

**CORRESPONDENCE  
FROM MARCH 9, 2026,  
APRIL 13, 2026, AND  
MAY 4, 2026,  
CITY COUNCIL MEETING**

**McMillan, Acquanette (Netta)**

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**From:** Lauren Siegel <  
**Sent:** Friday, April 10, 2026 2:27 PM  
**To:** Official Records - City Clerk  
**Cc:** Jomsky, Mark; Airitam, Derrick  
**Subject:** CIP Budget - Letters on Artificial Turf  
**Attachments:** 2024-09-10 EAC Artificial Turf Memo to Council with Figure.pdf

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Good Afternoon,

I believe ALL the public comment letters to EAC, Parks and REC and MSC on artificial turf should be included in public comment regarding the CIP for City Council and Finance Committee. The Planning Commission didn't receive the letters, and I feel it impacted their vote. There were thirty letters sent to MSC, please attach these to the CIP comments and the EAC letter.

Thanks,  
Lauren Siegel

--

Lauren Siegel  
MS Sustainable Development and Resource Management  
Pasadena Environmental Advisory Commissioner  
[linkedin.com/in/siegel/](https://www.linkedin.com/in/siegel/)



## Memorandum

To: Pasadena City Council  
From: Environmental Advisory Commission  
Date: September 13, 2024  
Re: Recommendations and Background on Artificial Turf in the City of Pasadena

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### 1. Executive Summary

Plastic artificial turf (also known as “synthetic turf” or just “artificial turf”), much like lead paint, DDT, and asbestos, represents a once-promising innovation that has since raised significant concerns regarding environmental and public health and safety. Initially introduced as a low-maintenance alternative to natural grass, artificial turf was celebrated for its durability and ability to provide consistent, year-round playing surfaces, and the look of green grass without the commitment of water and fertilizers. However, as was the case with other seemingly-promising innovations, the long-term health risks and environmental impacts associated with artificial turf are now becoming unavoidably apparent.

In the case of artificial turf, the toxicity of materials used in its production, including in the infill, which is often made from shredded rubber tires, have raised alarm. Studies show that exposure to chemicals in artificial turf, including lead and other heavy metals and forever chemicals, poses risks to athletes, children, the public, and contamination of our water supply. Dangerous heat conditions arise since artificial turf gets significantly hotter than natural grass, increasing the urban heat island effect and leading to thermal burns and heat stress. Biodiversity loss and tree root suffocating derives from no organisms living under artificial turf. These concerns echo the historical pattern of substances initially embraced for their practicality, only to later reveal serious public health and environmental consequences.

For the reasons set forth below, after several months of study, research, testimony, and discussion at Commission meetings, the Environmental Advisory Commission recommends that the Pasadena City Council take the following steps relating to artificial turf in the City of Pasadena:

#### A. Recommendations for Residential, Commercial, and Institutional Settings:

- Adopt an ordinance that would put a moratorium on new installations or replacement installations of artificial turf for landscaping in residential properties, commercial and institutional settings.
- Direct Pasadena Department of Water and Power to explore incentives and rebate programs to remove and replace artificial turf in residential, commercial and institutional settings with drought-tolerant native plants.

#### B. Recommendations for City-Owned Property, Including Parks and All City Landscaping:

- Adopt an ordinance that would put a moratorium on new installations or replacement installations of artificial turf for City-owned property, including parks and City landscaping.

- While artificial turf still exists in City-owned parks, direct the Parks and Recreation and Public Works Departments in coordination with the Public Health Department to (1) establish policies for the safe utilization of artificial turf to prevent burn injuries, heat stress, and dehydration; and (2) educate the public by conducting a series of information sessions about the environmental and public health safety concerns of artificial turf playing fields, including exposure to PFAS and extreme heat conditions.
- Direct the Public Health Department to conduct a Health Impact Assessment (HIA) on artificial turf to study potential adverse health impacts of artificial turf both directly and due to contamination to natural resources caused by artificial turf. (An HIA is a tool designed to investigate how a proposed program, project, policy, or plan may impact health and well-being and inform decision-makers of these potential outcomes. An HIA in this context will aid the City in determining what, if any, future planning and actions should occur to mitigate health effects from existing artificial turf installations.)

## 2. Background - What is Artificial Turf?

Artificial turf is made of plastic, a petrochemical product designed as a substitute for natural grass. Plastics are derived from chemicals produced through the combustion of fossil fuels like oil and gas. Energy-intensive processes, including extraction, refining, and manufacturing, transform these fossil fuels into plastics, which are then used to produce both the grass-like blades and the backing materials in artificial turf installations.

There are three main components of artificial turf:

- **Blades:** The plastic blades are made by melting nylon, polypropylene or polyethylene pellets and mixing them with other chemicals and additives to achieve desired color. The melted mixture is shaped into strands and spun into a yarn that is then sewn into a mesh material.
- **Backing layers:** These layers are derived from various types of plastics such as polyester, polyurethane, polypropylene and latex to support the blades and provide stability and drainage.
- **Infill:** This granular material is spread between the blades to keep the blades upright and provide shock absorption. The most common types of infill are rubber crumb (made from shredded end-of-life automobile tires) and sand.

## 3. Environmental and Public Health Concerns of Artificial Turf Installations

### A. Dangerous Heat Conditions and Urban Heat Islands

**Turf Heats Up More than Grass:** Numerous studies confirm that plastic turf gets significantly hotter than natural grass, regardless of the type of fibers or infill used. Penn State research shows surface temperatures of synthetic turf can reach 140-170°F.<sup>1</sup> A study by Brigham Young University found synthetic turf to be 37°F hotter than asphalt and 87°F hotter than natural grass.<sup>2</sup> Unlike artificial turf, grass cools itself and the surrounding air through water evaporation. (See Figure 2 of temperatures of artificial turf and grass at Villa Park).

<sup>1</sup> (Abraham, 2019; Claudio, 2008; NPRA, 2019)

<sup>2</sup> (Williams & Pulley, 2002)



**Plastic Turf Increases Urban Heat Island Effect:** Urban areas are already warmer than surrounding regions due to heat retention by buildings and pavement. Artificial turf contributes to this by trapping and radiating heat, creating dangerous conditions for users, and raising temperatures in surrounding neighborhoods. According to Kelly Turner of UCLA's Heat Equity Initiative, plastic turf is one of the hottest materials, retaining heat longer than asphalt.<sup>3</sup> (See Figure 1 of Urban Heat Island Effect at Jackie Robinson Park)

**Climate Change Will Make Plastic Turf Even Hotter:** As global temperatures rise, Pasadena will experience more frequent days above 90°F. It is critical to address how artificial turf contributes to worsening conditions.<sup>4</sup>

## B. PFAS and Microplastic Pollution

**Toxic "Forever Chemicals":** Plastic turf contains PFAS (per- and polyfluoroalkyl substances), chemicals that persist in the environment and have been linked to cancer, hormonal issues, neurotoxicity, and developmental delays in children. All artificial turf tested has contained PFAS.<sup>5</sup> In addition, the infill, typically made of shredded tires made from end-of-life automobile tires, is extremely toxic, containing, among other substances, heavy metals and volatile organic compounds.<sup>6</sup>

**Risks of Cumulative Exposure:** Athletes frequently in contact with plastic turf, such as soccer players and goalies, face higher risks of exposure to PFAS through skin contact, inhalation, and ingestion.

**Contamination of Water Systems:** Runoff from plastic turf fields carries PFAS into storm drains, polluting Pasadena's water supply, which could be both difficult and costly to clean up. Estimates suggest cleanup would reach tens of billions of dollars, depending on the scale of the problem.<sup>7</sup>

**Microplastic Pollution:** Plastic turf blades break off over time, releasing microplastics into drainage systems and waterways. Fields using crumb rubber infill are even worse, with studies showing 85% of water samples near such fields contain microplastics.<sup>8</sup>

## C. Greenhouse Gas Emissions

**Plastic Turf's Carbon Footprint:** Greenhouse gasses are emitted from artificial turf continuously throughout its lifespan, in the extraction, storage, transportation and energy-intensive manufacturing processes, as well as off-gassing methane and ethylene while

<sup>3</sup> <https://innovation.luskin.ucla.edu/climate/heat-equity/>.

<sup>4</sup> California Healthy Places Index: Extreme Heat Edition, available at: <https://heat.healthylivesindex.org/>.

<sup>5</sup> What are the health effects of PFAS? Agency for Toxic Substances and Disease Registry, available at: <https://www.atsdr.cdc.gov/pfas/health-effects/index.html>; Our Current Understanding of the Human Health and Environmental Risks of PFAS, EPA, available at:

<https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas>.

<sup>6</sup> Health Impacts of Artificial Turf: Toxicity Studies, Challenges, and Future Directions, available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10262297/>.

<sup>7</sup> "Groundbreaking study shows unaffordable costs of PFAS cleanup from wastewater,"

Minnesota Pollution Control Agency, available at:

[https://www.pca.state.mn.us/news-and-stories/groundbreaking-study-shows-unaffordable-costs-of-pfas-cl](https://www.pca.state.mn.us/news-and-stories/groundbreaking-study-shows-unaffordable-costs-of-pfas-cleanup-from-wastewater)  
[eanup-from-wastewater](https://www.pca.state.mn.us/news-and-stories/groundbreaking-study-shows-unaffordable-costs-of-pfas-cl).

<sup>8</sup> (Korbol, 2018).

in use and as it degrades. Solar radiation triggers the off-gassing from artificial turf and it continues long after dark.<sup>9</sup> Methane is 80% more powerful at trapping heat than CO<sub>2</sub> and a significant contributor to global warming.

**Life Cycle Emissions:** A recent study<sup>10</sup> found one artificial turf field emits 527 tons of CO<sub>2</sub> equivalents over its life cycle.

#### D. Carbon Absorption and Biodiversity Loss

**Loss of Carbon Sink:** Plastic turf installations eliminate natural spaces that would otherwise absorb carbon, hindering Pasadena's climate goals.

**Biodiversity Loss:** Plastic turf kills soil microorganisms and displaces habitats for pollinators and wildlife, worsening the biodiversity crisis. Nothing can thrive in plastic grass.

**Harm to Trees:** Plastic turf covering the ground near tree roots suffocates the soil, depriving trees of essential nutrients. Preserving Pasadena's tree canopy is critical for climate mitigation.

#### E. Public Safety and Injuries

**Thermal Burns:** Playing on plastic turf in high heat can cause first-degree burns at 118°F and second-degree burns at 131°F. Hot artificial turf can melt shoes, blister skin, and cause dehydration or heatstroke.

**Plastic "Turf Burns":** Friction injuries from sliding on plastic turf are common and can lead to bacterial infections like MRSA. Artificial turf causes a two-to-threefold increase in skin abrasions compared to natural grass.<sup>11</sup>

**Increased Injury Rates:** NCAA football players are nearly three times more likely to suffer ligament tears on artificial turf than grass. NFL players also experience a 16% increase in lower extremity injuries on artificial turf.<sup>12</sup>

#### F. Lack of Recyclability

**Plastic Waste:** At the end of its life, plastic turf becomes non-recyclable plastic waste, emitting methane in landfills. A typical 80,000 sq. ft. plastic turf field contains 40,000 pounds of plastic.<sup>13</sup>

#### G. Water Use and Maintenance Costs

**High Water Usage:** Artificial turf is often touted as a water-saving alternative to grass. However, in hot climates like ours, water is regularly required to cool the surface of artificial turf, which can

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<sup>9</sup> "Synthetic turf will contribute to greenhouse gas problems" MV Times, available at: <https://www.mvtimes.com/2019/02/20/synthetic-turf-will-contribute-greenhouse-gas-problems/>.

<sup>10</sup> "Analysis of energy use and emissions of greenhouse gasses, metals and organic substances from construction materials used for artificial turf" available at: <https://www.sciencedirect.com/science/article/abs/pii/S0921344917300861>.

<sup>11</sup> (California Office of Environmental Health Hazard Assessment, 2010).

<sup>12</sup> American Journal of Sports Medicine, 2019, available at: <https://pubmed.ncbi.nlm.nih.gov/30995074/>.

<sup>13</sup> (Beyond Plastics, 2024).



reach 140-170°F. Water is also regularly required to remove pollution, bodily fluids, animal waste and bacteria from the surface of artificial turf. Given these factors, the water usage for artificial turf can easily match or exceed that needed to maintain natural grass.<sup>14</sup>

**Replacement Costs:** Plastic turf must be replaced every 8-12 years, with replacement costs ranging from \$300,000 to \$650,000 for football or soccer fields.<sup>15</sup>

#### H. Environmental Justice

Pasadena's Environmental Justice Element requires fair treatment for all residents in implementing environmental policies. Artificial turf fields in Robinson Park and Villa Parke create urban heat islands in neighborhoods where some of Pasadena's most disadvantaged residents live, raising utility bills and worsening health conditions for low-income communities.

#### 4. Other Municipalities Adopting Similar Ordinances

The cities of Millbrae and San Marino have already begun establishing moratoriums for new artificial turf installations. Other California cities and counties such as Los Angeles, Sunnyvale and Santa Clara County are considering artificial turf bans.

