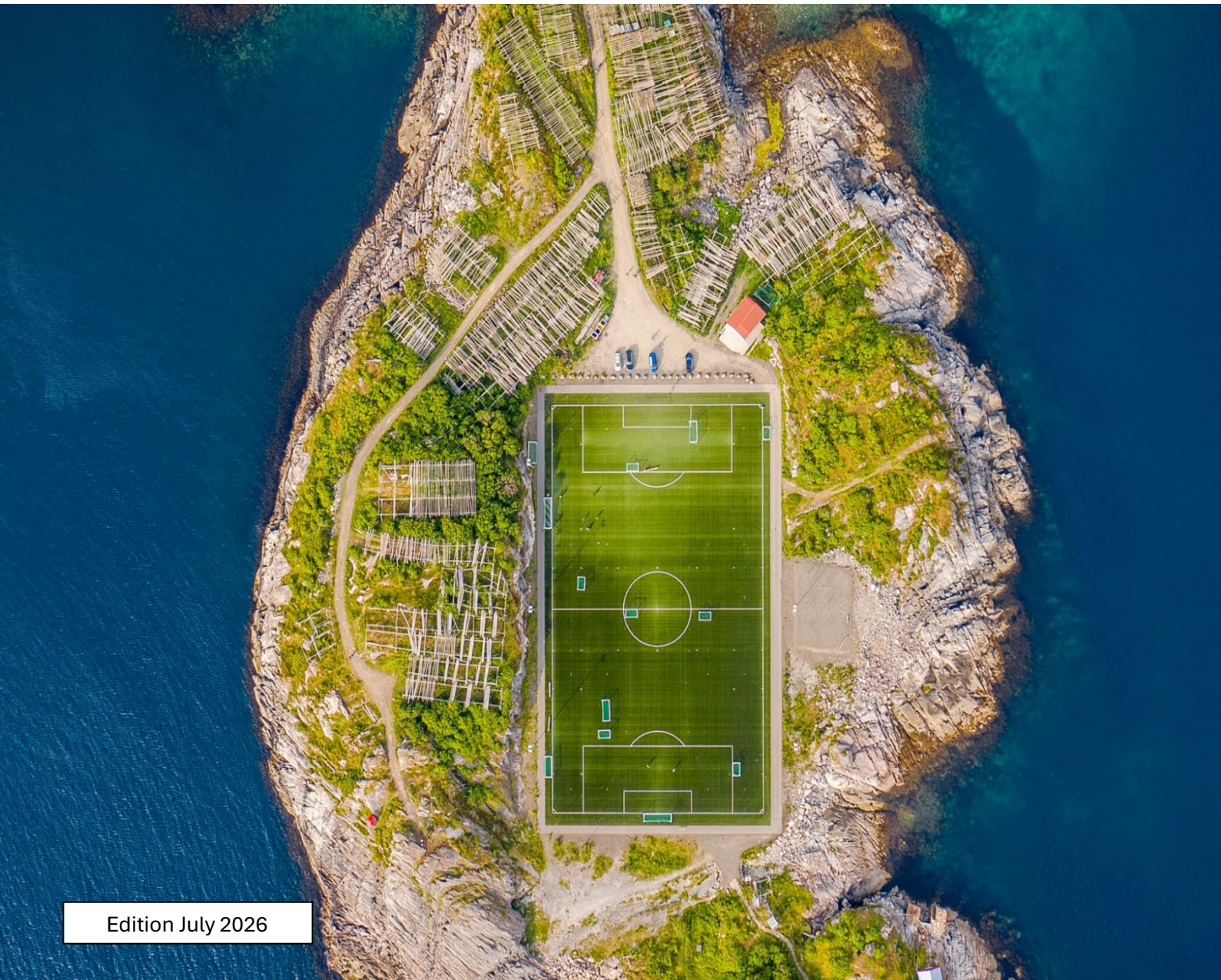


SMART GUIDE 3

ENVIRONMENTAL OPPORTUNITIES

Creating positive outcomes for the environment for future generations





SMART GUIDE TO SYNTHETIC SPORTS SURFACES

Environmental Opportunities

Acknowledgements

Smart Connection Consulting is grateful to the sport peak bodies, valued suppliers and manufacturers who have provided information, photographs, and case studies for this Smart Guide.

Without their support, we would not be able to achieve our goal of enhancing the industry's knowledge of synthetic sports surfaces. We would also like to thank our colleagues, clients, and organisations for which we have completed work in the sports industry. Your appetite for change and progress makes our job so rewarding.

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ISBN: 978-0-9942880-8-0

Disclaimer

Smart Connection Consulting does not accept liability for the accuracy of the information provided. All material and information provided by third parties is done so in good faith to assist organisations in understanding the key issues around synthetic sports surfaces. We will continually update the Smart Guide to attempt to keep the industry updated.

About the Smart Connection Synthetic Surfaces Library

Smart Connection Consulting is committed to sharing knowledge and learnings with the industry and has produced a comprehensive library of information available free of charge to the industry. These are identified in three levels.

- **The A-Z of Smart Synthetic Sports Surfaces** – An overview of everything you need to know from A-Z.
- **Smart Guides** – A detailed overview of key subjects that are currently raised, including
 1. Smart Guide to Football Turf
 2. Smart Guide to Maintaining Synthetic Sports Surfaces
 3. Smart Guide to Environmental Opportunities
 4. Smart Guide to Decision Making
 5. Smart Guide to Synthetic Performance Standards.
- **Smart Insights** – a brief overview of key subjects that are consistently raised by clients, partners and the community, these include:
 1. Climate Change and Sport
 2. Biodiversity Positive Outcomes
 3. Maintaining Synthetic Sports Surfaces
 4. Environmental Impact Opportunities
 5. Synthetic Sports Surfaces End of Life
 6. Concerns, Challenges and Reality
 7. Microplastics and Synthetic Surfaces
 8. Urban Heat Island Impact
 9. Synthetic Surfaces Drainage
 10. Global Regulations for Synthetic Sports Turf
 11. Synthetic Surfaces – A Sustainability Lens
 12. Performance Standards
 13. Decision Making for Sports Surfaces



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Our Commitment to Environmental Sustainability

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He clearly understands the strategic and political environment of sport while also providing tactical and innovative solutions. Martin is an international speaker whose expertise is recognised for aligning synthetic surfaces and facility development with player pathways, supply and demand forecasting, and participation growth strategies.

Martin is the Chair of The International Association for Sport and Leisure Facilities (IAKS) Expert Panel on Outdoor Sports Surfaces and Technical Consultant for Australia's leading football and sports codes, including:



Designing Better Places Through Sustainable Design

LIVEABLE
Enhance community wellbeing and urban liveability.

RESILIENT
Designed for climate resilience and long-term performance.

RESOURCEFUL
Efficient use of resources and circular thinking.

SUSTAINABLE
Minimises environmental impact and delivers positive outcomes.

LEVEL 3

FULL-SIZE FIELD

Full-size football field / synthetic turf.

LEVEL 2

ACTIVE RECREATION

Multi-sport courts for flexible use, including futsal and netball.

LEVEL 1

COMMUNITY SPORTS

Flexible multi-use community use, programs and supporting facilities.

GROUND LEVEL

ACTIVATED & ACCESSIBLE

Activated civic spaces, gathering areas, landscape, retail and active mobility.

SOLAR POWER

Rooftop solar panels generate clean, renewable energy.

WATER HARVESTING

Rainwater is collected for non-potable uses such as irrigation, toilets and cleaning.

NATURALLY VENTILATED

Open facades and stack ventilation support natural airflow and comfort.

LED LIGHTING

High-efficiency LED lighting with smart controls minimises energy consumption.

ACTIVE TRANSPORT

Direct connections to walking, cycling and public transport.

HIGH PERFORMANCE TURF SYSTEMS

Athletic surface systems support durability and player safety.

