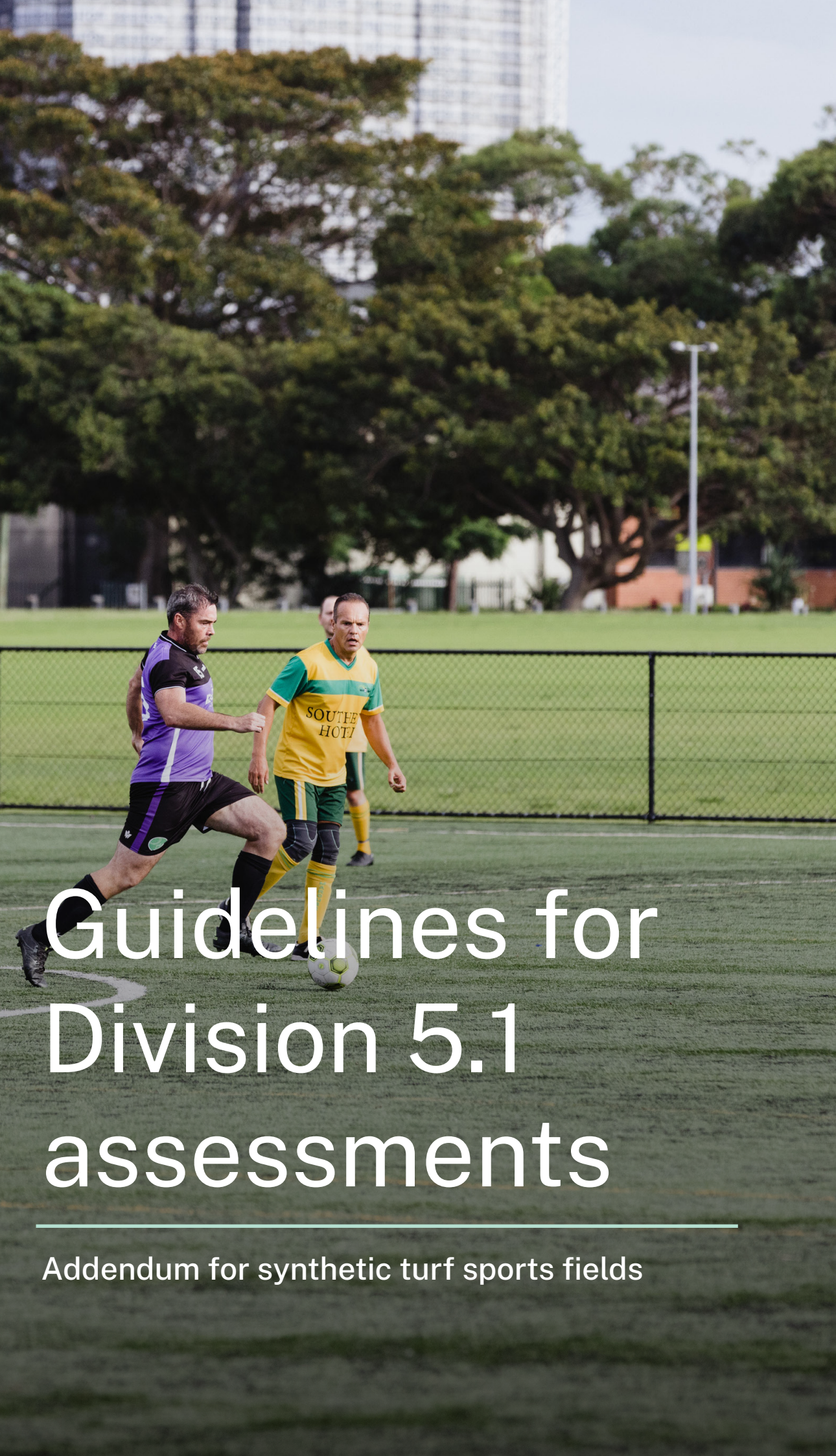




Guidelines for Division 5.1 assessments

Addendum for synthetic turf sports fields



Acknowledgement of Country

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

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

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This guideline has been prepared by the Open Space Team in the Infrastructure Programs branch.

Artwork (above) by Nikita Ridgeway

Cover image: Hefron Park, Maroubra NSW
(NSW Government)

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01

Introduction



Sport plays an integral role in our community in supporting physical and mental health, as well as social cohesion and general wellbeing. The demands on sports fields are intensifying with population growth and urban density as well as an increasing involvement in the community in sporting activities. Synthetic turf sports fields are helping to meet this growing demand in the use of sports fields and are becoming more common, with an estimated 181 synthetic turf sports fields now in operation across NSW compared with roughly 24 in 2014¹.

