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INSURANCE

# Taking the Heat Off: Designing Resilience into Urban Areas

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# Taking the Heat Off: Designing Resilience into Urban Areas

Dr Madelon Willemsen

Peter Gillam

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*Bringing ideas to life*





## Acknowledgement of Country

Aurecon acknowledges the Traditional Custodians of the lands, waters and skies where we work, live and play.

We celebrate the diversity of Aboriginal and Torres Strait Islander peoples and their ongoing cultures and connections to lands, water and skies across Australia. In particular, we acknowledge their ongoing connection to Country and continuing environmental stewardship.

We acknowledge the Aboriginal and Torres Strait Islander Custodians of these lands and we pay our respects to Elders past and present.



**Fire**



**Floods**

# Exploring 167 years of vulnerability: An examination of extreme heat events in Australia 1844–2010



Lucinda C  
John McA

## Natural Hazard Deaths 1900-2011

Extreme heat	4555	<b>55.2%</b>
Flood	1221	14.8%
Bush/grassfire	866	10.5%

<sup>a</sup> Risk Frontiers,  
<sup>b</sup> Bushfire and N  
Victoria 3002, A

ARTICLE

Published on line 11 June 2014

Keywords:

Despite their relative importance in terms of human mortality, extreme heat events have not attracted the same level of study compared with other natural hazards in regards to vulnerability and implications for emergency management and policy change. Definitional

# Extreme Heat Is Top Way People Experience Climate Change

EXTREME HEAT

64%



FOOD PRICE  
INCREASES

57%

DROUGHT

37%

DISEASES

31%

# Heatwaves may mean Sydney is too hot for people to live in 'within decades'

ABC Science / By technology reporter James Purtil

Posted Sun 24 Jan 2021 at 6:12am, updated Mon 25 Jan 2021 at 9:58am



With Australia's largest city facing 50-degree-plus summers, experts say its suburbs need to be radically redesigned and rebuilt in order to remain liveable. (Getty Images: Jenny Evans)

## The future of Australian housing

# 'Ultimately uninhabitable': western Sydney's legacy of planning failure

Houses built to the fence line with dark roofs and tiny backyards leave their owners at the mercy of the climate crisis, experts say

- [A broken dream: outer Melbourne has affordable houses but no train or school](#)
- [Download the free Guardian app; get our morning email briefing](#)

by [Anne Davies](#)

On 4 January 2020, the western Sydney suburb of Penrith was [one of the hottest places on Earth](#) at 48.9C.

The heat that day, at the foot of the Blue Mountains, gave a brief window into what the future will be like in the city's outer rings, soon to be home to more than 1.5 million people.



**Nature-based solutions:**  
Actions that protect and restores natural ecosystems and address social challenges while delivering well-being and biodiversity benefits.

An artist's impression of the Agribusiness Precinct.



# Nature-based Solutions

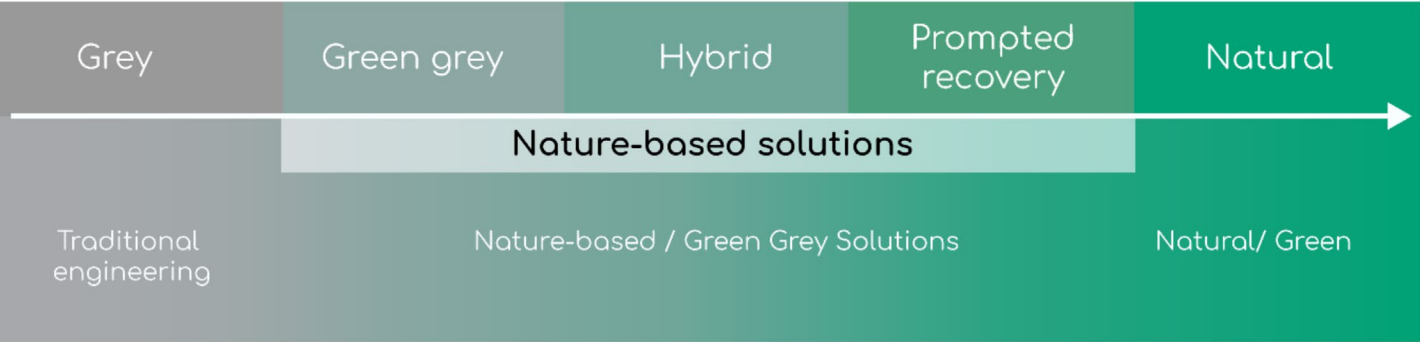
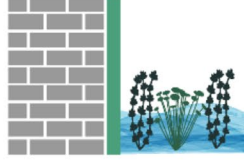
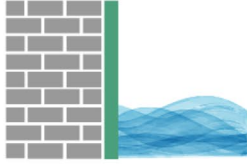
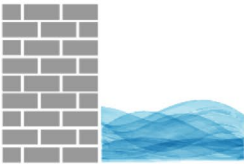
Project or scheme constructed with little or no ecological consideration; e.g. dams, floodwalls, metal rockfall nets

