



INFORMATION ONLY MATTERS: Smart and Cool Places Project

DIVISION: Development and Environment
REPORT DATE: 28 November 2024
TRIM REFERENCE: ID24/2227

EXECUTIVE SUMMARY

Purpose	<ul style="list-style-type: none"> Strategic Project Update 	
Issue	<ul style="list-style-type: none"> Research project carried out to understand the impacts of heat adjustment on the urban environment. In 2023 Dubbo Regional Council partnered with the University of NSW and the State Government Department of Climate Change, Energy, the Environment and Water (DCCEE), and Maitland City Council in Phase 1 of the Smart and Cool Places Project aimed at establishing a National Heat Vulnerability Observatory (NaHVO). Dubbo and Maitland participated as 'pilot locations' for the Project to help develop the foundational elements of the NaHVO. The Report includes a range of recommendations regarding heat mitigation and adaptation strategies, which includes the need for greater tree canopy in the urban environment, planning for heat mitigation in the public realm, consider the use of cooling materials and the need for planning controls and guidance to manage urban heat impacts. A key recommendation from the research was also to establish a Network of Community Heat Refuges that can play a critical role in strengthening a local community's adaptive capacity to extreme heat, especially for those who are more vulnerable. Community heat refuges are typically air-conditioned facilities such as libraries, halls, shopping centres, and cinemas, but can also include public outdoor spaces like swimming pools. 	
Reasoning	<ul style="list-style-type: none"> To manage the future impacts of urban heat for our community. 	
Financial Implications	Budget Area	Growth Planning
	Funding Source	Growth Planning Budget
	Proposed Cost	N/A
	Ongoing Costs	N/A
Policy Implications	Policy Title	Dubbo Regional Local Environmental Plan 2022 Dubbo Development Control Plan Wellington Development Control Plan

	Impact on Policy	The outcomes of this research will assist in facilitating the construction of more efficient planning controls to manage the impacts of urban heat.
Consultation	A number of Council service areas	Direct involvement in the project.

STRATEGIC DIRECTION

The Towards 2040 Community Strategic Plan is a vision for the development of the region out to the year 2040. The Plan includes six principal themes and a number of objectives and strategies. This report is aligned to:

Theme:	6 Environmental Sustainability
CSP Objective:	6.2 We recognise, plan for and respond to the impacts of climate change
Delivery Program Strategy:	6.2.1 The impacts of climate change are identified and addressed through collaboration with our community and government

RECOMMENDATION

That the information contained in the report be noted.

Steven Jennings
Director Development and Environment

SJ
Director Development and Environment

BACKGROUND

In 2023 Dubbo Regional Council partnered with the University of NSW and the State Government Department of Climate Change, Energy, the Environment and Water (DCCEEW), and Maitland City Council in Phase 1 of the Smart and Cool Places Project aimed at establishing a National Heat Vulnerability Observatory (NaHVO).

Dubbo and Maitland participated as 'pilot locations' for the Project to help develop the foundational elements of the NaHVO.

REPORT

1. Why was the Project needed?

Urban overheating is a major challenge now facing Australia's cities. Across the Central West and Orana Region, average temperatures are projected to continue to increase.

According to Adapt NSW, by 2090 the average temperature is projected to rise by around 1.4°C under a low emissions scenario and around 4.1°C under a high emissions scenario. Under a high-emissions scenario, areas such as Dubbo are projected to experience more than triple the number of hot days (35 degrees Celsius and above), compared with the 1990–2009 average.

These extreme temperatures have significant impacts on not only outdoor thermal comfort but also on the socioeconomic environment, peak electricity demand and human health, especially when it comes to the elderly and young.

The Final Project Report for Smart and Cool Places Phase 1 (Pages 8-9) outlines some of the impacts of extreme heat below:

- Deaths - Between 1900 and 2010, extreme heat events claimed more Australian lives than the total number of deaths from all other natural hazards combined.
- Human health - In addition to heat stroke and heat exhaustion, extreme heat can exacerbate numerous existing health conditions.
- Economic cost - By 2050, it is estimated that heatwaves will be responsible for \$7.1 trillion lost in productivity because it will be too hot to work, which represents 57% of the economic impact of all other weather events.
- Planetary health - The increased frequency and severity of extreme weather events such as heatwaves can significantly degrade the effectiveness of nature-based solutions to climate change, which can then accelerate and compound the impacts of climate change.
- Energy and water consumption - Heatwaves are typically associated with increased energy (total and peak) and water consumption. A reliance on air conditioning for space cooling during heatwaves increases peak electricity demand, and with this an increased risk of blackouts and higher energy bills.

- Infrastructure damage - Extreme heat can cause significant damage to roads, footpaths, rail tracks, bridges, and power lines. During Australia's 2018 heatwave, parts of the Hume Highway literally melted.
- Education - Classrooms without air conditioning can be associated with reduced learning outcomes for students.
- Other risks - Extreme heat can also increase the risk of fires, crime, and food insecurity, degraded air and water quality, and amplify social issues and vulnerabilities.

Hence, examining the impacts of urban overheating and heat vulnerability in Australia's cities and towns, and developing appropriate intervention strategies to mitigate them, becomes an urgent task.

2. What did the Project involve?

Australia currently lacks a nationally integrated and consistent approach to assess and benchmark heat vulnerability, which incorporates the potential of mitigation and adaptation interventions over time. This can make it extremely difficult to make informed and evidence-based planning and policy decisions to effectively reduce the impacts of extreme heat within Australia cities and towns.