Increasing population density is driving demand for green space, while constraining availability of open space. Overuse of existing sport and recreation facilities is a driver increasing the installation of synthetic turf in areas of higher population density.

Synthetic turf is recognised for being useable in more weather conditions. The loss of playable hours on natural turf sports fields due to wet weather is often cited as a key reason for pursuing synthetic turf sports fields, as it ensures consistent sport usability during the winter season when demand is typically at its highest.

These benefits do not come without potential adverse environmental impacts including air and water pollution, waste, carbon emissions and limited biodiversity value. Consequently, a range of factors needs to be carefully considered when locating synthetic turf sports fields. These factors include proximity to sensitive flora and fauna habitats, bushfire and flood risk and proximity to heritage areas and items.

One of the key benefits of synthetic turf is that it can withstand more frequent use for sporting activities. As a result, synthetic turf sports fields may be much more intensively used than natural turf sports fields. This can extend play into the evenings and therefore impacts such as light spill, noise and traffic may be greater, particularly where sports fields are located close to residential areas.

Top left: Kareela Park, Kareela NSW.
(NSW Government)

Left: Tempe Recreation Reserve, Tempe NSW.
(Inner West Council)

Right: Gore Hill Oval, St Leonards NSW.
(NSW Government)

¹ Office of NSW Chief Scientist and Engineer, Independent review into the design, use and impacts of synthetic turf in public open spaces, October 2022, p.iv





1.1 Independent review by Chief Scientist

In November 2021, the (then) Minister for Planning and Public Spaces requested the NSW Chief Scientist & Engineer provide expert advice on the use of synthetic turf in public open spaces in NSW.

In June 2023, The NSW Chief Scientist and Engineer released their independent review into the design, use and impacts of synthetic turf in public open space, which is welcomed by the NSW Government.

A cross-government response to the NSW Chief Scientist and Engineer's report has been prepared for government endorsement, noting the findings and recommendations. One of the key recommendations from the response was to provide guidance and support councils in the delivery of synthetic turf sports fields in public open space.

The Department collaborated with local government and key stakeholders to finalise the "Synthetic Turf in Public Open Space - Guideline for Decision-Makers," which addresses planning, approvals, sustainability, risk, and end of life considerations. This guideline will serve as the primary response document to the Chief Scientist and Engineer (OCSE) Report.

In addition, the Department is developing guidelines for best practice environmental assessment of new and upgraded synthetic turf sports fields. These guidelines mandate the factors to be considered, assessed, and mitigated for synthetic turf installation. The findings and recommendations of the review have informed preparation of this *Guidelines for Division 5.1 Assessments – Addendum for synthetic turf sports fields*.

The guidelines support councils in making informed decisions about synthetic turf in public open spaces. It aids in planning, designing, delivering, and managing sports fields and serves as a practical tool for stakeholders involved in synthetic turf sports fields.

Gore Hill Oval, St Leonards NSW
(NSW Government)

Responding to the NSW Chief Scientist and Engineer

The NSW Government response was led by the DPHI and aims to support councils in the delivery of synthetic turf on sports fields in public open space. By setting guidance to ensure best practice in planning, design, management of synthetic turf, as Figure 1 shows, the key Government response can be achieved through:

- Finalising the draft Synthetic Turf in Public Open Space - Guideline for Decision-Makers as the keystone response document to the Office of the NSW Chief Scientist and Engineer Report that includes aspects of planning, approval pathways, sustainability, risk and end-of-life considerations.
- In parallel, creating a guideline to assist in reviewing the environmental impact of new and upgraded synthetic turf sports fields. The guideline will be authorised under section 1.70 of the *Environmental Planning and Assessment Regulation 2021* (Secretary's Guideline) and will describe the potential impacts and a best practice environmental assessment and mitigation measures to be considered. If the proposed synthetic turf sports field is assessed to have too great of an impact, the proposed synthetic turf sports field will need to be amended and/or an Environmental Impact Assessment will need to be undertaken under the *Environmental Planning and Assessment Act 1979*.

- Education facilities - this Addendum is intended to work in parallel with the 2024 changes to the *State Environmental Planning Policy (Transport and Infrastructure) 2021*. The Department made changes to Chapter 3 to make the process of delivering school, university, and TAFE facilities more consistent and simpler.
 - › The Department's changes clarify that proposals involving synthetic surfaces are excluded from the exempt category and instead require development consent, meaning synthetic turf sports fields require environmental assessment.
 - › This change responds to the NSW Chief Scientist and Engineer's independent review into synthetic turf in public open space which made recommendations regarding the environmental assessment requirements for synthetic turf installations. This will ensure that proposals within educational establishments are subject to the same environmental assessment requirements that are applied to proposals on public open space.

