



# Synthetic Turf in Public Open Space

---

Guidelines for Decision-Makers

*Draft for public exhibition*



# Acknowledgment of Country

The Department of Planning, Housing and Infrastructure acknowledges the traditional custodians of the land and pays respect to Elders past, present and emerging.

We recognise Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to place and their rich contribution to society.

---

**Published by NSW Department of Planning, Housing and Infrastructure**

[planning.nsw.gov.au](http://planning.nsw.gov.au)

Title: Synthetic Turf in Public Open Space

Subtitle: Guidelines for decision-makers

© State of New South Wales through Department of Planning, Housing and Infrastructure 2024. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Planning, Housing and Infrastructure as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer:

The information contained in this publication is based on knowledge and understanding at the time of writing (March 2024) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Planning, Housing and Infrastructure), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

Acknowledgement:

This guideline has been prepared by the Open Space Team in the Infrastructure Policy branch, supported by the generous input of the Council and Industry Advisory Group.

Artwork (above) by Nikita Ridgeway

Cover image: Central Park, Chippendale, NSW

Credit: Department of Planning, Housing and Infrastructure

# Contents

Acknowledgment of Country	2
01 Introduction	4
How to use this Guide	6
Previous Studies and Additional Information	6
02 Synthetic turf in public open space	8
Types of Turf Surface	9
Sports field design and management	10
Reasons synthetic surfaces used	12
Considerations when using synthetic turf	18
03 Guide	20
Plan	22
Design	29
Deliver	37
Manage	39

# 01

## Introduction

Middle head Sporting Fields, Mosman, NSW.  
Credit: Mosman Council



Bearman Park, Earlwood.  
Credit: NSW Department of Planning, Housing and Infrastructure



Public open space is the foundation of liveable communities. It is infrastructure that is essential when creating great places to live, and includes parks, natural areas and linkages, waterways and foreshores, informal parklands, sports grounds and courts, playspaces, historical sites, and recreation trails for walking and cycling. From regional towns, to new greenfield suburbs, and long-established urban centres, public open space plays a crucial ecological, economic, social and cultural role in our lives.

Public open space is where communities come together for the moments that matter, like festivities, recreation, sport and relaxation. It is and is a significant component of the identity of a place, reflecting the local community and its heritage. Public open space also plays a significant role in the mitigation of the impacts of climate change and urban heat island effect.

It is widely recognised by industry and government that public open space, including sports fields and ovals, is in high demand. This demand is a perpetuated by sustained population growth, changing recreational preferences and the expansion of higher density housing coupled with less private open space placing greater demand on public open space for family uses. Where land for additional public open space is difficult to acquire, alternative solutions and practices are needed to increase the capacity of existing public open space, and meet community needs. The increased use of synthetic turf as an alternative to natural grass in public open space is an example of these alternative solutions.

The use of synthetic turf as a replacement for natural grass in public open space, (commonly for sports fields), has attracted high levels of interest from a wide range of stakeholder and community groups. Concerns include impacts on the local environment, perceptions of loss of open space and changes to the amenity of the local community.

Alternatively, organised sports groups and users see the value of synthetic turf as a way to meet growing needs and offer consistent surfaces to play on.

Given the ongoing pressure on public open space and the need to adapt to community changes, decision makers should think carefully about using synthetic turf for both sport and non-sport activities in local parks, and the broad network of public open space. Considerations can include

improved maintenance or selection of natural turf type, better design of sports fields, more durable and higher quality materials, better lighting, and the introduction of synthetic or hybrid playing surfaces.

When deciding between natural and synthetic turf for public open space, it is crucial to weigh up factors such as environmental impacts, maintenance costs and community needs. Striking a balance between sustainability and functionality will contribute to the creation of inviting and adaptable public open space that both enhances the wellbeing of community and aligns with long term goals.

Through thoughtful consideration and consultation, decision makers can ensure that their choices align with the values and aspirations of the community, fostering a harmony between innovation and nature in public open space.



## Public Open Space Strategy for NSW

NSW Department of Planning and Environment 2022

The NSW Public Open Space Strategy is a major step to deliver more and better public open space. It sets out a collaborative, coordinated and evidence-based approach to unify planning, investment and delivery.

Decisions for synthetic turf should consider five key objectives within the NSW Public Open Space Strategy that will be achieved through specific, defined and targeted directions which can be adopted across all of Government:

- › Better recognition for public open space.
- › Stronger First Nations involvement.
- › Coordinated planning governance, policy and funding.
- › Greater social, environmental and economic value.
- › Better outcomes for regional NSW.

## How to use this guide

This guide is designed to assist decision-makers, planners and sports field managers who may be considering synthetic turf as an alternative to natural grass and to support designers, delivery agents and open space managers plan and deliver the best outcome for their community.

The guide focuses on synthetic turf used for sporting purposes only – they do not include synthetic turf in private or residential settings, streetscapes or playspaces.

The document is structured to be used during a particular stage of a project or through the whole project from planning to delivery. This guide will help you understand:

- › Understand the pressures on public open space and the types of surfaces that can be considered to meet community use needs.
- › What to consider when planning and designing sports field surface selection.
- › How to achieve best practice when planning, designing and delivering public open space.

Developed in partnership with local government, sporting bodies and industry experts, the guide offers strategies and case studies to inform decision makers.

## Stakeholders

This guide has been created to help anyone involved in planning, designing and delivering public open space and surface selection. This involves a wide cross-section of stakeholders, including:

- › Councils and government agencies
- › Landscape architects and designers
- › Open space and recreation planners
- › Policy makers
- › Construction and asset managers
- › Community champions
- › Non-government agencies

## Previous Studies and Additional Information

### Synthetic Turf Study, NSW Department of Planning and Environment 2021

To address some of the above contextual issues, the Synthetic Turf in Public Open Space Study was produced and noted the need for consistent, statewide guidance to assist councils when considering synthetic turf.

The study recommends potential adaptations to relevant state environmental planning policies (SEPPs) as well as further primary, evidence-based research into the human health and natural environmental impacts of synthetic turf use.

In particular, the study notes the need to analyse:

- › The impact of heat on larger fields, and the potential for higher UV reflectivity of synthetic turf.
- › The appropriateness of natural vs synthetic in bushfire prone areas.
- › The impact of synthetic materials on human health.
- › The health and social implications of reduced accessibility for informal enjoyment of public open space.

The study recommends consideration of the potential benefits and impacts of the emerging technologies of hybrid and 4G (fourth generation) synthetic technology within an Australian context and research to understand barriers to implementing best practice natural turf fields

### Independent review into the design, use and impacts of synthetic turf in public open spaces, NSW Chief Scientist & Engineer 2022

The Office of NSW Chief Scientist & Engineer (OCSE) was commissioned to provide expert advice on the use of synthetic turf in public open space in NSW following an initial 2021 study commissioned by the Department of Planning, Housing and Infrastructure.

The 'Independent review into the design, use and impacts of synthetic turf in public open

spaces' was completed in November 2022 and presents an overview of key insights and makes recommendations to guide the use of and improve the management of synthetic turf in NSW.

In response to the OCSE report, a NSW Government inter-agency working group will prepare the proposed whole-of-government response to the report's recommendations, which Cabinet will consider. As those findings progress the outcomes will inform this guideline.

## **Development of best practice guidelines for natural turf irrigation**

The NSW Government is developing in parallel a best practice irrigation guideline for natural turf. This will assist as a best practice guide for government, water utilities, councils, and industry in developing and delivering quality community sporting fields that are water efficient and sustainable.

The performance of turf sporting fields (e.g. water requirements, playing surface quality, carrying capacity and climate resilience) are strongly influenced by a range of technical elements (e.g. soils, drainage, turf variety, irrigation system, climate conditions) as well as processes and decision making during the asset lifecycle (e.g. planning, design, construction, maintenance, budgets). The current performance and water requirements of a field today may be a direct result of previous decisions made many years earlier.

# 02

## Synthetic turf in public open space



Petersham Park, Petersham, NSW.  
Credit: NSW Department of Planning, Housing and Infrastructure





# Types of Turf Surface

## Natural turf

Natural turf refers to grass-based fields which can range from a basic soil-based grass field to a high quality engineered sand-based field with profile reinforcement. Each of these vary in capacity and durability based on the material used and construction.

The construction options for natural turf range from a basic soil-based grass field to a high quality engineered sand-based field with profile reinforcement. The design of a high quality (engineered) natural turf playing surface sand profile typically consists of a natural turf surface layer, root-zone sand layer and gravel drainage layer.

