URBAN HEAT ISLAND EFFECT

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The world is seeing an unprecedented rate of urbanisation.

Between 2012 and 2050, the world population is expected to increase from 7.0 billion to 9.3 billion.

United Nations Department of Economic and Social Affairs/Population Division 2011

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The world is seeing an unprecedented rate of urbanisation.

Between 2012 and 2050, the world population living in urban areas is expected to increase from 50% to 67%.

United Nations Department of Economic and Social Affairs/Population Division 2011

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The world is experiencing irrefutable and perceptible global warming.

In 2013 Australia experienced its hottest year on record.

Australian Bureau of Meteorology

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The world is experiencing irrefutable and perceptible global warming.

In 2013 the World experienced its fourth hottest year on record.

National Oceanic and Atmospheric Administration (NOAA)

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In a motorized city, on average 30% of the surface is devoted to roads while another 20% is required for off-street parking.

In North American cities, roads and parking lots account between 30 and 60% of the total surface.

The Geography Of Transport Systems by Dr Jean-Paul Rodrigue

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Air temperatures in densely built urban areas are higher than the temperatures of the surrounding rural country.

Heat-Island Effect by M Santamouris, Department of Applied Physics, University of Athens

URBAN HEAT ISLAND EFFECT

Air temperatures in densely built urban areas are higher than the temperatures of the surrounding rural country.

This phenomenon known as the 'heat island' was first noticed by meteorologists more than a century ago and is the most well documented phenomenon of climatic modification.

Heat-Island Effect by M Santamouris, Department of Applied Physics, University of Athens

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The intensity of the heat island is mainly determined by the thermal balance of the urban region and can result in temperature differences of between 5 to 10 degrees.

Heat-Island Effect by M Santamouris, Department of Applied Physics, University of Athens

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Google Earth / SKM

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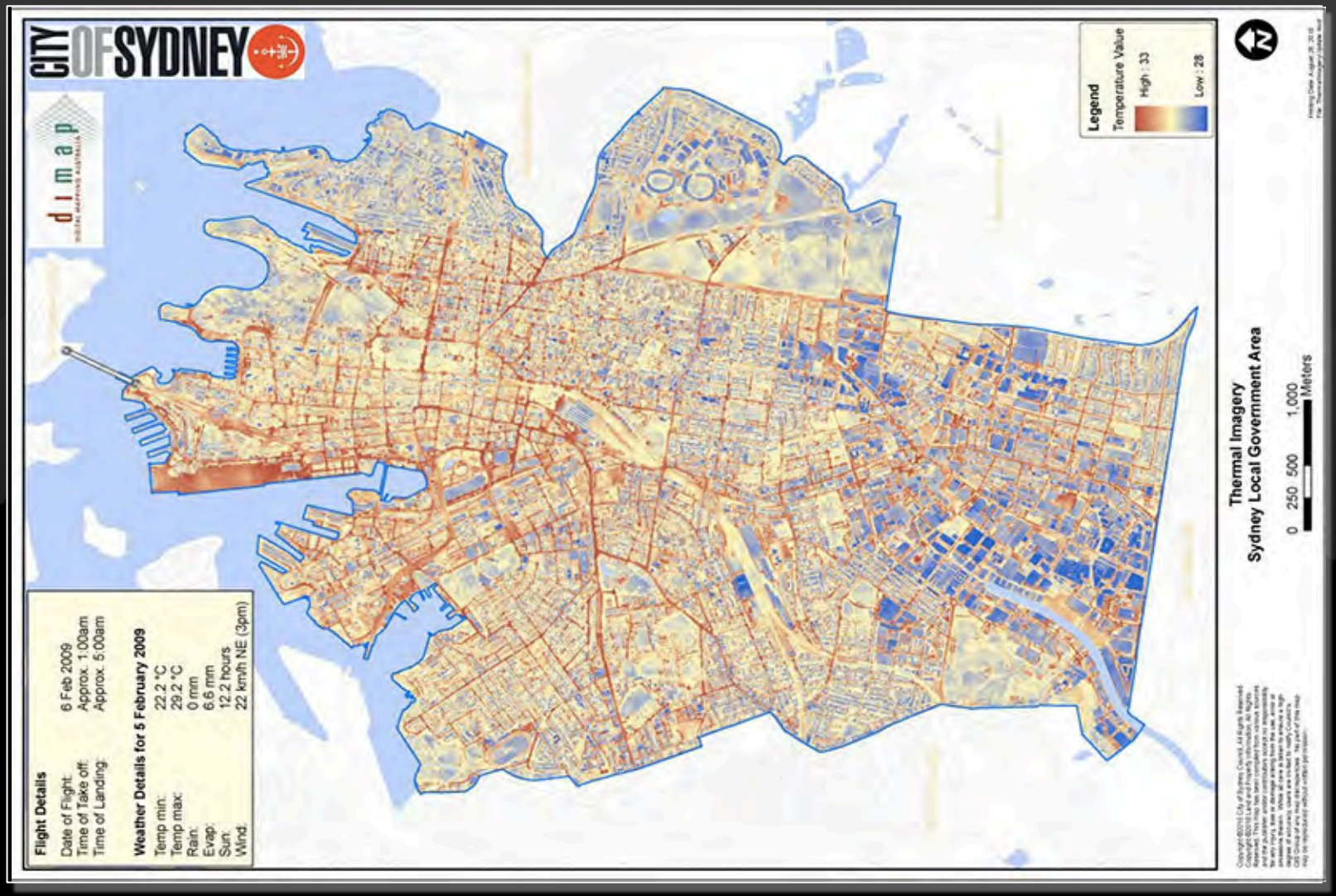

