Smart 7 Guide

Minimising the Impact of Microplastics on the Environment



Acknowledgements

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Without their support, we would not be able to achieve our goal to enhance the knowledge of the industry on synthetic sports turf fields. We would also like to thank our colleagues, clients and organisations that we have completed work for in the sports industry. It is your appetite for change and progress that makes our job so rewarding.

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Disclaimer

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

About the Smart Guide Series

Smart Connection Consultancy is committed to sharing knowledge and learnings with the industry and has produced a number of volumes of the Smart Guide to Synthetic Sports Surfaces which can be downloaded free of charge from our website www.smartconnection.net.au

The volumes of the Smart Guide to Synthetic Sports Surfaces include:

- Volume 1: Surfaces and Standards (2021)
- Volume 2: Football Turf Synthetic and Hybrid Technology (2021)
- Volume 3: Environmental and Sustainability Considerations (2021)
- Volume 4: Challenges, Perceptions and Reality (2021)
- Volume 5: Maintenance of Synthetic Long Pile Turf (2021)
- Volume 6: Multi-Sports Areas for Schools and Local Communities (2021)

 Volume 7: Minimising the Impact of Microplastics on the Environment (2021)

About the Author



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Martin has worked in the sport and active recreation industry for 40 years, managing a diverse

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He clearly understands strategic and the political environment of sport, whilst 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 Technical Consultant for Australia's leading Football codes including:













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Welcome and Purpose

The popularity of synthetic sports surfaces used by many sports, local governments and within the education sector in Australia has significantly grown in the last two decades to complement their natural turf fields. This enables the local community to participate in sport when the demand on natural fields cannot be accommodated.

The key football codes in Australia have all embraced synthetic sports surface technology for their community clubs and some for their elite players. Their aim is simply to provide more opportunities for communities to play sport and appreciate that the synthetic sports fields is one way of creating significant additional playing hours in many areas where fields are in short demand.

The aim of this Smart Guide – Reducing the Impact of Microplastics on the Environment is in response to the growing concern by Local Governments and the community into the growing concern of how to protect our waterways and natural environments for future generations. It explores the sustainability issues that should be considered as part of the planning, design, procurement and ongoing management of the technology.

Smart Connection Consultancy is passionate about working with organisations that are keen to encourage their community to be more active. Sport is one of the vehicles to achieve this and provides many physical, community and health benefits. That commitment to provide opportunities that will impact on community health and wellbeing must be balanced with any impact on the environment. This Smart Guide provides an approach to almost completely irradicate the challenge of synthetic fields impacting on the environment from the use of microplastics.

Smart Connection Consultancy has embraced the use of sports surface technology, whether that be natural, hybrid, synthetic or alternative sports surfaces to complement natural fields, as a vehicle to promote and provide the community with opportunities to be more active more often.



Photo 1: Football (Soccer) Gosnells LGA, WA (source: ABS Sports Surfaces)



Photo 2: Rugby Union - Latham Park, NSW (source: Polytan)



Photo 3: AFL and Football - ELS Hall Park, NSW (source: Turf One)



Photo 4: Football, AFL and Cricket - St Kevin's College, Vic (source: Tuff Turf)



Gore Hill Oval, providing sustainability to community use as the natural turf field could not cope with the usage and the continued flooding (source: Willoughby City Council)

1. Sport and Recreation Embrace Technology

1.1. Introduction

The growth of the Australian population over the past 21 years has seen an increase of over six million¹ (33%) from approximately 18 million to 24 million people. The expected population in the next 15+ years will rise to be over 31 million² (approximately 40% increase) and this will seriously impact on sports field provision and accessibility in many cities around Australia.

This demand will continue to place significant pressure on sports field infrastructure around key cities in Australia where demands for additional playing fields and additional hours per field continue to exceed the hours available for natural surfaces.



Photo 5: Typical sports field in NSW halfway through football season with natural grass

1.2. The Challenges

All levels of government are encouraging children to play sport and recreate resulting in increasing daytime and weekend usage of sports facilities. Not forgetting the changes in weather patterns, with some states having more rain or greater droughts then they can remember, both of which are becoming more common.

