

Submission
No 212

**INQUIRY INTO PLANNING SYSTEM AND THE IMPACTS
OF CLIMATE CHANGE ON THE ENVIRONMENT AND
COMMUNITIES**

Organisation: Friends of Lane Cove National Park Inc.

Date Received: 3 November 2023

Friends of Lane Cove National Park Inc.

Inquiry into the planning system and the impacts of climate change on the environment and communities

NSW Parliament Portfolio Committee No 7 – Planning and Development

The Friends of Lane Cove National Park, in conjunction with the NSW National Parks and Wildlife Service, aim to:

- **promote awareness of the significance of Lane Cove National Parks unique natural and cultural heritage**
- **work for the protection and restoration of the ecosystems of Lane Cove National Park through bush regeneration**
- **organise educational activities in the Park**

OVERVIEW OF RECOMMENDATIONS

These recommendations are further developed in Section 3.0.

Recommendation 1: INDEPENDENCE

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value should be undertaken by independent experts.

Recommendation 2: TRANSPARENCY

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value should occur at the beginning of the development process, made publicly available and subject to adequate periods of consultation.

Recommendation 3: OVERSIGHT AND ACCOUNTABILITY

There must be adequate oversight by independent umpires for developments in fire, flood or heat prone areas or with high biodiversity value, with powers to review, amend or revoke developments and effective penalties for deliberately misleading assessments.

Recommendation 4: INFORMATION

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value must be undertaken on the basis of up to date, high level, scientifically validated data.

Recommendation 5: ASSESSMENT REQUIRMENTS FOR FLOOD, FIRE AND HEAT PRONE AREAS

Clear assessment requirements are needed for fire, flood or heat prone areas or areas where there is high biodiversity value.

Recommendation 6: NEW PLANNING FRAMEWORK FOR SYNTHETIC FIELDS

A new planning framework that takes into account climate and biodiversity risks is required for assessing synthetic fields in NSW.

1.0 Background

- This submission uses a specific case study to analyse the adequacies of the current planning system to assess, review and revoke developments in order to ensure both people and the environment are protected from climate change impacts. It then examines the need for reform of NSW planning system to ensure communities are able to mitigate and adapt to changed conditions.
- The case study considered is Kur-ring-gai Council's development of Norman Griffiths oval into a synthetic field. It is particularly relevant to the inquiry as the field is in a flood detention basin, a bushfire zone, a wildlife corridor, surrounded by a Sydney Turpentine Ironbark Forest (a critically endangered ecological community - CEEC), and above a creek that runs directly into area of Lane Cove National Park where there has been considerable regeneration efforts of the Quarry Creek catchment areas and is habitat for threatened species.

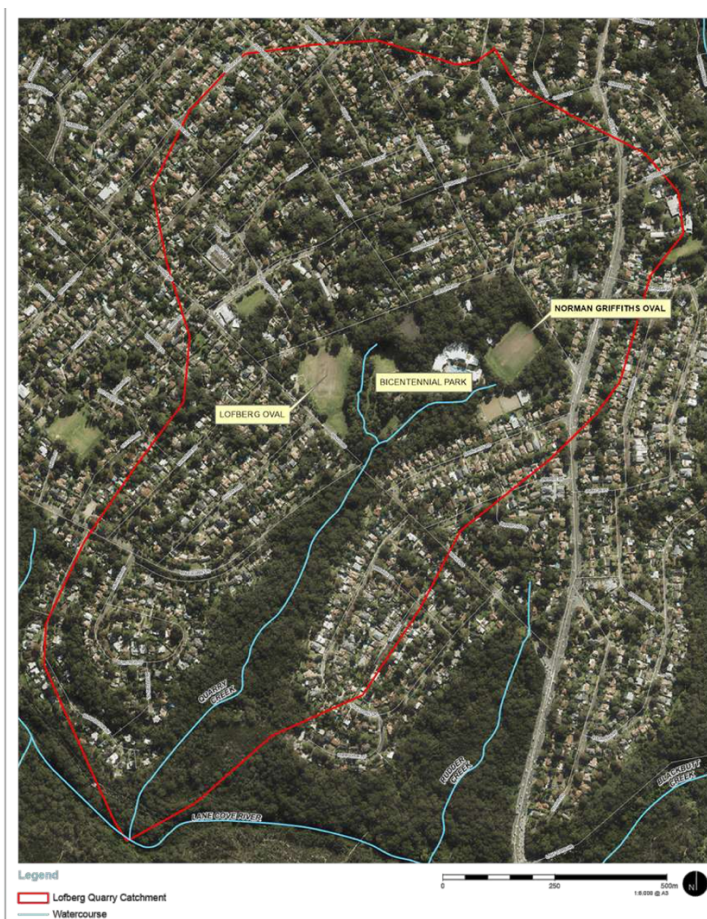


Figure 1: **Lofberg Quarry Catchment. Lane Cove National Park is to the south of the Bicentennial Park.¹**

- Synthetic fields are currently assessed through a Review of Environmental Factors (REF) under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).
- The NSW Chief Scientist's [“Independent review into the design, use and impacts of synthetic turf in public open spaces”](#) (CS Synthetic Review) was made public on 9

¹ Diagram by Jacobs 'Norman Griffith Oval Flood Assessment', 2018, page 21, publicly available on KMC website.

June 2023² and identified **climate change consideration as one of the main gaps** in 'important environmental and human health considerations in the Review of Environmental Factors (REF) for synthetic turf sites' (see Appendix 1)³

- The REFs for Norman Griffiths oval do not explicitly deal with climate change impacts despite the fact that that synthetic fields are heat islands and the Norman Griffiths oval synthetic development is in a flood and fire prone area.⁴

2.0 Adequacy of planning powers and planning bodies, particularly local councils, to review, amend or revoke development approvals, and consider the costs

2.1 Background – the environmental assessment process for Norman Griffith

- The construction of the synthetic field at Norman Griffiths is a case study in the reality of the operation of the environmental assessment process in NSW.
- It revealed a number of disturbing aspects of how that process could operate in practice which are the subject of recommendations 1-3.
- The section below summarises some background to the approval process at the Norman Griffiths field:

2.1.1 Council's Original Assessment of the Proposal

- In 2019, after several years of intensive study by Council staff utilising reports specifically prepared by flood experts, Norman Griffiths oval was rejected by Council as a site for a synthetic oval. 5
- In October 2020, after an alternate site was rejected, council voted to proceed to design and construction of a synthetic field at Norman Griffiths. Councillors arguing for that course highlighted the desirability of constructing a synthetic field because the local soccer club had their clubhouse at that field.

2.1.2 Financing

- The NSW Government provided a substantial grant to the Council which was tied to both the construction of a sport field at a specific site, and to the construction of a synthetic sports field rather than a natural turf field.
- The result was to set up a financial incentive to construct a specific type of sport field (synthetic rather than natural turf) at a specific location (in a flood basin

² Independent review into the design, use and impacts of synthetic turf in public open spaces Final report, 13 October 2022, NSW Chief Scientist and Engineer.

³ CS Synthetic Review, 59.

⁴ Climate change is mentioned the REF examines the relevance of a clause 171(2) of the EP&A Regulation around coastal impacts, pages 36,82.

⁵ Ku-ring-gai Council's head of Strategy and Environment stated that [rubber or cork infill] in a detention basin is fundamentally incompatible". Video of KMC meeting, 19 November 2019 found here: <https://www.krg.nsw.gov.au/Council/Council-meetings/Council-meeting-recordings-2019>. KMC Council Agenda, 9 April 2019 stated "Due to site complexities it was determined the project was not viable. Major site constraints such as the oval being a flood detention basin, limiting space to achieve flood immunity whilst maintaining a full-size field, environmental factors and visual connectivity within the surrounding Bicentennial Park implicated prohibitive costs to achieve the conversion"., https://eservices.kmc.nsw.gov.au/Infocouncil.Web/Open/2019/04/OMC_09042019_AGN.PDF

surrounded by critically endangered species) notwithstanding the expert advice provided by Council staff of the environmental dangers and that the site was “fundamentally incompatible” with that use.