#### 5. Conclusion

Based on the significant environmental and public health concerns we have outlined related to artificial turf installations, the EAC firmly believes that keeping this substance in our city is not a responsible choice for Pasadena. The Commission believes that allowing new installations or re-installations of artificial turf is not in alignment with the City of Pasadena's Climate Action Plan and makes it more difficult for the City to achieve its goals for climate change mitigation, adaptation and readiness.

We urge the City Council to act, adopting the recommendations we have put forward: Placing a moratorium on new and replacement installations of artificial turf for residential, commercial, institutional, and City-owned properties, conducting a Health Impact Assessment of artificial turf and establishing safe utilization policies for park field usage while the product still exists within the City of Pasadena.

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<sup>14</sup> <https://www.turi.org/publications/artificial-turf/>.

<sup>15</sup> <https://sportsvenuecalculator.com/knowledge/artificial-turf-field/turf-field-replacement-and-recycling/>.

Figure 1. Villa Parke Temperatures on Artificial Turf vs Grass on September 2nd, 2024

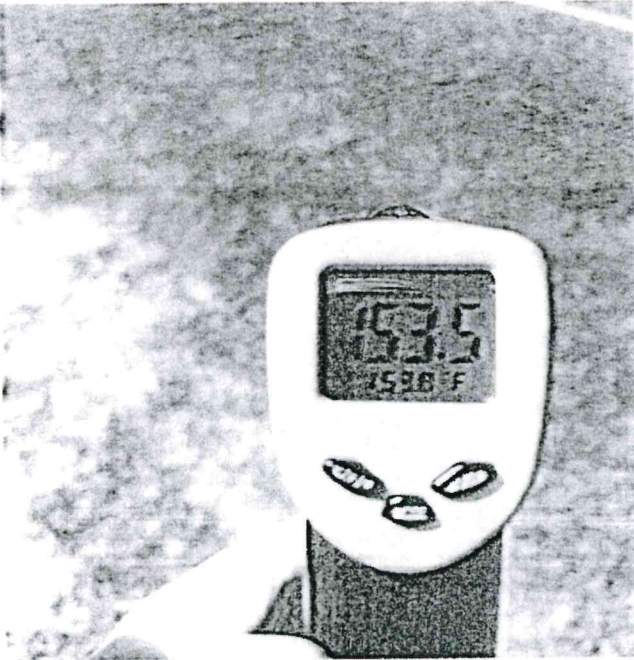
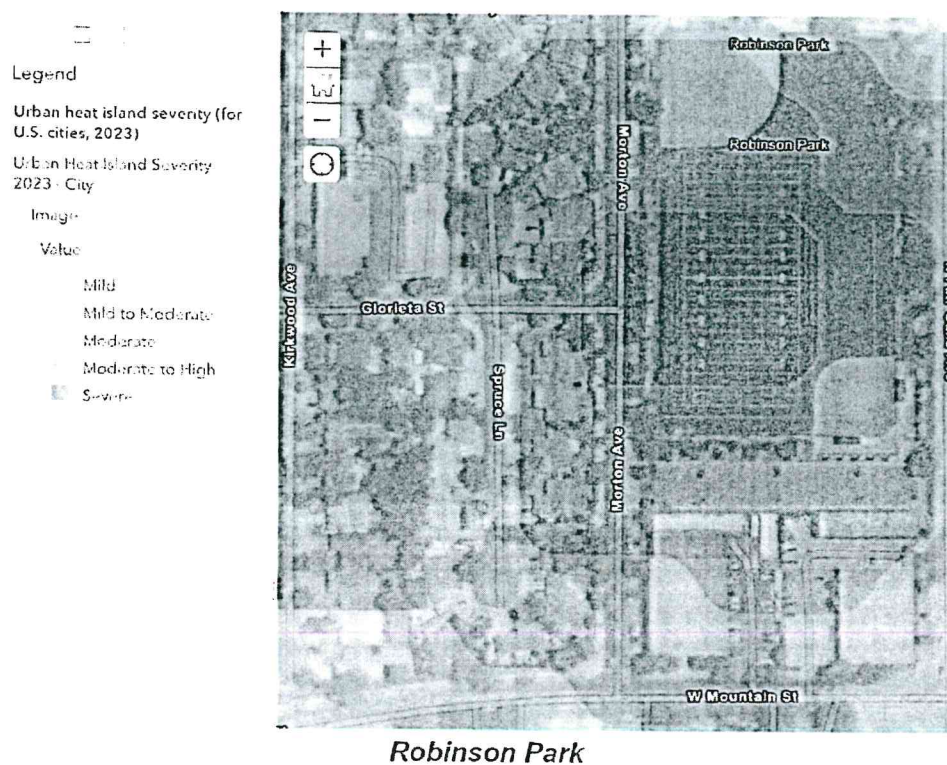


Figure 2 (Safe Healthy Playing Fields Memo to EAC, August 2024)

Heat Island over Robinson and Villa Parks synthetic turf fields extending over surrounding areas:





**McMillan, Acquanette (Netta)**

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**From:** Cynthia Cannady  
**Sent:** Sunday, April 12, 2026 12:11 PM  
**To:** Jones, Justin; Rivas, Jessica  
**Cc:** Lauren Siegel; ; f Suzanne York; Ana  
Soulriver; Felix Breden; phlunteriddle; ; PublicComment-  
AutoResponse  
**Subject:** Ten Reasons to Say NO to Artificial Turf at Jackie Robinson and Villa Parke-HEAT  
**Attachments:** GOOD REASONS TO ELIMINATE ARTIFICIAL TURF FROM PLAYING FIELDS.pdf

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Dear Justin and Jess,

If I am correct, Jackie Robinson and Villa Parke are in your Council districts so I address this to you especially.

We (Suzanne York and I) have made the attached document "Ten Good Reasons to Say No to Artificial Turf". (This is based on the excellent work of the EAC for more than a year.)

I will focus on #1 on this list: Heat. We are talking about atmospheric heat, not just the high surface temperature.

Artificial turf increases atmospheric (neighborhood) temperature, contributing to urban heat island effect. See this [analysis](#). And [this](#) And [this](#). There's lots more.

Northwest Pasadena is an urban heat island with low tree shade, high asphalt, low air conditioning access and freeway proximity. It has "[major heat risk](#)". See this [good EPA paper](#) on heat islands.

Overall, Pasadena is a city with heat risk. See this [2018 PWP study](#) that concludes that temperatures here are increasing as a result of climate change. And [this](#). And [this](#).

And [research](#) shows that minorities and low income populations suffer disproportionately from heat island burden: "Our findings reveal that present-day income inequality is a stronger predictor of heat burden than the legacy of redlining. Additionally, land surface temperature disparities exhibit a seasonal hysteresis effect, intensifying during extreme heat events by 5–7 °C. Sociodemographic analysis highlights that African-American and Hispanic populations in historically and economically disadvantaged areas are often the most vulnerable."

Globally, a 2026 [study by the World Meteorological Organization](#) concluded that climate change is causing global heat increases at a faster pace than anticipated. It states:

"One of the longest observational records of climate change is that of global mean near-surface temperature. The past three years are the three warmest years in the 176-year combined land and ocean observational record."

04/13/2026

Item 18

This chart from p. 8 is worth a thousand words.

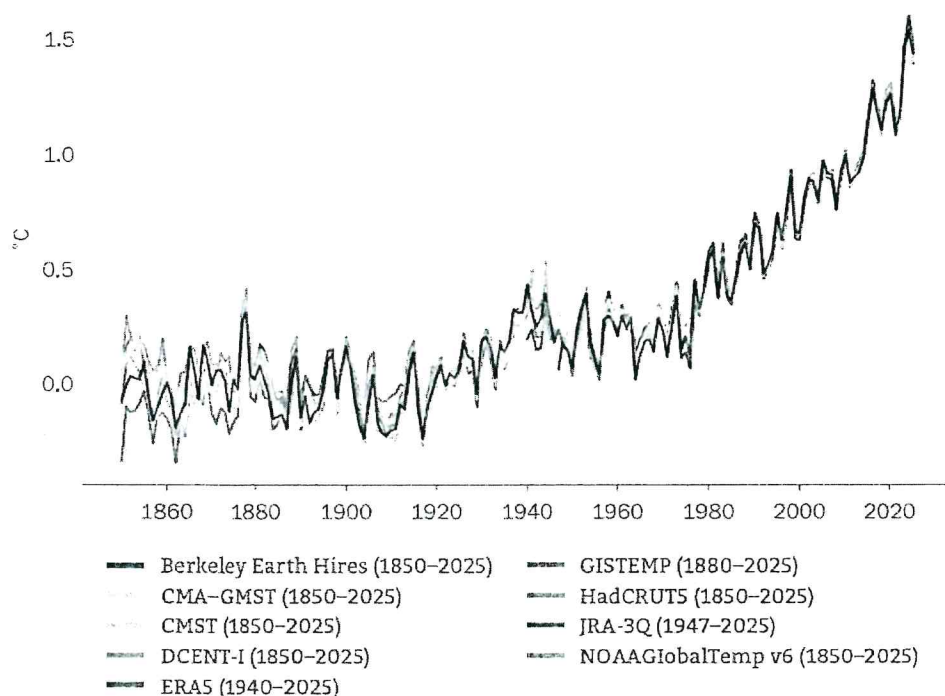


Figure 2. Annual global mean temperature anomalies relative to a pre-industrial (1850-1900) baseline shown from 1850 to 2025

Source: Data are from the datasets indicated in the legend. For details see Datasets and methods.

**So, why would we install a material that increases surface and ambient heat on a field in a heat island neighborhood in a high heat risk city at a time when climate change induced heat is a big problem?**

Please say no to this. I remain convinced that the mid-long term public health risks to children inhaling PFAS and toxic chemicals should not be ignored. (There are lots of studies on this both ways, with the profitable turf/petroleum industry arguing that the PFAS and toxins may not be "bioavailable", and lobbying and intimidating vigorously). Same was true of cigarettes and asbestos. At some point, wise policy makers realized that the risk did not have to be conclusive to justify policy decisions. And eventually, the evidence became conclusive. During the interim between risk and conclusive evidence, many people suffered and died from lung cancer, mesothelioma and asbestosis.

Secondarily, for Pasadena to accept the life cycle greenhouse gas emissions of plastic grass appears inconsistent with our carbon free electric power goal.

But the heat problem alone is reason to decline to authorize this expense.

How will we recall these decisions when the days above 100 degrees F. increase dramatically and people are getting sick? When children can't play?

Finally, the environmental injustice issue cannot be ignored. See [this study](#) on "thermal inequity" in Los Angeles County parks. We cannot ignore the reality that John Muir has artificial turf but Polytechnic and Westridge do not. That AF is proposed for Villa Parke and Jackie Robinson, but not for Victory Park. That

San Marino has banned AF as have many affluent cities (Milbrae, Westport, Boston) across the nation, but South Central Los Angeles schools (Carson, Fremont, Dymally, Conteras) have it.

There are 10 good reasons to reject the budget proposal for artificial turf. All of which are founded in facts.

The EAC researched and highlighted these problems more than a year ago.

Cynthia



## TEN GOOD REASONS TO SAY NO TO PLASTIC GRASS (artificial turf or AF)

1. **Surface and atmospheric heat:** AF can reach surface temperatures of over 150 to 200°F, significantly hotter than natural grass or asphalt, creating a high risk of heatstroke, dehydration, and burns for children and athletes. AF is also known to contribute to the “heat island effect”; entire urban neighborhoods suffer from intensified heat in a climate that is already heating to dangerous levels.
2. **Increased Injury Rates:** Professional athletes, including the NFL Players Association, have noted higher rates of non-contact injuries on AF. Studies show a 28% increase in overall injuries compared to natural grass, specifically for ACL tears and ankle issues.
3. **Toxic Chemical Exposure:** The “blades”, filler and base of AF release PFAS (“forever chemicals”), lead, and known carcinogens (benzene, arsenic, cadmium, polycyclic aromatic hydrocarbons among others). May be absorbed through skin contact or inhaled.
4. **Microplastic Pollution:** Constant wear and UV exposure cause plastic blades to break down into microplastics. A single field can lose 200 to 3,200 pounds of plastic per year, which migrates into soil, waterways, and the ocean.
5. **Destruction of Biodiversity:** Unlike natural grass, artificial turf is a “biological desert.” It kills soil organisms like worms and microorganisms by creating an impermeable barrier, and provides no food or habitat for birds or insects.
6. **Greenhouse Gas Emissions:** The entire life cycle of plastic grass- from manufacture to disposal- emits carbon dioxide and methane gas, both potent greenhouse gases, which cause climate change. By contrast, natural grass absorbs CO<sub>2</sub>.
7. **Water Contamination:** PFAs and leached chemicals from the blades, fill and base can contaminate groundwater aquifers and local estuaries, posing a threat to drinking water. These also drain to the ocean, increasing the alarming contamination of the ocean.
8. **Poor Drainage and Runoff:** Installation often involves compacting soil, making it less permeable. This can lead to increased surface runoff and a higher risk of urban flooding compared to absorbent natural turf.
9. **Disposal and Recycling Issues:** Most turf cannot be recycled due to mixed materials and contamination. With a lifespan of only 8 to 10 years, most of the thousands of tons of used turf end up in landfills or are incinerated.
10. **High Mid to Long-term Costs:** While marketed as low-maintenance, a single field can cost over \$1,000,000 to install and requires expensive professional cleaning, repairs, and replacement every decade.