So how can natural turf really cope with the demand? The challenge for local government, education and sport is how their natural surfaces can cope with the additional intensity of recreation, training and matches. So, what are the options informing the decision-making process?

The ability to cater for the growing demand of natural playing fields is causing concern to many inner-city local governments. These natural turf fields are under greater capacity pressure and this results in increased stress levels

to the natural turf. Many local governments are embracing the synthetic sports turf technology to complement natural turf and satisfy community need.

1.3. Benefits

Many are embracing the synthetic technology to reduce the stress on natural sports fields by decreasing the intensity of training to allow them to recover during the week as the training is then on synthetic surfaces.

The benefits of synthetic sports turf cater for increased playing capacity, often more than 60 hours a week, and offering a consistency that is not detrimentally impacted by drought or excessive rain. Football codes in Australia benefit from this technology and the growth in synthetics fields for Soccer, Rugby (Union and League), AFL and multi-sports fields, continues to increase.

Smart Connection Consultancy are committed to designing and procuring synthetic sports surfaces in a manner that is environmentally sustainable for the community. Many Councils consider such investments against a Triple Bottom Line benefit to these organisations and community.

Appreciating that the impact of such an installation can provide benefits to the community through extended usage and playing capacity of the surface compared to natural grass. Economically the initial investment may be more costly, but when considered the number of hours use per year of a typical synthetic field would comfortably accommodate 3,000³ hours of use compared to grass being 1,000⁴ per annum, the cost per person per hour of use is significantly less than natural turf per person and per hour of usage.

1.4. Environmental Considerations

Many Councils are becoming more conscious of the environmental impact of such developments. This Smart Guide explores the key environmental approaches that Smart Connection Consultancy would encourage Councils and Sports to consider before embarking on such a development and the impact of microplastics on the environment.

Microplastics have the opportunity to negatively impact the natural environment, waterways and land that could impact food sources for generations. It is critical therefore that the design, planning, procurement and

¹ ABS, <u>Australian Demographic Statistics</u> (cat. no. 3101.0), data extracted 21 December 2016

http://abs.gov.au/ausstats/abs%40.nsf/94713ad445ff1425ca256820001 92af2/1647509ef7e25faaca2568a900154b63?OpenDocument

² ABS, http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/3222.0

³ 3,000 hours use is based on 60 hours per week for 50 weeks per annum

⁴ 1,000 hours use is based on natural turf accommodating 25 hours over 40 weeks

management recognises that by managing microplastics we are actually looking after and protecting our future generations of society.

2. Planning for a Sustainable Future

2.1. Introduction and Context

Within Australia, there has been an embracement of synthetic sports surfaces over the past decade to support the continued demand for additional sporting, recreational and play surfaces that cannot be addressed with just natural turf, especially within inner metro areas.

It is estimated that there are over 200 full Football fields, dozens of Hockey fields and athletic tracks, thousands of Tennis courts (grass and acrylic) and tens of thousands of play parks.

Australia is currently seeing the start of the replacement of the third generation (3G) fields that were installed in 2008-2010 as part of the GSF State Government funded of sports facilities in Victoria (approximately 50), and also early adopter of fields in NSW (less than 10). When combined with Hockey fields, Tennis courts and other hard and rubber surfaces the impact on the environment is becoming prevalent.

Recent challenges regarding recycling in Australia are resulting in strategic review of waste, green engineering and principles of sustainability. This section explores four key aspects and predominantly this section explores the synthetic grass fields and those with infill.

- Components of synthetic sports turf system
- Environmental impacts perceptions and reality
- Recycling at the end of life considering
- Sustainability Principles protecting of future

2.2. Components of Synthetic Sports Turf System

By exploring the components of a typical synthetic spots surface, one can appreciate the impact that each can have on the environment allowing strategic decisions to be embraced environmentally.

