

Status of the TR-16 Storm Resiliency Supplemental Guidance



**Saco, ME
December 3, 2014**

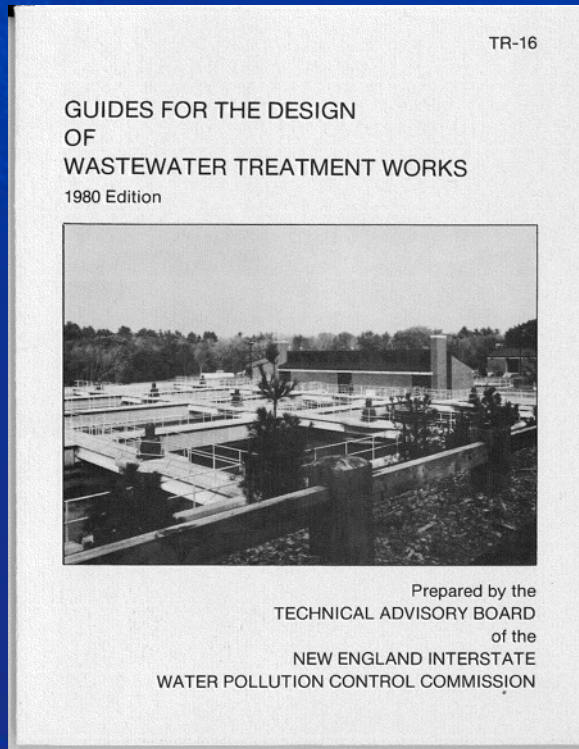
New England Interstate Water Pollution Control Commission (NEIWPCC)

- 💧 A not-for-profit interstate agency established by an act of Congress
- 💧 Established in 1947
- 💧 Jurisdiction: ME, NH, VT, MA, CT, RI, & NY
- 💧 Coordinate & Manage on a Watershed Basis

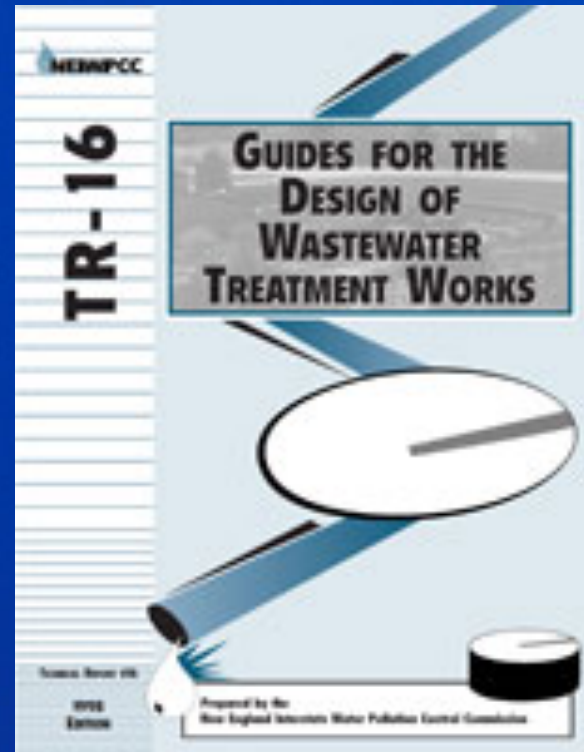
What is TR-16?

- 💧 **Technical Report #16**
 - 💧 **Guides for the Design of Wastewater Treatment Works**
- 💧 **A guidance document for designing and reviewing plans for wastewater treatment plants.**
- 💧 **It is intended to serve as a practical guide to the design of wastewater treatment works.**
- 💧 **NEIWPCC's most referenced and requested document.**

1980



1998



GUIDES FOR THE DESIGN OF WASTEWATER TREATMENT WORKS



2011 Cover

Who participated in 2011 update?

- 💧 **104(g) Wastewater Operator Trainers**
- 💧 **NEIWPCC Workgroups**
- 💧 **Past committee participants**
- 💧 **Regional engineering firms**
- 💧 **State agencies**
- 💧 **MWRA and NEWEA members**
- 💧 **Regional wastewater experts and wastewater consultants**

Chapter Chairs and Chapters

- 1. Procurement of Design and Construction Services:
Fred Gaines**
- 2. Sanitary Sewers/Wastewater Collection Systems:
Joe Boccadoro, AECOM**
- 3. Wastewater Pumping Stations: Craig Wagner, CDM
and Daniel Saulnier, SEACON**
- 4. Wastewater Treatment Works: Bill McConnell, CDM**

Cont.