## McMillan, Acquanette (Netta)

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**From:** julianna  
**Sent:** Sunday, April 12, 2026 1:02 PM  
**To:** Hampton, Tyron; Cole, Rick; Jones, Justin; Masuda, Gene; Rivas, Jessica; Madison, Steve; Lyon, Jason; Gordo, Victor; PublicComment-AutoResponse  
**Cc:** 'Cynthia Cannady, JD'; 'Suzanne York'; Reyes, David  
**Subject:** RE: Agenda Item 18 --- Replace Artificial Turf with Natural Grass in CIP Projects

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RE: Agenda Item 18 – Replace Artificial Turf with Natural Grass in CIP Projects

Honorable Mayor and Members of the City Council:

Please consider replacing Pasadena's 'fake grass,' or synthetic, artificial turf playing fields ("artificial turf") with natural grass in City parks projects listed in the 2027-2031 CIP. It seems counter-intuitive and counter-productive for the City to prioritize being carbon-neutral by 2030, yet installing a material that contributes to urban heat islands, needs regular water for cleaning that seeps pollutants into our water table and eventually the ocean, creates microplastics that destroy natural habitats and systems, and is difficult to recycle, typically ending up in landfills. Most insidiously, artificial turf playing fields pose potential health risks which are not yet clearly known, especially to children, our most vulnerable population with the highest exposure to it.

Artificial turf is a manufactured, non-living replacement material for turfgrass, installed ostensibly to reduce maintenance costs and water use in light of California's drought. The grass blades are made of fibers such as nylon or plastic. The base is typically a crumb rubber made from used tires, plastic pellets, or sand. The turf contains heavy metals and PFAS chemicals, "forever chemicals" that according to the Environmental Protection Agency are known carcinogens which can interfere with hormones, reproduction, immunity, and cause developmental delays in children.

In 2010, then Attorney General Brown successfully sued manufacturers to prohibit the use of lead in artificial turf production but none of the other chemicals. In 2026, a CalEPA study found carcinogen exposure from crumb rubber to be within an acceptable range:

<https://oehha.ca.gov/sites/default/files/media/2026-03/oehhaturffinal.pdf>

However, there have been no studies of the long-term health effects of the entire, cumulative range of chemicals used to produce and install artificial turf. See especially this paper on toxicity and call for more study by New Jersey Institute of Technology researchers funded through the National Institute of Health, available from the National Library of Medicine:

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10262297/pdf/nihms-1903943.pdf>

According to USC Environmental Engineering professor Adam Smith, although research is continuing to understand fully what the health implications of the chemicals are, current research suggests that "PFAS is absolutely bad for human health." It can enter the human body through contact with skin, by



breathing the particles in or through water sources, especially groundwater sources, that can get contaminated during leaching.

For use as a playing surface, artificial turf is also significantly harder on the human body than grass, often leading to more surgeries and longer recovery times for athletes. This has called for widespread protest among professional athletes to cease the use of artificial turf for the following reasons:

- **Toxic Chemical Exposure:** Artificial turf often contains per- and polyfluoroalkyl substances (PFAS) and heavy metals. Crumb rubber infill, made from recycled tires, can contain polycyclic aromatic hydrocarbons (PAHs), phthalates, and VOCs. These harmful chemicals that can be absorbed or inhaled, are linked to cancer and respiratory issues.
- **Higher Injury Rates:** Studies of NFL data shows that non-contact injuries are about 20% more likely on artificial turf than on grass, with a staggering 69% higher rate of non-contact foot/ankle injuries. NFL and NCAA studies indicate significantly higher rates of ACL and ankle injuries, as the turf has higher friction, leading to joints absorbing more force.
- **Extreme Temperatures:** Synthetic surfaces can be 30–60 degrees Fahrenheit hotter than natural grass, on sunny days causing severe heat-related illnesses and thermal burns.
- **Turf Burns and Infections:** Sliding on plastic turf causes friction burns ("turf burn") that are notorious for becoming infected with bacteria like MRSA.
- **Reduced "Give":** Natural grass offers more "give," allowing for natural movement, while stiff turf puts excessive stress on ligaments and tendons

On a larger scale, microplastics from the grass blades and crumb rubber leaches into groundwater and freshwater bodies, eventually making its way to the ocean. Former Chief Scientist of the National Oceanic and Atmospheric Administration Sylvia Earle said, "These molecules are actually entering the food chains in the ocean, and they're in our system, they're in our blood, they're in our muscle. We've changed the nature of nature through actions that we've taken. Now they are coming back to haunt us."

As Dr. Earle said, "We want to increase the population of our habitat pollinators, and plant climate-resilient plants that provide shade, buffer sun exposure, provide windbreaks, help reduce stormwater runoff and reduce soil and water erosion. And you can't do that with synthetic grass."

The best alternative to any artificial surface is natural plants. Let's strive to contribute to improving our environment and our future by eliminating a bad idea: by replacing artificial turf in our parks with natural grass, and developing safer playing fields through effective operations and management practices, including a program of rotational replanting.

Thank you for your consideration.

Sincerely,

Julianna Delgado, MArch., PhD, FAICP

Julianna Delgado, M.Arch, Ph.D, FAICP

President, Southern California Planning Congress

Planning Commissioner, City of Pasadena

Design Commissioner (Chair), City of Pasadena

Member, Mayor's Housing Task Force, City of Pasadena



Professor Emerita, Department of Urban and Regional Planning  
California State Polytechnic University, Pomona

***After enlightenment, do the laundry.***

*- Zen proverb*

**McMillan, Acquanette (Netta)**

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**From:** Myung-Soo Seok  
**Sent:** Friday, May 1, 2026 1:52 PM  
**To:** PublicComment-AutoResponse  
**Cc:** Tony Trinidad; Stephanie Von Slomski; Robert Smith  
**Subject:** re: May 4th City Council Meeting Agenda Item 11  
**Attachments:** City of Pasadena opposition letter final draft.docx; Beyond the Myths\_What the Facts Says About Synthetic Turf\_Last Updated 4.22.26.pdf; Syn vs Nat Grass.pdf; TCG Flyer\_DC36\_ClientReview.pdf; Turf Temperature\_TenCate 0525.pdf

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Please see the attached letter and documents from the Painters and Allied Trades District Council 36.

Best,

Myung-Soo Seok  
M2 Strategies

04/20/



# Painters & Allied Trades District Council 36

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**Luis F. Robles**

Business Manager

DRYWALL FINISHERS, FLOORLAYERS, GLAZIERS, PAINTERS, TRADESHOW & SIGNCRAFT

June 4, 2025

Mayor Victor Gordo  
City Councilmember Tyron Hampton  
Councilmember Rick Cole  
Councilmember Justin Jones  
Councilmember Gene Masuda  
Councilmember Jason Lyon

Re: Proposed Ban on Artificial Turf in City of Pasadena

Dear Mayor Gordo and Councilmembers:

Thank you for the opportunity to comment on the discussion of ban of synthetic turf in Pasadena. We are a labor union that represents workers that install synthetic turf throughout California. While we appreciate the genuine concerns that the members of the City Council have, an outright ban of synthetic turf is both irresponsible and unnecessary in alleviating environmental concerns. In particular, there seems to be an assumption that all artificial turf manufactured with same materials and that is not the case. Case in point is the artificial grass manufactured by TenCate.

TenCate is the leading manufacturer of artificial turf in the world. Their artificial turf has proactively eliminated PFAS materials in 2023 before any PFAS legislation has been passed. This eliminates widespread concern of PFAS impact on the environment.

In order to address the concern of harmful chemicals leeching into the ground water, TenCate eliminated rubber infill with GeoCool infill which is made from a renewable inorganic mineral that is 100% renewable and non-toxic. Other organic and natural infills made with cork or walnut shells have been incorporated.

In addressing temperature of the artificial grass, TenCate has incorporated non-toxic and natural materials that cool down the artificial grass that does not use water. This leads to millions of gallons of water being conserved each year. These materials allow the current models of synthetic turf to reduce temperature on the field. You can see from the study that we are enclosing with this letter, you will see that the difference between natural grass and current synthetic turf is not great.

Finally, TenCate is actively recycling end of life artificial turf. TenCate is the first in United States to recycle old synthetic turn into feedstock that can be used to create new turf and other products.



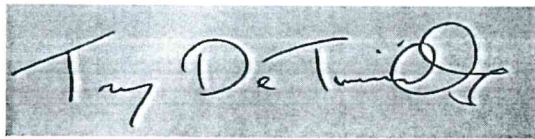
While we commend the Councilmembers for initiating this important discussion about the impact of synthetic grass on the environment, an outright ban will lead to loss of small businesses and jobs that were encouraged to be created during our drought crisis. Our union will lose thousands of jobs throughout California if such ban is passed throughout the state.

Rather than banning an entire industry, implementation of thoughtful regulation of eliminating harmful materials and creating an industry standard should be considered. In fact, such discussions are taking place in many municipalities in State of CA, including in the City of Los Angeles.

We look forward to speaking with you as you prepare to hear this issue in your future City Council meeting.

I can be reached at [Tony.Detrinidad@dc36.org](mailto:Tony.Detrinidad@dc36.org) and/or 626-216-3089.

Thank you.

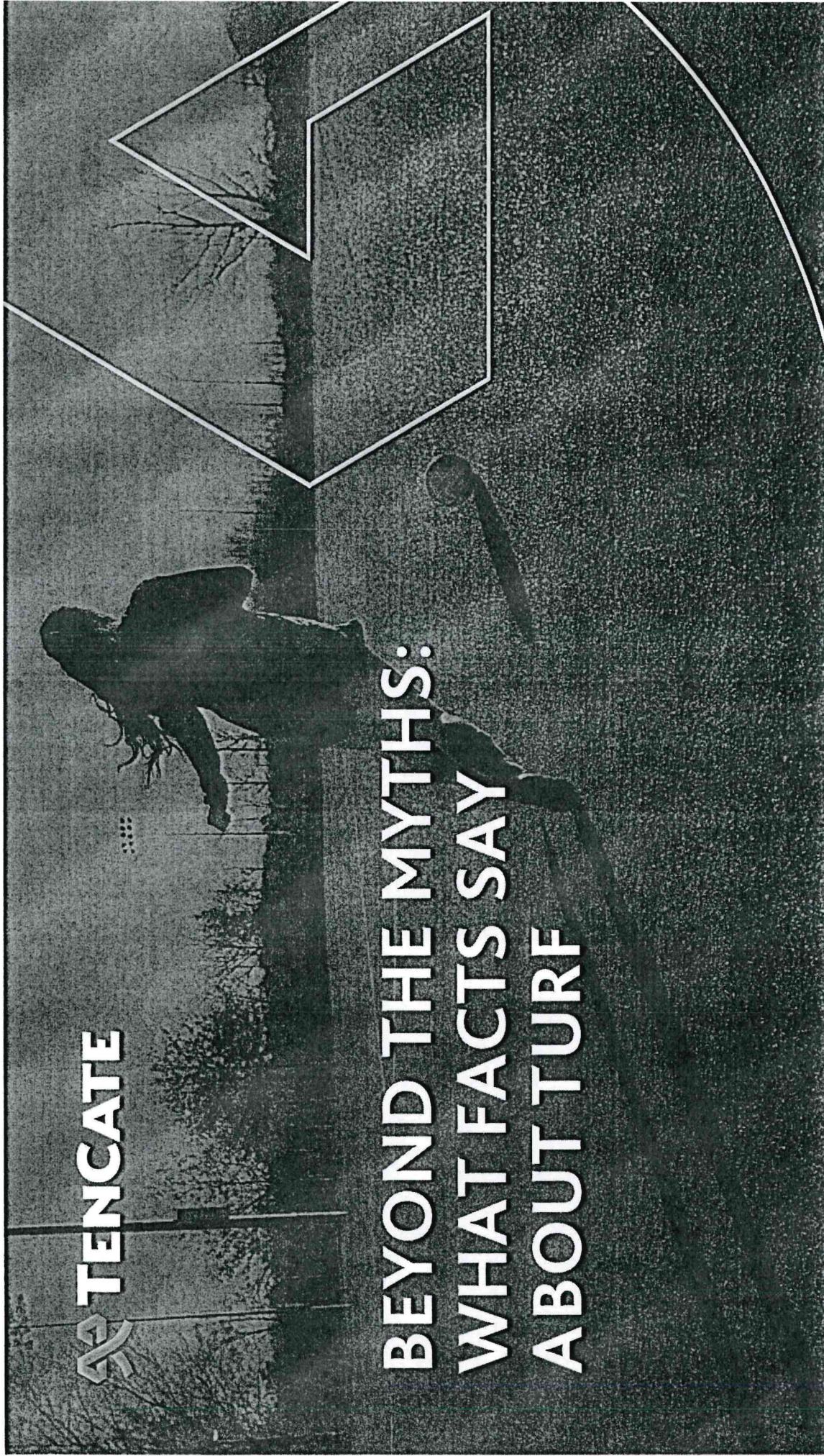
A handwritten signature in black ink on a light blue background. The signature reads "Tony De Trinidad" in a cursive, flowing script. The "T" is large and loops around the "y". The "De" is written in a smaller, more compact cursive. The "Trinidad" is written in a larger, more elaborate cursive with a prominent loop at the end.