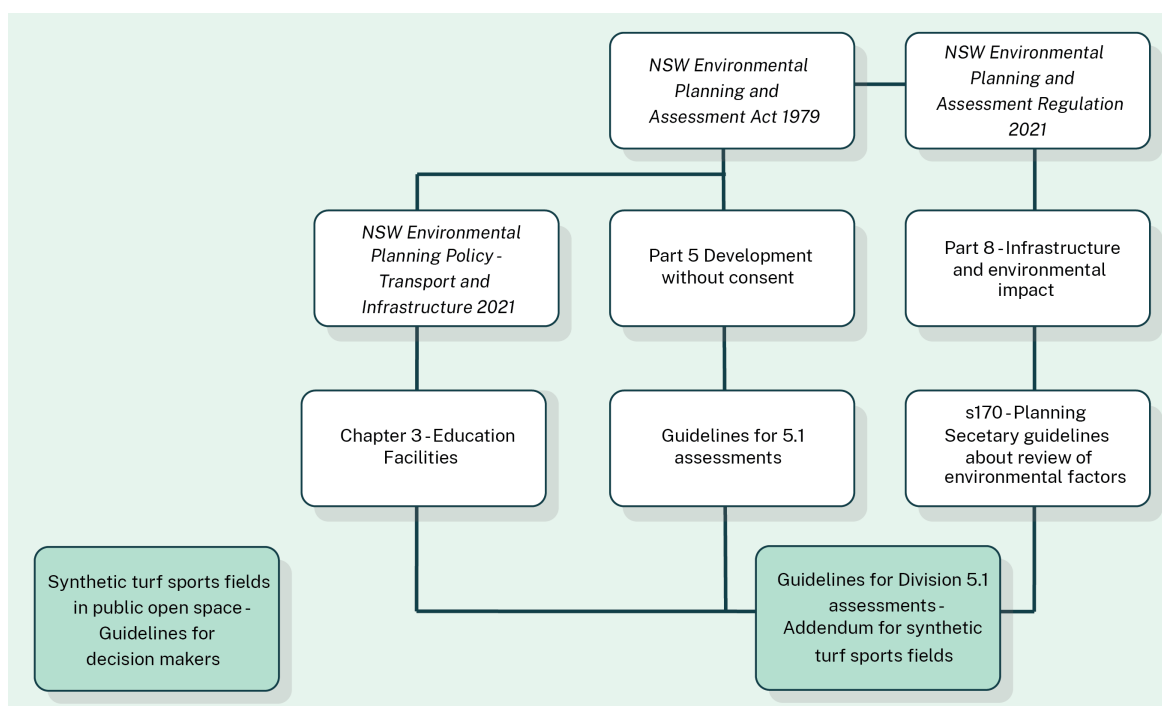


Figure 1 – NSW Government planning system approach to responding to the Synthetic Turf in Public Spaces
Independent review into the design, use and impacts of synthetic turf in public spaces – final report

1.2 Document purpose

This document is an addendum to the Guidelines for Division 5.1 Assessments (NSW Department of Planning and Environment, June 2022) issued under section 170 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation 2021).

This Addendum applies to the installation of synthetic turf for both new sports fields and upgrades to existing sports fields where it is proposed to be carried out as development without consent under a SEPP or LEP such as the *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

Determining authorities (such as councils and other public authorities) must apply this Addendum when preparing a Review of Environmental Factors (REF) for this type of development. This addendum only applies to the use of synthetic turf for sports fields uses.

Ensuring environmental assessment

This Addendum has been designed to ensure that the environmental assessment of synthetic turf sports fields is undertaken appropriately and considers all relevant factors. The length and detail of an REF will vary depending on the location, scale, complexity and potential impacts of the activity being assessed.

This Addendum has been released for a three month period of transition to allow stakeholders time to become familiar with the documents, after which it will be issued by the Planning Secretary on 25 August 2025 and applies to assessments of synthetic turf sports fields after this date. It will remain in force unless it is removed from the NSW Planning Portal and may be varied or revoked in accordance with the *Environmental Planning and Assessment Regulation 2021*.