- 5. Preliminary and Primary Treatment: Benjamin Mosher, CDM**
- 6. Biological Treatment Processes: Paul Dombrowski, Woodard & Curran**
- 7. Physical and Chemical Processes for Advanced Treatment: Paul Dombrowski, Woodard & Curran**
- 8. Disinfection: Bill McConnell, CDM**
- 9. Land Treatment, Treated Effluent Disposal, and Treated Effluent Reuse : Joseph Ducharme, CMA Engineers**

Cont.

10. Odor and VOC Control: Bob Bowker, Bowker & Associates







11. Residuals Treatment and Management: Kelly Saikkonen, CDM

12. Receiving Hauled Wastes: Mike Jennings, NEIWPCC

13. Instrumentation, Controls and Reporting: Leroy Kendricks, Woodard & Curran









Areas Addressed

Climate Change

-  Site elevations
-  Wet Weather frequency (flooding)
-  Consult most recent FEMA, Army Corps of Engineers flood maps
-  USDA Rural Development may request or require consideration of the 500-year flood plain
-  Evaluate vulnerability and the differential cost of increasing the level of protection to above the current 25-year and 100-year flood levels
-  Covered mostly in Chapters 3 and 4

Areas of Adressed (cont.)

Energy Efficiency

-  Addressed and emphasized in most chapters
 -  Incorporate energy conservation into the overall scope as well as individual processes
 -  Emphasis in Chapter 1, 3, 4, 5, 6, 7, 10, 11, 13
-  No energy efficiency chapter
 -  Most users only focus on specific areas of the guide
 -  This way it is shown in multiple spots
-  Main focus on pumps, blowers, aeration units, instrumentation controls
 -  High energy use items are noted









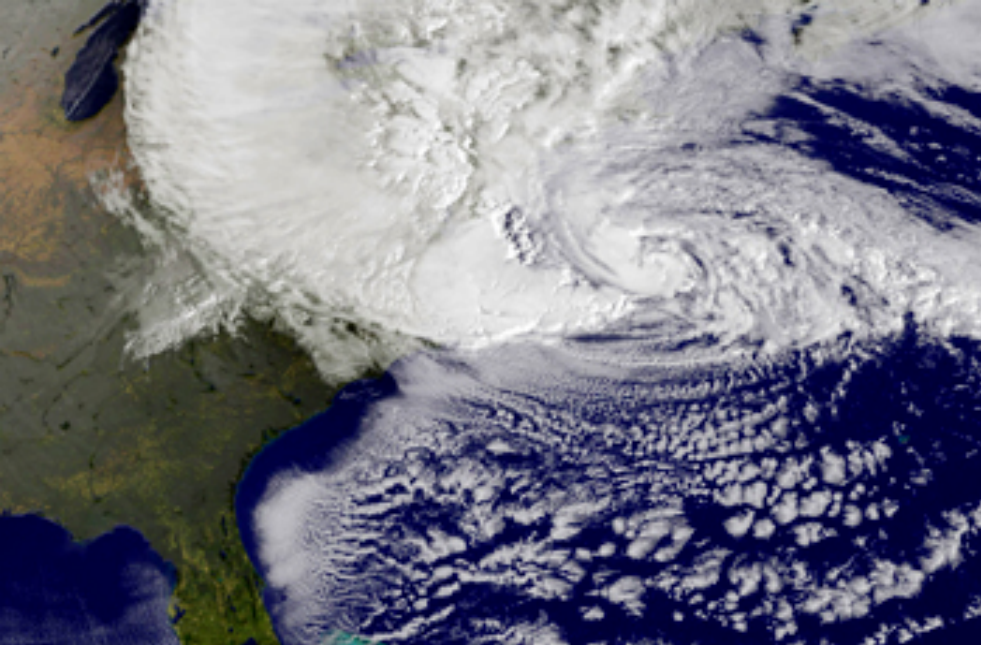
Are these events the new normal?