2.1.3 Contractual Arrangements

- Council chose to proceed with the proposal by entering into a binding contract for the design and construction of the synthetic oval. That contract was signed before the REF was finalised. It made it the responsibility of the contractor to retain and pay a person to prepare a REF satisfactory to the Council as a precondition to construction proceeding. The contractor was also responsible for the selection and payment of experts whose reports might be required in preparing the REF.
- The contract also had provisions which allowed the contractor (with Council approval) to pre-order hundreds of thousand if not millions of dollars of construction materials (which were ultimately the Council’s liability) before any necessary environmental assessments or approvals had been obtained. It also provided for significant damages to be paid by Council if the construction was delayed or terminated by Council outside the terms of the contract.

2.1.4 Conflicts of Interest

- The responsibility for the preparation of the legally-mandated REF was therefore delegated to the contractor who had a substantial financial interest in the proposal proceeding. It is difficult to imagine steps which could mitigate this conflict of interest.
- The person who investigated the environment impacts of the proposal, retained relevant experts to assist that investigation, and prepare the REF to justify the decision to proceed, was selected by and paid by the contractor. This sets up a conflict of interest.
- When the Council came to consider the REF and determine whether it was satisfactory, it had spent hundreds of thousands of dollars on the design of the proposal; an even greater amount incurring liabilities for pre-ordering building materials for its construction; and entered into contractual arrangements which limited its freedom of action and exposed it to potential damages claims.
- Unlike the situation where a third party proponent seeks an approval from a planning body that is independent of the project (and thus in a position to vigilantly ensure that environmental and other planning laws are adhered to) in this case the law allowed the Council to be both the proponent and approval authority for the project.
- The result was there appears to have been no party in the decision making process who was not the subject of serious conflicts of interest.

2.1.5 Delay in Environmental Assessment

- The way the Council proceeded, and the contractual arrangements put in place, meant that the first occasion on which a completed REF was received was several years after the proposal was approved, after a contract for the design and construction of the contract had been entered into, after the Council had incurred hundreds of thousands of dollars in pre-ordering building materials for the project, after the final designs of the project had been approved and days before

construction was scheduled to begin and when the contractor had already begun mobilising for construction of the project.

- The delay in the serious environmental assessment of the project was extraordinary. It can only give rise to cynicism as to whether the environmental assessment was properly conducted, and whether its results would be seriously considered by decision makers.
- Such cynicism is only confirmed when regard is had to the history of statements on the environmental process appearing in Council papers. On one occasion, (even though the REF had not been prepared) Council papers referred to a 'preliminary environmental assessment' concluding 'the likely environmental impact of the project is reasonable'.⁶ The response to the GIPA requests to view the 'preliminary environmental assessment' was that council did not hold the document at this time.

2.1.6 Consultation and Publication

- There was no obligation on the Council to publicly release the REF or even provide it to the National Parks and Wildlife Service who had responsibility for a National Park which would be directly affected by the proposal.
- The REF was published online on 20 February 2023 only because Councillors passed a resolution to ensure that in response to community pressure.⁷ This was a multi-million-dollar project affecting a public space, national park, and involving critically endangered plant and animal species. It is not clear how the public interest is served by not requiring these assessments to be publicly accessible by law.
- The community were not given an adequate opportunity to comment on the REF after its release. Construction was scheduled to begin within a week of the release of the REF, and any delay beyond two weeks would, it was alleged, incur substantial contractual damages.
- As a matter of public policy, failing to provide opportunities for community feedback and comment can only degrade approval processes and foreclose amendments of proposals to reflect valid concerns raised through consultation.
- NSW National Parks and Wildlife Service wrote to council on 3rd March 2023 asking for construction to be delayed and more time given to assess the plans, on the basis that agreed consultation had not occurred and the development had potential impacts on National Park and the Lane Cove River (Appendix 2).
- 2.1.7 Recourse For Defective REF's
- The REF prepared and released by Council did not explicitly deal with regulation 171A of the EP&A regulations in the REF. Sue Higginson MLC wrote to council about this and community members wrote to the Minister for Environment (Attachment 3).

⁶ KMC Agenda, 20.10.20 https://eservices.kmc.nsw.gov.au/Infocouncil.Web/Open/2020/10/OMC_20102020_AGN_AT.PDF

⁷ REF's do not have to be made public, nor be subject to a consultation period. The REF was made public following community pressure and a council resolution to that effect.

- Ultimately, to force the Council to address these issues, a community organisation began proceedings in the Land and Environment Court. The Council then immediately issued an amended REF on 4 July 2023.⁸ The only change was the inclusion of a table dealing with regulation 171A. This could be taken as an admission that the original REF was defective, and the Council continued construction for over a month knowing that.

The new REF was subject to an unsuccessful legal proceeding in the NSW Land and Environment Court in July - August 2023.⁹

2.2 The cumulative impacts of development (b)(i)

2.2.1. Cumulative impacts on heat

- There are now 181 synthetic turf sports fields in NSW, the majority of which are in Sydney Metropolitan area - a sharp increase from 30 in 2018.¹⁰
- Natural turf fields play an important role as carbon sinks and relieving urban heat island effects, 'bolstering the adaptive capacities of cities to climate change'.¹¹ Their role is made more important given the urban heat island effect is intensified by climate change where higher frequencies of extreme temperatures and heatwaves are predicted.
- In contrast to natural turf, synthetic fields have been found to modify microclimates, significantly increase surrounding air temperature and contribute to urban heat.¹²
- While there is a lack of information about heat impacts of synthetic fields on both humans and flora and fauna in the Australian climate, it is likely their effects will be relatively localised.¹³
- Pfausch and Wujeska-Klaus's study for the NSW Chief Scientist notes that some of their temperature measurements:

"highlight the enormous impact of synthetic turf on worsening human thermal comfort with potential heat stress experienced on sports fields and playgrounds, especially when being physically active"¹⁴

- They conclude "the global analysis presented here clearly indicates the limited use of unshaded synthetic turf in hot summer climates"¹⁵
- There has been no research into how these heat impacts affect usage of the fields both now and into the future, particularly during heatwaves or high temperature days.
- The Chief Scientist states that the *cumulative* depletion of grass surfaces over time 'may exacerbate urban heat island effects and increase heat exposure risk in the

⁸ The final REF can be found here: <https://www.krg.nsw.gov.au/Planning-and-development/Projects-and-current-works/Pymble/Norman-Griffiths-Sportsground>

⁹ The judgement can be found here: <https://www.caselaw.nsw.gov.au/decision/189e1fb3d44fbb022f0f26ac>

¹⁰ CS Synthetic Review, page iv, it is unclear this include fields in educational facilities.

¹¹ Rahman et al., 2022 cited in CS Review, 138.

¹² 'Nazarian, N and Mohseni, P, Synthetic Turf in Public Places: Thermal Comfort and Heat related health risks', Appendix 8, CS Synthetic Review, page 7

¹³ Hochuli et al, Effects of artificial light and heat on biodiversity, CS Synthetic Review, Appendix 16, page 23

¹⁴ Pfausch and Wujeska Klaus, Synthetic Turf in Public Spaces, CS Synthetic Review, Appendix 7, page 12

¹⁵ Pfausch and Wujeska Klaus, Synthetic Turf in Public Spaces, CS Synthetic Review, Appendix 7, page 3

population”,¹⁶ particularly in urbanised areas with low canopy and high average temperatures’.¹⁷

- Despite the fact the Chief Scientist’s review was published before the Norman Griffith final REF was published, it does not reference the Chief Scientists information on heat.
- The Norman Griffith REF states that “heat testing has been undertaken on synthetic surfaces as attached at Appendix 12, which supports that the synthetic surface temperature does not largely effect the surrounding air temperatures when exposed to heat from the sun’. This conclusion is made on the basis of cork heat testing in its Appendix 12. Appendix 12 contains a non-peer reviewed study which cuts out at 23.7°C and covers a three hour period, clearly irrelevant to Australian conditions. Nonetheless the heating results in a 48°C surface temperature reading.¹⁸
- The REF also states that the surface ‘is to be infilled with granulated cork of which surface temperatures have been measured to be 20° cooler on the hottest days, than standard synthetic surfaces (infilled with rubber)’. No supporting data is provided for this claim.¹⁹ While expert comparative data is clearly needed, the claim is not supported by comparative heat readings of natural turf, rubber tyre and cork infill fields and bitumen road which is included in Appendix 4.
- It states trees surrounding the field will ‘[reduce] the impacts of the heat island’, and if cooling is required there is the potential to use travelling irrigators for extreme heat days.²⁰

