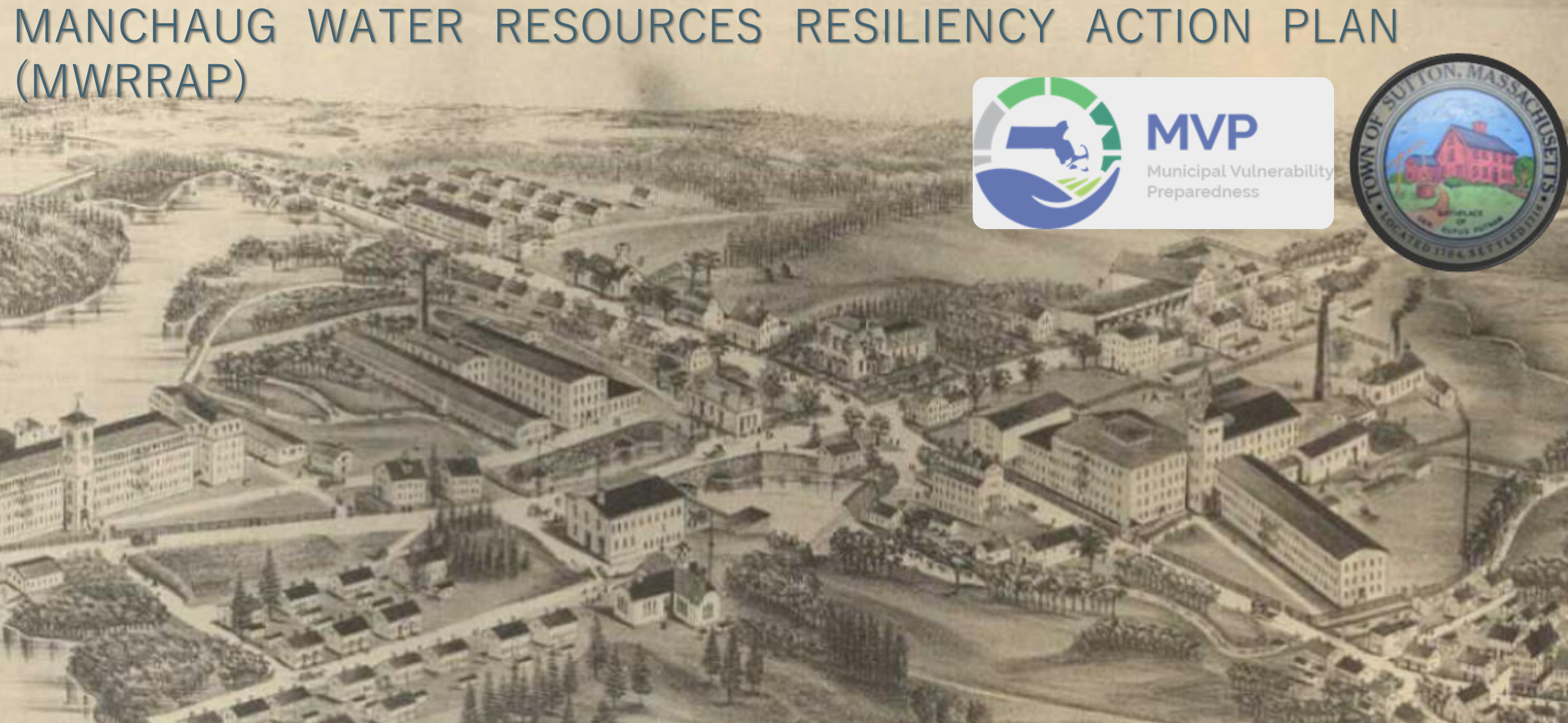


# MANCHAUG WATER RESOURCES RESILIENCY ACTION PLAN (MWRRAP)



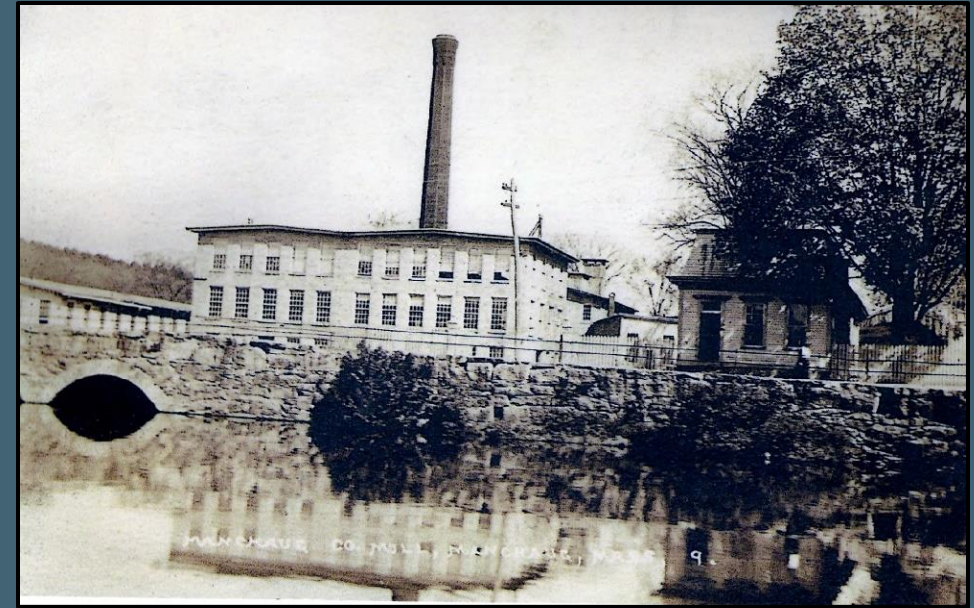
Select Board Meeting  
June 6, 2023





# Select Board Meeting - Agenda

- MWRRAP Process & Project Team
- Project Phases and Public Involvement
  - Phase I: Data Collection & Inventory
    - *The Listening Session*
  - Phase II: Existing Conditions Evaluations
    - *The Problem Meeting*
  - Phase III: Solution Strategy Development
    - *The Solutions Meeting*
  - Phase IV: Report Development
    - *The Select Board Meeting*
  - Next Steps (Phase V: Report Finalization)
- Discussion



# MWRRAP Process

- **Overview:**

- Resiliency Action Plan for the Mumford River/Dark Brook watershed & river corridor
- Specific focus on the issue of riverine flooding within Manchaug Village
- A master plan for the Town to prioritize and seek funding for future individual projects.

- **Funding:**

- \$75K Grant from Municipality Vulnerability Program (MVP) through the Executive Office of Energy and Environmental Affairs (EOEEA)
- \$25K Match from Sutton



# Project Team

- **Project Lead (Town of Sutton)**

- **Lead:** Jennifer Hager
- **MVP Team:** Pamela Nichols, Lee Dillard Adams, Robin Dresser, Paul Maynard, Bill Wence, Matthew Stencel, Cheryl Rawinski, Sara Plutnicki (CMRPC)
- **EOEEA:** Hilary King, MVP Central Regional Coordinator