WATER SENSITIVE URBAN DESIGN

Permeable surfaces, bio-retention swales and water-efficient systems improve water quality.

COOLER, SHADED PUBLIC PLACES

Tree canopies create shade and passive cooling for comfortable public spaces.

LOW-CARBON & RECYCLED MATERIALS

Sustainable materials and low-carbon concrete reduce embodied carbon.

BIODIVERSITY PLANTING

Native planting and habitat support urban biodiversity and ecosystem health.

CIRCULAR ECONOMY THINKING

Design for disassembly, reuse and resource efficiency.

SMART GUIDE TO ENVIRONMENTAL SUSTAINABILITY OPPORTUNITIES

- ENERGY**
Reduce energy use and generate renewable energy on site.
- WATER**
Capture, reuse and treat water sustainably.
- MATERIALS**
Use sustainable, low-impact and recycled materials.
- BIODIVERSITY**
Enhance urban ecology and protect natural habitats.
- TRANSPORT**
Promote active transport and reduce emissions.
- WASTE**
Reduce, reuse and recycle to keep resources in use.
- COMMUNITY**
Create healthy, inclusive places for all.
- RESILIENCE**
Design for climate change adaptation and long-term durability.



CONTENTS

- 1. **Embracing Environmental Sustainability for Sports Surfaces**.... 5
 - 1.1 Introduction 5
 - 1.2 The Importance of Sustainability 5
- 2. **Challenges – Percieved and Actual FAQ’s**..... 8
 - 2.1 Introduction 8
 - 2.2 Concerns, Challenges and Reality 8
- 3. **Environmental Sustainability Gameplan**..... 14
 - 3.1 Introduction 14
 - 3.2 The Smart Environment Strategy Framework..... 14
- Appendix 1: Key Contacts 20

Can Synthetic Sports Fields Support Biodiversity?

Yes — when designed as part of a whole-of-park ecological strategy.

Alignment to the UN's SDGs

- 3 GOOD HEALTH AND WELL-BEING
- 6 CLEAN WATER AND SANITATION
- 10 REDUCED INEQUALITIES
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 13 CLIMATE ACTION
- 14 LIFE BELOW WATER
- 15 LIFE ON LAND

- Native trees & shade
- Vertical gardens for cooling & biodiversity
- Water-sensitive design
- Bug hotels
- Healthy soils support life below the surface
- Pollinator gardens
- Recycled turf + organic infill
- Habitat log piles
- Bat boxes
- Bird boxes
- Habitat corridors
- Drinking fountains
- Active, healthy communities

5 WAYS WELL-DESIGNED SYNTHETIC FIELDS SUPPORT BIODIVERSITY

1. Protects open space
2. Frees land for habitat
3. Reduces water & chemical use
4. Designs out key risks
5. Supports whole-of-park uplift

Smart 4P Sustainability Framework: **People • Planet • Prosperity • Performance**

smart connection consulting

Better parks. Stronger nature. Thriving communities.

Contact Us For More Details:
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1. Embracing Environmental Sustainability for Sports Surfaces

1.1 Introduction

In the face of rising urban populations, shrinking passive green spaces, and increasing participation in both traditional and informal sport, synthetic sports surfaces have emerged as a critical enabler for sustainable recreation infrastructure. Once viewed as environmentally problematic, the next generation of synthetic sports surfaces has transformed significantly by embracing environmentally responsible planning, design, construction, and lifecycle management.



Photo: 2 Paris Olympic/Paralympic Games had the First Carbon Neutral Hockey Turf, where 80% was Made From Sugar Cane Polymers and Reduced Water by 60% Compared to London 2012.

Strategic advancements in manufacturing, technology, regulation, and environmental policy have reshaped synthetic sports surface systems to align with global sustainability goals, including the United Nations Sustainable Development Goals (UN SDGs), Australia's climate resilience strategies, and local government triple-bottom-line frameworks. Today's synthetic systems are designed to be smarter, cooler, safer, and far more ecologically sound than their predecessors.

There are many different kinds of synthetic surfaces from best practice to a cheaper mass produced market. It is therefore critically important in the planning, design and procurement stages of a new or upgraded sports fields or surface that the quality requirements are considered and specified. Not all synthetic surface options will be environmentally positive. This Guide aims to highlight the key considerations for the reader.

Governments will continue to create healthy places by balancing open space provision between passive parklands and active spaces. As the population increases, active spaces are already struggling to cope with the growth in demand for places to exercise, play, recreate, and participate in community sports. The

growth and intensity of usage may create burdens on natural surfaces that even science and good management practice cannot meet.

To that end, embracing some technological advances could result in alternative surface types being considered where appropriate. These alternatives could include:

- **Hard surfaces** – acrylic for recreational spaces, 3-on-3 basketball, netball, tennis, 5-a-side, fitness and recreational spaces.
- **Rubber surfaces** – for jogging, running, exercise areas and playgrounds.
- **Synthetic (short) grass** – for tennis courts, recreation areas, bowls greens, hockey and more.
- **Synthetic grass (long-pile)** – for football codes of soccer, rugby union, rugby league, Australian rules and more.

Some sports only ever want engineered solutions as an alternative to natural grass, including:

- **Netball** – acrylic hard surfaces are their key choice
- **Hockey** – hockey turf is engineered specifically for the sport and how the game has been played since 1970's
- **Athletics** – track and field athletics, since the 1960s have used rubber tracks for both safety and performance reasons.

1.2 The Importance of Sustainability

The main reasons for choosing a non-natural surface is predominantly due to the capacity or performance of the natural surface, where normally grass is not able to cope with the intensity of usage required to satisfy demand. The second reason is that a number of sports do not want natural turf due to it not being fit for purpose.

The environmental benefits of considering a synthetic surface include:

- Significant saving on water usage.
- Significant reduction in the use of herbicides and pesticides.
- Reduction of maintenance to the surface and the subsequent reduction in operations on the environmental footprint.
- Water harvesting for the rest of the parkland.
- Reduction of over usage that would normally be associated with natural grass.

To embrace sustainability emphatically it is critical that a balanced perspective is used, for this Guide we have used the United Nations, Sustainability Development Goals (SDG's).



Photo 3: Synthetic Football Field in Norway, One of the Globes Most Sensitive Environmental Eco-systems

The key SDG’s that are applicable to sports environments and surfaces have been assessed and have been aligned with local governments Triple Bottom Line of environmental, community and economic perspectives, plus an addition of an performance lens. This allows a multiple-bottom line perspective against a 4P rationale with the SDG goals and aligned targets identified in brackets:

- **Community (People):** Understanding the impact of the decision-making on the whole community.
 - SDG 3: Good health & wellbeing (3a)
 - SDG 10: Reduce inequalities (10.3 & 10.4)
 - SDG 11: Sustainable cities & communities (11.7)
- **Environment (Planet):** Enhancing the environmental footprint where possible and protecting the landscape for current and future generations.
 - SDG 6: Clean water & sanitation (6.3 & 6.4)
 - SDG 12: Responsible consumption and production (12.2, 12.4, 12.5 & 12.7)
 - SDG 13: Climate action (13.1 & 13.3)
 - SDG 14: Life below water (14.1)
 - SDG 15: Life on land (15.5)
- **Economical (Prosperity):** Ensuring best value affordability for the capital and ongoing management and replacement costs.
 - SDG 9: Industry, innovation & infrastructure (9.1)
- **Performance:** to ensure that the design, construction and management are ‘Fit for Purpose’

When deciding on what surface to invest in, there are many variables and the decision process should be developed to encourage a holistic and structured approach to ensure everything has been considered.



Photo 4: Circular Economy Starts in the Planning and Design Stage NOT the Post Life Stage

Good practice decision making should explore five stages in the life of a project, Planning, Design, Procurement, Management and End of Life considerations. In addition it should consider views from a Multiple Bottom Line framework with the 4 Ps, People (community), Planet (environment), Prosperity (economic) and Performance (fit for purpose).

