

Urban Adapt Heat Risk Assessment Framework

urban adapt

A stylized, white, line-art graphic of a city skyline with various building shapes of different heights, positioned below the text 'urban adapt'.

Heat Risk Assessment Framework

Exposure: Contact between a person and one or more physical, biological, chemical, or psychosocial stressors.

Sensitivity: Degree to which a person is affected by exposure.

Adaptive Capacity: Ability of a person or community to adjust to or cope with potential hazards.



Population Impact

Heat Risk Assessment Framework

High resolution
air temperature



Health-based
endpoint (mortality)



AC prevalence



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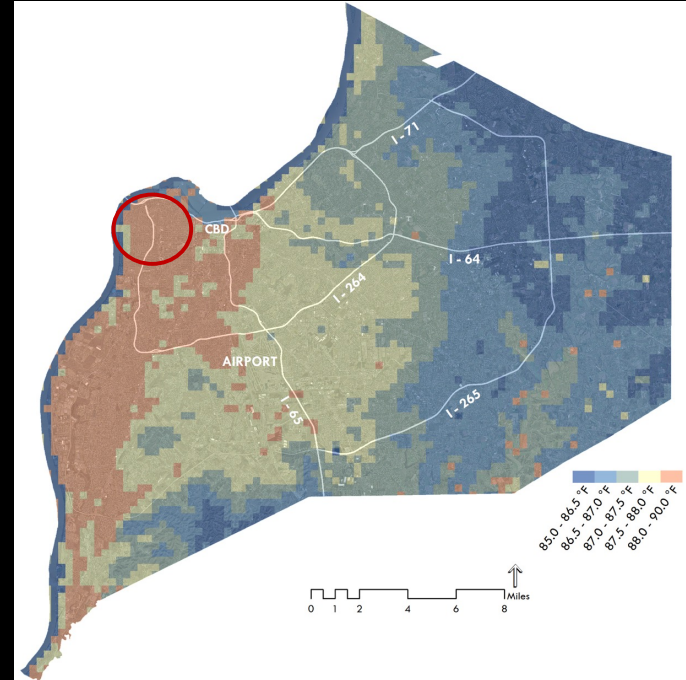


Population Impact

Heat risk data available at the scale of cities



satellite land surface temperature (LST)



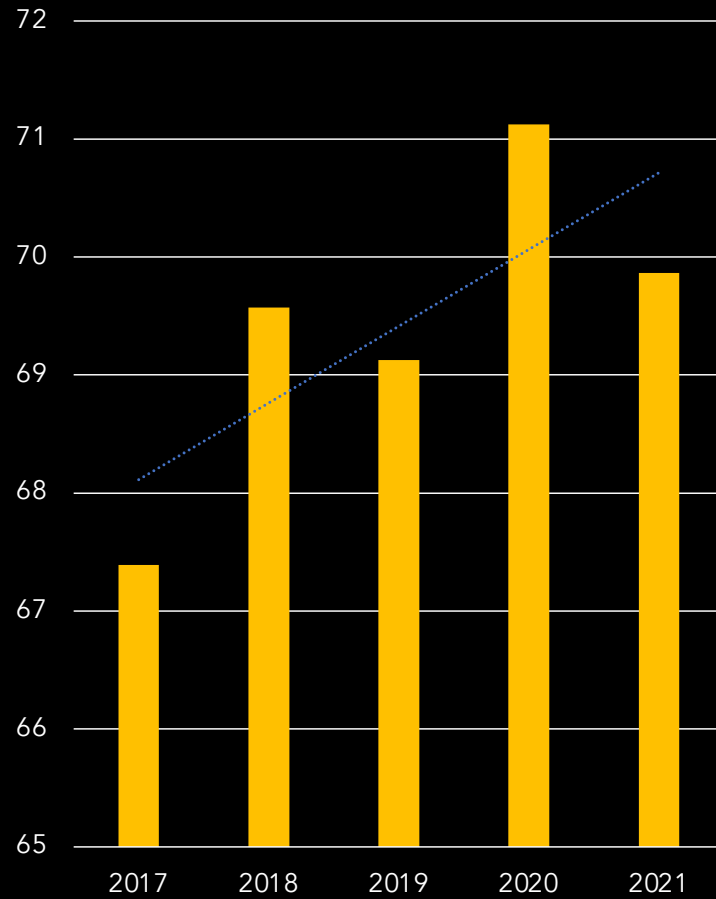
air temperature from climate simulation model

Commonly used land surface temperature from satellites may not accurately identify areas of highest air temperature exposure, which is the driver of human health risk.