- **Project Consultants:**

- Pare Corporation
- Traverse Landscape Architects

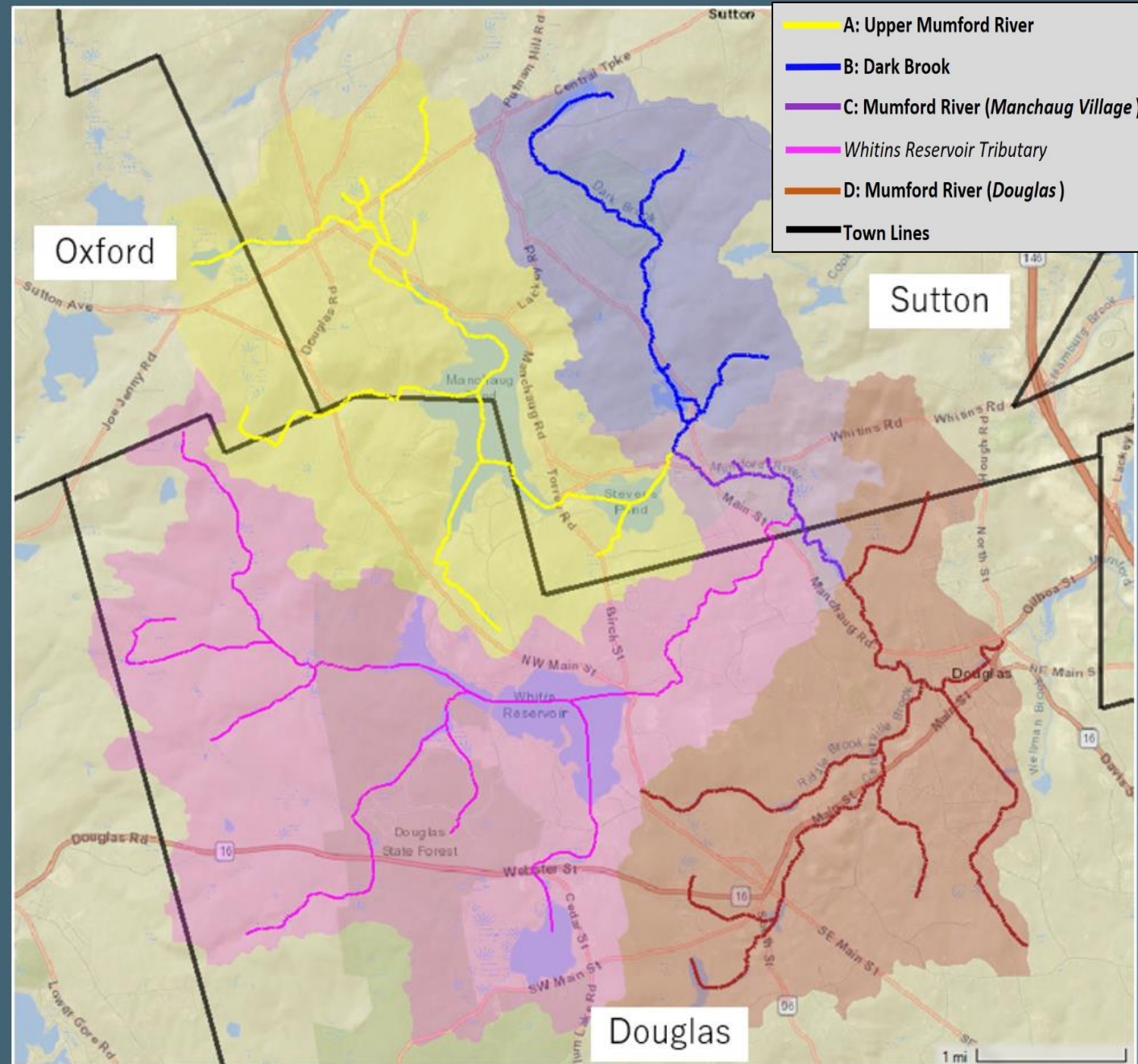
- **Project Stakeholders:**

- Residents of Manchaug Village and the Town of Sutton
- Manchaug Pond Foundation
- Blackstone Watershed Collaborative (BWC)
- Blackstone River Watershed Association (BRWA)
- Central Mass Regional Planning Commission (CMRPC)
- State Agencies: (EOEEA, MassDOT, MADCR, MADER)



# Phase I: Data Collection & Inventory

- Inventoried all major stream crossings along river corridors
  - Dams and Roadway Crossings
  - File Review & Data Collection
  - Geometry, Condition, Hazard
- River Corridor Subdivided into Four Reaches (A-D)
  - A. Upper Mumford River
  - B. Dark Brook
  - C. Mumford River (*Manchaug Village*)
  - D. Mumford River (*Douglas*)
- Section 1 of Report






# The Listening Session

- **First Public Meeting – November 17<sup>th</sup>**
  - Process and Scope Overview
  - Overview of Phase I
  - Open Discussion
- Open Discussion from 30+ attendees generated valuable feedback both during the meeting and weeks after
- Feedback utilized to:
  - Refine Phase II scope
- **Site Walk Meeting – December 6<sup>th</sup>**
  - Feedback received from MVP Team as well as Local and State Officials

**VILLAGE MEETING**  
Manchaug Water Study Project – Meeting #1



**Thursday, November 17<sup>th</sup> at 6 PM**  
Manchaug Mills  
9 Main Street – 1<sup>st</sup> Floor Wing




The Town of Sutton received a \$75,000 Municipal Vulnerability Preparedness (MVP) Grant from the Executive Office of Energy and Environmental Affairs (EOEEA) ([www.resilientma.org/MVP](http://www.resilientma.org/MVP)). The natural and manmade drainage and water flow systems in the Village of Manchaug will be assessed and strategies developed to prevent future flooding and other water induced damage.

**THIS IS YOUR VILLAGE. PLEASE COME SHARE YOUR THOUGHTS AND KNOWLEDGE!**

- Meeting #1 – Our consultant will share information and gather your input about the natural and manmade water flow systems in Manchaug.