Therefore, it is critical that technology is embraced in strategic locations to reduce the impact on passive open space by converted and enhancing the ability of active open space to meet current and future demands.

This Guide has studied many global reports on the impact of climate change on sport, the UN’s Sustainability Development Goals, The NSW Chief Scientist and Engineers Report, European guidance, publications from peak bodies such as the Sport Environment Alliance, Sport England, The European Sports Turf Council and IAKS Expert Circle on Outdoor Surfaces.

This has allowed us to consider a “**Framework for Environmental Sustainability for Sports Surfaces**” based around the vision and focus in Section 3.

1.3 Sustainability at Each Stage of the Surfaces Life Cycle

This Guide has embraced a 5-Stage Lifecycle Framework, to ensure that every sports facility and surface is strategically conceived, sustainability designed, efficiently delivered, responsibly managed and just as committed to a sustainable end of life.

These 5-Stages include:

- **Planning** – laying the foundations for smarter, more sustainable sport and recreation facilities.
- **Design** – turning vision into functional, environmental and sustainable facility changes.

- **Procurement** – ensuring the right procurement and project management process delivers the best outcomes.
- **Manage** – maximising facility performance through smart management and maintenance practices.
- **End of Life** – planning for renewal with sustainability, innovation and community needs in mind.



Figure 1: Smart 5 Stage Lifecycle Plan

2. Challenges – Perceived and Actual FAQ's

2.1 Introduction

There are community groups or alliances that have expressed concerns about the use of non-natural surfaces for sport and may not appreciate the full technical research around some of their concerns. This section addresses their concerns and typical questions and explores the reality and how any mitigations can be embraced to reduce risk to the environment or people using the surface.

2.2 Concerns, Challenges and Reality

The main questions asked or perceptions made are:

1. Is water polluted from the synthetic surface with leaching and heavy metals?

This should not be the case. Synthetic fields with recycled car tyres (crumbled/SBR) are often identified as causing leaching into the local water system and environment, but this is unlikely on quality fields. There has been significant research globally on the impact of recycled SBR on local ecosystems. These research projects^{1 2} including those representing the California Environmental Protection Agency, the Norwegian Institute of Public Health, the French National Institute of Environment and Risk, and Auckland Council, all have similar conclusions.

The conclusions are best summarised by the Swiss Study³ by the Ministry of Environment, Traffic, Energy and Communications. The study was on the Environmental Compatibility of Synthetic Sports Surfaces which explored the secretion of synthetic surfaces from disintegration by UV radiation, mechanical destruction by abrasion, and diffusion of ingredients and washing off by rainwater.

The testing was in a controlled environment with rain washing through the synthetic and natural turf systems over a two-year period then collected and measured for the secreted substances. The report summarises there is no risk for the environment from Poly Aromatic Hydrocarbons (PAH's) or heavy metals including Mercury, Lead, Cadmium, Chromium, Zinc, and Tin,

which were all lower than the required European safety levels.

Contemporary synthetic grass only use organic infills, which have no PAH's or heavy metals.

The new European Standard, EN 15330-5 Surfaces for sports areas – Synthetic turf and textile sports surfaces – Part 5: Specification for infill materials (Sept. 2025) addresses the possible toxicology of infills by:

- Polycyclic aromatic hydrocarbons (PAH) content
- Migration of chemical elements through accidental human digestion, and
- Leaching of chemical elements through immersion in water

These standards should be adopted in all Australian specifications moving forward, as Smart Connection Consulting has been for a number of years.

2. Are heavy metals from the grass colouring dangerous to the environment?

Historically, Lead Chromate was used for pigment colouring in yarn, and after research was conducted in 2008, the use of Lead Chromate as a pigment for the grass was stopped in 2009⁴ for all sports turf on a voluntary basis by all the major manufacturers.

The European standards, require infills to satisfy the thresholds of CEN/TS 16384: 2021 Annex A: (EN 12457.4), tables 6 & 7, mainly:

- Mercury \leq 0.001 mg/L,
- Lead \leq 0.025 mg/L,
- Cadmium \leq 0.005 mg/L,
- Chromium \leq 0.008 mg/L,
- Zinc \leq 3.0 mg/L, and
- Tin \leq 0.04 mg/L.

It is recommended to mitigate any perception of environmental impact that synthetic systems that are procured should, therefore, meet these or the alternative standard. In addition we recommend adopting the Category 3, Table 1 of EN71.3: 2019 – A2 IN 2024. (Safety of Toys – Part 3: Migration of certain elements). In the US, the equivalent is the ASTM F3188 – 16: Both the European and US alternative standards measure the possible heavy metal migration of material that may be hazardous if ingested. We recommend that all turf procured in Australia adopts this standard.

¹ Humphrey, C., & Katz, L., (2000). Water-Quality effects of tire shreds placed above the water table: Five-year field study. Transportation Research Record: Journal of the Transportation Research Board, 1714, 18-24. DOI: <http://dx.doi.org/10.3141/1714-03>

² Hofstra, U. (March, 2009). Zinc in drainage water under artificial turf fields with SBR. Summary ITRON Report. [agp_-listing_of_independent_research_and_reports_1998-2014_artificial_grass.pdf](http://www.agp-artificial-grass.com/listing_of_independent_research_and_reports_1998-2014_artificial_grass.pdf)

³ Muller, E. (2007). Results of a Field Study on Environmental Compatibility of Synthetic Sports Surfaces. Swiss Ministry of Environment, Traffic, Energy and Communication Authority of Environment Section Water

⁴ STC: Lead Chromate in Synthetic Turf, though safe for kids per CPSC, was discontinued in 2009 (20/3/2015 - STC Website)

3. Isn't the carbon footprint impact greater with synthetic grass?

Concern has been voiced that the reduction of natural grass by the synthetic sports surface, reduces carbon sequestration with the loss of natural grass. This is true and the greenhouse gasses calculated as part of research by Carbonneutral.com.au states that:

- Natural grass generates -2T. CO²
- Sbr infill for synthetic turf – 89T CO²
- EPDM infill -118T CO²
- TPE infill -180T CO²

That said with the next generation of planning, the EU has dedicated that all products need to now be able to demonstrate their carbon and environmental footprint. These Product Environmental Footprint Category Rules (PEFCR) have been developed by the European Sports Turf Council, the trade association for the synthetic turf industry in the EMEA region. There is a calculator that they have established and been approved by the E.U. Commission.⁵

In Australia, it is recommended that the key approaches to lowering the environmental footprint include:

- Consideration of the whole of parks environmental footprint and not just the 'field of play' surface.
- Expansion of the tree canopy for the whole park
- Retain as much of the natural grass and fauna on site (e.g., spectator mounds, or reshaping of parkland).
- Ensure 'Circular Economy' products are chosen.
- Embrace Green Engineering for the construction of the sports surface, pathways etc.
- Water harvest the rain water from the surface to water the whole parkland.
- Utilise as much recycled content in the performance surface and the civil engineering solution.
- Utilise organic infill for the sports fields
- Embrace heat reduced technology for sports surfaces.

Adopting these strategies can increase and improve the environmental outcomes of a parkland and especially with reduction of the environmental footprint impact. Manufacturing locally in energy efficient factories will have a significant impact.

4. Do synthetic turf fields create a significant urban heat island impact?

The urbanisation of Australia has radically transformed environments from native vegetation through farmland to present day's urban footprints of towns and cities with

an urban sprawl. Away from the coastal areas, where the natural land receives a moderating influence of cooling sea breeze, population heartlands in urban areas are now showing 'Urban Heat Island' effects.



Figure 2: WSROC Turn Down The Heat – Strategy and Action Plan

Urban surfaces such as roads and roofs absorb, hold, and re-radiate heat; raising the temperature in our urban areas. This effect is often worsened by development activity when green spaces are replaced with more hard surfaces that absorb heat.