Tony De Trinidad  
Government Affairs Representative  
International Union of Painters & Allied Trades District Council 36



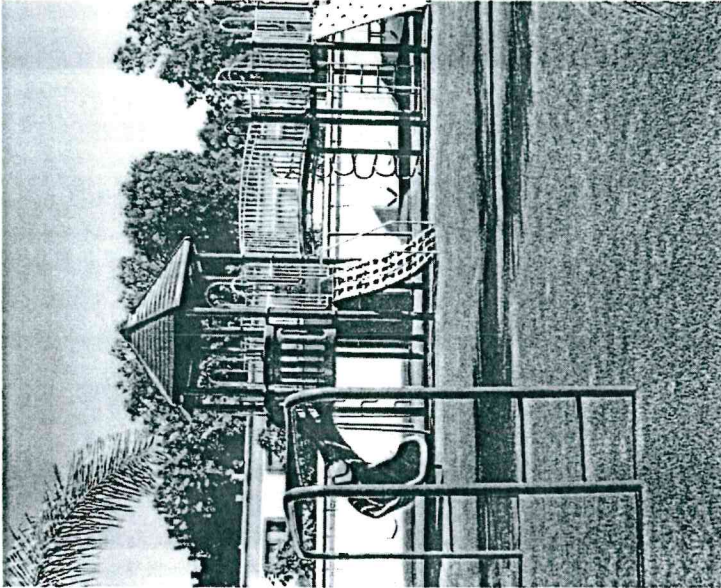


# BEYOND THE MYTHS: WHAT FACTS SAY ABOUT TURF



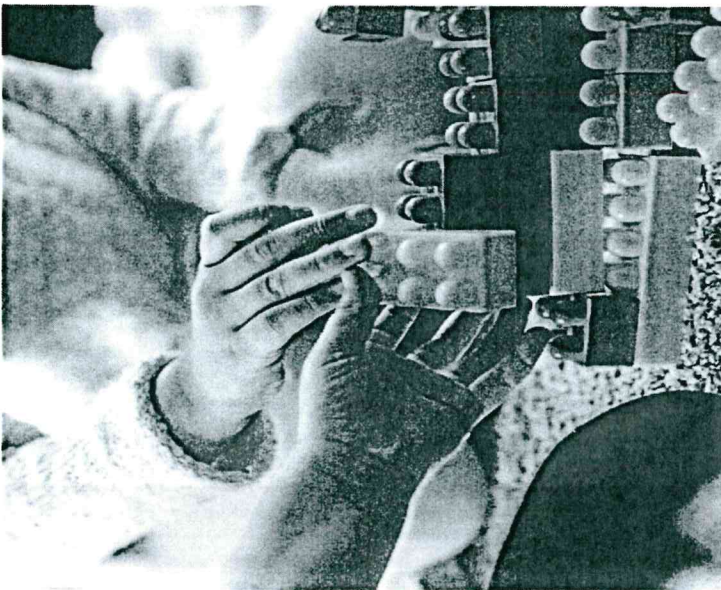
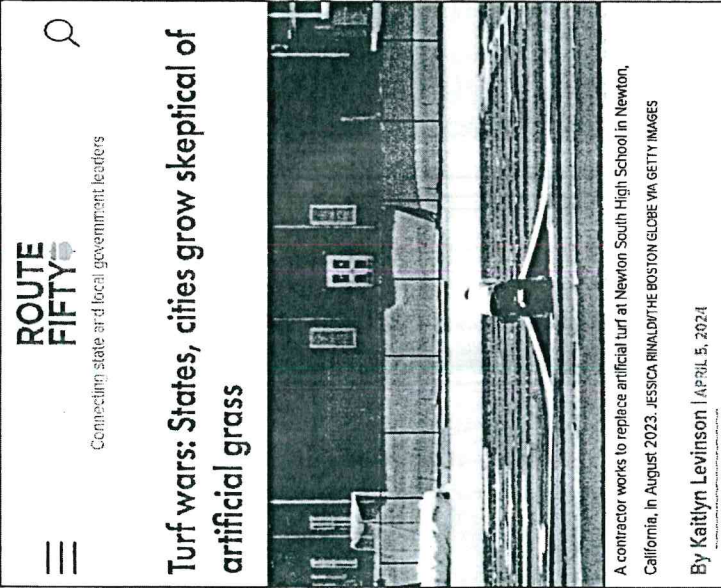


Our vision: to build healthier, more beautiful communities.



## Our Vision

Build healthier, more beautiful communities.



## We Understand

Turf is facing opposition and fear from many environmental groups based on false or outdated information.

## Safety First

The Turf we manufacture complies with all US (EPA/CDC), EU (REACH), and California Prop 65 quality and safety standards<sup>1</sup>.



**Myth: turf is made from dangerous chemicals.**

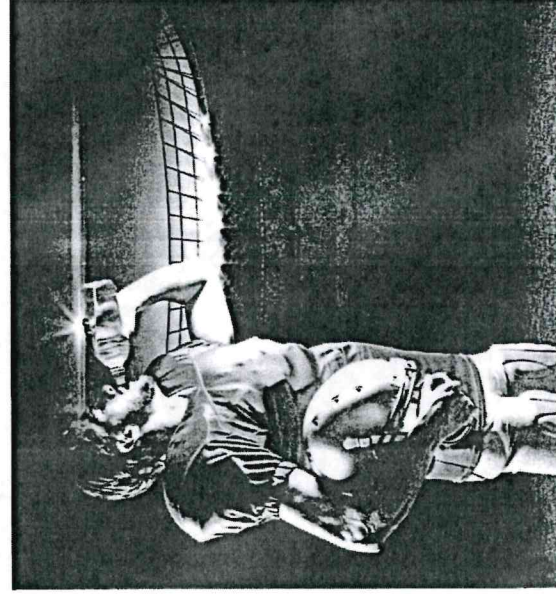


**Fact: Turf is made from the same materials we use everyday.**



#### **Polypropylene**

Used in items like face masks, yoga pants, yogurt containers, children's toys and food packaging.



#### **Polyethylene**

Commonly used in water bottles.

#### **Polyester**

Frequently used in food packaging, medical equipment, jerseys and athletic wear.



#### **Polyurethane**

Used in footwear to replace leather, creating lightweight sports shoes, safety shoes, and recycled soles.



**Myth: turf is made from dangerous chemicals.**



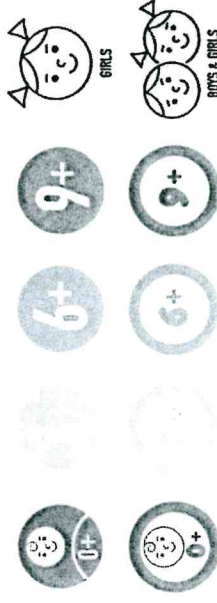
**Fact: Turf is compliant with strict, established U.S. and European safety standards<sup>1-6</sup>**



**No heavy metals  
EN71-3 | ASTM F963<sup>1,6</sup>**



**No Proposition 65  
warning required<sup>1,3,4</sup>**



**Compliant with EU and U.S.  
toy standards, including no  
lead or other toxic  
materials<sup>1,2,5,6</sup>**



## Myth: artificial turf contains PFAS.

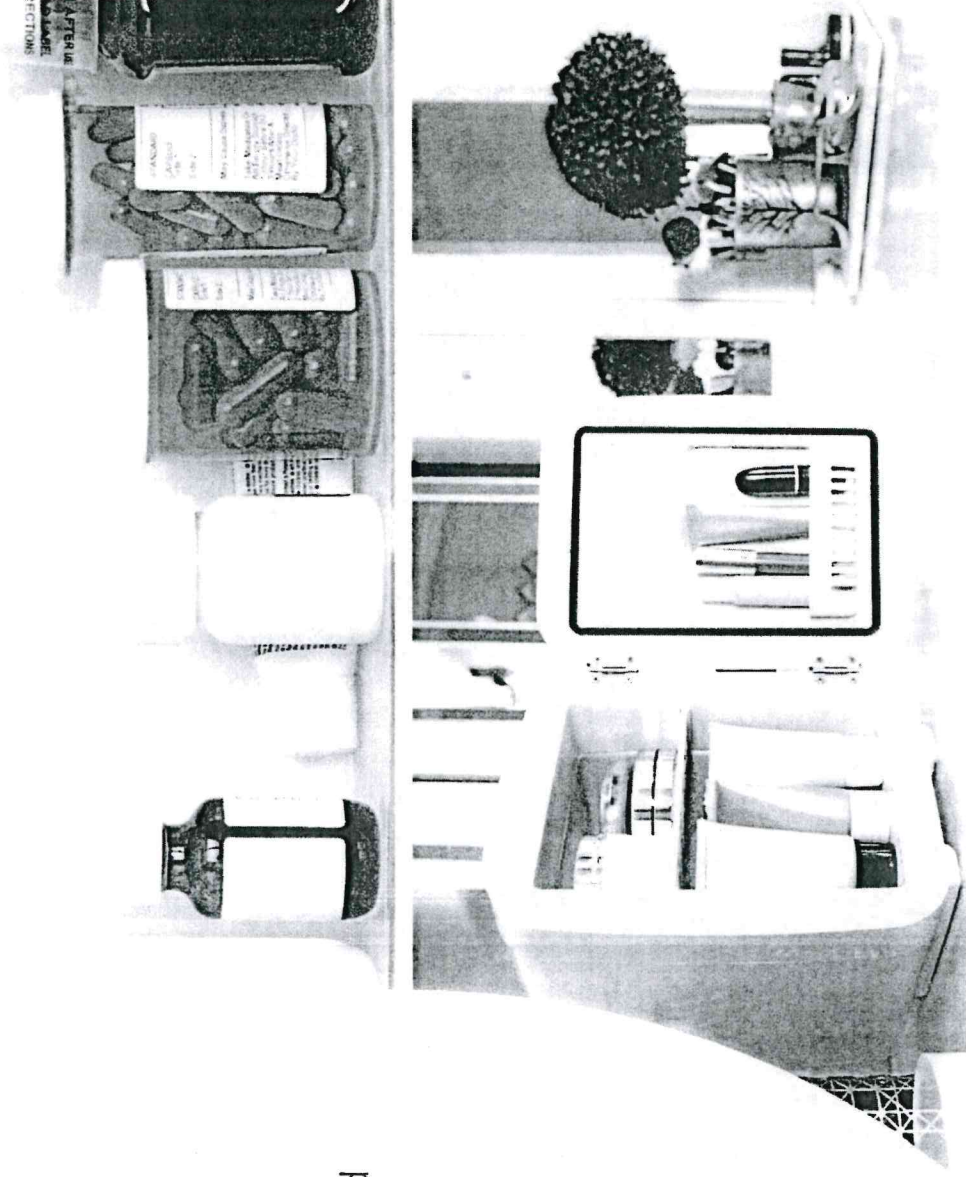


### Fact: TenCate turf contains no PFAS\*.

- PFAS has never been used as an ingredient in our turf products; it was previously used as a processing aid and was proactively removed from manufacturing in October 2023<sup>1</sup>
- PFAS levels in heritage turf are much lower than levels found in everyday products like medicines, oral care and beauty products, and shampoos

\*manufactured with no intentionally added PFAS

<sup>1</sup> TenCate, Supplier Declaration of Regulatory Compliance (December 8, 2025); TenCate, "Staying Ahead of the Game, TenCate Begins Making Synthetic Turf Without Using PFAS" (January 9, 2024); Mark Haft, A. PFAS Statement Regarding TenCate Turf Materials (January 11, 2024); Joe Fields, Statement on PFAS Removal from TenCate Turf Manufacturing (January 9, 2024); Melanie Lauria, et al., "Widespread Occurrence of Non-Extractable Fluorine in Artificial Turfs from Stockholm, Sweden," *Environmental Science & Technology Letters* 9, no. 7 (2022): 666–672.