With 3G long pile sports fields the components include:

- Synthetic carpet including yarn, performance infill, stabilising infill, primary and secondary backing;
- Shockpad whether insitu, foam or prefabricated; and
- · Pavement, sub-base and drainage components



Photo 6: Oi Hockey Stadium will be constructed in Oi Central Seaside Park Sports Forest and the yarn is made out of 65% sugar cane (©Getty Images)

A recent Environmental Impact Study published by FIFA⁵ identified that 49% of the system composition was stabilising infill (sand) and 44% performance infill, with the carpet backing and yarn being 8%, by weight. It is expected that in Australia the composition would be slightly different due to the high number of systems that have a shockpad, which reduces the amount of performance infill needed.

The performance infill in Australia is still dominated by recycled SBR (car tyres) with it still being over 75% of all fields, although premium infill is growing due to perceived concerns by the community for recycled SBR. Premium infills including EPDM (Ethylene Propylene Diene Monomer) and TPE (Thermoplastic Elastomer) and organic natural (predominantly cork) are being embraced. These infills often help to define the type of recycling route that is required.

2.3. Microplastics – Perceptions and Reality

2.3.1. Microplastics

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.

The European Commission received a report (DG Environment) in February 2018⁶ 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.

⁵ Environmental Impact Study on Artificial Football Turf (Eunomia Research & Consulting Ltd: March 2017)

⁶ Investigating options for reducing releases in the aquatic environment of microplastics emitted by (but not intentionally added in) products

Synthetic fields are "...a relatively small source..." as shown in the table below.

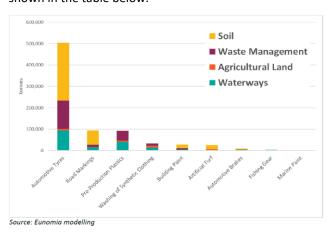


Figure 1: Sources of microplastics found in Europe

Soil is the largest single sink for microplastics and may over time be washed into waterways. The key aspects from a synthetic sports field that could be classified in this category would be the tips of the grass over time as they breakdown, due to UV Radiation which could be between 0.5 and 0.8% and also the infill.

The report suggests that the level of infill that needs topping up over a year would equate to 1-4% of the total infill installed initially. Although some of that is caused from compression, other is lost to the environment. From assuming that on a typical mid-ranged football field (7,500m²) with a typical infill of 10kg per metre² this would equate to 75 tonnes, with a range of 0.8 tonnes to 3 tonnes per annum. It is envisaged that the 'loss' of infill can be seen to migrate as follows:

- Migration to the surrounding soil area;
- Migration to surrounding paved areas and then subsequently released into the sewerage system via grates etc.;
- Into indoor environments (including washing machines) on kit, shoes and bags of participants, which again will be released into the sewerage system; and
- Release into drains and waterways.

2.3.2. Aspects that can impact on microplastics entering the environment

There are a number of aspects of the design, construction and management of the fields that could impact on the level of microplastic migration into the environment.

This could include:

- Infill splash with the infill migrating off the field of play
- Infill being washed away in wet weather or through snow
- Drainage transportation with many early designs having spoon drains at field level
- Excessive infill levels increasing probability of migration off the field
- Player transmission on boots etc.
- Breakdown of yarn due to UV degradation with age
- Fields not fit for purpose

It is critical that purchasers for synthetic sports fields can appreciate how the design, management and construction can have such a significant impact on reducing the propensity of microplastics entering the environment.

Smart Connection Consultancy is committed to working with all levels of government, sport, synthetic field manufacturers and construction companies to reduce the amount of microplastics that could enter the environment. It has developed a 21 point plan which it has shared in this Smart Guide.

2.4. Global and Australian Approach to Containment of Microplastics

Globally sport peak bodies and industry associations have embraced this challenge with enthusiasm to reduce the impact on the environment and therefore on society. The majority of global sports International Federations for the sports, including Football (FIFA), Rugby (World Rugby) and Hockey (FIH) have all researched this and have issued guidance on how fields should be constructed and managed.

The peak body associations have also provided similar information including the Synthetic Turf Council (https://www.estc.info/wp-content/uploads/2021/03/2021-RMM-flyer-final-with-ESTC-logo-v2.pdf).

