City of Cambridge
Climate Change Vulnerability Assessment and Adaptation Plan

December 18 , 2012

Today's Agenda

9:00 Welcome & Introductions

9:15 Why Is Cambridge Doing a Vulnerability Assessment? The Science of the Project

9:30 Project Approach: Methodology and Technical Approach to Complete the Vulnerability Assessment

10:15 Project Approach: Committee Roles and Contribution

10:45 Next Steps & Wrap Up

Welcome & Introductions

Richard Rossi

Deputy City Manager, City of Cambridge

&

John Bolduc

Environmental Planner, City of Cambridge

Brief Introductions

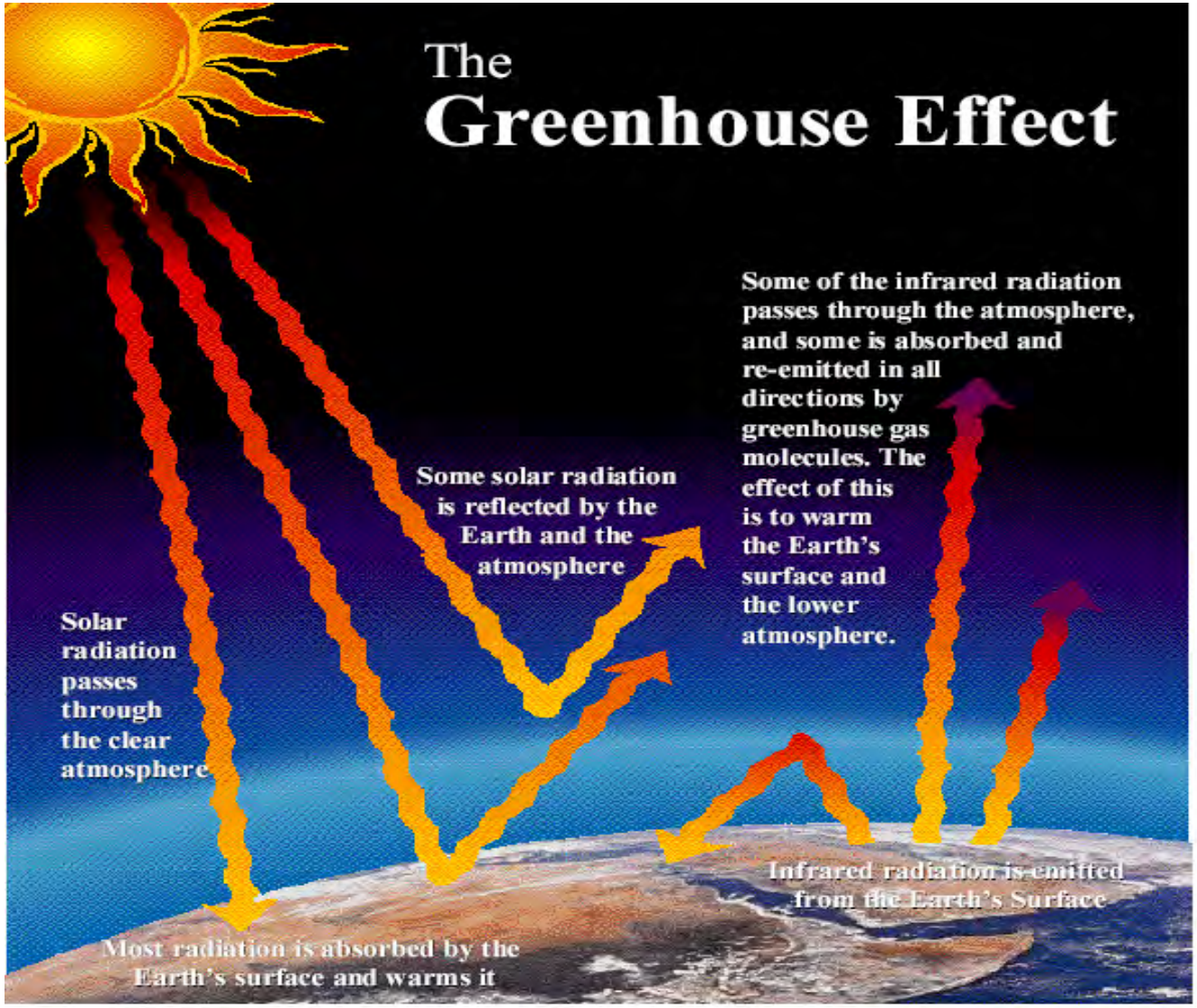
- Name
- Affiliation

Operating Procedures

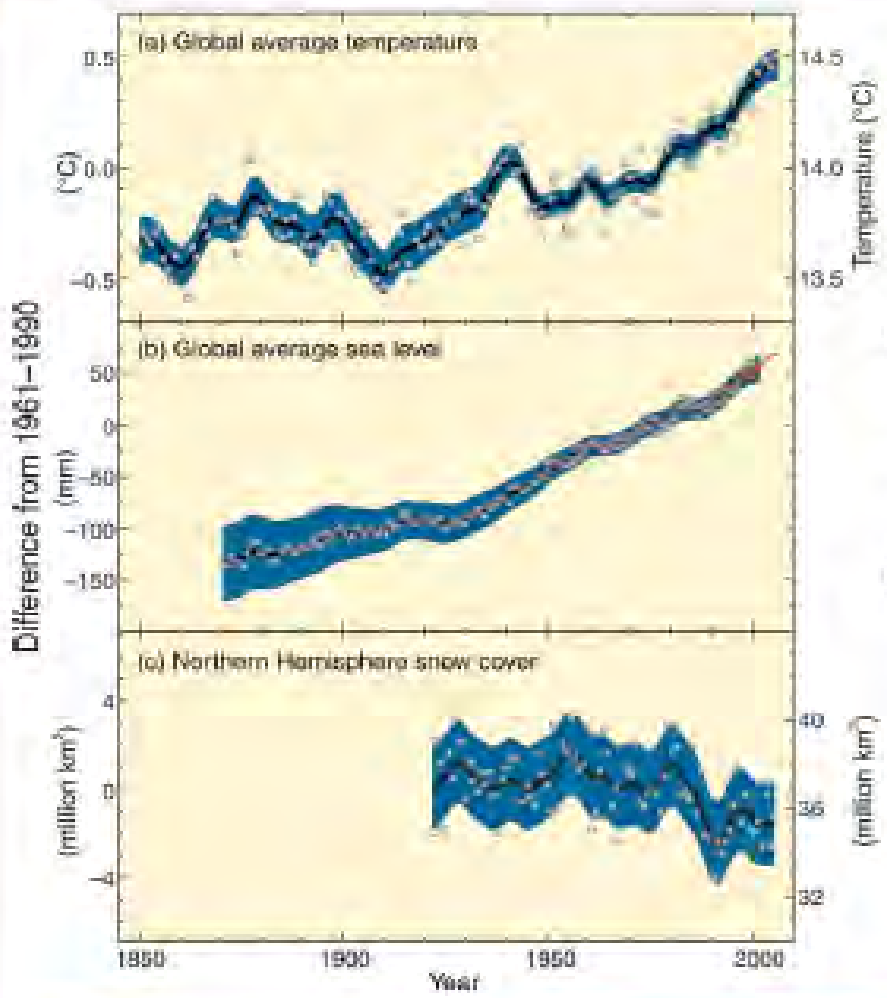
- Keep on track with agenda
- Everyone is encouraged to participate
- Avoid side conversations
- There will be time to ask questions after each presentation
- Use name placards to raise your hand
- Public comments at end of meeting