2.2.3 Cumulative impact on soil health

- The decline in soil health is exacerbating many of the most severe challenges from climate change. Its importance is increasingly being recognised as delivering resilience to climate change and natural disasters.²¹ The more complex and diverse the soil microbiome is, the more resilient the environment will be.
- Removing soil through installing synthetic fields underpinned by a plastic shock pad laid underneath the infill affects soil health through compaction, contamination, changes to water flows and has a cumulative impact. The Chief Scientist Review noted that the removal of natural grass leads to a loss of microbial communities, earthworms and habitat for animals foraging on or around grassy areas and ‘may be a significant new threat to bird conservation’.²²
- Chemicals and microplastics from synthetic turf fields may contaminate surrounding soil ecosystems:

¹⁶ Rahman et al., 2022 cited in Health impact of Synthetic Turf, NSW Health Appendix 3 CS Report, 138

¹⁷ CS Synthetic Review, 53

¹⁸ Norman Griffith REF, page 56. Appendix 12 NG REF. The Average Ambient Air Temperature in Sydney during Summer records daily high temperatures of around 26°C, with temperatures rarely falling below 20°C or exceeding 32°C with average humidity is 65%. The test method results reveal a synthetic surface temperature [50 °C] that is more than double the ambient air temperature [23.7 °C]. Under conditions in Sydney during summer, the synthetic surface temperature may well approach 60 °C. The proposed use of travelling irrigators in the REF if required to cool the area needs further investigation as once the irrigators pass over the synthetic surface, the surface temperature will very quickly climb again, and will exacerbate the relative humidity.

¹⁹ Norman Griffith REF, 56.

²⁰ Ibid

²¹ CS Synthetic Review, Pochron, S. ‘Soil health’ Appendix 17, 1. Pochron notes earthworms improve net carbon storage, increase drainage and decrease the likelihood of floods.

²² Sánchez-Sotomayor et al. (2022) cited by Hoculi et al, Environmental lighting and heat impacts, Appendix 16, 24.

“Applied research on the soil environment and microbiome indicates poor soil health outcomes in the footprint of a synthetic field. In isolation, a single field may appear minor. However, cumulative impacts of multiple fields are unknown, and may become increasingly relevant”.²³

- The Norman Griffith REF did not find any significant impacts with regards to soil removal, citing other grasslands in close proximity.
- However, a report by ecologist Roger Lembitt focused on habitat impact for territorial birds and vulnerable microbats that are recorded at the oval, concluding:

The degree of transformation of the locality is understated. The conversion from a grassed field to a synthetic field by its nature changes the habitat value of the area. Bird species such as Australian Magpie, Grey Butcherbird, Welcome Swallow and Australian White Ibis use these expanses of managed exotic grasses as feeding sites variously preying on insects and soil invertebrates....This food source will be removed.

... Australian Magpies are highly territorial (Jones 2022), and individuals displaced due to interruption to their food supply may not survive in the broader landscape. Microbats also feed on insects which have part of their life cycle in the soil of these grassed areas. In particular, the Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) and Eastern Bent-winged Bat (*Miniopterus orianae oceanensis*) are known to forage over grassland areas (Van Dyck and Strahan 2008). The insect habitat which provides this feed source will be removed.²⁴ (Appendix 5)

- Cumulative impacts of flooding and rainfall are examined below.

2.3 Climate change and natural disasters (b)(ii)

- Recommendation 1.4 of the Chief Scientist’s Review recommended that synthetic fields should not be placed in areas of ‘high environmental risk, including bushfire and flood prone areas’.

2.3.1 Flooding

- The potential impact of climate change - which increases the likelihood of extreme rainfall events and flooding - is of particular significance when synthetic ovals are developed in flood prone areas. The flood risk is increased significantly because of the impermeable shock pad underpinning these fields. Figure 3 illustrates the risk.
- The increased risk of runoff and flooding needs to be mitigated using detention systems.
- Flooding is made more problematic because of the potential for plastic tufts, infill, microplastics and chemical leachates to enter surrounding land and waterways risking serious pollution events. The more intense rainfall events, the more likelihood there this pollution impacts the surrounding environment.

²³ CS Synthetic Review, 52.

²⁴ Lembitt, R, 2023 Installation of Artificial Grass at Norman Griffiths Oval, West Pymble, attached at Appendix 4. This report was not submitted as evidence for the court proceeding and thus can be included here.

- Sampling by Haan et al found that artificial turf fibres (their lower density means they are dispersed over greater distances) are a major source of plastic pollution in aquatic environments and hypothesise that their leakage is driven by rainfall events which disperse artificial turf through drainage water systems or streams. ²⁵
- Figure 2 shows infill migration into the Cooks River at Tempe Recreation Area, a field with a surrounding curb to mitigate against infill loss after a high rainfall event.
- Glamore calculated that the amount of turf fibres lost from a synthetic turf per year is 'likely to be in the 100s of kilograms per year, however this type of loss from ST field is far less studied, and no estimates of transport into water networks currently exists. Due to the lower density of the turf fibres and hence higher mobility, they may pose a greater pollution risk for aquatic environments than infill'.²⁶
- The Chief Scientist Synthetic review noted:

"little is known about leachate and microplastic runoff dynamics of synthetic turf fields in Australiaperiodic intense rain and flood conditions in Australia can overwhelm drainage systems and wash away leachates and microplastics in larger quantities. These conditions are expected to become more frequent and extreme under a changing climate"²⁷



Figure 2: Tempe Recreation Reserve showing cork infill and plastic turf seeping into the Cook's River after a high rainfall event. This field includes a surrounding curb designed to prevent microplastic loss and overland runoff.

²⁵ De Haan et al (2023) *Environmental Pollution*, 'The dark side of artificial greening: Plastic turfs as widespread pollutants of aquatic environments', 2.

²⁶ CS Synthetic Review, 24 citing Glamore, Appendix 4.

²⁷ CS Synthetic Review, 24



Figure 3: Michelton Synthetic Oval, Queensland after March 2022 floods.

Photo credit: NSW Chief Scientist Synthetic Turf Review, page 10

*“The intention was to build a field capable of tolerating a high level of use that could be used in all-weather conditions and ensure that poor weather did not result in cancelled training sessions”.*²⁸

- In regard to the risk of flooding, the Norman Griffith REF relies on two mitigation measures – the detention system is alleged to accommodate stormwater flows to a 1% storm event, and the surface level of the field is raised ‘above the 1% AEP storm event’.²⁹
- Relevant to climate change impacts, there is no analysis of a *cumulative* low probability catastrophic outcome.³⁰ The proposal creates a risk that, if the oval is flooded at any time in the future, approximately 89 tonnes of synthetic cork infill will likely be washed into areas of high environmental value, the STIF, into Lane Cove National Park, including Quarry Creek, Lane Cove River and the Foreshore and Wetlands of Sydney Harbour.³¹ There is no analysis of the *environmental impact* of such an event, and no attempt, in accord with best practice, to appropriately assess this risk by modelling the Probable Maximum Flood event.
- The Norman Griffith REF does not include a comprehensive floodwater study. The *Floodplain Development Manual* outlines what a flood study entails.³²

²⁸ <https://www.sporteng.com.au/synthetic-turf-for-the-mitchelton-fc-qld>

²⁹ Norman Griffith REF, 21

³⁰ Over the lifespan there is an 18% chance of water containing cork and plastic blade fragments (both of these float) being transported on mass into the downstream receiving environment. Mass losses of cork during much smaller storms has been seen on several fields (eg. Tempe). The REF calculates that during a 1 in 100 year rain event, 0.29 m3 per second (1,044,000 litres per hour) of water will bi-pass the filtration system entirely and be transported via overland flow to the downslope waterway. A 1-in-100 year storm event has about an 18% chance of occurring at least once (2% chance of occurring more than once) during the 20 year lifespan of the synthetic field (20 years is typically the lifespan cited for the shock pad, 10 years for the carpet).

