans (Town/Utility providers)
- Communications to residents
- Agricultural operations
- Weatherization of homes (vulnerable populations)
- Hospitals/Home Care agencies
- Transportation protocol for affected residents/emergency vehicles
- Snow removal fire hydrants/storm drains
- Aging population (resources/services needed)
- Pets/livestock (Town-wide)
- Food Supply (Town-wide)
- Looting (Town-wide)Large-scale sheltering for residents
- Lack of emergency personnel/volunteers during emergencies
- Maintain cell phone availability (Charging stations)
- Awareness of shelters (tornado events)
- Asthma rate increases
- Vector-borne illnesses increase
- Schools/sheltering in place (air conditioning)
- Evacuation along Sudbury River/floodplain

Environmental

- Wild and scenic river
- Development pressure (Town-wide)
- Update science/climate change projections in regulations
- Outdoor recreation opportunities (mosquito/tick exposure)
- Changes in species composition (invasive species)
- Wetland/floodplain resources (Town-wide)
- Trees/forests (aging/white pines triangle)
- Drinking water (quality and supply)
- Steep slopes
- Air quality

4. Current Strengths and Assets

Among the discussion groups at the workshop, a range of strengths were also identified among the infrastructural, societal and environmental assets of the Town. These included:

Infrastructural

- Underground power lines
- Underground gas mains
- Culverts (size and maintenance)
- Emergency sheltering
- Reverse 911/Emergency communications system
- DPW storm response
- Citizen Emergency Response Team (CERT)/Medical Reserve Corp (MRC)
- Fire Dept. capacity (response time/multiple locations)
- Police dispatch/emergency command
- Hospital/Home Care agencies
- Stormwater management system (Town-wide/retail center)
- Fuel storage (DPW facility)
- Public water supply (Town-wide)
- Septic systems (Town-wide)
- Municipal stormwater system/regulations
- Renewable/Solar energy
- Center traffic lights
- Tree canopy (reduces heat-island effect)
- Amount of pervious land area
- Updated regulations for new developments (utilities underground)
- Pavement Management Plan

Societal

- Reverse 911
- DPW storm response
- Citizen Emergency Response Team (CERT)/Medical Reserve Corp (MRC)
- Fire Dept. capacity (response time/multiple locations)
- Police dispatch/emergency command
- Hospital/Home Care agencies

- Critical Care Customer Support (BOH/Eversource)
- Food Supply (Town-wide)
- Communication resources/education
- Vulnerable populations registry (in development)
- Schools/Police Dept. relationship
- Transportation routes to hospitals generally clear during events
- Critical Facilities list
- R.A.V.E.
- Hazard Preparedness Guide (BOH)

Environmental

- Wild and scenic river (floodplain)
- Overall regulatory framework
- Conservation of forests/open spaces/wetlands (Town-wide)
- Achieving 40B 10% housing stock
- Pest management (Middlesex Mosquitos)
- Wetlands/floodplain resources (Town-wide)
- Trees/forests (Town-wide)
- Drinking water (quality and supply)
- Wildlife habitat (refuges/hunting)

5. Top Recommendations to Improve Resilience

Following the presentation of each group's priorities, workshop participants, along with the workshop facilitator, combined duplicative suggestions to create a final list of recommendations. These were then further prioritized using dot voting. Six action items were chosen as the highest priority for the Town and are listed below:

1. Tree Maintenance and Forest Management
   a.) Maintain trees at roadways/utility rights-of-way
   b.) Preserve existing tree canopy/plan for future species changes
      i.) Identify/remove dead and falling trees
      ii.) Develop plan for re-planting (native species, size, shape, and placement)
   c.) Purchase bucket truck for DPW
   d.) Public education around trimming and planting

2. Power/Utility Lines Management
   a.) Bury lines underground as roads are repaved
   b.) Establish tree/buffer management
   c.) Evaluate funding resources
      i.) Rate-payer funding
      ii.) MA Surcharge Program
      iii) Solar facilities

3. Improve Emergency Response Planning and Communication
   a.) Increase capacity and support for Citizen's Emergency Response Team (CERT) and Medical Reserve Corps (MRC) recruitment

b.) Training and communication protocol for hospitals and home healthcare agencies
c.) Educate community on Reverse 911
d. Assess needs of vulnerable populations to understand sheltering needs (Know-Your-Neighbor)
e.) Maintain database of vulnerable populations and address data privacy/sharing challenges

4. Update Existing Regulations
   a.) Stormwater regulations to reduce flooding and water quality impacts
   b.) Incorporate latest science and climate change projections
   c.) Private well restrictions and water bans during drought events

5. Improve Drainage Infrastructure and Capacity
   a.) Stormwater Infrastructure Assessment
      i.) Retrofits, replacement Low Impact Development (LID), and Green Infrastructure (GI)
   b.) Culvert Replacement
      ii.) Repair, replace, engineering/design

6. Strengthen Emergency Shelters (Schools, Libraries, Community Center)
   a.) Generators
   b.) Air conditioning
   c.) Charging stations (cell phones)

Workshop participants identify their top six highest priority actions the Town should move forward with.

6. Conclusion and Next Steps

Sudbury continued the MVP certification process by presenting and distributing the findings of the public workshop at a formal public information and listening session on May 30, 2019 at 7 PM followed by the Multi-Hazard Mitigation Plan Update public workshop. This session provided an opportunity for any member of the interested public to learn, ask questions, and provide feedback about the MVP Workshop and the recommended highest priority actions that emerged from that workshop. The following comments were brought forward by the public:

- When planning for disaster response focus on the neighborhood level and have trained volunteers responsible for covering their neighborhoods.
- Plan for communications in the event that during a power outage cellular reception is not available in some areas of town.
- Plan for better distribution of cell towers to enable better coverage.
- Plan for accessibility so that residents with disabilities are better able to cope during disasters. Funds are available for accessibility plan development and implementation.
- Is the Town looking at what it can do to better mitigate climate change as well as adapt to it?

Priorities identified during the MVP Workshop will be integrated into existing municipal planning efforts, in particular, the update to the HMP and Master Plan (currently underway by the Horsley Witten Group, Inc.). The Town will also continue to pursue grant funding to implement the priority actions identified through the MVP Workshop process to continue to improve the Town's resilience to climate change.

Attachment A: List of Workshop Participants

Sudbury MVP Workshop – May 14, 2019
Participants

LAST NAME	NAME	ROLE
Abrams	Sue	Capital Improvement Advisory Committee
Abram	Laura	Agricultural Committee
Alikpokou	Fabiola	Horsley Witten Group
Alwan	Rami	Energy and Sustainability Committee
Baker	Ellie	Horsley Witten Group
Bakstran	Fran	Bay Path Elder Services
Barkley	Luther	LSRHS Student
Barletta	William	Director, Facilities Dept.
Berry	Susan	Finance Committee
Bilodeau	Maryanne	Assistant Town Manager
Blake	Craig	Permanent Building Committee
Boyd	Bob	Sudbury Water District
Brown	Patricia	Board of Selectmen
Bursky	Sarah	SuAsCo Wild and Scenic
Chandler	Mimi	Ponds and Waterways Committee
Choate	Tim	Assistant Fire Chief
Costello	David	National Development /Meadow Walk
Dolci	Paige	Mass Audubon
Doucet	Gary	Bridges Memory Care
Dretler	Janie	Sudbury Housing Trust/Board of Selectmen
Duchesneau	Adam	Director, Planning and Community Development
Elenbaas	Peter	Lincoln-Sudbury Regional HS Associate Principal
Field-Juma	Alison	OARS
Forsell	Nathalie	Master Plan Steering Committee
Galloway	Deb	Director, Senior Center
Gemayel	Josiane	
Gossels	Jamie	Capital Improvement Advisory Committee
Gough	Melissa	Sustainable Sudbury
Grady	Robert	Sudbury Police
Griffin	Susan	National Grid
Herweck	Mark	Building Inspector
Huet-Clayton	Linda	Board of Health
Kite	Gemma	Horsley Witten Group
Krozier	Brad	Superintendent Sudbury Public Schools
Levine	Jeff	Council on Aging
Lewis	Andrew	Assistant Building Inspector
Magnuson	Kelsey	Emerson Hospital
Marin	Mike	Emerson Hospital
Mattei	Laura	SVT
McAllister	Kathleen	Horsley Witten Group

LAST NAME	NAME	ROLE
Melanson	Chuck	DPW Foreman
Moravec	Krista	Horsley Witten Group
Morse	Richard	Conservation Commission
Murphy	Bill	Director, Health Dept.
Nason	Dan	Director, Public Works Dept.
O'Rourke	Bill	Deputy Director, Public Works Dept.
Pantoja	Jeanette	MAPC
Pereira	Craig	Horsley Witten Group
Roy	Vin	Sudbury Water District
Royea	Marie	Volunteer CERT Team
Rushfirth	Sue	Commission on Disability
Sapienza	Alice	Livability Ambassador/Transportation Committee
Schilp	Phyllis	Town Nurse
Scully	Sara	Metrowest Regional Transit Authority
Seawell	Andrew	Roche Bros./Sudbury Farms Market
Suedmeyer	Beth	Environmental Planner - Town of Sudbury
Tarves	Pat	DPW Foreman
VanDewoestine	Emily	Metrowest Regional Transit Authority
Williamson	Dick	Parks and Recreation Commission
Zadakis	Scott	Crosstown Connect TMA
Zamparelli	William	Eversource

Attachment B: Workshop Handouts

- Agenda
- Prior Recommendations (2010 Hazard Mitigation Plan)
- Climate Change Projections
- Example Vulnerabilities and Strengths
- Demographics

Horsley Witten Group
Sustainable Environmental Solutions

Sudbury Municipal Vulnerability Preparedness (MVP) Workshop

Tuesday May 14, 2019 9:00 am – 5:00 pm
Fairbank Center - Gymnasium
40 Fairbank Road

ANNOTATED AGENDA

TIME	ACTIVITIES	NOTES
8:30 AM	Registration and Refreshments	
9:00 AM *(10 min)*	Welcome and Introductions	Maryanne Bilodeau, Assistant Town Manager
9:10 AM *(10 min)*	Workshop Overview Purpose, desired outcomes, expectations Review agenda	Craig Pereira Horsley Witten Group (HWG)
9:20 AM *(30 min)*	Overview of Science and Data Resources Review recent climate related events. Present summary of anticipated climate changes. Present summary of recent/existing planning efforts.	(HWG)
9:50 AM *(30 min)*	Large Group Exercise #1 Develop list of hazards affecting the community Prioritize top 4 hazards	(HWG)
10:20 AM	BREAK	(15 mins.)
10:35 AM *(5 min)*	Welcome Back	(HWG)
10:40 AM *(15 min)*	Small Group Exercise #1 Introduction to Hazard/Vulnerability Matrix and Instructions for Small Group Exercise #1	Small Group Facilitators
10:55 AM *(75 min)*	Small Group Exercise #1 Confirm Hazards: Identify Vulnerabilities and Strengths, Location, Ownership	Small Group Facilitators (25 mins. each category)
12:10 PM	LUNCH	(1 hour)
1:10 PM *(5 min)*	Small Group Exercise #2 Introduction to Community Actions and Instructions for Small Group Exercise #2	Small Group Facilitators
1:15 PM *(80 min)*	Small Group Exercise #2 Identify Community Actions Prioritize Actions	Small Group Facilitators (20 mins. each category) (20 mins. to prioritize actions)
2:35 PM	BREAK	(15 mins.)
2:50 PM *(20 min)*	Small Group Report Out	(HWG) (5 mins. per group)
3:10 PM *(60 min)*	Large Group Exercise #2 Prioritization of Actions	(HWG)
4:10 PM *(20 min)*	Wrap Up/Questions	(HWG)
4:30 PM	ADJOURN	

Horsley Witten Group
Sustainable Environmental Solutions

Sudbury Municipal Vulnerability Preparedness (MVP) Grant Project
KEY RECOMMENDATIONS FROM 2010 HAZARD MITIGATION PLAN

RECOMMENDATION	HAZARD	2019 STATUS
High Priority Mitigation Measures		
Enhance Flood Plain Bylaw enforcement assistance.	Flooding	Not Completed…carry forward
Revise wetlands bylaw to provide better wildlife habitat protection and comply with new DEP Stormwater regulations.	Flooding	Completed…ongoing. Move to Capability Assessment
Increase Town emergency response to imminent storms and during winter storms.	All Hazards	Completed…ongoing. Move to Capability Assessment
Elevate the grade of Concord Road two feet (between Lincoln Road to Old Sudbury Rd.).	Flooding	Not Completed…carry forward
Elevate Concord Road two feet (eastern end of Concord Rd.).	Flooding	Not Completed…carry forward
Remove beaver dam and conduct beaver trapping/removal as needed.	Flooding	Completed…ongoing. Move to Capability Assessment
Develop inspection/maintenance plans: Carding Mill and Stearns Mill Dams.	Flooding	Completed
Establish a regular tree inventory and maintenance plan.	Snow/Blizzard/ Ice, Wind-related events	Not Completed…carry forward
Establish microwave link communications system with repeater at Nobscot Mountain.	All Hazards	Completed
Establish a municipal HAM radio station and provide training/licensing for operators.	All Hazards	Not Completed…remove
Build a municipal Emergency Operations Center as part of the redesign of Fire Dept. or new Police Station.	All Hazards	Completed
Reconfigure generators at Lincoln-Sudbury High School to include heating capability.	All Hazards	Not Completed…carry forward
Install a large-capacity, multi-fuel generator at the Curtis Middle School.	All Hazards	Not Completed…carry forward
Acquire a large, mobile, diesel generator for the Fire Dept.	All Hazards	Completed
Measures to Ensure Compliance with NFIP		
Adopt new regulations for the Water Resource Protection District bylaw.	All Hazards	Not Completed…carry forward
Develop/Adopt new Stormwater bylaw in conjunction with MAPC.	Flooding	Completed
Develop/Adopt new Earth Removal Bylaw.	Flooding	Not Completed…carry forward