Why Is Cambridge Doing a Vulnerability Assessment?

Paul Kirshen, University of New Hampshire


The
Greenhouse Effect
Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.
Some solar radiation is reflected by the Earth and the atmosphere
Solar radiation passes through the clear atmosphere
Infrared radiation is emitted from the Earth's Surface
Most radiation is absorbed by the Earth's surface and warms it

EPA



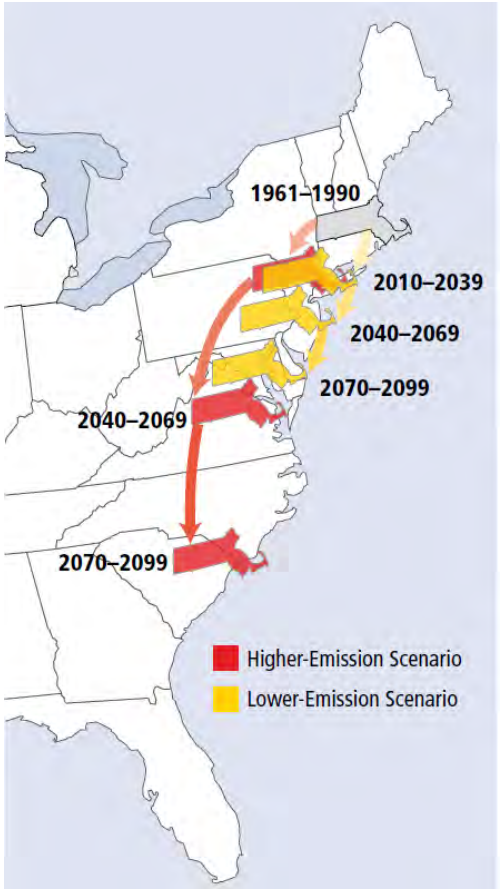
Warming of the climate system is unequivocal

- Increasing global air and ocean temperatures
- Rising global average sea level
- Reductions of snow and ice

(IPCC, November 2007)

