

Resilient Water Services, Resilient Communities

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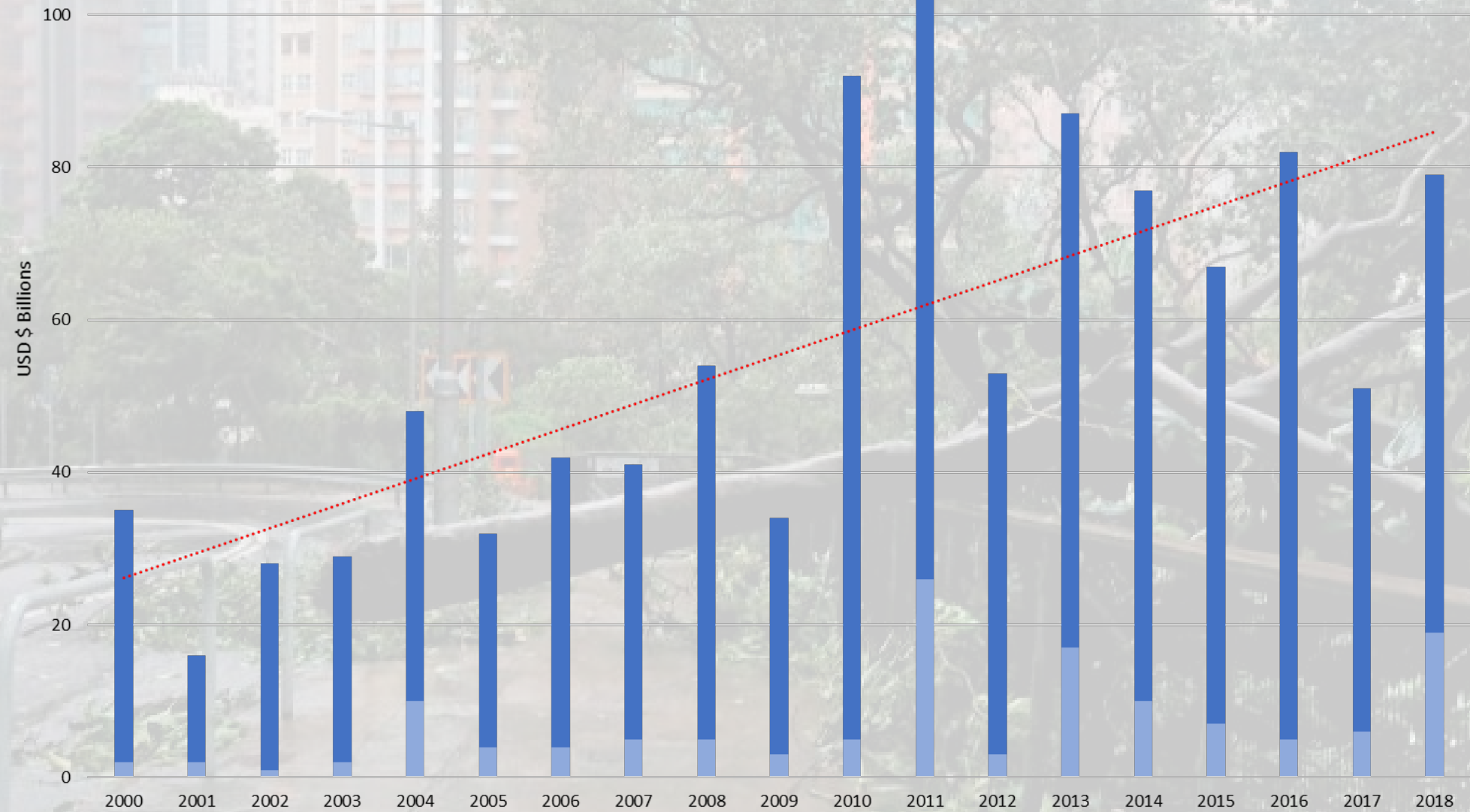


The Resilience Challenge

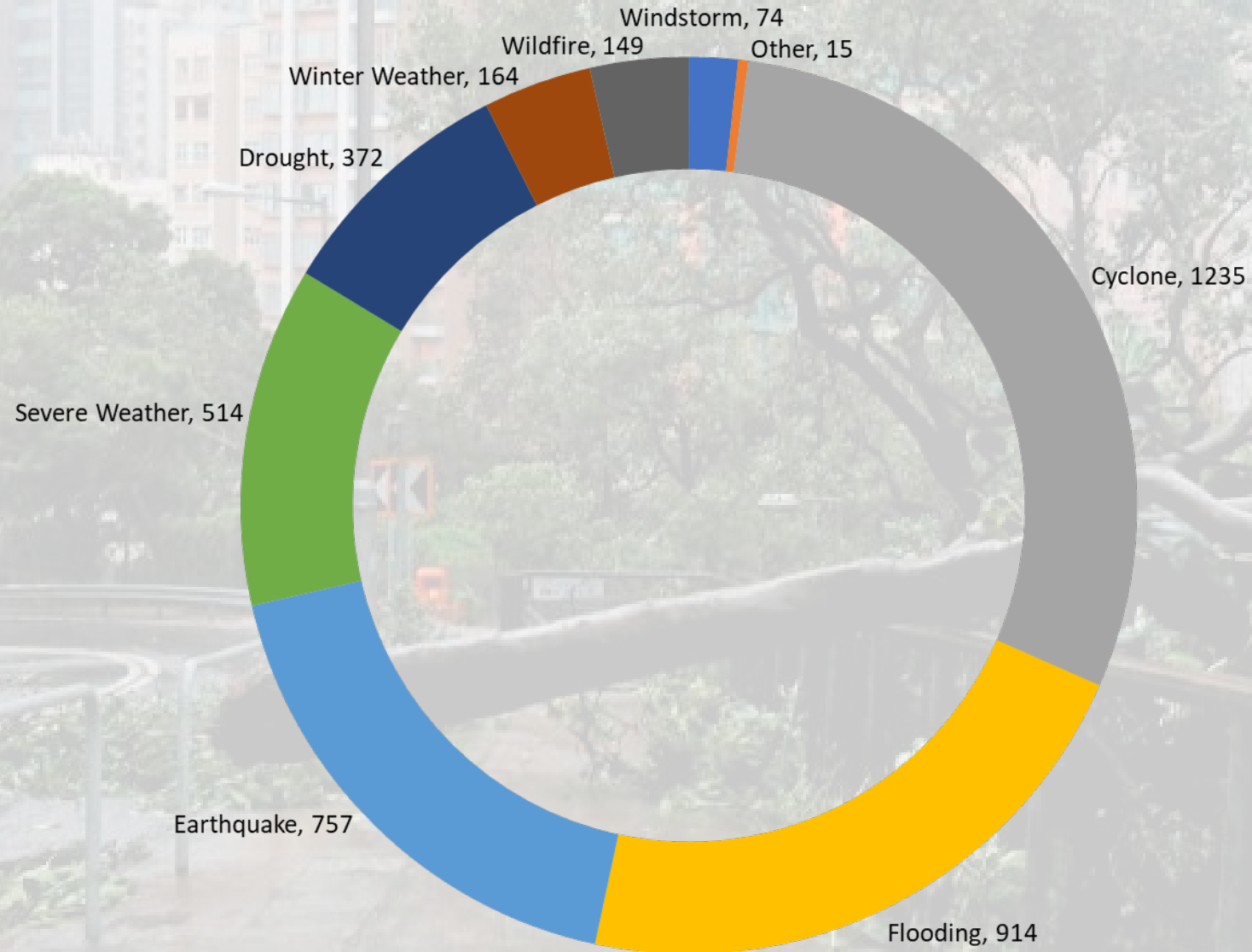
Global Economic Losses from Extreme Weather Events