³¹ This environmental outcome is especially concerning according to the REF ‘the cork infill is both buoyant and will endure indefinitely’.

³² *Floodplain Development Manual*, NSW Department of Infrastructure, Planning and Natural Resources, April 2005, Page F-2.

- It is not possible to fully assess the effectiveness these mitigation measures for the field without a full flood assessment and there is no data which allows for an assessment of the risks and impact, such as erosion or sedimentation, or distribution of infill and microplastics in Quarry Creek or Lane Cove National Park.³³
- These concerns were echoed by NSW National Parks in a letter sent to council after the REF was published.
- There is no listing in the REF of the chemical composition of the polymer grass blades, the cork infill and any additives it may have, nor analysis of the quantum of pollutants.³⁴
- In terms of the risk of pollution, the REF acknowledges that:

“The synthetic turf field may increase pollutants such as microplastics and chemicals entering the stormwater system and impacting connecting waterways. However, stormwater design strategies have been adopted to minimise this risk”.³⁵
- It also notes that any runoff from the surface:

‘may impact on water quality. The surface is proposed to be raised above the flood level to ensure there is limited runoff of any synthetic materials’.³⁶
- Further information about how the REF deals with these pollution risks is shown in Appendix 6 in relation to a regulation which requires a proponent to outline how the development deals with a release of pollutants in a flood event.

2.3.2 Fires

- Norman Griffith oval is surrounded by forest, is a Vegetation Category 2 bushfire zone and within sight of Vegetation Category 1 bushfire zone. The site has a Fire Danger Index (FDI) of 100 as per PBP 2019. This represents a probable worst case fire weather scenario for the site.
- As noted above, the Chief Scientist recommended that synthetic fields should not be built on bushfire prone zones.
- A UNSW study commissioned by the Chief Scientist concluded that ‘synthetic turf is easily flammable and poses a fire risk.... Synthetic turf that is commonly made from polymeric materials may be subjected to an approaching bushfire via three forms of attack: radiant attack, ember attack and direct flame contact.’³⁷

³³ In order to do this the REF would have to do what the Department of Planning and Environment outlines is required to assess conditions: *“The water discharge and velocity associated with a discharge of water past a given point on a river system depends upon five factors: The available energy driving the flow; The loss of energy associated with frictional effects as the flow moves over the bed and banks of the river channel and floodplains; The cross-sectional area of the flow; The depth of the flow; Impacts due to backwater from downstream channels and structures... Waterflows from one place to another because of a difference in energy levels. In broad terms, the slope of the river channel defines the available energy. The greater the slope, the greater the gravitational energy available to cause the water to flow in a downstream direction, and the faster the water flows....”* Floodplain Development Manual, NSW Department of Infrastructure, Planning and Natural Resources, 2005, page F-6.

³⁴ The REF states ‘cork is naturally anti-fungal and anti-microbial and do not require the use of harsh chemicals, algacides or fungicides for maintenance’. However, cork infill may require application of fungicide to prevent growth within the infill and is also sometimes sprayed with plastic.

³⁵ Norman Griffith REF, Flora and Fauna Impact Assessment (Appendix 15) 15

³⁶ Norman Griffith REF, 30.

³⁷ Yuan Heng Yeo (2022) Use of synthetic fields in bushfire prone areas, Appendix 10, CS Synthetic Review, 382.

- While cork infill (which is being used at Norman Griffith) is less flammable than rubber tyre, the shock pad underneath the infill also poses a fire risk.
- The study notes that there is no current relevant ignition or fire testing standards for outdoor applications of synthetic turf experiencing bushfire wind and temperature conditions.³⁸
- Studies that are relied on are used for indoor flooring these fire testings do not address the flammability for bushfire conditions (ember and radiant attack) or the effect of flame spreading over a large field covered with synthetic turf that would ideally be tested in a fit-for-purpose outdoor environment.
- The REF for Norman Griffith oval states that the proposed activity:

“will be constructed of flame-resistant materials. The Fire Resistance Certificate is attached at Appendix 7. As such, the proposed activity is unlikely to result in an increased bushfire risk”³⁹
- Appendix 7 constitutes a Fire test for flammability and flame resistance for indoor floor coverings.⁴⁰ The Fire Resistant Certificate test itself stipulates that ‘these test results relate to the behaviour of a product under the particular conditions of the test, they are not intended to be the sole criterion for assessing the potential fire hazard for the product’.⁴¹

2.4 Biodiversity loss (b)(iii)

- The Chief Scientist Review highlights a range of potential impacts to biodiversity caused by replacing natural grass with synthetic surfaces “which extend beyond the footprint of the field in question, including:
 - 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 (ALAN)
 - increased heat from the synthetic surface”.⁴²
- The Norman Griffith REF ecological report focused on the immediate vicinity of the oval. It did not find the need for an Environment Impact Study.
- In terms of the impact on the examination of the critically endangered Sydney Turpentine Ironbark Forest (which surrounds the oval and is further downstream shown in the figure below) it highlights the fact that no trees would be removed for the project and found no threat from immediate heat impacts or hydrological changes on the critically endangered forest surrounding the oval.⁴³

³⁸ Ibid.

³⁹ Norman Griffith REF, 48

⁴⁰ Certificate of Test, Appendix 7, REF Norman Griffith Oval).

⁴¹ Norman Griffith Oval REF, Ecological Assessment Appendix 15.

⁴² Chief Scientist Synthetic Review, 49

⁴³ Ibid, Page 15, one of the reasons given is that it states the Sydney Turpentine Ironbark forest closest to the oval is degraded.

- Ecologist Roger Lembit's analysis found:

The activity may result in a change in the temperature and moisture profile within the STIF remnants in the vicinity of the activity subject site.... Some tree species are more susceptible to the impacts of heat and altered hydrology. Such species present in the area of Sydney Turpentine-Ironbark Forest immediately to the north of the subject site are Blackbutt (*Eucalyptus pilularis*) and Smooth-barked Apple (*Angophora costata*). Edge effects such as altered microclimate are identified as a threat to Sydney Turpentine-Ironbark Forest (Department of Environment and Planning (2022)).⁴⁴

- Despite changes such as deep excavation for the detention system, redirection of floodwaters (including an overland flow path water through the Sydney Turpentine Ironbark Forest)⁴⁵ and the fact that this critically endangered plant community is also present southeast of the oval, no comprehensive analysis of hydrological changes was conducted.
- The REF stated hydrological impacts would be minimal because the main area of forest was north of the development and raised above it.
- While acknowledging the synthetic turf field may increase pollutants such as microplastics and chemicals entering the stormwater system and impacting connecting waterways it did not quantify or examine any impacts of potential microplastic, chemical or pollutant impact on the Sydney Turpentine Ironbark Forest downstream nor on downstream waterways and endangered flora and fauna in the National Park.
- In terms of impact on wildlife its conversion from grass to synthetic turf and associated loss of insect habitat was not considered in the Assessment of Significance for territorial microbats and it did not mention the area is a wildlife corridor, nor examine any impacts on it.⁴⁶



Figure 4: The extent of Sydney Turpentine Ironbark Forest near the oval, Source: KMC

⁴⁴ Lembit, *ibid* (see Appendix 4).

⁴⁵ Norman Griffith Oval REF, Appendix 9, Review of stormwater Management System, Overland flow path shown on page 6.

⁴⁶ The plan of management for the Bicentennial Park of which Norman Griffith is a part states 'the bushland contributes on a regional level for its values as a wildlife refuge and as part of a corridor network assisting the movement of wildlife between small and large bushland reserves and National Parks'.

3.0 **CONSIDERING THE COSTS - THE NEED FOR REFORM**

Recommendation 1: INDEPENDENCE

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value should be undertaken by independent experts.