This Urban Heat Island (UHI) shows that the area is significantly warmer than its surrounding rural areas due to number of direct and indirect causes including:

- Absorption of short-wave radiation, in concrete, asphalt and buildings and then slow release during the night;
- Change in surface materials which do not have evapotranspiration properties (e.g. concrete v grass vegetation);
- Dark coloured surfaces that retain heat during the day and release in the night (e.g. asphalt);
- Increase of carbon dioxide, through increases in traffic pollutants and people, with reduced trees capturing carbon dioxide in cities; and
- Use of building materials – pavements and roofs has significantly different thermal bulk properties and surface radiative properties (e.g. shade and evaporation). Also, high buildings normally reduce wind penetration, which also acts as a coolant and assists in the disbursement of pollutants.

The NSW Chief Scientist and engineer stated in her report (2023) that **the impact from synthetic sports fields is likely to be very low and localised**. That said we should still be looking at how this small impact can

⁵ www.estc.info/knowledge-centre/product-environmental-footprint

be elevated through good design planning. This can include the adoption of initiatives such as:

- Expansion of tree canopy around the field of play to provide shade and greater tree evaporation to cool the area
- Water harvesting to use on the rest of the parkland
- Use of organic infill as opposed to black rubber infill
- Procurement of a dual yarn technology system (monofilament and tape) to reduce the heat impact
- Increase of landscape performance to offset any reduction of natural grass
- Create shaded areas around the field of play

Placement of the fields and UHI strategy can create a positive impact here.

5. Do synthetic surfaces create heat stress on a player?

A key component of many community concerns is the heat of non-grass surfaces, which on warm or sunny days increases greater than on most wet fields. The heat on concrete or asphalt sports courts is significantly warmer, where the U.V radiation is high.

Synthetic grass also has a propensity to get warmer if using a black infill. All these surfaces lack the water component of natural grass, when it is watered and not dried out. The industry has invested significantly over the past decade in the manufacturing of heat reduced acrylic surfaces, heat reflected grasses and lighter coloured rubber surfaces that do not absorb the heat as much.

In Australia the industry has been introducing innovations for a number of years, including:

- Cool grass technology (5% reduction of heat).
- Acrylic coating heat technology (30% reduction in heat) for hard surfaces.
- Use of dual yarn grass technology (FIFA heat index reduced by a 0.5 score).
- Organic infill, as opposed to rubber/plastic (30% reduction in heat).
- Shade sail, over smaller areas (e.g. bowls areas, courts etc.) have been found to reduce heat by 30% on high U.V. days.
- Vertical draining on grass systems allows the base to stay moist longer, and by reverse osmosis, the infill and carpet stay a little cooler.
- Tree canopy near to the surface provides shade and also the leaves evaporate cooling effect helps.
- Water harvesting into a 'wetlands' close to the surface helps, especially if the sports surface is 'down-wind' of the wetlands.
- Water on hockey fields

It is important to consider heat stress as a holistic approach for weather stress. In the same manner that owners of natural grass fields have to close many grass fields in the wet weather to protect both the field of play and the players, it may be similar to consider a similar approach for synthetic surfaces. Whether that is rubber (athletic tracks), acrylic (Tennis, Netball or Basketball) or synthetic grass (Hockey, Football codes), a heat policy by the sport is normally used to determine an appropriate level of heat (and humidity) for people to play in. Sports Medicine Australia produce a Hot Weather guideline that has been adopted by many sports in the development of their own Heat Policies⁶.

It is recommended that to reduce the heat stress on players that at the planning and design stage, strategies such as the ones listed below are considered:

Design and Plan to Cool the Created Environment

- Ensure that the design integrates into the broader environment to create opportunities for additional cooling designs, including additional trees, water harvesting into wetlands etc.
- Explore Green Engineering technology and blue and green infrastructure building methods into each project
- Explore how the drainage strategy can replace water into the soil as opposed to storm water to keep the ground close to the field moist
- Develop light coloured paths, rooves and other hard standing areas to reduce the propensity to capture heat radiation from the normal black surfaces
- Landscaping to reduce solar radiation
- Encourage innovation from the contracts to drive opportunities

Cool with Green Space and Water

- Invest in water harvesting and keep as much water on site for alternative uses
- Increase the tree canopy in the area around the parkland to provide both shade and other green benefits to the environment
- On hockey surfaces use water cannons to help with speed of play and heat reduction
- Include water bubblers around the field to reduce heat impacts on players
- Water sensitive urban design (WSUD)

It is recommended that the infill surface temperature (during exposure to infrared energy) is measured against the EN 15330-5 standard and procure systems with a class 1 (<50°C) or class 2 (50 - 65°C).

⁶ <https://sma.org.au/resources-advice/policies-and-guidelines/hot-weather/>

6. Are intentionally added microplastics from synthetic fields are dangerous to the environment?

Microplastics is a term commonly used to describe extremely small pieces (less than 5mm in all directions) of synthetic or plastic material in the environment resulting from the disposal and breakdown of products and waste materials. The concerns around microplastics centres on their potential to cause harm to living organisms in the aquatic and other land-based environments.

There are two forms of microplastics, intentionally added microplastics and secondary microplastics. The intentionally added microplastics is the SBR/crumb rubber that was historically used as infill for 3G grass, or rubber on the top of athletics tracks or playground soft fall areas. The secondary microplastics are seen with ageing of the fields as the end of the grass yarn break off.

The European Commission received a report (DG Environment) in February 2018⁷ which explores this in detail and provides the most extensive study to date. It specifically explores synthetic sports surfaces as part of a broader sector of microplastics.

Synthetic fields are “...a relatively small source...”⁸ as shown in the table below.

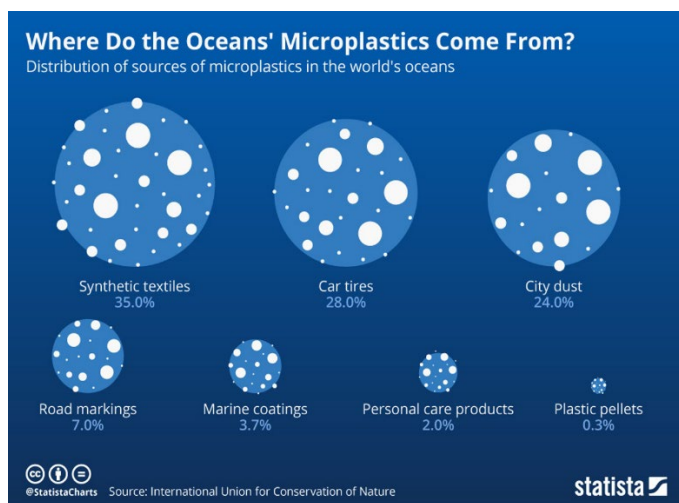


Figure 3: Sources of microplastics found in Europe

The migration of microplastics off the field of play into waterways of the adjacent soil is the concern of the community. This can be addressed simply by a number of design considerations, namely:

- Do not use and ‘intentionally’ added microplastics – use organic infill for 3G fields,
- Design a sub-surface drainage system so that no microplastics can enter the waterways through the drainage,

- Create an upstand barrier around the field to contain the secondary microplastics,
- Procure a grass system that is exceptionally durable and has a U.V stabiliser to reduce the level of breakage with age. These fields should be dual yarn (tape and monofilament) and be tested to Lisport (2012) of our 200,000 reps.

A more detailed list of strategies can be found in Appendix 2.

7. Doesn't flooding destroy synthetic surfaces?

Many local governments and sports consider investing in the use of synthetic sports surface technology across a city to satisfy the growing demand for sports as the population increases. Some sports fields and courts are built on a floodplain, which means we will never be able to prevent flooding. Storms and flooding are a natural part of living in that area.

Organisations should consider as to whether these flood types would most likely impact or even preclude synthetic surfaces being installed and flooding challenges may curtail the ability to install and manage a synthetic sports surface and what mitigation should be considered by themselves and community clubs and organisation's as part of their site feasibility and prior to any investment.