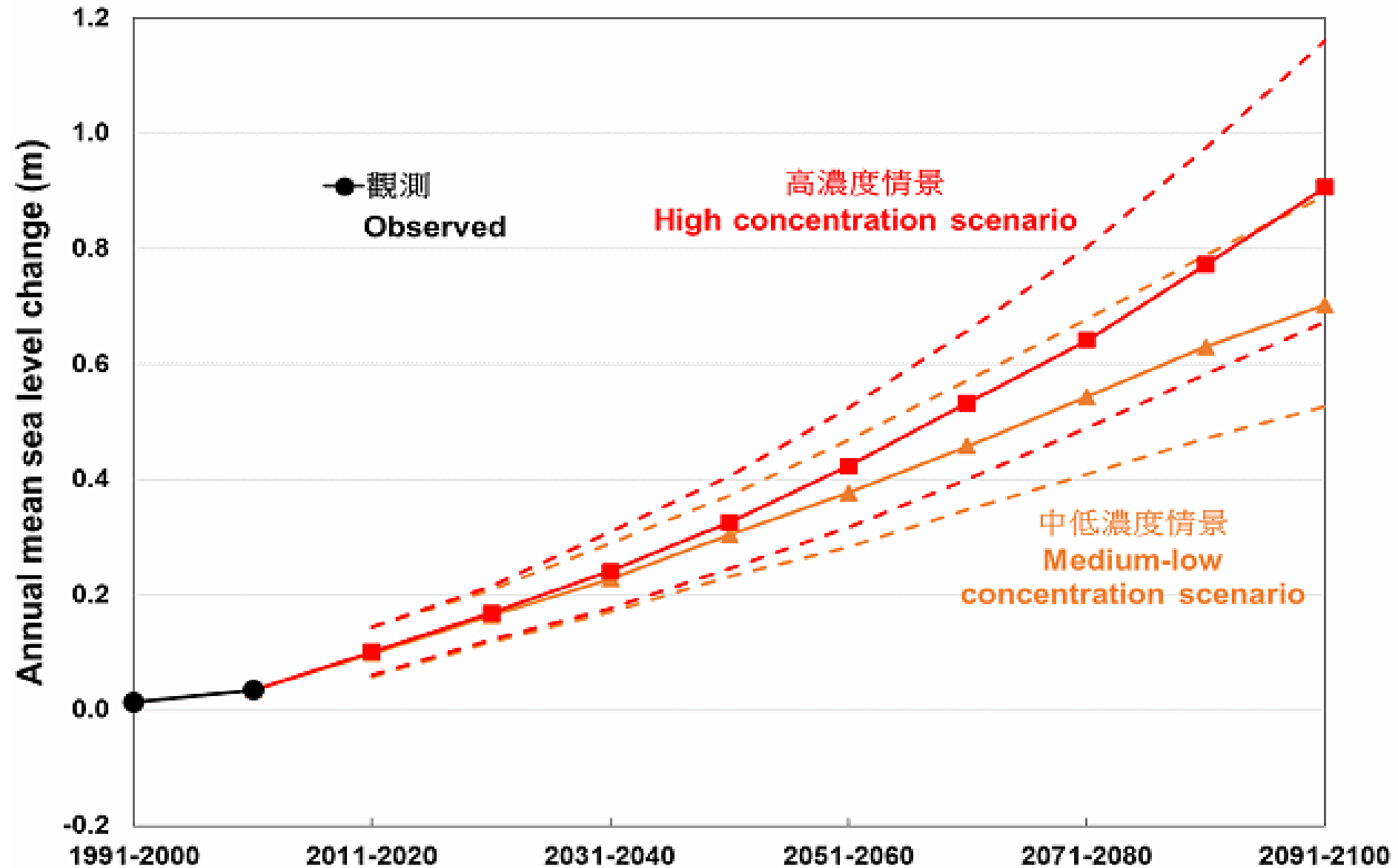
APAC Economic Losses from Extreme Weather Events



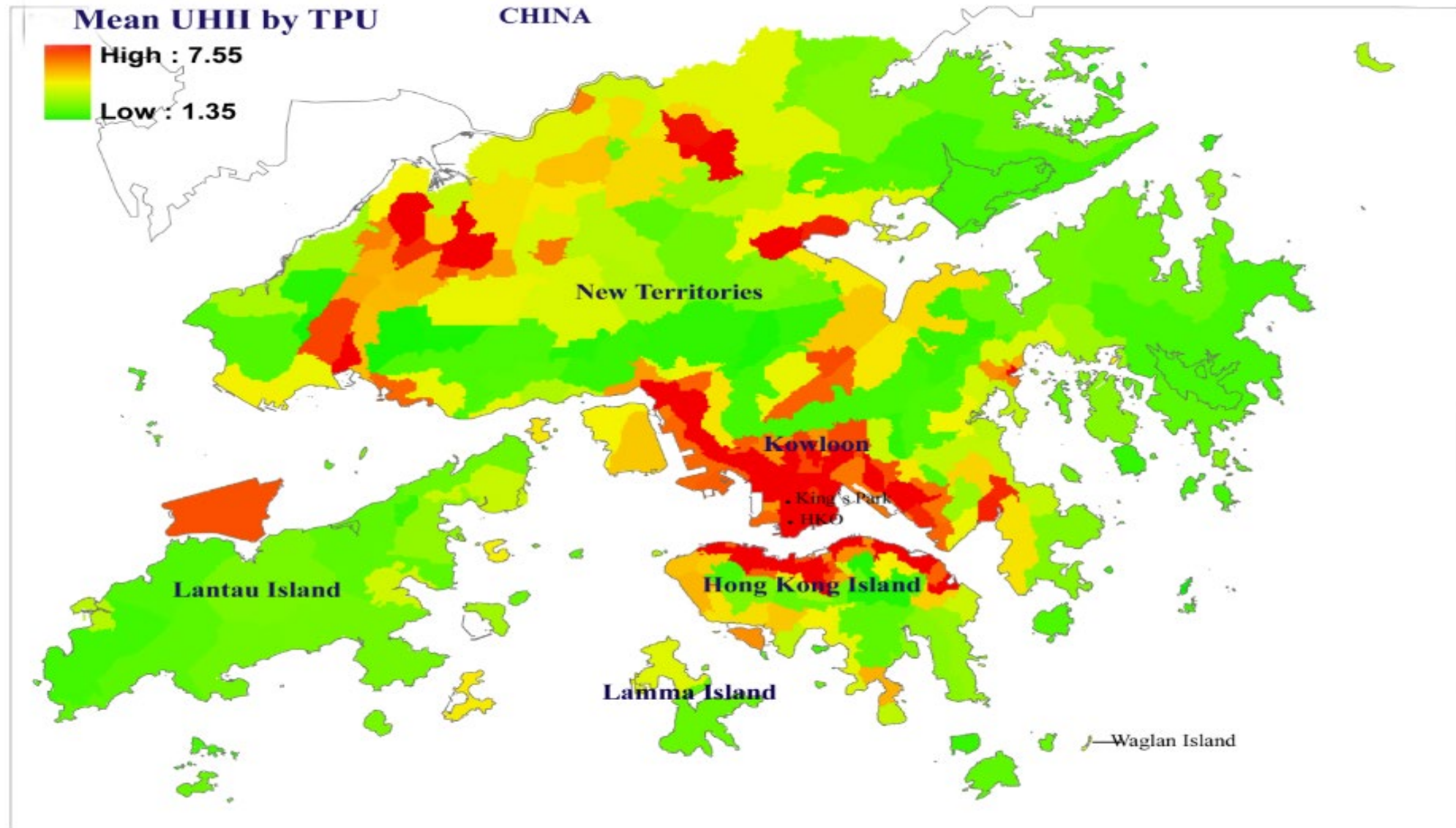
Global Aggregate Economic Losses from Extreme Weather Events, 2000-2018