- Projects in these areas should not be proposed and assessed by the same planning body and there is a clear conflict of interest where this occurs.
- There are also clear issues where assessments are retained and paid by the successful contractors who have a financial interest in producing a favourable assessment.

Recommendation 2: TRANSPARENCY

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value should occur at the beginning of the development process, made publicly available and subject to adequate periods of consultation.

- Biodiversity values should be considered early in the planning process for these areas.
- Assessments should be finalised before a project commences and unless unforeseen information arises, they should not be able to be changed or reviewed after construction has commenced.
- Where planning bodies are initiating developments in these areas, environmental assessments should be finalised before any substantial financial commitments are made.

Recommendation 3: OVERSIGHT AND ACCOUNTABILITY

There must be adequate oversight by independent umpires for developments in fire, flood or heat prone areas or with high biodiversity value, with powers to review, amend or revoke developments and effective penalties for deliberately misleading assessments.

- Given the climate and biodiversity crisis, it should not be possible for developments to proceed with factually incorrect, incomplete or inadequate assessments in these areas as the implications of inadequate assessment are serious and it effectively renders environmental legislation meaningless.

- Where there is expert evidence showing a development would give rise to a serious and irreversible impact in these areas, there should be appropriate trigger mechanisms for a review of assessments by an independent third party, for example the Minister for the Environment, EPA or independent panel of experts and community representatives.
- The third party should have the power to amend or revoke developments.
- As noted below NSW National Parks National Parks should have sign off powers on significant developments on their borders which could have direct, indirect and cumulative effects on National Parks.
- If it is found that information is deliberately misleading and would give rise to serious consequences, effective penalties should be applied.

Recommendation 4: INFORMATION

Assessments for developments in fire, flood or heat prone areas or with high biodiversity value must be undertaken on the basis of up to date, high level, scientifically validated data.

In order for responsible decision making to occur in these areas, publicly available mapping of biodiversity value, particularly around habitat for native and threatened species, climate change vulnerability and heritage assets (Aboriginal and cultural) need to be finalised as matter of urgency.

- A lack of data means areas with high biodiversity value is not recognised nor what is lost when these areas are negatively impacted. ⁵²
- In terms of assessing impacts or the validity of mitigation strategies, scientifically validated evidence must be used. For example, concluding that 'microplastic movement is mitigated' must be backed up by data that quantifies pollutant loads.

Recommendation 5: ASSESSMENT REQUIREMENTS FOR FLOOD, FIRE AND HEAT PRONE AREAS

Clear assessment requirements are needed for fire, flood or heat prone areas or areas where there is high biodiversity value.

The planning system needs to explicitly require that climate impacts should not just be 'taken into account' but actively avoided. This will mean excluding some developments in high-risk areas.

1a. Flood zones

- Comprehensive flood studies, including a Probable Maximum Flood analysis not just on people but also the environment should be compulsory, and publicly available, for developments in these zones.
 - This should be mandatory for any synthetic fields developed in flood prone areas should the Government choose not to heed the Chief Scientists finding that synthetic fields should not be developed in flood zones.
- Pollution risks such as microplastic or chemical dispersal should be independently calculated before development and monitored after development where there is risk from high rain or flood events.
 - This is relevant to high-risk developments such as tailings dams.
 - An attempt to ‘mitigate’ impacts should not be used as an excuse to pollute or damage the environment. It should not be enough to state that a mitigation attempt has been made, it should be measurable.
 - The Chief Scientists recommendation should be followed that synthetic fields ‘located in proximity to or draining into a sensitive ecosystem [should be] independently assessed. Runoff should be sampled, with testing outcomes reported on and remediation action taken to bring testing within acceptable scientific standards”.⁴⁷

1b. Fire zones

- Comprehensive fire studies, looking at risks not just on people but also the environment should be compulsory and publicly available for developments in these zones.
- Standards should be developed for synthetic fields within the Planning and Bushfire Protection Guide 2019.
- As per the Chief Scientists report, synthetic fields should not be developed in fire prone areas.

1c. Urban Heat Islands

- Areas which are known urban heat islands should be subject to specific planning frameworks.
- In these areas assessments of heat impacts of developments, including at a regional level, should be published.
- Clear and proactive policies to reduce heat are needed. This could include banning dark roofs or legislating for tree canopy targets. Alternative designs with lower impacts should be incentivise.
- There should be a limit on how many synthetic fields can be developed in each LGA.
- While there are still gaps in knowledge of Australian conditions (outlined in the Chief Scientists report⁴⁸) there should be a moratorium on replacing ovals (carbon sinks)

⁴⁷ CS Synthetic Review, 24

⁴⁸ See for example research gaps outlined by Pfautsch and Wujeska-Klaue, CS Review, Appendix 7, page 22

with heat islands (synthetic fields, including with organic infill) in areas that are already heat islands allowed until evidence-based policy can be developed.

- This should include investigating the way in which heat impacts restrict summer usage (whether fields will be unusable with higher temperatures) and potential health impacts of these fields on the elderly, young children and people with underlying cardiovascular and respiratory conditions who are physically more susceptible to excessive heat.
- Government grant money should be used to incentivise climate positive developments that reduce heat, improve soil, increase canopy and conserve water.
 - For example, grant funding for oval upgrades is entirely tied to synthetic upgrades, corrupting the planning process by ignoring alternatives and allowing developments in unsuitable environments.
 - The Chief Scientist noted that the adoption of best practice guidelines for natural turf will support the capacity of natural turf sporting fields to meet demands for use.⁴⁹
 - Development of new generation modern turf fields should be incentivised as they act as carbon sinks, improve soil and recycle compost. They rely on developments in new turf cultivars, soil science and drainage to increase usage hours while not locking out passive recreation opportunities such as dog walking from recreational area.

1d) Biodiversity

- The Planning system needs to proactively prevent biodiversity loss rather than its current focus on mitigating it. Conserving and restoring natural spaces is essential for limiting carbon emissions and adapting to a changing climate.
- This means changing the focus to **retaining** and **restoring** existing habitat, including *all* diverse forests, not the current system which focuses on those that are critically endangered.
- **NSW National Parks – Buffer zones and stronger sign off powers for National Parks.**
 - National Parks should have sign off powers on significant developments on their borders which could have direct, indirect and cumulative effects on National Parks.
 - The planning system needs to legislate for effective buffer zones around National Parks as a priority. While there are excellent ‘Guidelines’ on developments in these areas, they should be mandatory requirements.⁵⁰
 - Urban national parks are under pressure from excessive stormwater runoff which encourages weed growth and undermines regeneration efforts, as well as over-development on their borders.⁵¹

⁴⁹ Chief Scientist synthetic review, viii.

⁵⁰ <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Development-guidelines/developments-adjacent-npws-lands-200362.pdf>

⁵¹ The NPA found that during the last bushfire season urban National Parks became habitat for native birdlife, and their role as important repositories of biodiversity is more important than ever.

- **Planning around Critically Endangered Ecological Communities (CEEC's)**
- CEEC's need far more protection that they are currently have. There should be independent oversight of developments in or around CEEC's and preferably independent Environmental Impact Statements for all CEEC's.
- The current system focuses primarily on the impact of the clearing of critically endangered plant communities. It should focus on other direct, indirect, and cumulative impacts that can negatively impact these communities over the long term. This includes changes to hydrology, impacts of lighting, chemical runoff.
- The current approach which appears to view degraded CEEC's as not worth protecting needs to change. The planning system needs to focus on restoring CEEC's. In a biodiversity crisis there should be no offsetting of these plant communities as their value is so high and regenerating areas elsewhere to the same level of biodiversity is extremely difficult and takes time. It is far more logical to keep what we have and focus on nature repair and restoration.

Recommendation 6: PLANNING FRAMEWORK FOR SYNTHETIC FIELDS

A new planning framework that takes into account climate and biodiversity risks is required for synthetic fields.