City of Sydney

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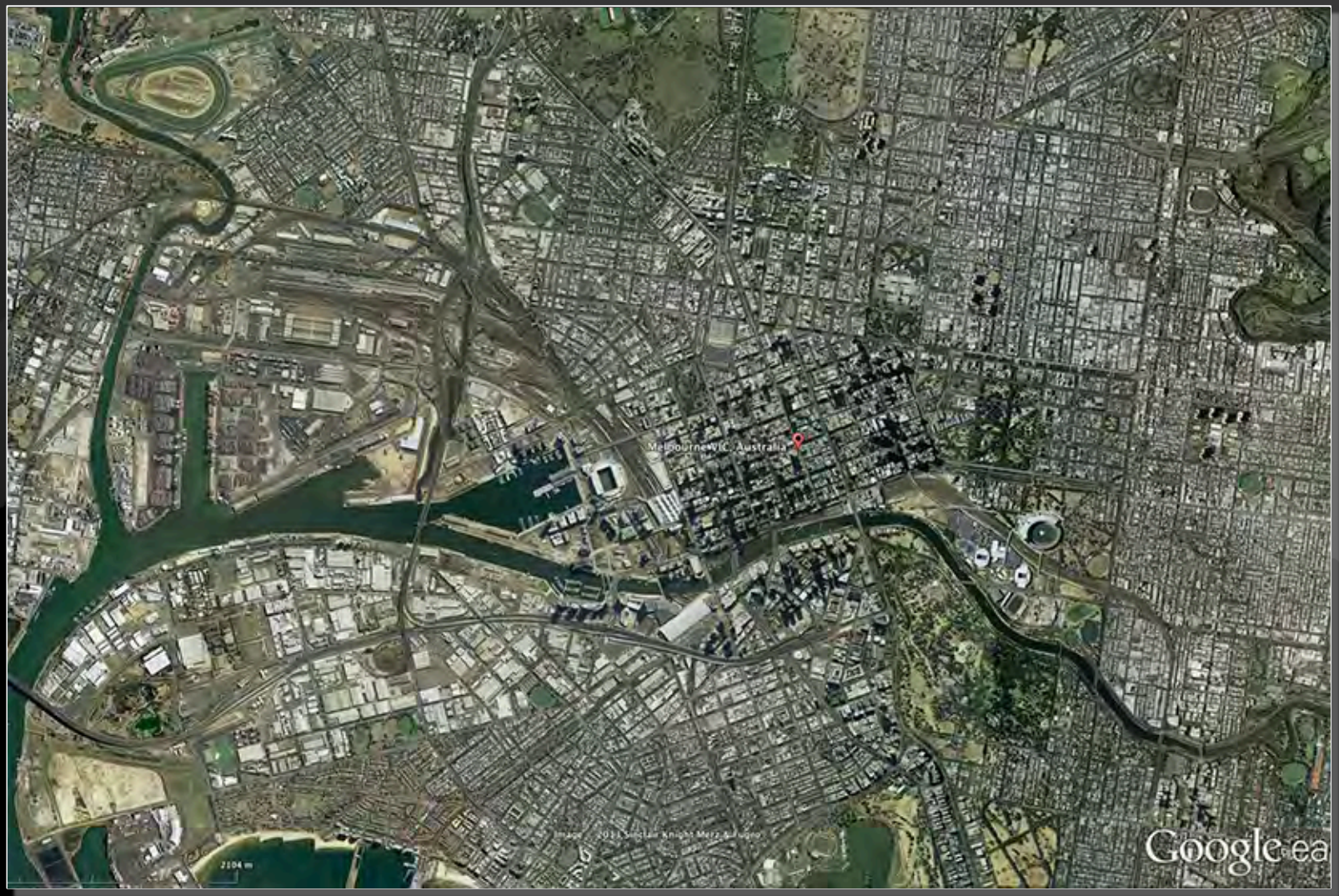