Advantages of modelled climate data

1. Can estimate air temperature directly at level of city block
2. Can validate with surface weather stations
3. Allows certainty in capturing heat wave conditions
4. Provides needed input to health impact assessment
5. Enables modeling of specific adaptation scenarios
6. Enables cost assessment and community outreach for adaptation
7. Geospatial datasets supportive of other assessment needs

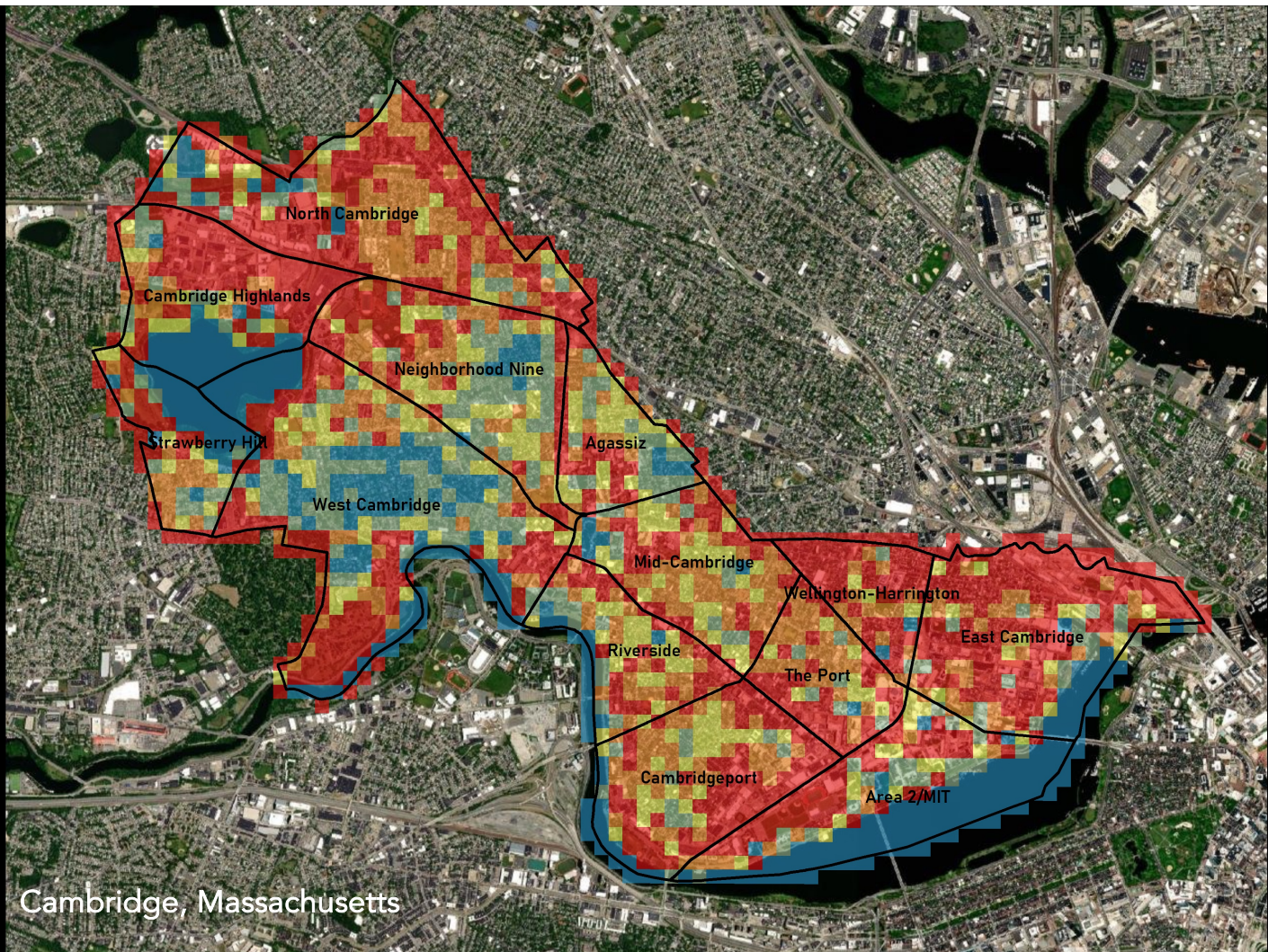
1. Obtain meteorological inputs to climate model for recent hot summer