**UP NEXT:**

- Meeting #2 – March 2023 – Share and discuss field work and identified problems.
- Meeting #3 – April 2023 – Share and discuss possible strategies and solutions.
- June 2023 - Final report presented to the Select Board.



If you have questions, want to be added to the stakeholder list, or need more information, please reach out to Jen Hager at [j.hager@town.sutton.ma.us](mailto:j.hager@town.sutton.ma.us) or 508-865-8729.

Planning Study - Manchaug Village Flooding  
Listening Session 11/17/22 - Handout Packet  
Page 1 of 30  
**General Outline**

*Listening Meeting General Outline*

1. Meeting Kickoff	Town	6:00
2. Overview of the General Scope of the Study	Pare	6:10
3. Present Supporting Figures & Site Photographs	Pare	6:15
4. Open Discussion	All Attendees	6:30 – 7:30

**General Scope:** Planning Study for the Mumford River / Dark Brook watershed and river corridor with particular focus on flooding issues within the Manchaug Village area.

*The Listening Session*

**a) Hydrologic and Hydraulic (H&H) Analyses of Existing Conditions (EC)**

- Data Collection – Completed September
- Develop HydroCAD Model of Entire Watershed and Adjoining Watersheds
- Develop HEC-RAS Hydraulic Model of Flooding Area of Interest
- Run all storms (1-year through 1,000-year) through the Hydraulic Model
- Review and Refine the Model and Model Inputs as needed

**b) Decipher EC Model Results & Identify Strengths & Vulnerabilities**

- Structures Vulnerable to Flood Damage
- Hydraulic Structure Performance
  - Dams
    - a) Upper Tucker Pond Dams
    - b) Manchaug Pond Dam
    - c) Stevens Pond Dam
  - Roadway Crossings
    - 1. Putnam Hill Road (2 each)
    - 2. Tucker Lane
    - 3. Manchaug Road (4 each)
- Other
  - Beaver Dams along Dark Brook (2 for sure; possibly as many as 6 total)
  - Former Dams Partially Removed/Breached (Mill Site #1, Upstream of Putnam Hill Road)
  - River and Floodplain Performance
  - Watershed Characteristics (Land Cover and Soils)

d) Mill Site #2 Dam
e) Potter Road Dam
f) Sutton Falls Dam
4. Whittins Road (2 each)
5. Torrey Road
6. Potter Road

