

Briefing Note on Artificial Turf for sportsfields, playgrounds, schools and kindergartens

Artificial turf, also known as Synthetic Turf, is a problem the Victorian State Government needs to address as a priority in the portfolios of Community Sport, Early Childhood and Pre-prep, Education, and perhaps also a role for Health, and Local Government.

The Victorian parliamentary Inquiry into Environmental Infrastructure for Growing Populations handed down its report ([pdf](#)) in February 2022. The Government has yet to respond. Recommendation 4a was "investigate the environmental impacts, as well as cost-effective mitigation strategies, associated with the large-scale installation of synthetic surfaces in coming years;"ⁱⁱⁱ

In 2011 Sports and Recreation Victoria set guidelines for Artificial Grass for Sport. This document has not been amended or updated despite a decade of research on the actual and potential health and environmental impacts of artificial turf for sports fields.ⁱⁱ

Use of artificial turf in playgrounds, kindergartens and schools. The Good Play Space Guide (Sport and Recreation Victoria 2007), is in need of major overhaul and update. It warns of contact burns and heat injuries, but fails to warn of children's higher susceptibility to these risks than adults (as detailed in research)ⁱⁱⁱ and inhalation of fumes and microplastics. It provides no decision making framework for using synthetic turf in playgrounds, whether in parks, kindergartens or schools.^{iv} Ideally, Victoria Sports and Recreation and Education Department should have thermally comfortable design standards for landscape design of all playgrounds, including in schools, using Australian conditions but similar to *Thermally Comfortable Playgrounds* prepared for Standards Council of Canada.^v Artificial turf has been widely used in playgrounds, much of it fully exposed to the sun, apparently without adequate state government guidelines exposing our children to a number of short term and potentially cumulative (microplastics) health risks.

State Grant Funding. Artificial turf has been seen as a low maintenance surface providing higher sports use capacity. It also has high upfront capital costs. Many of the sports fields conversions to synthetic turf are financed, wholly or partially, through state government grants. There should be adequate oversight of all grants in the portfolios of Community Sports, Early Years, and Education, to ensure good governance and decision making is based on a robust triple bottom line framework including environment and health impacts and mitigation of risks.

The NSW Chief Scientist and Engineer conducted a significant investigation into use of synthetic turf in public spaces in NSW in 2022, drawing upon significant scientific assessments and proposing recommendations for action. This includes preferring exploration of better management of natural turf surfaces for greater sports capacity. Several of the science assessments found significant knowledge gaps. Victoria should draw upon the recommendations of this report for implementing in Community Sport, Early Years and Education portfolios in Victoria.^{vi}

Environmental and health impacts seldom considered on par with Sports Social benefits in decision making. Most sports fields conversions have focussed almost exclusively on sports capacity and associated social benefits and largely ignored environmental and health risks or treated them as a minimal afterthought, in decision making. This is poor governance.

Triple Bottom line decision framework required, including the precautionary principle. Decisions for implementing artificial turf use (or other surfaces) for either community sports, early years playgrounds or education environments should use a triple bottom line decision making framework that incorporates social, economic, environmental (and health) benefits and impacts. The precautionary principle should be fully integrated in the framework.

The Problem

- Artificial grass adds to urban heat in urban microclimates. This is a growing issue given rising temperatures with climate change.
- On warm days artificial turf in playgrounds can approach extreme temperatures which can produce contact burns. These can be even more severe in children. Shade strongly recommended for all high heat surfaces to reduce risk of contact burns and UV exposure .^{vii}
- Research from University of Western Sydney recommended for schools “Use of artificial grass should be avoided or restricted to areas with zero exposure to direct sunshine.” It can also increase the local school micro-climate affecting childrens learning capacity. (Pfautsch et al 2020)^{viii}
- Artificial turf produces microplastics and nanoplastics both from infill and from the fibres from natural weathering from UV exposure and wear and tear usage. This is a cause of environmental pollution. These particles can provide a vector for other toxic pollutants. They can be inhaled adding to the cumulative ingestion of microplastics by humans. Smaller, lighter particles are airborne and spread further, while larger particles are washed into stormwater systems and waterways where they can be taken up in freshwater and marine ecosystems. Health impact of inhalation and ingestion of microplastics is a very active area of research with cumulative human health impacts presently unknown.
- Artificial turf is known to contain PFAS chemicals from testing in the USA and Europe. NSW EPA has recommended testing for PFAS be considered in the context of testing for other more prevalent chemicals such as PAHs and some heavy metals. They suggest there would be a benefit in including PFAS in the suite of potential contaminants that are routinely investigated at synthetic field sites.
- While health risks are currently assessed to be low, there is still a lack of long term research, especially research specific to children, and synthetic turf in Australian conditions.
- Artificial turf as an artificial surface reduces urban biodiversity,
- Artificial Turf makes the underlying soil hydrophobic adding to flash flooding risk from more extreme rain events increasing with climate change.
- Artificial turf has high embedded carbon, emits methane and ethylene gas through its life,
- Artificial turf is difficult to recycle. Chemical contaminants (such as PFAS, heavy metals) in used artificial turf may mean plastics recovered in any recycling process may have limited reuse value as a feedstock. End of Life: NSW Chief Scientist report recommended no secondary use of artificial turf and highlighted difficulty of recycling hybrid fields.