RECOMMENDATION	HAZARD	2019 STATUS
Acquire wetlands parcels in the Sudbury River floodplain.	Flooding	Completed…move to Capability Assessment
Increase funding for preventative practices on drainage infrastructure.	Flooding	Not Completed…carry forward
Medium Priority Mitigation Measures		
Continue ongoing education for town residents on stormwater and wetland resources.	Flooding	Completed…ongoing. Move to Capability Assessment
Complete repairs and develop Operations and Management Plan for Pantry Brook Dam.	Flooding	Not Completed…carry forward
Elevate Concord Rd. near Nashawtuc Country Club.	Flooding	Not Completed…carry forward
Upgrade older drainage systems in town.	Flooding	Not Completed…carry forward
Beaver dam removal, beaver trapping/removal as needed.	Flooding	Completed…ongoing. Move to Capability Assessment
Establish more frequent maintenance schedules for town-owned drainage facilities.	Flooding	Completed…move to Capability Assessment
Acquire Soft Suction pond water drafting system.	Wildfire	Completed
Devote more resources to privately-owned drainage facilities.	Flooding	Not Completed…carry forward
Relocate overhead electrical/cable utility lines underground.	All Hazards	Not Completed…carry forward
Conduct feasibility study to investigate options for all public buildings to be earthquake proof.	Earthquakes	Not Completed…carry forward
Add manpower to the Fire Dept. and provide homeowner education on fire prevention using building/landscaping best management practices.	Wildfire/Fire	Completed…ongoing. Move to Capability Assessment
Low Priority Mitigation Measures		
Increase outreach and education on subsidence, erosion, stormwater and BMPs to landscapers and contractors.	Flooding	Completed…ongoing. Move to Capability Assessment

Source: Town of Sudbury Hazard Mitigation Plan 2010, Sudbury Local Hazard Mitigation Committee 2019.

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Sudbury Municipal Vulnerability Preparedness (MVP) Grant Project:

CLIMATE CHANGE PROJECTIONS[1]

TEMPERATURE

HIGHLIGHTS:

- ✓ By 2050, we could have more than 5 times as many very hot days (over 90°F) than we do today. By 2100, we could have more than 10 times as many.
- ✓ We will have far fewer days with temperatures below freezing.
- ✓ We will have to expend less energy on heating in the winter, and far more on air conditioning in the summer.
- ✓ The growing season will increase by almost half by 2050 and could almost double by the end of the century.

Table 1: TEMPERATURE PROJECTIONS

Climate Parameter	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Average Annual Temperature (°F) *Sudbury/Assabet/Concord*	48.7	51.6 – 55.0	52.5 – 59.6
Maximum Annual Temperature (°F) *Sudbury/Assabet/Concord*	59.6	62.3 – 65.9	63.0 – 70.5
Minimum Annual Temperature (°F) *Sudbury/Assabet/Concord*	37.9	41.0 – 44.3	42.0 – 48.9
Annual Days with Max Temp over 90°F *Sudbury/Assabet/Concord*	8	18 - 42	22 - 84
Annual Days with Min Temp below 32°F *Sudbury/Assabet/Concord*	143	103 - 124	78 - 119
Annual Heating Degree-Days (Base 65°F) *Sudbury/Assabet/Concord*	6,535	4,948 – 5,789	4,075 - 5551
Annual Cooling Degree-Days (Base 65°F) *Sudbury/Assabet/Concord*	585	870 – 1,356	743 - 983
Annual Growing Degree-Days (Base 50°F) *Sudbury/Assabet/Concord*	2,525	3,138 – 3,866	3,321 – 5,067

[1] Source: Northeast Climate Science Center, 2018. *Massachusetts Climate Change Projections*. University of MA Amherst. Published by MA Executive Office of Energy and Environmental Affairs. Available at: http://www.massclimatechange.org/resources/resource::2152/massachusetts-climate-change-projections-statewide-and-for-major-river-basins. Data is for the Sudbury/Assabet/Concord Basin, which includes the land area of Sudbury.

PRECIPITATION

HIGHLIGHTS:

- ✓ Average annual precipitation in Sudbury will increase up to 13% - 14% by 2050 and up to 18% - 19% by 2100.
- ✓ The largest increases in precipitation will occur in winter.
- ✓ The greatest increase in consecutive dry days will occur in fall.

Table 2: PRECIPITATION PROJECTIONS

Climate Parameter	Baseline (1971-2000)	Mid-Century (2050s)	End of Century (2090s)
Total Precipitation (inches):			
Annual *Sudbury/Assabet/Concord*	45.4	50.0 – 51.5	46.6 – 53.4
Winter *Sudbury/Assabet/Concord*	11.2	11.3 – 13.8	11.6 – 15.3
Spring *Sudbury/Assabet/Concord*	11.6	11.6 – 13.7	11.8 – 14.2
Summer *Sudbury/Assabet/Concord*	10.8	10.3 – 13.0	9.7 – 14.0
Fall *Sudbury/Assabet/Concord*	12.0	10.7 – 13.7	10.5 – 13.4
Annual Days with Precipitation over 1 inch *Sudbury/Assabet/Concord*	7	8 - 10	8 - 11
Annual Days with Precipitation Over 2 inches *Sudbury/Assabet/Concord*	1	1 - 2	1 - 2
Annual Days with Precipitation Over 4 inches *Sudbury/Assabet/Concord*	0	0 - 0	0 - 0
Annual Consecutive Dry Days *Sudbury/Assabet/Concord*	17	17 - 19	16 - 20

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Sudbury Municipal Vulnerability Preparedness (MVP) Grant Project:

EXAMPLES of VULNERABILITIES and STRENGTHS[1]

INFRASTRUCTURE

Examples of Vulnerabilities:

- Main road floods during storms, blocking emergency response.
- Power outages during heat waves lead to health concerns.
- Wildfire and high winds resulting in supply chain interruptions.
- Sewer pump stations become submerged and inoperable.
- Compromised rail system due to heat-related warping of tracks.

Examples of Strengths:

- Critical road elevated and passable by emergency management.
- Hurricane roof installed at school with improved sheltering capacity.
- Hardened utility lines reduce outages due to ice storms.
- Undersized culvert replaced to reduce flooding in key intersection.
- Improvement to communication systems during extreme weather.

SOCIETAL

Examples of Vulnerabilities:

- Senior housing without backup generators during heat waves.
- Residents without access to transportation during hurricane evacuation.
- Household contamination and sewage mobilization during flooding.
- Limited areas of refuge in elementary schools during tornados.

Examples of Strengths:

- Reliable communications protocols across departments for all employees.
- “Neighbor-helping-neighbor” program aligned with emergency operations.
- Well-supported volunteer organizations (fire, ambulance, CERTs).
- Faith-based and civic groups with hazard preparedness plans.

ENVIRONMENTAL

Examples of Vulnerabilities:

- Proliferation of subdivisions in wildfire and flood prone areas.
- Lack of urban tree canopy increasing heat island effect.

Examples of Strengths:

- Forested watersheds maintain drinking water supply during droughts.
- Native, vegetated slopes remain stable after intense 24hr rain events.
- Floodplains provide stormwater storage and downstream flood reduction.

[1] Source: Community Resilience Building Workshop Guide, communityresiliencebuilding.com

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Sudbury Municipal Vulnerability Preparedness (MVP) Grant Project:

SELECTED DEMOGRAPHIC DATA[1]

Demographic Parameter	Result
Population	18,697 people (ACS, December 2018)
Age	0-19 = 32% 20-34= 7% 35-64 = 47% 65+ = 15%
Income	<$40K = 10% $40-60K = 6% $60K+ = 84%
% Below Poverty Line	2%
Race	White = 87% Black = 1% Asian = 9% Other = 3%
Ethnicity	Hispanic = 2% Not Hispanic = 98%
Environmental Justice	0% (U.S. Census 2010)
% Population Over 65 Living Alone	2.2%
Heart Attack Hospitalizations	11.8 (age-adjusted rate per 10,000 people)
Asthma Emergency Department Visits	3.2 (age-adjusted rate per 10,000 people)
Pediatric Asthma Prevalence	8.9% of all children enrolled in grades K-8
Heat Stress Emergency Department Visits	0 (age-adjusted rate per 10,000 people)

[1] Source: MA Dept of Public Health, 2018. MA Environmental Public Health Tracking Community Profile for Sudbury. Report Created on May 1, 2019.

Attachment C: Base Maps

- Critical Facilities/FEMA Flood Zones
- Population Density

Legend

- Sudbury Outline
- Major Roads
- Open Water
- Open Space
- Streams
- Local Roads

FEMA Flood Zones

July 2017

- Zone A (100 yr.)
- Zone X (500 yr.)

Critical Infrastructure

- Animal Shelter
- Assisted Living Center
- Bridge
- Crime Lab
- Dam
- Daycare
- DPW Garage
- Emergency Operations Center
- Emergency Operations Center Alternate
- Fire Station
- Funeral Home
- Long-Term Care Center
- Municipal Office
- Pharmacy
- Police Station
- Power Substation
- Public Water Supply
- Schools
- Water Treatment Plant
- WastewaterTreatment Plant

CONCORD
MAYNARD
STOW
LINCOLN
HUDSON
MARLBOROUGH
WAYLAND
FRAMINGHAM
Cutting Pond
Puffers Pond
Willis Lake
Hudson Road Pond
Stearns Mill Pond
Blanford Pond
Carding Mill Pond
Grist Mill Pond
Sudbury River

Data Source: MAPC/ Town of Sudbury/ MASS GIS

N

0 0.475 0.95 1.9 Miles

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Sudbury, MA
Critical Infrastructure and FEMA Flood Zones

Date: 5/8/2019

Draft

Legend

- Sudbury Outline
- Parcels
- Major Roads
- Local Roads

Population Density (2010)

People/ Square Mile

- < 100
- 101 - 200
- 201 - 300
- 301 - 400
- > 400

ACTON
CONCORD
MAYNARD
STOW
HUDSON
MARLBOROUGH
LINCOLN
WAYLAND
FRAMINGHAM

CRANBERRY CIRCLE
POWDER MILL ROAD
MAYNARD FARM ROAD
DEER POND ROAD
BARNET ROAD
FOX HILL DRIVE
POWERS ROAD
PADDOCK WAY
FIELD ROAD
DAKIN ROAD
GREAT ROAD
FORD ROAD
CURRY LANE
LONGFELLOW ROAD
MOSSMAN ROAD
NORTH ROAD
CEDAR CREEK ROAD
WILLARD GRANT ROAD
BOWKER DRIVE
CHANTICLEER ROAD
GREYSTONE LANE
JULIANS WAY
HAYNES ROAD
PUFFER LANE
VILLAGE ROAD
HAWES ROAD
NORTHWOOD DRIVE
SUFFOLK ROAD
LEDGE ROAD
SYLVAN WAY
HADLEY ROAD
DUNSTER ROAD
PANTRY ROAD
CONCORD ROAD
TAINTOR DRIVE
BELCHER DRIVE
OLD COACH ROAD
SUNSET PATH
RUDDOCK ROAD
BALCOM ROAD
BRIANT DRIVE
DEACON LANE
TWIN POND LANE
FROST LANE
WYMAN DRIVE
KENDRA LANE
MUSKET LANE
FLINTLOCK LANE
MORSE ROAD
MEACHEN ROAD
WEBSTER CIRCLE
MARLBORO ROAD
CROWN POINT ROAD
CANTERBURY DRIVE
HUNT ROAD
THOMPSON DRIVE
WEIR HILL ROAD
MAYNARD ROAD
JUNIPER ROAD
HILLTOP ROAD
BISHOP LANE
LAKE SHORE DRIVE
BASSWOOD AVENUE
OAKWOOD AVENUE
BEECHWOOD AVENUE
PINEWOOD AVENUE
INTERVALE ROAD
HARNESS LANE
BUTLER PLACE
CAMPERDOWN LANE
WILLIS ROAD
SAWMILL LANE
FERN TRAIL
LINCOLN ROAD
LINCOLN LANE
FAIRBANK ROAD
DOROTHY ROAD
GRINDSTONE LANE
OLD FORGE LANE
BARBARA ROAD
DUTTON ROAD
HUDSON ROAD
STUBTOE LANE
GOODNOW ROAD
CRESCENT LANE
CODMAN DRIVE
NEW BRIDGE ROAD
WATER ROW
FIRECUT LANE
ATKINSON LANE
REEVES STREET
CHURCHILL STREET
SAXONY DRIVE
MIDDLE ROAD
RAYNOR ROAD
STEARNS LANE
MOORE ROAD
HOP BROOK LANE
CANDY HILL ROAD
CLARK ROAD
PLYMPTON ROAD
MAGNOLIA ROAD
SPRING STREET
BARTON DRIVE
SURREY LANE
MILLPOND ROAD
PINE STREET
POPLAR STREET
CENTER STREET
EAST STREET
WILLOW ROAD
PRATTS MILL ROAD
OLD LANCASTER ROAD
DRUM LANE
COLONIAL ROAD
OLD SUDBURY ROAD
RICE ROAD
TANBARK ROAD
AUSTIN ROAD
KENDALL ROAD
AMANDA ROAD
AXDELL ROAD
FOX RUN
FOREST STREET
BROOK LANE
GERRY DRIVE
MEADOW DRIVE
GOODMANS HILL ROAD
PURITAN LANE
KATO DRIVE
OLD GARRISON ROAD
NOYES LANE
NEWTON ROAD
ROBERT BEST ROAD
CODJER LANE
CLARK LANE
UNION AVENUE
POKONOKET AVENUE
GREEN HILL ROAD
WINSOR ROAD
INDIAN RIDGE ROAD
MASSASOIT AVENUE
JARMAN ROAD
ROLLING LANE
BRIDLE PATH
HORSE POND ROAD
PEAKHAM ROAD
FRENCH ROAD
CARRIAGE WAY
BENT ROAD
STONE ROAD
ROBBINS ROAD
JACK PINE DRIVE
LAFAYETTE DRIVE
WASHINGTON DRIVE
STATION ROAD
SINGLETARY LANE
OLD COUNTY ROAD
BOSTON POST ROAD
EASY STREET
ADAMS ROAD
DUDLEY ROAD
HIGHLAND AVENUE
MAPLE AVENUE
LANDHAM ROAD
WAYSIDE INN ROAD
BOWDITCH ROAD
BIGELOW DRIVE
NOBSCOT ROAD
OLD FRAMINGHAM ROAD
BRIMSTONE LANE
MORAN CIRCLE
RAYMOND ROAD
WARREN ROAD
CLIFFORD ROAD
WOODSIDE ROAD
ROBERT FROST ROAD
LOMBARD LANE
CIDER MILL ROAD
READ ROAD
PELHAM ISLAND ROAD
GUZZLEBROOK DRIVE
BLACKMER ROAD
ANSELM WAY
STOCK FARM ROAD
WAGONWHEEL ROAD
PATRICIA ROAD
AMES ROAD
LYNNE ROAD
EDDY STREET
KAY STREET
GRISCOM ROAD
VICTORIA ROAD