1.3 How to use this document

It is critical that users review the *Guidelines for Division 5.1 Assessments* first before addressing the matters in this Addendum. This Addendum identifies:

- › The key environmental impacts of synthetic turf installation
- › Matters that need to be considered when assessing those impacts
- › Appropriate management measures and best practice approaches.

It also provides guidance on appropriate technical studies and other documentation that should be undertaken in support of the environmental assessment.

The items that are listed below as ‘matters for consideration’ are prompts for consideration when designing and assessing synthetic turf sports fields. They should be read in conjunction with the *Synthetic turf sports fields in public open space – Guidelines for decision makers*. These guidelines provide a more detailed look at strategies to manage synthetic turf sports fields.

It should also be noted that the matters of consideration listed here are not exhaustive and additional factors and studies may be required for specific sites.

For technical matters, it is recommended the matters listed for assessment be prepared by suitably skilled, experienced and qualified practitioners as per the *Certified Environmental Practitioner (CEnvP) Scheme*². Any assessment or reports produced to inform the REF must be done in accordance with industry best practice and any applicable standards or policies.

² <https://www.cenvp.org/>



1.4 Supporting documentation

Preparing REFs for synthetic turf sports fields is likely to require undertaking detailed technical studies to examine and determine potential impacts of the development and refine the design of the project to avoid, mitigate or minimise impacts.

For highly technical matters, it is recommended the matters for consideration outlined below be prepared by suitably skilled, experienced and qualified practitioners. Any assessment or reports produced to inform the assessment must be done in accordance with industry best practice and any applicable standards or policies.

1.5 Involving the community

While synthetic turf sports fields may be permissible without development consent and therefore not subject to mandatory public exhibition requirements, their location and design are still typically of community interest.

A key finding of the NSW Chief Scientist and Engineer's final report was increased community involvement in the planning and approval stages of synthetic turf sports fields. Therefore, it is strongly recommended that:

- › Proponents consult with the community early on in the process, such as during the planning and design stage of the development; and
- › Draft REF's for synthetic turf sports fields be placed on public exhibition on the determining authority's website for a minimum of 3 weeks.

Determining authorities should consider any feedback from the community and stakeholders on the proposed activity in finalising the project design and REF assessment. For example, feedback from stakeholders may suggest alterations or additional mitigation measures are necessary to minimise impacts of the proposed development. Further detail on involving the community and REF publication requirements is provided in the Guidelines for Division 5.1 Assessments.

Arlington Reserve, Dulwich Hill, NSW.
(Nick Hyde, Dulwich Hill FC)

02

Matters for consideration



The information below is intended to guide councils and other public authorities when assessing proposals (as determining authorities) under Part 5 of the *Environmental Planning and Assessment Act 1979* to install new sports fields or upgrade existing sports fields involving synthetic turf. This Addendum, together with the Guidelines for Division 5.1 assessments and the NSW Chief Scientist & Engineer's "*Independent review into the design, use and impacts of synthetic turf in public open spaces*" 2022, gives guidance on how to design a synthetic turf sports field that takes account of its surroundings and any potential environmental impacts the development may cause.

Guidance on the following factors is provided in the next section:

- › Location of synthetic turf sports fields
- › Stormwater and soil health
- › Human health
- › Biodiversity
- › Amenity and intensification of use
- › Material selection and management

Under each of the factors is a description of the potential impacts followed by best practice assessment and mitigation that should be considered in the environmental assessment and determination of the proposal.

This is not an exhaustive list, and additional factors and studies may be required for specific sites - it is the determining authorities' responsibility to consider their duty under section 5.5 of the EP&A Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by carrying out the activity.

Top: Gunyama Park, Zetland, NSW
(City of Sydney)

Heffron Park, Maroubra NSW
(NSW Government)

2.1 Location of synthetic turf sports fields

2.1.1 Potential impacts

Flooding

Many sports fields are located on land with a relatively high risk of flooding. Flooding can occur as overland flow, with water moving at speed, or as slower floodplain inundation. Major flooding events can substantially damage infrastructure through deposition of sediment and debris, a risk for both natural and synthetic turf sports fields. Flooding can also exacerbate the spread of synthetic fibres and infill into the wider area and ecosystem, somewhat bypassing any filters/traps.

While some natural turf sports fields located in flood prone areas have been designed to assist water flow and/or act as a buffer between urbanised areas and natural bushland, synthetic turf sports fields in these locations may have adverse environmental impacts. Damage to drainage pores in synthetic turf sports fields because of flooding events may necessitate partial or entire replacement, with extreme flooding events having been known to move and lift entire synthetic turf sports fields.

