



**Massachusetts Bay
Transportation Authority**

Climate Change Resiliency at the MBTA

Presentation: MassDOT Moving Together Conference

September 29, 2016



Overview

- › **Pilot Study: Blue Line Vulnerability Assessment**
- › **Coordinate with Other State and Local Government Bodies**
- › **Incorporating Climate and Weather Resiliency into All MBTA Activities: Governance and Infrastructure Project Planning**





Pilot Study: Blue Line Vulnerability Assessment

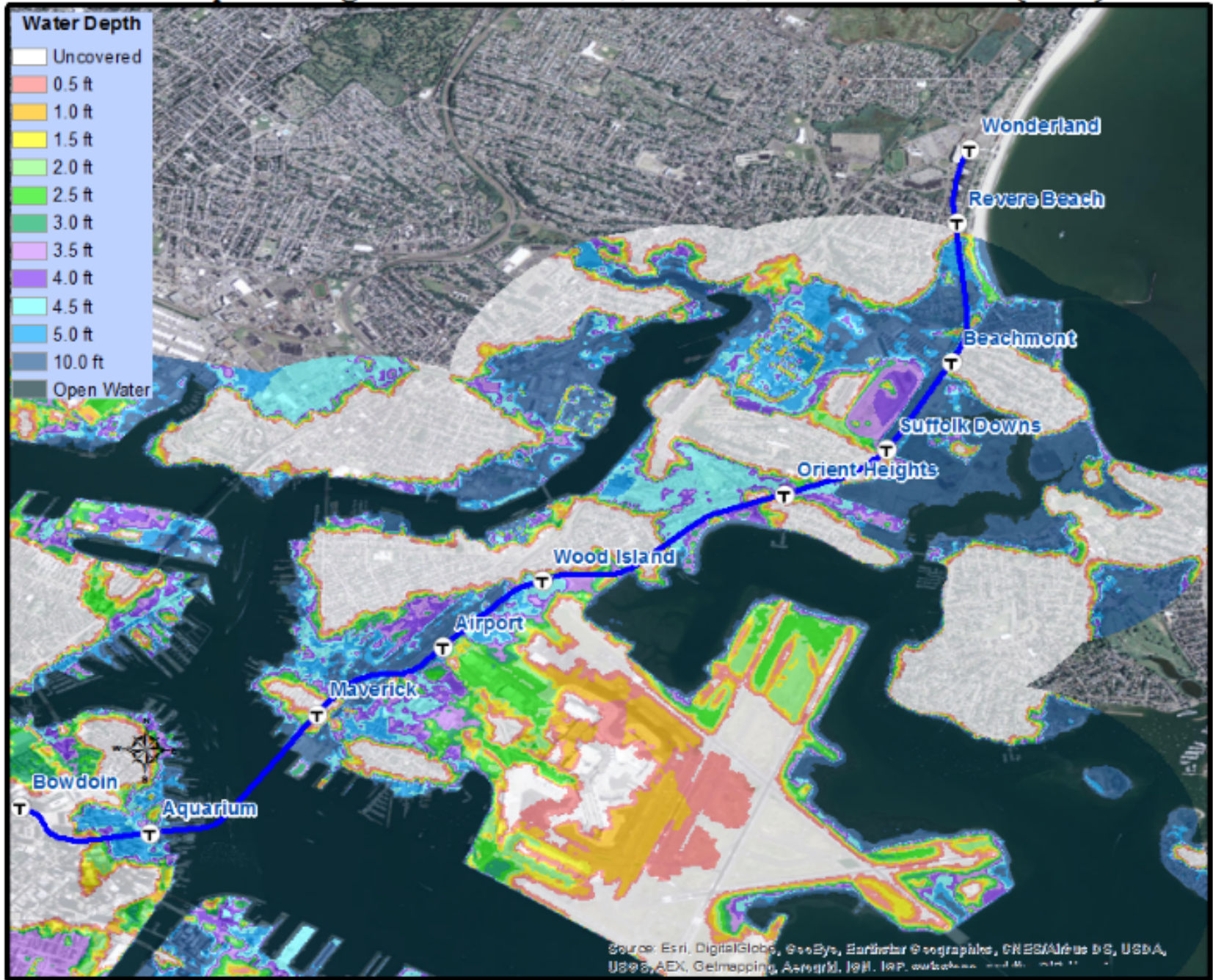
- **Incremental Approach to Identifying Vulnerabilities and Best Approach for Mitigating Impacts**
- **Context—Neighborhood Organization of Affordable Housing (NOAH) project: ClimateCARE, funded by the Kresge Foundation**
 - › **Understand overall climate-related vulnerabilities of East Boston: social, economic, infrastructural**
 - › **MBTA participating in Transportation and Infrastructure Working Group with MassPort, MassDOT, Umass, MWRA, Boston Water and Sewer Commission**
 - › **Blue Line VA helps MBTA plan our system-wide approach while contributing to NOAH's goals**



