Keeping the Water on for Critical Facilities: Mapping Flood Risk

Amy C Burnicki
Assistant Professor in Residence, UConn
Analysis Objective

• assess critical facilities in four counties impacted by super storm Sandy for vulnerability to future flood risk

• critical priority facilities include
  – commerce centers, hospitals, nursing homes, emergency shelters
Data

- Critical facilities
  - list of 1617 critical priority facilities

- Public Water Systems
  - service area footprints for large and small systems
  - large PWS: intake & wells, treatment plants, pump facilities
  - PWS wells

- Flood risk
  - FEMA flood zones
Data Analysis & Example

• to illustrate current methodology, illustrative example focused on assessing care facilities
• 475 care facilities identified and mapped for four county region
• which care facilities are vulnerable to future flooding based on association with PWS?
Methodology: Step 1

• Establish connection between each care facility and PWS
  – assumption: distance-based relationship
• Closest large or small PWS identified for each care facility
  – in some cases, closest water system was well
• Results:
  – 425 care facilities linked to large PWS
  – 42 care facilities linked to small PWS
Methodology: Step 2

• Determine if PWS is vulnerable to flood risk
  – assessment differed for large and small PWS
• Large PWS
  – vulnerability of source → intakes or wells within flood zone
  – vulnerability of treatment plants → within flood zone
  – vulnerability of pump facilities → within flood zone
• Small PWS
  – service area footprint intersected with flood zone
  – determined percent area of intersection
Methodology: Step 2

- Large PWS
  - 28 systems had full accounting of system infrastructure
  - 366 out of 425 care facilities (86%)
  - 7 out of 28 vulnerable due to source
    - all intakes and wells located in flood zone
  - 4 out of 28 vulnerable due to treatment plant(s)
    - 2 of 4 were also vulnerable due to source
Methodology: Step 2

• Small PWS
  – 115 intersected flood zone (24.6%)
  – threshold: area of intersection accounts for at least 10% of service area footprint
    • 34 vulnerable small PWS (7%)
Methodology: Step 3

- Identify care facilities associated with vulnerable PWS

- Large PWS \((n = 366)\)
  - 71 care facilities vulnerable due to source \((19.4\%)\)
  - 42 care facilities vulnerable due to treatment plant \((11.5\%)\)
    - note: all 42 were vulnerable due to source

- Small PWS \((n = 42)\)
  - 14 care facilities vulnerable if apply 10% of area threshold \((33.3\%)\)