The key consideration is that organisations who are interested in embracing the technology need to appreciate the position on when a known flood risk or site identified as being contaminated, may pose too high a risk for a synthetic surface project.

With modern technology and ongoing flood modelling, councils are able to better understand risk and respond appropriately, and the developed tools support them in their knowledge and decision making on the levels to place sports surfaces.

A detailed overview of flooding impacts on surface is shown in Appendix 3.

The key recommendations for considering flooding include:

- Identify the Annual Rain Intensity (ARI) event level that the organisation wants the drainage strategy to achieve so that the drainage pipework can cope with that discharge level.
- If overload flood risk, consider the pathways for the water and how to mitigate this, so that the water does not enter the field of play.

If an engineering solution can not be designed for this then the surface shouldn't be built.

⁷ [Investigating options for reducing releases in the aquatic environment of microplastics emitted by \(but not intentionally added in\) products](#)

⁸ [Section E1.1. Estimating Microplastics](#)

8. Isn't crumb rubber not only bad for the environment but unsafe on users?

Concern has historically been raised that the crumb rubber (SBR) is carcinogenic, which would be very concerning if true. The concern is that these chemicals (PAH'S) can be leached into the environment, or cause cancer for people playing on the surface.

The amount of PAH's varies in the compounds that are used for the rubber infills, and from the tyres. The European Chemical Agency has worked with the EU Government (REACH) to identify a safety level of these PAH's which are found in rubber tyres. These are encased within the rubber anyway and need a chemical reaction to release them.

There are two aspects for consideration:

- How to ensure that the rubber being used is within a safety level agreed by the EU Chemical Agency (this isn't addressed in Australia).
- To ensure if children swallow the infill it is not harmful.

It is therefore recommended that

- i. All rubber is tested to the EN REACH Guidelines, DIN 1803.5 parts 687/ESM105 and REACH standards.
- ii. That all rubber has been tested to EN 71.3 Safety of Toys – Part 3 Mitigation of Certain Elements, Table 2, Category 3.

In addition now rubber is being replaced by organic infill this perception should be removed.

9. Is the circular economy ready in Australia?

There has historically been concerns that the sports surface (grass, rubber etc) could not be recycled. Australia now has it's own specialist recycling and repurposing plant in Barnawartha by Re4orm and has already been processing the carpets and infills since 2024.

10. Are synthetic surfaces full of PFAS?

No they are not. To explain and provide some context. Per- and polyfluoroalkyl substances (PFAS) are a broad class of hundreds to thousands of synthetic fluorinated chemicals that have been manufactured since the mid-20th century for their ability to repel heat, oil, water and stains. Because of their strong carbon-fluorine bonds, many PFAS are extremely persistent in the environment and resist degradation, earning them the informal name "forever chemicals."

They have been used in a wide range of industrial and consumer product, including firefighting foams, non-stick cookware, waterproof textiles, food packaging, and personal care items and have been detected throughout soil, water, air, and living organisms globally.

PFAS may travel long distances in the environment, accumulate in animals and humans, and have been linked in some studies to health effects such as immune disruption, reproductive harm, and increased cholesterol, although the strength of evidence varies by chemical type and exposure level.

In Australia, both the Commonwealth and state/territory governments are progressively strengthening their approach to managing PFAS contamination and reducing future risks. A key national framework is the PFAS National Environmental Management Plan (NEMP), which is jointly maintained by the Commonwealth and states and sets out consistent guidance for investigating, assessing and managing PFAS contamination in the environment. At the federal level, the Industrial Chemicals Environmental Management Standard (IChEMS) now lists key PFAS like PFOS, PFOA and PFHxS on its highest-risk category, meaning their industrial use, manufacture and import is now prohibited except in specific circumstances, bringing Australia closer to implementing obligations under the international Stockholm Convention.

The Australian Government also updates health-based guideline values for PFAS in drinking water through the National Health and Medical Research Council's Australian Drinking Water Guidelines, and commissions research to refine understanding of exposure and health outcomes. In New South Wales, government agencies are actively responding both to legacy contamination and ongoing monitoring needs. The NSW Environment Protection Authority (EPA) is undertaking a statewide PFAS investigation program to identify and assess potential contamination at high-use sites such as airports, firefighting training areas and industrial zones, with the aim of better understanding how PFAS is distributed in soil and water. NSW Health has convened expert advisory panels to review the evidence on health effects and guide communication and public health advice, and the NSW Government has aligned its drinking water monitoring and risk-management practices with updated national guidelines, confirming that public supplies currently meet these standards. Additionally, state parliamentary inquiries have reviewed gaps and recommended improvements in monitoring, risk communication and interagency cooperation.

A useful distinction in PFAS regulation and product management is between intentionally added PFAS and what might be described as *secondary* or unintentionally present PFAS. *Intentionally added PFAS* refers to PFAS chemicals that manufacturers deliberately incorporate into products for a defined purpose, such as providing stain-resistance in textiles or surfactant properties in certain formulations. These PFAS are a functional

component of the product and their continued presence is intended in its design or performance.

In contrast, *secondary* or unintentionally present PFAS can arise as trace contaminants, by-products of industrial processes, or through environmental transformation of precursor substances into other PFAS (for example, certain fluorotelomer compounds breaking down to form perfluorooctanoic acid, PFOA). These are not added to confer a property to the product but nonetheless may be present and contribute to environmental and health exposure. In regulatory terms, controlling intentionally added PFAS focuses on phasing out their use where feasible; managing secondary PFAS often involves addressing contamination sources, environmental pathways and transformation processes to limit exposure.

Within the synthetic surface manufacturing context, all of the key companies have committed to removing all PFAS from their manufacturing process in the next couple of years. That said many of their components are recycled (shockpad, organic infill) and may have secondary PFAS associated with them in an earlier life, this will be harder to control, but over the next decade we will see that the sports surface market will continue to reduce any PFAS connected to the surfaces.

11. Is the dust or infill dangerous to the environment and if users inhales or ingest it, by accident or through a child’s curiosity?

If there is dust from the infill all surfaces being procured should be tested to EN 15051 Part 2: Measurements for the dustiness of bulk materials – Part 2: Rotating Drum Method and the infill should be classified as either ‘very low’ or ‘low’. In relation to possible migration of chemicals through accidental digestion, the infill and yarn should be able to satisfy the requirements for Category 3, Table 1 of EN71.3: 2019 – A2 IN 2024. (Safety of Toys – Part 3: Migration of certain elements).

Environmental Sustainability for Football Synthetic Fields: The 4P Framework

PEOPLE (Community)
Maximising Community Social Impact

60+ Hours of Usage Per Week
High-capacity synthetic fields allow for intense evening training and weekend competition, accommodating significantly more members per club than traditional surfaces.

Synthetic fields act as a critical enabler for community health by providing a consistent, safe surface that supports triple the usage hours of natural grass.

Alignment with UN SDGs 3, 10, & 11

PLANET (Environment)
Footprint Reduction & Resource Saving

Cooling the Urban Environment
Strategies like expanding the tree canopy for shade and using organic infills can reduce surface heat by up to 30% compared to traditional black rubber systems.

Microplastic Mitigation Strategies
Utilising organic infills instead of “intentionally added” rubber (SBR) and installing 200mm containment hobs and sub-surface drainage prevents yarn fragments from entering the local ecosystem.

Modern designs achieve a significant reduction in pesticides and herbicides while enabling water harvesting from the surface to irrigate the rest of the parkland.

Alignment with UN SDGs 6, 12, 13, 14, & 15

PROSPERITY (Economic)
Whole of Life (WOL) Financial Value

WOL Cost Per Hour: ~\$48.89-\$55.33 over 30 years

Smart Synthetic Turf: \$65.30
Natural Turf (Community): ~\$1.4M-\$1.6M

While capital costs for a 8,500m² “Smart” field are approximately \$1.4M-\$1.6M, the high usage capacity drives the cost per hour down.

