Assessing Climate Vulnerabilities of Food Distribution Center Sites in Greater Boston: Climate Adaptation Planning in Practice

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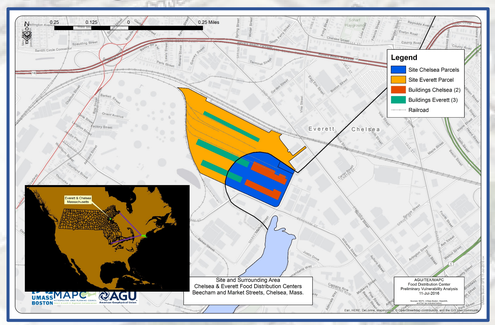
The Site



The Vulnerability

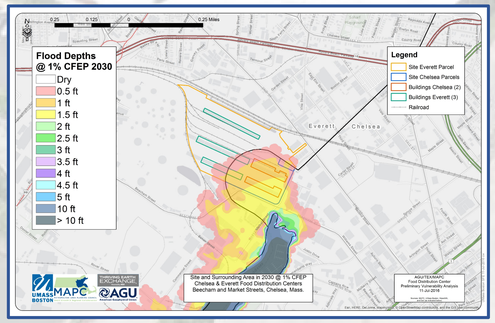
Vulnerability: Function (exposure, sensitivity, adaptive capacity)

- **Exposure:** Estimated from BH-FRM results expanded for City of Chelsea
- **Sensitivity:** Assume all structures are NOT flood proof => highly sensitive to flooding
- **Adaptive Capacity:** Assume low or zero adaptive capacity

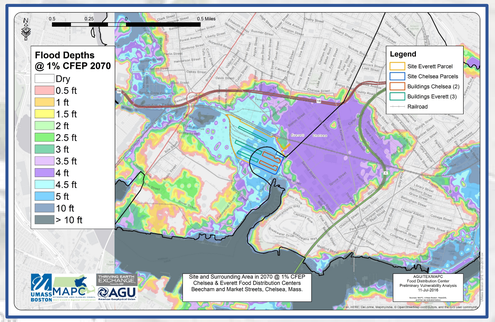
Therefore, Vulnerability is solely a function of exposure

- Exposure=> 1% Coastal Flood Exceedance Probability (CFEP; 100-year Water Surface Elevation)

Coastal Flooding 2030



Coastal Flooding 2070



Project Objectives

- Build upon existing analyses of the region's food system and climate vulnerabilities to identify flood risk exposure to the food distribution centers in Chelsea and Everett, Massachusetts
- Inform the Metropolitan Area Planning Council's (MAPC) and the Metro Boston Climate Preparedness Taskforce's understanding of this critical regional food distribution infrastructure and potential strategies for addressing its flooding vulnerabilities

Methodology

- Based on results from the Massachusetts Department of Transportation's Boston Harbor Flood Risk Model (BH-FRM)
- Dynamic modeling techniques that incorporate storm surge, wave action and sea level rise projections under different climate scenarios
- Aligned with methodologies from other regional analyses
- Leveraged both the results of a complementary study performed by Stantec/Woods Hole Group for the City of Chelsea and a design study by Climate Creatives to expand project to include adaptation options

Conclusions

- Significant coastal flooding of site and adjacent neighborhoods and roadways in near term (by ~2030) – green infrastructure and elevation options
- Extensive flooding in future – local protection options more limited (by ~2070)
- Regional protections are the most viable solutions
- Long term (2100 and beyond) – river restoration may be necessary

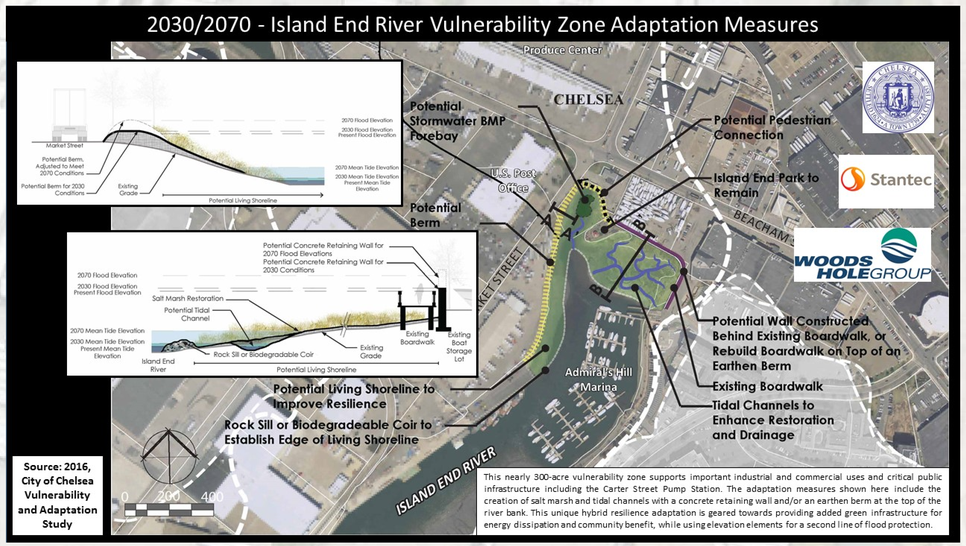
Project Team

- Chris Watson (**Chris.Watson@umb.edu**) and Dr. Ellen Douglas: School for the Environment, University of Massachusetts Boston
- Axum Teferra: Metropolitan (Boston) Area Planning Council (**ATeferra@mapc.org**)
- AGU's Thriving Earth Exchange (TEX) Program

With significant assistance from: Woods Hole Group (Kirk Bosma); Stantec (Jen Ducey, Hillary King); City of Chelsea Planning Dept (John DePriest, Alex Train); UMass Boston (Paul Kirshen); Climate Creatives (Susan Israel); Taller13 (Elias Cattan, Ludovic Celle)

Potential Adaptation Strategies: 2030/2070

Green Infrastructure and Elevation Elements



2100 and Beyond

River Restoration and Revitalization

Poster Background Image: Food Distribution Centers; Source: Apple Maps