



Clean Water State Revolving Fund (CWSRF) Requirements and Guidance for a Climate Adaptation Plan (CAP)

DEPLW1278-B-2018

Maine CWSRF Adaptation Plan Requirements

The Department is providing an incentive to encourage municipalities and districts to develop a Climate Adaptation Plan (CAP) for their wastewater treatment system. Under this context, the “wastewater treatment system”, a.k.a. system, will consist of the municipality’s or district’s infrastructure assets to collect, convey, treat, and discharge municipal sewage. The incentive will be provided in the form of a standalone principal forgiveness loan to borrowers that want to develop a Climate Adaptation plan. The amount of the incentive will be established annually during the development of the Intended Use Plan (IUP). The intent of the CAP is for loan recipients to assess the wastewater treatment system’s vulnerabilities to climate change and developing a plan for system resiliency.

The climate adaptation plan must be prepared by a licensed engineer and submitted to the Department within **one year** from the loan closing date.

The **Climate Adaptation Plan** should identify hazards associated with climate change, evaluate their impacts on critical assets, identify adaptation practices, and present recommendations that build resiliency into the critical assets. Some impacts to critical assets will develop slowly over time (sea level rise, air and water temperature changes, precipitation changes, etc.) and other impacts may happen suddenly (storms, tidal surge, ice jams, etc.). Therefore, it is important to consider what practices may be implemented over time as adaptation practices, and what practices may be deployed in the near term to respond to more immediate weather events as preparedness practices for your emergency operations plan. For example, emergency operations’ planning is often intended to define actions taken during a specific weather event. Adaptation planning identifies protective measures, or practices, to implement prior to an anticipated weather event so that the level of emergency response needed during a weather event is reduced.

The CWSRF Climate Adaptation Plan shall consist of the following steps:

The format for the final report is at the discretion of the author and contributors; however, each of the following steps should be addressed. The Maine DEP will meet with the applicant prior to starting the CAP to answer any questions about these expectations and requirements.

- 1. Identify Participating Personnel:** The Authorized responsible person in charge of the facility whether that is the Superintendent/Town Manager/Public Works Director/or Boards is required.

Primary Participants (expected/required):

- Superintendent
- Town/City/District Manager
- CWSRF Environmental Engineer
- Maine Emergency Management Agency (MEMA)
- Consultant Engineer
- Local Emergency Management Agency (for preparedness strategies) - one meeting expected

The Climate Adaptation Plan shall identify the following for each primary participant:

- i. Relevant Qualifications
- ii. Experience in Subject Matter
- iii. Resume of Key Personnel

Depending on how comprehensive the applicant addresses the utility, efforts to further include other key individuals will be involved with the project may prove to be helpful and a more efficient use of resources. For example, the following list contains some common participants when developing a climate adaptation plan.

Additional Participants (discretionary):

- Town Planner / Regional Planner
- Board of Directors
- General Public
- Select Board
- Drinking Water Program
- Insurance Company

- 2. Identify System Hazards:** Identify the natural hazards and their potential risk to your system. The following list of potential natural hazards may be applicable to your system. The list is not meant to be all inclusive as additional hazards might be applicable.

- Heavy Precipitation & Floods (riverine, flash, inland, urban, coastal)
- Severe Storms (i.e. Nor' Easters, Hurricanes, Heavy Snowfall, Ice Storms)
- Stronger winds
- Sea Level Rise (i.e. inundation, marsh migration)
- Storm Surge with Sea Level Rise
- Ocean Acidification
- Drought
- Temperature changes

Examples of impacts to wastewater operations because of natural hazards:

- Assets impacted such as pump stations, collection piping, energy supply, and communications (i.e. flooding, ice jams, erosion).
- Accessibility to the critical assets (i.e., during an emergency can you get to the treatment plant, a pumping station, or an emergency generator, etc. via roads, water crossings, etc.)
- Treatment plant operations
- Service and demand use
- Water quality (i.e. surface, ground)

Common planning considerations for this task include:

- i. Reviewing historic information (example, using information from a previous storm)
- ii. Projecting future conditions of the climate:
 - How far in the future should you plan for?
 - Use future climate change estimates / projections of temperature and precipitation that correspond with your plan or the life of the asset in consideration.
 - Consider worst case scenarios of hazards to vulnerable assets.
 - Make use of best available data

An explanation of what scenarios were selected and what data sources were used will be very helpful to the analysis and implementation of your adaptation plan, and should be included in the final report.