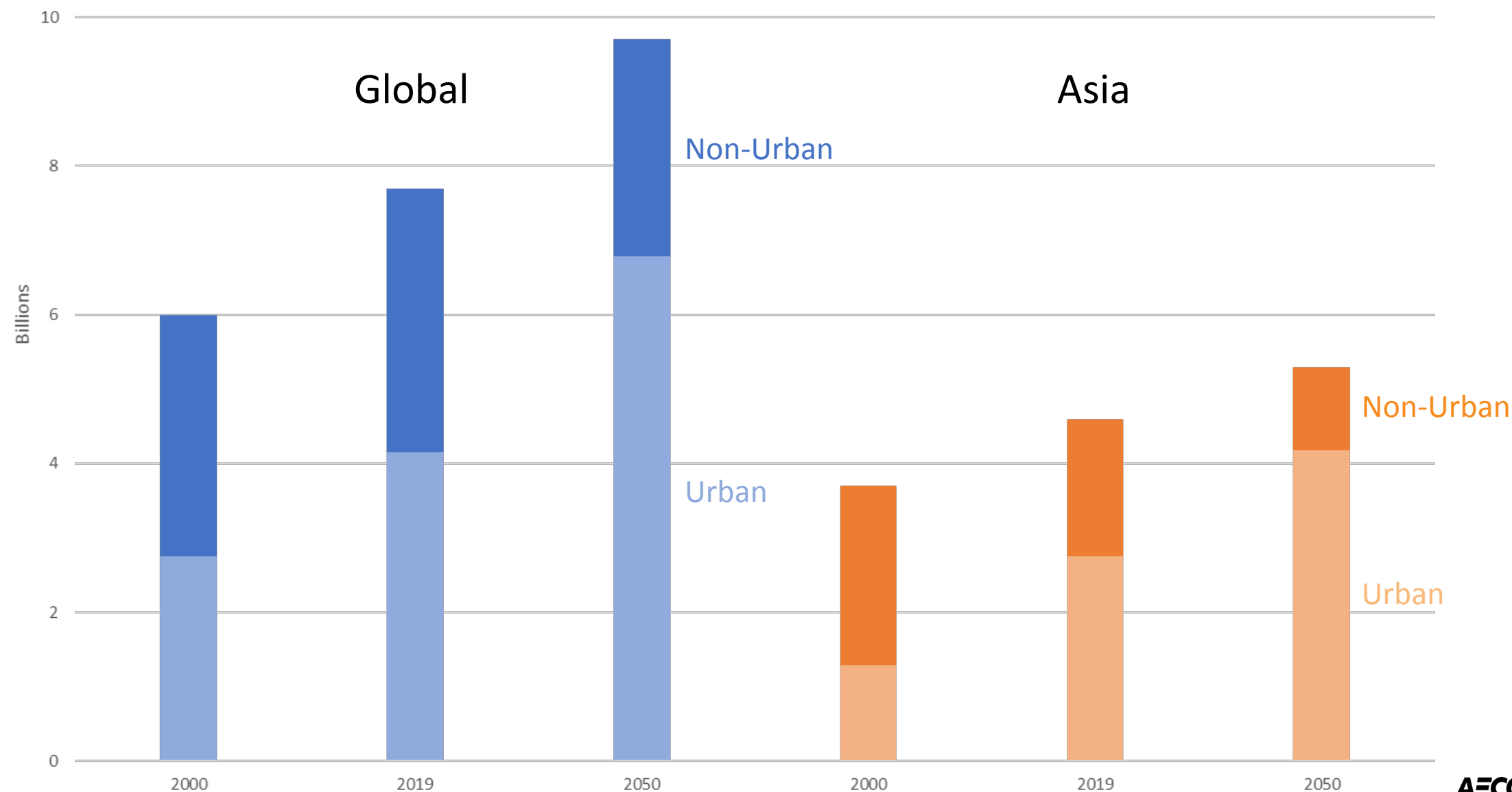
Sea Level Rise



Urban Heat



Population Growth & Urbanisation





Lower Manhattan Coastal Resilience

Two Bridges

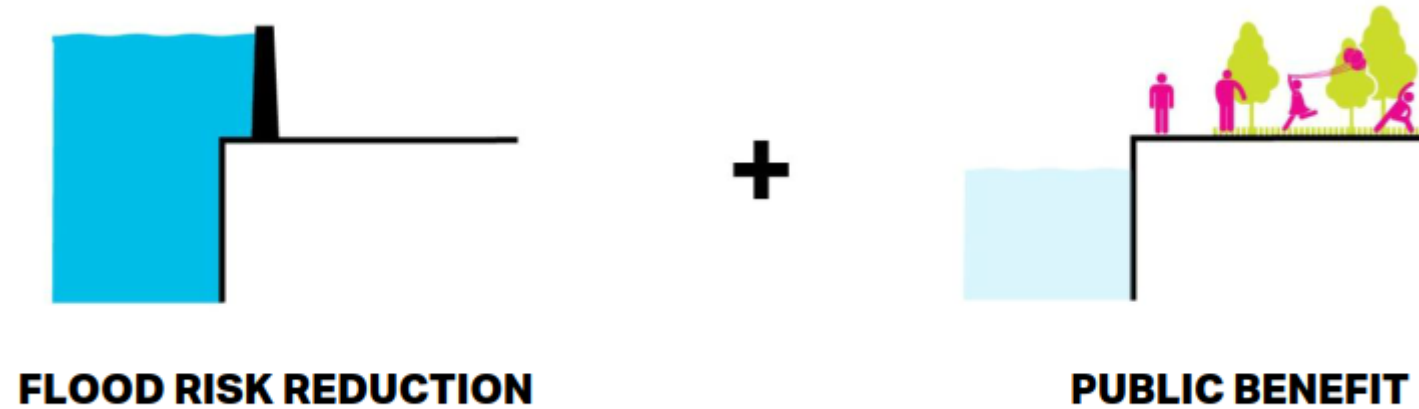
Superstorm Sandy



Lower Manhattan Coastal Resilience



Lower Manhattan Coastal Resilience



Evaluation Criteria



CONSTRUCTABILITY

- Cost
- Structural requirements
- Impacts on utilities
- Disruptions to existing structures and transportation
- Failure risk