2. Build spatially comprehensive
land cover dataset



3. Run base case model scenario



Average Daily High Temperature

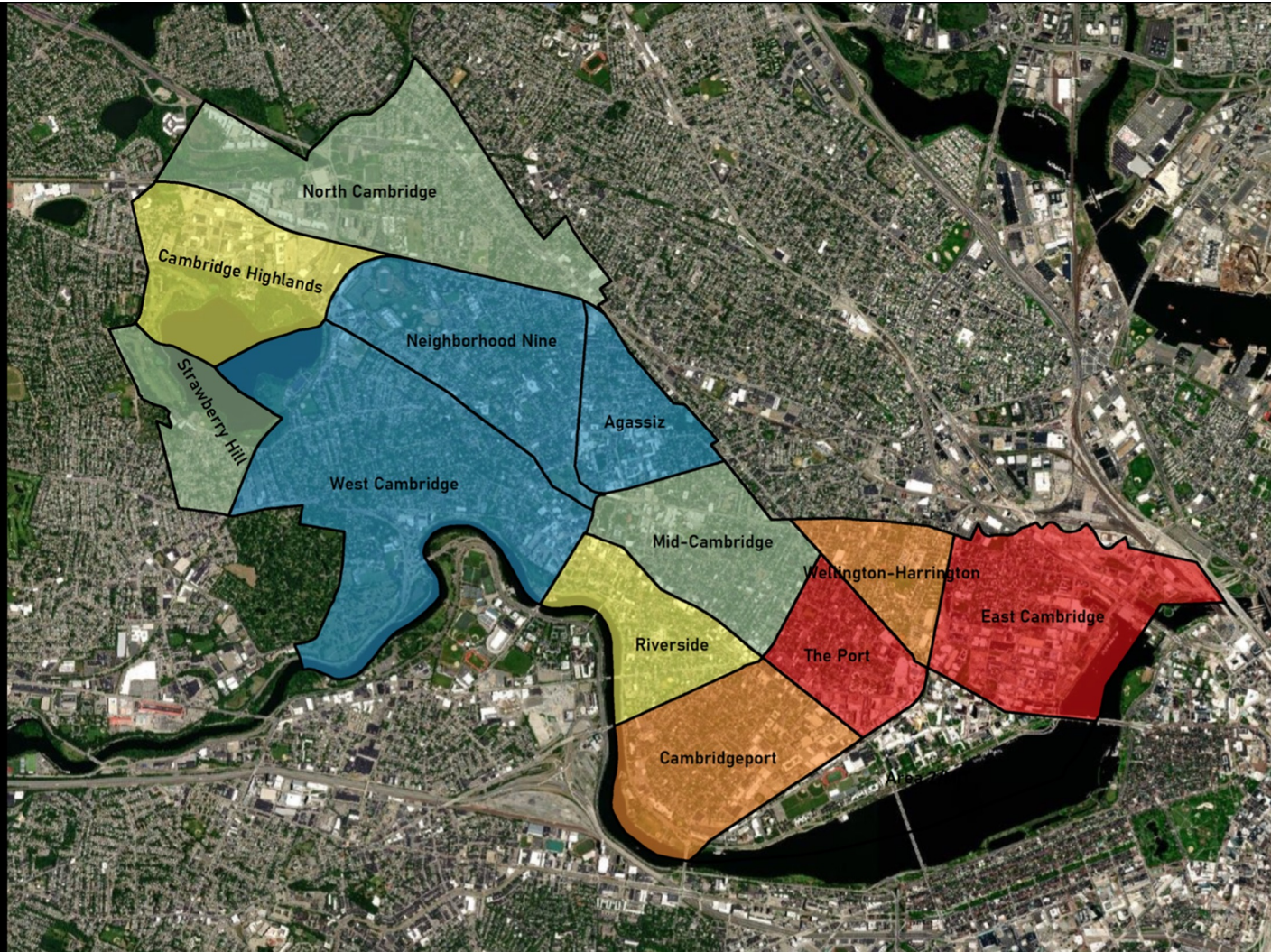


80-89 °F
89-92 °F
92-93 °F
93-94 °F
94-104 °F

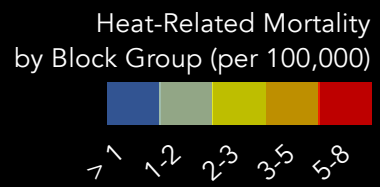
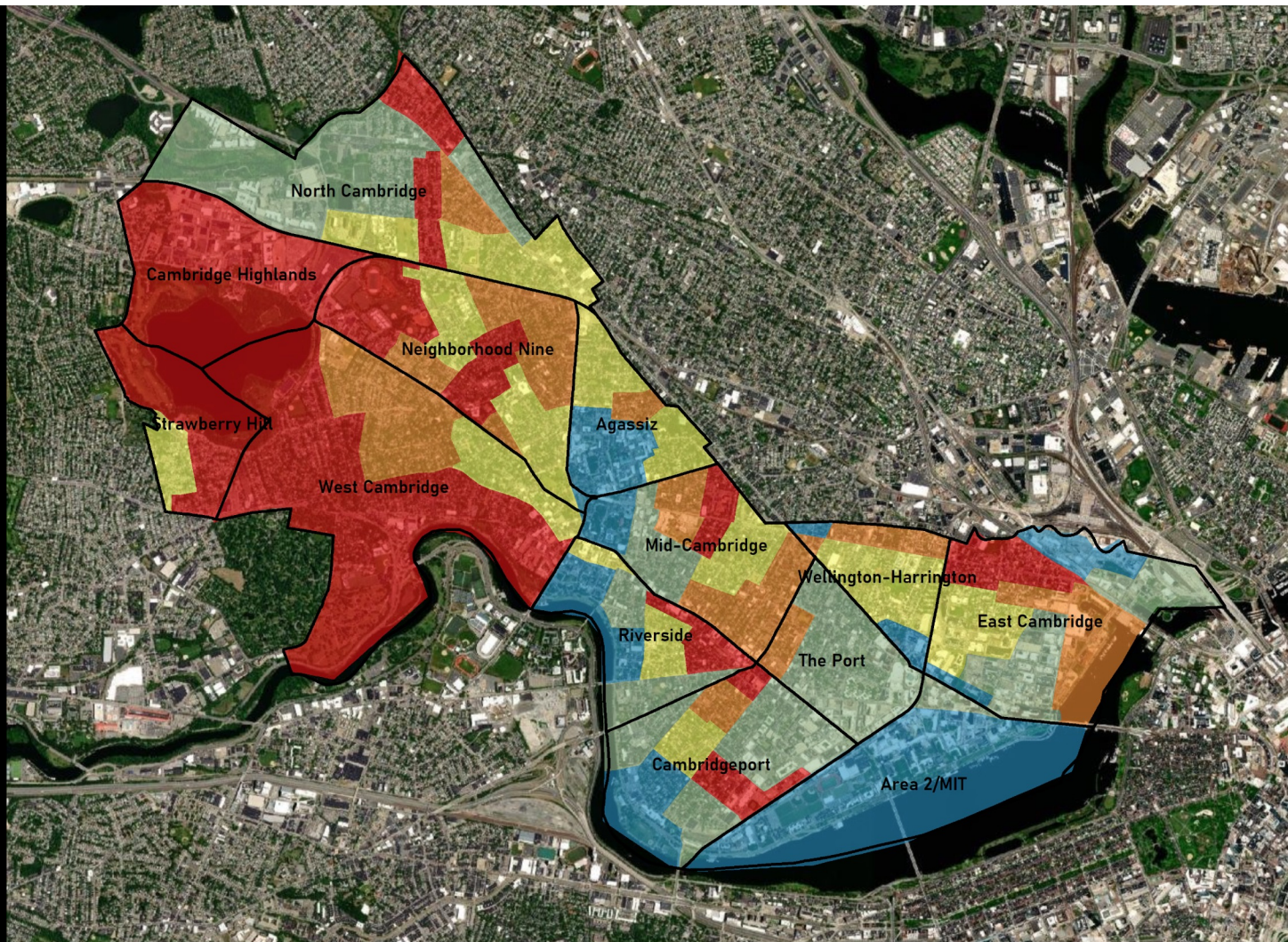
4. Co-produce heat management scenario parameters

- Green infrastructure
 - Increase in tree canopy over roadways and other impervious areas
 - Increase in tree canopy over non-impervious areas
 - Decrease in tree canopy
 - Green roofs
 - Displacement of surface impervious with grass area
- Cool materials
 - Cool roofs
 - Cool paving for roads
 - Cool paving for parking lots
- Blue infrastructure
 - Increase in water surface area
- Combination of strategies