- 3. Identify Vulnerable Assets & Determine Consequences:** Evaluate the critical assets of the treatment system to determine their vulnerability to the identified hazards, e.g. determining elevations of assets, locations of asset, etc. Develop a characterization of consequence and likelihood for each hazard. Determine the possible impacts to the assets and the resulting consequences, e.g. equipment damage, service interruption, etc. What are the impacts to the entire facility, e.g. collection system, pump stations, treatment plant, etc.?

Referencing supplemental information, that has already been collected, where still relevant, may be incorporated into this step to make use of previous research and to limit new research.

- 4. Identify and Evaluate Adaptation Practices:** Identify possible short and long-term adaptation practices for the vulnerable critical assets. These could be a change in operating procedures or practices that may or may not include a capital expense. Estimate the costs to reduce or eliminate the critical assets' vulnerability to the hazard. Planning horizons may also dictate using worst case scenarios for climate projections.

Prioritize the resiliency options based on their effectiveness, cost, and practicality to implement, and determine cost estimates for adaptations measures. Considerations to be noted would include the age and lifespan of the asset, cost estimates for adaptation measures, a priority ranking between the identified critical vulnerable assets and practices, as well as practices that can be taken as “no regret” solutions.

Other near-term considerations to include are actions that would be needed to respond to a hazard before the adaptation practice is in place. These practices will likely overlap with preparedness strategies. Emergency Management personnel could be included to help identify these immediate needs.

Make recommendations as to the adaptation practices that are appropriate for each vulnerable critical asset. Take into consideration any compliance with technical standards such as FEMA and ASTM standards for coastal applications. Where possible identify funding sources or mechanisms for implementing recommendations.

- 5. Develop Implementation Plan:** Develop a plan to implement the recommended adaptation practices to reduce damage to equipment or interruption to service. Each adaptation practice, or suite of practices if similar and aids in accomplishing this task (mostly applies to larger facilities), should be identified for short-term (within 1-5 years), and long-term (within 6+ years) implementation. Using the outcomes of Step 4 and integrating them into Step 5, included in the final plan would be a timeline or schedule, process, and potential funding sources or mechanisms to be pursued for implementation, as well as the timeline for known or planned maintenance, retrofit, upgrade, or replacement, and use of the Adaptation Plan to inform decision-making processes.

The plan should include a schedule for implementing identified adaptation measures. If implementation of the recommended measures requires a capital expense, information pertaining to it should also be integrated into the utility’s asset management plan.

- 6. Submit CAP:** The Climate Adaptation Plan shall be submitted to the Department for review and approval at the following times:
 - At any point in the drafting process, Maine DEP is available to meet or assist the applicant to answer any questions about the plan;
 - A draft plan will be submitted at the 80% completion for review;
 - Final review and approval will be given at 100 % Completion; and,
 - A follow-up optional meeting with the applicant would be available to gather feedback about the Climate Adaptation Plan opportunity, in order to help improve the process and outcomes for future applicants and for Maine DEP staff.

Key Terms and Definitions:

These working definitions were created in coordination with Maine state agencies. Sources of definitions for Risk Assessment and for Vulnerability can be found from the Global Change Research Program at GlobalChange.gov <http://www.globalchange.gov/climate-change/glossary>.

TERM	DEFINITION
Weather	Weather is the atmospheric condition at any given time or place, measured from variables such as wind, temperature, humidity, air pressure, cloudiness, and precipitation. Weather can vary from hour-to-hour, day-to-day, and week-to-week.
Climate	Climate is the average weather condition at a given place over a period, for example, meteorologists often make comparisons against a 30-year period, called a climate normal. Long-term climate is usually defined as a century or more.
Climate Change	Climate Change is a difference in the climate over multiple decades or longer. Long-term variations in climate can result from both natural and human factors.
Adaptation	Adaptation is an adjustment in natural or human systems that adequately and appropriately capitalizes on beneficial opportunities or reduces negative effects due to a changing climate.
Resilience	Resilience is the capacity to prepare for, respond to, and rapidly recover from significant hazard events with minimal damage to social well-being, the economy, and the environment.
Risk Assessment	Studies that estimate the likelihood of specific sets of events occurring and their potential positive or negative consequences.
Vulnerability	The degree to which physical, biological, and socio-economic systems are susceptible to and unable to cope with adverse impacts of climate change.

