

DRINKING WATER VULNERABILITY ASSESSMENT AND RESILIENCE PLAN

A PLAN FOR COMMUNITY WATER SYSTEMS AND PRIVATE WELLS



Photo courtesy of NPU (Taken by MMI)

Presented by:

**David Murphy, PE, CFM
Milone & MacBroom, Inc.**

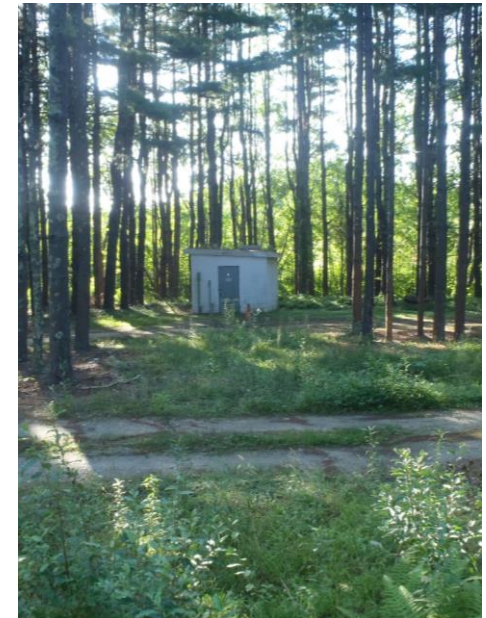


Photo courtesy of CWC (Taken by MMI)

AGENDA

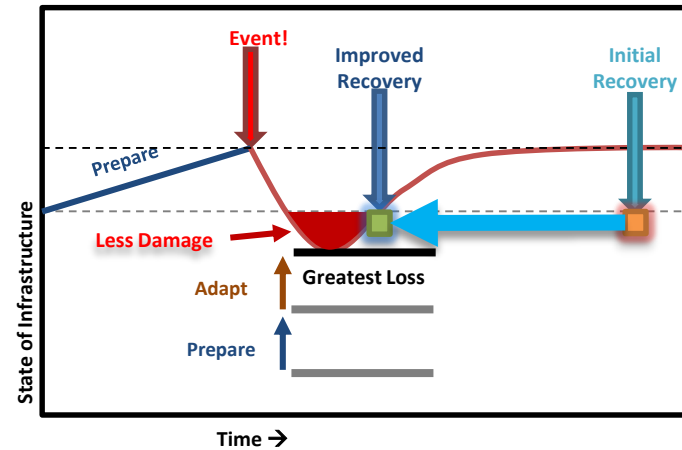
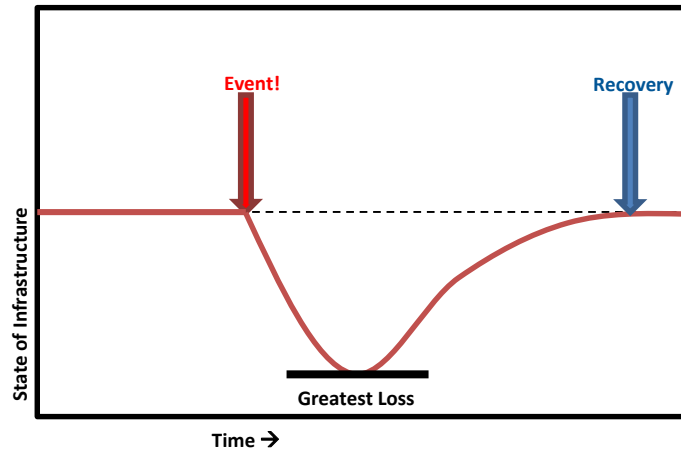
- What Are We Talking About?
- Overview of Plan Contents
- Top Ten Plan Themes
- Plan Recommendations
- Linkage to Other State and Local Plans
- How Can the Plan Be Used?

WHAT ARE WE TALKING ABOUT?

*Resiliency =
Prepare,
Withstand,
Recover,
Adapt*

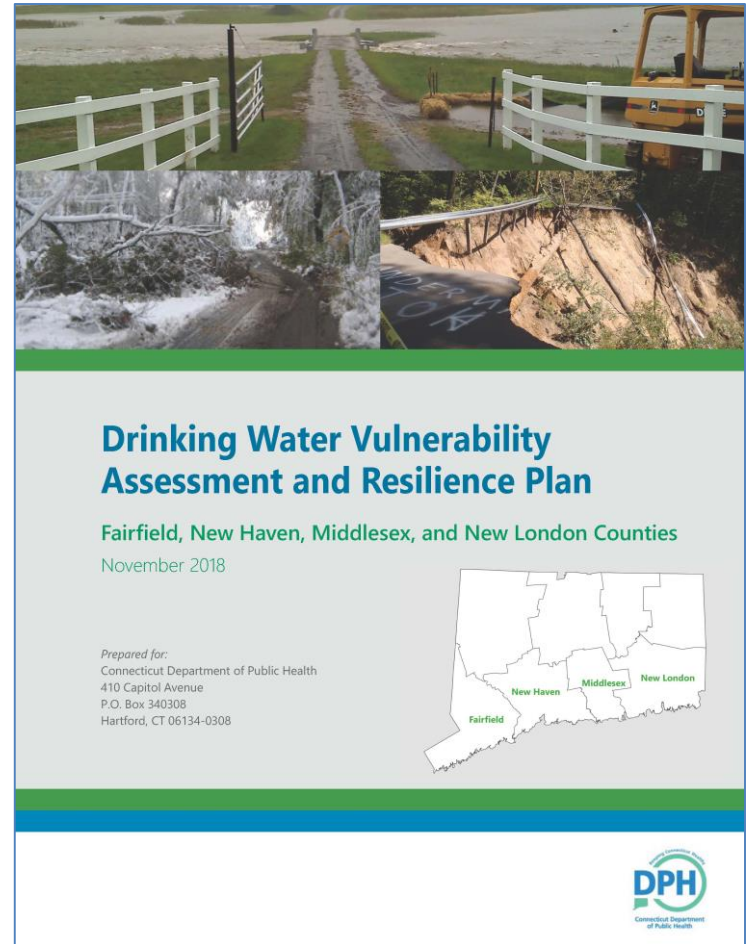


Elevating buildings protects them from storm surges



OVERVIEW OF PLAN CONTENTS

1. Executive Summary
2. Introduction
3. Community Water System
Vulnerability and Risk Assessment
4. Private Well Vulnerability and Risk
Assessment
5. Findings
6. Recommendations



TOP TEN PLAN THEMES

1. Lessons Learned from Past Events
2. Flood Risk to Community Water System Infrastructure & Critical Facilities
3. Water Quality and Quantity Vulnerabilities
4. Climate Change Impacts
5. Community Water System Vulnerabilities and Emergency Preparedness
6. Drought Planning and Resilience
7. Interconnections and Infrastructure Upgrades
8. Drinking Water Section Emergency Preparedness
9. State and Local Laws Affecting Drinking Water
10. Addressing Private Well Vulnerabilities