Phase 1 of the Smart and Cool Places Project aimed to develop the foundational elements of a National Heat Vulnerability Observatory (NaHVO) including four key features:

- NaHVO Index

Providing an integrated, consistent, and dynamic heat vulnerability assessment index for Australian cities.
- In Depth Modelling and Simulation of "What if Scenarios"

For various mitigation and adaptation interventions at precinct and city scales.
- Data Collection Protocols

To establish integrated, consistent, reliable, and scalable heat vulnerability benchmark datasets.
- Robust Methodology and Framework

To enable the future integration of advanced artificial intelligence and machine learning techniques to enable data driven decision-making for reducing heat vulnerability in Australian cities.

3. What was Council's involvement?

Dubbo and Maitland were used as pilot locations for the Project to validate the overall approach, user needs, and ability to scale up the NaHVO across NSW.

In particular, the Project saw in depth modelling and simulation of 'what if scenarios' of key mitigation strategies performed at a city wide and precinct scale in Dubbo. The Southlakes Estate and South Dubbo were chosen as the locations for the precinct scale modelling.

The modelling involved utilising temperature data from two former heatwaves (2019, 2020) and it was then validated through on-site measurements and data collection from heat sensors installed in the Southlakes Estate and South Dubbo as part of the Project. Part C of the Final Report provides a summary of the key mitigation strategies modelled for Southlakes Estate and South Dubbo and discusses the cooling potential of the strategies modelled.

4. Key Recommendations for Council

The Final Report provides a set of recommendations regarding heat mitigation and adaptation strategies for Dubbo Regional Council. These recommendations are established from the modelling results and are also informed by the UNSW High Performance Architecture (HPA) Research Cluster's past work, and the Urban Heat Island Mitigation Performance Index developed by UNSW and the CRC for Low Carbon Living.

The specific details of the recommendations can be found in the Final Report. A summary of the key recommendations for Council are as follows:

(a) Increase Tree Canopy

The cooling potential of increasing the number of trees in the public and private realms for all case study precincts in Maitland and Dubbo was shown to be an effective way to reduce air and surface temperatures during extreme heat events.

(b) Improve the Amenity of Green Open Spaces

The cooling potential analysis results of the Maitland and Dubbo case study precincts has shown that irrigated green open spaces can provide localised air temperature reductions of 2 to 3 °C during extreme heat events.

(c) Apply Cool and Permeable Surfaces for Streets and Paved Areas

Although the low-density case study precincts of Maitland and Dubbo have higher proportions of pervious surfaces, the application of cool materials for roads, footpaths, and private hard surfaces provides surface and air temperature reductions during extreme heat events.

(d) Prohibit Dark Roofs for New Developments

There is substantial scientific evidence showing that dark roofs can exacerbate the urban heat island effect, severely degrade indoor thermal comfort, and increase peak and total cooling energy consumption during extreme heat events.

(e) Maintain and Encourage Shading and Water Misting Along Key Pedestrian Routes

The cooling potential analysis results from the case study precincts in Maitland and Dubbo showed significant air and surface temperature reductions from the addition of outdoor shading and water misting sprays. As the cooling benefits are localised, maintaining and encouraging outdoor shading and water misting along key pedestrian routes is therefore recommended.

(f) Increasing Housing Density Must Integrate a Combination of Mitigation Strategies

The cooling potential analysis results from the case study precincts in Maitland and Dubbo clearly show that a combination of heat mitigation strategies is the most effective way to limit precinct-wide urban overheating.

Importantly, the subdivision scenario analysis results for Southlakes Estate in Dubbo demonstrate that increases in density from the traditional 600m² residential lot size will likely result in exacerbating urban overheating unless a comprehensive combination of mitigation strategies is integrated.

(g) Establish a Network of Community Heat Refuges

Heat refuges can play a critical role in strengthening a local community's adaptive capacity to extreme heat, especially for those who are more vulnerable. Community heat refuges are typically air-conditioned facilities such as libraries, halls, shopping centres, and cinemas, but can also include public outdoor spaces like swimming pools.

(h) Enhance Heat Education, Awareness, and Preparedness

Knowing what to do, where to go and how to cope can significantly increase a local community's capacity and capability to adapt and survive extreme heat events. While the NSW State Government and Bureau of Meteorology (BOM) have online resources available to support this, local governments can play a crucial role in translating this higher-level information into specific community action.

(i) Enhance Urban Heat Provisions in Planning Controls, including Local Environmental Plans and Development Controls

Planning policies such as Local Environmental Plans (LEPs) and Development Control Plans (DCPs) enable opportunities to directly improve urban heat outcomes for new developments and the redevelopment of existing areas or buildings. The key findings and recommendations

from Phase 1 of the NaHVO provide a strong foundation for Council to enhance urban heat provisions within its LEP and/or DCP.

5. Next Steps

Council's main role in the Project is complete, with the next step to implement, where appropriate, the key recommendations of the Project relevant to local government. In addition, the heat sensors located within Dubbo will continue to collect temperature data for ongoing monitoring.

Particularly in respect of the enhancement of heat provisions in planning controls, Council will be considering the outcomes of the Study in a range of current strategic planning works as follows:

- Ongoing planning processes for the North West Precinct.
- Review of the Dubbo Development Control Plan and the Wellington Control Plan.
- Review of the Dubbo Open Space Master Plan.

From the Project perspective, the UNSW Sydney will be working to scale up the NaHVO to integrate more cities in NSW and across Australia. A 'Government User Needs Workshop' was conducted in May 2024 to understand business needs, heat mitigation strategies of interest, required data and functionality, stakeholders, and key challenges. The outcomes of this workshop will inform and scope the scale-up plan for Phase 2 of NaHVO development.

Consultation

A YourSay page was developed for the project and Council notified residents in the subject areas where sensors were installed on public lands.

Resourcing Implications

Council as part of the overall project provided project support and guidance as an in-kind contribution. The overall cost of the project was borne through a grant process between the State Government and the University of New South Wales.