- 💧 **More frequent and significant events**
 - 💧 Rain/flooding
 - 💧 Hurricanes
 - 💧 Ice/Snow
 - 💧 Earthquakes
 - 💧 Tornadoes

- 💧 **More frequent and extended power losses**

- 💧 **WWTP's in flood plains**

- 💧 **Aging Infra-structure – susceptible to failures**
 - 💧 Major I&I issues



Storm Resiliency Guide Development

- 💧 **After Sandy, our member states wanted us to revisit some of the TR16 design criteria and make WWTPs more resilient to storm events.**
- 💧 **Cannot continue the way we have in the past.**
- 💧 **Resiliency is going to take commitment as this is not a quick fix, long term planning is needed.**
- 💧 **Elevation of critical components, and coastal facilities as major areas to be addressed.**

Areas to be addressed

- 💧 Include the important lessons learned from facilities that have been impacted by events.
- 💧 Provide background information on programs that are available and links to access the information.
- 💧 Incorporate improved design considerations.
 - 💧 Elevation of critical components
 - 💧 Fuel delivery
 - 💧 Waterproofing electrical components
 - 💧 Pump Stations



TR-16 Supplement: Storm Resiliency

- 💧 Introduction and why is this guide needed
 - 💧 Past 10 years of significant events in the northeast

- 💧 Available Programs

- 💧 Lessons Learned

- 💧 Case Studies (2-3)

- 💧 Design considerations



Elevations

- 💧 States want us to revisit some of the design criteria and make WWTPs more resilient to storm events.
 - 💧 Hurricane Sandy (2012)
- 💧 NYC Building Code: 1% (FEMA BFE) plus 2'
- 💧 Army Corps: 1% (FEMA BFE) plus 1'
- 💧 NYS EFC SMLP (areas subject to tidal influence):
 - 💧 FEMA 100-year flood elevation plus five feet
 - 💧 Sandy high-water mark plus 4 feet
 - 💧 FEMA 500-year flood elevation

Pump Stations and Facility

- ◆ All pump stations including all electrical and mechanical equipment, should be protected from physical damage by waters at or above the 100-year flood elevation, and should remain fully operational and accessible during a 25-year flood. All entrances and/or unsealable openings of a station should be above the 100-year flood elevation.
- ◆ Treatment plants should provide for uninterrupted operation of all units under flood conditions of a 25-year frequency, and should be placed above the 100-year flood level or protected against the structural, process, and electrical equipment damage that might occur in a 100-year flood. All first floors, tank walls, and structural openings should be higher than the 100-year flood level.
- ◆ Provide floodproofing (e.g., stoplogs at garage entrances, raised motor drives and pumps, lab cabinets with positive latching systems to prevent lab chemicals from mingling with floodwaters, storage at the highest practical elevation in a facility, and adequate structural strength to buildings) to above the 100-year flood level. All facilities should be constructed outside of coastal velocity flood zones.

SMLP Elevation Criteria

Elevation criteria	Baseline Condition	Critical Equipment	Critical Equipment
Area subject to sea level rise or tidal action	All	No	Yes
100-year flood elevation	100-year + 2 feet	100-year + 3 feet	100-year + 5 feet
Sandy high-water elevation	Sandy + 1 foot	Sandy + 2 feet	Sandy + 4 feet
500-year flood elevation	500-year	500-year	500-year

Surveys to Impacted Facilities

- 💧 Tried to focus on communities hit recently by storm events.
- 💧 88 responses
- 💧 Good baseline of information.
- 💧 Had responses from all member states



The Basics

- 💧 **Be prepared**
- 💧 **Emergency Plan**
 - 💧 **Accessible**
 - 💧 **Familiar with it/practice it**
 - 💧 **Keep it updated**
 - 💧 **Access to critical documents and contacts**
- 💧 **Communication is essential**
- 💧 **Be safe**
 - 💧 **Assure employees are all accounted for**

Lessons Learned

- 💧 **SOPs, Checklists, Emergency Operating Plans**
- 💧 **8 Facilities are part of a WARN Program**
- 💧 **Provide examples**
- 💧 **Grant/funding opportunities**
 - 💧 **Too many facilities go back to pre-storm design**







- 💧 It's possible that you/your staff/help/contractors may not be able to access the plant.
- 💧 Can be a major issue for limited access facilities.