Grey infrastructure that intrinsically incorporates green habitat elements by design or retrofitting; e.g. greening of floodwalls

Traditional engineering fronted by a created 'natural' feature; e.g. combination of steel beams and afforestation for flood retention

Scheme initiated by human input that is then dependent on natural processes; e.g. wetland creation, forest plantation

Naturally occurring habitat; e.g. wetland, saltmarsh, forest, etc.

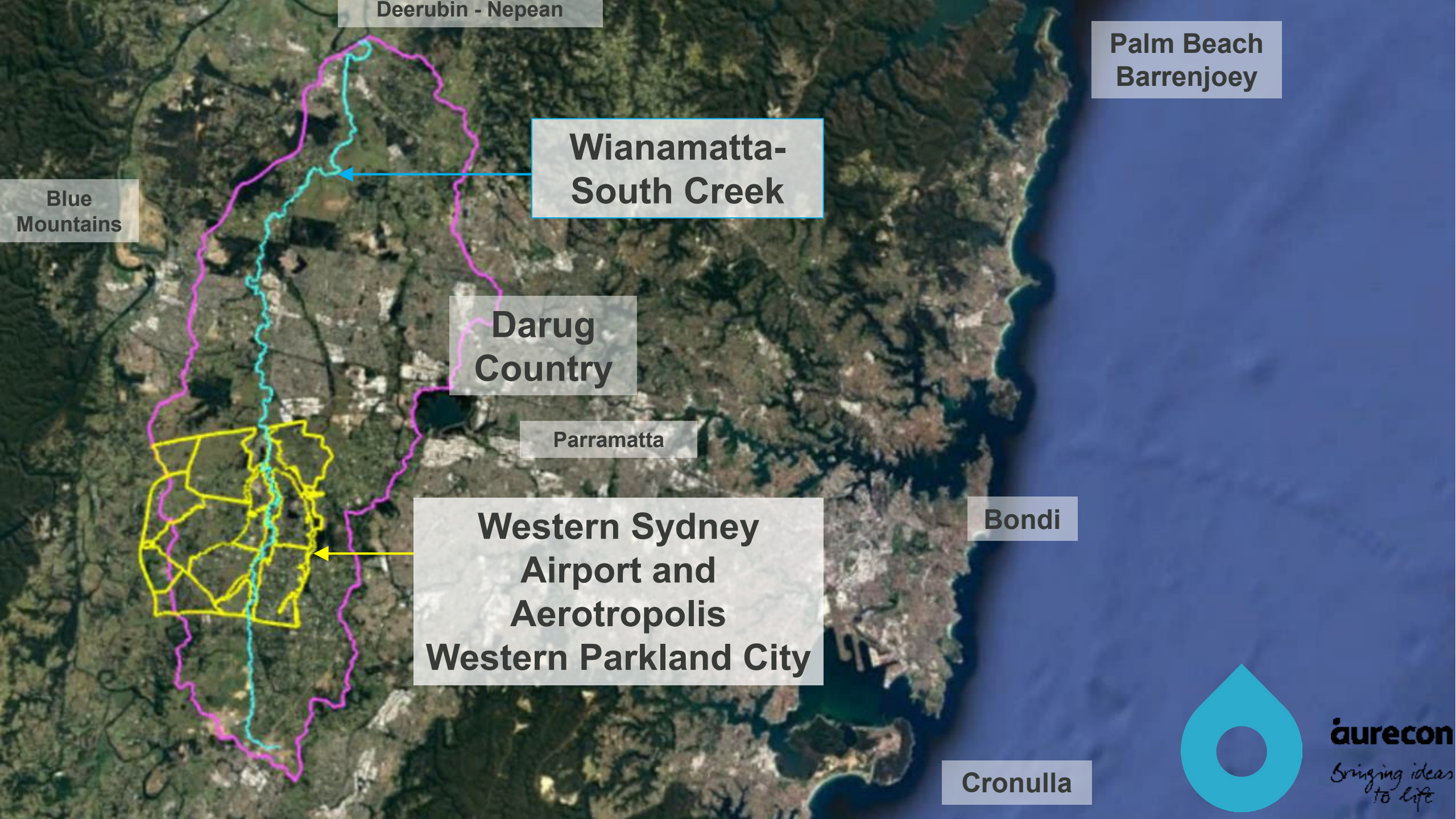


# Nature-based Solutions

## Benefits

- Working with Nature
- Cost efficient
- Value led
- Multi-functional
- Tackle Climate Change





Deerubin - Nepean

Palm Beach  
Barrenjoey

Blue  
Mountains

Wianamatta-  
South Creek

Darug  
Country

Parramatta

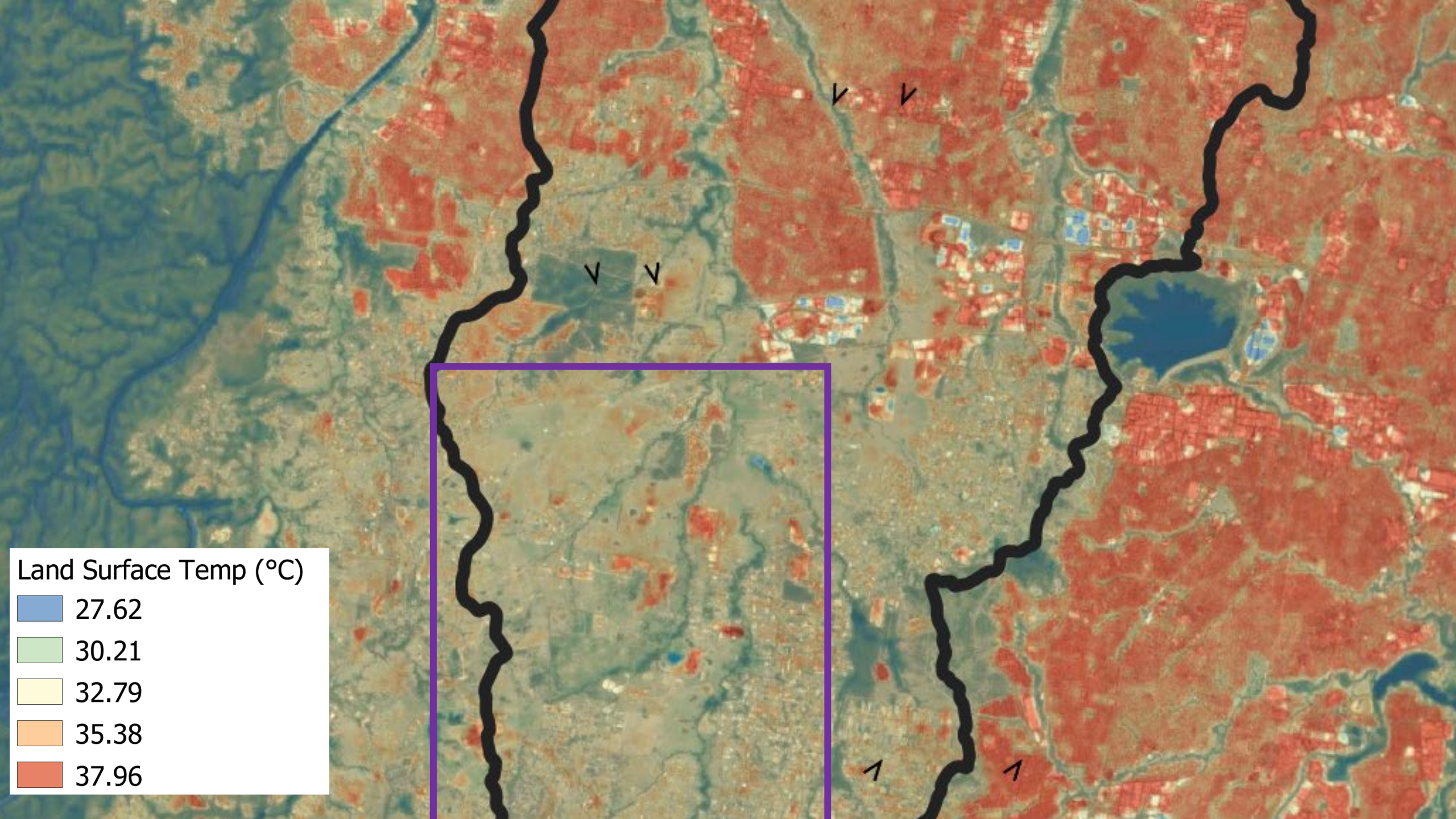
Western Sydney  
Airport and  
Aerotropolis  
Western Parkland City