117
27
20

N

0 0.475 0.95 1.9 Miles

Data Source: MASS GIS

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Sudbury, MA
Population Density (2010)

Date: 5/13/2019

Draft

Attachment D: Discussion Matrices from the Five Discussion Groups

Community Resilience Building Risk Matrix **Group 1** www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability S = Strength
High, Medium, or Low priority for action over the Short or Long term (and Ongoing)

Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes/Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Power lines (above/below ground)	Townwide	Public	V/S	**Bury lines (as appropriate), tree/buffer management, rate payer responsibility/MA Surcharge Program**	**Bury lines (as appropriate), tree/buffer management, rate payer responsibility/MA Surcharge Program**				
Underground gas lines	Townwide	Private	V/S			Floodplain management/drainage regulations			
Roadways (transportation systems)	Townwide	Public/Private	V		Tree/buffer management, network/communicate with vulnerable populations	Raise roadways (Route 27/Concord Rd.)		H/L	
Drainage capacity	Townwide	Public	V			Follow DPW priorities			
Bridges (Route 20/Lincoln Rd./Shreman bridge)	Multiple	Public	V			Sherman Bridge (replace wooden planks regularly)		L	
Water Supply (Water District/Individual wells)	Multiple	Public/Private	V/S				Update regulations to prioritize drinking over lawn care	M	
Culverts (Maintenance)	Townwide	Public	V/S			Support funding		H	
Tree Maintenance (along roadways)	Townwide	Public	V		Funding for a DPW bucket truck			H	
Emergency Shelters (generators needed for HVAC, charging stat	Community Center	Public	V/S	**Infrastructure/generator for charging/planning and funding**	**Infrastructure/generator for charging/planning and funding**	**Infrastructure/generator for charging/planning and funding**	**Infrastructure/generator for charging/planning and funding**	M	
Societal									
Database of vulnerable populations	Townwide	Public/Private	V	**Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.**	**Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.**	**Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.**	**Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.**	H	
Reverse 911	Townwide	Public	S	Outreach to get people signed up	Outreach to get people signed up	Outreach to get people signed up	Outreach to get people signed up	H	
Low Density Population (people are spread out)	Townwide	Public	V/S	Neighbor-to-neighbor' support network/connect with faith-based communities/home healthcare agencies	Neighbor-to-neighbor' support network/connect with faith-based communities/home healthcare agencies	Neighbor-to-neighbor' support network/connect with faith-based communities/home healthcare agencies	Neighbor-to-neighbor' support network/connect with faith-based communities/home healthcare agencies	H	
DPW storm response	Townwide	Public	S						
Strong civic networks/faith-based) community networks	Townwide	Private	S						
Emergency response plans	Townwide	Public	V/S	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?		
Communications to residents	Townwide	Public	V	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?		
Citizen's Emergency Response Team/Medical Reserve Core	Townwide	Public	S	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?	Possible funding through MAPC?		
Agriculture	Multiple farms	Private	V						
Fire Dept. (multiple stations/short response time)	Townwide	Public	V/S	**Update Fire Station for North Quarry development**	**Update Fire Station for North Quarry development**	**Update Fire Station for North Quarry development**	**Update Fire Station for North Quarry development**	H	
New Police emergency dispatch/command	Townwide	Public	S						

Environmental									
Wild and scenic river	Townwide	Public	V/S						
Development pressure	Townwide	Private	V	Green building standards for new development	Green building standards for new development	Green building standards for new development	Green building standards for new development		
Updated science/climate projections into regulations	Townwide	Public	V	**Update regulations (floodplain/stormwater management/sustainability)**	**Update regulations (floodplain/stormwater management/sustainability)**	**Update regulations (floodplain/stormwater management/sustainability)**	**Update regulations (floodplain/stormwater management/sustainability)**	H	
Overall regulatory framework	Townwide	Public	S						
Outdoor recreation opportunities (vector-bourne illness exposure)	Townwide	Public	V			Coordinate training for workers, public education and signage, work with BOH		M/H	
Changes in species composition (invasives)	Townwide	Public	V			Stewardship plans for public lands (NPS funding?)		M/H	
Stormwater management (water quality impacts) roadways/parking areas	Townwide	Public/Private	V	**Update regulations**	**Update regulations**	**Update regulations**	**Update regulations**	H	
Water monitoring/research									

Community Resilience Building Risk Matrix **Group 2** www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability **S** = Strength
High, **M**edium, or **L**ow priority for action over the **S**hort or **L**ong term (and **O**ngoing)

Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes/Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Utilities (power outages)	Townwide	Public	V/S	Cut/Manage trees, underground wires, plan for redundant feeds to critical facilities	Cut/Manage trees, underground wires, plan for redundant feeds to critical facilities		Cut/Manage trees, underground wires, plan for redundant feeds to critical facilities		
Transportation systems	Townwide	Public/Private	V	**Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management**	**Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management**	**Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management**			
Fuel Storage	DPW Facility	Public	V/S	Bring above-ground, contract with local stations	Bring above-ground, contract with local stations		Bring above-ground, contract with local stations		
Public Water Supply	Townwide	Public	V/S			Develop MOUs, maintenance/replace pipes, water bans (private wells)	Develop MOUs, maintenance/replace pipes, water bans (private wells)		
Septic Systems	Townwide	Public/Private	V/S			Consider WWTF			
Emergency Shelters/Facilities	Multiple locations	Public/Private	S	Education/Awareness, coordinate with utility providers, generators	Education/Awareness, coordinate with utility providers, generators	Education/Awareness, coordinate with utility providers, generators	Education/Awareness, coordinate with utility providers, generators		
Municipal Storm System/Drainage	Townwide	Public/Private	V/S	**Increase capacity**	**Increase capacity**	**Increase capacity**			
Emergency Communications Systems	Townwide	Public/Private	S	Maintain/Modernize	Maintain/Modernize	Maintain/Modernize	Maintain/Modernize		
Private Home/Driveways	Townwide	Private	V	Educate public	Educate public	Educate public	Educate public		
Renewable/Solar Energy	Multiple locations	Public/Private	S	Explore expansion opportunities	Explore expansion opportunities	Explore expansion opportunities	Explore expansion opportunities		
Dams	Multiple locations	Public/Private	V	Maintain	Maintain	Maintain			

Societal

Citizen Emergency Response Team	Townwide	Public	S	**Recruit/Support/Expand**	**Recruit/Support/Expand**	**Recruit/Support/Expand**	**Recruit/Support/Expand**		
Housing with elevators/medical needs				Coordinate with Eversource/educate residents, generators	Coordinate with Eversource/educate residents, generators	Coordinate with Eversource/educate residents, generators	Coordinate with Eversource/educate residents, generators		
Vulnerable populations	Townwide	Public/Private	WS	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities		
Critical Care Customer Support (Eversource/BOH)	Townwide	Private	S	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities	Identify/Educate, coordinate with Eversource/utilities		
Pets/Livestock	Townwide	Private	V	Create a plan for emergencies	Create a plan for emergencies	Create a plan for emergencies	Create a plan for emergencies		
Food Supply	Townwide	Private	WS	Plan/Coordinate/Educate	Plan/Coordinate/Educate	Plan/Coordinate/Educate	Plan/Coordinate/Educate		
Communication resources/education	Townwide	Public/Private	S	Workshops/target communications/develop resources/emergency power	Workshops/target communications/develop resources/emergency power	Workshops/target communications/develop resources/emergency power	Workshops/target communications/develop resources/emergency power		
Looting	Multiple locations	Public/Private	V	Provide adequate resources (education, security cameras)	Provide adequate resources (education, security cameras)	Provide adequate resources (education, security cameras)	Provide adequate resources (education, security cameras)		

Environmental

Wetlands/floodplains resources	Townwide	Public/Private	WS	**Strengthen bylaws, enforce/maintain stormwater system**	**Strengthen bylaws, enforce/maintain stormwater system**	**Strengthen bylaws, enforce/maintain stormwater system**	**Strengthen bylaws, enforce/maintain stormwater system**		
Trees/forests	Townwide	Public/Private	WS	**Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management**	**Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management**	**Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management**	**Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management**		
Drinking water quality/supply	Townwide	Public/Private	WS	Water testing, water bans, treatment, allow composting/other low impact toilets		Water testing, water bans, treatment, allow composting/other low impact toilets	Water testing, water bans, treatment, allow composting/other low impact toilets		
Steep slopes	Multiple locations	Public/Private	WS	Regulate (erosion control)		Regulate (erosion control)			
Mosquitos/Ticks/Pests and infectious diseases	Townwide	Public/Private	V		Catch basin treatment, educate	Catch basin treatment, educate			
Air quality	Townwide	Public				Reduce emissions, increase transportation options, educate/outreach	Reduce emissions, increase transportation options, educate/outreach		
Wildlife Habitat (refuges/hunting)	Townwide	Public/Private	WS	Manage/Plan for protection	Manage/Plan for protection	Manage/Plan for protection	Manage/Plan for protection		
Beaver dams	Townwide	Public/Private	V			Manage			

Community Resilience Building Risk Matrix **Group 3** www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability S = Strength
High, Medium, or Low priority for action over the Short or Long term (and Ongoing)

Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes/Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Emergency Shelter	Fairbank Community Center	Public	V/S	Develop new emergency facility (use schools, generators)	Develop new emergency facility (use schools, generators)	Develop new emergency facility (use schools, generators)	Develop new emergency facility (use schools, generators)		
Retail Center stormwater management system	Boston Post Road	Private	S	Explore Green Infrastructure/Low Impact Development stormwater infrastructure	Explore Green Infrastructure/Low Impact Development stormwater infrastructure	Explore Green Infrastructure/Low Impact Development stormwater infrastructure			
Power Lines/Power outages		Public	V	**Bury power lines, identify/target most vulnerable areas**	**Bury power lines, identify/target most vulnerable areas**	**Bury power lines, identify/target most vulnerable areas**	**Bury power lines, identify/target most vulnerable areas**		
Inadequate culverts	Water, Lincoln, Concord Roads	Public	V/I	Culvert analysis/plan development (asset management)	Culvert analysis/plan development (asset management)	Culvert analysis/plan development (asset management)			
Lack of stormdrain maintenance	Townwide	Public	V			Catch basin maintenance, identify funding			
Roads: deficient maintenance/tree cover	Townwide	Public	V	Storm Plow prioritization plan	Debris management prioritization				
Public water supply/wells (dated water infrastructure)	Townwide	Public	V				**Replacement/improvement plan**		
Septic Systems	Townwide	Private	V	CWMP	CWMP	CWMP			
Societal									
Reverse 911	Townwide	Public	S	**Educate community**	**Educate community**	**Educate community**	**Educate community**		
Community Support/Emergency Volunteer	Townwide	Public	S	Develop cohesive coordination	Develop cohesive coordination	Develop cohesive coordination	Develop cohesive coordination		
Communication protocol from affected residents to Town	Townwide	Public	V	Develop protocol/educate resdients (neighborhood approach)	Develop protocol/educate resdients (neighborhood approach)	Develop protocol/educate resdients (neighborhood approach)	Develop protocol/educate resdients (neighborhood approach)		
Transportation protocol for affected residents/emergency vehicles		Public	V	Develop townwide protocol for transportation during emergencies	Develop townwide protocol for transportation during emergencies	Develop townwide protocol for transportation during emergencies			
Clearing of fire hydrants/storm drains (currently not formalized)	Townwide	Public	V	Educate residents, adopt hydrant program	Educate residents, adopt hydrant program	Educate residents, adopt hydrant program			
Aging population (transportation/other services)	Townwide	Public	V	**Assess needs of vulnerable populations for sheltering (know your neighbor)**	**Assess needs of vulnerable populations for sheltering (know your neighbor)**	**Assess needs of vulnerable populations for sheltering (know your neighbor)**	**Assess needs of vulnerable populations for sheltering (know your neighbor)**		
Environmental									
Sudbury River floodplain	Sudbury River		S	**Maintain good floodplain protection**	**Maintain good floodplain protection**	**Maintain good floodplain protection**			
Desert with high probability for fire, lackof fire prevention management plan	Nobscot/Desert		V				Develop wildfire protection plan		
Conserve forest/open space/wetlands	Townwide	Public/Private	S	Continue to conserve open space	Continue to conserve open space	Continue to conserve open space	Continue to conserve open space		
Invasive species management (CISMA)	Townwide	Public/Private	V/S			Sudbury Conservation participates more with CISMA (SWEET already active in), educate residents on invasives			
Achieving 40B 10% (maintain local zoning regulations)	Townwide	Public	S	**Continue to maintain 10 %**	**Continue to maintain 10 %**	**Continue to maintain 10 %**	**Continue to maintain 10 %**		
Protected floodplains in light of climate change	Townwide	Public/Private	V		Develop long-term floodplain projections maps	Develop long-term floodplain projections maps			
Pest Management (Middlesex Mosquitos)	Townwide	Public	S						
Open Space plan to include flood protections	Townwide	Public/Private	S						
Water Quality (Plans/Procedures)	Townwide	Public/Private	V						