Bushfire

As with other infrastructure, synthetic turf sports fields may be subject to an approaching bushfire via three forms of attack: radiant attack, ember attack and direct flame contact. Polymers used in synthetic turf have a low melting point (~100-170°C). Heating degrades the polymers, with ignition occurring from around 330°C, comparable to dead dry grass. The polymers used in synthetic turf can therefore be ignited in bushfire settings. The materials may cause additional risks due to toxic gases and noxious emissions being released.

Materials used in other layers and infill vary significantly in flammability. From a fire safety perspective, sand represents an important ingredient in the synthetic turf system to reduce heat release rates while other materials commonly used exhibit higher peak heat release rates and flammability. Synthetic turf blade material and infill material such as crumb rubber have lower melting and ignition temperatures than sand. Synthetic turf products that have been tested are classified as easily flammable. There are also

no relevant ignition or fire testing standards for outdoor applications of synthetic turf sports fields experiencing bushfire wind and temperature conditions³.

Climate change

The changing climate will impact the safety, health and wellbeing of citizens and biodiversity, as well as the durability and resilience of built infrastructure and urban ecosystems.

Future extremes of flooding, heat and fire risk will affect the performance of different types of both synthetic and natural turf. The impact of intense rainfall and flood on the durability of synthetic turf sports fields and increased water runoff and pollution impacts are noted concerns. Increased heat effects are also a concern, as synthetic turf lacks the cooling and latent heat loss of natural turf; and high surface temperatures have been recorded from unshaded synthetic turf sports fields.

Heritage

Synthetic turf sports fields within close proximity to heritage items or within heritage conservation areas can have a negative impact on the heritage qualities that the heritage controls are trying to protect. With the look of the synthetic turf sports field and the intensity of use they can dominate the setting and diminish the heritage values. Consequently, consideration needs to be given to ensure that this is not the case.

2.1.2 Assessment and mitigation

Strategic planning and cumulative impacts

- Undertake strategic planning at LGA-wide level to identify appropriate locations for synthetic turf sports fields, having regard to environmental, social and economic constraints.
- Assess cumulative impacts from the addition of sports fields at a regional as well as local scale, including heat, extent of impenetrable surfaces, light, soil and water health.

Flooding and bushfire

- Synthetic turf sports fields should not be located in areas of high bushfire and extreme flood risk. Filtration systems should be designed in such as fashion to not be overwhelmed by high and extreme flooding events.
- Risk assessments should be undertaken for extreme flood risk and high bushfire prone areas. Assessments and testing should be informed by relevant NSW Government emergency response agencies as well as independent expert advice.
- Where synthetic turf sports fields are proposed on bushfire prone land, undertake detailed assessment of potential bushfire impacts having regard to the findings in the Chief Scientist's review⁴.
- Consider the use of sand as part of synthetic turf system to reduce bushfire risk.

Climate change

- Consider future climate trends and potential impacts when assessing the location and lifespan of synthetic turf sports fields.
- Assess the contribution of a synthetic turf sports fields to increased heat at a local climate scale. Suggestions for mitigation of surface heat include using particular infill, mixing organic components or liquid to the surface and use/retention of shade where possible.
- Assess the contribution of the synthetic turf sports field installation to greenhouse gases through its lifecycle from manufacture to disposal.

Heritage

- Where synthetic turf sports fields are proposed within a conservation area, Aboriginal Heritage site⁵ or adjacent to a listed heritage item, a heritage impact statement should be prepared. This statement can determine impacts, how impacts can be mitigated, or recommend a more appropriate site is found.

2.2 Stormwater and soil health

2.2.1 Potential impacts

Synthetic turf sports fields have the potential to result in water contamination and adverse impacts on soil health. There is evidence that both rubber infill and turf fibre blades from synthetic turf sports fields are found in waterways in NSW. It has been estimated that a synthetic turf sports field without structures to reduce infill loss will wash tens to hundreds of kilograms of infill per year into stormwater systems or waterways. The amount of turf fibres lost from a synthetic turf sports field is likely to be in the 100's of kilograms per year, with the amount increasing for sports fields near the end of life or under poor maintenance⁶.

International studies have also found a large difference between the amount of microplastics shed from different types of synthetic turf with weathering, UV exposure and the association of microbes with plastic material influencing leaching of chemicals into the environment⁷.

Consideration of soil health in urban environmental planning is necessary as it underpins all other important environmental assets. The main impacts of installing a synthetic turf surface on soil health are likely to be compaction and contamination.

Contamination from crumb rubber and other materials and additives used in synthetic turf have potential to adversely impact surrounding environments as particles and leachate travel through the soil and impact other environments.

