

Artificial Turf - A Cause for Concern

My story - an accidental Artificial Turf expert

- Climate action Advocacy from 2004 (incl at UNFCCC COPs)
- Feb 2018: Question on urban heat impact at Merri-bek Council meeting on Sports Surfaces Needs Analysis that proposed a pipeline of 8 synthetic turf projects
- Oct 2020: Hosken Reserve, Coburg North, AT conversion/ lack of consultation campaign
- April 2021: [Literature Review on synthetic turf health and environmental impacts](#)



Artificial Turf - A Cause for Concern

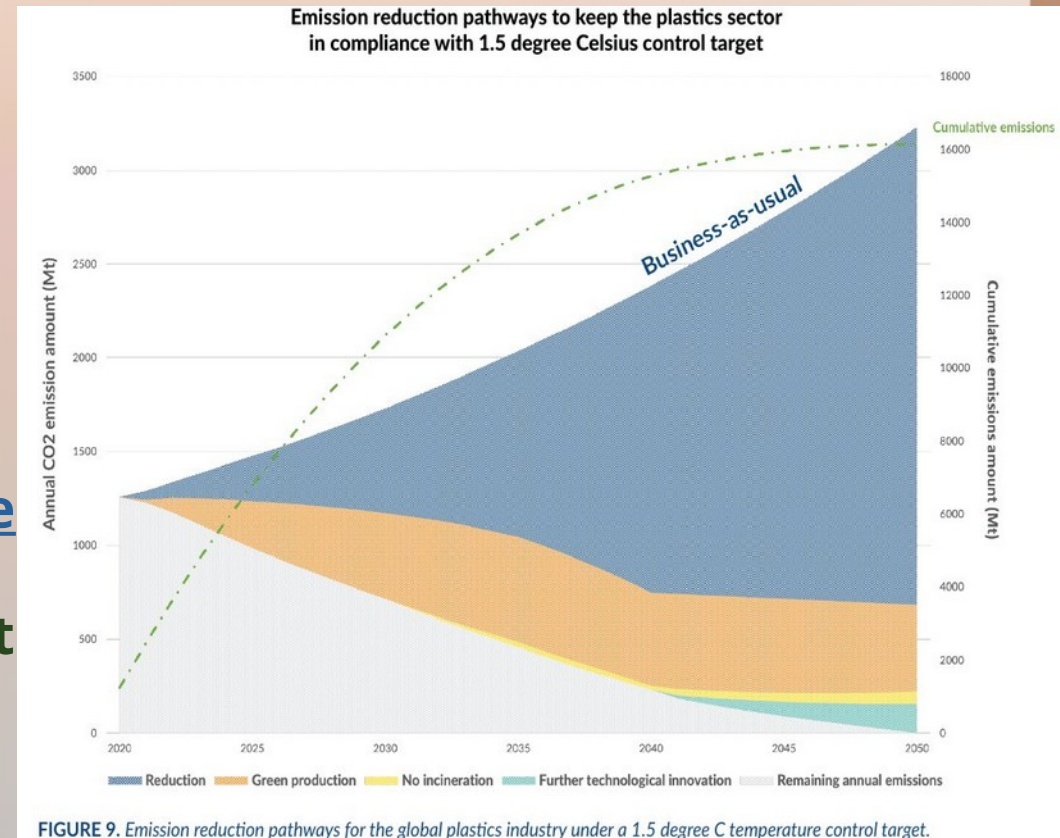
What is wrong with Artificial turf?

- * Derived from fossil fuel petrochemical industry
- * Produces greenhouse gas emissions during all stages of lifecycle
- * Problematic to recycle, Increases landfill at end of life
- * Produces microplastics pollution (Both waterbased and airborne)
- * Heat health, thermal comfort impact. Adds to urban heat island effect
- * Replaces natural grass. soil organic carbon sequestration, oxygen
- * Reduces soil biota, insects: trophic impact on local biodiversity.
- * Compacts the soil increasing stormwater runoff
- * Toxic Chemical leachates from fibre & rubber infill pollute waterways
- * Air pollutants and odours
- * increased lower extremity injuries
- * Long term human health impacts uncertain
- * Enhances potential infection transmission risk.
- * Appears to improve water conservation, but the situation is complex
- * Increased fire risk, flood risk
- * Reduced community amenity for multifunction/informal use
- * Infill and fibres contain rich chemical mix. Includes PAHs, VOCs, PFAS

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Artificial turf : Plastics from fossil fuel gas processing

- Plastics production seen by Fossil Fuel sector as growth area.
- Petrochemical companies seek to pivot their business models to encompass the 'circular economy' and 'sustainability'
- Latest climate research: Plastic must be reduced by at least 75% by 2050 (PDF). This includes phasing out single-use plastic by 2040 and curbing durable plastic.
- Synthetic turf fibers emit small quantities of greenhouse gases methane and polyethylene gas through the life cycle.