SCHEDULE

- Regulatory actions
- Environmental impacts
- Jurisdictional coordination



RESILIENCE

- Buildings, residents, and infrastructure protected
- Adaptability



OPERATIONS & MAINTENANCE

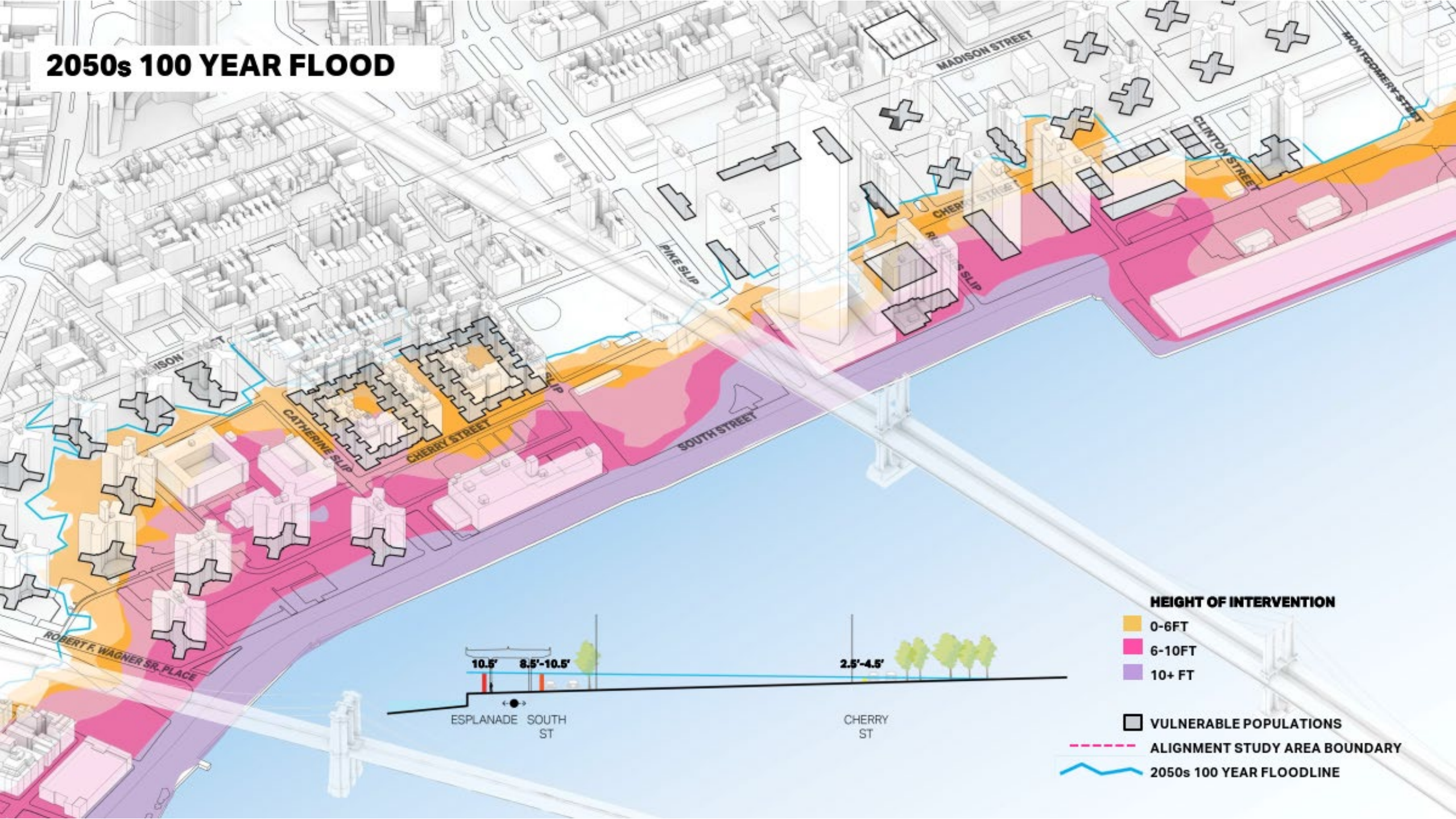
- Accessibility
- O&M requirements



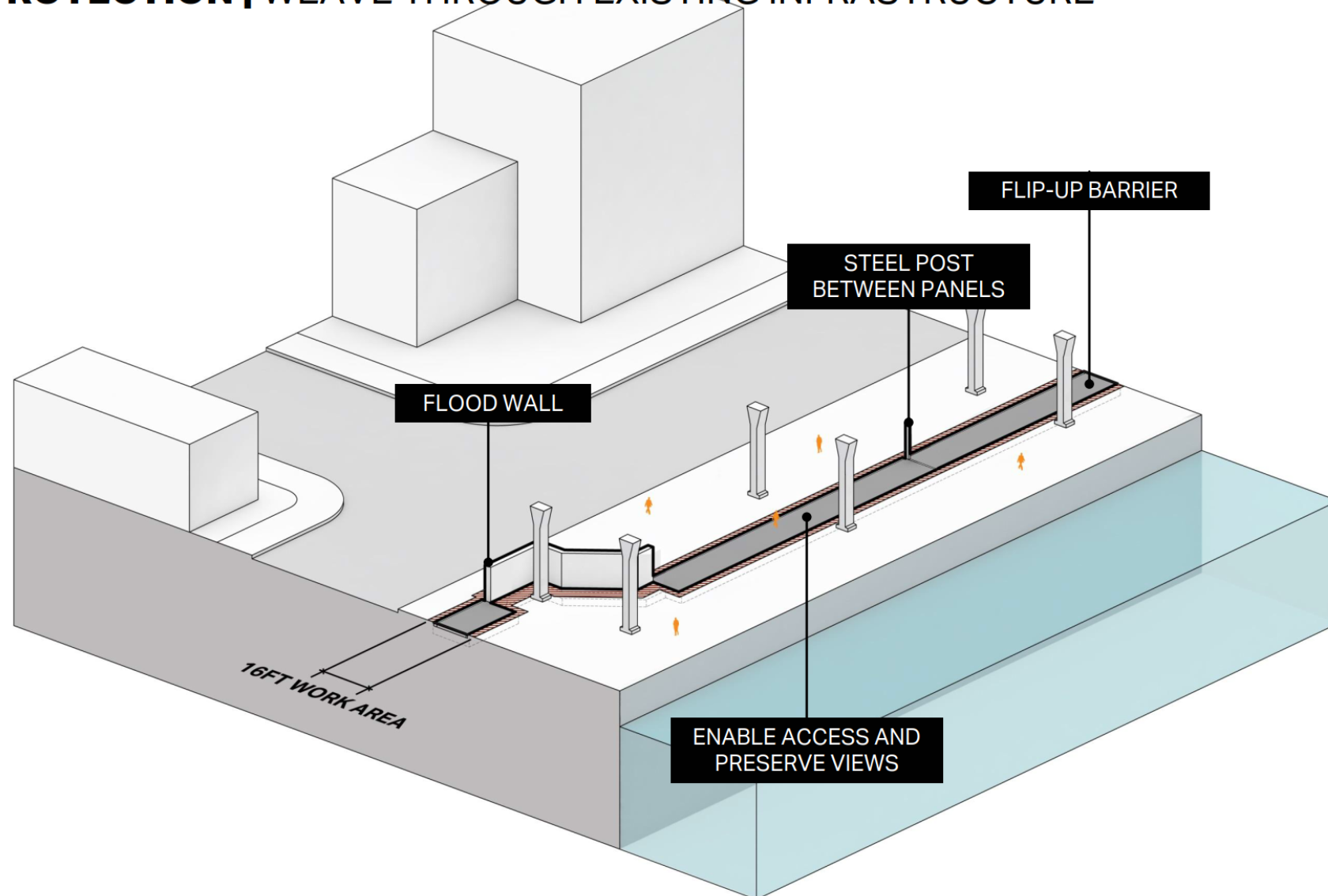
PUBLIC REALM BENEFITS

- Opportunity for community amenities, placemaking, and urban design

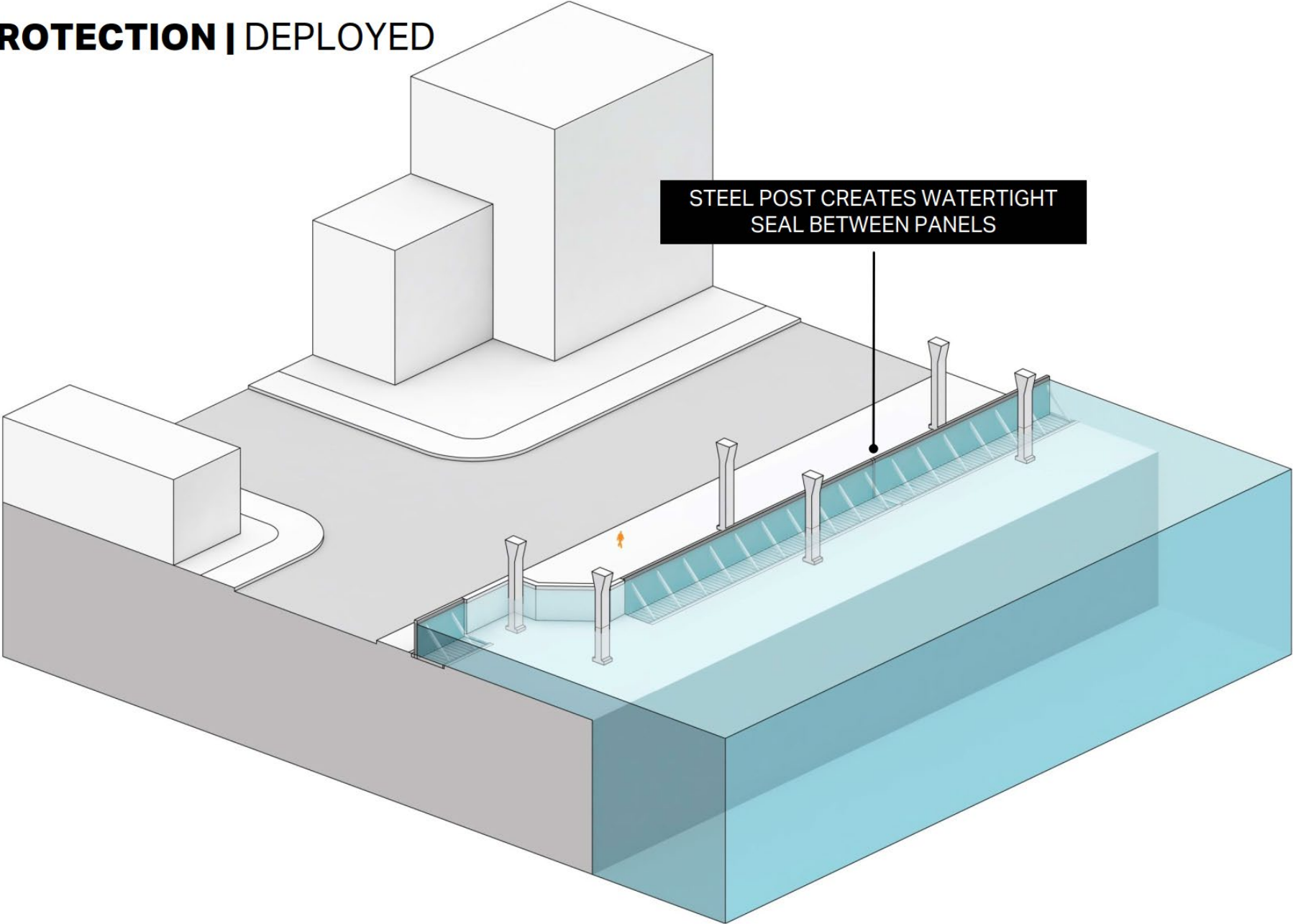
2050s 100 YEAR FLOOD



LINE OF PROTECTION | WEAVE THROUGH EXISTING INFRASTRUCTURE



LINE OF PROTECTION | DEPLOYED



Flip-Up Gate Features

A.

- Cover plates will hide seams and protect gate hinges.
- Gates and cover plates can be designed flush with existing grade.



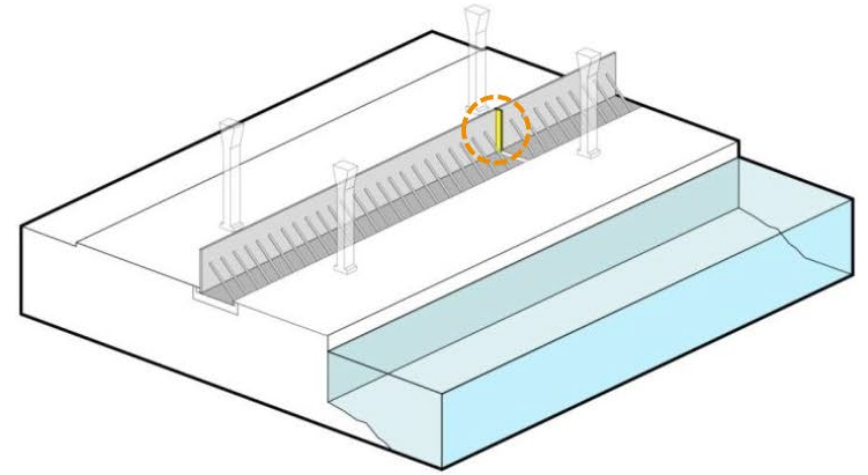
B.

- Flip-up gates can be clad with pavers that match the surroundings.