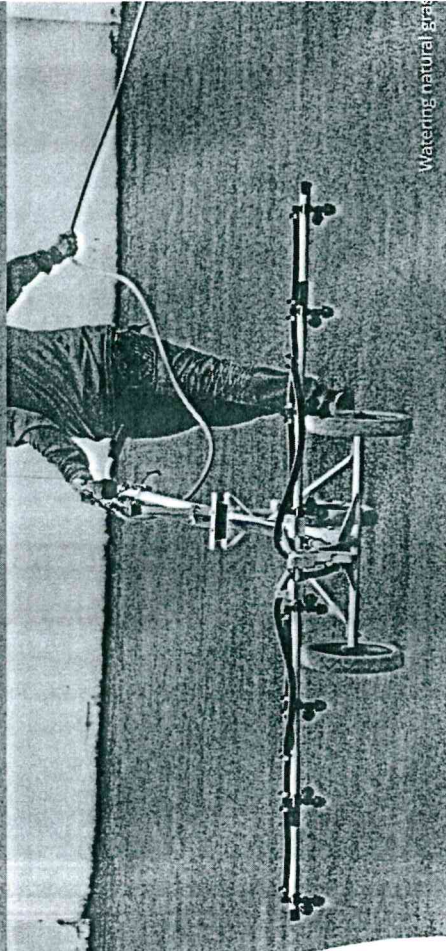


## Myth: runoff from turf is polluting our water.

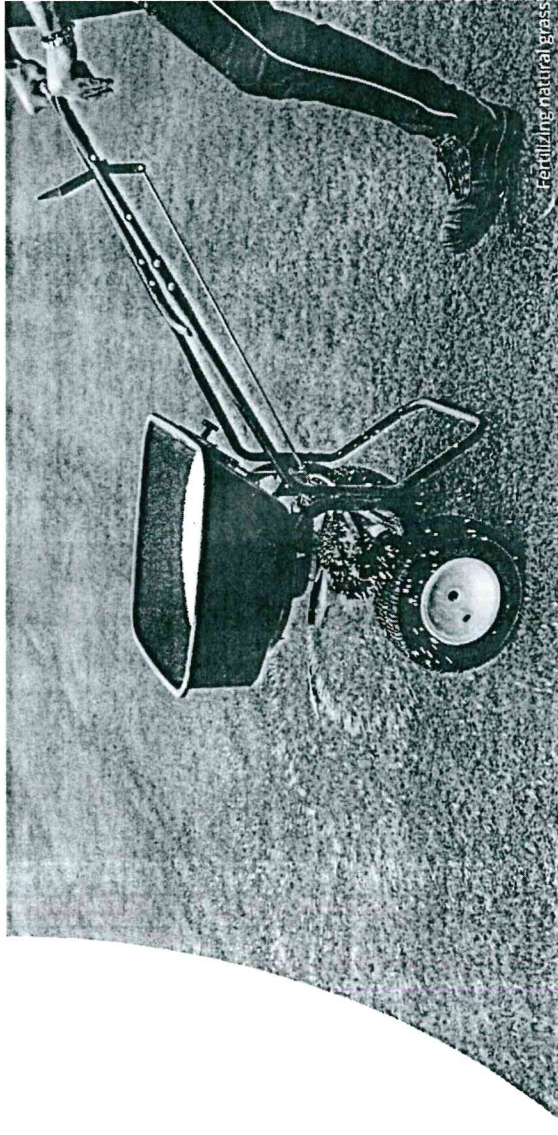


### Fact: Runoff from natural grass maintenance is more harmful to local water systems than turf<sup>11</sup>.

- Synthetic turf does not require pesticides and fertilizers like what you see pictured here that can harm soil, water, and human health.
- Other harmful chemicals from fertilizers can leach into local watersheds, negatively impacting potable water sources or aquatic ecosystems<sup>12</sup>.



Watering natural grass



Fertilizing natural grass

<sup>11</sup> U.S. Environmental Protection Agency. "Nonpoint Source: Agriculture." Accessed April 8, 2026. <https://www.epa.gov/nonpoint-source-agriculture>  
<sup>12</sup> Keena, Mary, Mirana Meehan, and Tom Scherer. 2017. "Environmental Implications of Excess Fertilizer and Manure on Water Quality." NDSU Agriculture and Extension. North Dakota State University, October 31, 2017.

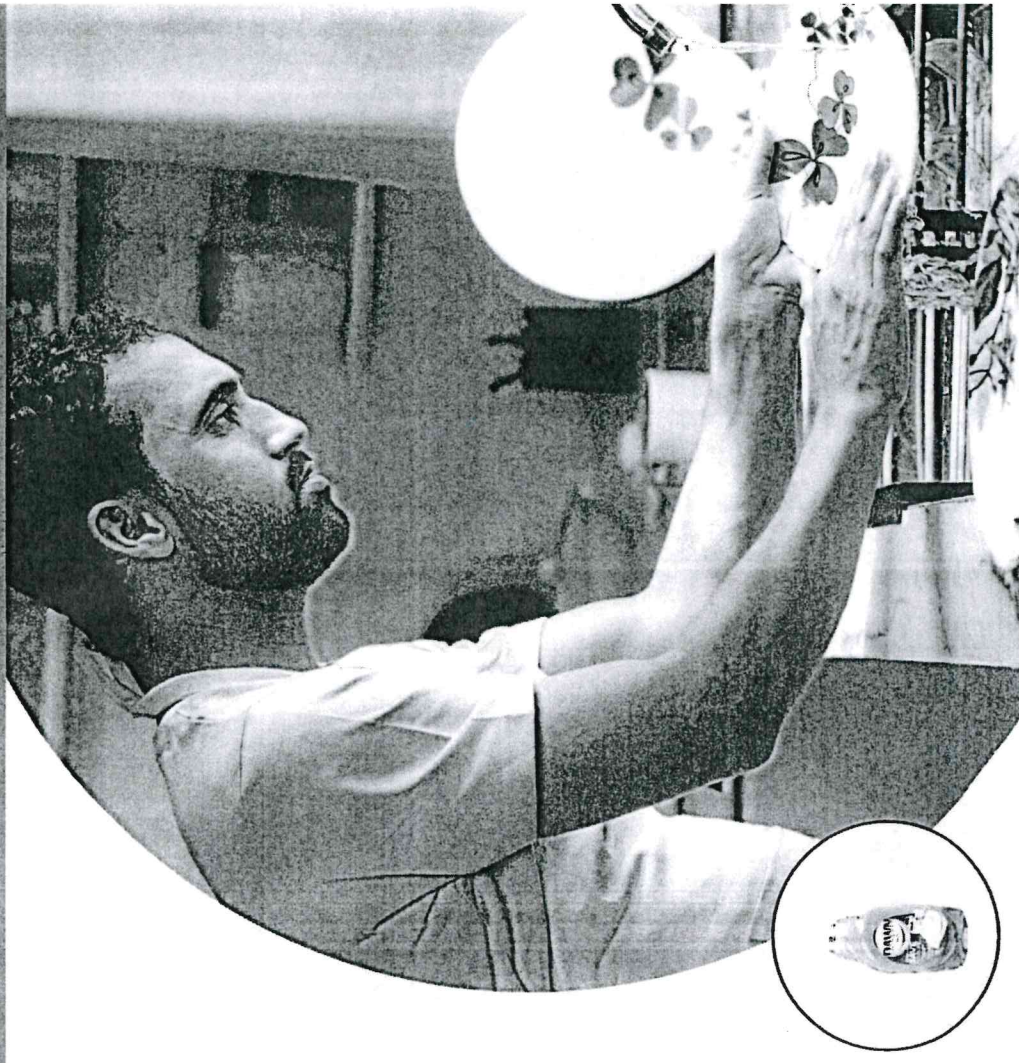


**Myth: turf is more difficult to clean.**



**Fact: Turf can be cleaned with the same dishwashing detergent used at home.**

- No harsh chemicals required, and compliant with safety standards like Prop 65
- Maintenance guidelines for turf explicitly restrict chemical use to protect the surface and users



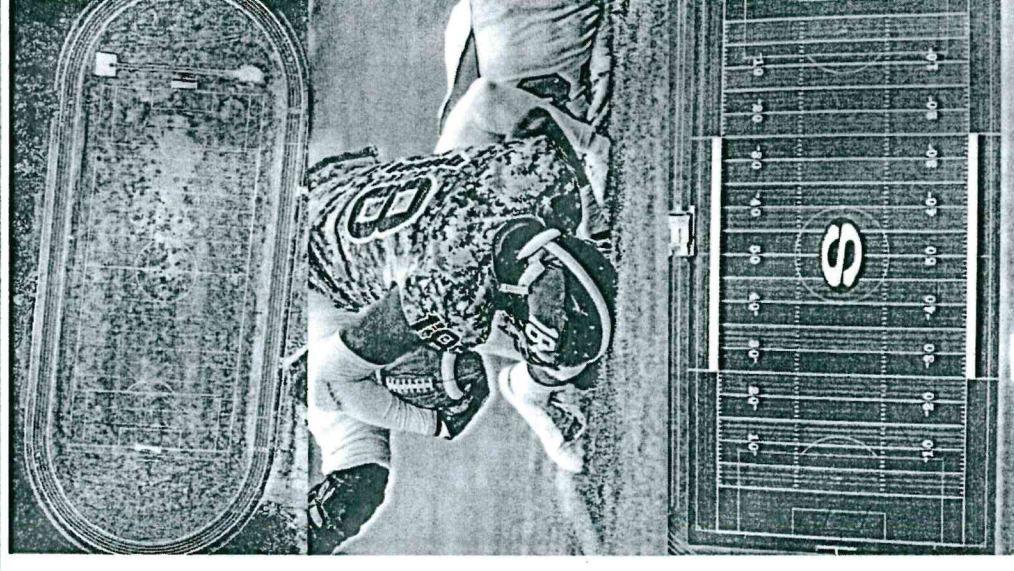


## Myth: more injuries occur on turf than natural grass.



**Fact:** There is **no statistical difference** between injury occurrence on turf and well-maintained grass.

- Extensive research by the NFL<sup>13</sup>, NCAA<sup>14</sup>, and academic institutions<sup>15</sup> has found no difference in overall injury rates.
- Early-generation turf concerns, like increased injury rates, turf toe, and player discomfort, have been addressed through continuous advancements in turf research and innovation<sup>16</sup>
- A 2024 study published in the *Clinical Journal of Sport Medicine* found more severe and more frequently reported concussion symptoms on natural grass than on artificial turf<sup>17</sup>



<sup>13</sup> Associated Press, "NFL Mandates Playing Surfaces for All Stadiums Meet New Standards by 2028," NFL.com, December 4, 2025.

<sup>14</sup> Incidence of Knee Injuries on Artificial Turf Versus Natural Grass in National Collegiate Athletic Association American Football: 2004-2005 Through 2013-2014 Seasons (2019). Authors: Loughran et al.

<sup>15</sup> Ekstrand, J. T. Timpa, and M. Hagglund. 2006. "Risk of Injury in Elite Football Played on Artificial Turf versus Natural Grass: A Prospective Two-Cohort Study." Commentary. British Journal of Sports Medicine 40 (12): 975-80.

<sup>16</sup> Meyers, Michael C. 2010. "Incidence, Mechanisms, and Severity of Game-Related College Football Injuries on FieldTurf versus Natural Grass." The American Journal of Sports Medicine 38 (4): 687-97.

<sup>17</sup> Morgan Michelle Heinzelmann, Matthew Stokes, Shane M Miller, Stephen C Burt, Linda S Hyman, Nyaz Didehban, and C. Munro Cullum. 2024. "Impact of Playing Surface on Concussion Symptoms in Young American Football Players." Clinical Journal of Sport Medicine 34 (4): 357-61.



## Myth: turf is impermeable and does not drain.



**Fact:** turf systems are designed to meet drainage performance standards<sup>18</sup>. Most systems can drain 10–20 inches of water per hour.

- Turf is commonly designed to store large volumes of water in the base system to help prevent flooding.