### Best practice guidelines for natural turf surfaces

Projects undertaken over the last decade to improve management of natural turf fields indicate that significantly more can be done to improve their playability and longevity. Key guidelines are available:

- › Best management practices for sustainable and safe playing surface of Australian Football League sports fields (2007).
- › Best practice guidelines for holistic open space turf management in Sydney (2011).

## Hybrid turf

A hybrid turf is a combination of synthetic and natural turf in a single product. This includes:

- › Hybrid turf profile: where a backing similar to those used in synthetic turf reinforces natural turf growing from the mat. This system combines blades of synthetic grass with natural turf to provide a consistent playing surface, improved surface durability and stability.
- › Profile reinforcement: where natural turf is grown within a base of synthetic turf fibers to improve the durability and stability of natural turf and reduce divoting.

- › Combining natural and synthetic turf: where synthetic turf is used in areas of more wear such as at the goal mouth of otherwise natural turf fields to improve durability without needing to convert the entire field.

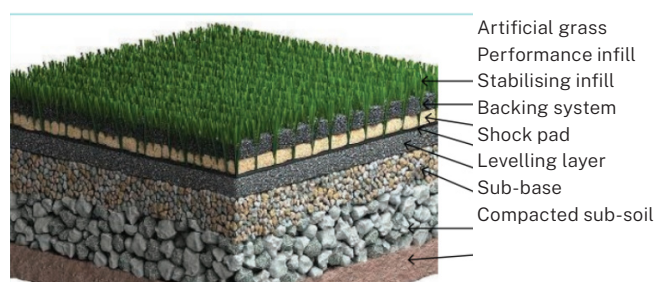
Hybrid turf fields are an emerging option that blend elements of synthetic and natural turf together to create fields that are more durable and stable, but may present maintenance issues. Hybrid surfaces are currently used infrequently in NSW, and unless specifically indicated in this guide, should be read as part of synthetic turf.

## Synthetic Turf

Synthetic turf was developed as an alternative to natural turf that requires no mowing and provides a durable surface. It can be used by a range of sport disciplines, and it is a common feature in outdoor playgrounds worldwide.

Contemporary synthetic turf fields primarily consist of a pavement base, shock pad to reduce the risk of injury, turf carpet made of artificial grass blades (composed of polyethylene or polypropylene) stitched through a woven mat and infill, which helps keep the blades upright, improves grip and drainage. Common types of infill include crumbed rubber, sand, and cork.

Synthetic turf surfaces are becoming increasingly popular. In the United States, early adopters include gridiron and athletics in the 1960s and hockey in the 1970s. In Australia, lawn bowls and tennis adopted the surfaces from the 1980s. Several sports that traditionally play on grass surfaces have recently adopted the synthetic turf technology, including football, rugby union, Australian rules football, rugby league, Gaelic football, and cricket.



Reference: *Synthetic turf study*, NSW Department of Planning and Environment 2021.

# Sports field design and management

Both natural turf and synthetic turf sporting fields can be designed, configured and managed in a range of ways that support different levels of performance and are appropriate for different uses. The performance and user experience of each surface type is strongly influenced by the maintenance regime and funding levels allocated to upkeep.

No surface type is 'low cost', nor will any surface type perform well without regular maintenance and care.

The following table outlines some of the key differences for designing and managing synthetic turf and natural turf sporting fields.

	Natural Turf	Synthetic Turf
<b>Capital cost</b>	A well constructed natural turf field that consists of a natural turf surface layer, rootzone sand layer and gravel drainage layer is typically less than a third the cost of a synthetic turf field.	The capital costs associated with a synthetic turf field can vary depending on site establishment requirements, facility size and specification (such as provision of a shock pad) and supporting infrastructure (such as drainage systems, player dugouts, spectator fencing, security fencing and lighting).  Renewal costs are also higher and unlike natural turf, synthetic turf needs to be replaced at the end of its life.
<b>Maintenance</b>	Requires regular and continuous maintenance involving irrigation and mowing to sustain a playable surface.  Applications of fertilizer as well as ongoing weed, pest and disease management and aeration are needed.	Requires regular cleaning, grooming, topping up the infill material, and repairing any damage.  When sand or organic infills are selected, occasional weeding and removing of algae is required.  The frequency of maintenance tasks depends on how often the sports field is used.
<b>Irrigation</b>	Requires more water during the summer months to maintain plant growth and provide fit-for-purpose surfaces.  In areas where water is scarce, irrigation can have negative effects on the environment. The ability to irrigate may also be impacted by water restrictions which are imposed in areas where drought conditions are being experienced.	Most synthetics (some surfaces require watering before use) require minimal to no irrigation.
<b>Wet weather</b>	Poorly located or constructed natural turf fields may become waterlogged and unusable during wet weather, although upgrades to the field can reduce the impact of excess rainfall on turf performance.	Synthetic turf fields are typically more reliable and have better surface quality during wet weather.  Some synthetic fields sustain significant damage/disintegration during extreme rainfall events, depending on age, siting and condition.

	Natural Turf	Synthetic Turf
<b>Recovery from use</b>	Rotation from winter sport which is generally high wear to summer sport which is generally low wear usually provides enough field recovery time. Time needed post winter sports depends on several factors: the amount of wear, soil health, the type of turf cultivar, management practices and user practices (e.g. distributing play/training across the field).	Synthetic fields do not need a recovery time, however there are constraints on use to protect it from damage. Normal running shoes flatten the synthetic grass blades so fencing is often installed to keep the general public off the grass so as not to damage it. It is difficult to recover a synthetic turf surface once the blade of the synthetic is flat.
<b>Heat stress</b>	Irrigated natural turf sports fields have lower surface temperatures than surrounding areas. Natural turf surfaces take longer to be affected by extreme heat conditions.	Synthetic turf has a significantly higher surface temperature that can impact on player and user comfort. In very hot weather, play can rapidly be cancelled on synthetic turf due to heat stress.
<b>Flexibility</b>	Natural turf fields are typically flexible and can be used by different sporting codes with simple modifications like line marking which can easily be changed on natural turf.  Natural turf fields cater for more diverse uses that includes organised sporting activities and passive recreation activities such as picnicking, walking, jogging, dog walking and more.	Synthetic turf fields are typically specific for certain sporting codes and codes have different requirements which reduces their flexibility. Line markings are more permanent and pile height and other features are specifically designed for certain codes/groups of codes.  Eg. AFL, football and rugby all have specified performance features to certify synthetic turf as suitable for their sport.



# Reasons synthetic surfaces used

Quality public open spaces make for liveable, sustainable, and healthy neighbourhoods. They provide us with places to exercise, play, rest, participate in social activities, and contribute to healthy, happy, and resilient communities. As NSW experiences sustained population growth and housing density increases, making sure the community continues to enjoy access to quality public open spaces is critical.

Access to quality public open space directly affects participation rates in sport. Participation in sport and active recreation supports people's health and wellbeing, fosters social cohesion, and helps to boost productivity and local economies. Maximising the use of existing sports fields is often the only option for meeting growing demand as there may be no suitable land available to acquire for new sports fields, and the land acquisition costs can be prohibitively high.

Installing synthetic surfaces as an alternative to natural turf fields in public open space is one way to meet growing demand for sports fields and to support greater levels of formal sport participation - synthetic turf fields often allow longer hours of play than natural turf alternatives. Synthetic fields are also installed due to preferences by specific sporting codes and to align with competition standards.

## Increased demand for public open space

The primary driver of increased demand for public open space in NSW is population growth, with the population of NSW is forecast to reach 8.9 million by 2041 (DPE 2022).

Population growth is placing pressure on existing public open spaces which need to accommodate increased levels of demand and more diverse community aspirations. In inner city areas, population growth is often occurring within areas already lacking adequate provision of public open space.

To accommodate population growth, housing density is increasing dwelling sizes are becoming smaller and more people are living in apartments with limited or no access to private open space, such as backyards. This means people are increasingly turning to public open space to maintain their physical and mental health and wellbeing and access to public open spaces for walking, cycling, dog-walking and formal or informal sport is increasingly valuable to local communities.

At the same time, increasing density means that pressure on existing sporting fields is increasing, there are more people living in a local area looking to participate in formal sport. The result is significant pressure on existing public open space networks for both formal sporting use and general recreation.

In many dense urban areas and areas experiencing rapid housing growth, it can be difficult to provide sufficient parkland for recreation, let alone for large new sporting fields. Finding and acquiring land suitable for sporting use (i.e., large flat areas) is an increasingly difficult challenge, as there is often a lack of available space (particularly in inner city areas), land values are prohibitively high and there are often competing development interests in sites.