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Artificial turf : a rich Chemical cocktail

- **Fibres: Polyethylene / Polypropylene / nylon**
- **Matting: Polyurethane**
- **Infill: Crumb Rubber, sand, TPE, EPDM, R-EPDM, organic (cork/coconut husk)**
- **Plastics contain many chemical additives: Plasticizers, flame retardants, biocides. Chemicals identified in artificial turf, including polycyclic aromatic hydrocarbons (PAHs), phthalates, and per- and polyfluoroalkyl substances (PFAS), are known carcinogens, neurotoxicants, mutagens, and endocrine disruptors. Heavy metals also present, most common is zinc.**
- **Crumb Rubber: polycyclic aromatic hydrocarbons (PAHs), metals, plasticizers, such as phthalates, and bisphenol A (BPA)**
- **Accurate Chemical content of artificial turf plastics unknown, unregulated. Crumb Rubber infill chemicals also unregulated.**

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Artificial turf poses health risks

- Health risk assessments conclude AT a low health risk to adults. Health Risk management used rather than precautionary risk.
- Studies confirm increased lower extremity injuries
- Long term health risk still uncertain, with many knowledge gaps
- The only human epidemiology studies conducted related to artificial turf have been highly limited in design, focusing on cancer incidence.
- Children at greater health risk, “No studies have addressed children’s exposure to chemicals from artificial turf surfaces via oral and dermal routes.” (ICAHN School of Medicine – Childrens Environmental Health Centre ([2021 letter PDF](#)))
- “Specific lack of empirical evidence around indirect and longer-term cumulative health impacts with a general lack of field studies, epidemiological studies and health risk assessments in the Australian context.” ([NSW CSE report PDF](#))

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Artificial turf poses Environmental risks

- Produces microplastics pollution (Both waterbased and airborne) from fibres and infill as it weathers and degrades.
- Microplastics hacky structure means it can become a vector for toxic chemicals, heavy metals and even viruses.
- Microplastics impacting aquatic and terrestrial ecosystems, pass up the food chain.
- Humans can inhale, or ingest from the foodchain. Microplastics may accumulate. Nanoplastics now found in human blood. Long term human health impacts unclear, being researched.
- Many leachate chemicals already polluting and changing aquatic ecosystems.

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Artificial turf poses Environmental risks

- **Artificial turf is flammable.**
Poses a bushfire risk.
- **Flood events can cause major damage and significant water pollution**
- **Adds to urban artificial surfaces reducing species biodiversity, especially birdlife**
- **Artificial light upgrades can impact local biodiversity & nocturnal behaviours**
- **Adds to Urban Heat Island, may affect nearby residents including household energy use**



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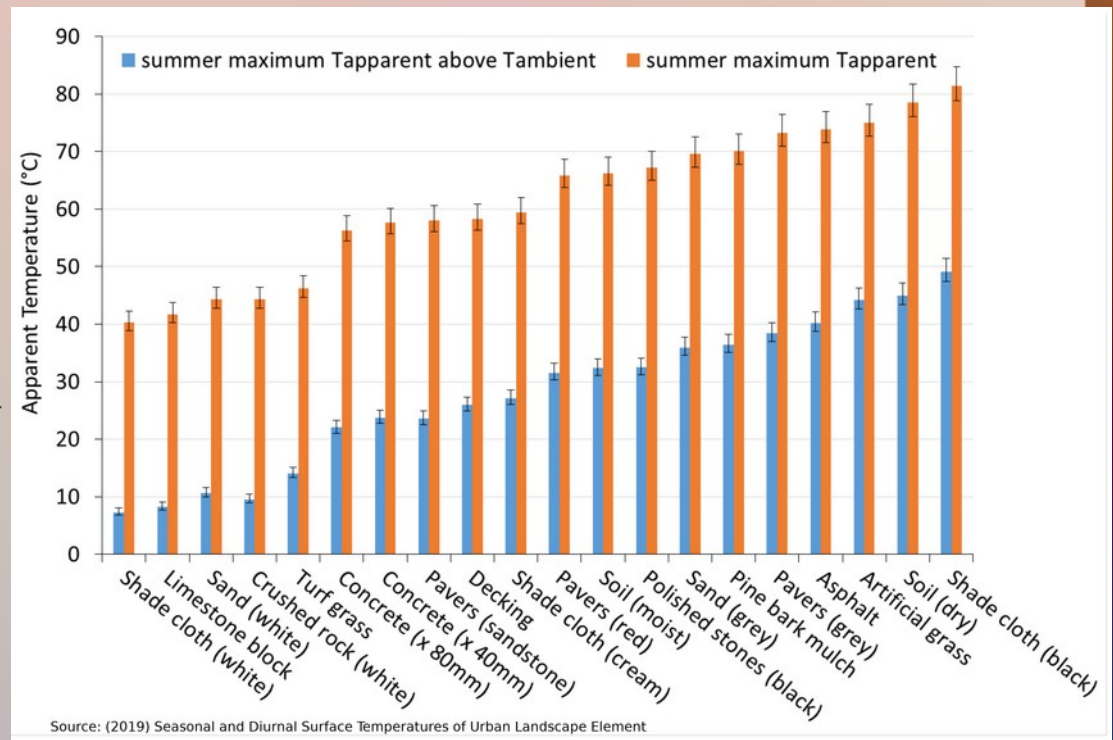
Artificial Turf adds to Urban Heat island effect