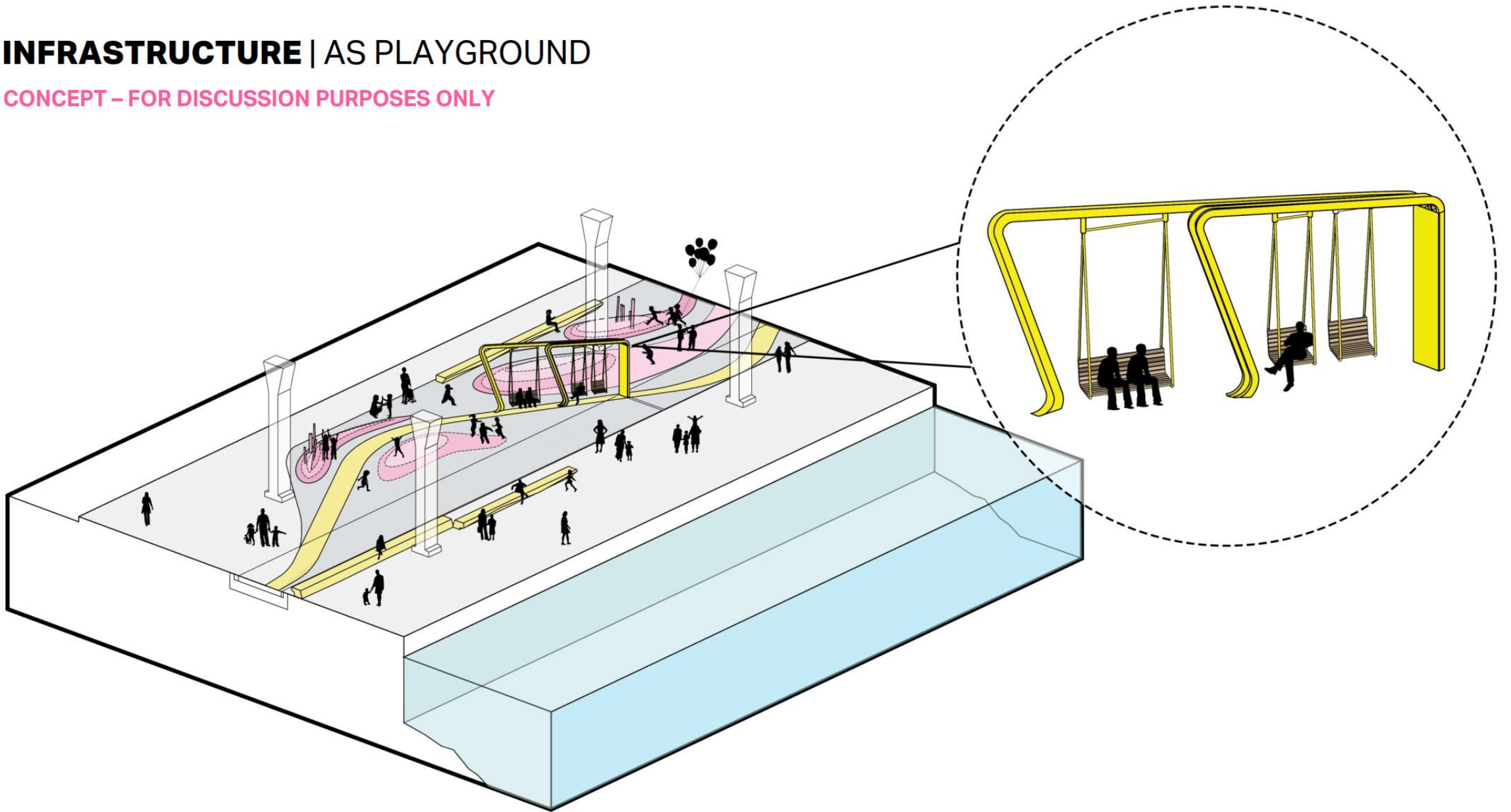
C.

- Adjacent gates will be sealed against an intermediate structural post.
- Furnishings cannot be permanently installed on top of the flip-up gates.



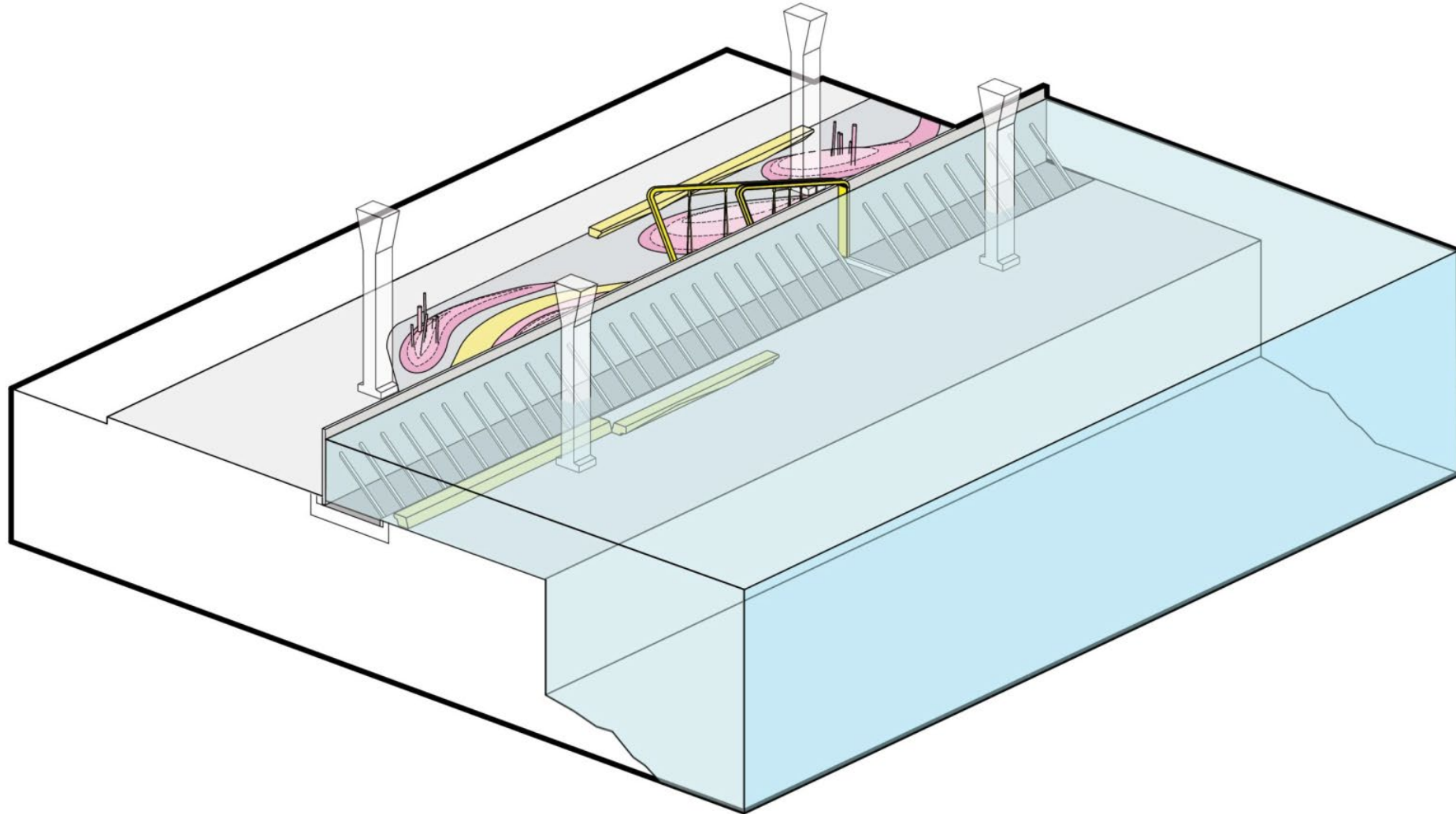
INFRASTRUCTURE | AS PLAYGROUND

CONCEPT – FOR DISCUSSION PURPOSES ONLY



INFRASTRUCTURE | DEPLOYED

CONCEPT – FOR DISCUSSION PURPOSES ONLY



A nighttime photograph of a cityscape. In the foreground, a body of water reflects the lights from the buildings and the bridge. A large, modern bridge with a complex, curved structure is visible on the left. In the background, several modern buildings are lit up, with their lights reflecting in the water. The sky is dark blue.