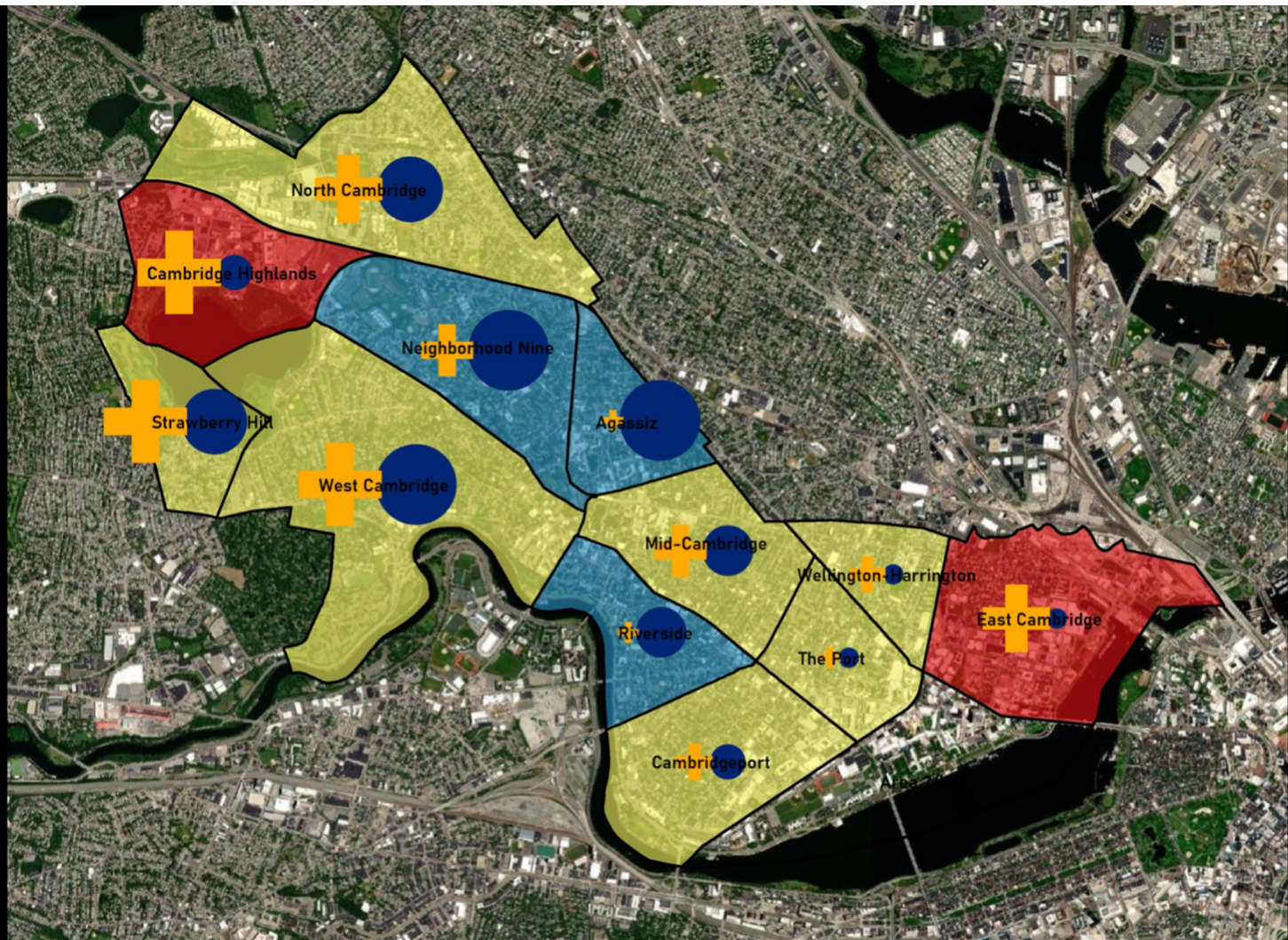
5. Estimate differences in adaptive capacity by neighborhood