Community Resilience Building Risk Matrix **Group 4** www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability **S** = Strength
High, **M**edium, or **L**ow priority for action over the **S**hort or **L**ong term (and **O**ngoing)

Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes/Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Priority H - M - L	Time Short Long Ongoing
Infrastructural									
Lack of large shelter for residents during extreme events			V						
Drought-related wildfires (not yet experienced)			V						
Downed trees/Power outages			V	**Evaluate funding mechanism to put lines underground/require lines be placed underground when repaving, tree management requirements, explore backup battery systems, prioritize roads needing underground wires**	**Evaluate funding mechanism to put lines underground/require lines be placed underground when repaving, tree management requirements, explore backup battery systems, prioritize roads needing underground wires**			H	O
Private wells dependent on electricity			V	**Strengthen regulations/homeowner responsibility, evaluate backup battery system**	**Strengthen regulations/homeowner responsibility, evaluate backup battery system**			M	O
Public Water Supply			V/S		Expand service area to reach vulnerable populations		Conservation notices	M/L	O
Flooded roads			V	Purchase high-profile fire truck		Raise/elevate road sections		H	O
Building accessibility and evacuation (ADA)			V	Explore state grants to assess and study ADA compliance, identify who in Ttown is disabled (registry), ensure shelters are ADA accessible	Explore state grants to assess and study ADA compliance, identify who in Ttown is disabled (registry), ensure shelters are ADA accessible	Explore state grants to assess and study ADA compliance, identify who in Ttown is disabled (registry), ensure shelters are ADA accessible	Explore state grants to assess and study ADA compliance, identify who in Ttown is disabled (registry), ensure shelters are ADA accessible	M	O
Center traffic lights stay on during storm events			S						
Culverts/Stormwater management improvements			S			**Continue culvert replacement/BMPs, Green Infrastructure/ LID**			
Septic system failures			V			More stringent regulations on inspections		M	O
Stormwater regulations			S						

Societal									
Sudbury BOH/registry of vulnerable populations			S	Work with municipal committees to ensure accuracy of lists, develop plan for vulnerable people evacuation/assistance, outreach to faith-based groups	Work with municipal committees to ensure accuracy of lists, develop plan for vulnerable people evacuation/assistance, outreach to faith-based groups	Work with municipal committees to ensure accuracy of lists, develop plan for vulnerable people evacuation/assistance, outreach to faith-based groups	Work with municipal committees to ensure accuracy of lists, develop plan for vulnerable people evacuation/assistance, outreach to faith-based groups	M	O
Reverse 911/emergency alert system			S	Outreach on how to opt in	Outreach on how to opt in	Outreach on how to opt in	Outreach on how to opt in	M	O
Lack of large-scale shelters for residents			V	**Develop emergency evacuation plan for majority of population**	**Develop emergency evacuation plan for majority of population**	**Develop emergency evacuation plan for majority of population**	**Develop emergency evacuation plan for majority of population**	H	S
Outreach to faith -based organizations to reach vulnerable populations			S						
lack of personnel/volunteers during emergencies			V	**Recruitment/education of volunteer medical/logistical help**	**Recruitment/education of volunteer medical/logistical help**	**Recruitment/education of volunteer medical/logistical help**	**Recruitment/education of volunteer medical/logistical help**	H	O
Aging population (more vulnerable residents)			V	MOUs with more municipalities	MOUs with more municipalities	MOUs with more municipalities	MOUs with more municipalities	M	O
Schools/Police Dept. have a great relationship			S						
Roads to hospital generally accessible during events			S						
Cell phone use/Charging stations			V	**HAM radios**	**HAM radios**	**HAM radios**	**HAM radios**		
Critical Facilities that require power			S						
Environmental									
Drought-related fire			V					L	O
Tree canopy			S	**Consider more restrictive ordinance, tree-planting management (not under power lines), property management**	**Consider more restrictive ordinance, tree-planting management (not under power lines), property management**			M	O
Vector-borne diseases			V			Public education		M	O
Protected open space (rivers/streams)			S			**Improve invasive species management, outreach to homeowners, strengthen development restrictions in floodplains, defining as 500-year floodplain**		M	O
Beaver dams			V/S			**Monitor**		M	O
Amount of pervious land/space			S					M	O
Managing trees/open space					Put remaining land into conservation	Put remaining land into conservation		M	S

Community Resilience Building Risk Matrix **Group 5** www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability **S** = Strength
High, **M**edium, or **L**ow priority for action over the **S**hort or **L**ong term (and **O**ngoing)

Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes/Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Priority H-M-L	Time Short Long Ongoing
Infrastructural									
Powerlines	Townwide	Eversource	V	**Tree trimming, new equipment, bury line (Pine Tree Triangle)**	**Tree trimming, new equipment, bury line (Pine Tree Triangle)**			H	S
Culverts, drainage system, erosion flooding	Multiple locations	Public	V/S	**Repair/engineer/design, maintenance of stormwater system**	**Repair/engineer/design, maintenance of stormwater system**	**Repair/engineer/design, maintenance of stormwater system**		H	O
Water Supply (lack of water)	Townwide	Sudbury Water District	V/S			Green Infrastructure, recharging aquifer	Backup wells, resident water usage (wells and public conservation, green stormwater management	H	S
Local regulations (new development underground utilities)	Townwide	Eversource	S						
Roadway elevations	Multiple locations	Public	V						
Aging building (Shelters/generators)	Townwide	Public	V	**Upgrade generators, shelter upgrades**				H	S
Pavement management plan	Townwide	Public	S			more funding		M	O
Power/electricity	Townwide	Eversource							
Societal									
R.A.V.E outgoing from town	Townwide	Public	S	**Identify and register more people**	**Identify and register more people**	**Identify and register more people**	**Identify and register more people**		
M. Village (vulnerable housing population)	Multiple locations	Public	V	RAVE/Enhanced 911, emergency action plans, housing development breathing doc.	RAVE/Enhanced 911, emergency action plans, housing development breathing doc.	RAVE/Enhanced 911, emergency action plans, housing development breathing doc.	RAVE/Enhanced 911, emergency action plans, housing development breathing doc.		
Residents at risk	Townwide	Public	S	**RAVE/Enhanced 911**	**RAVE/Enhanced 911**	**RAVE/Enhanced 911**	**RAVE/Enhanced 911**		
Enhanced 911	Townwide	Public	S						
Hazardous Preparedness Guide	Townwide	Public	S	Print/Distribute	Print/Distribute	Print/Distribute	Print/Distribute		
Awareness of shelters during tornadoes	Townwide	Public	V		Emergency Action Plan				
Increases in residents with asthma	Townwide	Public	V				**Continue to conserve/increase open/green space, minimize local sources of air pollution (school buses, public ed.), public health outreach**		
Vector-borne illnesses	Townwide	Public	V			**Mosquito control, public outreach, BOH staffing**			
Schools (no AC, sheltering in place)	Townwide	Public	V		retrofit with HVAC	retrofit with HVAC	retrofit with HVAC		
Shelters (need volunteers/staff)	Townwide	Public	V	Recruit/retain, plan for municipal employees training	Recruit/retain, plan for municipal employees training	Recruit/retain, plan for municipal employees training	Recruit/retain, plan for municipal employees training		
Evacuation	Sudbury River	Public	V	Public education	Public education	Public education	Public education		

Environmental

Aging trees (Pine Tree Triangle)	Townwide	Public/Private	V	**Enforcement of trimming, educate public trimming/planting, general maintenance (identificastion of dead trees)**	**Enforcement of trimming, educate public trimming/planting, general maintenance (identificastion of dead trees)**			M	O
Air Quality	Townwide		V						
Stronger wetland regulations	Townwide	Public/Private	V/S			Education/Communication of Conservation Commission			
Forested areas	Townwide	Public/Private	V/S						
Impervious surfaces (water quality)	Townwide		V			**Increase green infrastructure in developments/Planning Board**		H	O
Fertilizers/pesticides/water use	Townwide	Public/Private	V			Public education		M	O
High water table	Townwide	Public/Private	V						
Erosion on roads	Townwide	Public/Private	V			Pavement management plan, green infrastructure part of drainage system		M	O
Invasive species	Townwide	Public/Private	V			Educate public on local/native species, management plan (prioritize sites/methods)		M	O

Attachment E: Master Matrix of High Priority Actions Reported out by Each Discussion Group

Community Resilience Building Risk Matrix

Recommended

www.CommunityResilienceBuilding.org

Location = Mark on the map, note on matrix Multiple, Specific or Town-Wide
V = Vulnerability S = Strength
Type of Feature = Infrastructural, Societal, or Environmental
High, Medium, or Low priority for action over the Short or Long term (and Ongoing)

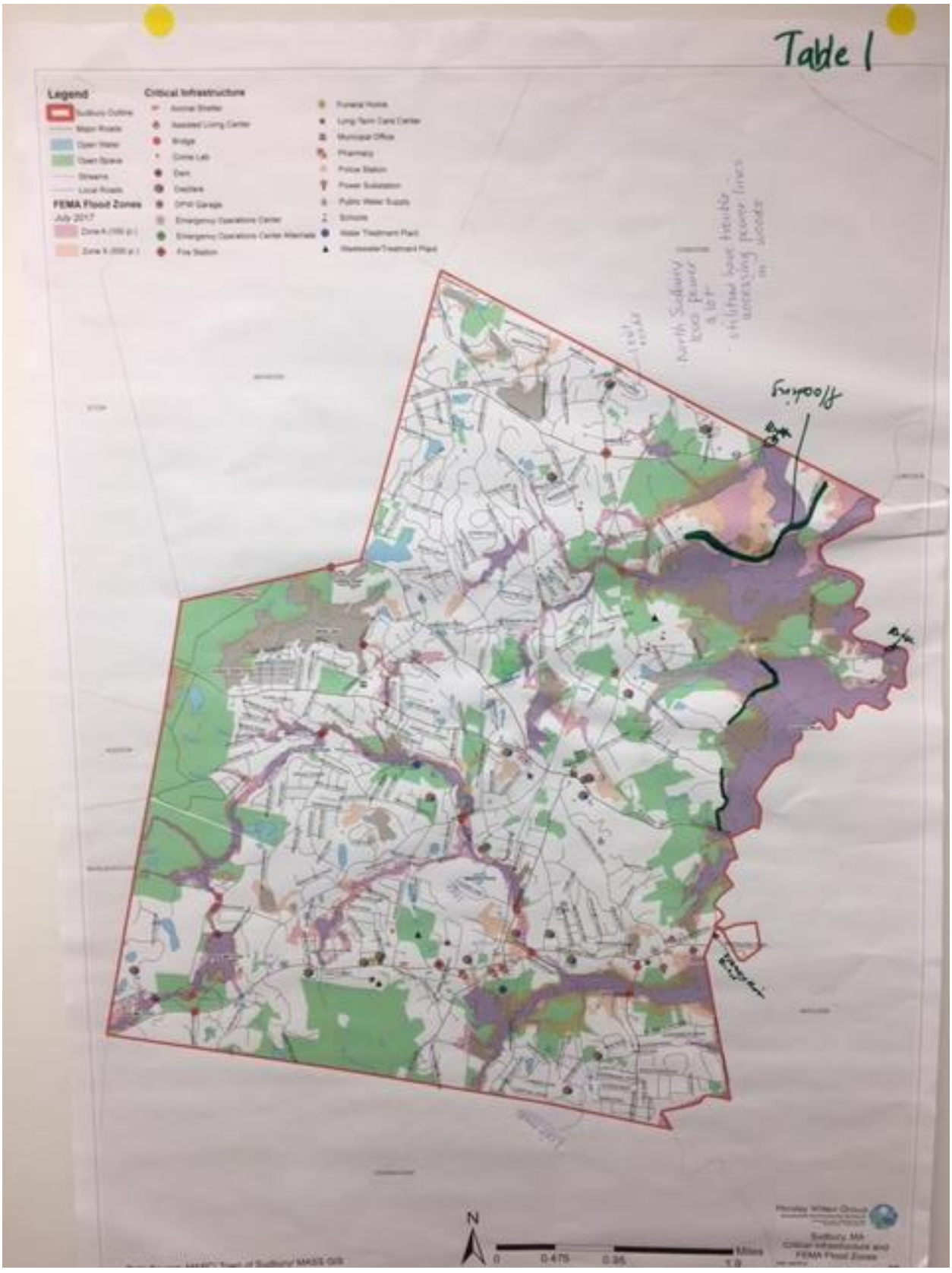
Top Priority Hazards (floods, wildfire, hurricanes, drought, sea level rise, heat wave, etc.)