- Assessing synthetic fields through a REF process and with the same planning regime as natural turf ovals is not just illogical but irresponsible given clear knowledge gaps around these fields alongside known risks of exacerbating heat, flood and fire impacts outlined above.
- Councils should not be proponents and assessors of these developments particularly in high-risk areas or areas with high biodiversity
- Assessments should be published and consultation undertaken on them.
- The Chief Scientists synthetic review recommendations need to be legislated including not allowing them in flood or fire prone areas, and ensuring fields near sensitive ecosystems are independently assessed and tested for impacts such as runoff.
- There should preferably be a moratorium on the construction of synthetic fields in heat prone areas until knowledge gaps outlined by the NSW Chief Scientist review are addressed.

Tony Butteriss
President - Friends of Lane Cove National Park

Written by Bronwen Hanna
 November 2023

APPENDIX 1: “Identification of apparent gaps and important environmental and human health considerations in the Review of Environmental Factors (REF) for synthetic turf sites” CSE Synthetic Review, page 59.

Table 3: Identification of apparent gaps and important environmental and human health considerations in the Review of Environmental Factors (REF) for synthetic turf sites

Factor	Coverage	Gaps and important considerations
Climate change	Climate change is sometimes included in a REF where the contribution of a synthetic surface to increased heat is acknowledged. 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.	Expected impact from climate change or contribution of the synthetic turf installation to greenhouse gases does not appear to be quantified in REFs.
Soil characteristics and health	Soil testing data is collected as part of a REF. ¹³⁸ Typically Environmental Protection Authority (EPA) standards are used for soils collection with a focus on contamination assessment.	<p>The impact of installation and increasing the extent of impermeable surface is generally only considered in terms of flood liability in a REF, and soil health is not considered in the process.</p> <p>Soil testing data is generally not collated from REFs or other processes and is not used to inform future planning decisions. Collation of this data would contribute to larger-scale research and understanding of soil health and requirements in urban planning.</p>
Waste and EOL	Waste disposal is generally only considered for the construction phase of an installation.	REFs typically do not address end of life plans for synthetic turf and associated products that are installed.
Contamination	Micro and nano plastic contamination: The <i>Protection of the Environment Operations Act 1997 (POEO Act)</i> definition of waste and water pollution encompasses micro- and nano-plastics, and synthetic fibre wastes are recognised in the EPA Waste Classification Guidelines. ¹³⁹	Micro and nano plastic contamination are generally not considered in REFs, and an Environmental Protection Licence (EPL) or mitigation measures are not required.
Impact on fauna	Some councils have a policy for lighting in the public domain. Lighting might be considered in an REF to ensure it is within the range expected for the location of the synthetic turf installation.	Impact on fauna outside the development footprint is generally not considered in a REF. Although increased heat, lighting, noise is expected through the installation process and afterwards in the surrounding area, fauna will be influenced in different ways. Increased light and heat can affect reproductive and feeding behaviour of some fauna; impacts cannot be understood as occurrence data of the nearby fauna

APPENDIX 2 SYDNEY MORNING HERALD ARTICLE COVERING NATIONAL PARKS LETTER

Fake grass furor: Council pushes ahead with controversial sports ground revamp

By Megan Gorrey, March 18, 2023 — 5.00am

A turf war has erupted over a Sydney council's push to replace grass with a synthetic sports field on the upper north shore, despite the NSW National Parks and Wildlife Service urging a halt on construction amid concerns about possible environmental harm to nearby waterways and bushland.

The majority of Ku-ring-gai councillors voted to forge ahead with a long-vaunted \$3.3 million upgrade to Norman Griffiths Oval in West Pymble at an extraordinary meeting on Thursday night.

Councillor Christine Kay said local opponents were "pretty much up in arms" after an environmental assessment for the synthetic oval – known as a review of environmental factors (REF) – was published on the council's website only two weeks before construction work was due to start on March 13.

"To not give the community a four to six-week period to view the document is disappointing to say the least," Kay told the meeting.

Residents across Sydney are fighting councils' attempts to swap grass for synthetic turf, citing environmental concerns and rising urban heat. But councils and sporting groups who support the synthetic surfaces argue they can be used in all weather and are more resistant to wear and tear.

Ku-ring-gai Council initially refused to tear up the grass for a synthetic surface. However, last year it approved plans to install a new all-weather surface and improved stormwater mitigation measures.

When the matter returned to council on Thursday Kay pointed to a March 3 letter from the NSW National Parks and Wildlife Service, which said the state government agency was "deeply concerned" that work to convert the oval to a synthetic turf field was due to start this month.

"Our in-principle support for the upgrade was contingent on ongoing detailed consultation around the proposed design and management strategies to mitigate impacts to [Quarry Creek], the downstream environment and Lane Cove National Park," the letter said.

The service requested a delay to the start of construction until staff could properly review the environmental report, and a meeting with the council to make sure that appropriate maintenance and mitigation measures would be put in place to "ensure no downstream impacts will occur".

A council spokeswoman said on Friday that staff had met with the National Parks and Wildlife Service to discuss their concerns last week.

"The independent report on environmental factors ... addresses these concerns and NPWS are currently reviewing that document. We will continue to discuss any further concerns with them."

A NPWS spokesman said it supported the upgrade of the sports field, but would continue to liaise with the council on its concerns and review any extra information provided. Council staff told Thursday's meeting they were not required to consult the community on the environmental assessment under the relevant planning policies for the project.

Councillor Alec Taylor said the switch to artificial turf was important to provide an all-weather playing surface for sporting groups, and shouldn't be delayed. But he said the planning process for the project had been "suboptimal" and the council could have "consulted on a deeper level of detail".

He suggested the council hold a workshop with community groups to discuss their concerns and consider minor design changes. Taylor also said the council appeared to have "dropped the ball with National Parks", but he thought early works could go ahead while the parties resolved any outstanding environmental concerns.

Mayor Jeff Pettett said the report had been online for nearly three weeks and staff had not received many emails "if any, from the wider community, saying that the REF has glaring holes or issues". "It's probably one of the best REFs that council could receive," Pettett said.

The environmental assessment said the fields would be synthetic turf with an organic infill made from natural cork that did not require the use of harsh chemicals. The surface was proposed to be raised above the flood level to ensure there was limited runoff of any synthetic materials. The environment assessment concluded that "subject to the implementation of recommended mitigation measures, potential environmental impacts can be controlled with no adverse impacts on the health, diversity or productivity of the environment".

The majority of councillors voted against delaying construction to give parties more time to consider the environmental report. The project is due for completion in November.

The council says local football clubs are contributing almost \$1 million in club funds and government grants to the cost of the field. That includes \$500,000 from Liquor and Gaming NSW's Clubgrants infrastructure funding scheme, promised in 2017 by Sports Minister and MP for the abolished seat of Ku-ring-gai, Alister Henskens, who is recontesting the new seat of Wahroonga.

Friends of Norman Griffiths Oval spokesman Dale Crosby said members of local environment groups – who have mounted a combined push against the revamp – were worried about the critically endangered Sydney turpentine ironbark forest that surrounds the oval. "We're concerned there hasn't been sufficient community consultation with regard to the run-off," Crosby said.

APPENDIX 3: LETTER FROM SUE HIGGINSON MLC TO KU-RING-GAI COUNCIL



Sue Higginson

NSW GREENS MP

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10 May 2023

John McKee
General Manager, Ku-ring-gai Council
818 Pacific Highway Gordon NSW 2072
Via email: krg@krg.nsw.gov.au

Cc. Penny Sharpe
Minister for the Environment
Via email: office@sharpeminister.nsw.gov.au

Dear Mr McKee

Failure to comply with environmental assessment requirements for Norman Griffiths Oval

I write to you today about the assessment requirements for the upgrade of Norman Griffiths Oval at West Pymble and the apparent failure of Ku-ring-gai Council to comply with the important and specific legal requirements of the Environmental Planning and Assessment Act 1979 (EPA Act).

Section 5.5 of the EPA Act requires a determining authority, in its consideration of an activity, to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. Pursuant to section 5.10 of the EPA Act the regulations may make provision for or with respect to determining the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment.

Clause 171A of the Environmental Planning and Assessment Regulation 2021 (EPA Regulation) provides specific and additional matters that must be considered where the proposed activity is within a regulated catchment and including matters under State Environmental Planning Policy (Biodiversity and Conservation) 2021.