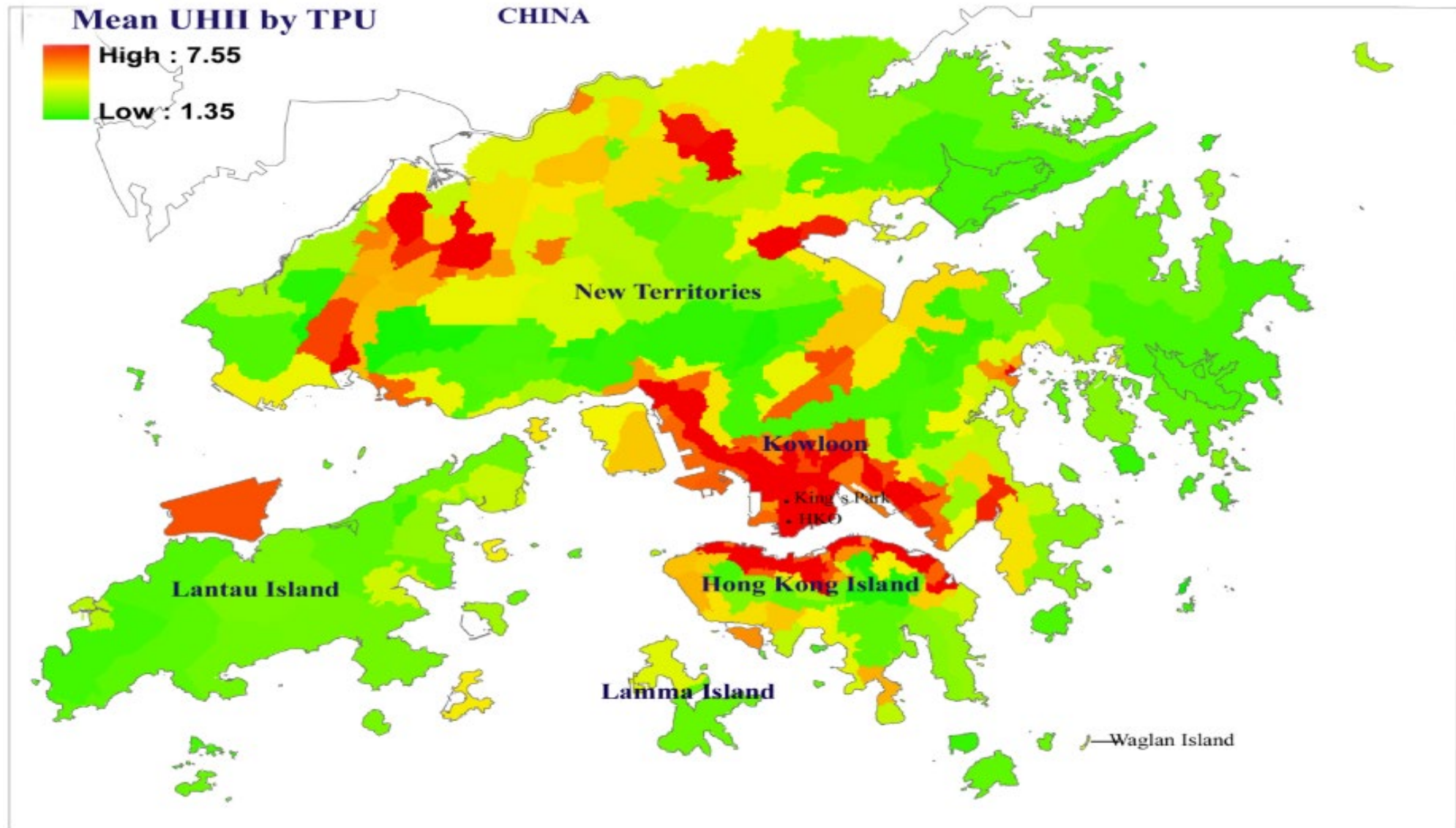
Urban Cooling

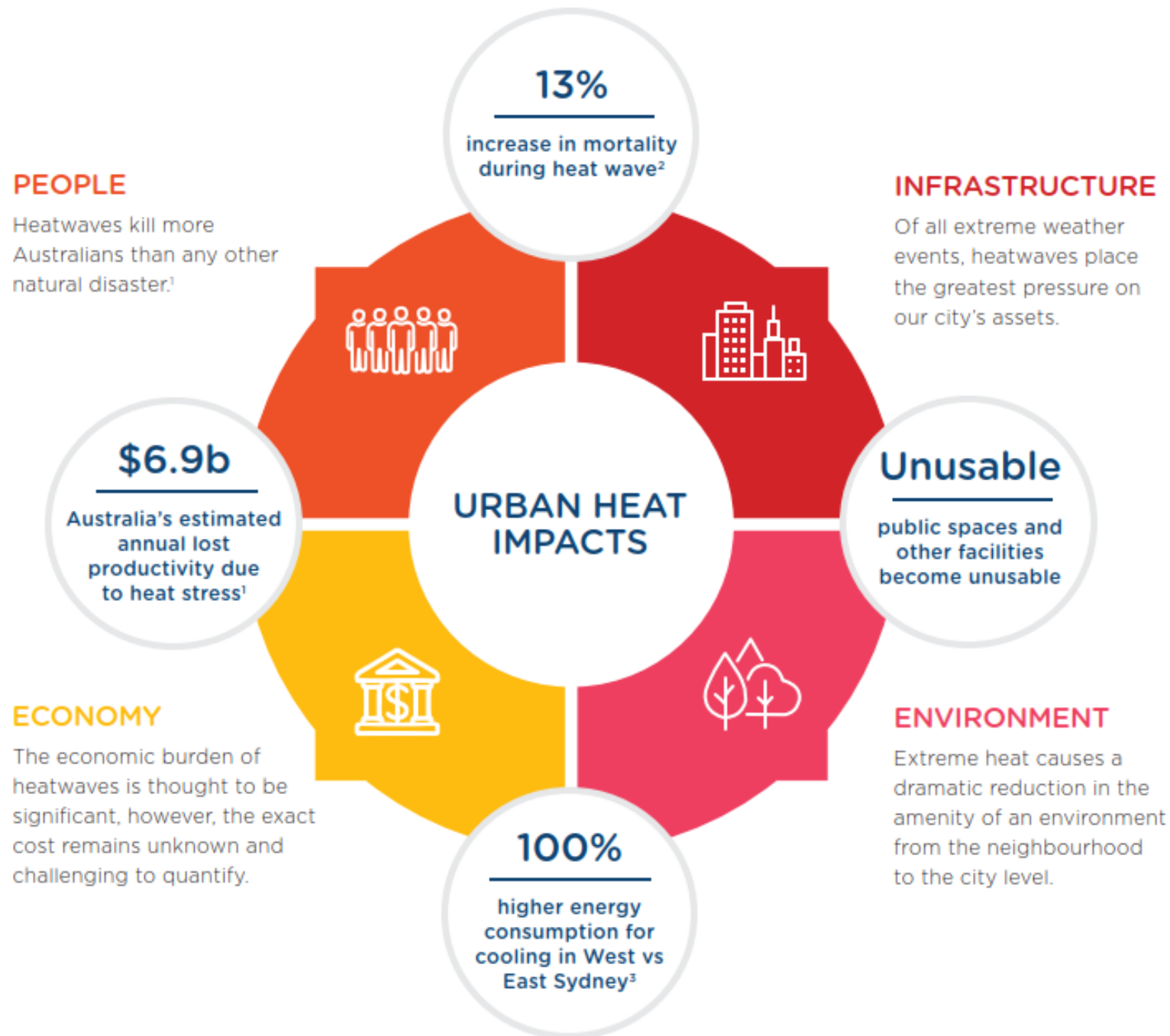
Resilient Melbourne 'Living Melbourne'

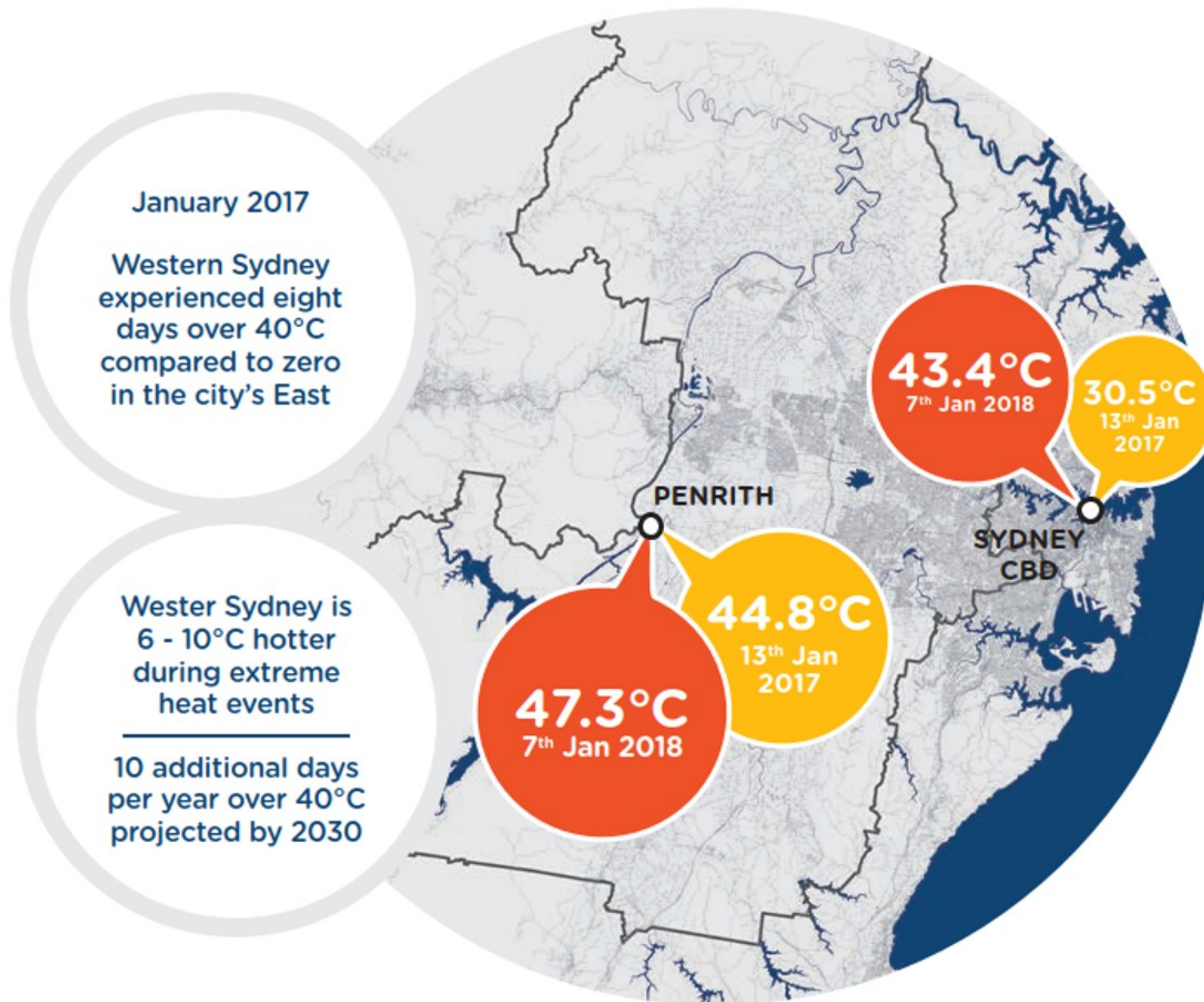
Melbourne Water 'Urban Cooling Strategy'