Lower Annual Maintenance Costs

Synthetic fields: ~\$20,000/annum vs. Natural turf: \$30,000+/annum
significantly fewer bad-weather closure days.

Alignment with UN SDG 9
Supports Industry, Innovation, and Infrastructure (9.1) by investing in resilient, high-value community assets.

PERFORMANCE
Fit for Purpose Engineering

Enhanced Durability & Safety
Systems must pass rigorous isport testing (up to 200,000 repetitions) and include high UV stabilisers to ensure the yarn remains soft and intact for a 10-12 year lifespan.

Porosity & Drainage Standards
Strategic civil engineering ensures fields manage high rain intensity (e.g. 180mm/hr porosity) to prevent flooding and protect the sub-base integrity.

Fields are designed to meet strict International Federation standards (such as FIFA Quality) to ensure the surface interacts with players and the ball just like high-quality natural turf.

3. Environmental Sustainability Gameplan

3.1 Introduction

When considering the development of a new synthetic sports surface, whether that be an acrylic surface, rubber tracks or synthetic grass, an environmental impact reduction strategy should be considered at the planning, design, procurement and management stages.

This section has embraced the UN’s SDG’s, The NSW DPHI Guidelines and good practice from the industry in the development of the following strategies.

3.2 The Smart Environment Strategy Framework

The Smart Environment Strategy Framework has embraced all of these focuses and pragmatically developed strategies on how an organisation who is embracing sustainability (The 4P’s) should address the planning, design, procurement and management of new sports surfaces.

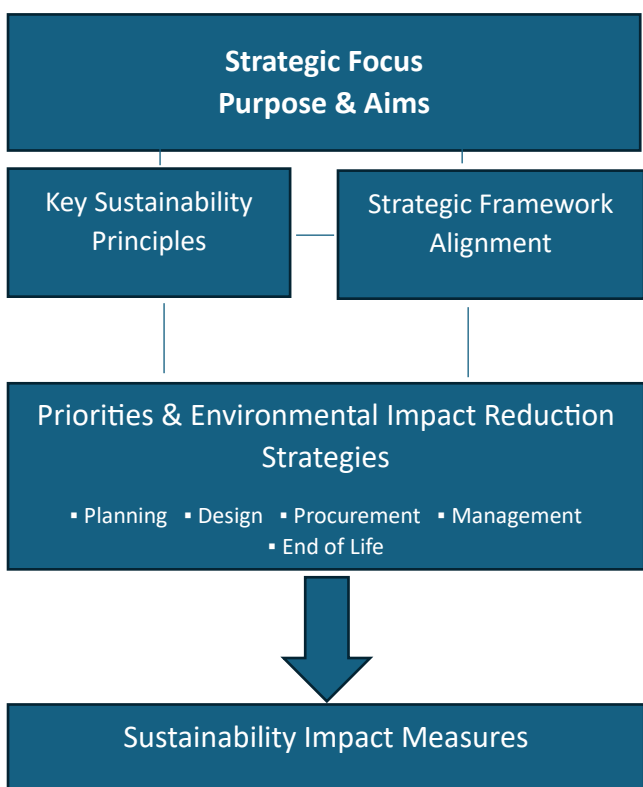


Figure 4: Smart Environment Strategy Framework

Strategic Focus

1. Purpose

To embrace environmental sustainability into the planning, design, procurement, management and end of life of synthetic sports surfaces.

- To create environments that encourage people to be active, exercise, play, recreate and participate

in community sport in a manner that reduces the impact on local environments

- To design environments in a manner that allows us, as custodians of the land to manage and maintain an ecological balance of the local environment
- To protect and where possible enhance the environmental value of the area protecting future generations from climate change and material scarcity

2. Key sustainability principles

To achieve these aims we will promote the following principles.

- Reduce** – reduction in energy consumption, carbon footprint, natural waste etc.
- Reuse** – extend the lifespan of products, repurposing components of a sports surface system etc.
- Recycle** – converting used materials into new products or taking components back to their raw state so they can be used again and again (circular economy).
- Rethink** – calling on local government and sport to question traditional practices, re-evaluating business models, programming approaches and create ‘lower environmental impacts’. This could include the need for less tennis, netball courts by programming over a whole long weekend and not just a single day.
- Refuse** – choosing not to purchase or consume unnecessary and unsuitable products (e.g. one with a high environmental footprint or ones that cannot be recycled at the end of life).
- Repair** – fix broken or damaged sports surfaces as opposed to replacing them. This needs to be part of the maintenance strategy – Repair Early to Save Money and Extend Life.

3. Key framework alignment

The environmental framework has embraced global and national key frameworks to ensure a strategic and holistic approach, namely:

- UN’s SDG’s – appropriate for sports surfaces
- NSW Decision Makers Guidelines for Synthetic Turf (May 2025) or SA Decision Making Guide (2026)
- Multiple Bottom-Line lens (4 Ps)
- Environmental Sustainability Principles

This allows us to identify against the 4Ps which of the UN’s SDG’s are aligned, the targets to embrace and how to do that practically in each stage of Planning, Design, Procuring, Management and End of Life.

4. Priorities and environmental sustainability impact reduction strategies

Embracing the NSW DPHI and South Australia Local Government Recreation and Sport Network Guidelines for structure the following priorities and strategies are identified:

Planning stage

Planning is critical to identify the best site, alignment with policy, procuring the right design and surface while also ensuring the long term use of the site (30 plus years) will have a reduced impact on the environment. The following strategies are considered:

1. Policy & strategic alignment: Align with government policies and environmental strategies, including carbon policies, waste policies, sustainable transport, sustainable materials, clean water, land use/wildlife etc.
2. Consider the sports facilities being placed in the right location geographically to ensure that the surfaces compliment others in the municipality or region.
3. Embrace and plan for the circular economy in the design, procurement, management and recycling of the surfaces stages.
4. Consider the siting of the sports facilities closeness to waterways, bushland, historical and residential hotspots, wildlife etc.
5. The impact on the identified parkland in relation to environmental considerations such as size of footprint as percentage of parkland, sub-surface considerations (old rubbish tip, contaminated land, high water table etc), impact on residents, reduction of tree canopy, lighting impact, drainage, infrastructure, flood modelling etc.
6. The opportunity to enhance the parklands environmental value with strategies such as, increase the tree canopy, water harvesting for the rest of the parkland, improved car-parking, cycle and walkways, landscape enhancement etc.
7. Centralisation of synthetic surface in a ‘Hub & Spoke’ model that will encourage greater use of synthetic surfaces, whilst reducing impact on natural turf surfaces by reducing the demand for training, enhancing environmental impact across municipality.
8. Centralisation of synthetic surface should also reduce the need to change passive parkland into active parklands, as the synthetic field will be able to host three times more intensity of usage.
9. Consider the use of natural noise and light barriers such as trees, shrubs and fauna to reduce environmental impact on local residents.
10. Consider developing whole of parkland masterplans allowing a holistic approach to environmental planning to offset any impact of a synthetic sports surface. This should include expanding tree canopy,

flora & fauna, water harvesting, lights, parking, Urban Heat Island impacts, site accessibility etc.

11. Understand the civil engineering considerations for the whole site, by commissioning site assessments including,
 - Geotech report – to ascertain how the ground conditions can build a pavement base of 30 years
 - Environmental assessment – to understand soil health issues and any mitigation strategies needed
 - Flood report – to explore any risks and mitigation strategies
 - Tree management report – considering an tree impact, loss of canopy and ability to develop a strategy that expands tree canopy to provide shade, reduce Urban Heat Island (UHI) impact and provide evaporative cooling
 - Site overlays – for heritage, environmental, existing easements, restrictive zoning etc
 - Drainage strategy – to address at least a 1 in 50 ARI event and the ability to disperse the water in the current storm-water network. The use of drainage for water-harvesting can have a significant environmental benefit to the whole parkland.

