SPORTS&PLAY
INDUSTRY ASSOCIATION LIMITED

# URBAN HEAT ISLAND IMPACT

Mitigating impact of sports surfaces on increasing Urban Heat Islands


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# Urban Heat Island Impact

## Purpose and Context

Many organisations are embracing synthetic technology in parks, sports fields and playgrounds to allow the surface to be able to cope with the intensity of use that the densification of inner cities is creating.
This additional and more durable solution for surfaces can also create challenges to the environment if not planned and designed effectively.
A new generation of thinking is now embracing environmental sustainability practices to compliment performance and people sustainability for these surfaces. The outcome is that by embracing these holistic sustainability outcomes that the economic benefit is increased across the whole of life of a sports surface. One such challenge for sports facilities could be Urban Heat Island impact, especially for hard surfaces such as asphalt and concrete based sports


## Key Causes of UHI

The causes of UHI are significantly impacted by population growth, and subsequent urban development with the expansion of hard surfaces that increase heat exposure. These causes can be summarised by:

- **Heat absorbing surfaces -** Asphalt, concrete, roofs, roads, car parks and pavements absorb and store solar heat, then release it slowly at night
- **Building density and form** - Closely spaced buildings, narrow streets and dense development can trap heat and reduce ventilation, which would normally act as aa cooling agent in the evenings
- **Anthropogenic heat** - Heat released by vehicles, air-conditioning systems, industrial activity, lighting and buildings adds to local temperatures.
- **Reflective heat -** From adjacent infrastructure (roofs, parking lots) contributing to microclimatic heating.
- **Removal of natural vegetation** - Trees, grass and planted areas cool places through shade and evapotranspiration. When vegetation is removed, urban areas lose this natural cooling function.

## Urban Heat Island Impact

An Urban Heat Island (UHI) occurs when urban areas, due to dense built materials, reduced vegetation, and compact surfaces, become significantly warmer than surrounding rural or vegetated regions. This phenomenon results from high solar absorption during the daytime, low evapotranspiration, limited shading or movement of cool air. UHI intensifies during heatwaves and can lead to nocturnal warming as this is when the heat held in the surface is released. This can be particularly challenging for public health, energy use, and overall liveability.
Health impacts include increased heat stress, worsening of cardiovascular and respiratory conditions, and heightened risk of dehydration, especially in vulnerable populations such as children, the elderly, and outdoor-sport participants.
This is why many local governments are transitioning away from dark residential roofs to light colours, or from dark asphalt to light coloured concrete.

## Synthetic Sports Fields and UHI:

### Evidence From NSW Chief Scientist's Report

The NSW Chief Scientist & Engineer's 2022 final report stated that the impact of synthetic sports surfaces on UHI is low and localised, certainly in comparison of all the other built forms in a municipality the size of impact of these synthetics is marginal at best. That said with better planning of the site and location of synthetic surfaces (acrylic, rubber and grass) the local impact can still be reduced.
On hot days (mid-30 °C air temperature), synthetic turf surface with black rubber crumb infill with traditional designs and ageing fields, temperatures can be higher than nearby natural grass, often times reaching up to 50 °C at peak sunlight hours. Understanding the design and planning is critical for embracing low heat retention and design of the whole parkland and not just the field of play.

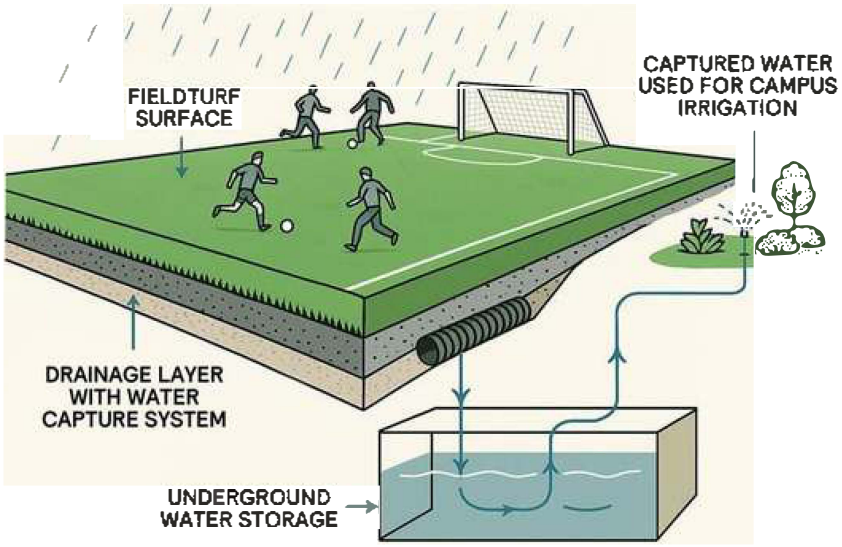
# How Irrigated Grass Helps Offset UHI

Irrigated natural, hybrid and synthetic grass offers several cooling functions:

- Evapotranspiration cooling: grass and soil release moisture, significantly reducing ambient air temperature.
- Lower surface temperatures: grass surfaces typically remain 30–40 °C cooler than unirrigated synthetic turf on very hot days.
- Shading and reflective albedo: grass reflects more solar radiation and absorbs less heat.
- Enhanced air flow: vegetated surfaces support better microclimates and improve comfort for users.