*The Problem Meeting*

**c) Develop & Evaluate Potential Alternatives**


- Structure Floodproofing
- Dam Modifications
- Dam Removals
- Roadway Crossing Replacements
- River & Floodplain Restoration

vi. Beaver Maintenance
vii. Land Cover Preservation
viii. Infiltration Improvement
ix. Attenuation Improvement

*The Solutions Meeting*

**d) Summary Report**

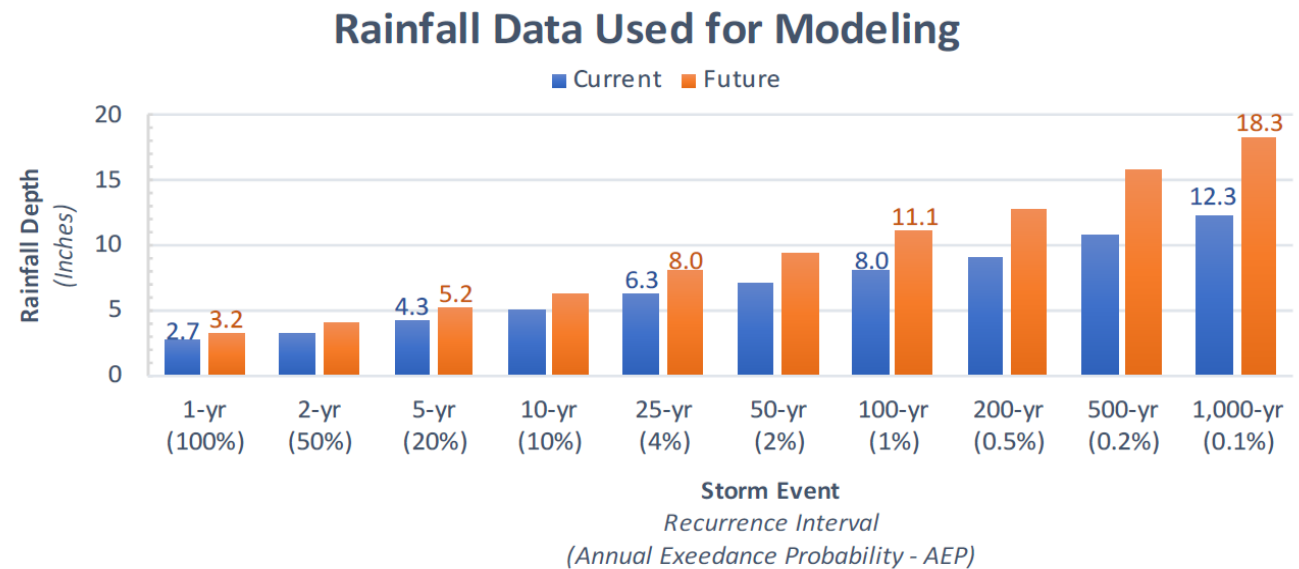
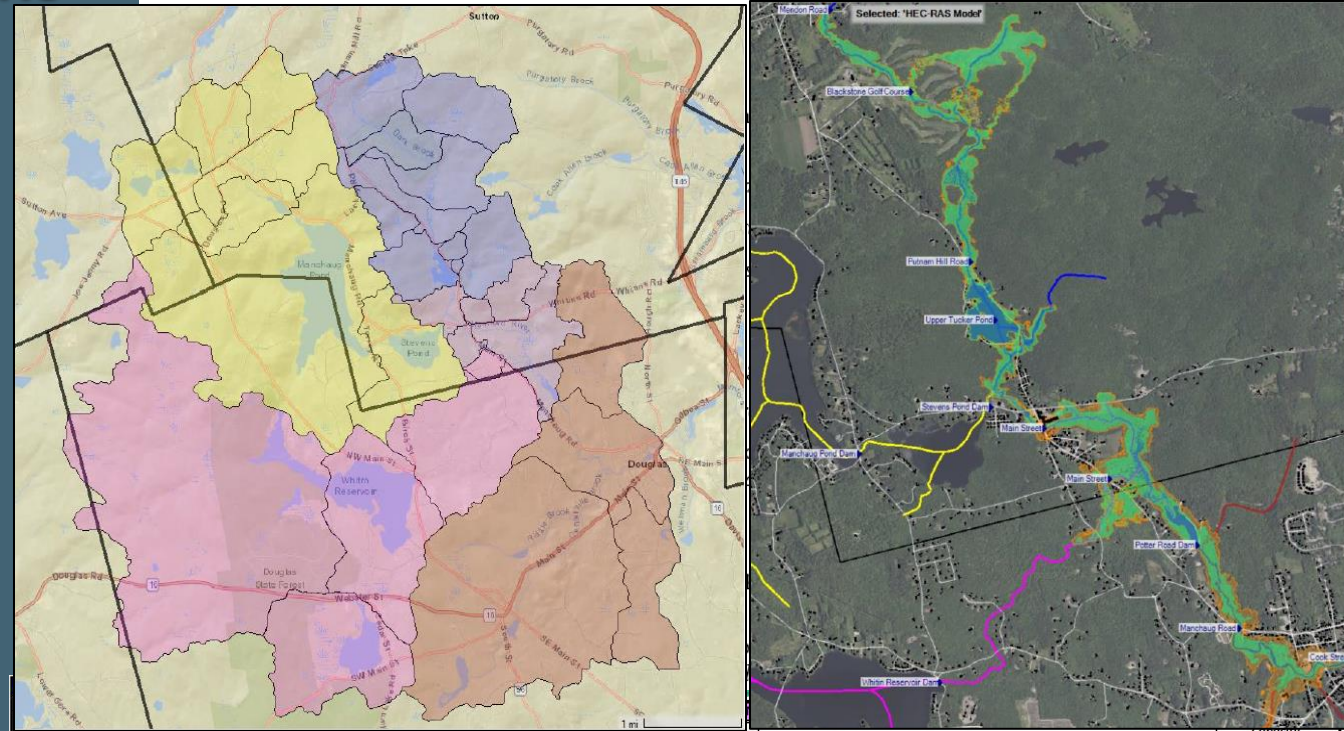
*The Closing Meeting*