Bondi

Cronulla



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Land Surface Temp (°C)

- 27.62
- 30.21
- 32.79
- 35.38
- 37.96

# The key to cooling is water

- Urban 10C  than Forests / Rivers
- Irrigated grassed areas 5C  than non-irrigated grass



A photograph of a person swinging on a rope over a lake. The person is in mid-air, having just released the rope. The background shows a large tree on the left, a body of water, and a clear blue sky with some clouds. The scene is bright and sunny.

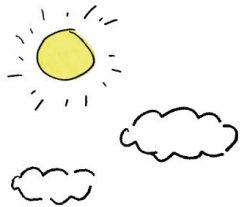
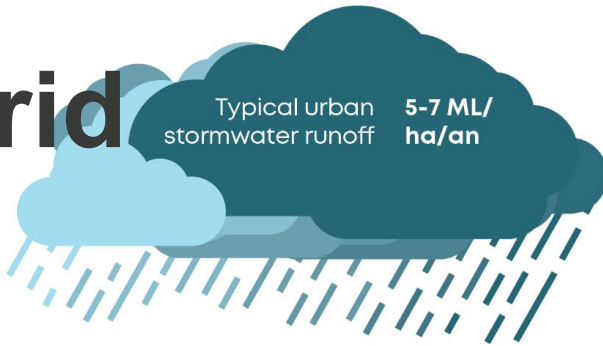
# Taking off the HEAT!

## Storm Water

- ✓ Use for Cooling
- ✓ Reduce Sediment run off
- ✓ Increase Water Quality

# Green & Blue Grid

Typical urban stormwater runoff **5-7 ML/ha/an**



- On lot
- Pervious surfaces
  - On site detention
  - GPTs

- On Street
- Street trees
  - Bioretention

- Trunk drainage
- Reprofiled creeks
  - Naturalised trunk drains

- Regional infrastructure
- Bio-retention basins
  - Wetlands
  - Reprofiled farm dams

Recycled water reservoir

Residual runoff to waterways **2 ML/ha/an**

Advanced Water Recycling Centre

Water mix and shandy: Stormwater and



**The Strategy will deliver:**



Year round, greener open space.



Naturalised blue-green grid.