*Hurricanes and severe storm systems can generate rainfall rates exceeding 2–3 inches per hour during peak conditions.*



<sup>18</sup> ASTM International, ASTM F2898-11(2019): Standard Specification for Synthetic Turf Playing Surfaces for Athletic Fields, West Conshohocken, PA: ASTM International, 2019. <https://www.astm.org/f2898-11r19.html>

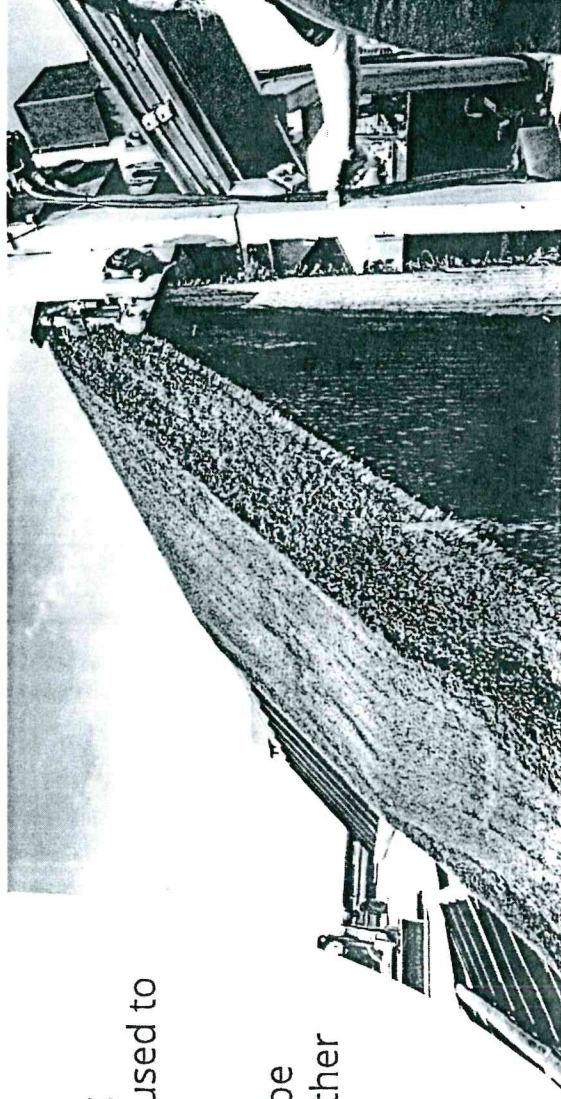
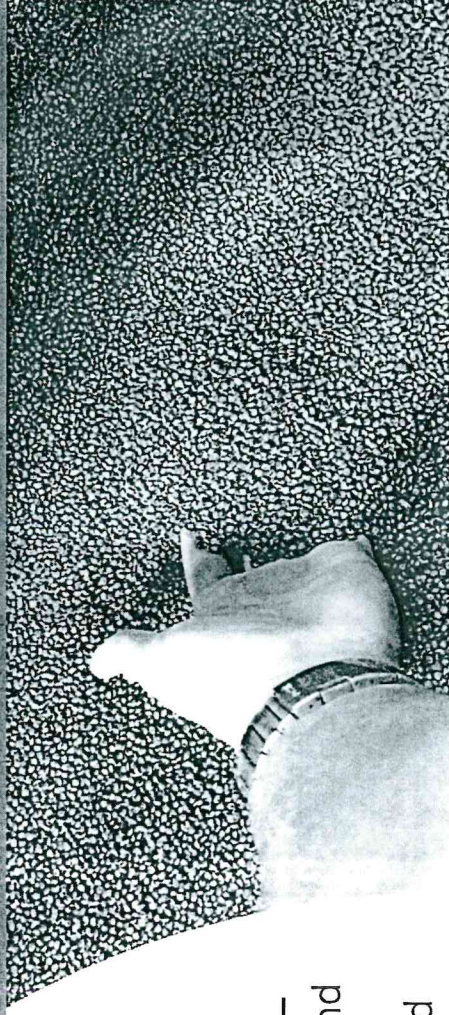


## Myth: turf is not recyclable.



**Fact:** The materials used in artificial turf are recyclable and can be processed through existing recycling methods.

- Artificial turf is typically made from polyethylene—the same plastic used in products like milk jugs and cereal bags—which is widely recyclable through both mechanical processes and modern advanced recycling methods<sup>19</sup>
- When processed through advanced recycling methods, the polyethylene from turf can be used to create new plastic products
- Infill materials such as sand and rubber can be separated, cleaned, and reused in fields or other applications<sup>20</sup>



<sup>19</sup> Sebastian T. Schwab et al., "Synthesis and Deconstruction of Polyethylene-Type Materials," *Chemical Reviews* 124, no. 5 (2024): 2327–2351; Plastics Europe, "Recycling," American Chemistry Council, "Advanced Recycling."

<sup>20</sup> TenCate Grass, 2023 ESG Report (2023).

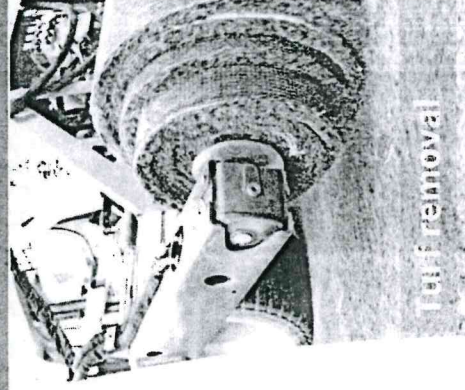


## Myth: turf is not being recycled.

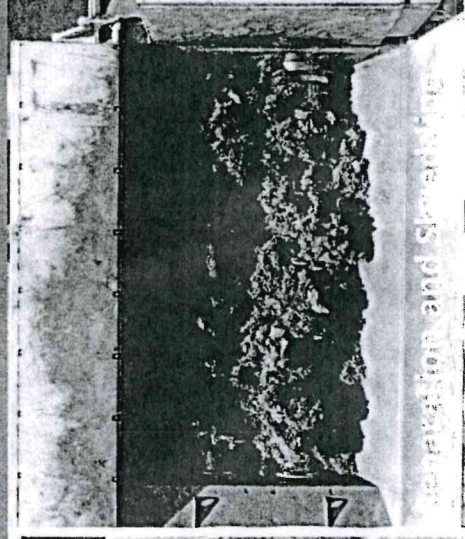


**Fact:** TenCate led the initiative for turf recycling in the Netherlands in 2018<sup>20</sup>.

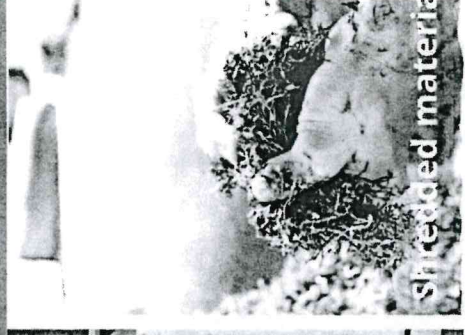
- TenCate has made a significant capital investment to set up a first-of-its-kind, turf processing facility in Baton Rouge, Louisiana, with more facilities planned throughout the country<sup>21</sup>
- TenCate accepts turf from any manufacturer
- Turf processed at our TenCate facility is prepared and sent to 3rd parties for the next step in advanced recycling<sup>20</sup>



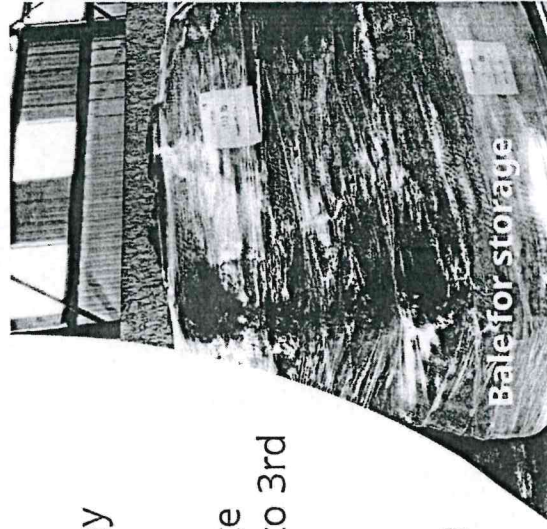
Turf removal



Compaction and Shredding



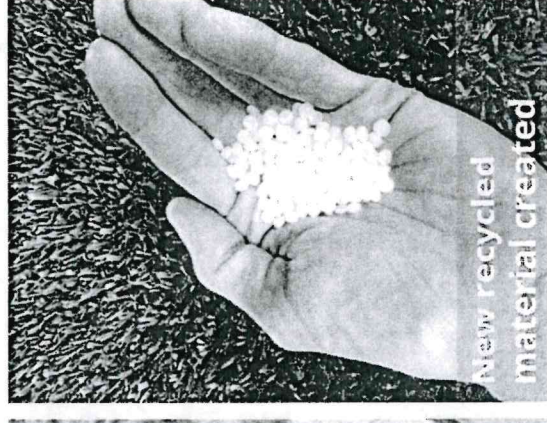
Shredded material



Bale for storage



Densify for advanced recycling

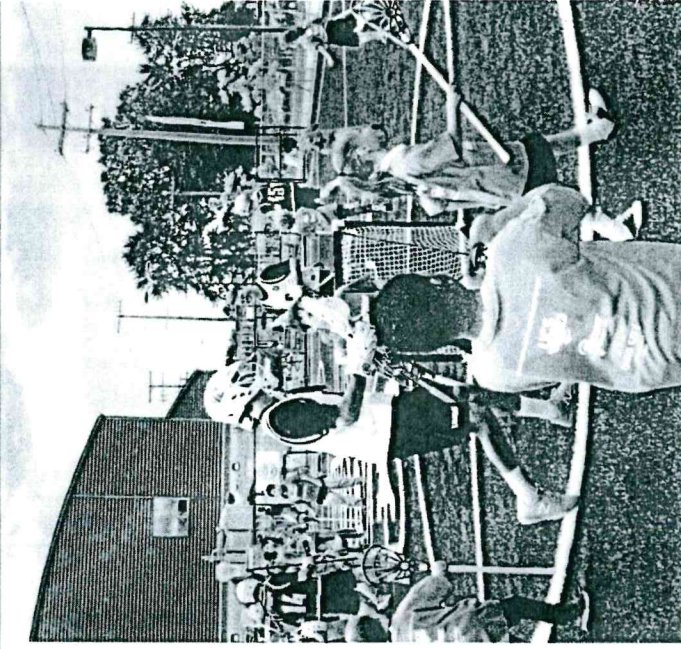
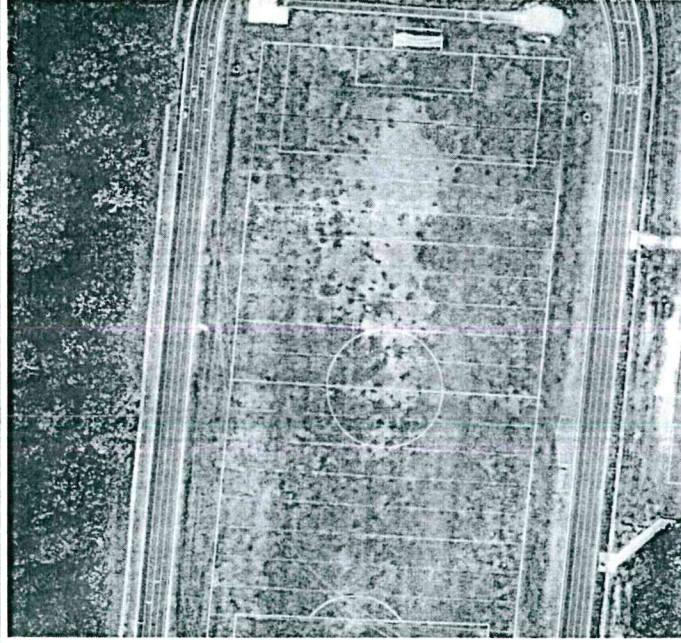
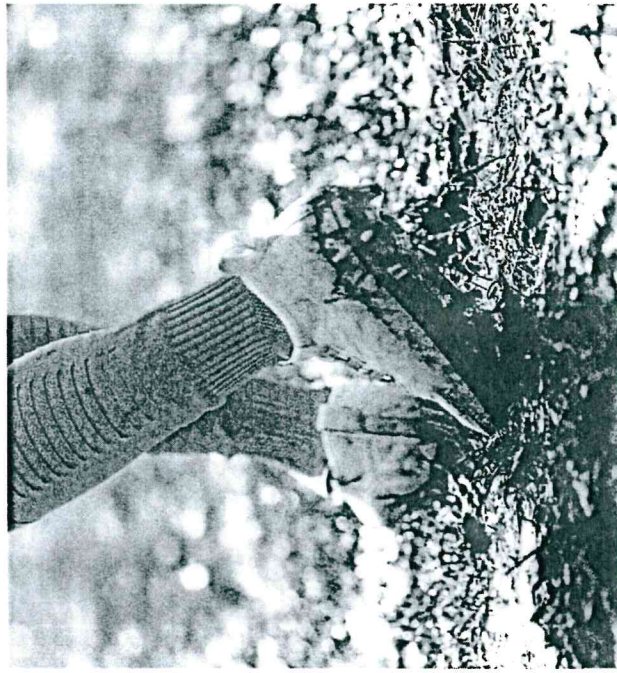


New recycled material created

<sup>20</sup> TenCate Grass, 2023 ESG Report (2023), <https://tencategrass.us/impact/esg/>  
<sup>21</sup> Adams, Bruce, First Chemical Recycling Program for Synthetic Turf Launched in U.S., Plastics Today, accessed April 10, 2026, <https://www.plasticstoday.com/advanced-recycling/first-chemical-recycling-program-for-synthetic-turf-launched-in-us>



## Turf solutions promote equity, health and community.



### Unlimited Playing Time

No matter the weather or season, one artificial turf field provides more annual playing hours than **four natural grass fields**, with far less resource-intensive maintenance.

### Maintaining Safe Surfaces

Maintaining safe and usable natural grass fields requires significant resources, posing challenges for many schools and communities.

### Solutions for Your Community

Artificial turf brings play to communities who need it most. Whether it's limited water, greenspace or difficult weather conditions, turf makes play inclusive and equitable – exactly the way it should be.