2.2.2 Assessment and mitigation

- Management plan developed and maintained by qualified and experienced specialists.
- Stormwater treatment devices must be fitted into drainage systems. Device performance should be independently tested and verified, both in controlled conditions and in the sports field, such testing undertaken by an appropriately experienced, equipped, and independent organisation.
- Sports fields located in proximity to or draining into a sensitive ecosystem must be independently assessed. Runoff should be sampled, with testing outcomes reported on and remediation action taken to bring testing as per the Australian and New Zealand guidelines for fresh and marine water quality.
- An assessment of the impact of the proposed synthetic turf sports field installation on soil health should be undertaken by a soil scientist and included in the REF. Include mitigation measures for any impacts.
- Design details of identified mitigation measures are to be included in the REF package and in the ongoing management plan.
- Best practice synthetic turf sports fields include:
 - › A surrounding solid curb to prevent microplastic loss and overland runoff entering or exiting the sports field
 - › An enclosed drainage system that collects all water from the sports field and surrounds
 - › Stormwater treatment devices with a minimum 200 micron terminal screen size filter system, fitted within the drainage system to collect microplastics as they leave the sports field
 - › A system that can manage leaf litter and other debris that may collect on the sports field;
 - › Easy cleaning and maintenance
 - › A resourced and budgeted cleaning, monitoring and regular maintenance plan that can be adjusted to suit sports field needs and filtration capacity.
- Refer to the Australian Standard technical report SA TR CEN 17519:2021 'Surfaces for sports areas - Synthetic turf sports facilities - Guidance on how to minimise infill dispersion into the environment' for more advice.

3 Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report, page 25-26, and Appendix 10 – Use of Synthetic Turf in Bushfire Prone Areas.

4 See Section 3.2.3 and Appendix 10 Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report

5 To search for Aboriginal sites follow the Aboriginal Heritage Information Management System | Heritage | Environment and Heritage

6 Office of NSW Chief Scientist & Engineer, op cit, p.vi

7 Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report, Appendix 17 – Soil Health

2.3 Human health

2.3.1 Potential impacts

Potential health impacts of the use of synthetic turf sports fields in public open spaces include:

- › Heat-related illness, thermal comfort and urban heat island effect
- › Chemical, microplastic and microbiological health risks
- › Air pollutants and odour
- › Mental and the social dimensions of health, including community access and impacts on nearby residents relating to wellbeing and social cohesion.

The Chief Scientist's review also considers potential impacts associated with injuries on synthetic turf were non-conclusive, but the review recommended these should be considered.

The heat retaining properties of synthetic turf surfaces is a characteristic that can impact health during hot conditions and their use should only be recommended during suitable weather for users on or around the sports field, particularly for children and exercising individuals who are susceptible to heat exhaustion. The contribution of synthetic turf sports fields to the urban heat island effect at scale is likely small, but the cumulative depletion of natural turf over time may exacerbate urban heat island effects and increase heat exposure risk in the population.

Without structures to reduce infill loss, tens to hundreds of kilograms of infill per year will wash into stormwater systems or waterways. The amount of turf fibres lost from a synthetic turf sports field is likely to be in the 100s of kilograms per year, with the amount increasing for sports fields near the end of life or under poor maintenance. International studies have also found a large difference between the amount of microplastics shed from different types of synthetic turf⁸.

Gaseous chemicals are emitted from synthetic turf sports fields in low concentrations. Air pollutants from synthetic turf require more research to determine risks to vulnerable portions of the population such as children, and any potential long-term effects.

Odours from synthetic turf sports fields have been reported and can impact the quality of life and experience for players on the sports field and the local community.

While the impact of installation directly on the soil ecosystem below it has not been studied, research examining soil under impermeable surfaces has found an anerobic environment, which may lead to an increase in pathogens harmful to human health.

The relationship between green space and health is complex and multidimensional. The replacement of natural turf sports fields with synthetic turf may decrease local communities' access to natural green space and amenities, which may have implications for community cohesion and mental health.

Replacement of existing natural turf sports fields in residential areas with a synthetic turf sports field appears associated with the highest level of concern and dissatisfaction for the community, particularly nearby residents (look and intensification of use) due to the well-documented mental and physical benefits provided by quality green spaces. However, if the outcome is beneficial (e.g. improved and functional sports field) or one that provides appropriate thermal comfort via natural vegetation and shading, then overall health impacts may be positive.

