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Wastewater Management and Changing Climate Conditions

A GUIDANCE DOCUMENT FOR MAINE MUNICIPALITIES

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Introduction

Modern wastewater infrastructure is a vital part of everyone's daily lives, protecting Americans from waterborne diseases and preserving the nation's waterways as ecological, recreational, and commercial assets. But Americans' preference to keep their minds out of the gutters, sewer mains, and treatment plants that comprise this system makes it easy for political leaders to neglect this infrastructure—at least until catastrophes cause unpleasant spills and costly cleanups. As climate change exacerbates extreme weather events and speeds sea-level rise, deficiencies in wastewater infrastructure will get harder to ignore—and increasingly costly to clean up after failures. To protect public health, the environment, and the economic gains provided by good water quality, local, state, and federal officials must act quickly to repair and upgrade the nation's rapidly aging wastewater infrastructure. This action must accommodate both contemporary and future levels of service demand and be constructed to withstand effects of climate change.[1]

Wastewater Infrastructure is one of the most important and likely largest pieces of community infrastructure. Long range planning, maintenance and replacement considerations are complicated even without adding the consideration of changing climate conditions. Climate change is playing a major role in how municipalities need to look at these issues moving forward. Regardless of the location of the wastewater plant itself, consideration needs to be given to sea-level rise, storm surge and increased storm intensity. This section will provide basic guidance to coastal communities with respect to the steps in assessing the vulnerability of the wastewater infrastructure in your town and the next steps to follow once that determination has been made.

Vulnerability Assessment

The place to start is with a vulnerability assessment of the wastewater treatment plant. This process should be undertaken by a committee of stakeholders that, at a minimum, includes members of the public, municipal staff, and wastewater treatment plant staff. While it is possible to conduct this assessment with in-house expertise, most coastal Maine communities will find it necessary to hire a consultant to help them through this process.

[1] Rising Waters, Rising Threats Center for American Progress

Recent examples of wastewater treatment plant assessments include those in Wiscasset and Boothbay Harbor (see http://lcrpc.org/coastal-projects-planning/wisc-bbh-waste-water-treatment-plants).

The municipality first needs to decide what climate change scenarios it wants to incorporate into the vulnerability assessment. This should be reflective of the community's level of risk tolerance. Using the most current and best available local data, the vulnerability assessment should look at a series of:

- Sea-Level Rise scenarios and
- Storm Surge scenarios

WWTP Looking North Between the Process Building and SBRs – BFE +4

Followed by:

- Analysis of the potential impacts to the wastewater system for each scenario;

- Development of alternative scenarios for each one of the baseline assumptions and impacts;
- A cost benefit analysis for each scenario.

This will help the community understand at what point the infrastructure will be impacted and to what extent. From that point, decisions can be made on what approach is the most cost effective for the community. There are three basic courses of action beyond a 'do nothing' choice:

- Protect in place
- Retreat by re-aligning the wastewater system location
- Retreat by consolidating systems with a neighboring community

The Vulnerability Assessment should include all elements of the wastewater system; those include:

Pump Stations

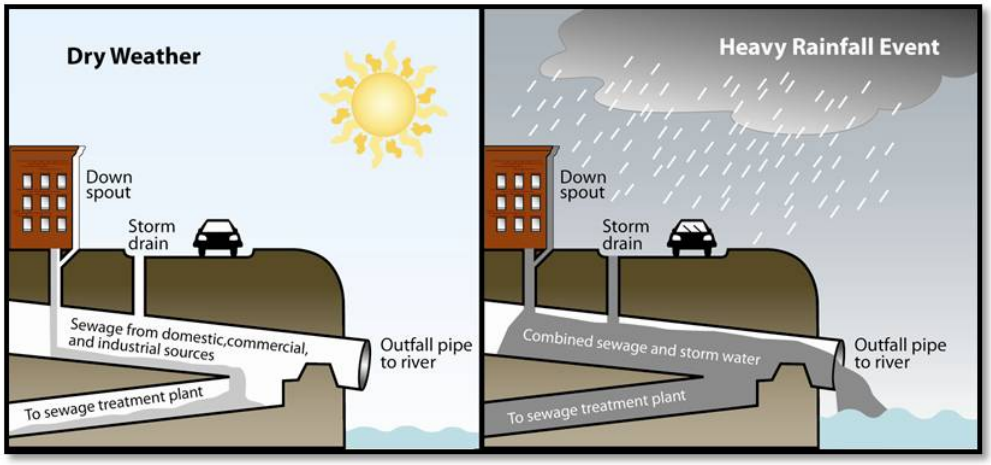
The only way to move the effluent through the system is by strategically placed pump stations. In some cases, those are located at low points and may be vulnerable to flooding regardless of the storm scenario. As part of the assessment, identify those locations that are vulnerable to impacts, assess the structural integrity of those locations and make a determination as to the best alternative solution for the system.