# Phase II: Existing Conditions Evaluations

- Hydrologic and Hydraulic Evaluations
  - 1-yr through 1,000-year storm events
  - Current and Future<sup>1</sup> Rainfall
    1. Climate Change Informed Predicted Future (CCIPF)
- Identify Strengths & Vulnerabilities of Assets within each Reach (A-D)
  - Dams / Roadways / Buildings
- Report Sections
  2. Detailed Results for Each Reach
  3. Damage Assessment for Buildings
  4. Overview Results for Each Reach





# The Problem Meeting

- Second Public Meeting – March 16<sup>th</sup>
  - Evaluations Overview
  - Results Overview
  - Open Discussion
- Open Discussion from 25+ attendees generated valuable feedback both during the meeting and weeks after
- Feedback utilized to:
  - Refine Phase II findings and reporting
  - Refine scope of Phase III

## VILLAGE MEETING

### Manchaug Water Study Project – Meeting #2



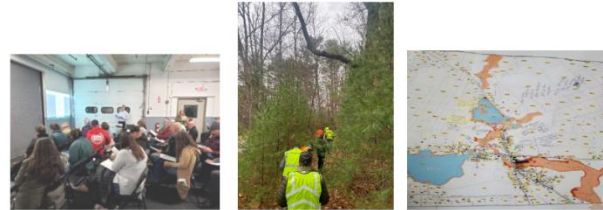
**Thursday, March 16th at 6 PM**  
Manchaug Mills, Blaxton Hall

The Town of Sutton received a \$75,000 Municipal Vulnerability Preparedness (MVP) Grant from the Executive Office of Energy and Environmental Affairs (EOEEA) ([www.resilientma.org/MVP](http://www.resilientma.org/MVP)) to assess and mitigate issues with the natural and manmade water flow systems in and around the Village. At Meeting #1 we discussed the overall project and received the knowledge and input of residents and stakeholders about these systems. We've used this input and completed the assessment of the water flow systems in the Village.

### Meeting #2 – Learn what we found and provide your feedback!

#### UP NEXT:

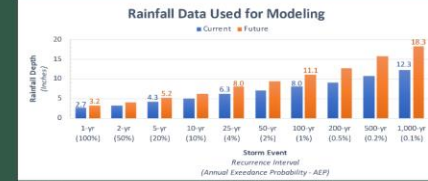
- Meeting #3 – April 27, 2023 – Share and discuss possible strategies and solutions.
- June 2023 - Final report presented to the Select Board.



If you have questions, want to be added to the stakeholder list, or need more information, please reach out to Jen Hager at [j.hager@town.sutton.ma.us](mailto:j.hager@town.sutton.ma.us) or 508-865-8729.

## Evaluations

- ▶ Hydrologic<sup>1</sup> & Hydraulic<sup>2</sup> (H&H) Modeling
- ▶ Current and Future<sup>3</sup> Rainfall Scenarios
- ▶ Decipher Model Results
- ▶ Identify Strengths & Vulnerabilities of Assets
- ▶ Dams
- ▶ Roadways
- ▶ Structures (EAD<sup>4</sup>)
- ▶ Watershed-Wide Assessment



#### Definitions:

1. **Hydrologic Modeling:** Used to determine how rainfall interacts with the ground surface.
  - ▶ How much of the rain is absorbed by the ground surface?
  - ▶ How much of the rain runs off to rivers and streams? And how much does it runoff?
2. **Hydraulic Modeling:** Used to determine what the runoff does to the river, its floodplain, and nearby infrastructure.
  - ▶ How high and wide does the water level reach? And how fast is it flowing?
  - ▶ What is expected to be impacted by those water levels?
3. **Climate Change Informed Predicted Future Rainfall Data**
4. **EAD: Equivalent Annual Damage**