PLAN RECOMMENDATIONS

1. Lessons Learned from Past Events

- A. Standby power and generators
- B. Priority electricity service restoration
- C. Small system assistance
- D. Water use restrictions and droughts
- E. Drought communication and messaging



PLAN RECOMMENDATIONS

2. Flood Risk to Community Water System Infrastructure & Critical Facilities

- A. Wells in flood risk zones
- B. Dam-related risks
- C. Pumping stations and treatment plants
- D. Adequate storage
- E. GIS of critical facilities served by water systems and critical facilities that *are* water systems
- F. Address sections of water systems that serve critical facilities
- G. Changing status of critical facilities



PLAN RECOMMENDATIONS

3. Water Quality and Quantity Vulnerabilities

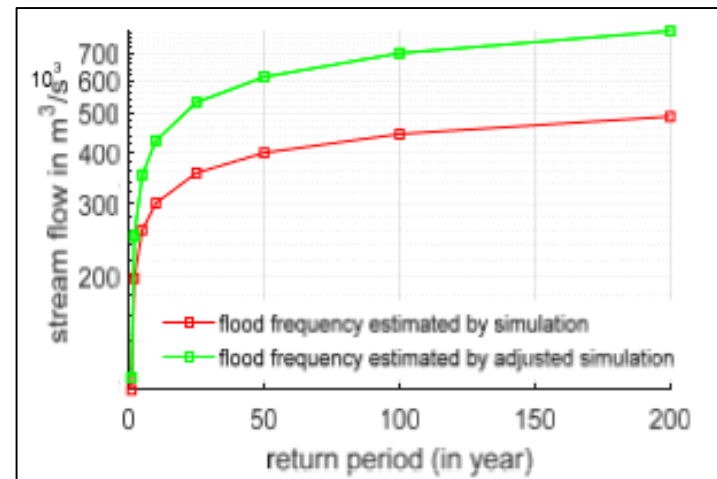
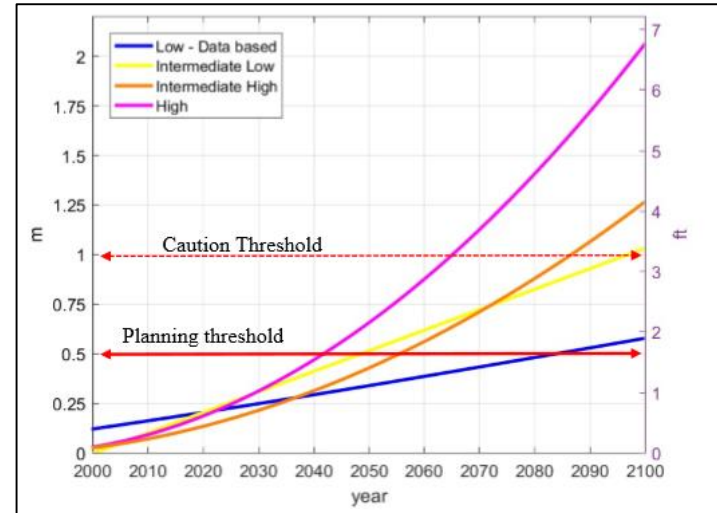
- A. Testing frequencies
- B. Incorporating resiliency into sanitary surveys
- C. Incorporating resiliency into capacity assessment tools
- D. Water quality and violation baseline
- E. Source water protection as resiliency
- F. Algal blooms
- G. Maximum contaminant level violations in small non-community systems



PLAN RECOMMENDATIONS

4. Climate Change Impacts

- A. Incorporate changing flood risks into plans and operations
- B. Incorporate changing drought risks into plans and operations
- C. Tracking algal blooms



PLAN RECOMMENDATIONS

5. Community Water System Vulnerabilities and Emergency Preparedness

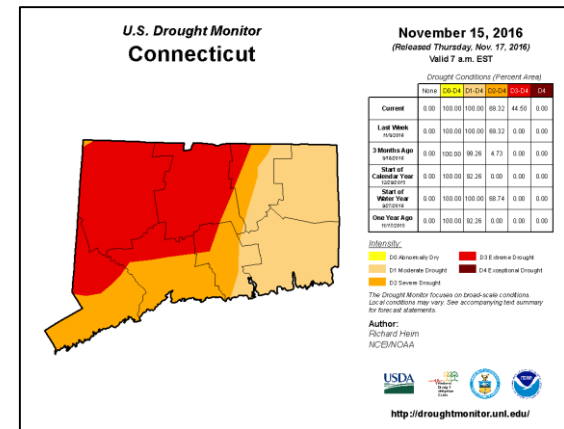
- A. Incorporate climate change risks into emergency contingency plans in the water supply plan
- B. Water supply plan emergency contingency plans should list all critical facilities as priority water service facilities

Critical Customers by Service Area				
Name	Street	Town	Telephone	Type
Amity Service Area				
Brighton Gardens	330 Amity Road	Woodbridge	203-389-2911	Conv Home
Ansonia/Derby Low Service Area				
Ansonia Middle School	115 Howard Ave.	Ansonia	203-736-5060	School
Ansonia Sewage Plant	Division Street	Ansonia	203-736-5945	
Assumption School	62 North Cliff Street	Ansonia	203-734-0655	School
Derby Cellular Products	150 Roosevelt Dr.	Derby	203-734-4661	
Derby Convalescent Home	210 Chaffield St.	Derby	203-734-7401	Conv Home
Derby High School	8 Nutmeg Ave.	Derby	203-736-5032	School
Derby Sewage Plant	1 Caroline St.	Derby	203-736-1475	
Gordon Rubber & Packing	10 Cemetery Ave.	Derby	203-735-7474	
Griffin Hospital	130 Division St.	Derby	203-735-7421	Hospital
Irving School	9 Garden Pl.	Derby	203-736-5043	School
Lincoln School	83 Cottage Ave.	Ansonia	203-736-5075	School
Seymour Sewage Plant	Derby Ave.	Seymour	203-735-0288	
St. Joseph's School	36 Jewett St.	Ansonia	203-734-3821	School
St. Mary's School	14 Seymour Ave.	Derby	203-735-6471	School
Brandford Service Area				
Vincent Hanchuruck	15 Woodside Dr.	Brandford	203-488-9657	Resident
Burwell Hill Service Area				
CT Air National Guard	206 Boston Post Rd.	Orange	860-292-2790	Military Facility
Dave Boucher	310 Old Silo Rd.	Orange	924-8341 Work 795-0013 Home	
Donald McDonald	394 Ridge Rd.	Orange	203-799-2003	Dialysis
Orange Health Care Center	225 Boston Post Rd.	Orange	203-795-0835	Conv Home
Haven Health Soundview	1 Care Lane	West Haven	203-934-7955	Conv Home
Seaboard Metal Finishing Co.	50 Fresh Meadow Rd.	West Haven	203-933-1603	Plating
Cheshire Service Area				
Burdette Cleaners	190 South Main St.	Cheshire	203-272-6670	Cleaners
Cheshire Correctional Inst.	900 Highland Ave.	Cheshire	203-272-2215	Jail
Cheshire WPC Plant	1325 Cheshire St.	Cheshire	203-279-9104	
Elm Park Baptist Home	140 Cook Hill Rd.	Cheshire	203-272-3547	Conv Home
Highland Health Care Center	745 Highland Ave.	Cheshire	203-272-7285	Conv Home
Maloney Youth Institute	275 Jarvis St.	Cheshire	203-271-5115	Jail
Manson Youth Institute	42 Jarvis St.	Cheshire	203-272-5391	Jail
Webster Correctional Inst.	116 Jarvis St.	Cheshire	203-271-5910	Jail
City of Derby High Service Area				
Marshall Lane Manor	101 Marshall Lane	Derby	203-734-3363	Conv Home
Ford Street Extra High Service Area				
Bredley School	155 David Humphry Rd.	Derby	203-736-5040	School
Mead School	75 Ford St.	Ansonia	203-736-5090	School
Prendergast School	59 Finney St.	Ansonia	203-736-5070	School
Hill Street High Service Area				