Elevated temperatures pose a general threat to public health with disruption to sleep and thermoregulation resulting in heat stress.

Artificial Turf found to contribute to the Surface and Canopy UHI locally (Golden, 2021)

* Surface temperatures of artificial turf may be elevated well into evening (Loveday 2019)

* Where artificial turf leads to an increase in air temperature by 1.85°C , this could produce an increase in local residential cooling energy use and utility costs up to 72% in Melbourne (Siebentritt 2020)



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Why is Artificial Turf popular

- Water Conservation (Millenium Drought)
- All weather sports surface, perceived greater capacity for sports use
- Low Maintenance
- Good marketing
- Capital cost often funded by Council/State Government
- Vic Sports and Recreation Artificial Turf guide Feb 2011 (long Out-of-date)



Artificial Turf - A Cause for Concern

Why is Artificial Turf popular

Sports Federations/Sports Clubs advocacy:

- Perceived increase to sports use capacity (40-60 hrs/wk)
- Reduces multisports & general informal community use, offers more dedicated space for particular sport. Land grab.
- Capital cost funded wholly or in part by Council/State Government grants
- All weather sports surface
- Low Maintenance



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Artificial Turf, wet weather & microplastics pollution

- NSW CSE Hydrology report (Appendix 4): Sports clubs argue advantage of wet weather sports use, but use of synthetic turf during wet conditions exacerbates infill loss microplastic pollution and should be avoided. ([NSW CSE report PDF](#))

“Reducing exposure during wet conditions when infill transport is highest [104, 105, 113]. Considering that the ability to play in wet conditions is a major advantage of ST fields, it is unlikely that play will be minimised when the field is wet. However, ideally maintenance should be avoided during wet conditions, and this was shown by Regnell (2018) to result in a reduction of infill material on the maintenance vehicle from 24.1 kg to 12.4 kg per brushing session”

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End of Life/Recycling of artificial turf:

- NSW CSE: R2.1 - End of Life Management Plan needs to 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.
- R2.2 - “The practice of cutting up EOL sporting fields for use in other settings should not be approved as an acceptable EOL plan”
- Hybrid Turf – NSW CSE 3.3.4 Recycling methods for synthetic turf: “There is not much information available about suitability or methods to recycle hybrid turf. The Review has been advised that recycling hybrid turf may be more complex in applications where natural turf is combined with synthetic materials, either by attachment to a mat or where it is in growing amongst a base of synthetic turf fibres.” - ([NSW CSE report PDF](#))
- Victoria establishing mechanical separation AT recycling, but question over furthering contamination ([Sustainability Victoria](#))

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Are there alternatives to Artificial Turf

- Well maintained, improved natural turf can provide sports capacity up to 35-40 hrs / wk to meet demand.
- Needs State level guidelines on cultivars, natural turf maintenance, soil improvement, irrigation, drainage.
- Natural turf is good for soil health, supports biodiversity, ameliorates urban heat island effect on local microclimate by evapotranspiration.
- Natural turf fits with long term sustainability and circular economy goals. No end of life issues.
- Bioplastics turf may become available, but will likely still have heat issues, and other environmental issues

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The politics of Artificial turf

- Artificial turf sportsfields surged during Millennial Drought
- Driven by Sports Federations and Sports clubs demanding all weather use and greater capacity.
- Clubs also realise it is a method to change sportsfields to more dedicated use, alienating community and general informal use.
- Health, environment considerations secondary, if at all.
- No focus on long term sustainability and circular economy, issues highlighted by Climate Crisis and Plastics Crisis.
- Councils, with little expertise, pressured by Sports clubs. Often close working relationship between Council staff and organised sport.
- Councillors, MPs can be beholden to clubs for political support
- State Government provides grant funding, minimal approval guidelines, an outdated guideline for installing artificial turf

