

WORK UNIT 2.4

FLOODING IMPACTS ON DRINKING WATER SYSTEMS

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BACKGROUND

- About ten thousand public water supply systems provide potable water for consumption and economic uses, estimated by the NYS DOH, and about 1/3 are community water supplies (regular service).
- Many of these facilities are vulnerable to flooding by virtue of being in NOAA defined storm surge areas and FEMA flood zones.
- In various upstate areas, water supply systems have been damaged by storms and the flooding associated with them. From 1960-2012, the NYS 2014 Hazard Mitigation Plan indicated that almost two-thirds of the counties experienced flood events and a similar proportion have experienced property damage.
- Historical and project climate change impacts such as sea level rise, increased precipitation and temperature will have considerable impacts on water supply system flooding.
- Where high-rise buildings depend on electric power to convey water to upper floors, storms can disable power and impair water supplies in such buildings.

Source: This summary presentation is drawn directly from R. Zimmerman, C.E. Restrepo, and H.B. Kates, "Flooding Impacts on Drinking Water Systems," (Work Unit 2.4) New York State Resiliency Institute for Storms & Emergencies. Readers are also referred to the NYS 2014 Hazard Mitigation Plan for additional material.

PROJECT SCOPE

- Formulation and identification of generic impacts of flooding on water supply system components for water delivery, vulnerabilities of water supply systems to flooding, and interdependencies between water supply and other infrastructures
- Location of key water supply systems and components damaged from flooding in previous storm-related flooding events
- Identification of NYS water supply sites, collection and distribution systems [community water supplies] prone to flooding with a flood-prone area overlay
- Recommendations and conclusions for water supply resiliency
- Preliminary projection of resiliency issues due to climate change

DATA SOURCES: FACILITIES

Water Supply Facilities (community water supply facilities)

- The NYSDOH community water supply system contacts database (Primary database used for analysis)
- The Envirofacts database under the Permit Compliance System (PCS) & Integrated Compliance Information System (ICIS) for water supply treatment facilities with discharge permits
- The NYSDEC data of water withdrawal permits by water supply facilities

High-Rises (NYC)

- NYC Department of Finance and NYC Housing Authority, provided by the NYU The Furman

Source: WU 2.4.

DATA SOURCES: FLOODING

FEMA Data

- FEMA National Flood Hazard Layer
- FEMA Q3 Data (consistent with those for mapping at 1:24000 scale)

NOAA Sea, Lake and Overland Surges from Hurricanes (SLOSH) data

- SLOSH model: “Storm Surge Heights” (Hurricane Surge Inundation)
- Calculations are from SLOSH basin Maximum of Maximum (MOM) surge height values, i.e., maximum surge from category 1 - 4 storms at high tide

RESULTS: NYSDOH SYSTEMS AT RISK

- Under 5 percent of the NYS DOH community water supply systems were in the FEMA 100 year flood risk zone
- Under 5 percent of the NYS DOH community water supply systems were in the FEMA 500 year flood risk zone
- In New York City, almost a third of the NYS DOH community water supply systems were in one of the four NOAA SLOSH Surge Risk categories 1 through 4

RESULTS: HI-RISE SYSTEMS AT RISK

(for NYC hi-rises 6 or more stories in New York City)

FEMA Flood Risk

- Under 5 percent of the Hi-Rise buildings are located in the 100 year storm zone
- Under 5 percent of the Hi-Rise buildings are located in the 500 year zone

NOAA SLOSH Surge Risk

- Almost three-quarters of the buildings are not in a surge zone
- Under ten percent of the Hi-Rise buildings are in each one of the four surge zones

CONCLUSIONS

Water Supply Facility Resilience enhancement by:

- Using Turbidity reduction procedures for storms
- Increasing water main protection
- Introducing water supply alternatives
- Increasing flexibility through interconnections with other supplies, e.g., cross-connections
- Addressing water and power interdependencies
- Managing water through land use

High-rise Resilience with:

- Auxiliary energy supplies for transporting water in power outages
- Alternative provisions for water supplies