PLAN RECOMMENDATIONS

6. Drought Planning and Resilience

- A. Evaluate and re-set triggers for response now
- B. Evaluate and re-set triggers for response every ten years
- C. Drought forecast modeling
- D. Multiple sources and interconnections
- E. Water conservation, communication, messaging



PLAN RECOMMENDATIONS

7. Interconnections and Infrastructure Upgrades

- A. Pursue interconnections between large systems
- B. Pursue interconnections between small systems, or small to large
- C. Water chemistry/compatibility
- D. Infrastructure redundancies within small systems
- E. Use of Drinking Water State Revolving Funds



PLAN RECOMMENDATIONS

8. Drinking Water Section Emergency Preparedness

- A. Update the Public Health Emergency Response Plan
- B. WebEOC
- C. Drinking Water Section Emergency Response Plan template
- D. Drinking Water Workgroup
- E. Drinking Water Section staff redundancies
- F. Culture of preparedness

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

Jewel Muller, M.D., MPH, M.P.A.
Commissioner

Daniel P. Malley
Governor
Nancy Wyman
Lt. Governor


DPH Drinking Water Section Strategy to Address the Effects of Storms Irene, Alfred and Sandy on Connecticut's Community Public Water Systems
Original draft December 2011, last update April 2018

Following the three storms that impacted Connecticut in 2011 and 2012, the Department of Public Health Drinking Water Section developed a strategy to address emergency preparedness for the state's community public water systems (CPWS). This public health strategy was developed in order to assure a safe and adequate water supply to the 2.9 million Connecticut residents served by CPWS. The strategy has the following objectives that address vulnerabilities, preparedness, resiliency and system capacity:

1. Assure sustained water supply for all CPWS,
2. Provide current and accurate large system status shared across WebEOC,
3. Work to develop mechanisms to prioritize restoration of street power to CPWS and priority facilities,
4. Assure that small community public water systems are well prepared to proactively address emergency situations.
5. Assure system capacity
6. Assure adequate certified operator oversight
7. Assure adequate review and oversight of public water systems
8. Work toward more resilient CPWS through enhanced water supply planning


Storms Irene, Alfred and Sandy brought different challenges, however affected small satellite CPWS (systems that serve under 1,000 people) in a similar way due to lengthy power outages that impacted large regions of Connecticut. Further, while large CPWS (systems that serve over 1,000 people) were able to sustain water supply and system pressure, some experienced lack of priority to regain street power with multiple large scale pump stations and surface water treatment plants on generators for more than 7 days.

On average for all three storms, over 100 small CPWSs were on boil water advisory due to loss of system pressure caused by loss of street power. These systems represent a significant percentage of Connecticut's 450 small CPWS. Many small CPWS were ill prepared, lacked planning, and lacked adequate technical, managerial and financial capacity to address loss of street power for an extended period of time. Below is a summary of the effects of the three storms on the state's public water systems:


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**PUBLIC HEALTH
EMERGENCY RESPONSE PLAN**


I. BASE PLAN



Emergency Support Function #8
Public Health and Medical Services



CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
Last Revised: July 2011

State of Connecticut



WebEOC Users' Guide

Prepared by
Department of Emergency Services and Public Protection (DESPP)
Division of Emergency Management and Homeland Security (DEMHS)



v. 2.00 March 2019

PLAN RECOMMENDATIONS

9. State and Local Laws Affecting Drinking Water

- A. Coordinated Water System Plan updates to include resiliency
- B. Water Planning Council role
- C. Local flood regulations

The screenshot shows the Connecticut State Department of Public Health website. The header includes the DPH logo and the text "Connecticut State Department of Public Health". Below the header is a navigation menu with the following items: DRINKING WATER, Contact Information, Forms and Applications, Publications and Reports, Resources and Links, Drinking Water Topics A to Z, and DPH Homepage. The main content area features three maps of Connecticut, each representing a different Water Utility Coordinating Committee (WUCC): Western WUCC, Central Corridor WUCC, and Eastern WUCC. The text "Water Utility Coordinating Committees" is displayed below the maps.

The letter is from the State of Connecticut Water Planning Council, dated December 28, 2018. It is addressed to the Office of the Secretary of the State, 30 Trinity Street, Hartford, CT 06106. The subject is the 2019 Schedule of the State Water Planning Council Meetings. The letter references Section 1-225(b) of the Connecticut General Statutes and provides a schedule of regular State Water Planning Council meetings for the year 2019.

MEETING DATES	TIME	LOCATION
January 8, 2019	1:30 p.m.	Public Utilities Regulatory Authority
February 5, 2019		Ten Franklin Square
March 5, 2019		New Britain, CT 06051
April 2, 2019		
May 7, 2019		
June 4, 2019		
July 2, 2019		
August 6, 2019		
September 3, 2019		
October 1, 2019		
November 5, 2019		
December 3, 2019		

The letter is signed by John W. Belkoski, III, Chairperson, Water Planning Council. Contact information for the Water Planning Council is provided at the bottom: Ten Franklin Square, New Britain, Connecticut 06051. Email: www.state.ct.us/pur. Twitter: [@ActiveActionEggs](https://twitter.com/ActiveActionEggs).