Central Park, Chippendale  
Credit: NSW Department of Planning, Housing and Infrastructure

## Case Study

### Central Park, Chippendale

Since opening in 2012, Central Park become central to life for thousands of locals and visitors. From the everyday dog walk or yoga class, to hosting bi-monthly markets and numerous annual major events, Central Park has been embraced by the community at all levels. Central Park needed a turf upgrade due to wear and tear and to enhance user experience and faced a pivotal decision to choose between natural and synthetic turf.

Considerations were made about the environmental impact, usability and maintenance and community preference. The end result was a hybrid approach, with natural turf in areas ensuring a connection to nature and synthetic turf in high traffic zones.

The hybrid approach balances the desire for a green, natural environment with the practical considerations for maintenance and usage. Central Park is an adaptable and reliable public open space that caters to community needs.



Chipping Norton, NSW  
Credit: Liverpool City Council

## Case Study

---

### South Park Oval, Chipping Norton

Several council-owned football pitches in Liverpool LGA are used by clubs exceeding 400 players every day. Council found at the start of 2021's winter season that pitch surfaces were showing significant signs of wear, which was worsened following the flood events in March 2021- soil that had been added to the field to restore it had been washed away.

To improve playing quality in time for the winter season, Liverpool City Council is trialling the installation of hybrid turf sections in the high use sections of the goal mouths of the fields (i.e. South Park Oval, in Chipping Norton).

Council chose this option due to its relative cost effectiveness \$14,000 to install, compared

with the high cost associated with full synthetic installation, and the fast turnaround of installation – the hybrid turf patches were installed over 2 days, and the pitch was playable the following weekend.

The response from the local soccer association has been positive because of the increased consistency in playing surface quality, and other local clubs are lobbying Council to introduce more hybrid options.

Given the relative ease of provision and low costs, and the reduced environmental and social impacts, this strategy could be an option to meet demand while minimising associated impacts.

## Constrained supply of sports fields

Existing natural turf sports fields in densely populated urban areas frequently do not have the capacity to meet high levels of demand, regardless of the quality of the field. In some instances, clubs turn away potential participants due to a lack of sports field capacity.

Some sports have also begun extending their seasons of play, having a longer pre-season or even playing year-round, resulting in a clash between winter and summer sports that are now competing for the same field.

Poorly maintained and constructed natural turf sports fields can struggle to support high levels of use due to poor condition and inadequate drainage, which limits their available hours of use for sport. Many natural turf fields are perceived to be in poor condition with inadequate drainage, poor construction and maintenance regimes resulting in low field capacity. Well-engineered natural fields maintained in good condition can provide significantly higher levels of utilisation than poor condition ones.

Innovative management practices can support greater use of natural turf fields. Strategic lighting to encourage evening use of particular areas of fields and shifting line markings to rotate areas of high wear (eg. goal area) are an effective way to distribute usage across a natural turf playing field surface. New technologies are also offering facility owners improved data on the status and usage of sports fields, enabling councils to better target maintenance, manage peak use and quiet periods, scheduling, and planning for use.

Partial/hybrid use of synthetic grass can also increase durability in natural turf fields. Hybrid turf combines blades of synthetic grass with natural grass to increase durability of fields while reducing use of synthetic materials. In addition, synthetic materials can be incorporated in the root zone to reinforce the soil profile. Synthetic turf can be used selectively in high wear areas of a sports field such as the goal area.

## Capacity

Sports field capacity is the theoretical higher limit of use hours a field can tolerate or is likely to sustain before wear and impact begin to deteriorate the surface and impact play. In the case of synthetic surfaces modelled capacity of 60 -70 hours per week is often compared with natural turf fields which can typically sustain 25-30 hours per week before significant surface degradation (well-engineered and well-maintained natural turf fields can sustain up to 45-60 hours per week).

The capacity of synthetic fields to accommodate increased sporting use, compared with natural turf, is commonly cited as a key advantage of synthetic turf over natural turf. When considering which sporting field surface to use, it is important to understand the real, not perceived, level of demand. Unless synthetic fields are used much during the day on weekdays, they are unlikely to be in use for more than 30 hours a week, as sport training sessions typically happens in afternoons and evenings and matches are held on weekends.

Additionally, sports fields are not always used solely for formalised sport. They are also places that the community use for dog walking, exercise and fitness, informal sports such as casual sport and many more activities that are typically prohibited on synthetic turf fields.

Best practice natural turf design and maintenance has the potential to improve the capacity of existing natural turf fields to support increased sporting use. Common and affordable practices used to increase the capacity of natural turf are effective and well maintained irrigation systems, sand slit drainage, re-surfacing and laser levelling.

Information about recent innovations and best practice for natural turf are not well known or commonly used. A lack of readily available information on best practice construction and maintenance of natural turf fields influences and also constrains decision making on sports fields turf options.

## Greater diversity in sports participation

The profile of participants in organised sport is changing. AFL, soccer, and rugby, once considered male-dominated sports, are seeing an increase in the number of female participants, with more participation from people over the age of 35.

Furthermore, the increasing cultural diversity of NSW communities has also driven a change in community preferences and demand for public open space. Issues such as certainty of play during inclement weather and different levels of competition and a more diversified competition within certain sports increase the gap between supply and demand.

Between 2017 and 2022, the number of adults participating in sport at least once a week has risen by approximately 160,000 in NSW. Similarly, the number of adults participating in sport at least three times a week has also risen by approximately 120,000, showing a clear need for more sporting facilities, including sports grounds. This trend will likely continue as the population of NSW grows.

Furthermore, the number of adults participating in physical exercise (with the most common being recreational walking) has risen by approximately 250,000 between 2017 and 2022, reflecting a need for more public open space. *Source: Ausplay 2023*

## Preference for synthetic turf from sports organisations

Sporting peak bodies provide guidance on synthetic turf relevant to their sport. Generally speaking, hockey and athletics prefer synthetic turf, due to the sport requirements, specific impact and competition standards. They are also generally accepted for some other sports, such as tennis.

There is also strong support among participants of specific sporting codes (such as football, AFL, hockey) for the installation of synthetic fields due to the increase in capacity of playing fields. This increased capacity is seen as a way to help address the growing demand for playing space and growing participation rates in some of these sports (eg. female participation in AFL).

Synthetic surfaces are a requirement for some higher grade and professional grade sporting codes. Clubs that wish to compete in and host higher grade games may seek to have natural turf surfaces replaced with synthetic surfaces.

However, there are community concerns about synthetic turf, including a potential polluting effect on air and water from materials, adverse effects on thermal comfort, reduced amenity and use for passive recreation, and the impacts of extended use to adjacent residents.

## Resilience in all weather conditions

Synthetic turf is recognised for being useable on all weather conditions. The loss of playable hours on natural turf playing fields due to wet weather is often cited as a key reason for pursuing synthetic playing fields, as it ensures consistent sport usability during the winter season when demand is typically at its highest (especially for football, rugby and AFL). Even a well designed natural turf playing field will have some 'lost hours' of play after a heavy rainfall event, although they will recover quickly.

Recent extreme rainfall events and flooding in NSW during 2022 caused significant damage to some synthetic fields and disintegration of old fields into unfiltered drains, resulting in water pollution and additional maintenance costs. The substantial capital cost of synthetic fields has meant these have not been replaced and remain out of use. Newer synthetic fields did not experience significant damage.

Natural turf needs to rest after wet weather/after winter to ensure it has an opportunity to bounce back for summer, which synthetic turf does not need. As a result, access is often restricted between seasons on natural turf, resulting in less sport games, which doesn't occur on synthetic turf fields.

In drought-prone areas, the use of synthetics means that a lack of water will not impact on the playing surface quality. Conversely, in extreme heat events, which are becoming more frequent, a natural turf field will remain playable for longer due to the cooling and heat absorption properties of the grass. Synthetic surfaces are significantly hotter and will have more 'lost hours' from heat load and the need to protect players.