Climatic Parameters

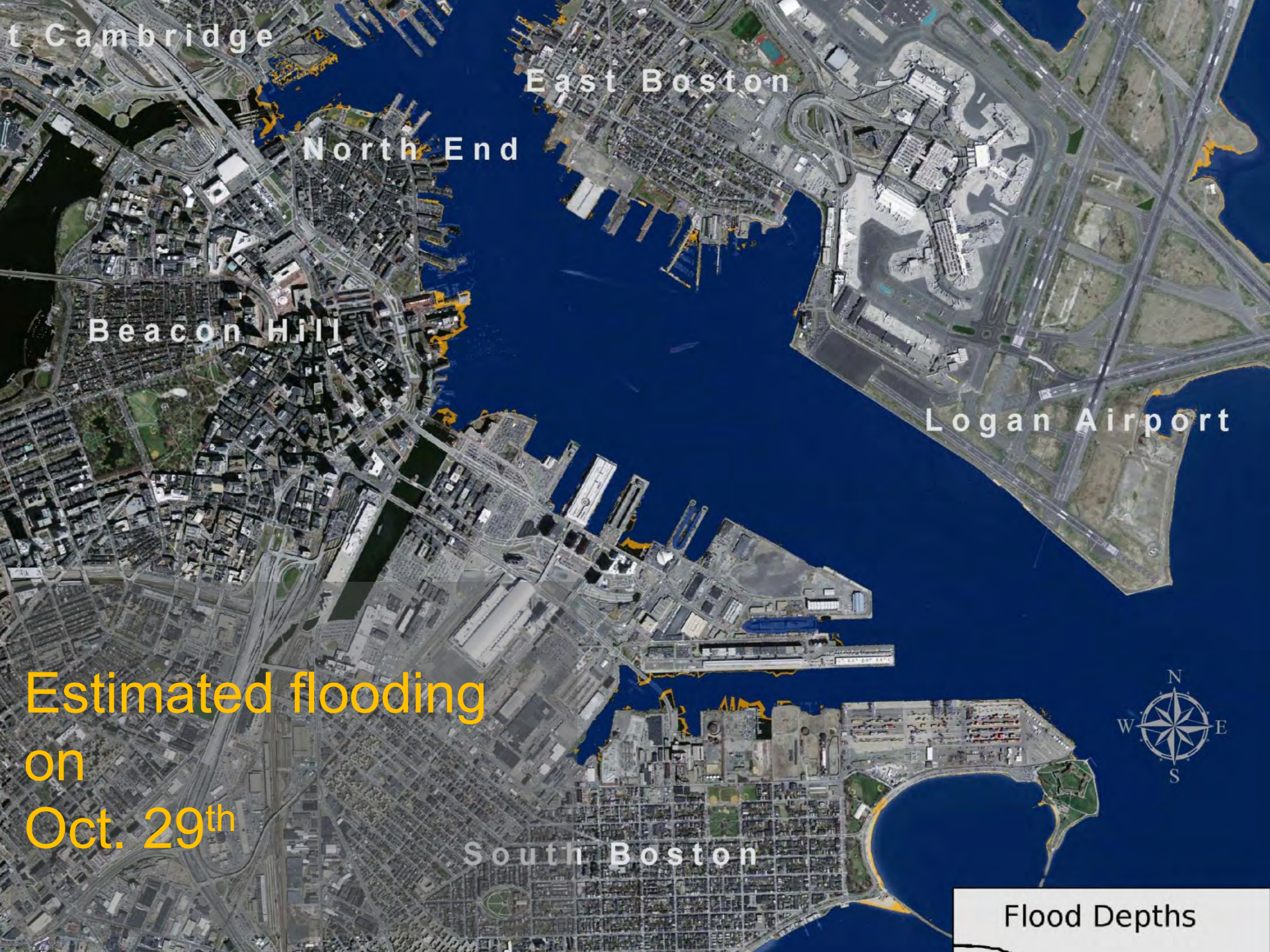
Temperature

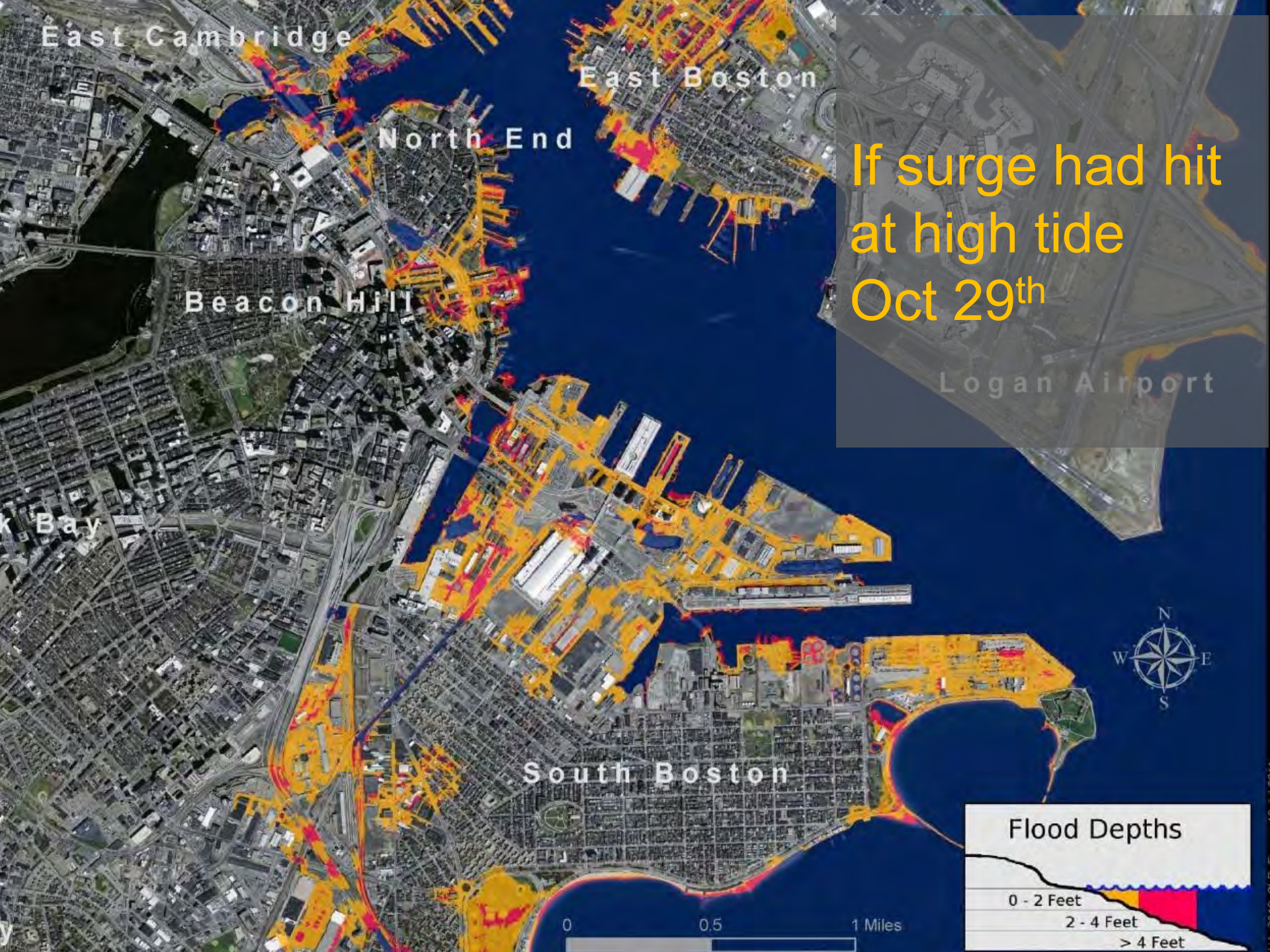


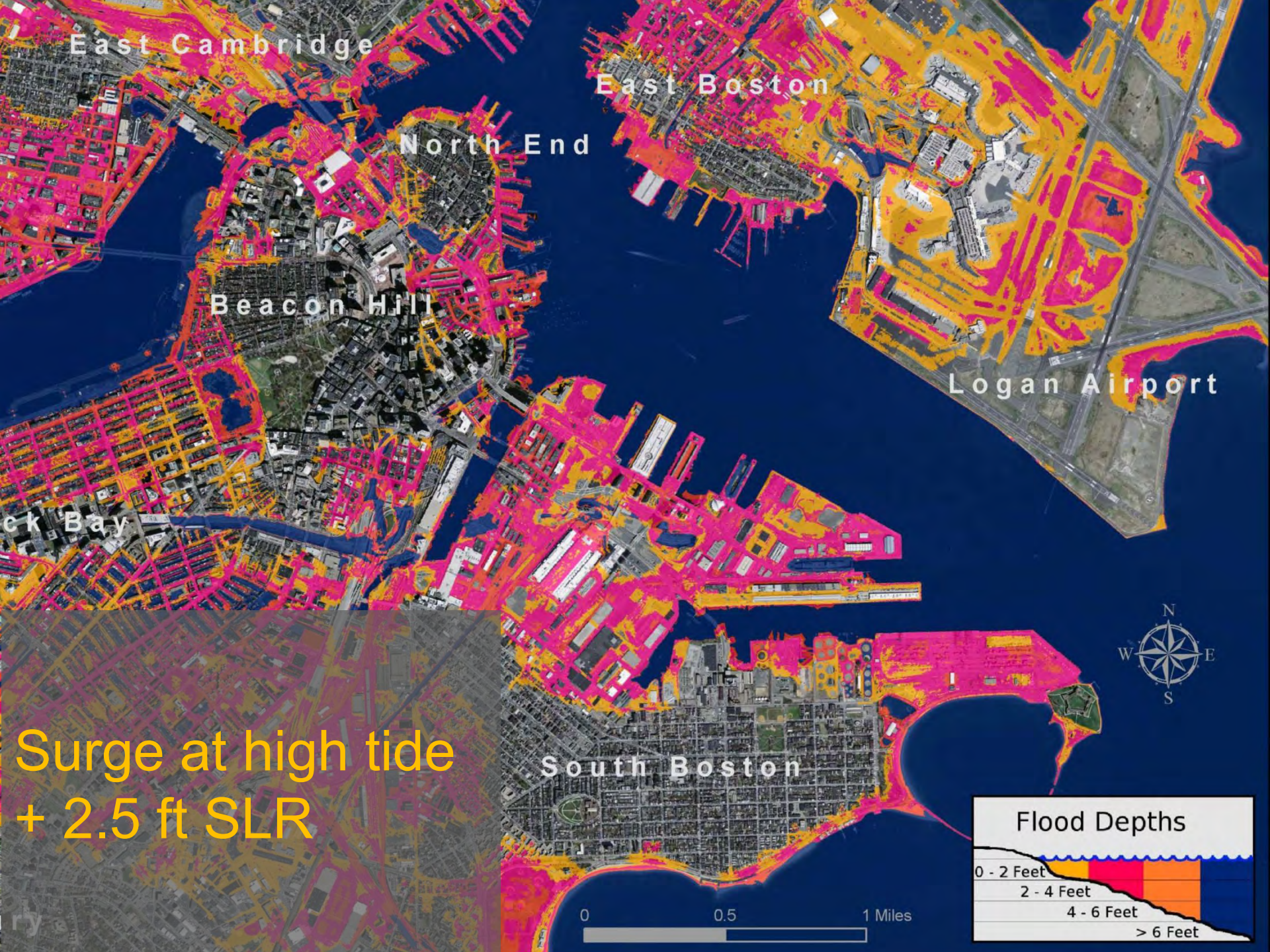
Precipitation

More extreme events

Sea level rise


t Cambridge
East Boston
North End
Beacon Hill
Logan Airport
South Boston
Estimated flooding
on
Oct. 29th
N
W
E
S
Flood Depths


East Cambridge
East Boston
North End
Beacon Hill
Logan Airport
South Boston
If surge had hit at high tide Oct 29th
Flood Depths
0 - 2 Feet
2 - 4 Feet
> 4 Feet
0
0.5
1 Miles
N
W
E
S

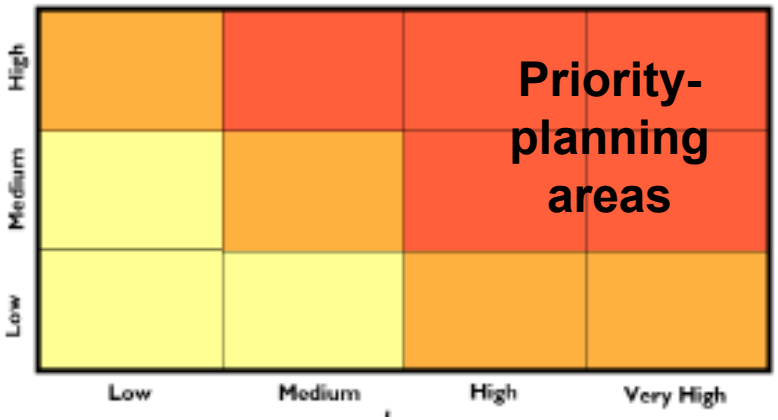

East Cambridge
East Boston
North End
Beacon Hill
Logan Airport
South Boston
Surge at high tide
+ 2.5 ft SLR
N
W
E
S
0
0.5
1 Miles
Flood Depths