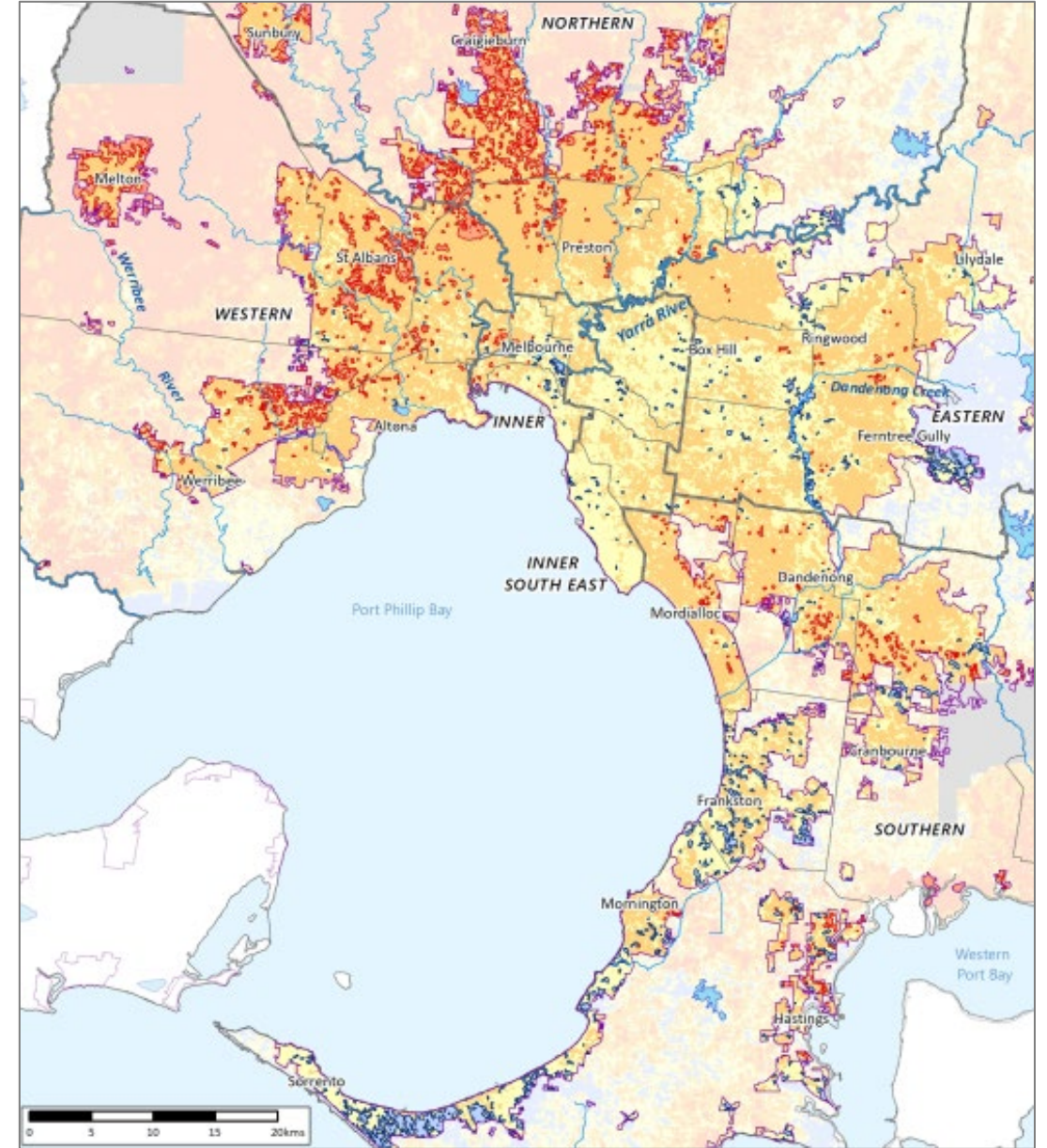
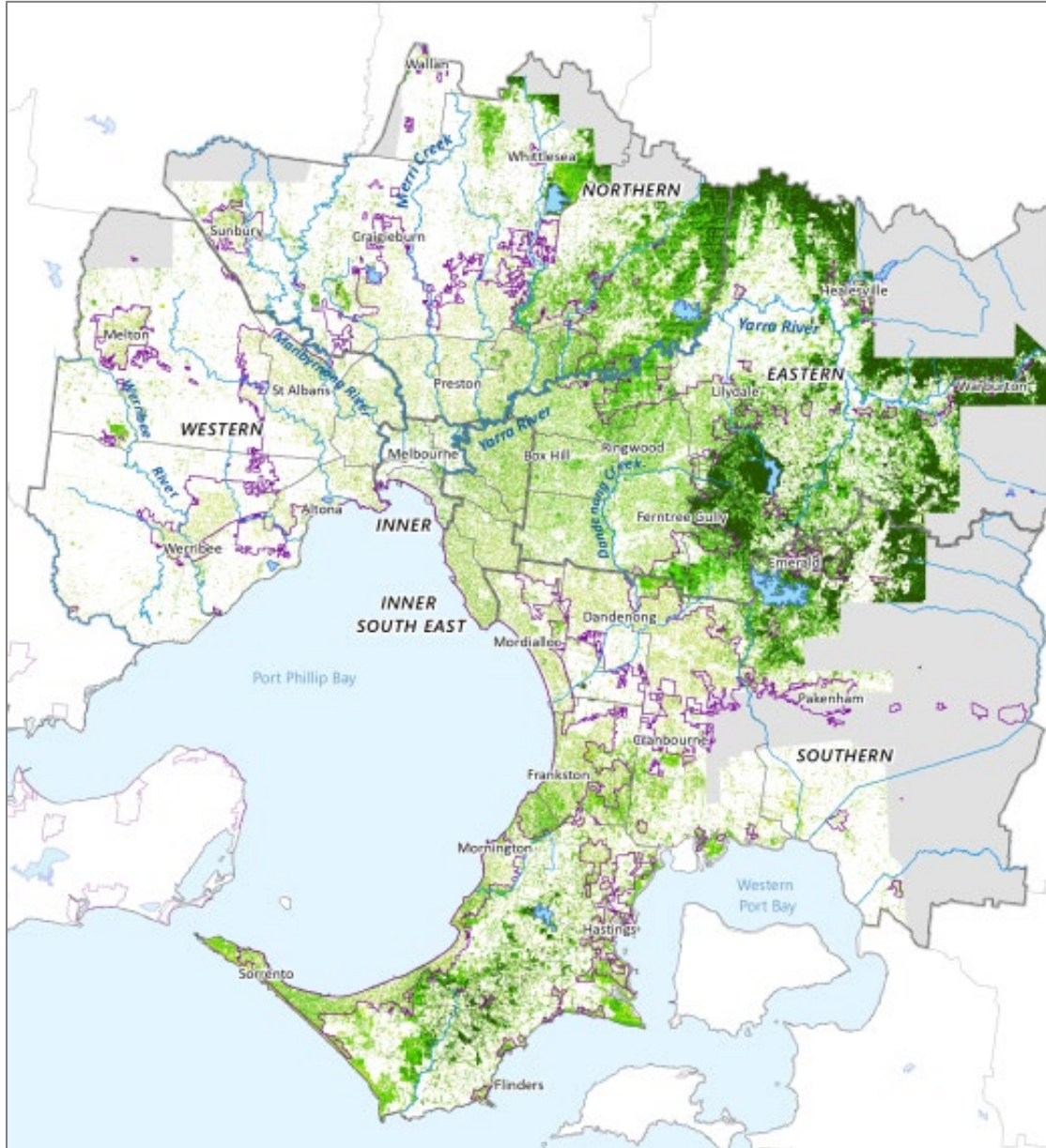
Western Sydney Regional Organisation of Councils 'Turn Down the Heat'