2.3.2 Assessment and mitigation

- Consider opportunities for shading of synthetic turf sports fields, turf infill choice, new product choices and irrigation to reduce urban heat island effects of synthetic turf.
- Implement stormwater management measures identified in above to mitigate leaching of chemicals and microplastics into the environment.
- Undertake early consultation with the community to ensure mental and social dimensions of change from natural to synthetic turf sports fields are well understood and taken into account during assessment.
- Prepare an air quality impact assessment and air quality management plan.

- Prepare an odour impact assessment and odour management plan.
- The air quality and odour impact assessments should be undertaken by appropriately qualified specialists.
- Complete an appropriate human health risk assessment that incorporates the above points and additional relevant considerations to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals or other harmful substances in the environment.



2.4 Biodiversity

2.4.1 Potential impacts

There are a range of potential impacts to biodiversity caused by replacing natural turf with synthetic turf sports fields. These impacts extend beyond the footprint of the sports field, and include:

- › Tree canopy loss, through root removal or dieback
- › Biodiversity change
- › Biodiversity loss and health impacts for particular fauna (e.g. Reported incidences of synthetic turf ingestion)
- › Habitat loss (e.g. Insects and grass seeds)
- › Disruption of habitat corridors, increased edge effect potentially leading to population fragmentation
- › Increased artificial light at night
- › Increased heat from the synthetic turf sports fields.

2.4.2 Assessment and mitigation

- Undertake biodiversity impact assessment to identify potential impacts of synthetic turf sports fields, including impacts of habitat loss, heat effects on fauna and light spill. The biodiversity impact assessment should consider impacts beyond the footprint of the sports field in question.
- The biodiversity impact assessment should identify appropriate management measures to reduce impact such as strategic planting of vegetation around synthetic turf sites and replacement of trees to be replaced at a minimum ratio of 2:1.
- Good practice frameworks for managing and mitigating adverse impacts of lights from sports fields on fauna are included in Appendix 16 of the Chief Scientist's review⁹.
- The details of how a proposal's lighting design minimises adverse biodiversity impacts should be included in the REF.

⁸ Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report, page vi.

⁹ Professor Dieter Hochuli et al, Synthetic Turf in Public Spaces: effects of artificial light and heat on biodiversity, undated (Appendix 16 of Chief Scientist's review, op cit)

2.5 Amenity and intensification of use

2.5.1 Potential impacts

Synthetic turf sports fields tend to be more intensively used than natural turf sports fields and therefore impacts such as light spill, noise traffic and parking issues may be greater, particularly where sports fields are located close to residential areas.

The Chief Scientist's review found greater community dissatisfaction with these factors appears mostly associated with single sports fields installed in predominantly residential areas where a synthetic turf sports field has replaced a formerly natural turf sports field.

Light associated with sports fields can be positive in terms of perceived increased physical safety and allowing increased hours for exercise. However, sporting lights are extremely powerful and can be an intrusive and harmful cause of light pollution to receiving communities.

2.5.2 Assessment and mitigation

- Consider the effects on accessibility, life quality, infrastructure access and amenity as part of early community consultation and planning.
- Identify opportunities for dedicated multi-field sports centres and hubs with parking and/or located in areas already associated with similar activities rather than close to residences.
- Ensure appropriate assessment of amenity impacts, including noise, traffic, light and odour, is included in the REF.
- Consider the impact that having an area of open space now fenced off will have on the current users of that open space.

Reserve 811, Kellyville Ridge NSW
(NSW Government)



2.6 Material selection and management

2.6.1 Potential impacts

Synthetic turf sports fields in NSW for the most part feature long synthetic blades supported by infill. Currently, the most used infill is styrene butadiene rubber (SBR) crumb sourced from waste tyres. The NSW Chief Scientist and Engineer's Review found that health risks through direct (such as dermal, ingestion and inhalation) or indirect contact (such as leachate and microplastic runoff) from synthetic turf is likely to be low. However, restrictive measures to limit potentially harmful chemicals, leachates and microplastics in synthetic turf components may reduce unforeseen consequences to health¹⁰. SBR crumb is the material most associated with community concerns about contamination, odour and ingestion issues. Currently, there are no requirements nor standards governing the materials or construction methods used to manufacture synthetic turf. Increasing attention has been given to microplastics and chemicals of concern, particularly those contained in SBR crumb.

Disposal will become a pressing issue in NSW in the coming decade as existing synthetic turf sports fields reach end of life. Councils have reported that it is challenging to find suitable end of life strategies for synthetic turf. There is future potential to manage this issue, with Victoria recently providing funding for Australia's first synthetic turf recycling hub¹¹. This has the prospect for up to 98% recovery of raw material for repurposing and distribution. Also, a circular economy within the synthetic turf industry has been created in Europe.