0 - 2 Feet
2 - 4 Feet
4 - 6 Feet
> 6 Feet

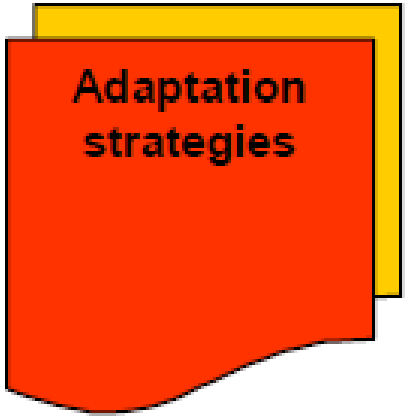
Project Approach

Methodology and Technical Approach
To Complete the Vulnerability Assessment

Lisa Dickson, PIC

Climate Change Services





Step 1

Climate Projections

Scenario Development

Step 2

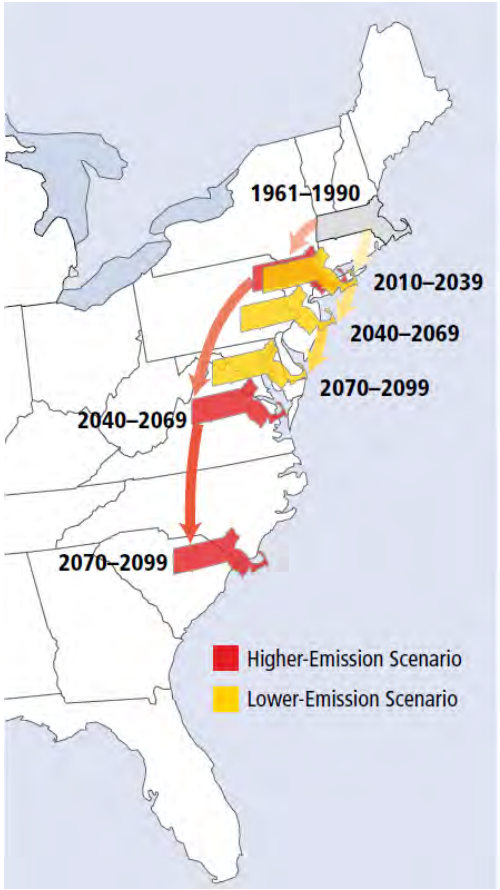
Vulnerability & Risk Assessment

Step 3

Adaptation Planning and Design

Climatic Parameters

Temperature



Precipitation

More extreme events

Sea level rise

Climate Change Projections

- Global Circulation Models (GCMs)
- Downscaling for local impacts

Scenario Development

- Emission Scenarios
- Years of Analysis (2030 and 2070)
- Other socio-economic factors