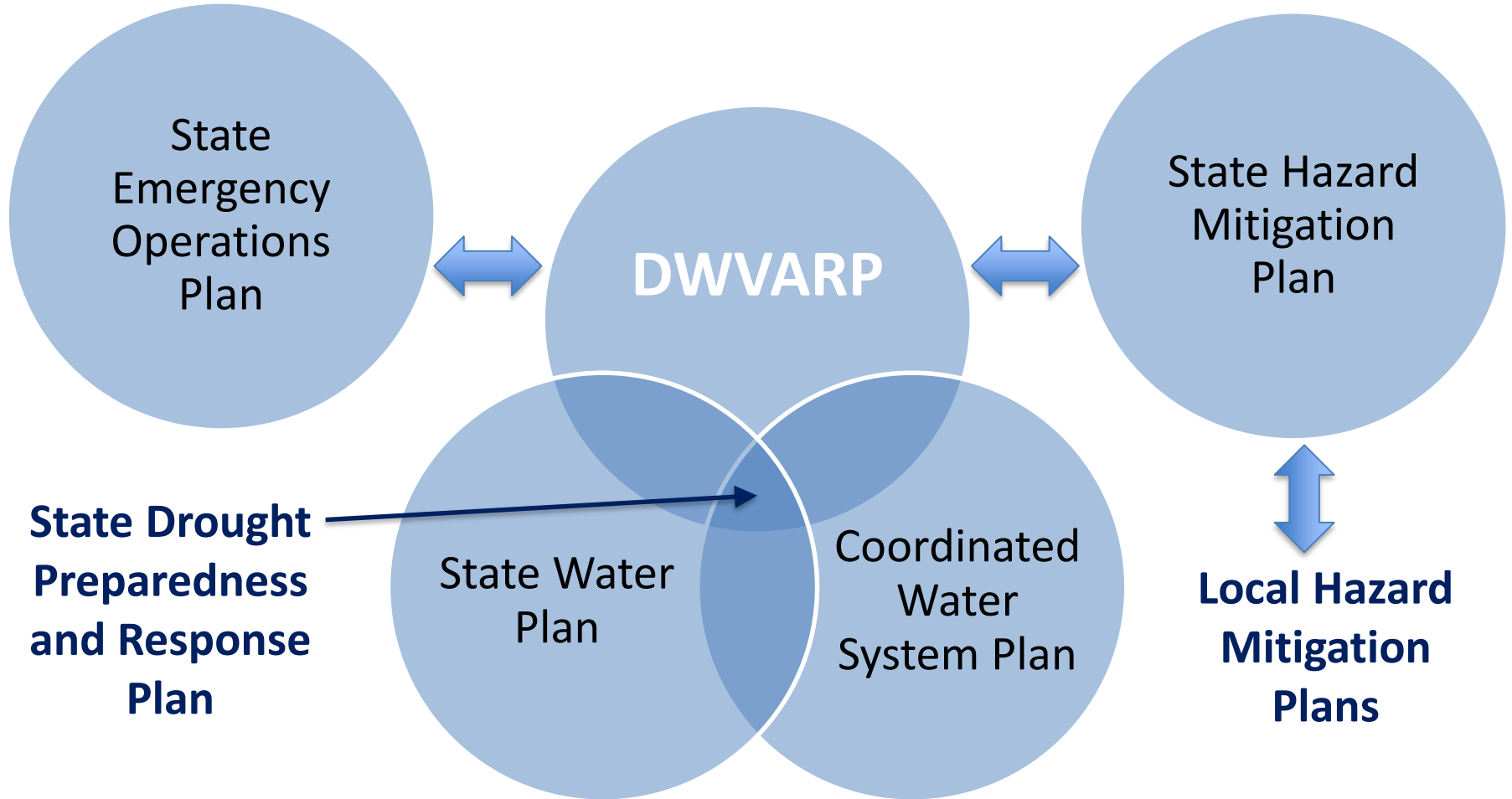
PLAN RECOMMENDATIONS

10. Addressing Private Well Vulnerabilities

- A. Outreach to towns and health districts
- B. Funding to remedy issues
- C. Specific private well risk reduction options
 - Siting
 - Drainage and flood control
 - Acquisitions
 - Water main extensions
 - New water systems
 - Well protection
 - Well relocation
- D. Water haulers
- E. Private well regulations
- F. Private well database

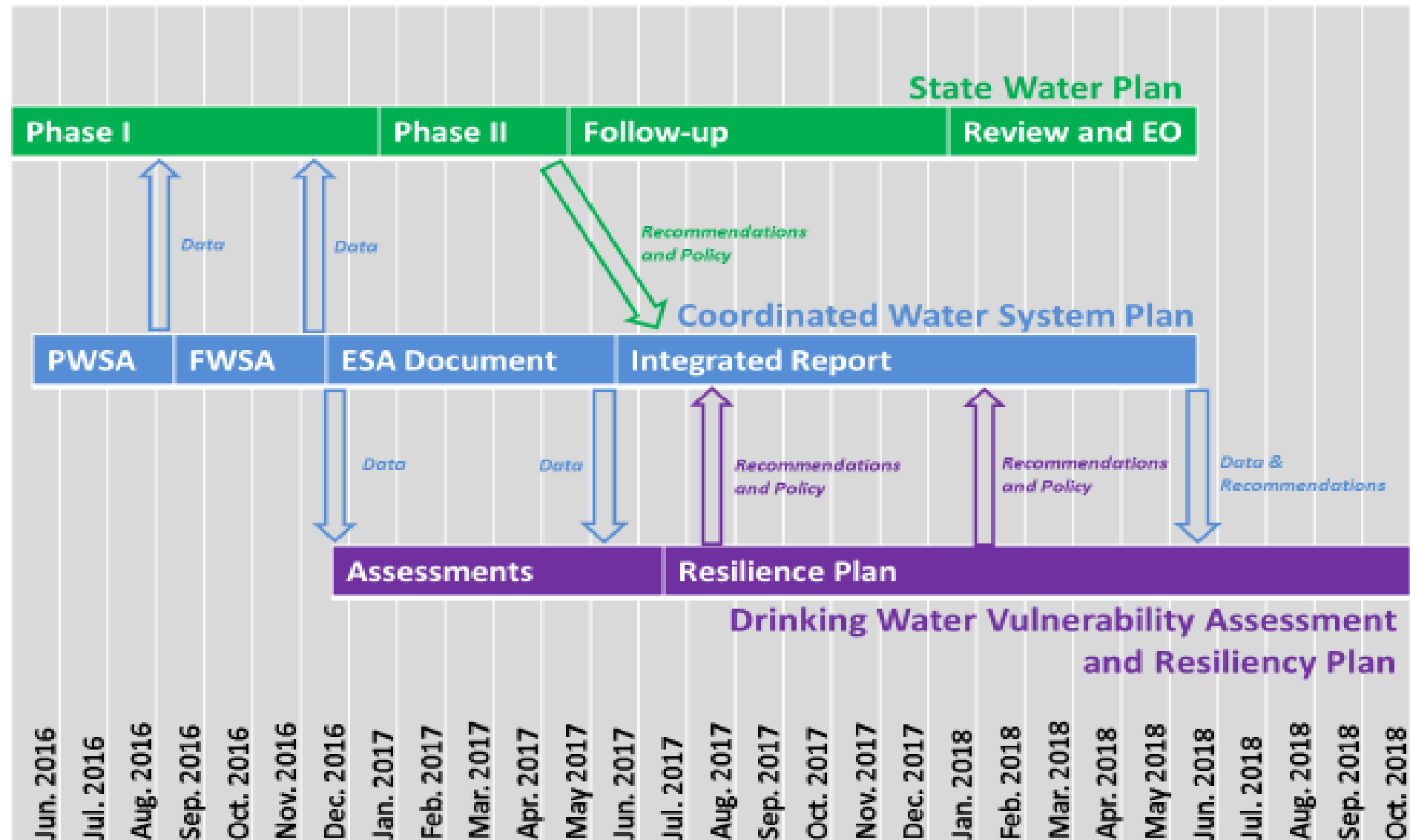


LINKAGE TO OTHER STATE AND LOCAL PLANS



LINKAGE TO OTHER STATE AND LOCAL PLANS

Relationship between Coordinated Water System Planning (WUCC), State Water Plan, and Drinking Water Vulnerability Assessment/Resiliency Plan