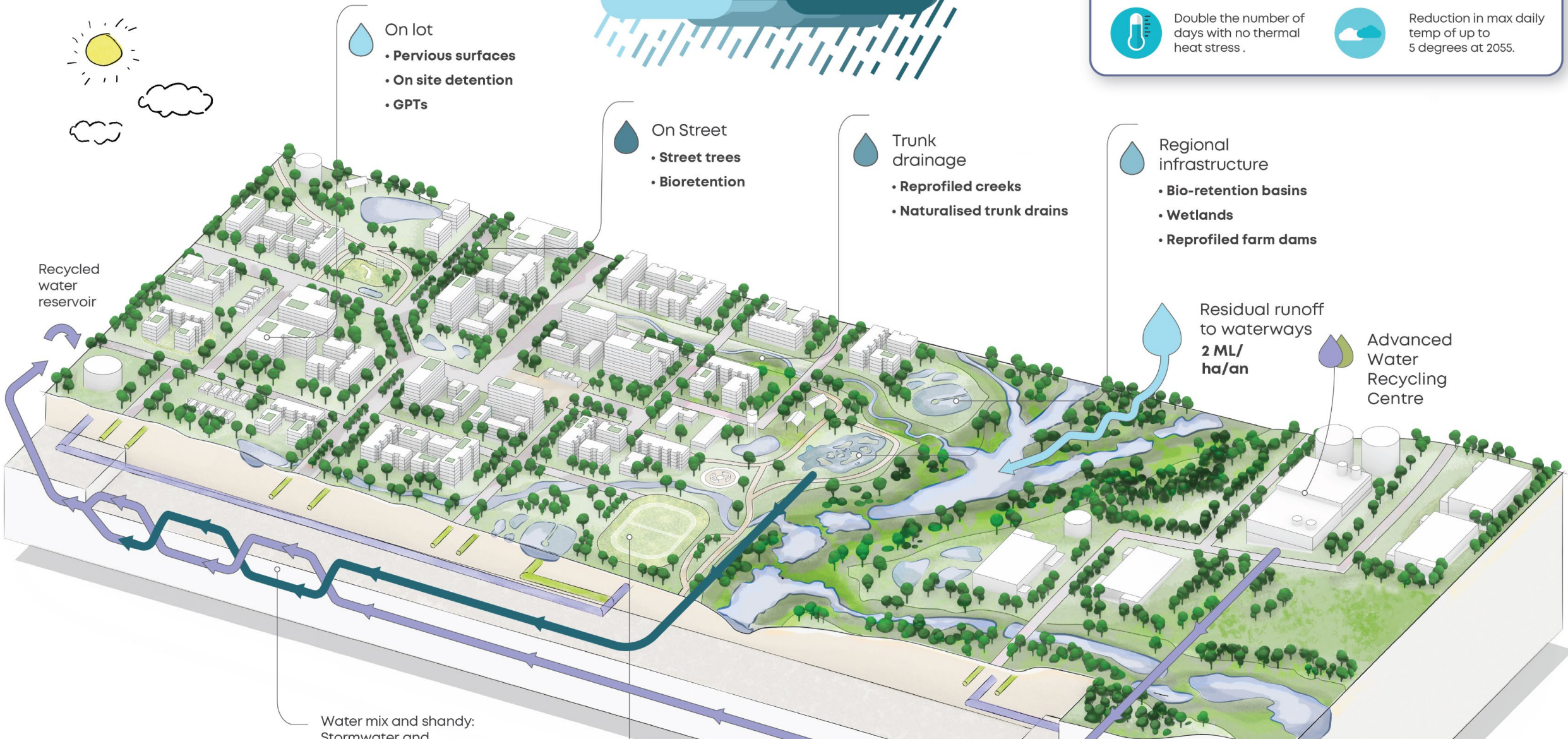
3x more canopy cover.



Double the number of days with no thermal heat stress.



Reduction in max daily temp of up to 5 degrees at 2055.