Three-Step Ranking Process

1: Vulnerability Analysis
- Sensitivity
- Adaptive Capacity

2: Risk Assessment
- Probability of Occurrence
- Consequence of Event

3: Priority Planning Areas
- Most vulnerable and at-risk areas
- Informs focus for Adaptation Plan

Example: ICLEI ranking of water system

Sensitivity

= degree to which built, natural or human system is directly or indirectly affected by changes in climate conditions (e.g., temperature) or specific impacts (e.g., sea level rise)

	Projected Climate Changes for Scenario 1 (2030)						
Critical Elements	*Temperature*	*Temp Ranking*	*Precipitation*	*Precip Ranking*	*Sea Level Rise*	*SLR Ranking*	*Overall Ranking*
Water Supply Reservoir	Increase in yearly average temp by 2 degrees	S2	Decrease in summer	S4	0.5 feet	S0	6
	more heat waves	S3	more frequent, intense rain events	S4			7
			more icing in winter	S1			1

Example: ICLEI ranking of water system

Adaptive Capacity

= ability of built, natural & human systems to accommodate changes in climate with minimal disruption or additional cost

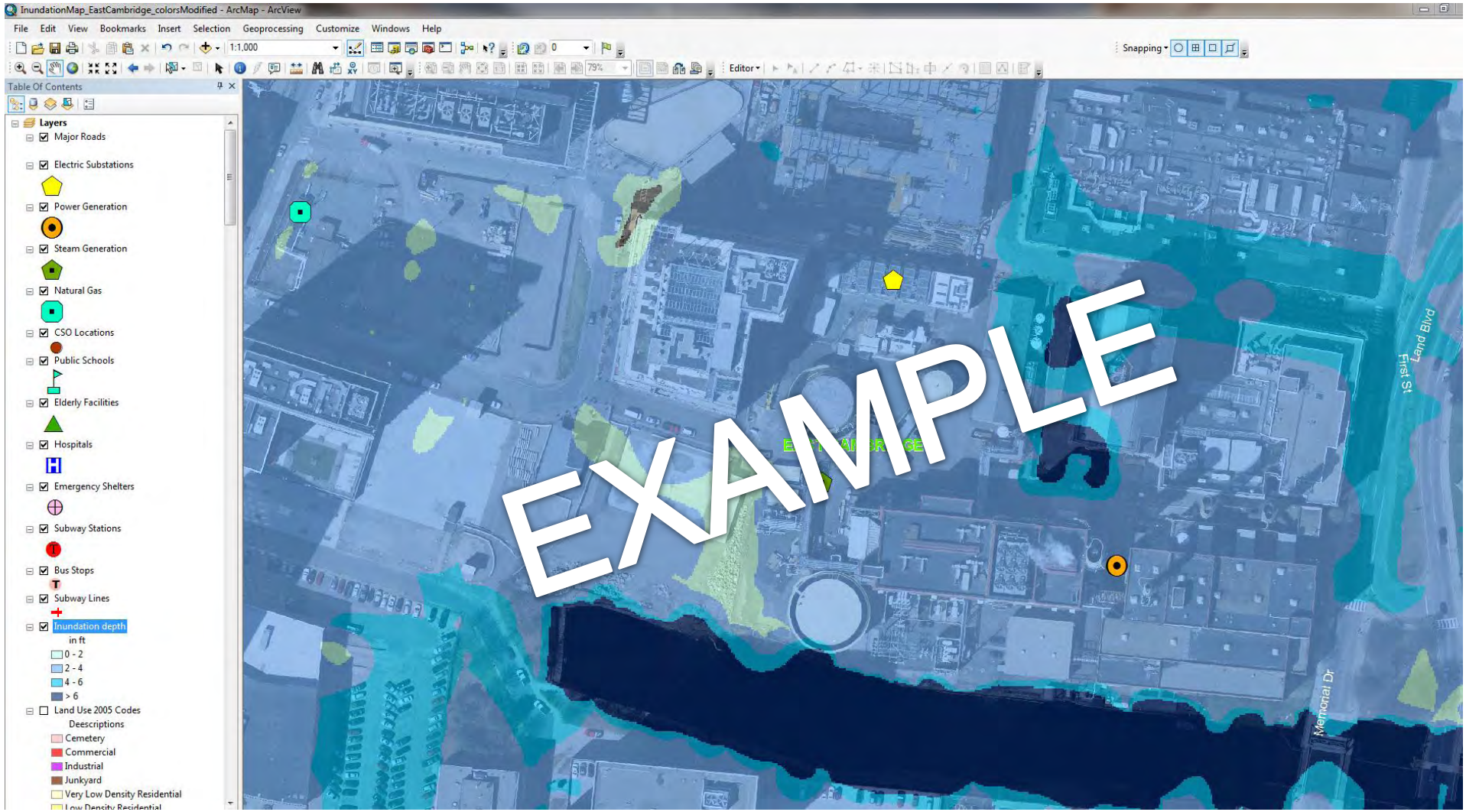
	Projected Climate Changes for Scenario 1 (2030)						
Critical Elements	*Temperature*	*Temp Ranking*	*Precipitation*	*Precip Ranking*	*Sea Level Rise*	*SLR Ranking*	*Overall Ranking*
Water Supply Reservoir	Increase in yearly average temp by 2 degrees	AC1	Decrease in summer	AC3	0.5 feet	AC0	1
	more heat waves	AC3	more frequent, intense rain events	AC3			6
			more icing in winter	AC1			1