## Reach C (Village) Model Results

### Beaver Activity

- #1 & Other Areas

### Dams

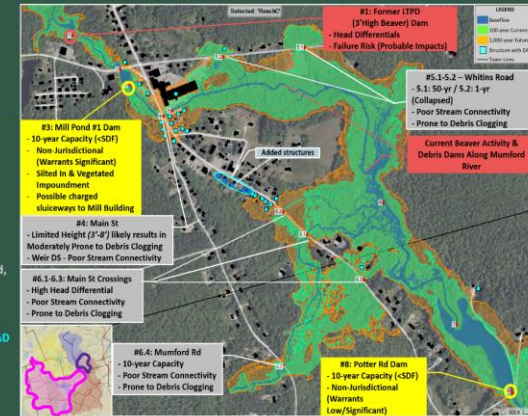
- #3 Mill Pond Dam
- #8 Potter Road Dam

### Roads

- #4 Main Street
- #9 Potter Road
- All 6 Tribs (3 Main Street, 2 Whitins Road, 1 Mumford Road)

### Buildings

- 25 w/ potential for EAD
- + 5 from Mitg Input
- Mill Site #1



# Phase III: Solution Strategy Development

- General Improvement Strategies
  - Section 5 of Report
  - Watershed-Wide, Building-Level, In-Stream
- Watershed-Wide Strategies
  - Section 6 of Report
  - EAP, Land Cover Interventions, River Obstructions
- Building-Level Strategies
  - Section 7 of Report
  - Sump Pumps, Floodproofing, Elevation, Retreat
- In-Stream Strategies
  - Section 8 of Report
  - Dam Modifications/Removals, Culvert Replacements
- Summary of All Strategies
  - Section 9 of Report

Potential "Solutions" - Abbreviated Tabulated Summary												
#	Location			Report Section	Action Item	Capacity - Current		Capacity - CCIPF		Estimate Range (\$K's)		Potential Funding
	Reach	#	Name			EC	PC	EC	PC	Lower	Higher	
1	All	-	Watershed Wide	Private, Town, State	6.1	Emergency Action Plan	-	-	-	-	\$ 50 \$ 100	EOEEA, FEMA
2	All	-	Watershed Wide	Private, Town, State	6.2.1	Land Cover Preservation	-	-	-	-	\$ 50 \$ 300	EOEEA, FEMA
3	All	-	Watershed Wide	Private, Town, State	6.2.2	Land Cover Conversion	-	-	-	-	\$ 200 \$ 2,000	EOEEA, FEMA
4	All	-	Watershed Wide	Private, Town, State	6.2.3	Green Stormwater Infrastructure	-	-	-	-	\$ 100 \$ 5,000	EOEEA, FEMA
5	All	-	River Wide	Private, Town, State	6.3.3	Beaver Dam and River Debris Removal, Monitoring & Maintenance (M&M)	-	-	-	-	\$ 750 \$ 3,000	MADER, NOAA
6	A	-	Reach A Buildings	Private	7.6	Building Modifications (59EA)	1	-	1	-	\$ 1,000 \$ 3,000	FEMA
7	B	-	Reach B Buildings	Private	7.6	Building Modifications (37EA)	1	-	1	-	\$ 500 \$ 1,000	FEMA
8	C	-	Reach C Buildings	Private	7.6	Building Modifications (30EA)	10	-	5	-	\$ 500 \$ 1,000	FEMA
9	B	11.2&11.3	Upper Tucker Pond (UTP) East and South Dams	Private, State	8.2.1.1	Hazard Reclassification, Spillway Design Flood (SDF) Modifications & Operational Plan	5	>1/2 PMF	2	>1,000	\$ 6,000 \$ 9,000	EOEEA, FEMA
10	A	11.2	Stevens Pond Dam (SPD)	Town	8.1.1.1	SDF Modifications & Operational Plan	>1,000	>1/2 PMF	200	>1,000	\$ 2,000 \$ 3,000	EOEEA, FEMA
10	A	11.2	Manchaug Road	Town	8.1.1.1	Crossing Replacement	-	-	-	-	\$ 2,500 \$ 5,000	MassDOT, MADER
11	A	10.2	Manchaug Pond Dam (MPD)	Town	8.1.1.2	SDF Modifications & Operational Plan	>1,000	>1/2 PMF	500	>1,000	\$ 1,500 \$ 4,000	EOEEA, FEMA
12	B	13	Putnam Hill Road	State	8.2.2	Crossing Replacement	10	200	5	50	\$ 2,000 \$ 3,000	MADER
13	B	9	Putnam Hill Road	State	8.2.2	Crossing Replacement	25	100	10	25	\$ 2,000 \$ 3,000	MADER
14	B	10	Tucker Lane Channel	Private	6.3.3 #5	Channel and Floodplain Regrading Upstream of Crossing	5	100	2	50	\$ 500 \$ 1,000	MADER, NOAA
15	A	1-7.1	Crossings US of SFPD	Town, Private	8.1.2	Crossing Replacements (11EA)	5-25	100	2-10	25-50	\$ 8,000 \$ 12,000	MADER
16	C	1	Mill #2 Site	Town, Private	6.3.3 #8	Floodplain Restoration at Mill #2 Site	-	-	-	-	\$ 500 \$ 1,000	EOEEA, MADER
17	C	3	Mill Pond Dam #1	Private	8.3.1.1	Modifications at Mill Pond Dam #1	10	500	5	100	\$ 1,000 \$ 1,500	EOEEA
18	C	5	Channel Weir	Private	8.3.1.3	Remove Weir and Restore Channel	-	-	-	-	\$ 50 \$ 100	MADER, NOAA
19	A	9	Sutton Falls Pond Dam (SFPD)	Private	8.1.1.3	SDF Modifications & Operational Plan	10	500	5	100	\$ 1,500 \$ 3,000	EOEEA, FEMA
20	C	5.2	Whitins Road	Town	8.3.2	Crossing Replacement	1	>1,000	<1	1,000	\$ 1,000 \$ 1,500	MADER
21	C	5.1	Whitins Road	Town	8.3.2	Crossing Replacement	50	>1,000	25	1,000	\$ 1,000 \$ 1,500	MADER
22	C	6.1-6.3	Main Street	State	8.3.2	Crossing Replacements (3EA)	50-200	1,000	25-50	500	\$ 3,000 \$ 5,000	MADER
23	C	8-9	Potter Road Dam & Bridge	Town, Private	8.3.1.2	Dam Removal/Modification and Crossing Replacement	10	200	5	50	\$ 2,000 \$ 4,000	EOEEA, MADER, MassDOT
24	C	6.4	Mumford Street	Town	8.3.2	Crossing Replacement	10	500	5	100	\$ 2,000 \$ 3,000	MassDOT, MADER
25	D	-	Reach D Buildings	Private	7.6	Building Modifications (22EA)	200	-	50	-	\$ 300 \$ 500	FEMA
Channel / Ecosystem Restoration											\$ 40 \$ 77	\$M's
Infrastructure Upgrade with Ecosystem Benefit											\$ 40,000,000 \$ 76,500,000	\$
Dam Modifications												
Structure Floodproofing												