The location of Norman Griffiths Oval falls within the boundaries of the Sydney Harbour Catchment, which is a regulated catchment and is, therefore, subject to clause 171A of the EPA Regulation. It is my understanding that the Review of Environmental Factors (REF) for Norman Griffiths Oval has not addressed clause 171A of the EPA Regulation.

Without addressing the specific matters in clause 171A of the EPA Regulation in the environmental assessment contained within the REF, section 5.5 of the EPA Act has not been satisfied. Furthermore, by examining the effects that the proposed development may have on the environment, as required by section 5.5 and clause 171A, it may be found that an Environmental Impact Statement (EIS) is in fact required for the activity, as opposed to a REF. Failing to discharge the duty under section 5.5 is a breach of the EPA Act and failing to prepare an EIS when one is required is a breach of the EPA Act.

I urge you to halt work upgrades of Norman Griffiths Oval until the above requirements are addressed. Ku-ring-gai Council may otherwise find it is faced with legal action, as any person can commence proceedings in the Land and Environment Court to restrain and or remedy a breach of the EPA Act.

While public access to sports fields for games and other outdoor activities is vital for a vibrant community, environmental assessment as required by law for development and activities is paramount and a duty examinable by the court.

Please do not hesitate to contact me directly on _____ to discuss the matter further. I look forward to your timely response on this important issue.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Sue Higginson', with a stylized flourish at the end.

Sue Higginson
Member of the Legislative Council & Solicitor

APPENDIX 4: Comparative Readings of Grass, Cork and Rubber Tyre Infill in Sydney, February 2022

The temperature of the Synthetic field (**rubber** infill) is 36.4 degrees higher than the surrounding ambient temperature and 34.0 degrees higher than an adjacent grass field.

The temperature of the Synthetic field (**cork** infill) is 31.7 degrees higher than the surrounding ambient temperature and 23.7 degrees higher than an adjacent grass field.

Temperature Measurement at ELS Hall Field (North Ryde) and Charles Bean Field (Lindfield)

Thursday 10th February 2022

Stanley IR Thermometer STHT77365

Measurements in degrees Celsius

ELS Hall Field, North Ryde - 1.20pm

	1	2	3	Average	Variation
Ambient temp	32.0	32.0	32.0	32.0	
Synthetic field (cork)	63.5	63.6	64.0	63.7	31.7
Grass field (adjacent)	40.3	40.9	39.5	40.2	8.2

Charles Bean Field, Lindfield - 2:20pm

Ambient temp	32.0	32.0	32.0	32.0	
Synthetic field (rubber)	69.4	67.2	68.7	68.4	36.4
Grass field (adjacent)	34.1	35.1	33.9	34.4	2.4

- Legend
- Ambient temp: Air temperature above field
 - Synthetic field: Field temperature
 - Grass field (adjacent): Temperature of nearby grass field
 - Variation: Difference between surface and ambient temperature

APPENDIX 5 Ecologist Report, Roger Lembitt
(Note this was not used as evidence in the Land and Environment Proceeding)

Installation of Artificial Grass at Norman Griffiths Oval, West Pymble

Report by
Roger Lembitt B.Sc.Agr.
Principal Ecologist
Gingra Ecological Surveys
P.O. Box 1
CANTERBURY NSW 2193
15 June 2023

This report is prepared at the request of NGANG Inc. in relation to the installation of artificial grass at Norman Griffiths Oval, West Pymble. This activity is being advanced by Ku-ring-gai Municipal Council who manage the broader Ku-ring-gai Bicentennial Park as part as Council's Open Space System.

In preparing this report I have read and sought to comply with the relevant requirements of the NSW Land and Environment Court's Expert Witness Code of Conduct, as per the Uniform Civil Procedure Rules 2005.

A list of documents relied upon in preparing this report appears at the end of the report.

I visited the site on 12 June 2023, including the areas mapped as supporting Sydney Turpentine-Ironbark Forest and the downstream riparian zone along Quarry Creek extending into Lane Cove National Park.

The activity was approved based on the preparation of a Review of Environmental Factors prepared by Willowtree Planning completed on 14 February 2023 and approved by Council on 20 February 2023.

In approving the activity Council is required to apply sections 5.5, 5.6(2)(a) and 5.7 of the Environmental Planning and Assessment Act 1979 and, in particular,

(a) cl 171 of the *EP and A Regulation 2012*;

(b) cl 171A of the *EP and A Regulation 2012*;

(c) s6.28(1) of the *SEPP (Biodiversity and Conservation) 2021* enlivened by cl 171A(4) of the *Regulation*

My opinion is that Council has not dealt adequately with ecological issues as required in clause 171 (2) and clause 171A of the Environmental Planning and Assessment Act Regulation.

1. The likely indirect impacts on the Sydney Turpentine-Ironbark Forest surrounding the activity subject site has not been addressed in an adequate manner.

Sydney Turpentine-Ironbark Forest (STIF) is a Critically Endangered Ecological Community listed under the Biodiversity Conservation Act. STIF has a restricted distribution in the Sydney Region and less than 0.5% of its original distribution remains intact (DPE 2022). The Ku-ring-gai Bicentennial Park. Plan of Management highlights the importance of STIF in the local context identifying its presence as a key element of the environmental values of the Park and that it is “is of regional significance as a remnant of an Endangered Ecological Community of which there is less than 0.5% left”.

The area of STIF also provides habitat for a range of fauna species including arboreal mammals, birds, including Powerful Owl and several species of microbats.

The activity may result in a change in the temperature and moisture profile within the STIF remnants in the vicinity of the activity subject site. I observed that drought conditions during the Millenium Drought and again in 2018-19 were associated with tree death adjacent to places such as motorways where heat exceeded levels present in more natural areas.

Some tree species are more susceptible to the impacts of heat and altered hydrology. Such species present in the area of Sydney Turpentine-Ironbark Forest immediately to the north of the subject site are Blackbutt (*Eucalyptus pilularis*) and Smooth-barked Apple (*Angophora costata*). Edge effects such as altered microclimate are identified as a threat to Sydney Turpentine-Ironbark Forest (Department of Environment and Planning (2022).

This area is a known Powerful Owl roosting site. There is a risk of the loss of a tree or trees which provide roosting habitat.

The vegetation conditions in the area of Sydney Turpentine Ironbark Forest immediately to the north of the activity subject site indicate to me that there is groundwater seepage associated with an aquifer. This is in the area where a number of orchid species have been found by local bush regenerators. These orchid species include *Cryptostylis erecta*, *Thelymitra nuda*, *Thelymitra pauciflora*, another *Thelymitra* sp., *Chiloglottis formicera*, *Caladenia carnea* and *Calochilus robertsonii*. The Flora and Fauna Impact Assessment (FIFA) report prepared by Total Earth Care also indicated that the endangered species *Thelymitra atronitida* is also present in this area.

Interruption to this aquifer, including by earthworks at its lower side has the potential to dry the soil profile, making the habitat unsuitable for long term survival of these orchid species. The assessment of the environmental impact on the ecosystems of the locality within the REF and supporting documents is flawed as the full extent of the Sydney Turpentine Ironbark CEEC and its associated biota was not considered, nor was the receiving catchment downstream from the subject site including the riparian zone of Quarry Creek extending through Lane Cove National Park to the Lane Cove River and Sydney Harbour.

2. The degree of transformation of the locality is understated. The conversion from a grassed field to a synthetic field by its nature changes the habitat value of the area. Bird species such as Australian Magpie, Grey Butcherbird, Welcome Swallow and Australian White Ibis use these expanses of managed exotic grasses as feeding sites variously preying on insects and soil invertebrates. Other bird species, such as Pied Currawongs also feed on insects that exist in the soil as part of their life cycle. This food source will be removed.

Australian Magpies are highly territorial (Jones 2022), and individuals displaced due to interruption to their food supply may not survive in the broader landscape.

Microbats also feed on insects which have part of their life cycle in the soil of these grassed areas. In particular, the Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) and Eastern Bent-winged Bat (*Miniopterus orianae oceanensis*) are known to forage over grassland areas (Van Dyck and Strahan 2008). The insect habitat which provides this feed source will be removed.