City of Melbourne

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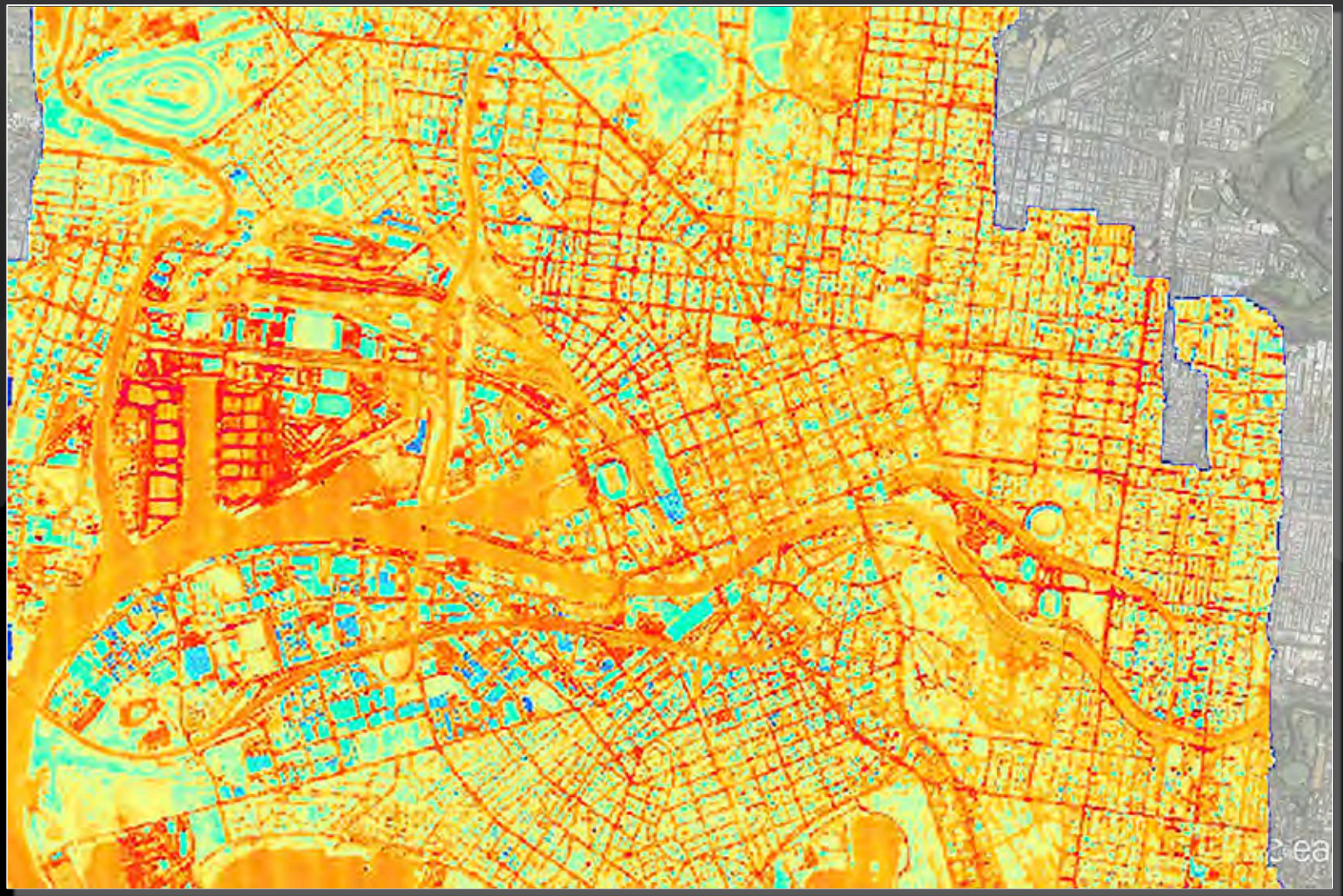

City of Melbourne

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Hence it seems apparent that the worst contributors to the heat island effect are our roads.