Exercise – Vulnerability Ranking

High sensitivity plus low adaptive capacity results in high vulnerability

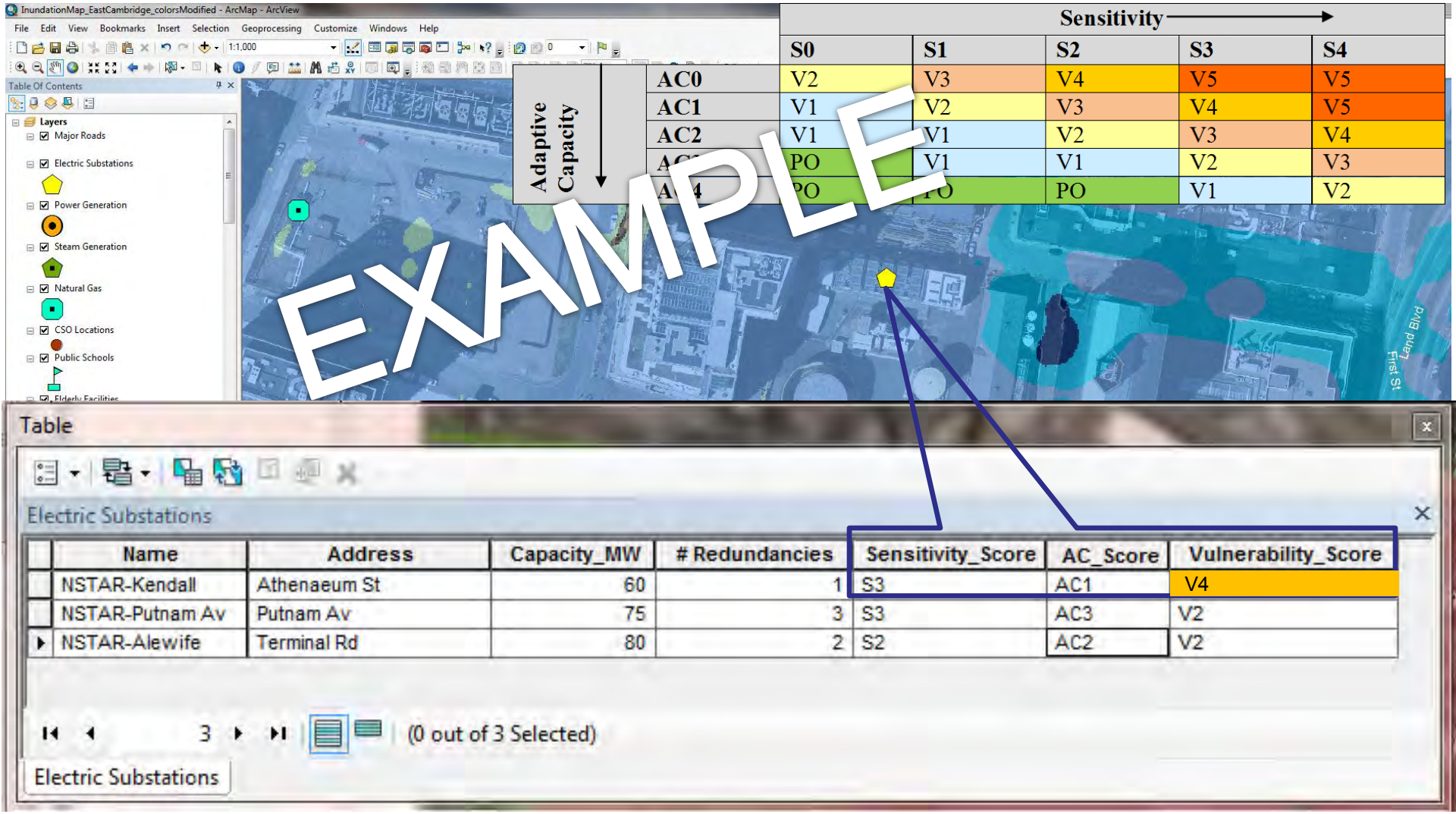
		Sensitivity: Low → High				
		S0	**S1**	**S2**	**S3**	**S4**
Adaptive Capacity Low ↓ High	**AC0**	V2	V3	V4	V5	V5
	AC1	V1	V2	V3	V4	V5
	AC2	V1	V1	V2	V3	V4
	AC3	PO	V1	V1	V2	V3
	AC4	PO	PO	PO	V1	V2

Linking GIS and Risk



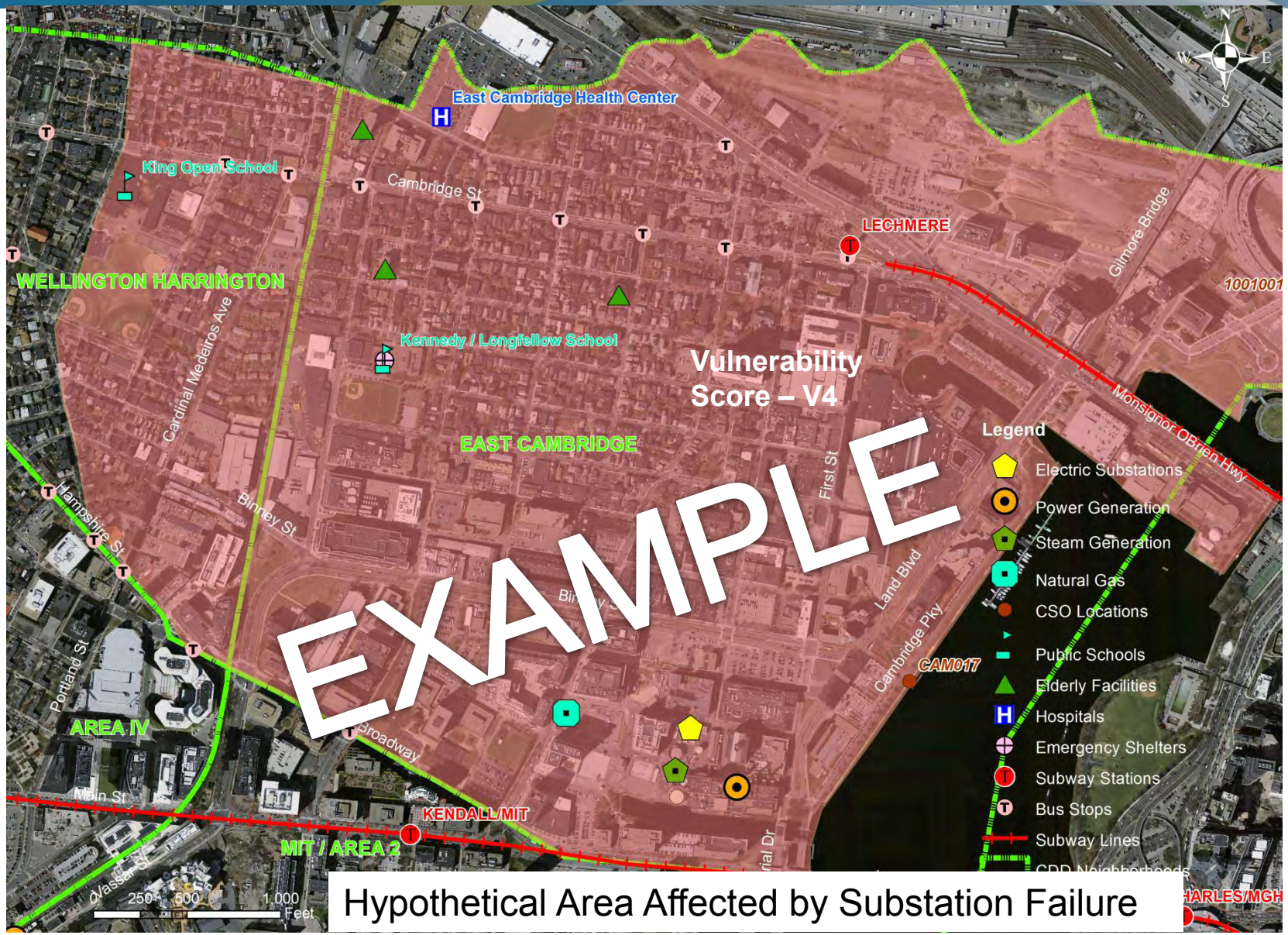
Hypothetical Area of Flooding in East Cambridge