Design stage strategies

The design stage needs to consider key aspects of the project, the environment, the location and its management to ensure that the design is fit for purpose. It is at this stage that design mitigation strategies need to focus on the CAUSE not the impacts. These aspects include:

1. Planning considerations: The siting, design and management process and outcomes need to be embraced (e.g. 30 year pavement life, ARI of 1 in 50 years, community sports usage of 60 plus hours etc).
2. Connection with park location is critical for the design, early access for pedestrians, cyclists, transport (cars and public) as well as spectator access to maximise the experience of the users (and passive users).
3. Civil engineering: must be driven by the technical geotech assessment to design the civil engineering solution for 30+ years and to accommodate the drainage strategy needed. This should include the pavement base needed for the surface, whether that be concrete court surfaces, asphalt (courts, tracks and hockey fields) or roadbase (mainly 3G fields). These designs must be able to meet the International Federation (e.g. World Athletics, FIH, FIFA etc) detailed performance levels. The use of recycled content and environmentally friendly concrete to build the facility is critical.
4. Performance surface: two considerations fit for purpose design for the primary sport and any

- secondary usage complementary sport or casual usage (e.g. 3-on3 basketball hoops on tennis courts) will ensure that the asset is used intensely. Consider the size of the footprint, does the sport always need 20 courts, or can it change its management practices of only playing one day of a weekend and need only 10 or 12 courts. Ensure that the surface can be used for a number of hours and type of usage (70+ hours p/w).
5. **Technology:** as this is progressing quickly, specify the outcomes you want it to achieve and not the name of a single branded surface type, as all the surfaces are propriety to different manufacturers. This can improve the design impact significantly.
 6. Design around the principles of a circular economy for each stage of the process and to reduce the environmental footprint of the design.
 7. **Field of play orientation:** to ensure that there is maximum usage throughout the day.
 8. **Lighting considerations** to optimise the players experience on the surface, embracing International Federation and/or Australian standards for the lighting at training and competition level. Consider embracing the Australian standards for 'Control of Obtrusive Effects of Outdoor Lights'-AS4282. Most software packages now allow the lights to have a range of lighting levels, e.g. competition at 200 lux, training at 50 lux and walk-off at 20 lux etc.
 9. Design mitigation of microplastic migration into waterways and landscape by embracing the following strategies to address cause (not effect) of microplastic challenges:
 - Only purchase a synthetic grass system with organic infill, this reducing all 'intentionally added microplastics'.
 - All drainage to be sub-surface (i.e. no spoon drains) so that and breakage of yarn (microplastics) do not enter waterways.
 - Design a 200mm hob around the field, using recycled products to 'contain' any yarn in the field of play, until it can be removed as part of the maintenance program.
 - Install show and vehicle grates to ensure any infill or microplastics do not leave the field of play.
 - Install a shockpad to ensure that the amount of performance infill is significantly reduced.
 - Request only systems that are exceptionally durable and therefore less likelihood of breaking the yarn tips, which should pass the Lisport (2012 test) to at least 200,000 repetitions (as opposed to FIFA requirement of 20,200).
 - Only use a 'Dual Yarn' system which is a monofilament/fibrillated tape option that will encapsulate the infill and significantly reduce the migration of infill and increase durability.

- Request high U.V stabiliser in the yarn to ensure that in the southern hemisphere that as the field ages the yarn doesn't break down so quickly.
10. Explore the use of wide canopy trees close to the field of play, with vertical root systems (as opposed to more horizontal and shallow root systems) placed around the field of play with appropriate root barriers to reduce long-term impact on the field. This should act as both a shade coolant and evaporative catalyst in hot weather.
 11. For hard courts, design the facilities with heat resistant technology to reflect the heat, cooling the area and reducing UHI impact of a night.
 12. Design the surface so that when it is replaced it is easy to recycle or re-use.

Procurement stage strategies

The procurement process aims to specify, procure and deliver the project in a manner that is best value for the organisation and will consider key aspects of timelines, affordability, fit for purpose, environmental impact etc. There are a number of considerations including:

1. Reject a Design & Construct (D&C) Contract Tender – as this often is open and only relates to a small number of criteria (e.g. FIH Global or FIFA Quality surface) it doesn't embrace the performance characteristics and standards for environmental aspects. Consider the Design Finalisation and Contract (DF&C) or Detailed Design (DD) contracts as more holistic and less risky to the organisation.
2. Detail the best practice construction standards for each part of the project delivery, to ensure there is clarity of expectation, especially around environmental aspects and best practice.
3. Project management is critical at the key stages of Critical Hold Points, Witness Points and Testing/Assessment points, by an experienced and qualified team. This will reduce the amount of rework needed over the length of the assets life and therefore will reduce the environmental impact.
4. Handover is critical at the end of the project, with details of the 'As Built' drawings, the warranties, the maintenance manual and product details etc.
5. Purchase only sports surfaces that can meet all of the environmental standards required (see Design section) and have a proven track record.
6. The establishment and management of the construction site shall embrace best practice in relation to environmental management.
7. Comparing each tender against the Environmental Footprint (calculated by the ESTC tool, Product Environmental Footprint).
8. Embrace Value Engineering, to encourage each tender to create beneficial environmental outcomes.

Management stage strategies

Ensuring that the surface achieves its life expectancy and the performance needs of the sport three aspects need to be considered:

1. Programming – to optimise the Return on Investment the surface intensity of usage should be understood (from the design) and then programmed to maximise the facilities usage (sweating the asset).
2. Maintenance and renovation – to ensure a quality experience the surface should have an agreed maintenance program, including brushing, cleaning, top-up and an annual remediation program, to extend the life of the surface.
3. Monitoring and review of performance – the International Federation stipulates the testing regime for their surfaces and level of play which could be embraced. After year 5 it is suggested that the surface is also independently checked for remediation needs, life expectancy and any dilapidation that may have occurred.

End of life strategies

Embracing a circular economy to minimise the environmental footprint.

1. Ensure at the design stage that additional standards and requirements (e.g. U.V stabilisers, durability testing and manufacturers warranties) ensure that the surface can meet local demand of over 60 hours p.w.
2. Ensure that any procured system can be 100% recycled.
3. Embrace a strong maintenance program to provide the greatest opportunity to extend the surfaces life before it needs replacing.
4. Ensure that the surface can be recycled with certificate of proof for each stage of the process.

5. Sustainability impact measures

It is critical that as part of this strategy that there is a measurement process to assess impact of what is being planned, designed, procured and managed.

The approach with this Guide is to measure impact against a multiple-bottom line set of criteria. These should include the following criteria:

- i. People (community) lens
 - Hours usage per week/year (hrs pr wk/yr)
 - Intensity of usage per week / year (people pr wk/yr)
 - People per field of play (field / 1,000 population)
 - Members per club (N° members/club)
- ii. Planet (environment) lens
 - Water used per week/year (L/ml)
 - Water saved per week/year (L/ml)
 - Bad weather days closed per year (wet/hot)

- Maintenance needed per week/year (hrs/wk & hrs/yr)
- Pesticide & herbicide used (L per wk/yr or times p/w or p/y)
- Pesticide & herbicide saved (L per wk/yr or times p/w or p/y)

- iii. Prosperity (economic) lens (per 8,500m² field)
 - Capital cost (\$ million)
 - Maintenance cost (\$k per annum)
 - Whole of Life cost (per annum over 30 yrs)
 - WoL costs per hour of usage (\$/hr over 30 yrs)
- iv. Performance (fit for purpose) lens
 - Playing standards
 - Additional safety, health, usage standards
 - Consistency of performance
 - Expected closure for renovations annually (days/annum)

An example multiple-bottom line sustainability comparison infographic is shown on the next page between five surface types:

- (i) Natural turf field – community standard – sand profile with warm season grass over sown with winter grass (30 hours expected play with 30 people per hour intensity).
- (ii) Hybrid reinforced turf field – community standards on a natural turf field (i) with reinforced areas around goals, running lines and centre circle (35 hours expected play with 30 people per hour intensity).
- (iii) Entry level synthetic field – FIFA Quality with shockpad and monofilament 3G field (42 hours expected play with 40 people per hour intensity)
- (iv) Smart synthetic turf field – FIFA Quality with additional standards around durability, porosity, U.V binder and dual yarn system (60 hrs p.w and 60 people per hour of intensity).
- (v) Best practice sustainable synthetic field – As a Smart synthetic field with a whole of parkland strategy integrated with the UN's SDG's.