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Individual urban trees, on average, contain approximately four times more carbon than individual trees in forest stands…

Nowak, D.J. and Crane, D.E. 2002. Carbon storage and sequestration by urban trees in the USA. Environmental Pollution 116: 381-389

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Research published in the journal Nature this week shows that in 97% of tropical and temperate tree species, growth rate increases with size.

This suggests that older trees play a vital role in absorbing carbon dioxide from the atmosphere.

As reported in The Conversation 17 January 2014

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“Planting trees in strategic locations near buildings can reduce building energy usage via enhanced shading and evaporative cooling in summer…

Trees in the City: A New Role for the “Ultimate Urban Multitaskers” by Dr Sherwood B Idso and Dr Craig D Idso

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"Planting trees in strategic locations near buildings can reduce building energy usage via enhanced shading and evaporative cooling in summer, and by wind speed reduction in winter, which phenomena lower the demand for electricity needed for cooling and heating and, in most cases, offset the burning of a certain amount of coal, gas or oil.

Trees in the City: A New Role for the "Ultimate Urban Multitaskers" by Dr Sherwood B Idso and Dr Craig D Idso

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Nowak and Crane note that the atmospheric CO^2 "avoidance" provided by such strategically planted trees is approximately four times greater than the amount of CO^2 they physically remove from the air.

Trees in the City: A New Role for the "Ultimate Urban Multitaskers" by Dr Sherwood B Idso and Dr Craig D Idso

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Hence… the average urban tree, which is four times more effective in physically removing carbon from the atmosphere than the average non-urban tree, is fully sixteen times more effective than the average non-urban tree in mitigating global warming when planted in places designed to reduce the cooling and heating costs of buildings.

Trees in the City: A New Role for the "Ultimate Urban Multitaskers" by Dr Sherwood B Idso and Dr Craig D Idso

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One can easily surmise that there should be a corresponding benefit in planting trees close to roads.

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Counter intuitively the trend now seems to be towards smaller lots and less street tree planting.

With less preservation of existing vegetation and larger houses on these small lots.

The implications are obvious.

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Butler - Google Earth 2013

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Clarkson - Google Earth 2013

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Ridgewood - Google Earth 2013

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Mt Lawley - Google Earth 2013

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In Perth, as a general rule, we allow for about 25-35% of the overall area of a new sub-division to be developed as road corridors.

This compares with 10% that has to be provided for Public Open Space.

The latter is mandated and seldom exceeded.

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In the context of all of the above it seems obvious that our streets represent an excellent, largely untapped, opportunity to extend the health benefits offered by parks and significantly improve our overall environmental conditions and credentials.

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Some good examples internationally:

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Bordeaux

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Orta San Giulio

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Monterosso Al Mare

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Saint Jean de Luz

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Paris

URBAN HEAT ISLAND EFFECT

Paris

URBAN HEAT ISLAND EFFECT

Paris

URBAN HEAT ISLAND EFFECT

Paris

URBAN HEAT ISLAND EFFECT

Madrid

URBAN HEAT ISLAND EFFECT

Leon

URBAN HEAT ISLAND EFFECT

Leon

URBAN HEAT ISLAND EFFECT

Barcelona

URBAN HEAT ISLAND EFFECT

Kentlands

URBAN HEAT ISLAND EFFECT

Prospect

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Kentlands

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Singapore

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Some good examples in Australia:

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Noosa

URBAN HEAT ISLAND EFFECT

Brisbane

URBAN HEAT ISLAND EFFECT

Brisbane

URBAN HEAT ISLAND EFFECT

Sydney

URBAN HEAT ISLAND EFFECT

Melbourne

URBAN HEAT ISLAND EFFECT

Canberra

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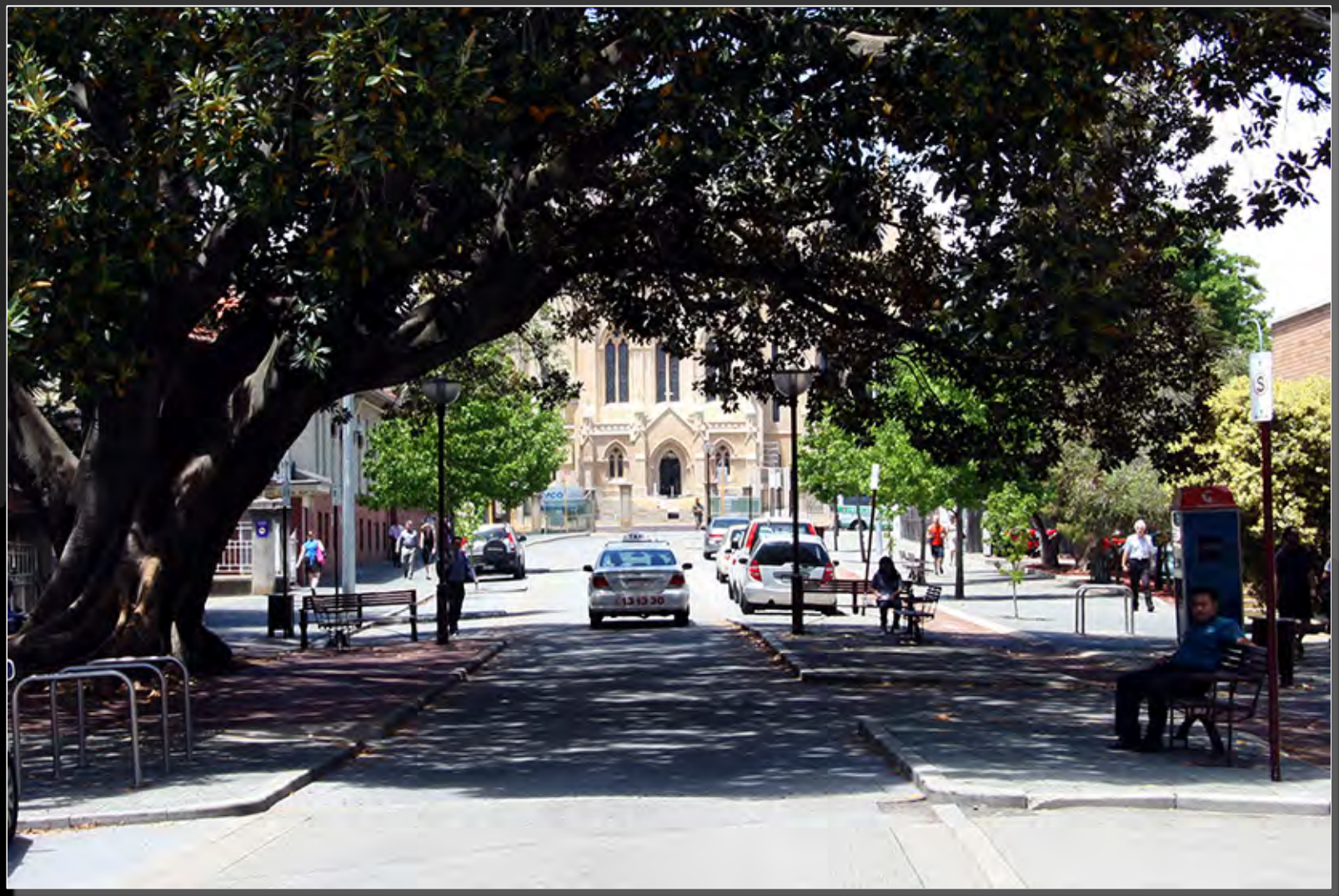