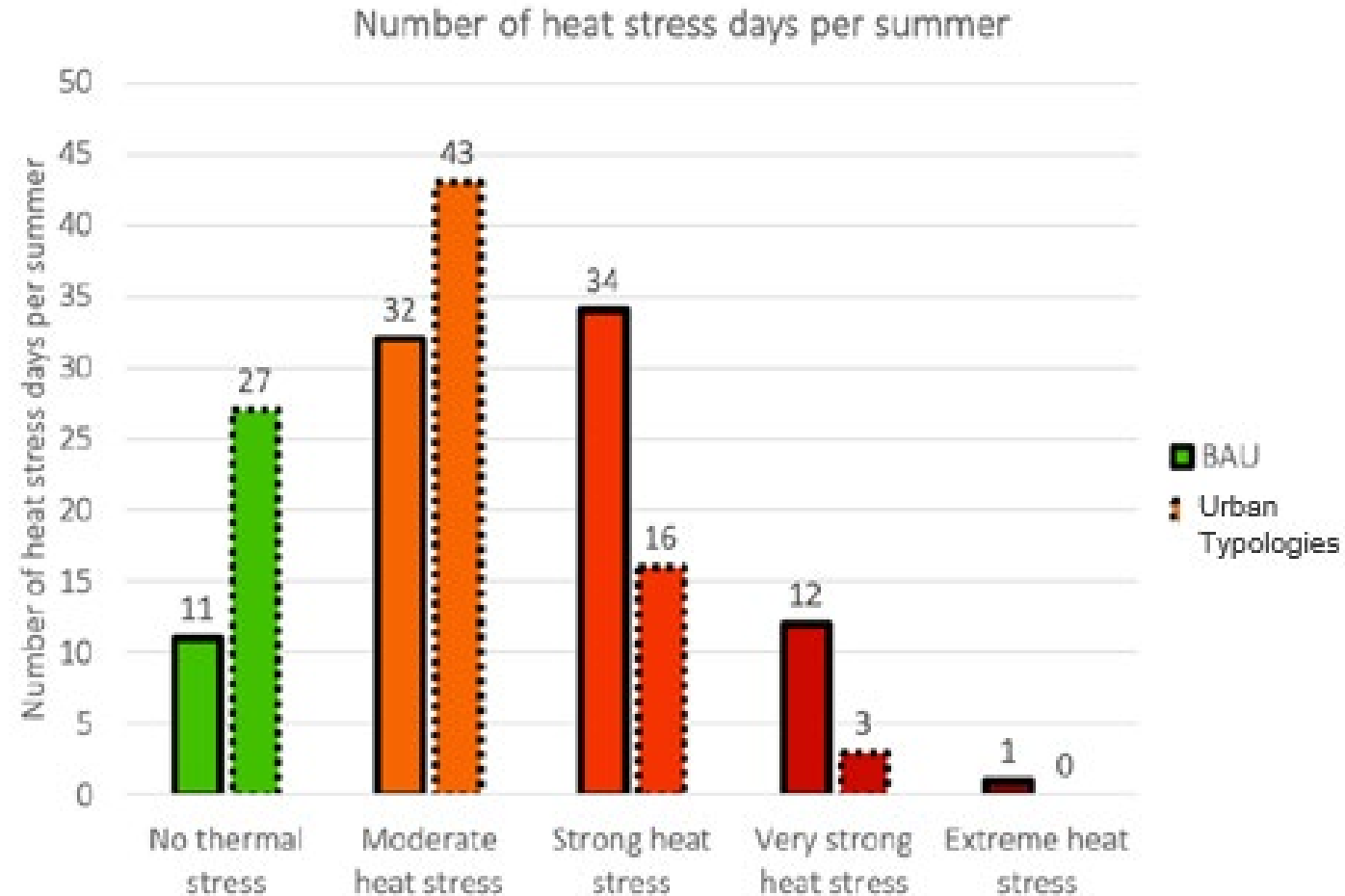
# Heat Resilience

Modelling the master plan:

**4 °C cooler**

Applying this over the last six Summers:

- Reduction in **Extreme, Very Strong and Strong Stress Heat Days** from **47 to 19**
- **No thermal stress** more than doubles





# Blue Green Grid

- Cooler & Greener
- Healthier Waterways
- Independent water supply
- Aligned with cultural values
- Meets Community's expectations



# Nature-based Solutions > Resilience






- Reducing impact of Climate Change
- Lessens flood risks
- Less water yields from natural catchments
- Flexible and more resilient water portfolio
- Social and biodiversity benefits



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