References & Further Resources:

The following resources are listed for reference only and are not meant to be an endorsement or requirement of a particular method for the climate adaptation plan development.

A. Technical Assistance:

All state and federal assistance is available at no cost.

Maine Department of Environmental Protection

- [Maine Climate Change Clearinghouse](#) – the Department of Environmental Protection has developed a centralized source of information to assist communities mitigate and adapt to environmental changes while recognizing beneficial opportunities and moderating negative effects.

US Department of Homeland Security

- [Critical Infrastructure Vulnerability Assessments](#) – the Department’s Protective Security Coordination Division conducts specialized field assessments to identify vulnerabilities, interdependencies, capabilities, and cascading effects of impacts on the nation’s critical infrastructure.
- [Infrastructure Survey Tool](#) – the Infrastructure Survey Tool (IST) is a voluntary, web-based security survey conducted by Protective Security Advisors (PSAs) in coordination with facility owners and operators after an Assist Visit to identify and document the overall security and resilience of the facility.

US Environmental Protection Agency

- [Flood Resilience Guide](#) – this basic guide for water and wastewater utilities has a user-friendly layout, embedded videos, and flood maps to guide you through flooding threats and identify practical mitigation options that protect your critical assets. The U.S. EPA developed this guide to help drinking water and wastewater utilities become more resilient to flooding. This approach was successfully tested during a pilot project at a small drinking water system, the Berwick Water Department (BWD), in Berwick, Maine. This guide is particularly useful for small and medium utilities. It provides easy-to-use worksheets with corresponding videos (based on the Berwick pilot). Although this guide focuses on flood resilience, the same approach can be applied to enhancing resilience to other hazards
- [Climate Resilience Evaluation & Awareness Tool](#) (CREAT) – is a risk assessment application, which helps utilities in adapting to extreme weather events through a better understanding of current and long-term weather conditions. Find out which extreme weather events pose significant challenges to your utility and build scenarios to identify potential impacts. Identify your critical assets and the actions you can take to protect them from the consequences of extreme weather events on utility operations. Generate reports describing the costs and benefits of your risk reduction strategies for decision-makers and stakeholders.

B. Analysis Tools: evaluate environmental changes related to the changing climate.

Non-regulatory

- [Maine’s Climate Future](#) – 2015 Update, University of Maine
- [Coastal Hazard Resources](#) – the Department of Agriculture, Conservation and Forestry Contains information and mapping tools for Maine’s Highest Annual Tide, Sea Level Rise / Storm Surge, Marsh Migration, Potential Hurricane Inundation, and Maine FEMA Floodplain Maps.

- Regional Sea Level Rise Modelling:
 - [Midcoast](#)
 - [Washington County](#)
 - [Lincoln County](#)
 - [Casco Bay \(wetlands\)](#)
 - [Saco Bay](#)

Regulatory

- [Flood Map Service](#) – Federal Emergency Management Agency

C. Process Support Tools: help guide integration of data into decision-making processes.

- [Infrastructure Survey Tool](#) – US Department of Homeland Security
- [Flood Resilience Guide – A Basic Guide for Water and Wastewater Utilities](#), – US Environmental Protection Agency
Contains Berwick, ME Water Department Treatment Plant Flood Resilience Project
 - Berwick, ME Case Study - [Flood Resilience Guide - VIDEO](#)
- Climate Resilience Evaluation & Awareness Tool (CREAT) – <http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm>

D. Planning Roadmaps:

- [Climate Change Adaptation Roadmap](#) – US Department of Homeland Security
- [Adaptation Strategies Guide for Water Utilities](#) – US Environmental Protection Agency
- [Being Prepared for Climate Change – A workbook for Developing Risk-Based Adaptation Plans](#) – US Environmental Protection Agency
- [New England Regional Climate Adaptation Plan](#) – US Environmental Protection Agency

E. Clearinghouses on Best Practices:

- [U.S. Climate Resilience Toolkit](#) – US Global Change Research Program contains a 5-step framework to discover and document climate hazards, then develop workable solutions to lower climate-related risks, case studies to see how people are building resilience for their businesses and in their communities; a catalog of more than 200 digital tools can help you take steps to build resilience, from engaging a community to developing a climate action plan; and, the CRT includes additional resources to reach experts, reports, trainings, and information on the impacts of climate change to specific topics of interest.