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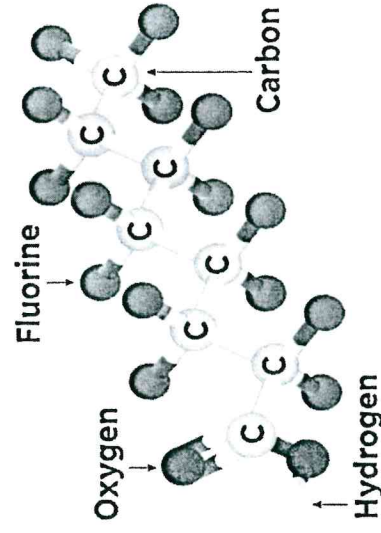
# SUPPORTING SLIDES

Technical Information & Cost Comparisons

# What are PFAS?



## PFAS



Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a large family of fluorocarbon chemicals.

Chemicals used in the manufacture of a **host of everyday products** due to their **lubricating** properties.

Since their introduction in the 1940s, they have been used widely. The abundance of their use combined with their slow breakdown means they are **ubiquitous in the environment all over the world**<sup>10</sup>.

<sup>10</sup> Lauria, Mélanie Z., Ayman Naim, Merle Plassmann, Jenny Fäldt, Roxana Sühling, and Jonathan P. Benskin.

"Widespread Occurrence of Non-Extractable Fluorine in Artificial Turfs from Stockholm, Sweden." *Environmental Science & Technology Letters* 9, no. 7 (2022): 666–672. <https://doi.org/10.1021/acs.estlett.2c00260>.



# PFAS levels in everyday life.



## Non-Soluble long Chain

| PRODUCT                           | PFAS PPM <sup>1</sup><br>(NON-BANNED) |
|-----------------------------------|---------------------------------------|
| Pharmaceuticals <sup>1</sup>      | >5% (50,000)                          |
| Women's makeup                    | 2,000                                 |
| Shaving cream                     | 1,000                                 |
| Dental Floss                      | 250,000 - 10,000                      |
| Body Lotion                       | 300                                   |
| TenCate Biaxial Turf <sup>*</sup> | < 1                                   |
| TenCate Mono Turf <sup>*</sup>    | < 1                                   |

<sup>1</sup> Certain prescription and over-the-counter medications used to treat conditions such as cholesterol, allergies, and mental health

<sup>\*</sup>Non detectable PFAS and fluorine EN 14582/ASTM D7359

<sup>\*\*</sup>Carpet, Flooring, Clothing, houseware items use PFAS mostly as fire resistance to meet compliance for FFA and 16 CFR standards.

PPM = parts per million

## Soluble Short Chain

PFOS/PFHx/PPFHx (banned PFAS chemicals)

| PRODUCT <sup>**</sup>                                           | PPM PFOA, PFOS<br>(banned) |
|-----------------------------------------------------------------|----------------------------|
| Fire suppression foam                                           | 15,000                     |
| Fabric protection coatings <sup>2</sup>                         | 5,000                      |
| Stain/fire protection on<br>pillowcases, clothing <sup>**</sup> | 300                        |
| Fire resistant carpeting,<br>flooring <sup>**</sup>             | 100-300                    |
| Coated Cookware                                                 | 100-300                    |

<sup>2</sup> Select consumer-applied products used to add stain and water resistance to fabrics and upholstery



# PFAS

## The Unexpected Ingredient

PFAS hangs out in some pretty unexpected places. In fact, you can see it in things like makeup, prescription medications and even dental floss.

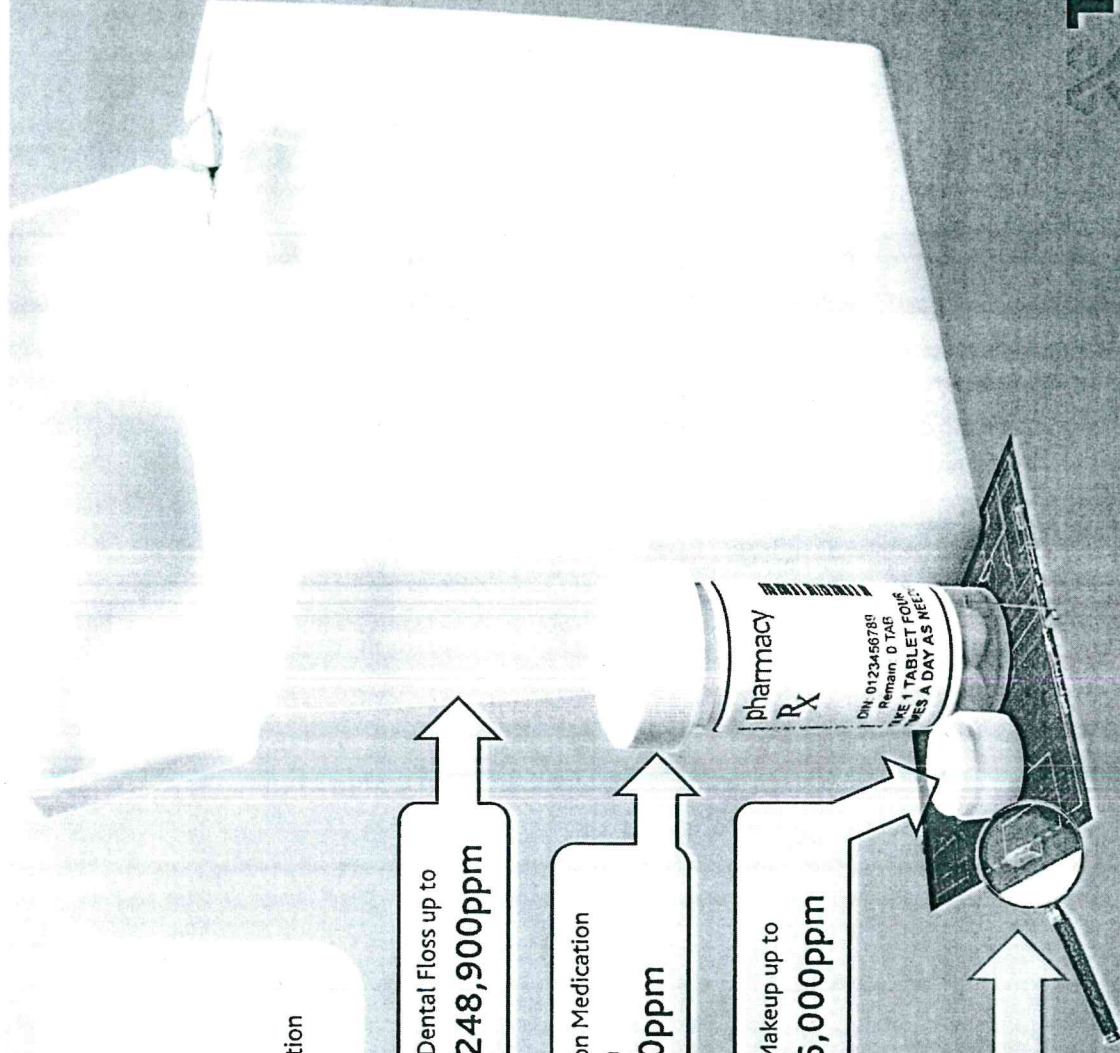
Dental Floss up to  
**248,900ppm**

Prescription Medication  
More than  
**50,000ppm**

Makeup up to  
**6,000ppm**

Typical Artificial Turf less than  
**100ppm**

And TenCate has removed intentionally added PFAS from our manufacturing process completely.



**TENCATE**



# NATURAL GRASS VS. SYNTHETIC TURF



| COMPARABLES                                                                           |                          | NATURAL GRASS                                                                                                                  | SYNTHETIC TURF                                                                                                                 |
|---------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|    | PLAYING TIME             | 650-800 hours of play per year with rest between heavy play and inclement weather                                              | Unlimited hours of play per year with no rest required                                                                         |
|    | MAINTENANCE              | Requires mowing, watering, seeding, fertilizing, pesticides, and aeration, which increases labor costs                         | Requires cleaning and topping off infill levels periodically through the life cycle                                            |
|    | REVENUE GENERATION       | Less opportunities for events due to the rest time required between play time or inclement weather                             | Can be used 24/7/365 for sports, community events, or other revenue generating activities                                      |
|   | ENVIRONMENTAL ADVANTAGES | Preserves natural environment of the soil and vegetation while sequestering carbon and releasing oxygen; requires pesticides   | Promotes water conservation (up to 1 million gallons/year depending on climate and soil conditions) and requires no pesticides |
|  | ROI                      | Costs less for the initial installation with slower ROI as a result of limited hours for usage and increased maintenance costs | Pays for itself faster due to facility rentals and lower maintenance costs                                                     |
|  | COMMUNITY USE            | Cannot withstand heavy use for multiple sports and events on one field                                                         | Will allow for multiple sports and events on one field                                                                         |
|  | LAND UTILIZATION         | Use can be limited due to necessary rest time                                                                                  | Can achieve more use with the same amount of space                                                                             |





# 12-YEAR COST COMPARISON



| EXPENSE                                      | NATURAL GRASS*<br>FOOTBALL/SOCCER | PIVOT TURF<br>FOOTBALL/SOCCER |
|----------------------------------------------|-----------------------------------|-------------------------------|
| Initial Installation                         | \$1,386,681                       | \$1,644,175                   |
| Maintenance                                  | \$50,000                          | \$0                           |
| Water Usage                                  | \$20,000                          | \$0                           |
| Total Annual Maintenance Cost                | \$70,000                          | \$1,000                       |
| Total Cost of Ownership over 12-years        | \$2,226,681                       | \$1,656,175                   |
| Total Hours Permitted Use in 12-year Cycle** | 5,808                             | 42,432                        |
| Cost Per Hour of Use                         | \$383.38                          | \$39.03                       |

*Natural grass installation and maintenance provided by Byrom-Davey, a leading installer of natural grass and artificial turf fields in Southern California.*

\* Study conducted by Tom Diehl of CHA Consulting examining actual costs of ownership of public natural grass sports fields in Los Gatos, CA.

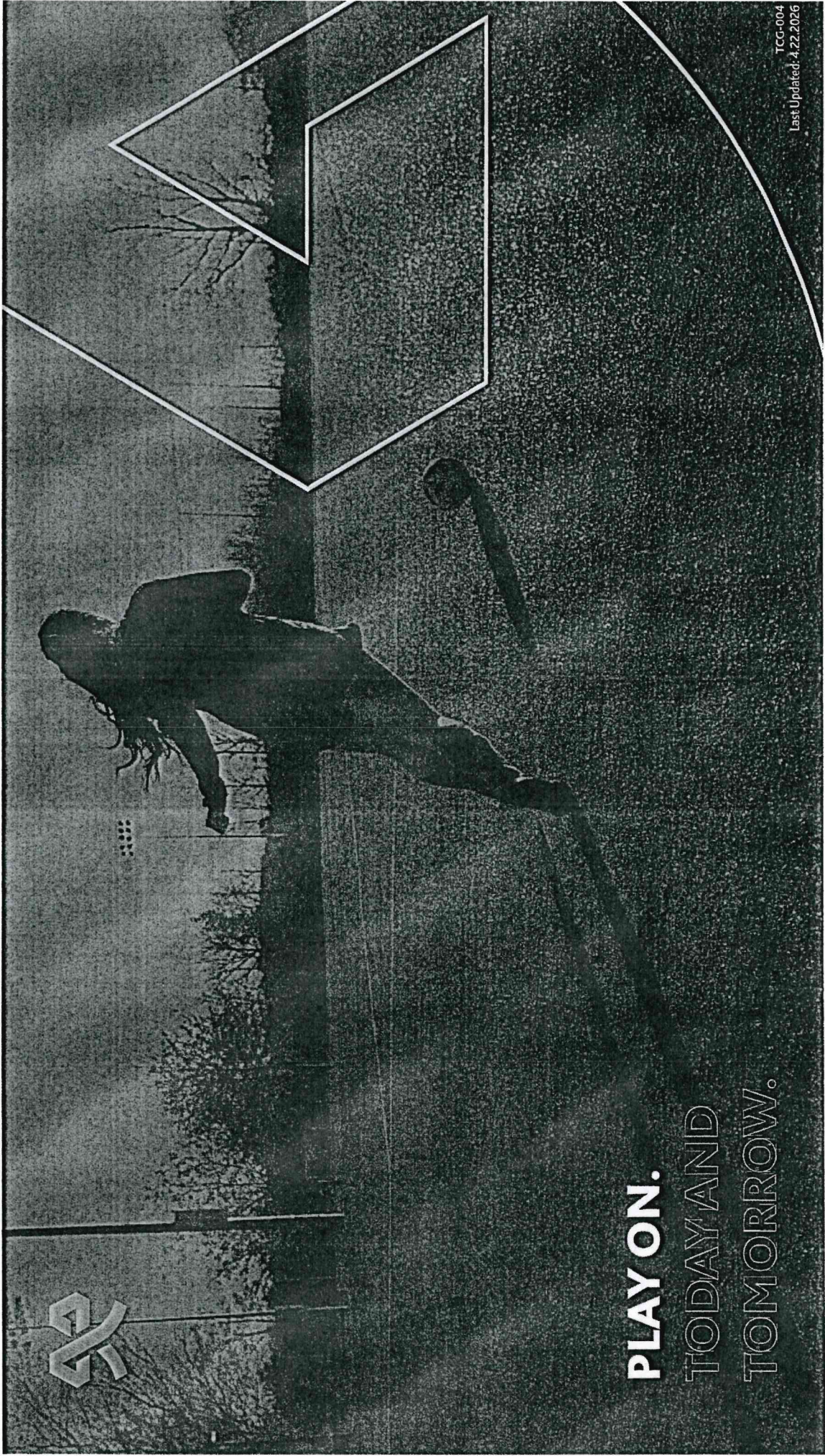
\*\* Hours of use permitted calculations by CHA Study:

- Natural Grass: 20 hours per week for 32 weeks per year, less 15% for rain, with downtime for resodding
- Pivot: 68 hours per week for 52 weeks per year, no rainouts, no downtime for replacement



Designed without performance infill, Pivot Performance Turf eliminates the challenges of traditional systems while maintaining consistent quality for athletes and facilities alike. It also is manufactured with no added PFAS, making it a prime option for safe and healthy play.