The loss of insect habitat arising from conversion from grass to synthetic turf is not considered in the Assessment of Significance for microbats included in the FIFA.

3. The potential for indirect impact on the sensitive environment downstream from the subject site for the activity is not addressed.

The Endangered Ecological Community Sydney Turpentine Ironbark Forest (STIF) extends along Quarry Creek to Yanko Road (see Figure 1). Further downstream is high quality Sydney Sandstone Gully Forest vegetation within Lane Cove River National Park. This downstream area has been actively worked by volunteer bush regenerators for several decades. It is in superior condition to many bushland areas within the Lane Cove catchment.

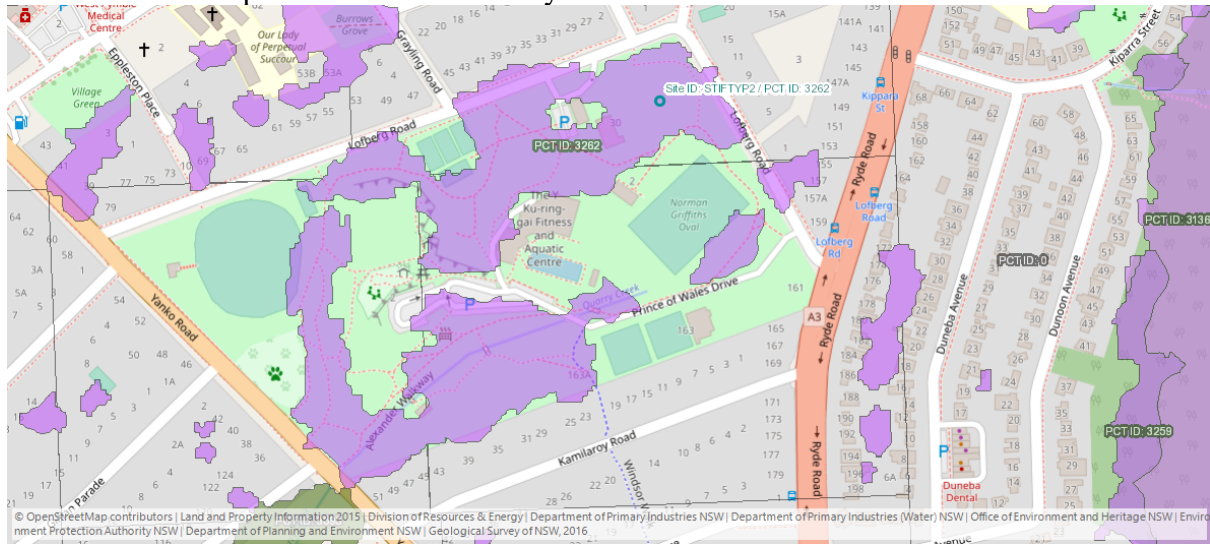


Figure 1. Extent of Sydney Turpentine-ironbark Forest at Ku-ring-gai Bicentennial Park PCT 3262.

The Assessment of Significance (5-part test) included in Appendix D of the FIFA fails to consider indirect impacts on STIF occurrences along Quarry Creek downstream from the subject site.

The threatened frog species, Red-crowned Toadlet has been recorded in the vicinity of Quarry Creek. The habitat values of this section of Quarry Creek include ponds suitable for breeding and dense fern cover which provides protection from predators. The likely presence of this frog is not addressed in the REF, nor is there any consideration of potential indirect impacts of the activity including pollution by chemicals or microplastics and changed hydrology. Frog species are declining in part due to the spread of diseases such as chytrid. The impact of environmental pollutants can affect the immune system of fauna species making them more vulnerable to disease.

Reduction in water quality and disease are recognised as threats to the existence of Red-crowned Toadlets (Department of Planning & Environment 2017).

The degree to which the potential impact of pollutants being transported downstream from the synthetic field is reduced depends on the effectiveness and management of the proposed absorption pits placed at the south-eastern corner of the subject site under the range of weather conditions, including intense rainfall events over the life of synthetic playing field. Movement of cork infill due to flooding has been observed at established synthetic fields such as at Tempe Recreation Reserve in 2023.

Management of synthetic turf such as proposed for use is addressed by Field Turf Australia in a maintenance guide published on their website (Field Turf Australia 2023). Management will require regular brushing, removal of debris including leaves and branches and animal waste, weed control using herbicides, control of mosses, algae and fungi.

4. The risk to environmental safety has not been addressed in an adequate manner.

The Bushfire Hazard Assessment (Blackash Bushfire Consulting 2022) indicates that the bushland surrounding the field constitutes Bushfire Prone Land Category 2. Blackash also states that potential exists for limited fire propagation and growth within the cork and synthetic filling.

Fire risk is not limited to the potential for fire spreading from the adjacent bushland onto the synthetic playing field. Fires could start on the playing field, such as through arson or illegal ignition of fireworks. Such fires may constitute an environmental risk due to combustion of the chemicals contained within the synthetic grass matrix including polyethylene, polypropylene, styrene-butadiene latex and the cork fill material.

Embers arising from a larger bushfire within Category 1 bushfire prone land distant from the field could also cause ignition of the synthetic surface.

5. The FIFA proposes to manage impacts on the STIF which abuts the northern edge of the subject site by construction of a fence. No other mitigation measure is proposed. Creating a cage around an area of bushland is not a long-term measure which comprises effective conservation action. Additional measures would need to be undertaken to provide a higher degree of certainty that this important section of bushland is protected, given its proximity to the synthetic field.

Building a fence does not address indirect impacts such as altered hydrology, mentioned in Appendix D of the FIFA.

Section 6.28 (1) of State Environmental Planning Policy (Biodiversity and Conservation) 2021

The proposed activity does not protect native vegetation, nor terrestrial and aquatic species, populations and ecological communities which exist downstream from the subject site along Quarry Creek, a tributary of the Lane Cover River. Threats to biota such as reduction in water quality, altered hydrology, chemical and microplastic pollution are not adequately assessed, nor has the precautionary principle been applied in relation to these potential impacts.

The impact of the activity on the Red-crowned Toadlet has not been assessed.

No rehabilitation of riparian lands or remnant vegetation is proposed as part of the activity.

Conclusion

The proposed activity inserts a synthetic playing field into a sensitive ecosystem constituted by the Sydney Turpentine-Ironbark Forest CEEC and the Quarry Creek section within Lane Cove National Park. There is a high environmental risk implicit in the location of the synthetic field within this ecosystem.

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APPENDIX 6: SECTION 171A REQUIREMENTS DEALING WITH POLLUTION

<p>6.8(2) <i>Development consent must not be granted to development on flood liable land in a regulated catchment unless the consent authority is satisfied the development will not—</i></p>	
<p>(a) <i>if there is a flood, result in a release of pollutants that may have an adverse impact on the water quality of a natural waterbody, or</i></p>	<p>The site is not considered a hazardous industry or hazardous storage establishment that requires containment of materials in the event of a flood.</p> <p>This project has been designed to keep the field flood free up to and including a 1% AEP event, to prevent export of surface materials during frequent flood events.</p> <p>Design of the field to be flood free at the 1% AEP, a rarer event than the current field and most sporting fields on flood liable land.</p>

	<p>Cork infill material was chosen over rubber infill in response to the evidence that rubber crumb can introduce heavy metals and other hydrocarbon contaminants into the environment. Noting the design features to prevent surface runoff from the field and choice of materials, potential loss of field surface materials during very rare flood events (above the 1%AEP and up to the PMF) is not considered to have an adverse impact on the water quality of Quarry Creek under those circumstances.</p> <p>Storage of flood flows in the detention system will also help to filter out pollutants from upstream prior to discharge back into Quarry Creek.</p> <p><i>Impact:</i> Negligible</p> <p><i>Mitigation:</i> The design of the field to be flood free to be above 1% AEP as well as other measures such as stormwater pollution devices and high flow bypass. Operation and maintenance requirements will be specified in the Operation and Maintenance Plan (Part F 32).</p>
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(Note this section was not in the first REF and added to the final REF)

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