Linking GIS and Risk



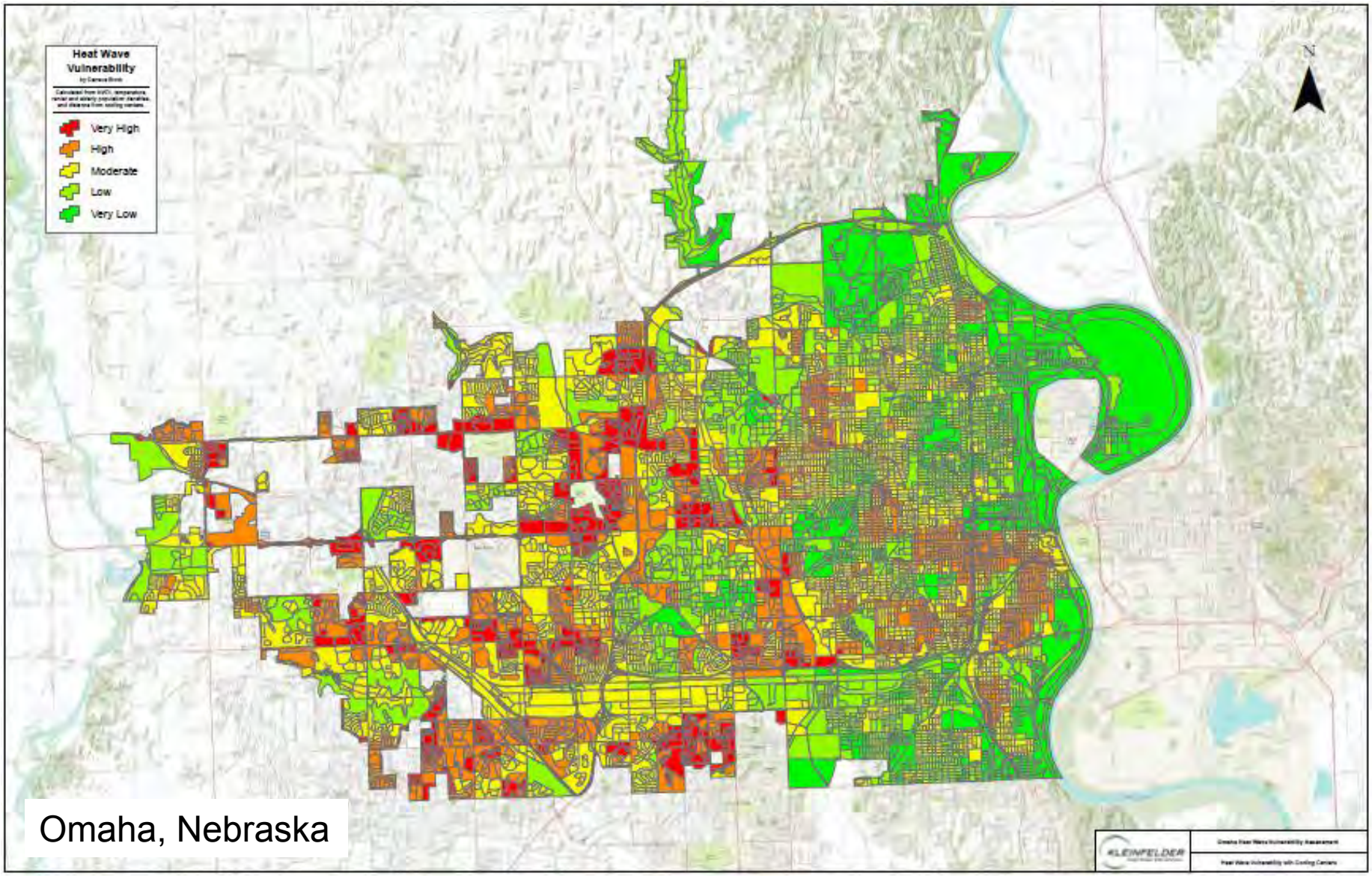
Hypothetical Vulnerability Ranking for Electric Substation

Identifying Vulnerabilities



Hypothetical Area Affected by Substation Failure

Heat Wave Vulnerability



Omaha, Nebraska

Project Approach

Committee roles and contributions

Nathalie Beauvais, PM

Stakeholder Engagement Efforts

1. Technical Advisory Committee
2. Expert Advisory Panel
3. Public Workshops
4. Other Engagement

Technical Advisory Committee (TAC)

- **The TAC will meet 5 times for ~2 hours**
- **17 members representing key stakeholder groups (agencies, institutions, businesses, residents, etc.)**
- **These meetings will be somewhat technical**
- **Key responsibilities**
  - **To learn about the project**
  - **To share information with technical team**
  - **To act as liaisons to their organizations and agencies**
- **Welcome to attend Public Workshops**
- **Each meeting's materials will be posted with a meeting summary**