Features	Location	Owner	V or S	Winter Storms/Extreme Cold	Wind/Hurricanes/Tornadoes /Micro Bursts	Flooding/Intense Rain	Drought/Extreme Heat	Group	Priority	Time
								1, 2, 3, 4, 5	H - M - L	Short Long Ongoing
Infrastructural										
Power lines (above/below ground)	Townwide	Public	V/S	Bury lines (as appropriate), tree/buffer management, rate payer responsibility/MA Surcharge Program	Bury lines (as appropriate), tree/buffer management, rate payer responsibility/MA Surcharge Program			1		
Emergency Shelters (generators needed for HVAC, chargi	Community Center	Public	V/S	Infrastructure/generator for charging/planning and funding	Infrastructure/generator for charging/planning and funding	Infrastructure/generator for charging/planning and funding	Infrastructure/generator for charging/planning and funding	1	M	
Transportation systems	Townwide	Public/Private	V	Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management	Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management	Vehicle maintenance, manage/cut trees, raise/elevate sections of roadways, increase stormwater management capacity, culvert management		2		
Municipal Storm System/Drainage	Townwide	Public/Private	V/S	Increase capacity	Increase capacity	Increase capacity		2		
Power Lines/Power outages		Public	V	Bury power lines, identify/target most vulnerable areas	Bury power lines, identify/target most vulnerable areas	Bury power lines, identify/target most vulnerable areas	Bury power lines, identify/target most vulnerable areas	3		
Public water supply/wells (dated water infrastructure)	Townwide	Public	V				Replacement/improvement plan	3		
Downed trees/Power outages			V	Evaluate funding mechanism to put lines underground/require lines be placed underground when repaving, tree management requirements, explore backup battery systems, prioritize roads needing underground wires	Evaluate funding mechanism to put lines underground/require lines be placed underground when repaving, tree management requirements, explore backup battery systems, prioritize roads needing underground wires			4	H	O
Private wells dependent on electricity			V	Strengthen regulations/homeowner responsibility, evaluate backup battery system	Strengthen regulations/homeowner responsibility, evaluate backup battery system			4	M	O
Culverts/Stormwater management improvements			S			Continue culvert replacement/BMPs, Green Infrastructure/ LID		4		
Powerlines	Townwide	Eversource	V	Tree trimming, new equipment, bury line (Pine Tree Triangle)	Tree trimming, new equipment, bury line (Pine Tree Triangle)			5	H	S
Culverts, drainage system, erosion flooding	Multiple locations	Public	V/S	Repair/engineer/design, maintenance of stormwater system	Repair/engineer/design, maintenance of stormwater system	Repair/engineer/design, maintenance of stormwater system		5	H	O
Aging building (Shelters/generators)	Townwide	Public	V	Upgrade generators, shelter upgrades				5	H	S

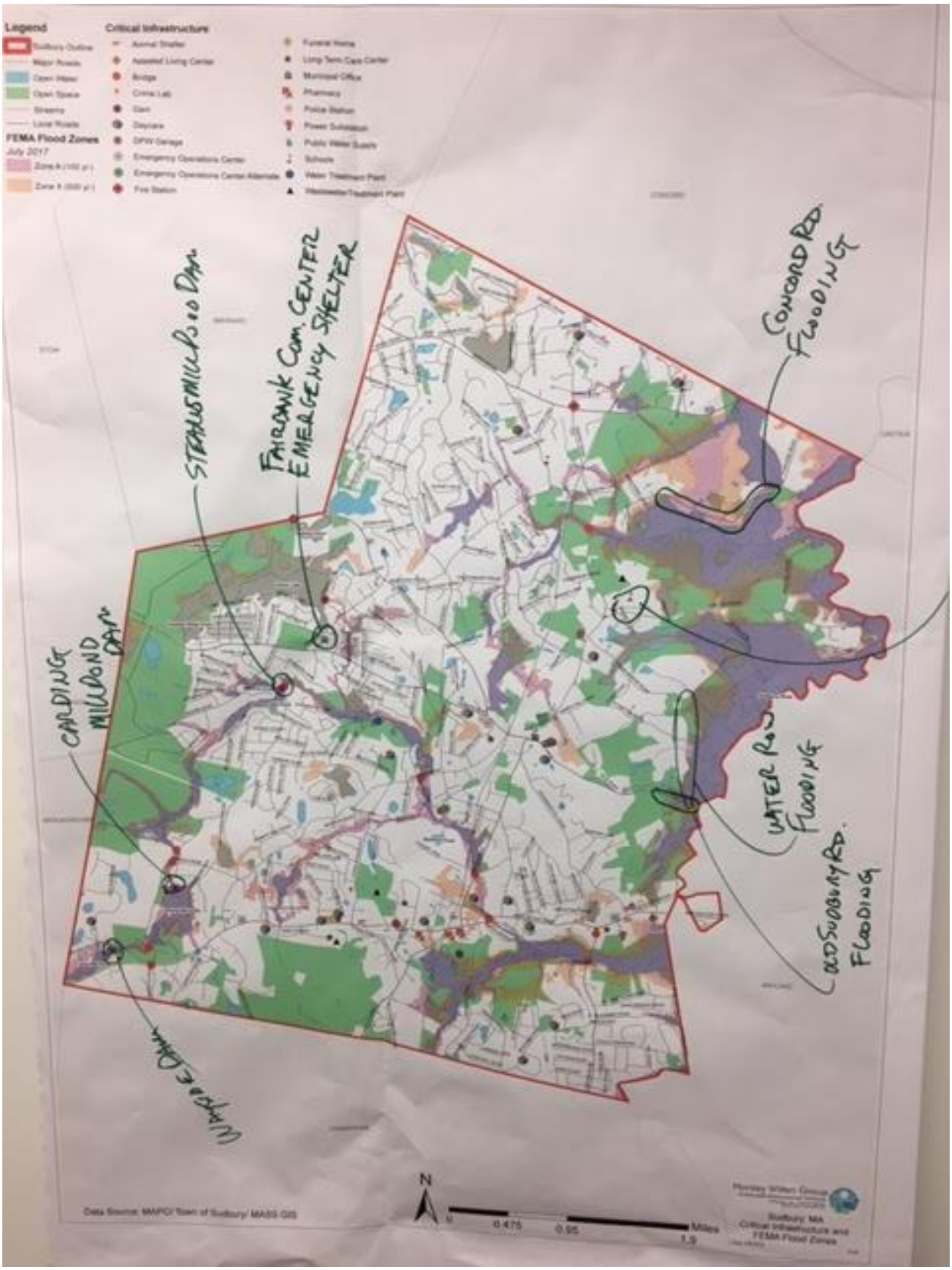
Societal										
Database of vulnerable populations	Townwide	Public/Private	V	Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.	Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.	Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.	Existing initiative (needs support). Fire Dept. (lead), Police, BOH, Senior Services, Home Health Care Agencies. Individual emergency plans/data privacy.	1	H	
Fire Dept. (multiple stations/short response time)	Townwide	Public	V/S	Update Fire Station for North Quarry development	Update Fire Station for North Quarry development	Update Fire Station for North Quarry development	Update Fire Station for North Quarry development	1	H	
Hospital/Home Care Agencies (network/education/aw aren	Multiple	Private	V/S	Training for home healthcare agencies, connectintegrate with CERT/MRC and response plans	Training for home healthcare agencies, connectintegrate with CERT/MRC and response plans	Training for home healthcare agencies, connectintegrate with CERT/MRC and response plans	Training for home healthcare agencies, connectintegrate with CERT/MRC and response plans	1	M	
Citizen Emergency Response Team	Townwide	Public	S	Recruit/Support/Expand	Recruit/Support/Expand	Recruit/Support/Expand	Recruit/Support/Expand	2		
Reverse 911	Townwide	Public	S	Educate community	Educate community	Educate community	Educate community	3		
Aging population (transportation/other services)	Townwide	Public	V	Assess needs of vulnerable populations for sheltering (know your neighbor)	Assess needs of vulnerable populations for sheltering (know your neighbor)	Assess needs of vulnerable populations for sheltering (know your neighbor)	Assess needs of vulnerable populations for sheltering (know your neighbor)	3		
Lack of large-scale shelters for residents			V	Develop emergency evacuation plan for majority of population	Develop emergency evacuation plan for majority of population	Develop emergency evacuation plan for majority of population	Develop emergency evacuation plan for majority of population	4	H	S
lack of personnel/volunteers during emergencies			V	Recruitment/education of volunteer medical/logistical help	Recruitment/education of volunteer medical/logistical help	Recruitment/education of volunteer medical/logistical help	Recruitment/education of volunteer medical/logistical help	4	H	O
Cell phone use/Charging stations			V	HAM radios	HAM radios	HAM radios	HAM radios	4		
R.A.V.E outgoing from town	Townwide	Public	S	Identify and register more people	Identify and register more people	Identify and register more people	Identify and register more people	5		
Increases in residents with asthma	Townwide	Public	V				Continue to conserve/increase open/green space, minimize local sources of air pollution (school buses, public ed.), public health outreach	5		
Vector-borne illnesses	Townwide	Public	V			Mosquito control, public outreach, BOH staffing		5		
Residents at risk	Townwide	Public	S	RAVE/Enhanced 911	RAVE/Enhanced 911	RAVE/Enhanced 911	RAVE/Enhanced 911	5		

Environmental										
Updated science/climate projections into regulations	Townwide	Public	V	Update regulations (floodplain/stormwater management/sustainability)	Update regulations (floodplain/stormwater management/sustainability)	Update regulations (floodplain/stormwater management/sustainability)	Update regulations (floodplain/stormwater management/sustainability)	1	H	
Stormwater management (water quality impacts) roadways/parking areas	Townwide	Public/Private	V	Update regulations	Update regulations	Update regulations	Update regulations	1	H	
Wetlands/floodplains resources	Townwide	Public/Private	V/S	Strengthen bylaws, enforce/maintain stormwater system	Strengthen bylaws, enforce/maintain stormwater system	Strengthen bylaws, enforce/maintain stormwater system	Strengthen bylaws, enforce/maintain stormwater system	2		
Trees/forests	Townwide	Public/Private	V/S	Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management	Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management	Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management	Re-planting plan (right tree, right place), maintain/protect, plan (especially along roadways/evacuation routes), pest management	2		
Sudbury River floodplain	Sudbury River		S	Maintain good floodplain protect	Maintain good floodplain protect	Maintain good floodplain protection		3		
Achieving 40B 10% (maintain local zoning regulations)	Townwide	Public	S	Continue to maintain 10%	Continue to maintain 10%	Continue to maintain 10%	Continue to maintain 10%	3		
Tree canopy			S	Consider more restrictive ordinance, tree-planting management (not under power lines), property management	Consider more restrictive ordinance, tree-planting management (not under power lines), property management			4	M	O
Protected open space (rivers/streams)			S			Improve invasive species management, outreach to homeowners, strengthen development restrictions in floodplains, defining as 500-year floodplain		4	M	O
Beaver dams			V/S			Monitor		4	M	O
Aging trees (Pine Tree Triangle)	Townwide	Public/Private	V	Enforcement of trimming, educate public trimming/planting, general maintenance (identificastion of dead trees)	Enforcement of trimming, educate public trimming/planting, general maintenance (identificastion of dead trees)			5	M	O
Impervious surfaces (water quality)	Townwide		V			Increase green infrastructure in developments/Planning Board		5	H	O