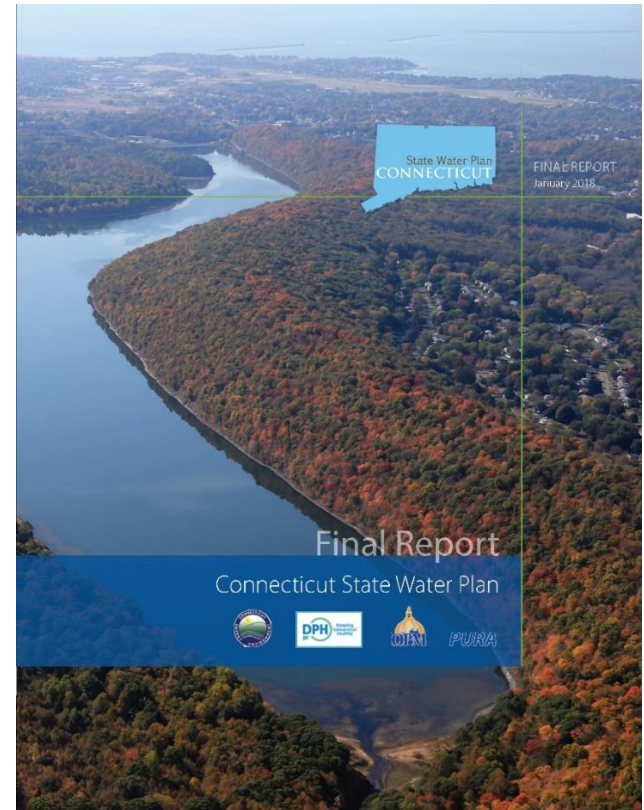
LINKAGE TO OTHER STATE AND LOCAL PLANS

State Water Plan Authority

- Public Act 14-163 (CGS Section 22a-352)

Where is Resiliency Addressed?

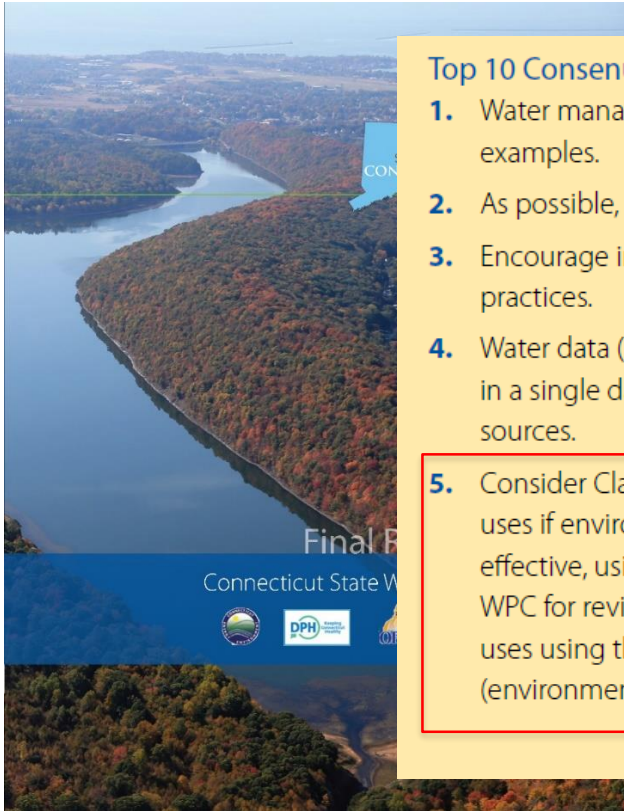
- Climate Change Assessment
- Policy Recommendations
- “Pathway Forward” Recommendations
- “Top Ten Consensus-Based Policy Priorities”



LINKAGE TO OTHER STATE AND LOCAL PLANS

Top 10 Consensus-Based Policy Recommendations:

1. Water management should follow scientific examples.
2. As possible, remove obsolete water registrations.
3. Encourage innovation in agricultural water practices.
4. Water data (or access to it) should be centralized in a single database and/or portal to other sources.
5. Consider Class B Water for individual non-potable uses if environmentally prudent and cost-effective, using guidelines to be developed by the WPC for review of Class B water for non-potable uses using the Triple Bottom Line philosophy (environmental, social, and economic metrics).
6. Develop an education and outreach strategy focusing on water conservation topics.
7. The WPC should provide ongoing review of other Connecticut state plans in order to identify and address inconsistencies.
8. Encourage regional water solutions where they are practical and beneficial.
9. Reaffirm support for the protection of Class I and II land contributing to water supply. Expand protections to other watershed lands and land that feeds aquifers used for public water supply or by private wells.
10. Create a data-based water education program aimed at the general public and municipal officials.



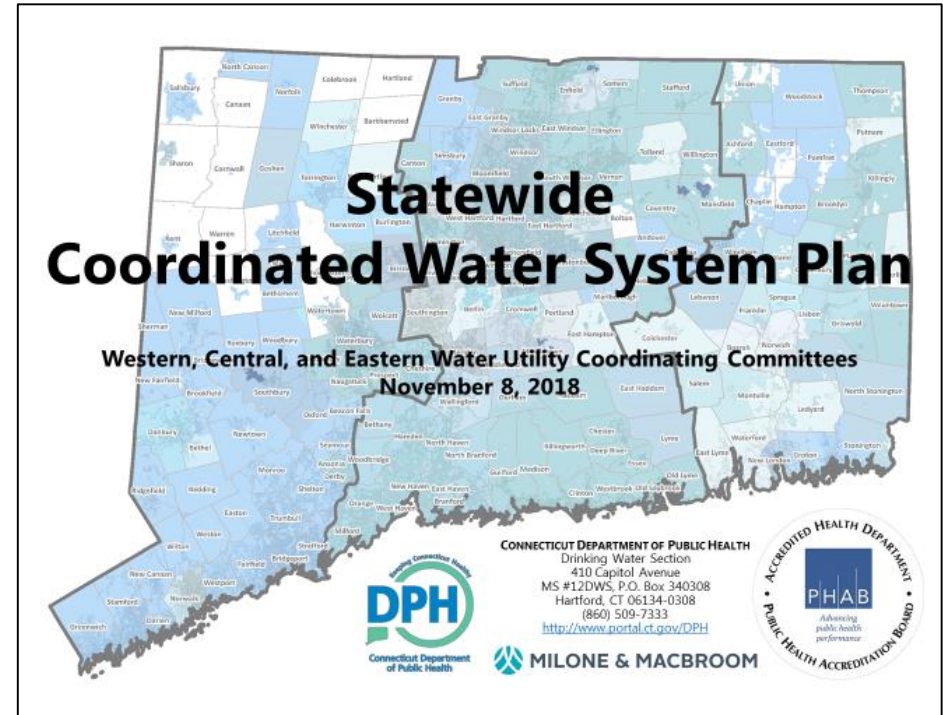
LINKAGE TO OTHER STATE AND LOCAL PLANS

Authority for the Water Utility Coordinating Committees (WUCCs)