When grass fields or hybrid sports turf systems (mixing grass with approximately 5% synthetic reinforcement) are integrated, they mitigate the thermal burden posed by some traditionally designed or ageing synthetic surfaces.

That said with grass fields that are not irrigated the thermal benefits decrease significantly and are more compatible with synthetic sports surfaces. Indeed, the organic infilled synthetic grass fields that are kept damp have key similar qualities as natural grass, as the sports of today understands.

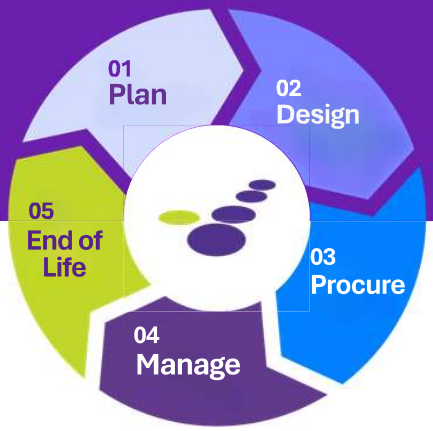



Water harvesting strategy by 'Fieldturf' for their fields

# UHI Mitigation Strategies

By combining scientific insights, landscape-informed design, and community-centric policies, stakeholders can manage UHI effects effectively allowing synthetic sports facilities to coexist with healthy, resilient, and liveable urban environments.

- Use a landscape-led, whole-of-site design rather than treating the synthetic sports surface in isolation.
- Integrate irrigated natural grass where practical to support evapotranspiration and cooling.
- Increase tree canopy around fields, paths, spectator areas and playgrounds to provide shade and reduce radiant heat.
- Add vegetated buffers, bioswales, rain gardens and planted edges around synthetic surfaces.
- Specify cooler synthetic materials, such as high-albedo turf, organic infill, cooler yarn technology and lower-heat infill.
- Use organic infills where suitable, such as cork, wood fibre, walnut husk or other plant-based options.
- Incorporate porous base layers and effective drainage to reduce heat retention and improve stormwater management.
- Harvest and reuse water to irrigate surrounding grass, trees and landscape areas.
- Reduce nearby hard surfaces such as asphalt and concrete, or replace them with cooler, permeable materials.
- Provide shade structures, shaded seating, drinking water and cooling areas for players and spectators.
- Monitor surface temperatures and set clear safe-play thresholds.
- Avoid or limit use during peak heat periods, especially in summer afternoons.




# Recommendations

The Sports & Play Industry Association (SAPIA) brings together the organisations that create the places where people of all ages and abilities can play, move and participate. Through professional standards, industry leadership and innovation, we are building and maintaining better places for a more active world.

To provide these SAPIA Insight Notes, we have partnered with Smart Connection Consulting to provide the latest technical knowledge on the issues that the community are keen to understand better. These notes are based around the NSW & SA Governments Frameworks for Decision Making for Synthetic Sports Fields.

## Plan

- Assess natural, hybrid and synthetic options before deciding.
- Assess the whole of region for the best location that can be integrated best into the natural landscape to reduce UHI and allow for upgrade of natural mitigation strategies to offset any UHI impact
- Adopt a risk-based decision framework for synthetic turf approvals, prioritising health, thermal risk, and urban greening outcomes
- Where possible and subject to budget limitations implement minimum landscape buffer requirements for synthetic fields - e.g. tree canopy zones, natural grass edges, or bioretention systems.
- Consider climate resilience requirements as part of planning approvals (e.g. projected surface temperature modelling with mitigation strategies).
- Engage the community early.

## Design

- Use a landscape-led design with grass, trees and planted buffers.
- Include shade for players, spectators and pathways.
- Choose cooler turf, organic yarn and infill systems.
- Reduce surrounding asphalt and concrete so not to retain heat.
- Use water harvesting, drainage and irrigation solutions to reduce heat on surface and subsurface.
- Use adjacent vegetated zones, such as turfed buffer strips or rain gardens, to support evaporative cooling.
- Deploy climate-resilient planting and urban greening strategies to reduce temperature extremes around parks and sports fields
- Trees, grass and planted areas cool places through shade and evapotranspiration. When vegetation is removed, urban areas lose this natural cooling function.

## Procure

- Build heat-mitigation requirements into the tender.
- Request thermal performance data from suppliers.
- Specify organic or lower-heat infills where suitable.
- Require lifecycle, environmental and end-of-life information.
- Assess whole-of-life value, not just upfront cost.

## Manage

- Monitor surface temperatures in hot weather.
- Avoid use during peak heat periods.
- Provide shade, drinking water and rest areas.
- Maintain and increase grass, trees and planted areas across site
- Set clear safe-play and heat-alert procedures.

## End of Life

- Plan for recycling or reuse before installation.
- Require an end-of-life plan from suppliers.
- Review whether synthetic, hybrid or natural grass is best at renewal.
- Use replacement as a chance to improve shade, materials and cooling.

To understand how SAPIA can assist you in making a difference to your projects and the community understanding of this technical subject please contact the SAPIA office at office@sapia.org.au or on our website www.sapia.org.au.