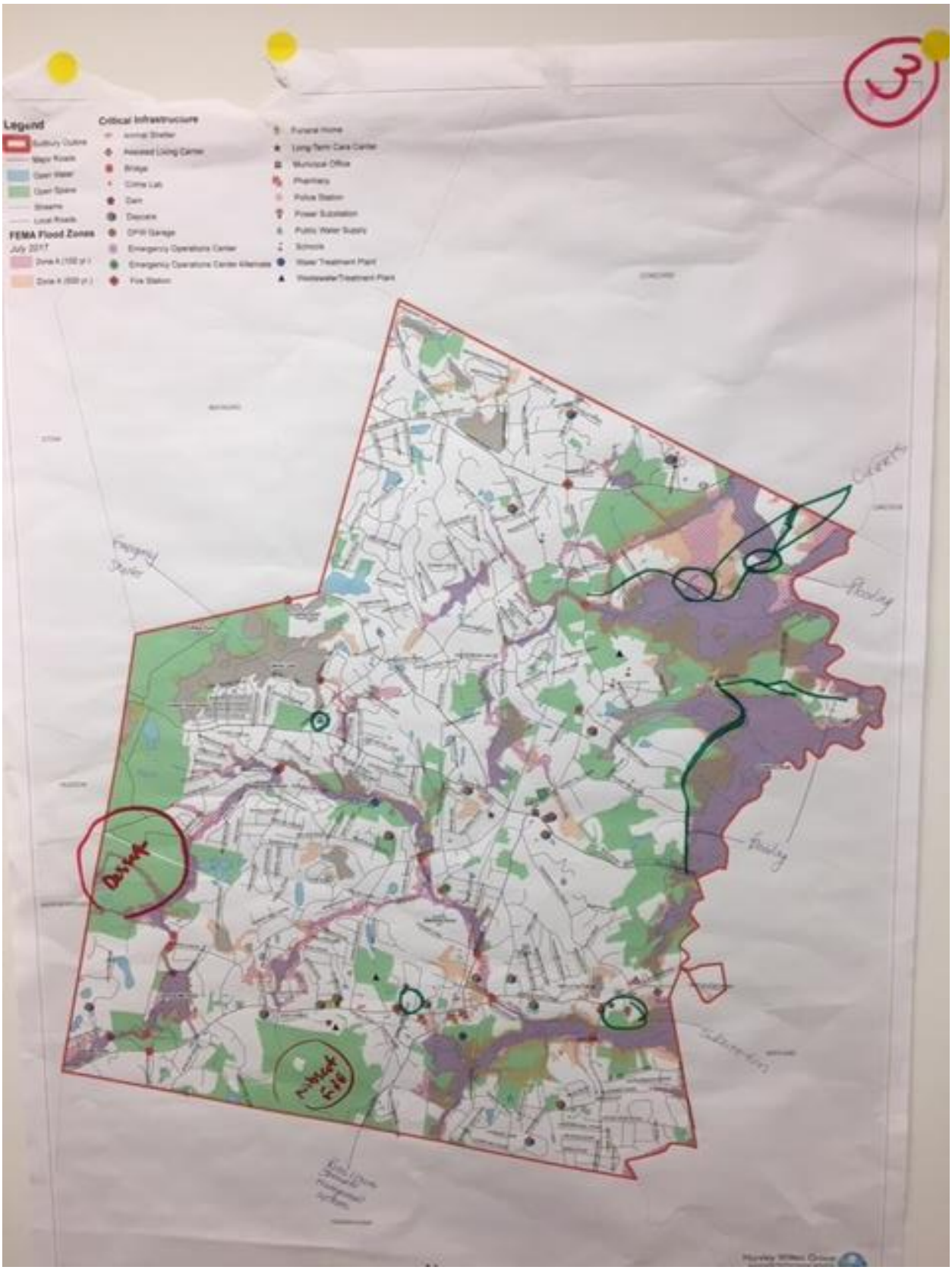
Attachment F. Annotated Maps from Discussion Groups



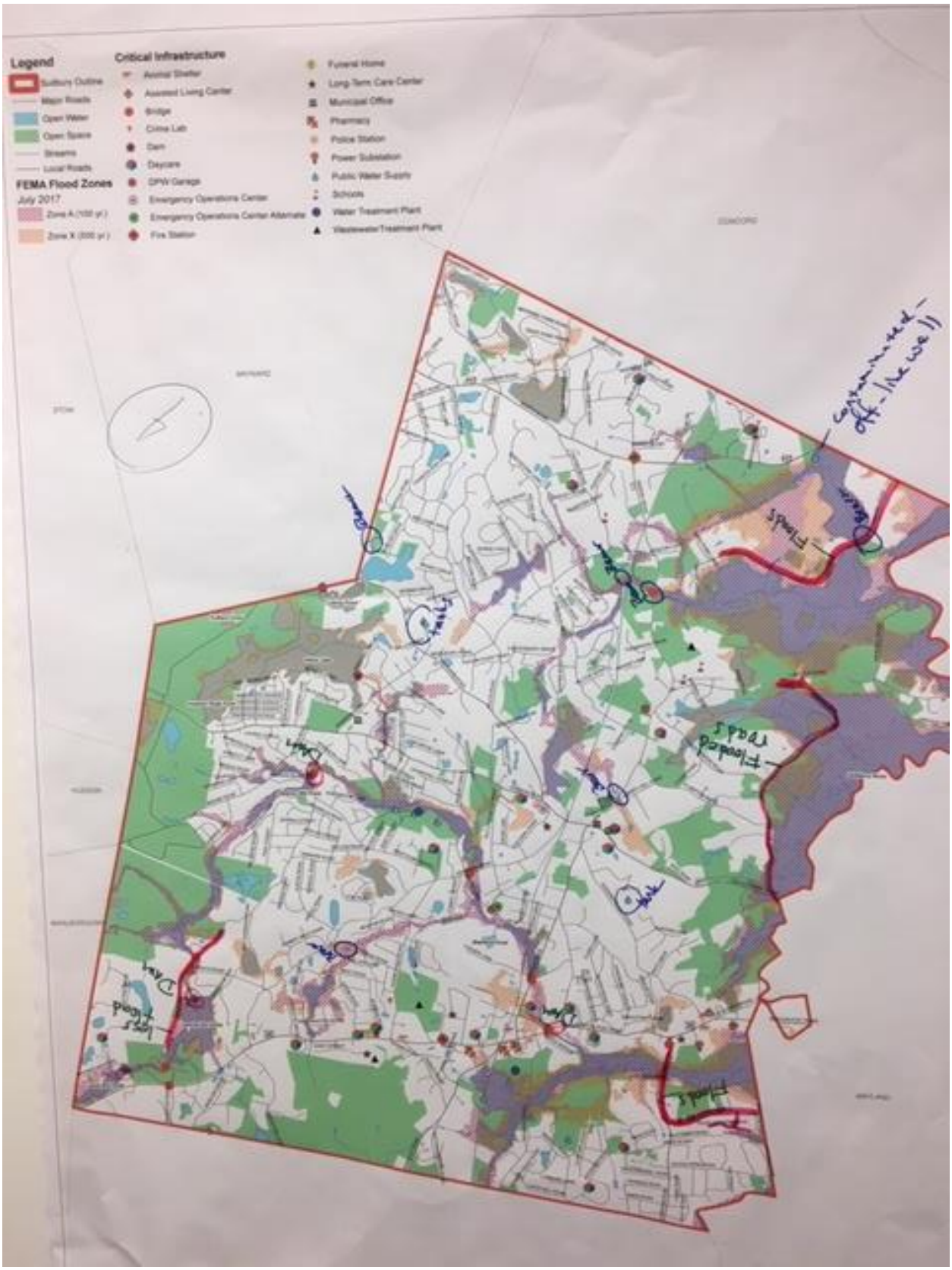
Group 1: Map annotated highlighting vulnerable infrastructure, flood zones, and other community resources.



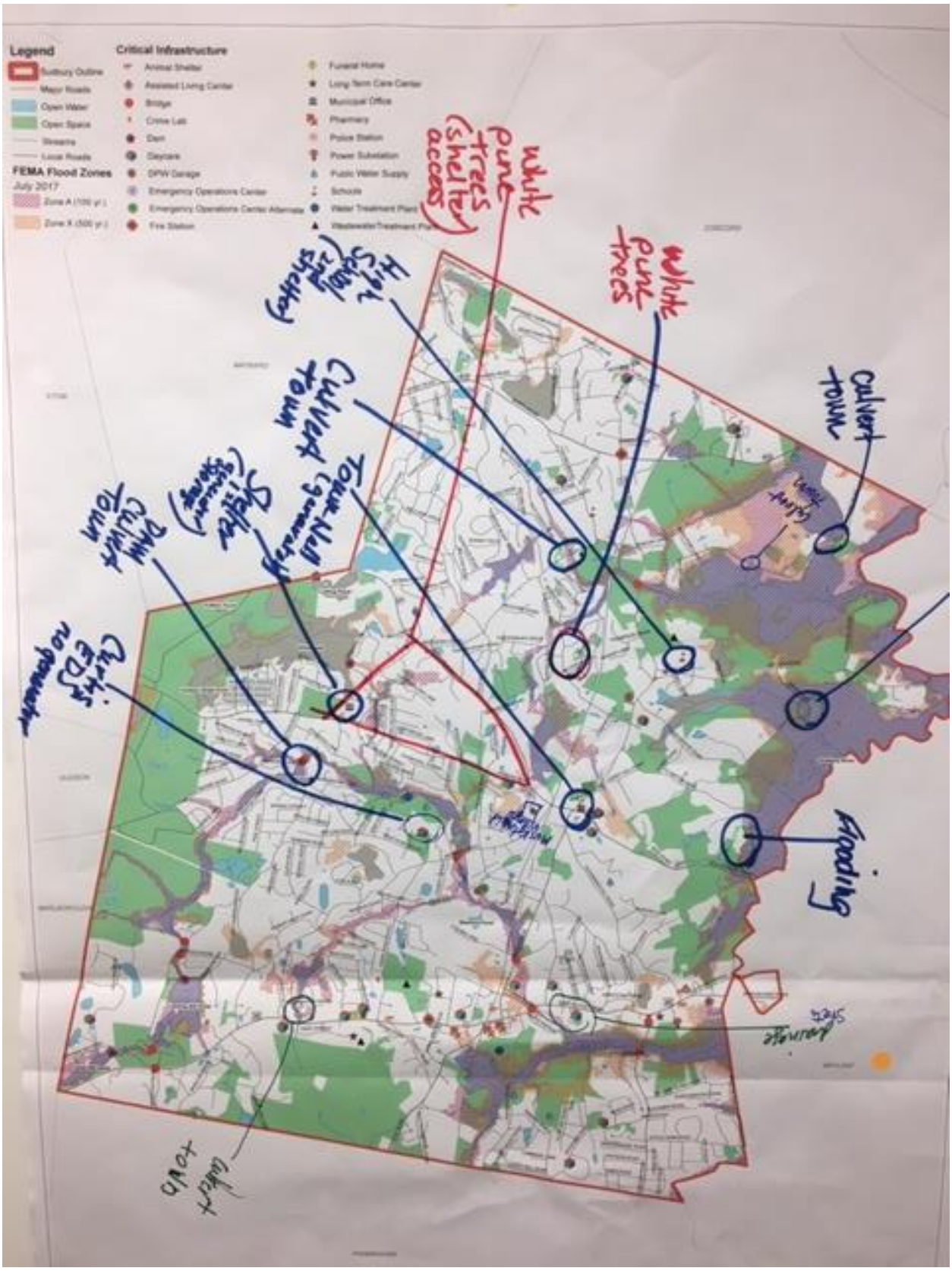
Group 2: Map annotated highlighting vulnerable infrastructure, flood zones, and other community resources.



Group 3: Map annotated highlighting vulnerable infrastructure, flood zones, and other community resources.



Group 4: Map annotated highlighting vulnerable infrastructure, flood zones, and other community resources.



Group 5: Map annotated highlighting vulnerable infrastructure, flood zones, and other community resources.

Attachment G: Policies/Regulatory Review Recommendations

Horsley Witten Group
Sustainable Environmental Solutions
113 R2 Water Street • Exeter, NH • 03833
603-658-1660 • horsleywitten.com

MEMORANDUM

To: Ms. Beth Suedmeyer, Environmental Planner, Town of Sudbury

From: Ellie Baker, AICP, Senior Environmental Planner

Craig Pereira, Project Manager

Date: June 28, 2019

Re: **Sudbury Code Review and Recommendations to Strengthen Climate Resilience (Funded through the Massachusetts MVP Grant Program)**

Horsley Witten Group (HW) reviewed the existing regulatory codes of the Town of Sudbury to identify specific areas in the code that could be adjusted to strengthen the resilience of the town in the face of anticipated climate changes. We presented a preliminary set of recommendations for discussion with the Sudbury Board of Selectmen in a memorandum initially dated May 2, 2019 and subsequently updated on May 28, 2019, the table of which was again revised in conjunction with this final memorandum dated June 28, 2019. This memorandum with updated table is attached here. Following discussion with and feedback from the Board of Health, Board of Selectmen, and Planning Board members, we worked with the Municipal Vulnerability Preparedness (MVP) Core Team to identify the recommendations that the Town would like HW assistance in pursuing, as part of the limited timeframe and resources the MVP grant. Please note that other items are equally worth contemplating and received significant discussion and general support from the various boards and commission; the decision to pursue certain recommendations versus others in this memorandum was determined by both priority and the level of effort required.

This memorandum herein provides the proposed regulatory code language and approaches for the subset of items that we agreed to pursue within the MVP grant project. This memorandum, including the table of recommendations in the attached May 28, 2019 memorandum, aims to provide the town of Sudbury with an overall menu of code revisions to be incorporated into the Town Master Planning process, now underway, as well as ongoing efforts by the various town boards and commissions to update and improve the effectiveness of their regulations. Our work was supported by Woodard & Curran, the engineering consultant currently assisting the Town with stormwater management planning and compliance with the NPDES MS4[1] Stormwater General Permit.

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[1] National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Stormwater General Permit for MA

PROPOSED CODE REVISIONS

HW proposes the following code revisions and approaches (Note: the identifying numbers and letters refer to the Goals and Recommendations table in the May 28, 2019 memorandum):

2.B. Investigate options for increasing the design volumes to which stormwater practices and conveyances are designed to anticipate increases due to climate change.