In Australia, the Australian Standards Committee for Sport CS101, has received 100% positive votes for the publication of identical adoption of the global standard as SA TR CEN 17519: 2021 Surfaces for sports areas - Synthetic turf sports facilities - Guidance on how to minimize infill dispersion into the environment.

⁷ Section E1.1. Estimating Microplastics

This standard will then allow councils to quote this standard in their tender documents, so the dispersion of infills can be reduced. This is positive information we can give to councils and show that the industry is doing something to mitigate the issue.

Smart Connection Consultancy believes that in Australia we can go further as we appreciate the impact on the community and this has been addressed below.

3. Smart 21 Point Guide to Reduction of Microplastics

3.1. Introduction

Smart Connection Consultancy has developed this guide at looking at the five stages of a typical synthetic sports field, namely:

- Design Performance Field
- Design Civil Engineering
- · Management and maintenance
- Construction
- Replacement

By adopting this 21-point plan, Smart Connection Consultancy believe that the probability of Microplastics will be reduced for sports fields that it will not be of material significance.

3.2. Design – Performance Field

By embracing the opportunities at the first stage will have a significant impact on how the field can be managed and reduce the level of infill.

- Yarn to reduce the amount of ball splash embrace systems that only use dual yarn (monofilament and tape combination systems) or tape systems. Do not use monofilament as the infill will have a tendency to migrate significantly more
- 2. Yarn UV Stabilising Levels ensure that the UV levels will provide the durability needed to ensure that as the yarn agers the tips of the yarn will not break down due to the UV radiation levels in Australia
- 3. Durability of Yarn and Infill ensure that the system can cope with the intensity of usage and the yarn and infill will not breakdown with aged usage. Using the FIFA Lisport Test the system needs to be able to provide a result in excess of 100,000 cycles (5 times that of FIFA requirement)
- **4. Shockpad** this will significantly reduce the level of infill needed in the carpet system and therefore reduce the chance of infill migration

- 5. Infill Type consider the use of organic infill and not just rubber, therefore reducing the level of microplastics significantly
- 6. Infill Quality the infill needs to be of a quality that does not leech, and certain recycled rubbers may have a greater tendency to leech heavy metals or indeed PAH's. We recommend adopting the REACH Safety Standards to ensure that if any microplastics enter the environment they will be safer and have minimal impact on the environment

3.3. Design – Civil Engineering

- 7. Drainage Design to ensure that the drainage can cope with the Annual Rain event expects (e.g. 1 in 10 years) as this will ensure that the infill doesn't migrate on top of the field etc.
- **8. Sub-Surface Drains** ensure that all drains are subsurface and not the older type of spoon drains around the surface levels
- 9. Non Porous / Impermeable Layer below the drainage level or pavement base to ensure that no water or infill can penetrate the subsurface. This layer should also be wrapped around the Collector Drains to ensure a 'closed system'.
- 10. Drainage Filter the drains should have filters to capture any infill before it progresses to the storm water outlets



 ${\bf Photo~7:~Containment~strategy:~Drains~fitted~with~filter.}$

11. Field of Play Perimeter Curb – design a plinth for the fence line to fit into which is approximately 200mm above the pile height to reduce the probability of the infill migrating from the field of play, with a 100mm depth to insert the fence posts



Photo 8: Containment strategy example 1: Curb to reduce the infill being dispersed outside of the field of play

12. Access /Egress Gates – at pedestrian and vehicle gates ensure that there is brush mats that are large enough (two strides for pedestrian gates) for people who leave the field of play to capture infill from boots etc. These need to be removable and cleanable to ensure that they do not allow infill captured to migrate into the environment. Vehicle gates are also fitted with a grated system to capture infill from the field of play from the vehicle tyres



Photo 9: Containment strategy example 2: Pedestrian gate mats that capture the infill

- **13. Equipment Sleeves** all field equipment sleeves including goals, posts, and flags should ensure that the bottom does not allow infill to seep into the subenvironment. Each needs to be capped
- **14. Boot Cleaners** each field should have a boot brush cleaner at the exit gates around the field with players encouraged to use them