Blue Line Overview

- **Weekday Ridership: ~66,000 as of 2015**
- **94 Cars (Siemens 700-Series, < 10 Yrs Old)**
- **Infrastructure**
 - › **12 Stations (6 in East Boston) over 6 Miles**
 - › **4 Electricity Substations (2 in East Boston)**
 - › **Maintenance Facility and Storage Yard at Orient Heights**
 - › **Rail Elevation**
 - » **Minimum *Station* Elevation -48 ft (NAVD88) at Aquarium; However, Minimum *Rail* Elevation is -86 ft under Harbor**
 - » **Maximum Station Elevation +30 ft at Beachmont**
 - › **Power—from Regional Grid, Distributed Internally by the T:**
 - » **3rd Rail from Bowdoin to Maverick (Tunnel)**
 - » **Catenary from Airport to Wonderland (Above Ground)**

Water Depth along MBTA Blue Line, 2070 1,000-Year Storm (Feet)





Blue Line Vulnerability Assessment: Findings

- **Summary:** Primary concern: water. Most stations on Blue Line could be exposed to flooding by 2070; precipitation-driven or storm surge flooding is plausible at some locations even now.
 - Heat is concerning, but not critical → minimal recovery time compared to flooding.
- **Most consequential vulnerability:** Flooding entering the portal between Maverick and Airport Stations. Entrance is 7 feet below sea level.



Flooding at Kenmore Station (Green Line)



Blue Line Vulnerability Assessment

• **Impacts of Water Entering Portal**

- Tunnel flooding, affecting contact rail. Number of stations affected depends on volume of water (modeling needed). Connects with other RTLs.
- *Any* exposure to salt water would corrode rail, switches, signals, communications cables
- Would cut East Boston residents off from easy access to jobs (though bus routes offer a limited alternative)

• **Next Steps**

- Blue Line Vulnerability Assessment report
- Investigate adding protection of portal that can be closed with little notice (e.g., gate or plug).
- MassDOT Highway Division designing protection for Aquarium Station. The MBTA will need to coordinate our efforts with theirs.



NY MTA—Montague Street Tunnel corrosion after flooding with 20 feet of salt water.

Source:

<http://www.theepochtimes.com/n3/92718-r-train-to-close-for-14-months/>



Coordinate with Other State and Local Government Bodies

- **Climate Ready Boston**
 - **MBTA participating in Infrastructure Advisory Group**
 - **CRB VA recommends:**
 - › **MBTA system-wide VA**
 - › **Infrastructure Coordination Committee (ICC) to set consistent design standards and joint adaptation planning**
- **Metro Boston Climate Preparedness Taskforce—coordinate with MAPC communities**
- **Somerville Climate Change VA—Advisory Group**
- **Cambridge Climate Change VA—Coordinate on Alewife Flood Resilience**





Incorporating Climate and Weather Resiliency into All MBTA Activities: Governance and Infrastructure Project Planning

- **MBTA Developing Strategy to meet Focus40 Goals, including climate resiliency**
 - **Cultural change to incorporate resiliency into all activities**
 - **Plan ahead, rather than reacting to acute events (e.g., minimize reliance on sandbags during flooding)**
- **For new Design and Construction projects, MBTA now requires an assessment of climate/weather-related vulnerabilities; evaluation of resiliency options**
- **Capital Improvement Plan requests will need to indicate whether the request improves resilience. This factors into prioritization of funding.**
- **Issuing RFP for consulting services to assess vulnerability and improve resilience. Full scope TBD.**



Sandbag barrier at Fenway Portal (Green Line) during heavy precipitation event, March 2010