



AUCKLAND URBAN HEAT ASSESSMENT

We want a Tāmaki Makaurau Auckland where communities are healthy and safe from the heat impacts made worse by climate disruption.

Auckland Council supports climate action that takes care of everyone, which is why we want to better understand how heat may impact us across the region. This helps us all to plan and take action.

Heat will increasingly need to be considered as we plan urban spaces, build our homes, or decide where to plant trees.

We have time to plan for more hot days

We have time to plan for a future where we have rising temperatures and may experience more extreme heat.

It is predicted that the number of hot days over 25°C will increase fourfold (to over 90 days a year) by the end of the 21st century.

The impacts of this include a significant increase in heat-related health issues and reduced productivity. It also impacts infrastructure, critical services, and our natural environment.

Heat impacts are intensified in cities by the Urban Heat Island (UHI) effect, a phenomenon where urban areas experience higher temperatures than rural surroundings. Buildings, roads and other urban surfaces absorb and retain more heat from the sun compared to green landscapes. Cities also have higher population densities and human-generated heat emissions, such

as heat from cooling buildings. Climate disruption and Auckland’s increasing population will contribute to an increase in the Urban Heat Island effect in the future.

Heat risks across cities are not evenly distributed and not everyone is impacted equally. The most vulnerable in society, such as the elderly or those with existing health conditions, are often impacted the most.

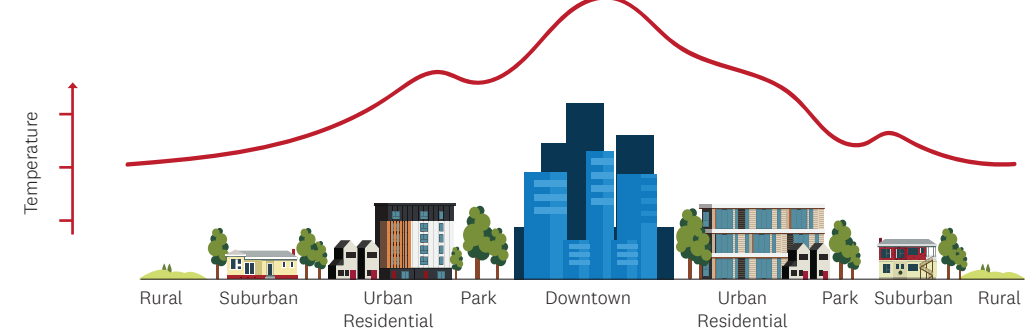
How we are working to better understand heat impacts

A geospatial heat dataset has been developed to provide detailed information of how temperatures vary across Auckland and the factors influencing these temperatures.

A sophisticated methodology was used for this assessment, combining two advanced climate modelling tools: WRF (Weather Research and Forecasting) and UHeat.

- WRF was used to capture regional climate variation across Auckland,

The Urban Heat Island effect



particularly wind, which can significantly affect UHI.

- UHeat is a digital tool specifically designed to predict temperatures and the urban heat intensity across cities at a high spatial resolution. It combines geospatial data, climate information and a physics-based urban heat model, accounting for multiple factors that influence UHI such as land cover, building shape and size, heat emissions, and the urban climate.

A five-month period from November 2021 to March 2022 (Auckland’s hottest summer to date) was modelled, producing highly detailed maps of air temperature predictions near ground level across Auckland.



Land cover data used for UHeat modelling

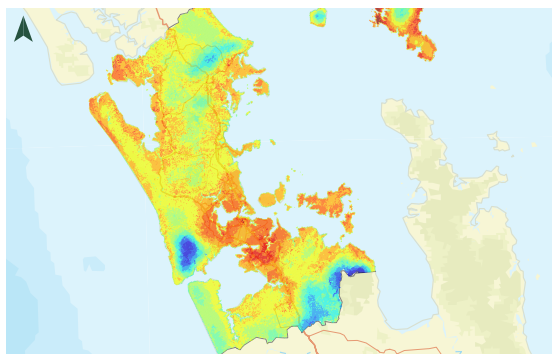




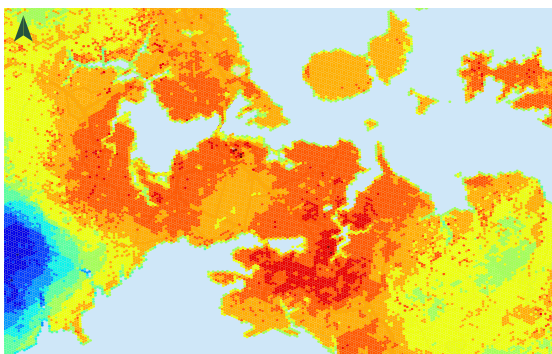
Findings from the assessment

The key insights from this assessment were:

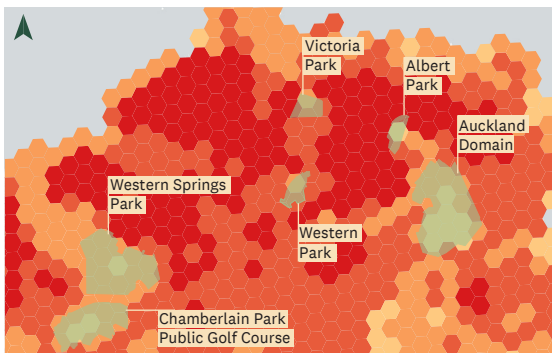
- The urban heat island effect was observed, with the city centre being up to 3°C warmer than rural areas at night time.
- It is important to consider local-scale influences on temperatures. This includes green space and hard surfaces, like buildings and roads. These different influences caused up to a 3°C variation within different locations in the city during a peak temperature day.
- Local wind conditions can alter the urban heat island effect, with the city centre sometimes being cooler than surrounding areas.



Heat map of the Auckland region showing average air temperature over a five-month period



Heat map of urban Auckland showing average air temperature over a five-month period



Heat data and green spaces in Auckland city centre

Map reference: Stats NZ, Esri, TomTom, Garmin, FAO, Foursquare, METI/NASA, NOAA, USGS, Lynker Analytics, Auckland Council: Healthy Waters, Geospatial, contains modified Copernicus Climate Change Service information 2024

How we can better plan for future heat impacts on the community



Lay the foundations for an Auckland response

Making sure Aucklanders know about the urban heat island effect and what they can do to cope with heat impacts.

Planning for high temperature events with a focus on vulnerable communities and areas of the city most impacted.



Let nature provide the solution

Increasing green and blue infrastructure or nature-based solutions to help reduce urban temperatures, for example increasing tree canopy cover, having more permeable surfaces, and installing green roofs or walls on buildings.



Turn down the heat

Providing cooling and respite centres to help the most vulnerable residents and those in the hottest parts of the city.



Design for a hotter future

Retrofitting existing buildings and designing new buildings to address overheating can reduce heat related health impacts. Measures could include shading, natural ventilation and cool surfaces.