Expert Advisory Panel (EAP)

- **EAP will meet 4 times, ~2 hours per meeting**
- **6 members, climate experts from local academic institutions**
- **These small meetings will be highly technical**
- **Key responsibilities**
  - **Review technical approach by project team and give guidance/input**
  - **Share knowledge of best practices, current info, etc.**
  - **Review draft documents from the technical team**
- **Welcome to attend Public Workshops**

Schedule

Joint TAC and EAP Meeting #1: Kick Off (December 18th)

EAP Meeting # 2: Climate Change Projections and protocols for analyses

EAP Meeting # 3: Scenario Development

TAC Meeting #2: Sensitivity Analysis

TAC Meeting #3: Introduction to Vulnerability & Risk Assessment (Ranking)

TAC Meeting #4: Results of Vulnerability & Risk Assessment and Priority Planning Areas

Joint TAC & EAP Meeting #5: Report's recommendation and Introduction to the Adaptation Plan

Public Workshops

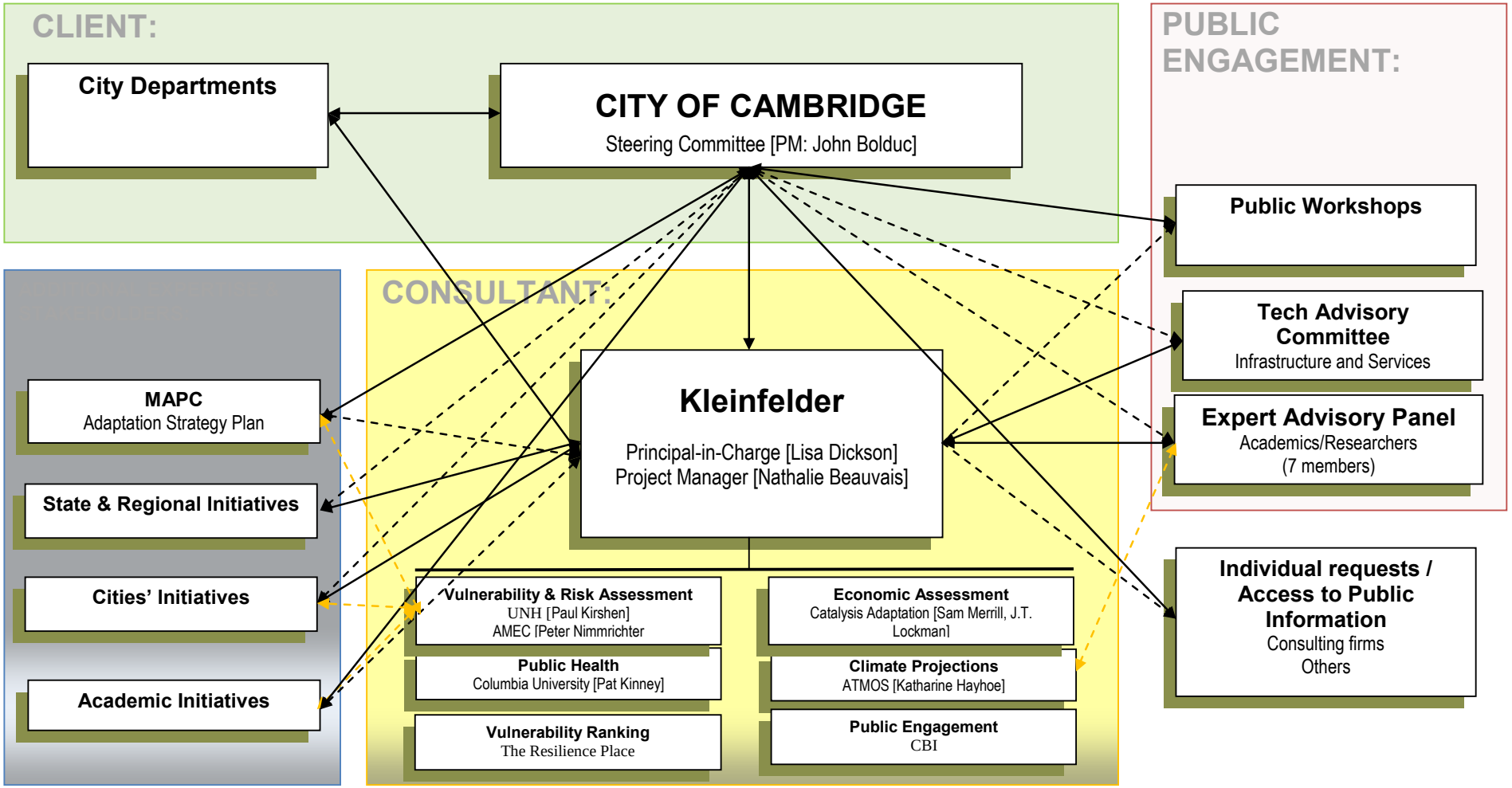
- 3 Public Workshops, ~3 hours each (evenings or weekends)
- Early, middle, end points of project
- Intent is to get 50-100 people to attend, seeking wide participation through many outreach strategies
- Designed so people can talk to each other
- These meetings will be designed for a general audience
- Key expectations:
  - Provide input, local knowledge
  - Share perspectives on early work
  - Act as liaisons into the community about the project
- Meeting materials and summaries will be posted online

Other Engagement

As the project gets further underway, the project team will engage people in other ways (as needed).

- **Project website**
- **Listserv to receive updates & meeting announcements**
- **Focus groups as needed**
- **Individual discussions**
- **Possible surveys**

Stakeholder Engagement



Project Approach

Two (2) stage process

1. **Vulnerability Assessment (2012-2013)**
   - Provide technical & scientific information for assessing risk & vulnerability
   - Identify priority planning areas
   - Establish stakeholder engagement processes

2. **Adaptation Planning (2014-2015)**
   - Identify measures to prepare for changes likely to occur from climate change
   - Adopt implementation measures

During 2013, the City hopes that by engaging people and letting them know about the vulnerability assessment work, the community will be ready and primed for the next phase.

Public comments

THANK YOU.

We look forward to working with you, and please let us know if you have any questions.