Reserve 811, Fyfe Road, Kellyville Ridge  
Credit: NSW Department of Planning, Housing and Infrastructure

# Considerations when using synthetic turf

## Environmental considerations

- › **Pollution:** Air and water pollution caused by synthetic turf materials (i.e. rubber crumb) is well documented in academic research. Pollution, particularly of waterways and bushland, is a key concern.
- › **Chemical use:** Pesticides and fertilisers are typically used for natural turf fields, while pesticides and fungicides are typically required for synthetic fields.
- › **Waste:** Environmental and financial challenge of disposing synthetic turf at the end of its 8–10-year life cycle.
- › **Heat:** Heat impacts to the surrounding environment caused by synthetic turf absorbing heat rather than reflection.
- › **Carbon emissions:** Synthetic fields contribute to heightened CO<sup>2</sup> emissions due to lack of carbon absorption associated with natural turf.
- › **Soil sterilisation:** Sterilisation of soil beneath the synthetic turf has an impact on ecosystems. Synthetic surfaces inhibit living systems.
- › **Water Usage:** Water consumption and irrigation requirements are lower for synthetic turf making it generally more suitable for drought and dry conditions (due to reduced water requirements).
- › **Variability:** Environmental impacts of synthetic fields vary substantially depending on what type they are. Older synthetic fields (generation 2 and 3) are associated with significantly higher radiant heat and environmental pollution.
- › **Wildlife:** While natural turf sports fields have limited biodiversity value, they do provide some habitat for local flora and fauna that synthetic turf does not.

It is noted that design of synthetic surfaces is technologically advancing in response to some of the impacts created by synthetic turf, e.g. microplastic pollution.

## Social Considerations

- › Synthetic fields are generally subject to higher ambient temperatures than natural turf on hot days.
- › The aesthetic of synthetic turf is very different to and can be perceived as much less attractive to natural turf.
- › Synthetic turf does not provide the same benefits of connection to nature compared to natural turf open spaces.
- › Natural surfaces provide greater levels of noise abatement, glare reduction and UV reflectivity.
- › Fenced synthetic fields reduce informal use of open spaces while prioritising sporting use.
- › Replacing natural turf with synthetic turf results in a loss of freely accessible public open space, and is a disincentive to informal sport and recreation.

Due to having an increased carrying capacity, synthetic fields can have:

- › Increased impact on surrounding residents from duration of field lighting at night.
- › Congestion and pressure on parking and increases to local traffic.
- › Increased impact and duration of noise due to greater intensity of use.
- › Elevated synthetic fields can impact on perceived privacy for adjacent residents.

## Health Considerations

- › Heat stress and the impact on player and user comfort associated with playing on synthetic fields in hot weather.
- › Some generations of synthetic turf (typically 1st, 2nd and 3rd) have a greater risk of abrasiveness on skin and higher injury rates.
- › Research has suggested that biological pathogens, toxic chemicals, and micro-plastic ingestion are all risks to human health that are associated with synthetic materials.

# Case Study

## Coffs Coast Regional Sports Hub

### Recycling synthetic turf

Synthetic turf has a lifecycle of approximately 8 to 10 years, requiring a disposal of materials (mostly the carpet) when refurbishment is due. It is purposefully designed to not breakdown quickly, and has the potential to stay in landfill for a significant amount of time after disposal.

In terms of recycling synthetic materials, a circular economy within the synthetic turf industry has been created in Europe. Victoria has also recently provided funding for an Australia's first synthetic turf recycling hub, with up to 98% recovery of raw material for repurposing and distribution.

This can be expensive, and is not factored into the lifecycle costs quoted by many synthetic turf providers. While design excellence and good maintenance practices can increase the lifespan of these products, thus reducing waste produced, end of life disposal is a key issue for synthetic turf which must be considered and mitigated against.

The Coffs Coast Sport and Leisure Park precinct located in Coffs Harbour, has been developed as a regional sports hub offering world-class multi-sport fields. With C.ex Coffs International Stadium at its heart, the precinct plays host to a number of major sporting events including NRL, Big Bash League cricket, A-League, national/state touch football and Oztag championships, local school sport and community events.

The recently completed Stage 2 of the Coffs Coast Regional Sports Hub project was jointed funded at the state and federal level and delivered three new fields, two of which are synthetic with FIFA quality certification and multi-sport compliance, as well as subsurface draining on the grass fields and lighting to Australian standard. The project also included an extension to existing amenities and construction of the new Hub2 building featuring including spacious airconditioned change rooms, officiating rooms, medical spaces, storage, canteen and a large, internal multipurpose space.

Coffs Coast Sport and Leisure Park provides a boost to the local economy through the hosting of more and larger events attracting more people to the area, increasing over-night stays and tourism, and also providing high-quality facilities for local teams and schools.



Coffs Coast Regional Sports Hub, NSW  
Credit: Coffs Harbour Council

# 03

## Guide

Henson park, Marrickville NSW  
Credit: Inner West Council



Kareela Oval, NSW  
Credit: NSW Department of Planning, Housing and Infrastructure



The process of planning, designing, delivering and managing a public open space is dependent on the size, scale, and complexity of the project. It's often iterative, and should always be collaborative, taking into account a broad range of ideas and perspectives. This guide has been developed to assist you through these four important steps that can be reviewed and referenced at anytime through the journey.

Good planning ensures that our public open spaces meet current and future needs of communities. Some projects can be complicated and required significant time and resources. Taking the time to plan and design can ensure your project is delivered within the budget and time constraints, to a high quality so that it is able

to function effectively and efficiently throughout its lifecycle. Engaging stakeholders early and often promotes transparency, accountability, collaboration, and cooperation.

There are many things to consider when creating public open spaces that can have a direct impact on the safety of the community. Proper planning and strong management principles can mitigate risk and ensure the safety of the public. Managing public open space becomes less challenging when good practice has been undertaken upfront. The following section provides guidance through all the project stages for developing open space, and will assist you in creating great public open spaces for your community to enjoy.

---

## Plan

Think about the bigger picture; facility type, location, use, responsibilities. Speak with the community to find out their needs.

## Design

Key project concepts which should be considered by decision makers.

## Deliver

Set yourself up for success with a good project brief, management practices, communication and quality control.

## Manage

Ensuring lifecycle is built into project longevity, along with ongoing maintenance, monitoring and evaluation.

# Plan Design Deliver Manage

---

The first step will be to consider demand at the local government level – for today and for the future. Any investment in a sporting facility must provide for the community while also achieving an adequate return on investment.

Get in touch with the NSW Office of Sport, local councils, state sporting organisations and consider approaching specialist sport data providers to understand demand or trends for sport in your area, which could influence demand.

## Identify sports uses and needs

### Provision

Consider the player-to-facility ratio – speak to the NSW Office of Sport or sporting organisations, or see if the local council has its own data through its inventory of sporting facilities and population and player data.

Different sports will inherently have different ratios based on team sizes. An evaluation of ratios can help to identify demand and provision of sporting codes.

- Does strategic documentation or data demonstrate that population growth will support the proposal?
- Will the proposal support increased female participation or meet demand from higher female participation?
- What specific sports have a high level of interest in your LGA, and does this proposal support it?
- Will the proposal assist local sporting teams and talents to progress to higher levels of competition?
- Is the proposal for a sporting facility that has an established preference for a synthetic turf?
- Is the request backed up by data that demonstrates a need for higher playing hours?
- Is the proposal able to co-share with other agencies?

### Capacity

When looking to convert an existing facility, analyse these factors to determine the capacity of the proposed site, including whether casual use is permissible, as this can increase surface wear.

- (For an existing facility) Are the current playing hours resulting in excessive wear to the field/facility?

### Training vs competition, school or an informal community use

Recognise that demands on facilities is a result of training and games. Consider how the proposal will meet the demands of both and whether there are alternative solutions for training that can minimise demand. You might also consider how to maximise the proposal to allow for other sports or community uses.

For many sports, training can take place in a different location or field/facility to where games are played, such as cricket nets or smaller soccer fields. Understanding this and the provision of different facilities across your LGA will help you to understand demand more holistically. Further, off-field warm-up areas can also be used for training and competition.

- Does the proposal consider alternative solutions for training locations that can minimise the demand?
- Does the proposal allow for other sports to use the facility for play and training?
- Does the proposal allow for community recreational use of the facility?

Consider also looking at the demographical break down and cultural make up of the area. Certain cultural groups have strong preferences for specific sports, and this information should be looked at when planning what facilities to implement.

### Sport-specific requirements and multipurpose opportunities

Certain sports have requirements for surface types and performance criteria – obtain this information from the relevant peak sporting body. The surface performance criteria will determine the surface construction profile to provide a consistent and safe surface for the sport. Ongoing re accreditation should also be factored in.

Multipurpose facilities can be constructed and designed so that the surface is safe and suitable for use for many different sports. Some surface technologies allow for hockey, football and rugby to be played on the same surface.

- Is the proposed grade (community or professional) suitable for the level of facility?