Recommended Revisions to: Stormwater Bylaw and Regulations

In discussions with the MVP Core Team, we heard that the town was interested in having some flexibility to require additional stormwater management design volumes or grater stormwater capacity in areas that drain to an already strained municipal stormwater system. Rather than raise the standards in all cases, the town would like the DPW to have the ability to comment that the stormwater management system should be designed to a higher standard, with a greater capacity, in order to mitigate or avoid additional impacts to the municipal drainage and roadway system.

Currently, the Stormwater Management Bylaw Regulations provide for a copy of each General Stormwater Management Permit (GSMP) application "to be distributed to each of the other relevant boards, including the Conservation Commission, Department of Public Works, Board of Health, and the Building Department" (Section 6.0 C). Similar language is not included but is common practice. This distribution to the specified departments should be codified in Section 7.0, which describes procedures for Stormwater Management Permits (SMP).

In addition, in both sections of the Regulations, the town may consider including language that specifies a timeframe and process for receiving and incorporating comments from those particular boards and departments. This will set the stage for the DPW to comment on the existing capacity of the municipal stormwater system as it relates to the proposed project.

Currently, section 8.0 defines the SMP Standards and Requirements, and Section 8.A.3.f defines the design storm events that the project must use in sizing its stormwater management systems. In order to provide the permitting agency with the ability to incorporate input from the DPW requiring that the applicant design to a higher standard for projects draining to areas where the municipal drainage system is already stressed, we suggest the following revised language:

> "In areas identified by the Department of Public Works in a publicly available list or map as having frequent flooding or an otherwise strained municipal drainage system, these design volumes may be adjusted up by as much as 25% at the request of the DPW upon review of the project."

Similar language might be considered within the standards presented in Section 6.J for GSMPs, which apply to smaller projects.

In support of this language, the DPW will need to maintain a list or map of areas with frequent flooding or otherwise strained stormwater systems.

4.A. Require roof runoff to be recharged within the Zone II. Add to prohibitions in Section 4242: Roofs of any primary structures that do not direct runoff to a system designed to recharge the roof runoff such that the annual volume of water recharged is equal to or greater than under natural vegetated site conditions.

> ***Recommended Revisions to:*** **Zoning Bylaw, Water Resource Protection Overlay District, Section 4242**

The existing zoning bylaw includes certain standards that apply within the Water Resource Protection Overlay Districts, including stormwater management standards, through the Special Permit process. These standards are further clarified through the Rules and Regulations for Special Permits in the Water Resource Protection Overlay Districts. Under the current code, applicants are permitted to recharge roof runoff from non-metal rooftops within the Water Resource Protection Overlay District (note: Under the MA Stormwater Manual, runoff from non-metal rooftops is formally considered to be clean and does not require water quality treatment.). The recommendation described here, developed with support from Woodard & Curran, would make such infiltration mandatory rather than optional within the Zone II, in order to boost the annual volume of recharge to the aquifer and improve the drought resilience of the town's water sources.

In preparing this recommendation, Woodard & Curran performed a web-based search for examples from other communities. In general, they were unable to find any precedent of communities *requiring* roof runoff to be recharged within the Commonwealth of Massachusetts. In fact, the focus of recharge requirements within aquifer protection districts is often to provide some level of prohibition on recharge in order to protect the quality of the aquifer. This stems from a concern that roof runoff may contain various forms of pollutants such as bacteria, dissolved metals and dissolved nutrients that may constitute a concern for drinking water. However, the MA Stormwater Manual evaluated this issue and addresses roof runoff within Aquifer Protection Zones on Page 7 of Chapter 1, as follows:

> *Runoff from non-metal roofs may be discharged to a dry well without any pretreatment. Runoff from metal roofs may be discharged to a dry well without pretreatment, only if the roof is located outside the Zone II or Interim Wellhead Protection Area of a public water supply and outside an industrial site. Infiltration of runoff from a metal roof that is located within the Zone II or Interim Wellhead Protection Area of a public water supply and/or at an industrial site requires pretreatment by means of a BMP capable of removing metals, such as a sand filter, organic filter, filtering bioretention area or equivalent. Metal roofs are galvanized steel or copper.*

Additionally, note that certain recharge systems are also regulated by the Massachusetts DEP as groundwater injection and managed under the state's underground injection program.

Implementation of this requirement could be performed by making the revisions described below to the Zoning Bylaw and the Rules and Regulations for Special Permits in the Water Resource

Protection Overlay District. We suggest the following language to be considered with input from the Sudbury Water District and should be cross-referenced with MADEP's underground injection program prior to modification of the Sudbury Zoning Bylaw or Water Resource Protection District regulations.

Add the following language as a prohibition within **Section 4242 of the Sudbury Zoning Bylaw**:

> Residential roofs of any primary structures that do not direct runoff to a system designed to recharge the roof runoff.

Add the following language as a requirement within ***Section 2.2 of the Water Resource Protection District Rules and Regulations:***

> *Rooftop Recharge Design and Calculations*
>
> Stormwater runoff collected from a residential rooftop shall be recharged directly into the ground, preferably through surface infiltration systems. Infiltration of runoff from a metal roof and/or at a non-residential site requires pretreatment by means of a BMP capable of removing metals, nutrients and bacteria, such as a sand filter, organic filter, filtering bioretention area or equivalent. Metal roofs are galvanized steel or copper.
>
> 1. The applicant shall provide a plan documenting location for rooftop runoff storage and infiltration. Infiltration recharge design criteria shall be based on recharge requirements as outlined within the Massachusetts Stormwater Handbook Standard 3.
>
> 2. For residential development, rooftop downspouts shall be designed to discharge to systems that will allow for natural infiltration. These systems may include surface or subsurface infiltration (e.g. drywells), but surface infiltration is preferable to allow for uptake of metals nutrients or other harmful pollutants within the surface soil profile. Drywells may be regulated as Underground Injection Systems and subject to additional regulations described by the Massachusetts Department of Environmental Protection under the Underground Injection Control program.
>
> 3. Use of drywells or other subsurface infiltration system will be prohibited where seasonal groundwater is within 4 feet of the bottom of the drywell. Otherwise place drywells at least 10 feet from the building foundation or basement, 20 feet from any cesspool or septic system, and 5 feet from any property lines. Drywells must be at least 500 feet from private drinking water wells.
>
> 4. Building projects involving additions greater than 25% of the existing building footprint but less than 50% of the existing building footprint shall collect the entire runoff from the roof of the addition plus runoff from the roof on the side of the existing structure that contains the addition.
>
> 5. Building projects involving additions that are 50% or greater than the existing building footprint shall capture the stormwater runoff from the entire roof.

6. The property must be located within an area of suitable soils for infiltration as defined during evaluation for Wastewater Disposal Plan outlined in 2.2.5. and as documented by on-site soil test pits. In the situation that site soils are not suitable for infiltration, the applicant can meet this rooftop recharge requirement with sufficient documentation that rooftop infiltration Is not possible on the site and approval by the authorized permitting entity. (Note: Alternatively, the Town could simply rely on the Waiver process that already exists in Section 1.5 of the Water Resource Protection District Rules and Regulations, but that is a higher bar than what is provided above.)

7. An As-Built drawing showing all stormwater management systems shall be submitted to the regulatory authority prior to the issuance of an Occupancy Permit.

8. The as-built (certified) Plot Plan showing the improvements to the property shall be stamped by a Massachusetts Registered Land Surveyor.

5.C. Allow sidewalks to be constructed of pervious/porous materials.

Recommended Revisions to: **Zoning Bylaw, Section 3561**

This section, which pertains to village business districts, currently states: In Village Business Districts, sidewalks shall be constructed of brick, stone, or concrete, and be maintained by the owner. We recommend the following simple revisions to allow these sidewalks to be constructed of pervious/porous materials:

> In Village Business Districts, sidewalks shall be constructed of brick, stone, ~~**or**~~ concrete, **porous/pervious concrete or porous/pervious pavers**, and be maintained by the owner.

Because asphalt was specifically not included in the existing list of allowed materials, presumably based on aesthetics, we did not include porous asphalt in this recommendation either.

7.B. Incorporate into site plan, subdivision, stormwater regulations requirement to minimize vegetation, slope, and land disturbance.

Recommended Revisions to: **Sudbury Zoning Bylaw and Subdivision Rules and Regulations**

The existing Sudbury Zoning Bylaw includes the following performance standard language to limit disturbance to land, vegetation and slopes during development:

> Section 3427. Site Development Criteria
>
> a. Natural Features Conservation – Disruption of existing site features, including particularly the changing of natural topography shall be kept to an absolute minimum. Where tree coverage does not exist or has been removed, new planting may be

> required. Finished site contours shall approximate the character of the site and surrounding properties.

The Cluster Development Zoning includes the following standard, which is similar but simpler:

> Section 5136. Preservation of Natural Features. Natural site features shall be preserved by minimizing disturbance to existing vegetation and by minimizing changes to existing topographic conditions on the site.

The Incentive Senior Development Zoning (Section 5400) includes requirements for open space ranging from 17.5% to 25% of the upland area of the parcel depending on the size of the parcel (the larger the parcel, the greater the percentage of open space required.) The Stormwater Bylaw applies different regulatory thresholds depending on the size of the area of alteration, but does not limit that alteration per se. The Wetlands Bylaw limits alteration only within its jurisdiction. The Subdivision Rules and Regulations include the following language:

> Section V. Design Standards
>
> E. Protection of Natural Resources
>
> The Board will require that the Subdivider make every reasonable effort consistent with sound planning to preserve natural features such as large trees, water courses, scenic points, historic spots, and similar community assets, which, if preserved, will add attractiveness and value to the Subdivision. The Board strongly encourages property owners and Subdividers to investigate and make use of conservation grants and easements, particularly in areas subject to wetland jurisdiction. The procedures are simple and do not delay Subdivision approval. Information can be obtained from the Board or the Conservation Commission.

None of these requirements provides detailed limitations on development on slopes, preservation of vegetation or limits on area of alteration. HW recommends that the town incorporate design standards into the Zoning Bylaw and Subdivision Rules and Regulations that limit the area of alteration, prohibit alteration of certain steep slopes, and limit the removal of some percentage of existing vegetation or trees on a site. These standards could replace the sections quoted above and should be consistent with any tree preservation bylaw recommended elsewhere in this memorandum.

Nearby Devens provides a helpful example of a Steep Slope Regulation that treats steep slopes as a resource to be protected, including a buffer. Slopes Resource Areas are defined on a resource map and are defined as: “Naturally formed, undisturbed slopes with a contiguous areas of a ½ acre or more. These areas are identified on the Devens Slope Resource Area Map in 974 CMR 3.06 Appendix B Figures (13) Figure M. Such slopes are generally in excess of 35%, with mature vegetative cover and in close proximity to sensitive resource areas and/or unique geological formations.” This language can be found here: http://www.devensec.com/rules-regs/decregs306.html Within Section 3.04 of the Devens regulations is a section defines requirements for Preservation of Existing Vegetation with All

Districts. This language can be found here: http://www.devensec.com/rules-regs/decregs304.html

Alternatively, Sudbury may consider developing a separate bylaw that sets overall limits on clearing, grading, vegetation protection and the like. Two model bylaw examples that may be of use in considering this option are provided below:

- Model Land Clearing Grading and Protection of Specimen Tree Species, Cape Cod Commission, including community profile and comments: https://www.mass.gov/files/documents/2016/08/uy/capecodord.pdf
- Model Bylaw for Green Development Performance Standards, Pioneer Valley Planning Commission: http://www.pvpc.org/sites/default/files/files/Green%20Development%20Performance%20Standards%209_10_09.doc.

9.A. Add to site plan, subdivision, stormwater regulations requirements for tree planting or tree fund contribution if trees cannot be planted onsite

Recommended Revisions to: New Sudbury Tree Preservation Bylaw

An effective mechanism to regulate tree preservation on both public property as well as private property is through a general tree bylaw. This bylaw would apply to all existing properties and trees across the town. In general, development approvals such as site plan review or subdivision approval will include their own standards and conditions addressing tree preservation, and these approvals can be essentially exempted from the general bylaw. However, the general bylaw can serve to define the tree preservation standard, establish a tree commission or tree warden with enforcement powers and master planning responsibilities, and create mitigation requirements, including a tree fund or tree bank. The tree preservation standards and mitigation requirements can be incorporated into the development approval regulations, either by reference or by directly incorporating the language of the standards, or incorporated within the conditions of approval as appropriate.

The Town of Sudbury requested that HW identify examples from other communities to demonstrate appropriate tree preservation standards and mitigation requirements. The following links provide examples of Massachusetts tree ordinances and bylaws that address trees on both public and private property. In general, they establish management authority with a Tree Commission or Tree Warden, and provide criteria for quantifying trees on a property, quantifying allowable tree cutting and trimming, and quantifying tree mitigation in the form of replanting. The example from Wellesley includes the establishment of a Tree Bank, which is a separate designated fund to collect fees in lieu of mitigation for the sole purpose of tree replacement and maintenance. The last item listed is a PDF document prepared by the National Association of Home Builders summarizing the approaches to tree preservation on private property across the country, including a discussion of various standards, and serves as a good national overview.