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What is Happening Elsewhere

- **2022: NSW set guidelines for natural turf. Chief Scientist Review recommendations to Government for data, end of life, short term pollution mitigation, favours natural turf to meet Sports demand.**
- **2022: City of Boston bans all new artificial turf installation**
- **2020: European Union approved a restriction on granules and mulches used in synthetic turf infill used in sporting fields and playgrounds to $20 \mu\text{g g}^{-1}$ for eight PAHs that are considered carcinogenic (European Chemical Agency., 2020). Further restrictions were placed by the Dutch authority to reduce the concentration of eight PAHs rubber infills in synthetic turf pitches to 17 mg/kg after further evaluating the health risks associated with synthetic turf infills. Dutch Government has announced an intention to phase out all crumb rubber infill by 2030.**
- **2019: Adelaide City Council unanimously bans artificial turf on verges following claims it contributes to urban heating and landfill.**

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What is Happening In Victoria

- **Feb 2011: Victorian Government published sports guidelines for artificial turf, not updated. Few general health and environmental warnings or standards as part of the guideline.**
- **Sept 2022: I asked EPA Victoria to test for PFAS / Fluoropolymers in Synthetic Turf. They declined, yet warned that a precautionary approach to avoid should be taken if PFAS presence suspected.**
- **Feb 2022: Sustainability Victoria funded synthetic turf recycling \$500,000. Possible presence of PFAS & other toxic chemicals raises questions whether mechanical recycling even feasible, given risk of furthering toxic contamination spread. And at what Cost?**
- **Feb 2022: Victorian Parliamentary Inquiry into Environmental Infrastructure for Growing Populations report. Gov yet to respond. Recommendation 4a: "investigate the environmental impacts, as well as cost-effective mitigation strategies, associated with the large-scale installation of synthetic surfaces in coming years".**

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Happening in Merri-bek

Merri-bek Council chose not to proceed with Hosken Reserve North conversion to Synthetic pitch in May 2021. Hybrid for south oval

Council commissioned a Sports Surface Study in 2022 to put forward a science based decision framework for sports surfaces. Pending July 2023

As at April 2023 Council is converting en tout cas tennis courts to sand filled synthetic courts, with no public engagement.



Charles Mutton Reserve:
Artificial Turf tennis Courts
installed April 2023



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Federal Regulation

- Little action so far apparent at DCCEEW (Tanya Plibersek)
- **Federal Chemical Regulation: PFAS class of chemicals are not produced in Australia. It is imported as a controlled chemical. Importers of PFAS must comply with legal obligations under the Industrial Chemicals Act 2019 (IC Act), which came into force from 1 July 2020. All Tyres also imported. Virgin Crumb Rubber imported. Federal Government could impose regulations or restrictions for PFAS and chemical restrictions for crumb rubber.**
- **Research Funding: Federal funding could close the Substantial knowledge gaps identified by Chief Scientist and Engineer Review.**
- **Australian Local Government Association (ALGA) National Conference, Canberra 20-23 June 2021, unanimously called for Federal Government: "to investigate the environmental impacts of artificial turf and more environmentally appropriate alternatives for sporting surfaces." (Report)**

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Artificial Turf in Schools

- Use of artificial turf in education environments highly problematic, posing health burn and thermal comfort risks, inhalation and ingestion of microplastics and air pollutants, also potentially affecting learning capacities. (NSW CSE Pfautsch and Wujeska-Klaue (Appendix 7 of [CSE report PDF](#)), Pfautsch S., et al (Sept 2020) [School Microclimates](#))



Moomba Park Primary School
synthetic turf playground

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Resources:

- **Natural Turf Alliance – Campaign Based in Sydney but people in Vic and SA** <https://naturalturfalliance.org/>
- **Turf Australia**
<https://www.turfaustralia.com.au/resources/turf-information/natural-turf-vs-synthetic-grass/>
- **Non Toxic Communities (US network)**
<https://www.nontoxiccommunities.com/>
- **Safe Healthy Playing Fields (US)**
<https://www.safehealthyplayingfields.org/>
- **Public Employees for Environmental Responsibility (US)**
<https://peer.org/?s=artificial+turf>
- **Plastics Rebellion (UK)**
<https://www.plasticsrebellion.earth/campaigns/toxic-turf>
- **Environment & Human Health (US)** <https://www.ehhi.org/turf.php>

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Other Issues? Questions?

NSW Planning -

[Synthetic Turf policy page](#)

Literature Review (April 2021):

<https://takvera.blogspot.com/2021/04/literature-review-synthetic-turf-carbon.html>

Climate Action Merribek:

<https://climateactionmoreland.org/our-campaigns/campaign-against-synthetic-turf/>

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