# The Solutions Meeting

- Third Public Meeting – April 27<sup>th</sup>
  - Solutions Overview
    - Watershed-Wide
    - Reach-Specific
  - Open Discussion
- Open Discussion from 25+ attendees generated valuable feedback both during the meeting and weeks after
- Feedback utilized to:
  - Refine Phase III findings and reporting
  - Refine the content of the Plan/Report

## VILLAGE MEETING

### Manchaug Water Study Project – Meeting #3



**Thursday, April 27th at 6 PM**  
Manchaug Mills, Blaxton Hall

The Town of Sutton received a \$75,000 Municipal Vulnerability Preparedness (MVP) Grant from the Executive Office of Energy and Environmental Affairs (EOEEA) ([www.resilientma.org/MVP](http://www.resilientma.org/MVP)) to assess and mitigate issues with the natural and manmade water flow systems in and around the Village. At Meeting #1 we discussed the overall project and received the knowledge and input of residents and stakeholders about these systems. At Meeting #2 we learned about the evaluation of the water flow systems in the Village and the issues discovered within the system.

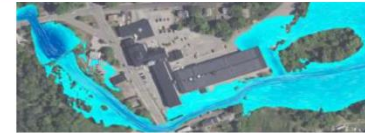
**Meeting #3 – Discuss possible solutions and provide your feedback!**

#### UP NEXT:

- June 2023 - Final report presented to the Select Board.

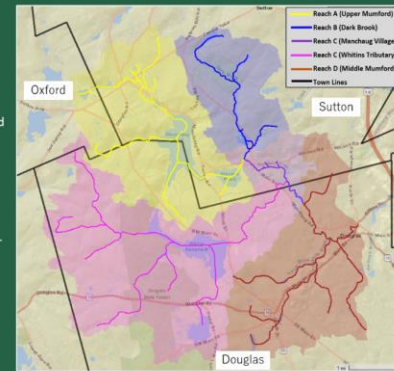


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## Watershed-Wide Solutions

- **Emergency Action Plan** – Watershed specific emergency action/response plan developed from the results of this study & intended to improve both public knowledge of the hazard (riverine flooding) as well as emergency preparedness & response to that hazard
- **Land Cover Interventions** - Policy & action aimed at maintaining & improving land cover conditions throughout the watershed
- **Beaver/River Maintenance** – Action to clear the watershed's rivers of beaver & debris dams at high risk/impact areas



## Reach C (Village) Solutions

- **Beaver/River M&M**
- **Previously Discussed #1, #4, & #5 Specifics**

### Dam Modifications

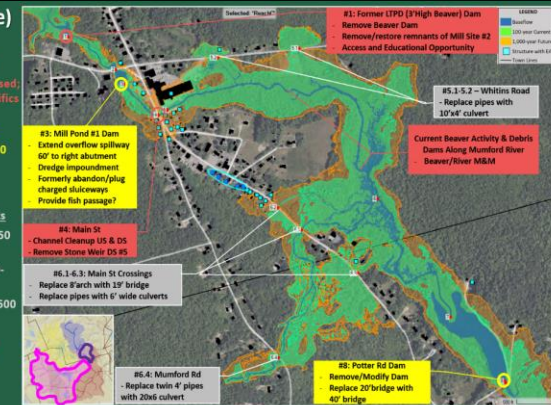
- **#3: From 10 to 500**
- **#8: Removed / Modified**

### Culvert Replacements

- **#5.1-5.2: From 1-50 to 1,000**
- **#6.1-6.3: From 50-200 to 1,000**
- **#6.4: From 10 to 500**