3.4. Management and Maintenance

15. Maintenance Brush – the maintenance should be conducted in a manner that does not break off the tips of the yarn, therefore heavy rubber mats should not be used and only a firm brush or appropriate machine



- **16.** Cleaning of Brushing all brushes and machines should be sprayed cleaned before leaving the field of play and any infill returned to the field of play.
- **17.** Clean all Drainage Channels all drainage channels should be cleaned during each maintenance operation and findings recorded
- 18. Clean all Gate Mats at each access and egress points
- **19. Monitor Infill Levels** to record and monitor expected levels

3.5. Construction

20. Stockpile of Infill Bags – the area is to be quarantined with impervious membrane under bags to ensure no spillage into the environment and all bags are to be cleaned before being taken away. The quarantine area to be cleaned prior to the area being returned to its original function or relandscaped.

3.6. Replacement

21. Recycling – the procurement must stipulate that all new fields procured can be recycled at the end of life, including a strategy for recycling of the carpet and yarn and the rubber infill. The sand should be reused and the shockpad and where possible, the rubber infill should be procured where they can be reused 2-3 times thus reducing the level of microplastics needed for the system over the whole of life of the field.

4. Key Contacts

4.1. Independent Advisory Services

Smart Connection Consultancy

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Consultant to all Football Codes in Australia

4.2. Key Sports

Football Federation Australia (Football)

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National Rugby League Limited (NRL)

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Rugby Australia (RA)

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Moore Park NSW 2021

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w: www.rugbyaustralia.com.au

Australian Football League (AFL)

Shayne Ward, Executive Officer, AFL/Cricket Australia Synthetic Turf Program

Australian Football League

National Venues and Community Facilities

AFL House, 140 Harbour Esplanade

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Gridiron Australia

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e: info@fieldturf.com.au

w: www.fieldturf.com

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

Grassports Australia

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w: www.grassports.com.au

Grassports Australia and ABS Sports Surfaces are an agent for Polytan, who are:

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

Greenplay Australia

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p: 1300 769 499

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w: www.greenplay.com.au

Greenplay Australia is an agent for the Limonta products. Limonta are:

- FIFA Licensee
- World Rugby Preferred Provider

HG Sports Turf Australia

Suite 2, Level 1, 526 Whitehorse Road

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e: info@hgsportsturf.com.au

w: www.hgsportsturf.com.au

HG Sports Turf is an agent for Desso, recognised as:

- FIFA Preferred Producer
- World Rugby Preferred Provider

They also provide a range of Hybrid solutions for local government, sport and stadia

Polytan

Factory 3, Dunlopillo Drive

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e: enquiry@polytan.com.au

w: www.polytan.com.au

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

Synergy Turf Manufacturing

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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

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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

4.4. Independent Testing Institutes

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4.5. Other Useful Contacts

Smart Connection Consultancy

www.smartconnection.net.au

4.5.1. Global Peak Bodies for Synthetic Turf

Synthetic Turf Council (STC, USA)

www.syntheticturfcouncil.org

European Synthetic Turf Organisation (ETSO, Europe)

www.theesto.com

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/

4.5.2. International Sports Federations

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

Hockey - International Hockey Federation (FIH)

http://www.fih.ch/

Tennis – International Tennis Federation (ITF)

https://www.itftennis.com/en/

Athletics – World Athletics (WA)

https://www.worldathletics.org/

About Smart Connection Consultancy

Smart Connection Consultancy offers an innovative approach that delivers outcomes to enhance the experience of participation in physical activity, recreation and sport in local communities.

We specialise in the planning, development, management and procurement of synthetic sports surface technology. We see this technology as complementing natural grass and encouraging more people to be active, play and achieve success in sport because of its extended durability.

By embracing the skills sets and knowledge of our collaborative consultants, we can provide an integrated and holistic approach to our client's projects.

Smart Connection Consultancy is the Technical Consultants for FFA, the NRL, and Rugby Australia for Synthetic Surfaces.

Field of Expertise

In collaboration with industry experts, we provide our clients with high level quality service that is offered for a very affordable investment.

Commitment to Knowledge Building

We are committed to providing leading edge advice and knowledge so that the industry and our clients can appreciate how synthetic sports turf can complement their natural turf options.