There is an increasing body of knowledge to guide the management of natural turf, to optimise its resilience, carrying capacity, wet weather performance and water use. If applied to installation and ongoing management of natural turf sports fields, these practices may allow increased performance of natural turf sports fields to help meet demand.

2.6.2 Assessment and mitigation

- An end of life (EOL) management plan must be prepared and included in the REF. The EOL management plan should be consistent with the intent and provisions of the NSW Waste and Sustainable Materials Strategy and the *NSW Plastic Reduction and Circular Economy Act 2021*. If the preferred EOL option is unconfirmed, a contingency plan should be prepared.
- The practice of cutting up EOL sports fields for use in other settings is not an acceptable EOL plan.
- In considering project alternatives, the REF should assess the use of natural rather than synthetic turf. The document, *Best Practice Sporting Fields – A guide for turf surfaces in the Lower Hunter* (Hunter Water, 2022), should be used as a guide in this regard.
- Material data sheets for the materials being used are to be included in the REF and ongoing management plan.

¹⁰ Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report, page vi.

¹¹ Sustainability Victoria, <https://www.sustainability.vic.gov.au/projects/australias-first-synthetic-turf-recycling-hub>

Glossary

Carrying capacity

The theoretical higher limit of use hours a sports field can tolerate or is likely to sustain before wear and impact begin to deteriorate the surface and impact play.

Biopolymer

Biopolymers are more environmental-friendly alternatives to traditional petroleum-based plastics, derived from natural sources such as plants and microorganisms, biopolymers are biodegradable and less harmful to the environment.

Community

Anyone affected by or interested in a project under Division 5.1, including individuals, community groups, Aboriginal and Torres Strait Islander communities, culturally and linguistically diverse communities, representative bodies and stakeholder groups.

Crumb rubber

Rubber Crumb is produced through shedding processes that mechanically break apart tyre material. The resulting rubber crumb granules are microplastics measuring <5mm. The granules are comprised primarily of synthetic rubber polymer and other reinforcing agents, aromatic extender oils, vulcanisation additives, antioxidants, and processing agents. The resulting granules are commonly used as road base, to fill synthetic turf sports fields and as a soft fall surface on playgrounds.

Leachate

Leachate is any liquid that, in the course of passing through matter, extracts soluble or suspended solids, or any other component of the material through which it has passed. This liquid often contains environmentally harmful substances.

Light pollution

Light pollution is the presence of unwanted, inappropriate, or excessive visual artificial light at night. Artificial light is composed of visible light, ultraviolet (UV) and infrared (IR) radiation derived from an anthropogenic source.¹²

Mitigation

Actions or measures to avoid, minimise, rectify (by repairing, rehabilitating or restoring) and/or reduce or eliminate over time (by preservation and maintenance) the adverse environmental impacts of a Division 5.1 activity.

Review of Environmental factors (REF)

An REF is the Division 5.1¹³ assessment under Part 5, Division 5.1 in the *Environmental Planning and Assessment Act 1979*.

The REF document is the documentation prepared under clause 156(3) of the EP&A Regulations to record the Division 5.1 assessment.

Tree replacement ratio

The tree-replacement ratio is a guide used to determine the number of new trees that must be planted to compensate for the removal of existing trees. This ratio ensures that the ecological, aesthetic, and environmental benefits provided by the removed trees are adequately replaced.

Urban heat island effect

The Urban Heat Island (UHI) effect occurs when surfaces and air in the cities are hotter than the surrounding non-urban environment

Surface run-off

The water flow that occurs when soil is infiltrated to full capacity and excess water from rain or other sources flows over the surface.

Synthetic turf

Turf surface made using 100% man-made fibres stitched into a carpet that is laid on an engineered constructed base often including a hard base layer and shock pad.

2G - Sand-based or sand dressed surfaces with short, dense pile usually less than 24mm.

3G - 35 to 65mm long-pile synthetic turf with sand and crumb infill keeping fibres upright and providing performance requirements. Infill can be a range of artificial or natural materials.

4G - Synthetic turf without infill crumb whilst still meeting all the performance requirements. These surfaces are in the early stage of development. Note, technologies beyond 3G have not yet been recognised by sport governing bodies.

Gore Hill Park, St Leonards NSW
(NSW Government)

¹² Office of the NSW Chief Scientist & Engineer, October 2022, Independent review into the design, use and impacts of synthetic turf use in public open spaces Final Report, section 5.3 p. 53.
¹³ Guidelines for Division 5.1 assessments