- If professional grade, does the proposal need sporting body accreditation for players using this surface?
- Is the categorisation of the facility (neighbourhood, local, district, state/national) appropriate for the location?
- Does the proposal allow for different sports codes to be played on the surface?
- Are there multiple sport clubs using this location that would allow for a multicourt/field development?

## Review strategic policy context

Use a strategic approach when considering what surface to choose for public sports fields.

Start by understanding rates of population growth and change, as well as sports participation and professionalism to understand the demand for different surfaces. These drivers are pronounced in metropolitan centres.

With ground managers (including councils, schools, clubs and associations) under pressure to provide high quality sports fields when elite facilities aren't always feasible, fit-for-purpose is a good outcome for the community.

## Case Study

### Narrabeen Sports High School

A successful agreement has been in place since 2012 with the Department of Education and Northern Beaches Council (originally Pittwater Council) to build and manage a lit synthetic field catering for a range of sports particularly football and AFL on the grounds of Narrabeen Sports High School in a joint use venture.

The joint use arrangement also included access to a natural grass field and amenities block. For council's contribution, they have access for the community from 4pm-10pm each school day and 8am – 6pm weekends and public holidays. Council is responsible for maintenance of both fields and field infrastructure including sports lights, with the school responsible for any damage caused during the school day.





Strategic and project decision-making about surface types requires you to:

- › Undertake verifiable need/demand and condition assessment audit to validate if existing natural surfaces can support future requirements.
- › Understand what fit-for-purpose will mean for different sports and levels (whether professional or community).
- › Ensure construction includes adequate sub-surface drainage and that the natural grass species is suitable for drought tolerance, coverage and recovery.
- › Introduce a maintenance program that reflects sporting requirements and natural grass species.
- › Consider lifecycle costs.
- › Consider community appetite for synthetic turf over natural turf for sports.

The review process may commence following a request from a local sporting group for new or upgraded synthetic turf, as a proposal as part of a larger development or as the need for a new facility to meet population growth is identified through strategic planning.

We encourage you to step back and fully evaluate every proposal within the wider open space network to ensure the right surface is used at the right location, to minimise any impacts and to maximise community benefit.

Sometimes the location of interest may be fairly rigid. In this case, evaluate whether the site is appropriate for a synthetic turf and if so, consider the impacts on the environment and community and designing to minimise them.

- Have you reviewed open space plans or more detailed recreation or sporting plans that illustrate a need for the proposal?
- Have you determined demands and trends?
- Is there an identified lack of this type of facility within the LGA?
- Is there a strategy or plan that documents the number of fields/facilities to compare to recommend provision levels?
- Is this site an identified priority from a strategic document, such as a sports field strategy?

## Strategic considerations

Consult region of councils (RoC) to confirm strategic needs. Councils in metropolitan areas should consider facilities in neighbouring LGAs that may be visited by surrounding residents and any regional-level facilities that could be shared.

Develop a regional sporting needs study that considers shared use and how best to optimise public open spaces for sporting needs.

### Open space strategy

An open space strategy will help create and protect a network of quality open spaces. It provides an understanding of supply and demand to identify deficiencies, secure new provision and improve quality through better management. It allows you to prioritise, spend and plan resources and, crucially, to show how much open space is valued. It is essential to support the case for increased resources.

An open space strategy requires collaboration with many partners, led by council's planning and open space management staff. You will need input from council departments, including recreation, housing, transport, culture, asset and facilities management.

- Have you developed (or reviewed) the open space strategy to ensure an appropriate network approach facilitates broader thinking and efficient use of facilities?

### NSROC Regional Sportsground Strategy Review and Regional Plan for Synthetic Sportsgrounds

In 2018, the Northern Suburbs Region of Councils (NSROC) quantified and demonstrated a current and future shortfall in the supply and capacity of sportsgrounds, finding an increase in supply/capacity of 26% is needed by 2026 (around 78 standard rectangular fields) and 40% by 2036 (around 120 standard rectangular fields).

This strategic collaborative approach to provision identified actions to increase supply and capacity of sportsgrounds across 7 LGAs.

## Recreation strategy

Recreation facilities include sports fields, courts, skate parks, swimming pools, indoor recreation centres, playgrounds, shared pathways and fitness stations. Devising a strategy (sometimes also considered as part of an open space strategy) will contribute to the health and wellbeing of the community by ensuring a diversity of fit-for-purpose, affordable and accessible formal and informal recreation programs, services and infrastructure. Understanding recreation uses in the area will help you to understand future impacts on sporting infrastructure.

- Have you developed (or reviewed) the recreation strategy to analyse and understand other community recreation uses?

## Sports field strategy

A sports field strategy is a strategic framework and action plan to guide how a council can provide well maintained sports field and amenities. It does not include council owned recreational facilities that are not considered sports field, such as aquatic and indoor recreation centres or equestrian facilities. It also does not include privately owned sports field and recreational facilities.

While the demand for a new or upgraded sport facility may come from a specific site, consider the wider network of facilities to ensure an equitable and well planned approach. Use the open space studies to understand the distribution of existing open space across the LGA, which will inform the selection of sites to manage existing demand and/or to consider for upgrade or new development.

Understand the days and times of training and play, which may allow for the demand to be spread across existing facilities or may reinforce the need for new or upgraded facilities in the location.

Understand the provision of facilities across a broader area, particularly state or national facilities where there will be considerable demand from neighbouring councils.

- Have you developed (or reviewed) a sports field strategy to analyse multi-use and demand distribution, and to determine the proportion of space a synthetic facility takes up within existing public spaces?
- Is this location identified as an area for

development with a strategic open space planning?

- Is the location identified in a wider strategic document such as a ROC study or structure plan?
- Have you consulted with ROC to consider best location of a regional facility?
- Is there the potential for cooperation with neighbouring councils to determine the most appropriate location?

## Assessments

### Quality of existing facilities

Audit the condition of existing natural and synthetic facilities to understand how they can help to meet the identified sporting needs.

- Is there an adequate variety of different sports fields in the vicinity?

### Conversion of existing sports field

Synthetic turf proposals will either relate to a proposal for a new site not currently used for formal sport or conversion of an existing sports field where organised sport is already played.

Existing sports field often include change facilities, parking, spectator facilities and lighting. These facilities would have established usage patterns and active user groups/clubs – impacts are already accepted.

However, if an existing sporting facility doesn't have adequate supporting infrastructure, the social impacts of any new proposal will need to be assessed in detail as part of the site evaluation, and you should seek support from the community.

### Development of a new site

Introducing a new sport facility may require greater consultation, planning and evaluation than an existing site. This ensures the location is optimal, that existing uses are not displaced, and that the community is supportive. New sites may come about through land acquisition, conversion of a greenfield or brownfield site or through strategic planning that has identified an optimal location.

## Lifecycle

The lifespan of a synthetic turf depends on materials and design, usage, environmental conditions, operating, managing, maintaining and disposing or recycling and replacement. Consideration regarding the delivery, management of synthetic turf should be factored into the overall lifecycle.

### Delivery

- Have local sporting groups and park users been consulted and will project delivery impact their use?
- Have you considered how environmental impacts will be managed during the construction process?
- Does the proposal consider the timing of the project delivery and the impact it will have on sporting seasons?

### Management

- Have you considered and costed for end of life?
- Is there a management plan that details the terms of use and maintenance?
- Does the management plan set out how multipurpose facilities will avoid conflict between sporting groups?
- Will the proposal affect lease agreements in place?
- Have you considered fees and changes for the facility and if there will be any changes that affect users?

### Maintenance

- Does the proposal include projected costings for maintenance?
- Are council staff trained in the management of these types of surface?
- Has material or training been provided to lease holders/clubs on any maintenance practices or procedures they can address and follow?



## Case Study

---

Tamworth Regional Hockey Centre, Northern Inland  
Centre of Sporting Excellence  
Credit: Tamworth Regional Council

### Council and club funding partnership

The nationally recognised Tamworth Regional Hockey Centre is home to 3 water-based synthetic hockey fields accredited to host international hockey championships.

It was partly funded through a successful joint application by Tamworth Regional Council and Tamworth Hockey Association to the Regional Sport Infrastructure Fund.

This funding included the construction of the third field, resurfacing the existing 2 fields and a new amenities building and infrastructure that could meet the requirements of Hockey Australia

to host state and national championships. At the time of installation there were only 5 other sites in Australia with this capacity. Council and Tamworth Hockey Association also provided funding.