Lessons Learned





- 💧 **Increasing elevation of assets**
- 💧 **Generator – fuel related issues**
- 💧 **Pump Station upgrades**
- 💧 **Funding**
 - 💧 **Insurance**
 - 💧 **Grants**
 - 💧 **FEMA**
 - 💧 **Storm Mitigation Loan Program**
 - 💧 **Capital Improvement Plans**
 - 💧 **CDBG-DR**

Lessons Learned

Communications

-  Within your facility (lack of power, phone lines down)
-  With emergency response coordinators

Importance of pre-event planning

-  Be more proactive than reactive.
-  Be prepared, error on the side of caution.
-  Notify staff ahead of time that they will be needed during the storm event.
-  Pay closer attention to weather reports.

Available Programs

- 💧 **Federal Emergency Management Agency (FEMA)**
 - 💧 Important to have agreements and contracts in place prior to events.
 - 💧 Helps get assistance in place faster and improves reimbursement time.

- 💧 **Water/Wastewater Agency Response Network**
 - 💧 WARN – Each state has its own program
 - 💧 Personnel, Equipment, Expertise, Supplies
 - 💧 Public sector mutual aid agreement during declared emergency events
 - 💧 Free to join
 - 💧 Facilities have been reluctant to join for a range of reasons

- 💧 **Hazard Mitigation Planning**
 - 💧 Community based planning, can also be done by a facility (updated and approved every 5 years)
 - 💧 Access to FEMA mitigation funding
 - 💧 Document essential services and critical facilities, describe potential hazards, and identify projects that may mitigate the damage to these services and facilities.

Available Programs

- 💧 **National Incident Management System (NIMS) and Incident Command System (ICS) Trainings**
 - 💧 Provides common organizational structure for incident management
 - 💧 Multi-agency coordination

- 💧 **Emergency Power Facility Assessment Tool**
 - 💧 Army Corps

- 💧 **Asset Management Plans**

- 💧 **EPA Climate Ready Water Utilities**
 - 💧 Climate Resilience Evaluation & Awareness Tool (CREAT)
 - 💧 Adaptation Strategies Guide
 - 💧 Extreme Events Workshop Planner

Warwick, RI Case Study

Design flow: 7.7 mgd with a peak capacity of 17.7 mgd and an average daily flow of 5 mgd.

In March of 2010, record rainfall in Rhode Island caused the Pawtuxet River to crest to the highest levels ever recorded at the U.S. Geological Survey (USGS) gauge on the Pawtuxet River at the Warwick-Cranston line: 14.98 feet on March 15th and 20.79 feet on March 31st.

On March 30, 2010, the Pawtuxet River breached the levee surrounding the WSA's wastewater treatment facility, filling the campus with an estimated 75 million gallons of stormwater and wastewater. The Flood completely wiped out the treatment processes as well as six (6) pumping station located along the banks of the Pawtuxet River.

The levee was designed to protect to the 100-Year Flood level, plus three feet of freeboard.





Warwick, RI Lessons Learned

- 💧 **Have a plan**
- 💧 **Get in the loop (ICS)**
- 💧 **Ask for help**
- 💧 **Communicate**
- 💧 **Take advantage of the “opportunity”**
- 💧 **Mitigate**
 - 💧 **Elevating berm to the 500 year flood level**
 - 💧 **Elevation of pump stations**
 - 💧 **Elevating/relocating SCADA and other critical equipment**
 - 💧 **Flood hardening of facility**

Design Consideration Areas

- 💧 **Elevation of critical components**
- 💧 **Waterproof electrical components such as pump motors; Electrical control panels above grade.**
- 💧 **Installation of back-up generators or alternative energy source to critical processes.**
- 💧 **Elevation of back-up generators and other steps to prevent flood damage to materials and equipment.**
- 💧 **Improve fuel delivery systems**
- 💧 **Tide flex valves – backflow prevention**
- 💧 **Saltwater issues**
- 💧 **Correction of I&I problems**

Next Steps

- 💧 **Work with writing committee on design considerations.**
 - 💧 **Seeking volunteers**
 - 💧 **Initial call in early February**
 - 💧 **February – March to complete design considerations**

- 💧 **Continue working with States on new information.**
 - 💧 **States are doing a great deal of work on climate change and storm resiliency for infrastructure.**

Timeline

- 💧 **Draft for Review**
 - 🔥 **Spring 2015**
- 💧 **Layout/Edit/Completion**
 - 🔥 **Summer 2015**
- 💧 **Workshops**
 - 🔥 **Fall 2015**



Questions/Comments

Thank you for your time.

John Murphy

978-349-2514

jmurphy@neiwppcc.org