NATURAL V HYBRID V SYNTHETIC SURFACE LEVELS



MULTIPLE BOTTOM LINE SUSTAINABILITY COMPARISON

	NATURAL TURF FIELD Community standard Sand profile with warm season grass over sown with winter grass	HYBRID SPORTS TURF REINFORCEMENT Community standards Natural turf plus reinforced areas around the goals, running lines & centre circle	ENTRY STANDARD SYNTHETIC TURF FIELD FIFA Quality FIFA Quality with shockpad with monofilament 3G Turf	SMART SYNTHETIC TURF FIELD FIFA Quality with shockpad and additional durability and performance dual yarn 3G Turf	BEST PRACTICE SUSTAINABLE SYNTHETIC FIELD As Smart Synthetic Turf with a whole of parkland integrated, holistic view based around the UN's SDG's
Hours Usage (week/year)	30 hrs/week 1,200 hrs/year	35 hrs/week 1,400 hrs/year	42 hrs/week 2,100 hrs/year	60 hrs/week 3,000 hrs/year	60 hrs/week 3,000 hrs/year
Intensity of usage (PEOPLE PER HOUR/YEAR)	30 ph 36,000 annually	30 ph 42,000 annually	40 ph 84,000 annually	60 ph 180,000 annually	60 ph 180,000 annually
Water used – weekly annually (based on 25 weeks at 150k L pw)	150,000 L 3,750 Million/L	150,000 L 3,750 Million/L	0 Zero	0 Zero	0 Zero and water harvested for the rest of the natural assets in the parkland
Bad weather days closed	3 HRS	3 HRS	2 HRS	1.5 HRS	1.5 HRS
Maintenance needed (HOURS PER WEEK)	3 HRS	3 HRS	2 HRS	1.5 HRS	1.5 HRS
Pesticide/herbicides used	x2-3 herbicide applications x1 insecticide x4-6 fertiliser applications	x2-3 herbicide applications x1 insecticide x4-6 fertiliser applications	Reduced annually with spot sprays	Reduced annually with spot sprays	Reduced annually with spot sprays
Acceptance by Community as Active Parkland	Excellent acceptance (as long as not too busy!)	Excellent acceptance (as long as not too busy!)	Sporting community excellent. Passive usage can struggle if too busy or if fenced off.	Sporting community excellent. Passive usage can struggle if too busy or if fenced off.	Sporting community excellent. Passive usage can struggle if too busy or if fenced off.

PEOPLE (COMMUNITY) LENS

PLANET (ENVIRONMENT) LENS

	NATURAL TURF FIELD	HYBRID SPORTS TURF REINFORCEMENT	ENTRY STANDARD SYNTHETIC TURF FIELD	SMART SYNTHETIC TURF FIELD	BEST PRACTICE SUSTAINABLE SYNTHETIC FIELD
	Community standard Sand profile with warm season grass over sown with winter grass	Community standards Natural turf plus reinforced areas around the goals, running lines & centre circle	FIFA Quality FIFA Quality with shockpad with monofilament 3G Turf	FIFA Quality with shockpad and additional durability and performance dual yarn 3G Turf	As Smart Synthetic Turf with a whole of parkland integrated, holistic view based around the UN's SDG's
Initial Capital costs (8,500m ² field)	\$0.9 M	\$0.9 M	\$1.2 M	\$1.4 M	\$1.6 M
Maintenance costs (pa)	\$30,000	\$35,000	\$25,000	\$20,000	\$20,000
Whole of Life (WOL) costs* over 30 years	\$2.4 M	\$2.4 M	\$3.8 M	\$4.4 M	\$4.8 M
WOL Cost per hour of usage over 30 years	\$65.30 p.h.	\$58.04 p.h.	\$59.52 p.h.	\$48.89	\$53.33
PROSPERITY (ECONOMIC) LENS					
	Limited (e.g NPL) not certified ■ Turfgrass composition and coverage ■ Surface hardness ■ Surface levels ■ Surface traction ■ Water infiltration ■ Water distribution uniformity (>85% DU)	Limited (e.g NPL) not certified ■ Turfgrass composition and coverage ■ Surface hardness ■ Surface levels ■ Surface traction ■ Water infiltration ■ Water distribution uniformity (>85% DU)	FIFA Quality	FIFA Quality Plus additional Australian standards	FIFA Quality Plus additional Australian standards ■ Safety standards ■ Durability standards ■ Parosity standards ■ Health standards ■ Microplastics standards
Playing standards	Seasonality driven linked with intensity of usage	Seasonality driven linked with intensity of usage	More consistent	More consistent	More consistent
Additional standards	NONE	NONE	NONE	NONE	UN's Sustainability Goals (SDG's) ■ Australian Institute of Landscape Climate Change Guidance ■ Holistic Environmental Sustainability best practice
Surface performance	6 - 10 Weeks	6 - 8 Weeks	1 Week	1 Week	1 Week
Expected closure for renovations annually**	6 - 10 Weeks	6 - 8 Weeks	1 Week	1 Week	1 Week
PERFORMANCE LENS					

**Whole of Life Costings based on Capital cost, maintenance costs over 30 years, and replacement of synthetic carpet at years 10 & 20. Natural having the sand replaced and turf replaced at 20-30 years. **Depending on usage, location, and maintenance/renovation needs.

Appendix 1: Key Contacts

Independent Advisory Services

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Key Sports

Football Australia (Football)

Level 9, 1 Shelley Street
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National Rugby League Limited (NRL)

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Suppliers & Agents

FieldTurf Australia

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- FIFA Preferred Producer
- World Rugby Preferred Provider
- AFL Approved Manufacturer

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Polytan

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- FIFA Preferred Producer
 - World Rugby Preferred Provider
 - AFL Approved Manufacturer
-

Sports Clean

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Synergy Turf is the agent and Australian manufacturer for Greenfields, recognised as:

- FIFA Preferred Producer
- World Rugby Preferred Provider

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TigerTurf is a FIFA Licensee

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Tuff Turf is an agent for the Co-Creation Grass (CCG) products. CCG is:

- FIFA Preferred Producer
- World Rugby Preferred Provider

Turf One / Bild

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Turf One is an agent for the FieldTurf products. FieldTurf is a:

- FIFA Preferred Producer
- World Rugby Preferred Provider
- AFL Preferred Manufacturer

Independent Testing Institutes

Acousto-Scan

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e: keith.mcauliffe@labosport.com
w: www.labosport.com

Global Peak Bodies for Synthetic Turf

Synthetic Turf Council (STC, USA)
www.syntheticturfCouncil.org

European Synthetic Turf Council (ETSC, Europe)
www.estc.info

International Sports Federations

Sports and Play Industry Association (SAPIA, AUS)
www.sapia.org.au

Sports and Play Contractors Association (SAPCA, UK)
<http://www.sapca.org.uk/>

International Association for Aquatics and Leisure Facilities (IAKS)
<https://www.iaks.org/>

Football/Soccer – FIFA - Quality Program for Football Turf
<http://quality.fifa.com/en/About-the-programme/>

Rugby Union – World Rugby - Rugby Turf Program
<http://playerwelfare.worldrugby.org/rugbyturf>

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