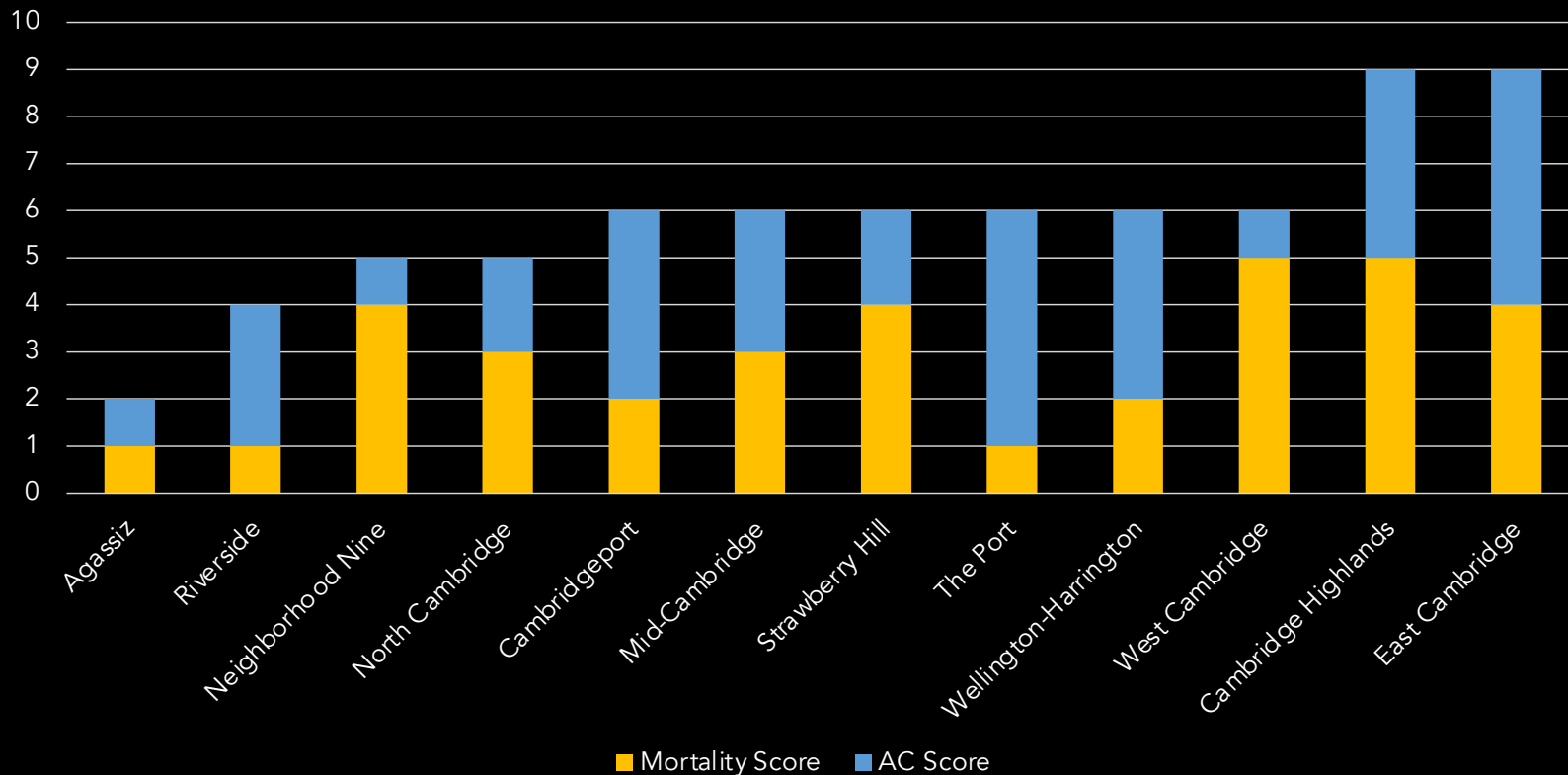
6. Estimate neighborhood heat mortality /morbidity



7. Score neighborhood by total heat risk



Overall Heat Risk Assessment



■ Mortality Score ■ AC Score

8. Development of neighborhood-specific recommendations

Neighborhood	Small Street Trees	Large Street Trees	Cool Roofing (Albedo, 000s sq ft)	Cool Paving (Albedo, 000s, sq ft)
Agassiz	490	90	2,509	2,670
Area 2/MIT	1,259	231	3,102	4,763
Cambridge Highlands	631	116	2,446	5,623
Cambridgeport	877	161	4,028	4,226
East Cambridge	2,732	502	5,761	9,208
Mid-Cambridge	790	145	3,878	4,169
Neighborhood Nine	1,317	242	4,949	6,996
North Cambridge	2,213	407	5,741	9,116
Riverside	1,074	197	3,505	3,915
Strawberry Hill	487	89	1,069	2,049
The Port	1,149	211	4,060	4,432
Wellington-Harrington	574	105	2,206	3,045
West Cambridge	1,051	193	4,616	7,001
Total	14,646	2,690	47,871	67,214

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