Urban Heat



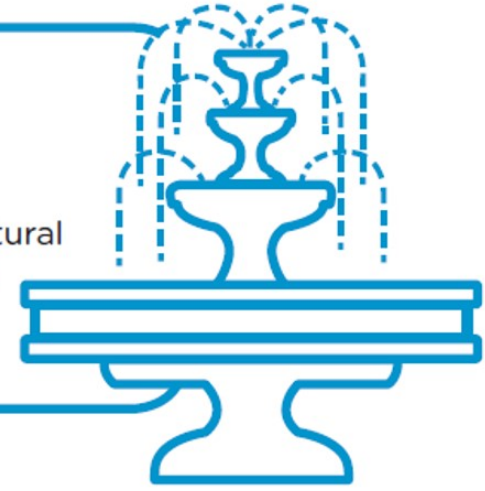






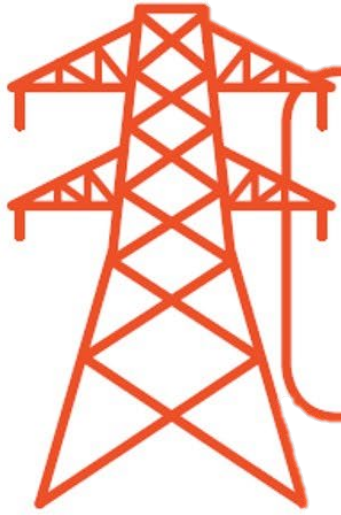
Designing with water

Water is one of the most effective ways to cool an urban environment. Designing with water can consist of a mix of natural water bodies, fountains, ponds, and technologies to integrate urban evaporative cooling systems.



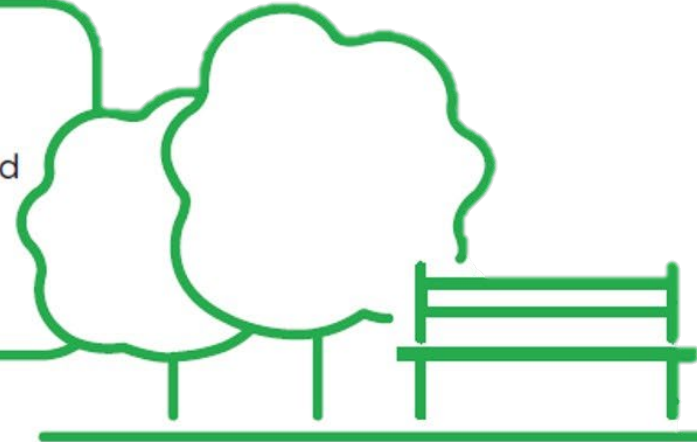
Infrastructure adaptation

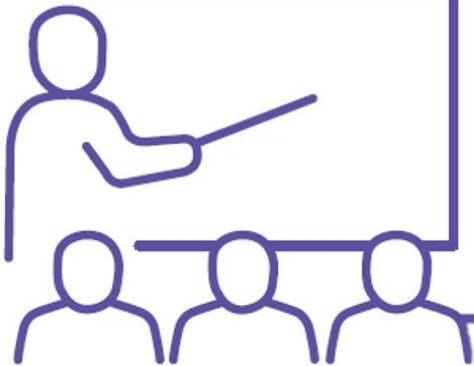
Preparing our city's infrastructure to cope with extreme temperatures is critical for our economy and to ensure the community has access to cooling, water and transport when they need it most.



Greening urban areas

Urban canopy cover and green spaces contribute to shade and evapotranspiration. Species selection, planting location and maintenance are critical to ensure optimum cooling benefits.





Education

It is critical that communities understand the health risks of extreme heat and can take action accordingly. Ensuring that people stay healthy and look out for others, but also equipping communities with the knowledge and resources to minimise their contribution to the problem.

Emergency and health response

While mitigation is crucial, we must also prepare for extreme heat events and heatwaves by ensuring we have appropriate emergency and health responses in place.



Cool materials

Building materials are major contributors to the urban heat island effect. They store heat and by doing so reduce indoor and outdoor thermal comfort. Choosing materials that prevent solar radiation (heat) from being absorbed can make a significant difference. Examples include light coloured roofs or pavers.

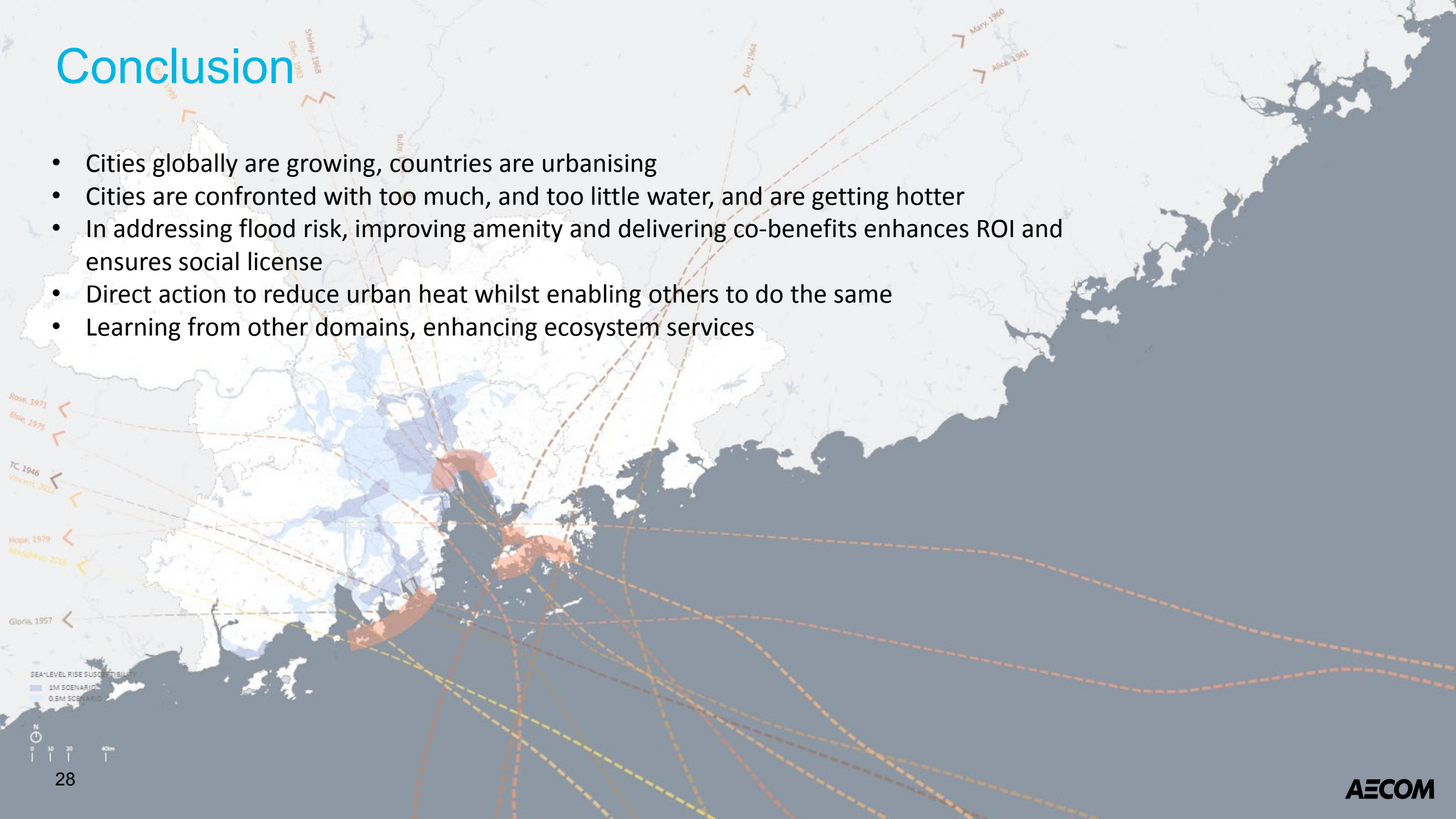


Conclusion



Conclusion

- Cities globally are growing, countries are urbanising
- Cities are confronted with too much, and too little water, and are getting hotter
- In addressing flood risk, improving amenity and delivering co-benefits enhances ROI and ensures social license
- Direct action to reduce urban heat whilst enabling others to do the same
- Learning from other domains, enhancing ecosystem services



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