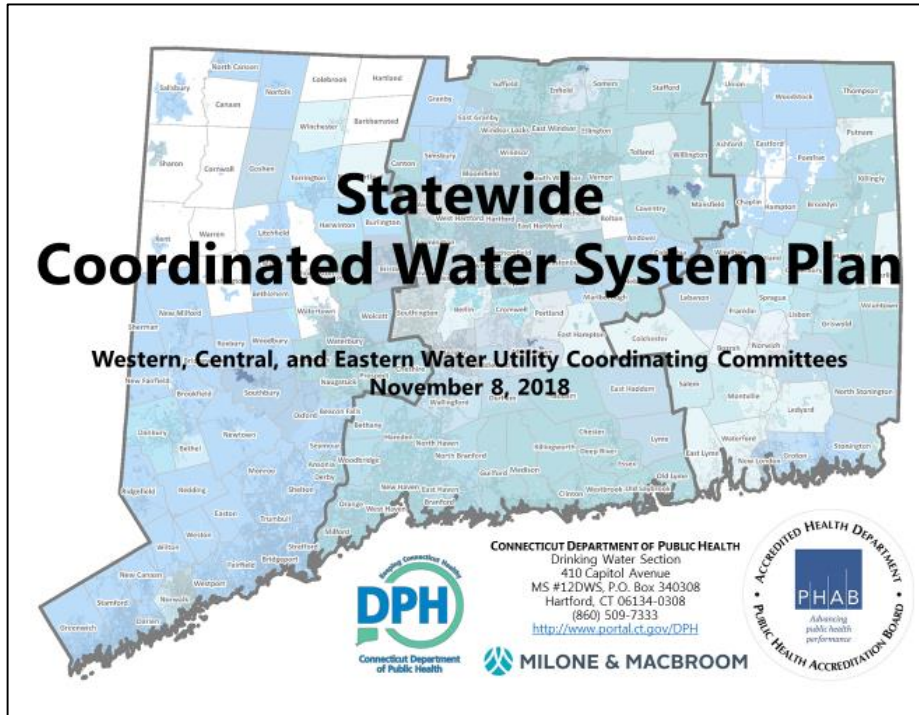
- Public Act 85-535, CGS Section 25-33c-h and RCSA Section 25-33h-1

Where is Resiliency Addressed?

- Water Supply Assessment: "Issues, Needs, Deficiencies"
- Integrated Report: "Climate Change and Resiliency"
- Integrated Report: "Potential Interconnections Recommended to Increase Resiliency"
- Executive Summary and Table of Recommendations



LINKAGE TO OTHER STATE AND LOCAL PLANS



THE TOP TEN NEEDS FOR PUBLIC WATER SYSTEMS

As envisioned in [CGS Section 25-33c](#), "an adequate supply of potable water for domestic, commercial and industrial use is vital to the health and well-being of the people of the state." This **vision statement** guided the CWSP process and requires constant vigilance by state agencies and public water systems to ensure adequate water quality and quantity is maintained. Each regional CWSP includes more than 60 specific recommendations in the [Integrated Report](#) for responsible planning, drought management, source protection, water conservation, resiliency, and funding to be pursued through 2030. These recommendations are reflected in the following top ten needs for public water systems statewide, each of which is discussed further on the following pages.

- 1. Regionalization and Interconnections**
Ensure redundant and environmentally responsible supplies.
- 2. Water Conservation and Water Efficiency**
Reduce future demands and unnecessary water use.
- 3. Reduction in Clustering of Small Water Systems**
Encourage system consolidations and ensure responsible planning to prevent proliferation of adjacent (but independent) small systems.
- 4. Assistance to Small Public Water Systems**
Ensure proper technical, managerial, and financial capacity of small public water systems.
- 5. Investment in Infrastructure**
Replace aging infrastructure, including century-old pipes.
- 6. Funding**
Provide grants and loans for planning, projects, and small systems in line with the above needs.
- 7. Drought Management and Resilience**
Increase awareness of drought impacts and standardize responses to the extent practicable.
- 8. Resiliency to Storms and Climate Change**
Reduce recovery time and adapt to future conditions.
- 9. Protection of Watersheds and Supplies**
Continue to ensure adequate water supplies with high water quality.
- 10. Improvements to Water Demand and Water Quality Planning**
Avoid the development of unnecessary new sources and ensure proper consideration of regulated and unregulated contaminants.