Our Services Include:

Feasibility and Funding Advice and Solutions

Completing a Business Case to justify the need of a synthetic surface can be streamlined by using our Smart Whole of Life Costing Model. We support clients in developing financial strategies, funding applications and where applicable offer funding packages with major financial institutes.

Masterplanning and Design Solutions

We will work with you in exploring the site parameters and constraints together with the opportunities to ascertain the best design and management options for your park or venue.

Procurement and Project Management Support

Over 20 years' experience in procurement and in collaboration with SPORTENG, we provide the detailed civil engineering hold points to ensure that every step of the installation meets the appropriate civil and performance standards.

Our Clients

We have successfully completed a significant number of sports performance standards reviews, sports strategies, master plans, feasibility studies, business cases and procurement projects. Our client base includes:

- International Federations (FIH, FIFA, World Rugby)
- National and State Sports Organisations including Football Federation Australia (FFA), National Rugby League (NRL), Rugby Australia (RA), Australian Football League (AFL NSW/ACT), Golf Australia, Sport Australia, Hockey ACT etc.)
- Local Governments More than 100 local governments with fields worth over Aus\$200 million, in most States/Territories
- Education Schools and Universities in WA, NSW, ACT and Victoria

"Over the last four years the relationship the City has built with Smart Connection Consultancy has become integral to the development of our public open space planning, most notably the Ellenbrook District Open Space, which includes four synthetic playing fields.

Smart Connection Consultancy has contributed in many ways including various studies, reports and research tours that we continue to use today. The work has been outstanding: on time, on budget and most importantly of a very high quality.

Martin has been very accommodating in its approach to our requirements and continues to go out of their way to help us where necessary – always going that extra mile."

Wayne Stuart, Facilities Planning Coordinator, Asset
Management – City of Swan

Smart Synthetic Sports Field Health Check

Review your field, understand risks and extend life expectancy

Australia's leading synthetic sports surface consultancy is offering the **Smart Synthetic Sports Field Health Check**, for clients who wish to find out what condition their synthetic fields are in and what is the probable life expectancy.

Smart Connection Consultancy has been involved in over 70% of all the synthetic football fields (all codes) developed and installed in Australia in the past decade. We work closely with our clients to maximise their usage and life expectancy of their fields.

The Smart Synthetic Sports Field Health Check consists of:

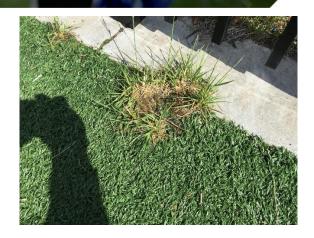
- Conducting a site analysis and field review to ascertain its current status;
- Assessing current maintenance practices to explore if this can extend the life of the field;
- · Reporting on findings with improvement strategies;
- Risk assessment with mitigation strategies;
- Predicting life expectancy; and
- Replacement costings and modelling.

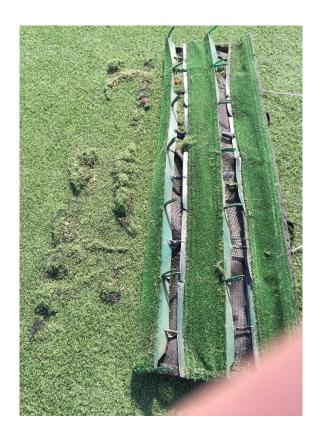
An Assessment Report provided within 48 hours of field assessment.

"The Smart Sports Field Health Check allowed us to appreciate the challenges we had, reduce our risks by adopting the risk mitigation strategies identified and we believe that we have extended the expected life by two years by adopting the recommendations for remediation and maintenance."

(Mick Roberts, Sports Grounds Manager, ACT Government)

Call (03) 9421 0133 and talk to Martin Sheppard or email martins@smartconnection.net.au to find out how the Smart Sports Field Health Check can extend the life of your synthetic sports field.







SPORT INSPIRES A NATION

Synthetic Sports Surfaces Create the Opportunities for All Generations

smarter synthetic solutions



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