PS #12 Electrical / Controls Panel Looking South - BFE +4

Old Pipes

Remember, not all the infrastructure is visible. There may pipes lurking underground that must be considered. A street washed out during a storm event can raise havoc with the pipes below. If the pipes are impacted, repairs may keep the entire system down until appropriate repairs can occur. This is another reason to understand the vulnerability and condition of the entire system before it is impacted – emergency repairs are always more expensive than scheduled repairs.

Old pipes are also often leaking pipes that allow groundwater to infiltrate and result in additional treatment plant load. In addition, many communities still have some combined sewer lines. That is, the stormwater and sewage systems may not be fully separated, allowing stormwater flows to enter sewage lines via catch basins. This is especially problematic during storm events when treatment facilities can get overwhelmed by the volume of combined stormwater and sewage entering the plant, sometimes resulting in the direct discharge of untreated waste into receiving water bodies, as illustrated by this graphic from Akron Waterways Renewed.



Chemical Storage

Wastewater facilities utilize a great deal of chemicals in the process of decomposition. Questions to consider during the vulnerability analysis include:

- How are they being stored?
- Where are they being stored?
- Are they stored out of harm's way now?
- Will they remain safe in the climate change scenarios evaluated through the Vulnerability Assessment process?
- In the case of a catastrophic event, assuming chemical storage is not impacted, how long can the system operate with the chemical supply on-hand? Is there a plan in place for emergency resupply?

Additional Considerations

- Changing Regulations- A community faced with making changes to its wastewater treatment system in response to changing regulations also has an opportunity to increase resilience to the impacts of climate change at the same time.

- Growth & Increased Demand- If the community is considering modifications to the facility to increase resilience to climate impacts, projected population growth and business expansions should be incorporated into the design process as well.
- The Coastal Barrier Resource System (CBRS)[2]- a facility located within a CBRS is covered by regulations that could affect funding for any proposed work. In accordance with the Coastal Barrier Resources Act (CBRA) of 1982, certain activities to develop or rebuild within CBRSs cannot be funded using federal subsidies. Consultation with the U.S. Fish and Wildlife Service may grant the use of federal monies for certain exempted activities within a CBRS, such as emergency assistance. Additionally, if the facility attained federal flood insurance before 1982, the policy may not be renewed upon substantial improvements or damages to the facility.

  The State of Maine recently accepted the federal designation of a CBRS, and created Maine Revised Statute Title 38, Chapter 21: Coastal Barrier Resource System. The governing statute prohibits state funding or financial assistance for any development activities within the Coastal Barrier Resource System (CBRS), unless the project involves the maintenance, replacement, reconstruction, repair, or in limited circumstances, expansion of state-owned or state-operated structures, facilities or roads identified in §1903(1)(A) of the Act. For maps and more information on CBRS in Maine, check the Maine Geological Survey site: http://www.maine.gov/dacf/mgs/explore/marine/facts/barrier.htm.

Outcomes of Not Addressing the Issue

First, many of the rivers, lakes, and seashores in Maine that receive wastewater runoff also happen to be top American vacation destinations. As a result, sewage-fouled waterways and beach closures following major storms result in substantial economic losses for recreation- and tourism-based businesses that depend on healthy coasts. Studies in Southern California and Michigan both found that the daily economic cost of closing just one beach due to pollution was about $37,000. In 2012, there were 5,634 days of beach closures and beach advisories nationwide due to storm-water runoff; in 2011, which was a significantly wetter year, there were 10,780 days of closures and advisories. Although a national average economic cost per day of beach closures is not available, these findings suggest that the impact of inadequate wastewater management to coastal businesses and communities is considerable.[3]

Second, sewage spills also carry significant health costs, exposing people to pathogens and toxins. Another Southern California study found that the fecal contamination of ocean waters in Los Angeles and Orange counties alone causes as many as 1,479,200 gastrointestinal illnesses every year, with a public health cost of between $21 million and $51 million. The EPA

[2] Woodard & Curran August 2012 Preliminary Engineering Report Town of Ogunquit
[3] Rising Waters, Rising Threats Center for American Progress

estimated in 2011 that 3.5 million people around the nation contract illnesses each year after contact with raw sewage from SSOs.[4]

[4] Rising Waters, Rising Threats Center for American Progress