 MILONE & MACBROOM **1**

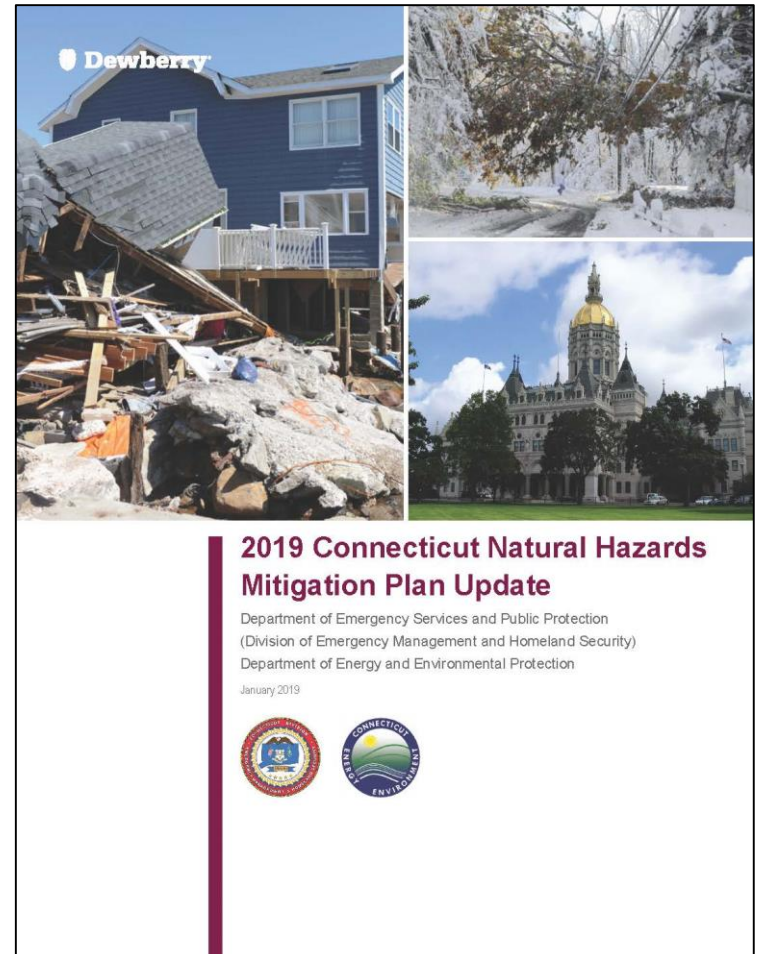
LINKAGE TO OTHER STATE AND LOCAL PLANS

Authority for State Hazard Mitigation Plan

- Stafford Act; Updated every five years

Example Mitigation Actions in 2019

- Review model ordinances and samples of higher standards language that communities can adopt into existing floodplain ordinances
- Encourage municipalities to adopt local water use restriction ordinances to ensure that proper water conservation measures are implemented during periods of severe to extreme drought and other water emergencies, in line with the Connecticut Drought Preparedness and Response Plan. Expand the local focus on drinking water vulnerability, with emphasis on private wells.



LINKAGE TO OTHER STATE AND LOCAL PLANS

Authority for Local Hazard Mitigation Plans

- Stafford Act; Updated every five years

Example Mitigation Actions

- Provide lists of critical facilities to water utilities to coordinate water system emergency planning
- Extend water mains to areas without fire protection
- Incorporate freeboard to local flood regulations (i.e. build higher)

Facility Name	Town	Address	100-Year Flood Zone	500-Year Flood Zone	Dam Breach Inundation Area
Mansfield center for nursing and rehab	Mansfield	100 Warren Circle			
Juniper hill elderly housing	Mansfield	1 Silo cir			
wrights way elderly housing	Mansfield	309 Maple Rd			
Jensens residential community	Mansfield	536 Middle Turnpike			
MANSFIELD MIDDLE SCHOOL	Mansfield	205 SPRING HILL RD.			
UNIV OF CT CHILD DEVEL LABS	Mansfield	843 BOLTON RD-U-117 HUMAN DEV			
E. O. SMITH HIGH SCHOOL	Mansfield	1235 STORRS RD.			
BERGIN CORRECTIONAL INSTITUTE	Mansfield	251 MIDDLE TPKE. 321 HUNTING LODGE RD.			
DOROTHY C. GOODWIN SCHOOL	Mansfield	999 Storrs RD			
Mansfield VFC	Mansfield	879 Stafford RD			
Eagleville Fire Department	Mansfield	126 N Eagleville RD			
University of Connecticut Fire Department	Mansfield	4 S Eagleville Rd			
Mansfield Police Dept	Mansfield	76 Quinn Rd			
Transfer Station	Marlborough	26 N Main St			
Town Hall	Marlborough	200 West Road	X		
Fire House #2	Marlborough	85 STAGE HARBOR RD			
MARLBOROUGH HEALTH & REHABILITATION CENTER	Marlborough	25 SCHOOL DR.			
MARLBOROUGH ELEMENTARY SCHOOL	Marlborough	7 Hebron RD			
Marlborough Volunteer Fire Department	Marlborough	10 Chestnut Street			
Police Department	New Britain	55 GRAND ST			
GRANDVIEW REHABILITATION AND HEALTHCARE CENTER	New Britain	975 CORBIN AVE			
JEROME HOME	New Britain	50 PULASKI ST			
MONSIGNOR BOJNOWSKI MANOR, INC	New Britain	400 BRITTANY FARMS RD			X
AUTUMN LAKE HEALTHCARE AT NEW BRITAIN	New Britain	66 CLINIC DR			
CASSENA CARE AT NEW BRITAIN	New Britain	100 GRAND STREET			
NEW BRITAIN GENERAL HOSPITAL	New Britain	2150 CORBIN AVENUE			
HOSPITAL FOR SPECIAL CARE	New Britain	125 Columbus Blvd Hngr 3			
New Britain Public Safety	New Britain	125 Columbus Blvd			
New Britain Police Detectives	New Britain				

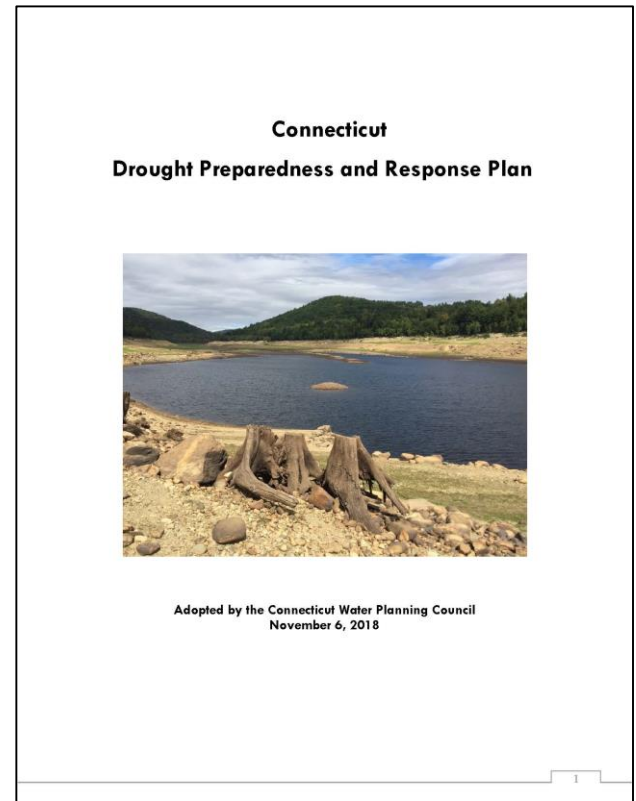
LINKAGE TO OTHER STATE AND LOCAL PLANS

Authority for Connecticut Drought Preparedness and Response Plan

- Interagency Drought Workgroup is responsible for administering the Connecticut Drought Preparedness and Response Plan as part of the State Response Framework

Preparedness and Planning Strategies

- Designate a water coordinator in each municipality
- Promote industry and public awareness of appropriate conservation activities
- Expect all water withdrawers to prepare water supply contingency plans
- Ensure clear understanding of authority for mitigating drought conditions and enforcing water use restrictions; each municipality to adopt a water use restriction ordinance in order to establish such authority



HOW CAN THE PLAN BE USED?

- **By Water Utilities**
 - For updating the Emergency Contingency Plans in the Water Supply Plans
 - For the Risk and Resiliency Assessment (RRA) associated with America's Water Infrastructure Act (AWIA)
 - For planning!

RISK AND RESILIENCE ASSESSMENTS AND EMERGENCY RESPONSE PLANS:

NEW REQUIREMENTS FOR DRINKING WATER UTILITIES

Section 2013 of America's Water Infrastructure Act of 2018 (AWIA) requires community water systems¹ that serve more than 3,300 people to complete a risk and resilience assessment and develop an emergency response plan.