Please refer to the NSW Chief Scientist and Engineers report on [Synthetic Turf in Public Spaces](#) and the 16 scientific appendices for a detailed appraisal of the knowledge gaps, problems, alternatives, and recommendations for action. NSW has set guidelines for natural turf, and report recommendations included for better data, addressing end of life, short term pollution mitigation, and favouring natural turf to meet Sports demand.

Background.

My concerns with synthetic turf arose in late 2020 with the imminent conversion of a multi-use natural grass sports field – Hosken Reserve in Coburg North - to a synthetic grass soccer pitch. I read scientific literature extensively to prepare a Literature Review on environmental and health impacts of synthetic turf, published in April 2021. ^{ix} Many of my conclusions were confirmed by the scientific assessments in the NSW Chief Scientist Report in 2022. In June 2023 I prepared an up to date [21 slide summary: Synthetic Turf Cause for Concern](#) (PDF) [on the issue](#).

John Englart, 8 August 2023

- i Victorian parliamentary Inquiry into Environmental Infrastructure for Growing Populations, February 2022, https://www.parliament.vic.gov.au/images/stories/committees/epc-LA/Inquiry_into_Environmental_Infrastructure_for_Growing_Populations/LAEPC_59-02_Inquiry_into_Enviro_Infrastructure.pdf
- ii Sport and Recreation Victoria (Feb 2011), Artificial Grass for Sport Guide. <https://sport.vic.gov.au/publications-and-resources/community-sport-resources/artificial-grass-sport-guide>
- iii See Table 2: Physiological differences between children and adults that trigger differences in children's thermal perception in hot environment in Antoniadis, Dimitrios, Nikolaos Katsoulas, and Dimitris K. Papanastasiou. 2020. "Thermal Environment of Urban Schoolyards: Current and Future Design with Respect to Children's Thermal Comfort" Atmosphere 11, no. 11: 1144. <https://doi.org/10.3390/atmos11111144>
- iv The Good Play Space Guide (Sport and Recreation Victoria 2007) <https://sport.vic.gov.au/resources/documents/good-play-space-guide-i-can-play-too> via Sports and Recreation PlaySpaces website <https://sport.vic.gov.au/publications-and-resources/design-everyone-guide/sport-and-recreation-settings/play-spaces>
- v Thermally Comfortable Playgrounds, Technical document prepared for Standards Council of Canada. Kennedy, E., Olsen, H., and Vanos, J. (2020). Thermally Comfortable Playgrounds: A review of literature and survey of experts (Technical Report). National Program for Playground Safety, University of Northern Iowa, 37 pp. + Appendices <https://www.scc.ca/en/about-scc/publications/general/thermally-comfortable-playgrounds>
- vi NSW Office of the Chief Scientist, Synthetic Turf in Public Spaces,(2022) <https://www.chiefscientist.nsw.gov.au/independent-reports/synthetic-turf-in-public-spaces> Full Report: https://www.chiefscientist.nsw.gov.au/_data/assets/pdf_file/0004/542263/CSE-Synthetic-Turf-Review-Final-Report.pdf
- vii Pfautsch, S., Wujeska-Klaue, A., & Walters, J. R. (2022). Outdoor playgrounds and climate change : importance of surface materials and shade to extend play time and prevent burn injuries. Building And Environment, 223. <https://doi.org/10.1016/j.buildenv.2022.109500>
- viii Pfautsch S., Rouillard S., Wujeska-Klaue A., Bae A., Vu L., Manea A., Tabassum S., Staas, L., Ossola A., Holmes, K. and Leishman M. (Sept 2020) *School Microclimates*. Western Sydney University, 56 p. DOI: <https://doi.org/10.26183/np86-t866>
- ix Englart, J (2021), Literature Review on environmental and health impacts of synthetic turf., Climate Action Moreland, DOI: 10.13140/RG.2.2.28126.56646 https://www.researchgate.net/publication/350886618_Literature_Review_on_environmental_and_health_impacts_of_synthetic_turf See also a 21 slide summary of the issue: Englart, J., (2023) Artificial Turf - A Cause for Concern, Climate Action Merribeek. <https://morelandclimategroup.files.wordpress.com/2023/06/2023-06-16-synthetic-turf-presentation.pdf>