### Buildings

- **Modifications at most 30**



**MVP 3rd Meeting**  
**April 27, 2023**

# Phase IV: Report Development

- **Draft Report (194 Pages)**
  - **Report Body (1-53)**
    - 9 Sections (1.0 – 9.0)
  - **Appendix A: Supporting Graphics (54-83)**
  - **Appendix B: Corridor Photographs (84-119)**
  - **Appendix C: Meeting Materials (120-193)**
    - The Listening Session Handout (121-150)
    - The Problem Meeting Slides (151-169)
    - The Solution Meeting Slides (170-193)
  - **Appendix D: Report Limitations (194)**

PREPARED FOR: TOWN OF SUTTON

## MANCHAUG WATER RESOURCES RESILIENCY ACTION PLAN Sutton, Massachusetts



PREPARED BY:

PARE CORPORATION  
10 LINCOLN ROAD, SUITE 210  
FOXBORO, MASSACHUSETTS 02035

PARE PROJECT NUMBER 22153.00

DRAFT Report – May 2023





# Next Steps

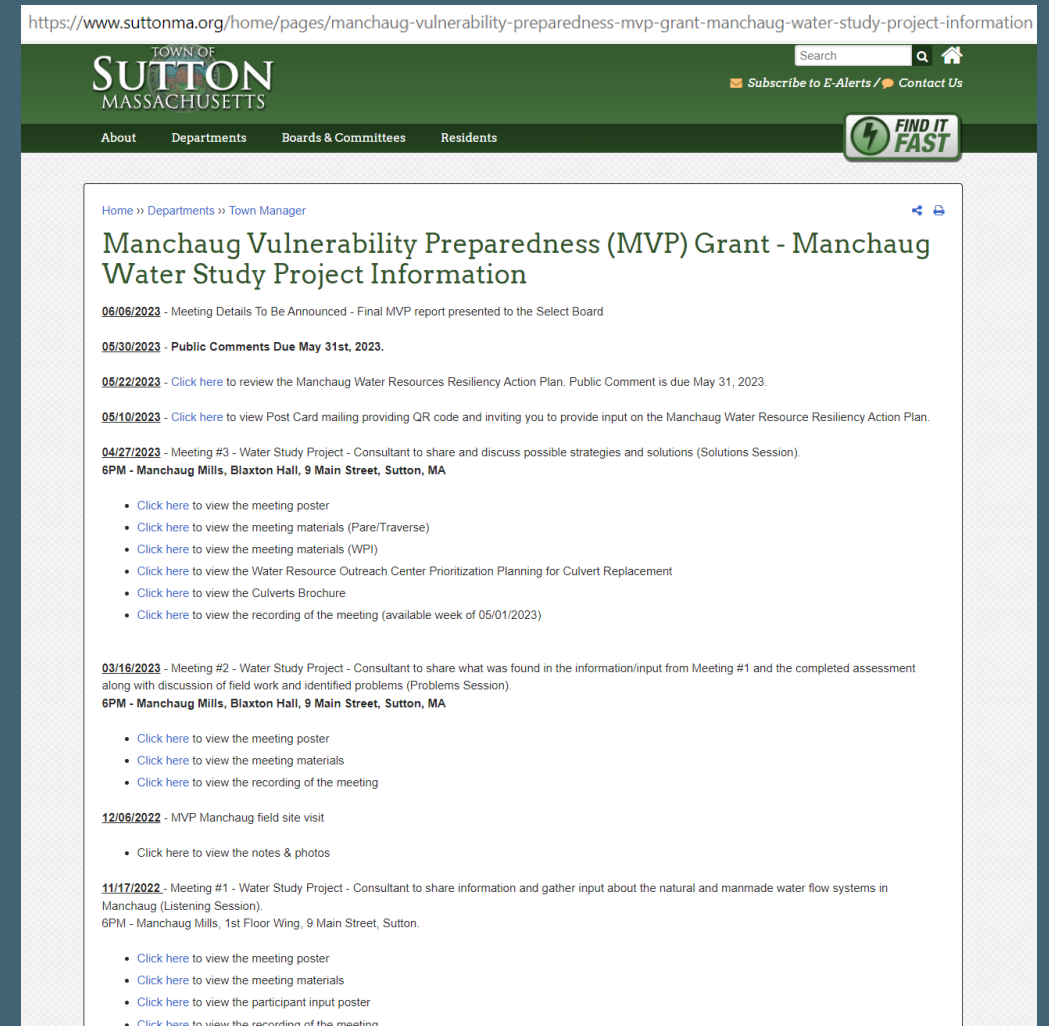
- Phase V: Report Finalization
  - Comments from Public – June 14<sup>th</sup>
  - Comments from Select Board – June 14<sup>th</sup>
  - Incorporate Comments Received
  - Issue Final Report – June 30<sup>th</sup>

# Contact

- Contact: Jennifer Hager
  - j.hager@town.Sutton.ma.us
  - 508-865-8729

# Online Materials

<https://www.suttonma.org/home/pages/manchaug-vulnerability-preparedness-mvp-grant-manchaug-water-study-project-information>





# Discussion