The Tamworth Regional Hockey Centre is part of the Northern Inland Centre of Sporting Excellence (NICSE). NICSE is a 100 ha site that also includes the Australian Equine and Livestock Events Centre, Tamworth Sports Dome, Tamworth Regional Entertainment and Conference Centre, Tamworth Regional Gymnastics Centre, Tamworth Regional Athletics Centre and Tamworth Regional Cycling Centre.

# Plan      **Design**      Deliver      Manage

---

The quality, suitability and type of public open space available for recreation and synthetic turf varies from an ideal site through to a challenging site. Ideal sites will have less or no inherent physical, social or environmental challenges while challenging sites will have many.

Challenging sites will require more consultation, design work, controls and mitigations if they are selected for development.

Due to various pressures on public open space and the history of its development, challenging sites are often the norm.

## Site evaluation

### Preliminary review and analysis

Analysis will help you to understand the present condition, site history and general suitability for development or upgrade before more extensive investigations – work that should have already been undertaken for greenfield sites or sites already identified in strategies. This will involve a review of the site history, zoning overlays, underground services, easements and environmental risks. These may easily eliminate a location from selection and any further investigation.

- Is the site located on a previous landfill?
- Are there existing services or easements running through the site?
- Is the site of significant heritage and importance?
- Is the site in a high-risk flood zone that is prohibitive to development?
- Are there any restrictive zoning overlays on the site?

### Site context analysis and surrounding land uses

Consider the site's landscape features, community values, views and local history to understand what may be appropriate within the site context. Consider whether the proposal will fit in with the character of the surrounding land uses and whether the site is located in a residential, business or industrial area.

For example, smaller open space areas that feel more like a local park may indicate the site is used for more relaxed recreation and a synthetic turf may not be appropriate; conversely, an industrial setting with a vacant lot has an entirely different feel which would be improved by development with limited nearby residents.

- Will the proposal have a negative impact on the site amenity?
- Is the site heavily overlooked or does it provide views for nearby residents?
- Is this public open space already highly utilised for formal sport?

- Would development require level changes which may impinge on neighbouring residents' privacy?
- Is access to the field currently fenced off?
- Is there adequate open space locally to mitigate the loss of natural grass?

### Site use

Determine who is using the site both formally and informally to understand the potential benefits and impacts on all current and future site users. Remember that many public open space areas are used by many different people and groups throughout the day and that the use of the site across the year will determine the seasonal changes on the demand and use.

- Is this public open space already highly utilised for formal sport?
- Will the proposal impact the use of the site throughout the day?
- Will the proposal impact the function and use of the site throughout the year?

### Active and passive recreation

Each site will have a different proportion of active or passive recreation users. Sometimes, the open space will have recreation facilities such as hard courts, goals and line marking that indicate formal use; other sites might include a large grass reserve that can still be used for active recreation but may be used for picnicking or dog walking at other times.

Evaluating the proportion of active and passive recreation will ensure that changes don't isolate or limit current opportunities. For example, a major shift would occur if the current use is 50% active and 50% passive if a development which change this ratio to 80% active and 20% passive.

Some council policies state what proportion a synthetic facility may take up in an existing public open space.

- Does the proposal retain the existing proportion of active and passive recreation?
- Does the proposal accommodate for both existing and future users?

## Existing and future users

As discussed in the plan stage, increases in population in some areas will influence future demand. For existing users, consider both formal and informal users and participation rates. You may need to capture data from bookings, formalised sport or from multiple site visits during the day to capture intermittent or transient users of the space such as dogs walkers, people who only may use the site on school holidays or weekends and early morning or dusk activities.

Aim to consider how and whether users can advocate for their needs.

## Hours of play

For existing sites, evaluate the current playing capacity in terms of hours of play by looking at booking records and other data. Note that formal sport is often played outside of school and work hours. Compare existing use to the proposal to identify potential changes that will need further consultation and management.

- For existing sites, is the current capacity in terms of hours of play being exceeded?
- Will the proposal extend the hours of play across different days or longer hours?

## Accessibility

Public open space is a community asset that should support allow everyone to participate. We should work to plan, design, manage and activate equitable public spaces so that all people can access the benefits they provide.

Consider whether people can easily access and move through the place, whether there is universal access, whether the place is safe, and if it can promote social interactions.

# Community engagement

## Community needs and preferences

When researching community needs and preferences ask if:

- › The proposal considers loss of informal use by the community
- › The proposal factors in managing conflicting uses
- › Potential changes in amenity and place characteristics been accommodated (with respect to heat, aesthetics, noise, glare and UV reflectivity).

## Community values

Assess the social impacts of a proposal and local community values. Given people's different viewpoints, engage with the full spectrum of people using the site or living or working nearby.

- Will conversion at this site alienate existing formal and informal users?
- Will conversion create tension between different users and in the community more broadly?
- Is this site used for community events such as markets, fairs or events?
- Is this site used as a community marshalling location for emergencies?

## Design considerations

Consider both the design of the surface and underlay, supporting infrastructure and the design of the broader site, including stormwater management, access and circulation, supporting infrastructure, lighting, park furniture and fencing. Also consider management and maintenance approaches at the design phase as it may be too late to retrofit.

While design can mitigate or control challenging site conditions, some design responses may make a proposal financially enviable. Assess the budget implications of the design response against the original business case for the proposal.

### Material properties

Synthetic turf with loose infill material may pose a risk through ingestion, lodgement, inhalation and skin contact. Develop procedures to limit these risks and provide first aid kits and information.

### Runoff

Another impact of water movement is runoff and the potential for material pollutants to be carried offsite. As some synthetic turf has a loose infill material the design must prevent loose material being carried offsite and into surrounding waterways or stormwater systems. Localised drains and concrete kerbing can minimise runoff to direct water to filtration points/pollutant traps; however, the level of water infiltration will not be as great as natural turf surfaces.

Shoe cleaning devices such as brushes or foot wells can prevent loose material going offsite and ending up in waterways.

- Is there existing or proposed stormwater retention or detention through capturing water?

### Water and flooding

A thorough understanding of the movement of water across the site and the extent, probability and impact of flood events can ensure a proposal is not be negatively impacted by flood events, nor have an impact on surrounding areas in a flood event.

In some locations the flood risk will be prohibitive to any development. Stormwater engineering solutions to redirect, capture or divert flows can

have visible changes on the landscape, such as changes surface levels or through visible bunds. Engineered solutions will also impact the overall project budget.

Many existing nature turf sports fields act as retention and detention basins that can protect nearby houses from flood events. Any proposal to convert retention or detention basins requires expert stormwater engineering advice to address this challenging site consideration.

- Have you engaged a stormwater expert to provide advice at a local and macro scale?
- Is the site suitable for development based on flood advice?
- Does the proposal include built solutions to capture and filter runoff?
- Have you identified that the site is not located within a drinking water catchment zone?
- Is the site located away from natural waterways or waterbodies?
- Is the site flood liable?
- If water is required for a wet play surface, is there supporting infrastructure and water supply in place or does the proposal allow for this?

### Bushfire

Polymers used in synthetic turf are classified as easily flammable and can be ignited in bushfire settings. They may cause additional risks due to toxic gasses and noxious emissions being released once ignited.

Materials used in other layers and infill vary in flammability – sand reduces heat release rates while crumb rubber in-fill exhibits higher peak heat release rates and flammability.

There are currently no ignition or fire testing standards for outdoor synthetic turf experiencing bushfire wind and temperature conditions. Synthetic turf, especially those consisting of crumb rubber in-fill, should be reconsidered in bushfire prone areas.

- Have you check if the site is located away from the bushfire prone areas?



## Trees

Existing trees make a place attractive, provide shade and offer biodiversity benefits. They provide evapotranspiration or natural cooling to the immediate area to offset the heat of synthetic turf. Seek the advice of an arborist or ecologist to understand impacts to the root zone of existing mature trees.

If an existing site doesn't have adequate tree planning, consider new plantings that can provide shade without casting shadows. Ascertain the solar aspect to ensure shade in summer and sunshine during winter to reduce any potential of algal build up. Consider trees species that don't have aggressive root system or drop leaves to minimise the maintenance. If these are not suitable, consider engineering solutions such as root barriers or structural root cells for new plantings to assist in root control.

When selecting the site, however, it is important to consider the types of trees around the field as dirt and leaf/fruit drop will impact and break down the fibres of the synthetic turf. Also consider having path connections to minimise the dragging of dirt by players onto the field.