Perth

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Canning Vale

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Subiaco

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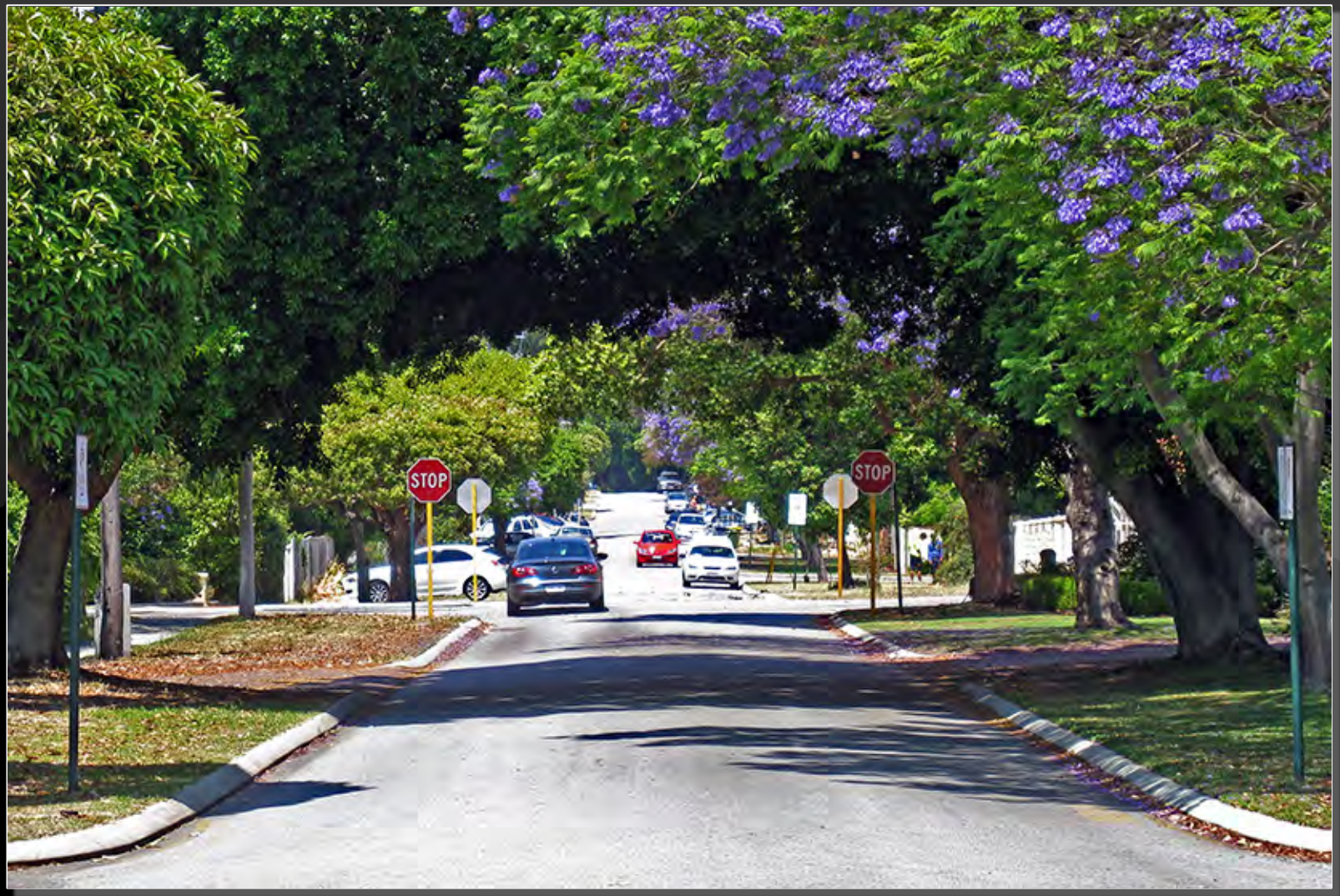

Nedlands

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Yallingup

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173 people died in the Black Saturday fires in Victoria 7 February 2009.

Zwartz, Barney (9 February 2009). "Counting the terrible cost of a state burning".

URBAN HEAT ISLAND EFFECT

173 people died in the Black Saturday fires in Victoria 7 February 2009.

During the same heatwave there were 374 more deaths state wide than would be expected for the week when comparing data over 5 years.

The Age 17 January 2014 "Melbourne city centre a death trap as heat-island effect takes its toll."

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PROPOSITION 1

That a study be undertaken to establish a baseline data point from which we can start producing the metrics to measure what improvements can be made.

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PROPOSITION 1

This study will first require aerial thermal imagery then ground proofing to establish this baseline data reference point.

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PROPOSITION 1

This baseline data will then be used to see what level of green infrastructure will achieve a beneficial result.

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PROPOSITION 2

Energy saving guidelines, similar to those that apply to all new buildings in Australia, such as NatHERS, NABERS, BASIX, should be developed for streetscapes based on aiming to reduce temperatures in urban areas by 5 degrees.

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