- Concord, MA Tree Preservation Bylaw (2017) and Regulations (2018): https://concordma.gov/DocumentCenter/View/13400/Tree-Preservation-Bylaw-Rules--Regulations-1-9-18
- Newton, MA tree regulations for public and private properties: http://www.newtonma.gov/civicax/filebank/documents/45830
- Wellesley, MA Tree Zoning Bylaw and Rules and Regulations: https://wellesleyma.gov/166/Tree-Bylaw-Information
- Lexington, MA Tree Bylaw: https://www.ecode360.com/10535335 and Tree Committee: https://www.lexingtonma.gov/tree-committee
- Newburyport, MA Tree Ordinance (Protection of Public Trees): https://www.cityofnewburyport.com/tree-commission
- Somerville, MA Tree Ordinance: https://www.somervillema.gov/treeordinance (Note: Somerville just adopted an update to this ordinance to include regulation of trees on private property. The public outreach materials and ordinance language available at the link above.)
- National Association of Home Builders Overview of Tree Preservation Ordinances: "Tree Ordinances: Preserving our Community Forest," August 28, 2014, tree-ordinances-preserving-our-community-forest.pdf (Locate online via Google Search)

CONCLUSION AND NEXT STEPS

This memorandum aims to provide the Town of Sudbury with a summary of opportunities to enhance the local regulatory code to improve the town's resilience to climate change and provide a jumping off point for the town to formalize some initial regulatory reforms. We anticipate that the recommendations provided in our May 2, 2019 Code Review, attached here, will also serve to inform the Town's discussions during the current Mater Plan Update process, as well as other relevant planning efforts such as the Hazard Mitigation Plan update, the Open Space and Recreation Plan or others.

It has been a pleasure to work with you and the Town on this important effort, and we thank you for this opportunity. Please do not hesitate to contact Ellie Baker or Craig Pereira with any questions or to explore opportunities for next steps on anything discussed in this memo. Ellie can be reached at ebaker@horsleywitten.com or 603-658-1660. Craig can be reached at cpereira@horsleywitten.com or 401-272-1717.

ATTACHMENT:

Memorandum: Sudbury Code Review to Strengthen Climate Resilience – Summary Table of Recommendations (update to May 2 and May 10, 2019 memos), dated May 28, 2019 from Horsley Witten Group to Beth Suedmeyer, Town of Sudbury

Horsley Witten Group
Sustainable Environmental Solutions
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MEMORANDUM

To: Ms. Beth Suedmeyer, Environmental Planner, Town of Sudbury

From: Ellie Baker, AICP, Senior Environmental Planner

Craig Pereira, Project Manager

Date: May 28, 2019

Re: Sudbury Code Review to Strengthen Climate Resilience – Summary Table of Recommendations (update to May 2 and May 10, 2019 memos)

Horsley Witten Group (HW) reviewed the existing regulatory codes of the Town of Sudbury to identify specific areas in the code that could be adjusted to strengthen the resilience of the town in the face of anticipated climate changes. The attached summary table provides a preliminary set of recommendations for discussion with the Sudbury Board of Selectmen. This summary table represents the results of an initial assessment and recommendations as well as discussions with the Board of Health and the Core Team guiding the Municipal Vulnerability Preparedness (MVP process in the town.

The purpose of this memorandum is to solicit feedback from the Board of Selectmen about which adjustments the town is interested in pursuing, so that HW can focus our efforts in the next stage of our work to develop suggested language to integrate into the town's regulatory code. This memorandum is an update to the May 2, 2019 and May 10, 2019 drafts.

In performing this code review task, HW first reviewed the following relevant reports and plans to understand the goals and recommendations that had been identified previously to improve the resilience of the town:

- Sudbury Natural Hazards Mitigation Plan (2010)
- MAGIC Climate Change Resilience Plan (2017)
- Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018)

HW also reviewed the following Town Bylaws and Regulations:

- Sudbury General Bylaws, in particular:
  - Stormwater Management Bylaw and Regulations
  - Wetlands Administration Bylaw and Regulations
- Sudbury Board of Health Regulations Governing:
  - Subsurface Disposal of Sewage
  - In-Ground Irrigation Systems
  - Stables and Keeping of Animals

- Sudbury Zoning Bylaw
    - Rules and Regulations for Water Resource Protection District Special Permits
    - Site Plan Rules and Regulations
    - Earth Removal Board Rules and Regulations
- Sudbury Rules and Regulations Governing the Subdivision of Land

Goals and Recommendations

Based on the information reviewed, HW identified the goals and recommended code revisions for improving the town's resilience. These goals and recommendations are summarized in the attached table, including reference to the specific code and section of the code where the change would be incorporated. These changes would be applicable to both public and private property and projects, as regulated by the local code.

Requested Feedback

HW requests feedback from the town regarding both the goals and the recommendations, as follows:

1. Does the town agree with the set of goals that we identified, which helped to guide our review and recommendations? Did we miss anything?
2. Does the town agree with the set of recommendations for code revisions, or did we miss anything?
3. Which goals and recommended changes should HW pursue to the next phase, by developing recommended language edits?

Conclusion and Next Steps

Once we understand which goals the town is interested in pursuing and which recommendations to pursue or explore, we will work with you to identify which changes to pursue within our current contract. We will then develop specific language edits in the form of deletions, insertions and changes to selected sections of bylaws and regulations to achieve the recommendations.

We look forward to discussing the content of this memorandum with you and your team soon. Feel free to contact Craig Pereira or me with any questions. I can be reached at ebaker@horsleywitten.com or 603-658-1660.

Review of Existing Bylaws and Regulations for Climate Adaptation and Resilience Improvements
Sudbury, MA

		CLIMATE ADAPTATION GOAL/RECOMMENDED CHANGE	CODE	SECTION
OPEN SPACE				
*		**1. Preserve natural open space and agricultural lands**		
	A	Incentivize the use of cluster developments and flexible developments permitted under the Alternative Residential Regulations in the Zoning Bylaw, even for small subdivisions that are currently more common, to protect open space and agricultural lands.	Zoning Bylaw	Article 5000, Alternative Residential Regulations
	B	Consider Open Space and LID Bylaw and/or Natural Resource Protection Zoning	Zoning Bylaw	Possible new section within Article 5000, Alternative Residential Regulations.
WATER AND OTHER NATURAL RESOURCES				
*		**2. Strengthen stormwater management requirements for reduced pollution, reduced erosion, increased infiltration, and reduced flooding impacts.**		
	A	Consider the creation of a stormwater management fee or utility to support maintenance and improvements to protect water resources and reduce erosion.	Stormwater Bylaw	Possible new section.
#	**B**	Investigate options for increasing the design storm volumes to which stormwater practices and conveyances are designed to anticipate increases due to climate change.	Stormwater Bylaw	Also, Stormwater Regulations, Section 8.A.3. Design and Performance Criteria
	C	Strengthen the requirements for storage and treatment of runoff and infiltration from manure and urine on properties that are keeping animals.	Board of Health Regs	Rules and Regulations for Stables and Keeping of Animals in the Town of Sudbury, Section 4. Sanitary Requirements
*		**3. Protect drinking water sources (from pollution, drought, depletion)**		
	A	Evaluate the risk of private irrigation wells on the public water supply aquifer, and then explore the option of removing the exclusion of private irrigation wells from town water use restrictions or bans.	Board of Health Regs	General Bylaws, Article XXVII, remove applicability #4; or, consider new standalone bylaw.
	B	Consider an application fee for Special Permits within the Floodplain Overlay District or the Water Resource Protection District to support enforcement.	Zoning Bylaw	Article 6270, Procedures, special Permits, Fees.
		4. Increase recharge to replenish healthy aquifers		
#	**A**	Require roof runoff to be recharge within the Zone II. Add to prohibitions in Section 4242: Roofs of any primary structures that do not direct runoff to a system designed to recharge the roof runoff such that the annual volume of water recharged is equal to or greater than under natural vegetated site conditions.	Zoning Bylaw	Section 4242, Uses prohibited within Water Resource Districts, Zone II; Section 4280 Stormwater Management within Water Resource Protection Overlay Districts

	CLIMATE ADAPTATION GOAL/RECOMMENDED CHANGE	CODE	SECTION
	5. Promote/require the use of green stormwater infrastructure		
	A Strengthen the language in the Stormwater Bylaw and Regulations to require the use of green infrastructure practices over grey infrastructure, unless grey is justified.	Stormwater Regs	Section 8A. Stormwater Management Plan, identify green infrastructure practices.
	B Allow landscaping buffers required in the Zoning Bylaw to explicitly include vegetated green infrastructure stormwater practices.	Zoning Bylaw	3550. Landscaping Requirements for Street Frontage of Non-Residential Uses
#	**C** Allow sidewalks to be constructed of pervious/porous materials.	Zoning Bylaw	3561
	6. Protect floodplains		
	A Consider development of Rules and Regulations for the Floodplain Overlay District	Zoning Bylaw	New rules and regulations.
	B Limit the reconstruction of flooded structures within the 100 year flood plain, when such reconstruction puts public utilities and emergency services at risk.	Zoning Bylaw	2460A. Reconstruction after Catastrophe
	C Create a conservative Floodplain Overlay District that is delineated to incorporate increased flood elevations (or a buffer), or to consider the 500-year floodplain, to account for climate change, rather than delineated based on the backward-looking static FIRM maps.	Zoning Bylaw	4131. Flood Plain Overlay District Location
	D Prohibit encroachment in the floodplain at all. It currently depends on proving that there will be no increase in the 100-flood level as a result of encroachment in the floodway. Be more conservative.	Zoning Bylaw	4143. Prohibited Uses of Activities in the Flood Plain Overlay District
	E Consider clarifying the buffers (delineation distance and standards) for certain wetland resources based on horizontal and vertical distances to provide a safety net for increased flood storage and wetland expansion.		
	F Include the Stormwater Bylaw in the list of Bylaws and Regulations that projects must meet if located within the Flood Plain Overlay District.	Zoning Bylaw	4180 Other Requirements.
	G Consider an application fee for Special Permits within the Floodplain Overlay District or the Water Resource Protection District to support enforcement.	Zoning Bylaw	4100 Floodplain Overlay District
	7. Encourage development that is designed in harmony with natural resource protection		
	A Consider transfer of development rights to protect sensitive resources	Zoning Bylaw	New Zoning
#	**B** Incorporate into site plan, subdivision, stormwater regulations requirement to minimize vegetation, slope, and land disturbance.	Zoning Bylaw	Site Plan Review, Subdivision Rules and Regulations, Stormwater Bylaw and Regulations - incorporate new set of consistent standards.

	CLIMATE ADAPTATION GOAL/RECOMMENDED CHANGE	CODE	SECTION
	8. Reduce impervious cover and disturbance of land and vegetation		
	A Reduce parking requirements. Review Table of Parking Requirements to determine if numbers could be reduced. Consider incorporating maximums also.	Zoning Bylaw	3120. Number of Parking Spaces
	B Reduce paved street widths.	Subdivision Regs	Section V. Design Standards, Subsection B. Right of Way and Roadway Design
	9. Improve management of forests and tree preservation/maintenance		
#	**A** Add to site plan, subdivision, stormwater regulations requirements for tree planting or tree fund contribution if trees cannot be planted onsite	Subdivision Regs	Section V. Design Standards, Subsection D. Open Spaces and Subsection E. Protection of Natural Resources
	TRANSPORTATION		
*	**10. Increase capacity of drainage system on municipal roads and reduce stormwater flow from offsite private properties**		
	A Investigate options to require stormwater retrofits on properties draining to public roadways, and/or prohibit flow into MS4 system.	Stormwater Bylaw	Also, Stormwater Regulations, Section 8.A.3. Design and Performance Criteria
*	**11. Reduce risk to public infrastructure and public utilities (culverts, drainage, drinking water, tree management and power lines)**		
	A See items above.		
	12. Encourage efficient parking (Route 20 corridor, shared parking between plazas)		
	A Reduce parking requirements. Review Table of Parking Requirements to determine if numbers could be reduced. Consider incorporating maximums also.	Zoning Bylaw	3120. Number of Parking Spaces
	13. Encourage multimodal transportation options for a healthy lifestyle (rail trail projects, connections from trail trails to key locations in town, allowing transportation options to be available)		
	A Include criteria for new developments to consider bike lanes and bike transit in circulation and traffic analyses and design.	Zoning Bylaw	3427. Site Development Criteria
	ENERGY		
	14. Allow/promote/facilitate the installation and use of renewable energy	Zoning Bylaw	
	15. Allow/require electric microgrids	Zoning Bylaw	

CLIMATE ADAPTATION GOAL/RECOMMENDED CHANGE	CODE	SECTION
OTHER		
16. Reduce risk to public infrastructure and public utilities		
A Evaluate the potential for increased risk to public utilities and public safety response teams created by proposed project. (i.e., don't support renovations in areas where such renovation puts avoidable burden on emergency response). Can language like this be incorporated into Section 4100 of the zoning: "Uses in the Flood Plain Overlay District shall not create any undue burden on the town for the provision of maintenance of utilities, emergency response, school bussing or other public services."	Zoning Bylaw	4100 Flood Plain Overlay District
17. Create consistency in key standards across subdivision and site plan review projects		
A Require all projects in the Floodplain Overlay District to meet stormwater bylaw.	Zoning Bylaw	4180. Other Requirements in the Flood Plain Overlay District

*** = Recommended goals that have been identified as priorities in working discussions with the Board of Health (May 14, 2019), the MVP Core Team (May 22, 2019 and June 20, 2019), the Board of Selectmen (May 28, 2019) and the Planning Board (June 26, 2019).**
 # = Goals that are addressed with draft and model language recommendations in the Final Code Review Memorandum, dated June 28, 2019.