- Is the proposed area for development outside of the root zone of any existing trees?
- Are there suitable trees species proposed to provide shade and amenity in a location that won't interfere with the surface- through roots or dropped debris?
- Does the proposal avoid recognised significant populations of wildlife living in or using the wider site?

## Heat

Synthetic turf absorbs, radiates and reflects heat, impacting users' thermal comfort. Consider the right material choices, player management practices and infrastructure such as shaded spectator and player areas, and water bottle refill stations or drinking fountains. Sports Medicine Australia's Extreme Heat Policy provides guidance for protecting users from the potentially ill effects of extreme heat in the summer. Peak sporting bodies also provide advice on maximum levels and protocols to follow at various temperatures.

The heat index or apparent temperature is often used instead of air temperature to accurately reflect the interplay of relative humidity, wind and air temperature. The heat index shows that at higher levels of relative humidity the apparent temperature will be higher.

Consider evaluating local weather data to determine whether any microclimates in the LGA would provide a location with lower summer temperatures or cooling winds. Always consider how shade structures and appropriate shade tree planting can provide respite for breaks and for spectators.

When developing facilities of a large size or numerous facilities in one location, consider the cumulative effect of increased reflection and hard stand area in the local heat island effect.

- Are there existing or proposed shade tree planting?
- Are there existing or proposed shelters for spectators?
- Are there existing or proposed drinking fountains and water refill stations?
- Does the proposed location offer any microclimate advantages?
- Is the proposal for winter sport only?
- Has the proposal considered the potential impacts of the heat island effect?

## Air/aerosols

Consider the materials specified in the synthetic proposal and their potential to contain volatile or odorous chemicals or compounds and whether these will impact nearby residents, players and other open space users.

[The National Environment Protection Measure for Ambient Air](#) (Air NEPM) sets national standards for the 6 key air pollutants to which most Australians are exposed: carbon monoxide, ozone, sulphur dioxide, nitrogen dioxide, lead and particles.

[Standards](#) refer to maximum concentrations of the pollutants set by Air NEPM. Goals refer to allowable exceedances of these maximum concentrations during a year.

## Carbon dioxide

The installation, materials and maintenance of sports fields all contribute to carbon emissions. As many councils move towards a more sustainable future consider how the proposal impacts these objectives and how carbon can be offset. Also consider material choice and lifespan and maintenance equipment in any assessments.

- Has the development considered and accounted for the carbon impacts of the proposal?
- Did this assessment look at the lifecycle, material and maintenance impacts?

## Layout

Orientation and layout would impact the use of the space. There are aspects to be considered:

- Has the development allow for maximum field dimensions for flexibility?
- Has the development considered the best practice for set out orientation. For example, suggest 15° North-South axis.
- Has the development considered the ball of travel, and the location of goal posts (for example, is the goal directly in front of a busy road)?

## Technology

New and emerging materials and technologies could reduce environmental and social impacts around synthetic turf. For example, hybrid solutions where only certain areas will be synthetic – such as around the goal – provides an option to address areas of excessive wear which can lead to a more stable playing surface.

Technology can also assist the management of facilities with sensors mounted to flood lighting that track player numbers and usage to assist in record keeping and maintenance programming. Moisture sensors could also be utilised to ascertain effective saturation of playing surfaces.

Automated lighting can also be used to control hours of use and limit after hours impacts on any nearby residents.

- Have you reviewed new materials or other surface alternatives?

## Hybrid turf

This system combines blades of synthetic grass with natural turf to provide a consistent playing surface, improved surface durability and stability. The hybrid system is still relatively new to Australia with only a few installations of a system including by Melbourne City Football Club training facility.

The system has become a popular option for international sporting codes such as the English Premier League and National Football League. This system is more durable than natural turf, due to the presence of synthetic grass fibers that provide traction even if natural grass is worn. However, hybrid turf can impede typical maintenance practices required for natural turf (deep aeration/decompaction), and further research is required to understand maximum carrying capacity of hybrid playing fields.

## Supporting infrastructure

Upgrades to existing fields or creation of new fields require careful consideration of supporting infrastructure to ensure effective and optimal use of the facility and to minimise impact on surrounding residents and the community.

### Lighting

Lighting allows for longer use of a sports facility, particularly in winter, and is often installed on natural turf facilities. When converting from a natural turf field with existing lighting to a synthetic turf field, it would allow longer hours of play without additional lighting impacts to existing residents. Also consider lighting technology such as LEDs that can reduce glare while extending hours of use, however, electricity supply needs to be considered if lighting is installed or upgraded.

- Does the location contain lighting that allows for extend use?
- If lighting is proposed, has a lighting and light-spill plan been developed to consider the impacts?
- If lighting is needed, is this expense captured in the initial proposal?
- Has the community been consulted on proposed lighting?
- Has the development considered LUX levels, depends on sports and level of competitions.

### Facilities

Determine if the required level of facilities is in place, and whether space and budget are available to develop the appropriate facilities to support an increased level of play.

Supporting facilities such as change rooms, amenities, canteens and storage rooms increase inclusion. The quality of facilities should correspond to the categorisation of the level of sport, with higher grades accommodating larger tournaments, more spectators and a greater variety of sports.

- Consider who will manage, monitor and regulate facilities if sufficient changes or new rules of use are made.

- Are there existing or proposed facilities of an appropriate size to support the proposal?
- If new facilities are provided, do they positively support inclusion and diversity in sport?
- Do the proposed facilities positively contribute to the site amenity?

### Pathways, access, and gates

Many people will be walking around and through a facility, particularly around changeover times. Develop a circulation plan to show the existing or proposed movement onto and off the surface and around the site. If the area is fenced, consider the location and size of access gates to allow for smooth transitions and access. The circulation plan should also capture vehicle movements, including emergency or maintenance vehicles.

- Has a circulation plan been developed demonstrating existing or proposed routes of travel?
- Are there enough entry gates of a suitable size to facility smooth player turnover and entry?
- Is access provided for emergency or maintenance vehicles?

### Fencing and signage

Depending on the sport, specific fencing may be required to retain balls and for the safety of any spectators. Fencing enables control and protection of a facility and helps council to enforce the conditions of play.

However, fencing can also impact the availability and access to open space. By understanding the proportion of active and passive space of a site, community needs, and the proposed sporting needs you can balance the need for open access with protection.

### Netting

Consider netting as an alternative for containment around the perimeter of a facility where it is preferential to conventional mesh fencing.

### Divider netting

Divider netting separates larger facilities to limit ball travel between different areas. Larger synthetic facilities designed for many purposes may need divider netting.

## Parking and transport

User access to sporting facilities varies greatly, as does the availability and proximity of public transport. Some facilities may be visited by users from considerable distances, meaning some places can only be accessed by car and need parking for players and spectators.

If an existing facility is being converted to synthetic turf determine if there will be an increase in vehicles at one time, or whether it will be a similar amount but over longer periods. If additional parking is required, consider the capacity of surrounding streets, noting that if this is a residential area, on-street parking may already be at a premium and additional facility parking may be necessary.

Any new facility in a location where formalised sport has not been played will require an assessment of parking on site and in the surrounding area; proximity and availability to public transport; and proximity of player numbers to the proposed site. Use these findings to inform parking requirements.

- Is there sufficient parking at the proposed location?
- If the proposal will result in increased vehicle numbers to the site, has the capacity and impact on overflow on street parking been assessed?
- Are there public transport links close to the proposed location?
- If developing a new sports field is there sufficient parking available to handle increased use?

# Plan      Design      **Deliver**      Manage

---

In order to deliver a quality project that reflects people's needs, consider its surrounding place. To ensure it is fit for purpose, it is important to consider and make the right decisions up front. A robust, well planned and managed project in turn will help ensure a smooth procurement and construction process, resulting in a quality project.

The skills necessary to undertake certain delivery tasks are often available within council's staff. However, in certain cases, external expert consultants may be required under the management of a council landscape architect or project manager. The procurement process will require clear briefs with expert advice.

It is important to ensure a council communications officer is informed and involved in the project. They can make sure community and relevant stakeholders are well informed and engaged about what is happening with the project.

## Procurement

The duration of the procurement process can vary depending on the size of the project. Larger and more intricate projects generally require more time for procurement.

- Having clear and comprehensive design documentation can speed up the process.
- When considering the implementation of the design vision, it is important to evaluate options such as staging the works if applicable.
- If temporary or early works are an option, it is important to establish a clear understanding of the responsibilities for ownership and maintenance in early stages.

## Communication

Communication plays a vital role in the delivery of synthetic playing fields as it helps resolution any barriers or challenges that may arise, ensuring that the final outcome meets project objectives and expectations.