	RISK AND RESILIENCE ASSESSMENT	EMERGENCY RESPONSE PLAN
Important Dates	<p>Your utility must conduct a risk and resilience assessment and submit certification of its completion to the U.S. EPA by the following dates:</p> <ul style="list-style-type: none"> • March 31, 2020 if serving ≥100,000 people. • December 31, 2020 if serving 50,000 to 99,999 people. • June 30, 2021 if serving 3,301 to 49,999 people. 	<p>Your utility must develop or update an emergency response plan and certify completion to the U.S. EPA no later than six months after risk and resilience assessment certification. Each utility deadline is unique; however, the dates below are the due dates for utilities who submit a risk and resilience assessment certification by the final due date according to the population served.</p> <ul style="list-style-type: none"> • September 30, 2020 if serving ≥100,000 people. • June 30, 2021 if serving 50,000 to 99,999 people. • December 30, 2021 if serving 3,301 to 49,999 people.
Recertification	<p>Every five years, your utility must review the risk and resilience assessment and submit a recertification to the U.S. EPA that the assessment has been reviewed and, if necessary, revised.</p>	<p>Within six months of submitting the recertification for the risk and resilience assessment, your utility must certify it has reviewed and, if necessary, revised, its emergency response plan.</p>
	<p>Visit the U.S. EPA website to find more information on guidance for developing a risk and resilience assessment at https://www.epa.gov/waterriskassessment/conduct-drinking-water-or-wastewater-utility-risk-assessment.</p>	<p>Visit the U.S. EPA website for guidance on developing an Emergency Response Plan at https://www.epa.gov/waterutilityresponse/develop-or-update-drinking-water-or-wastewater-utility-emergency-response-plan.</p>

TOOLS OR METHODS

AWIA does not require the use of any standards, methods or tools for the risk and resilience assessment or emergency response plan. Your utility is responsible for ensuring that the risk and resilience assessment and emergency response plan address all the criteria in AWIA Section 2013(a) and (b), respectively. The U.S. EPA recommends the use of standards, including AWWA J100-10 Risk and Resilience Management of Water and Wastewater Systems, along with tools from the U.S. EPA and other organizations, to facilitate sound risk and resilience assessments and emergency response plans.

¹ Section 2013 of AWIA applies to community water systems. Community water systems are drinking water utilities that consistently serve at least 25 people or 15 service connections/year-round.

Still have questions about the new AWIA requirements?
 Contact the U.S. Environmental Protection Agency (U.S. EPA) at dwrresilience@epa.gov Office of Water (4020)
EPA-817-F-19-004
May 2019

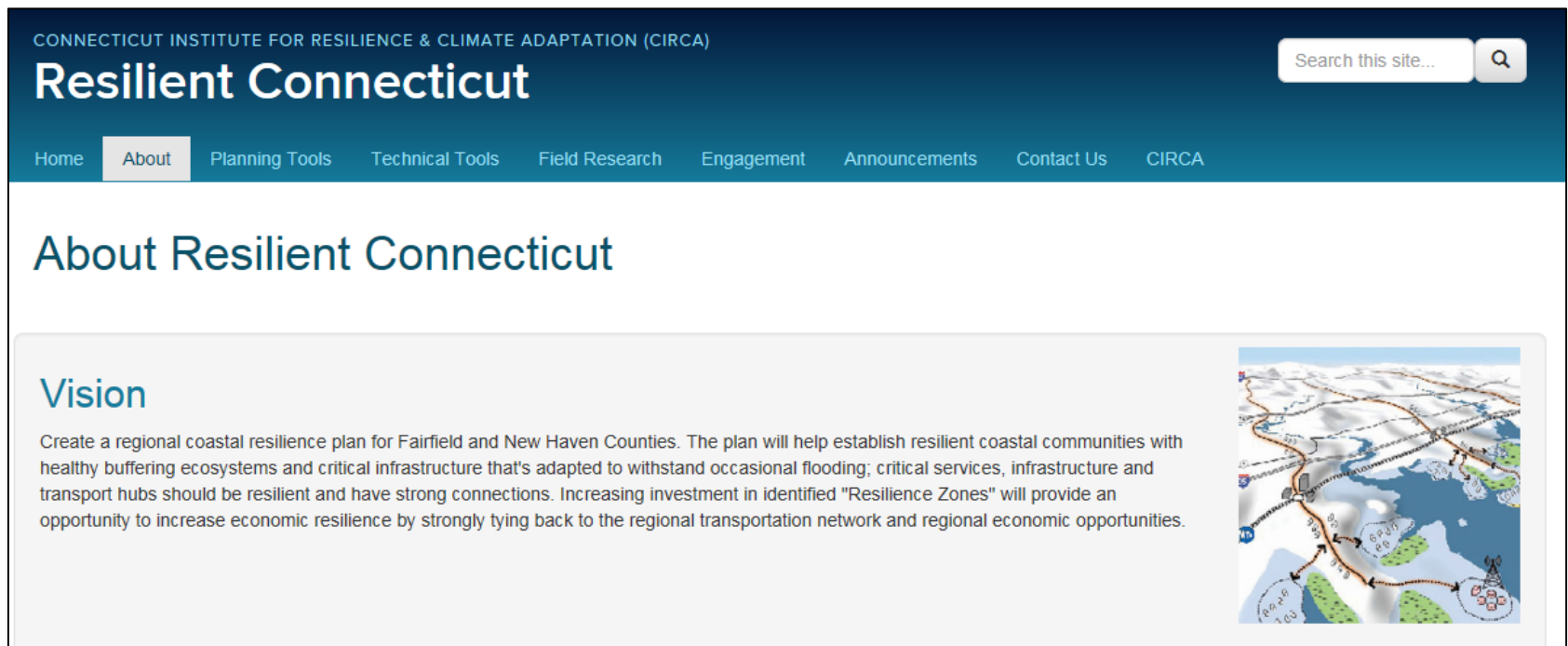
HOW CAN THE PLAN BE USED?

- **By the State and Local Municipalities**
 - Updates to State and Local hazard mitigation plans
 - Solving complex problems
- **By Local Health Districts**
 - Looking for ways to reduce risks to private wells or small system wells



HOW CAN THE PLAN BE USED?

- **By CIRCA**
 - For resiliency planning underway at the present time



CONNECTICUT INSTITUTE FOR RESILIENCE & CLIMATE ADAPTATION (CIRCA)

Resilient Connecticut

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About Resilient Connecticut

Vision

Create a regional coastal resilience plan for Fairfield and New Haven Counties. The plan will help establish resilient coastal communities with healthy buffering ecosystems and critical infrastructure that's adapted to withstand occasional flooding; critical services, infrastructure and transport hubs should be resilient and have strong connections. Increasing investment in identified "Resilience Zones" will provide an opportunity to increase economic resilience by strongly tying back to the regional transportation network and regional economic opportunities.