- It is crucial to verify that all the required permits and approvals have been obtained prior to commencing the construction works.
- Engaging experienced and qualified contractors is essential to ensure a high-quality execution.
- Establish the project timeline early, encompassing design time, review periods, designated hold points, and construction time frames.
- Ensure the community and local sporting groups have been consulted and assess whether project delivery will impact their use.
- Consider construction timing and the impact on different sporting seasons.

## Construction

A well-planned, well-designed and well-managed project will help create a smooth construction process, resulting in a quality and successful synthetic playing field.

Allow sufficient time for development and testing to ensure that the chosen methodology and facilities align with the project's objectives and site conditions. It is important to provide appropriate supporting technical information during this stage.

- Ensure selected materials are robust, sustainable, appropriate and available.
- Ensure that the construction is executed according to the approved design and documented plans. Any proposed changes by the contractor should be approved by the designer to maintain consistency and eliminate potential risks.
- Consider how environment impacts, such as storm water run-off, will be managed during the construction period.
- Undertake a practical completion walk to identify any defects or non-compliant works.

## Quality control

Establishing strong quality control measures is essential for achieving a synthetic playing field that is high quality, safe and fit for purpose.

- Ensure health, safety, environment and quality (HSEQ) requirements are agreed with the contractor before works begin, for example traffic management, site setup, environmental controls, quality assurance (QA) documentation.
- Ensure a safety-in-design register is established and maintained, highlighting any potential risks.
- Obtain the necessary contractor quality control documentation to meet council's requirements and align with the design specifications.

# Plan      Design      Deliver      **Manage**

---

Any proposal should align with a strategic approach, regardless of whether it is a proposal to facilitate with professional development of a club or sporting code, a response to demand for a particular sporting code, or another reason.

## Management considerations

To achieve its optimum performance, appropriate maintenance is critical to ensure its full lifespan. The installer's guarantee or warranty will usually be conditional on the recommended maintenance requirements being carried out.

Maintenance practices differ depending on the type of surface installed and it is important to follow the manufacturer's instructions and guidelines. This may involve restricting access as treading on the synthetic turf with flat shoes can ruin the pile of turf and it cannot be recovered - as such, you may consider fencing the field and closing off access to the general public.

Common maintenance practices that often requires specialist skills to maintain include:

- › Grooming (brooming and/or drag matting to lift the fibers).
- › Annual treatment for moss and/or algae;
- › Weed removal.
- › Stain removal; regular checking of joints and seams.
- › Frequent checking of infill levels (for filled surfaces only).
- › Six monthly power brushing (to ensure the crumb remain mobile and the carpet fibers upright).
- › Deep cleaning (depending on usage levels and surrounding environment -if surface contamination is suspected).

Additionally, costing for maintenance should be budgeted upfront and adequately sufficient for ongoing life of the product. Furthermore, increased cost of replacement and repairs need to be factored, along with monitoring and enforcement of usage (conditions of play).

If the field is accredited (such as, FIFA accredited), consider annual inspections to maintain this accreditation.

To fully utilise the sports fields, consider flexibility for use by multiple sports by orientation of line markings and goal posts.

As synthetic turf is more difficult to repair and replace than natural turf, care should be taken in choosing goal posts, especially if they are removable. Dragging goal posts, rather than carrying them, over the synthetic turf can cause irreparable damage and shorten the life of the

field, thus investment into wheelable or easily movable goal posts are recommended. Storage near goal lines is also recommended to further prevent dragging and further degradation of the

## Governance

Implement an effective planning framework that integrates the provision of public open space into the strategic, financial and statutory planning framework of your council and LGA.

## Reporting

Reporting should summarise what was measured with a conclusion of success/failure and recommendations for improvements as well as lessons learned for future facilities.

## Measure

Evaluation requires analysis of both qualitative and quantitative data. Determine what factors you wish to measure - whether it is community satisfaction, player numbers, hours of play or cost of use (maintenance/repairs) - and set out how, when and where the data will be collected.

Develop effective systems that capture the cost of providing and maintain public open space and associated facilities.

Periodic surveys can monitor and gather feedback on performance. These will range from surveys of the sporting clubs and other user groups who have access rights via a lease, permit or other agreements, to surveys of the people using open space for activities on a casual basis. Field surveys will capture visitor numbers at various times of the year, week and day. It will be necessary to apply a sampling approach.

Surveys should ascertain:

- › Where the user lives and their characteristics
- › Purpose of visit
- › Activities carried out
- › Time engaged in activities
- › Frequency of use
- › Positive and negative aspect of the space.





## Case Study

### Willoughby City Council's Synthetic Sportsgrounds Management Plan

Willoughby City Council's Synthetic Sportsgrounds Management Plan is used across Council's 4 synthetic sports fields and aligns with Council's Our Future Willoughby 2028- Community Strategic Plan and the core principles of sustainability and social justice.

It documents how the facilities are managed and covers:

- › Maintenance schedules
- › Minimisation of traffic and parking
- › Social justice: equity, access, participation and rights
- › Hour of use, including public holiday community use
- › Player and spectator code of conduct.

The plan balances hiring and sporting needs while managing potential social impacts through a community liaison contact who attends all competitive play.

Gore Hill Oval, St Leonards, NSW  
Credit: Willoughby Council



# Glossary

## User demand

The assessment of the actual hours of use likely to form the demand for a field or sporting facility. The actual hours of demand may vary from the modelled capacity and should be considered when comparing the cost benefits of different options.

## Field capacity/modelled capacity

The theoretical higher limit of use hours a field can tolerate or is likely to sustain. In the case of synthetic turf, modelled capacity of 60–70 hours per week is often compared with natural turf fields which can sustain 25–30 hours per week before significant surface degradation.

## Hybrid surface

A combination of synthetic fibres and natural grass. This has a higher resilience than natural turf but does not have the capacity of a synthetic turf and is likely to be more expensive to maintain.

## Infill

The fine granular material that sits on top of the synthetic turf but at the base of the fibres. It is a critical part of the functioning of the surface

and requires regular maintenance. Infill can be comprised of a range of natural and artificial materials.

## Natural turf and grass

Refers to those sports fields and courts that are constructed of natural materials and have a covering of selected grass species. Grass refers to the plant species, while turf means the whole surface including grass, root mat and soil/sand.

## Sporting facility, sports fields and fields of play

Refers to those areas designed for specific formal sport training and competition and includes line marking, goals and sideline areas needed for the conduct of outdoor sport.

## Synthetic turf

The combination of artificial fibres stitched into a carpet that is laid on an engineered constructed base including a hard base layer and shock pad. Synthetic fields usually have infill materials which help keep the fibres upright and functioning properly.

# Sporting specific resources

Peak sporting bodies within NSW offer their own guidance and further information on sport specific requirements. Please see list below for current guidance.

**AFL:** <https://www.afl.com.au/clubhelp/club-management/planning/community-facilities-development>

**Football (Soccer):** <https://footballfacilities.com.au/facility-guides/>

**Hockey:** <https://www.hockeynsw.com.au/info-hub/facilities/>

**NRL:** <https://www.playrugbyleague.com/media/1941/nrl-preferred-facility-guidelines.pdf>

**Office of Sport:** <https://www.sport.nsw.gov.au/community-sport-infrastructure-resource-library>

**Rugby Union:** <https://d26phqdbpt0w91.cloudfront.net/NonVideo/b463206a-16bd-4514-84fd-08d9467ea091.pdf>

**Tennis:** <https://www.tennis.com.au/vic/theclubhouse/facilities/facility-development>



## Project Advisory Group

In developing these guidelines, we received valuable contributions, advice and reviews from a Project Advisory Group of 31 members from 30 NSW councils. We also acknowledge and thank industry experts, sporting groups and other contributors.

Bayside Council

Bega Valley Shire Council

Camden Council

City of Canada Bay

City of Canterbury Bankstown

Cumberland City Council

Fairfield City Council

Georges River Council

Gunnedah Shire Council

Hornsby Shire Council

Hunters Hill Council

Inner West Council

Ku-ring-gai Council

Lake Macquarie City Council

Liverpool City Council

Murray River Council

City of Newcastle

Northern Beaches Council

Penrith City Council

Port Macquarie Hastings Council

Randwick City Council

City of Ryde

Snowy Valleys Council

City of Sydney

Tamworth Regional Council

Tenterfield Shire Council

The Hills Shire Council

Waverley Council

Wollondilly Shire Council

Wollongong City Council