**PLAY ON.**  
TODAY AND  
TOMORROW.



# SYNTHETIC TURF NATURAL GRASS



| COMPARABLES              | NATURAL GRASS                                                                                                                  | SYNTHETIC TURF                                                                                                                 |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| PLAYING TIME             | 650-800 hours of play per year with rest between heavy play and inclement weather                                              | Unlimited hours of play per year with no rest required                                                                         |
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| REVENUE GENERATION       | Less opportunities for events due to the rest time required between play time or inclement weather                             | Can be used 24/7/365 for sports, community events, or other revenue generating activities                                      |
| ENVIRONMENTAL ADVANTAGES | Preserves natural environment of the soil and vegetation while sequestering carbon and releasing oxygen; requires pesticides   | Promotes water conservation (up to 1 million gallons/year depending on climate and soil conditions) and requires no pesticides |
| ROI                      | Costs less for the initial installation with slower ROI as a result of limited hours for usage and increased maintenance costs | Pays for itself faster due to facility rentals and lower maintenance costs                                                     |
| COMMUNITY USE            | Cannot withstand heavy use for multiple sports and events on one field                                                         | Will allow for multiple sports and events on one field                                                                         |
| LAND UTILIZATION         | Use can be limited due to necessary rest time                                                                                  | Can achieve more use with the same amount of space                                                                             |

BUILDING FOR SPORTS FROM START TO FINISH

tencategrass.com



# THE GREEN SIDE OF SYNTHETIC TURF

A LOOK AT AVERAGE STATISTICS FROM A TYPICAL SIZED HIGH SCHOOL-LEVEL FIELD.  
THIS ANALYSIS IS PROJECTED OVER A 10-YEAR PERIOD.

| EXPENSE                                    | GRASS<br>FOOTBALL / SOCCER | SYNTHETIC<br>FOOTBALL / SOCCER | GRASS<br>BASEBALL | SYNTHETIC<br>BASEBALL |
|--------------------------------------------|----------------------------|--------------------------------|-------------------|-----------------------|
| Initial Installation/<br>Re-Crown & Re-Sod | \$607,500                  | \$900,000                      | \$786,000         | \$1,100,000           |
| Maintenance Labor                          | \$27,000 / year            | \$12,500 / year                | \$40,500 / year   | \$12,500 / year       |
| Equipment                                  | \$4,000 / year             | \$0                            | \$6,000 / year    | \$0                   |
| Fertilizer                                 | \$8,000 / year             | \$0                            | \$12,000 / year   | \$0                   |
| Top Seed                                   | \$5,500 / year             | \$0                            | \$8,250 / year    | \$0                   |
| Water (varies by location)                 | \$15,000 / year            | \$0                            | \$25,000 / year   | \$0                   |
| Line Paint                                 | \$3,500 / year             | \$0                            | \$1,500 / year    | \$0                   |
| Total Annual Cost                          | \$63,000 / year            | \$12,500 / year                | \$93,250 / year   | \$12,500 / year       |
| TEN YEAR TOTAL                             | \$1,237,500                | \$1,025,000                    | \$1,718,500       | \$1,225,500           |
| Usage (number of hours)                    | 4,800                      | 16,000                         | 4,800             | 16,000                |
| COST PER HOUR                              | \$257.81                   | \$64.06                        | \$358.02          | \$76.56               |

\*Cost does not reflect clay expenses: clay conditioner and replenishment



FOOTBALL - 100 events (estimated 2 hours)

|                                      |          |
|--------------------------------------|----------|
| UTILIZATION COST<br>GRASS FIELD**    | \$51,562 |
| UTILIZATION COST<br>SYNTHETIC TURF** | \$12,812 |

BASEBALL - 50 events (estimated 2 hours)

|                                      |          |
|--------------------------------------|----------|
| UTILIZATION COST<br>GRASS FIELD**    | \$35,802 |
| UTILIZATION COST<br>SYNTHETIC TURF** | \$7,656  |

\*\*Weather permitting

The above examples are based on a well-maintained natural grass field. All costs are estimates and subject to change.

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# REGULATE TURF. DON'T BAN IT.

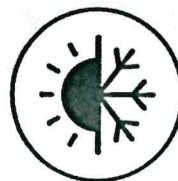
## PROTECT JOBS, PLAY, AND COMMUNITY ACCESS



1000s  
of jobs



2000+  
hours of play annually



365/24/7  
play in all climates



\$52.2 billion  
sports tourism industry

### SYNTHETIC TURF PROVIDES CRITICAL ACCESS TO PLAY WHERE WATER AND SPACE ARE LIMITED.

- Supports thousands of jobs
- Offers 2000+ hours of play annually versus 800-1200 from natural grass<sup>1</sup>
- Directly contributes to a \$52.2 billion sports tourism industry<sup>2</sup>



A natural grass field is more resource-heavy than turf: it needs up to 2 inches of water a week<sup>3</sup>, (that's ~1,000,000 gallons per year) and 87-217 pounds of nitrogen fertilizer per 1,000 square feet per year.<sup>4</sup>



### REGULATIONS CAN KEEP CONCERNS AT BAY AND TURF IN PLAY

Let's work towards better turf — recyclable, PFAS-free, with no infill — and keep jobs and play in our communities.

| PROBLEM       | REALITY                                                                                                                                                                         | SOLUTION                                                                                    |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Rubber infill | Alternatives to rubber infill exist, like coconut or cork, and some top performing fields don't require infill <sup>5</sup> at all.                                             | Incentivize alternative and no-infill systems in new installs.                              |
| PFAS exposure | This OEHHA study <sup>6</sup> found no significant health risks from exposure to synthetic turf. PFAS are also found in natural grass fields due to fertilizers and pesticides. | Prohibit added PFAS in synthetic turf and natural fields.                                   |
| Plastic waste | Turf is not single use like plastic packaging; it can offer years of community benefits. Recycling technologies are advancing but require policy support.                       | Require systems to be designed for recycling and mandate end-of-life recycling plans.       |
| Microplastics | Fiber loss varies by system type, maintenance, and age. Emerging data shows lower shedding in infill-free systems.                                                              | Establish monitoring standards, maintenance requirements, and clear replacement thresholds. |

<sup>1</sup> <https://www.paloalto.gov/files/assets/public/v/1/community-services/2025-08-13-reduced-size-for-posting-palo-alto-turf-athletic-fields-draft.pdf>

<sup>2</sup> <https://www.sportstravelmagazine.com/report-sports-related-travel-generated-52-2-billion-impact-in-2023>

<sup>3</sup> <https://safesportsfields.cals.cornell.edu/routine-care/watering/>

<sup>4</sup> <https://mda.maryland.gov/siteassets/pages/fertilizer/tt119.pdf>

<sup>5</sup> <https://geosurfaces.com/pivot-by-tencate/>

<sup>6</sup> <https://oehha.ca.gov/sites/default/files/media/2025-03/DraftTurfReport031325.pdf>



## **Heat and Temperature Impacts of Synthetic Turf**

Prepared for New York City  
Department of Parks & Recreation

by Dr. Colin Young, PhD | TenCate Grass

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## Heat and Temperature Impacts of Synthetic Turf

### Introduction

Synthetic turf fields have become a popular solution for recreational, educational, and sports facilities due to their ability to provide consistent play surfaces and significantly higher availability than natural grass. Unlike grass fields, which are often closed due to drought, rain, poor drainage, or recovery time, turf fields can withstand intensive use. A growing body of research from municipal parks departments and public agencies supports the operational and economic benefits of synthetic turf:

A study from the National Recreation and Park Association (NRPA) and field audits by San Francisco Recreation and Parks Department (SFRPD) report synthetic fields offer 2,000–3,000 hours of annual availability, compared to 300–816 hours for natural grass, depending on maintenance schedules and regional climate.

City of New York Parks & Recreation reported that synthetic fields provided 5 to 8 times more usable hours per year and enabled year-round programming.

These benefits are particularly valuable in hot, arid, or drought-affected regions where natural grass cannot survive without excessive irrigation. However, the expansion of turf has raised important questions about thermal performance, especially in hot climates. This document examines the thermal characteristics of synthetic turf, its contributions to heat stress and the urban heat island effect and compares traditional turf systems with modern cooling solutions using peer-reviewed studies, municipal research, and laboratory testing data.

Unlike natural grass, which maintains a relatively stable and cool surface temperature through evapotranspiration, traditional synthetic turf lacks organic moisture regulation mechanisms. As a result, legacy turf surfaces can reach extreme temperatures during sunny weather, often exceeding the ambient air temperature by more than 30°C (86°F).

Studies have recorded surface temperatures on traditional synthetic turf as high as 62.5°C (144.5°F), whereas adjacent natural grass remained under 37°C (98.6°F). In sunny climates such as Arizona, Texas, and Southern California, synthetic turf fields have been recorded at temperatures above 70°C (158°F), making them hazardous for direct human contact.

While some older synthetic turf systems, particularly those using dense, black SBR rubber infill, have been shown to reach high surface temperatures, it is important to recognize that not all turf systems are the same. Advances in materials science and system engineering have produced a new generation of synthetic turf fields that perform far better in terms of thermal regulation. Modern systems utilize cooling infills made from GeoCool, cork, mineral blends; or innovative system design such as non-performance infill turf like Pivot™ or water storage under the field. These features significantly reduce surface temperatures and, more importantly, lower Wet Bulb Globe Temperature (WBGT) readings, bringing heat stress risk levels close to those observed on natural grass fields under the same environmental conditions.

This distinction is essential for public health and policy. Evaluating synthetic turf as a monolithic category can lead to misleading conclusions about heat safety. In reality, a well-designed, modern synthetic turf system can offer both the durability and high usage benefits of turf and the thermal safety characteristics associated with natural grass. As municipalities, schools, and sports organizations consider future installations, they should demand thermal performance data, especially WBGT assessments, and prioritize systems that actively manage surface heat. With the right design choices, synthetic turf can be both safe and sustainable, even in hot climates.

## Thermal Characteristics of Turf

The primary cause of heat build-up in synthetic turf systems is solar radiation. Unlike natural grass, which uses moisture and evapotranspiration to cool its surface, synthetic turf lacks any biological mechanisms for heat dissipation. Instead, it absorbs solar energy through its plastic fibers, rubber or polymeric infill, and underlying base layers. This absorbed energy is stored in the materials and gradually re-radiated as heat, causing surface temperatures to rise, especially under direct sunlight.

Material choice plays a pivotal role in the thermal behavior of turf. Polyethylene, the most common yarn material used in turf fibers, has low thermal conductivity and high heat retention, meaning it traps heat rather than disperses it. Traditional SBR (styrene-butadiene rubber) infill is particularly problematic due to its dark color and low reflectivity, which makes it highly efficient at absorbing infrared energy. Moreover, SBR has low emissivity and thermal diffusivity, which means it stores heat and releases it slowly, even after the sun has gone down. This creates a thermal lag effect, where the surface remains dangerously hot well into the evening.

Other design elements also influence heat accumulation. Turf density, pile height, and infill depth can increase the surface area exposed to sunlight, further intensifying heat absorption. Underneath, impermeable or compacted base layers inhibit airflow, reducing opportunities for convective cooling. In contrast, modern systems that include breathable pads, reflective pigments, and lighter infills (such as cork or mineral-based alternatives) offer significant improvements in both surface temperature and subsurface heat dynamics.

Understanding these thermal dynamics is critical when evaluating the health and safety implications of synthetic turf installations. It also highlights why legacy systems with high-heat materials must not be conflated with today's engineered solutions, which are increasingly designed with thermal performance and heat stress mitigation in mind. Below are some examples of recent innovations to mitigate the heat of turf.



## Cooling Technologies and Modern Innovations

To address the longstanding concern of excessive heat buildup on synthetic turf, manufacturers have developed a variety of innovations aimed at significantly lowering surface temperatures and improving heat stress performance. One of the most effective areas of advancement has been the development of alternative infill materials. Traditional black SBR rubber infill is known for its high heat retention, but modern infills, such as cork, coconut husk, wood fiber, and mineral-based blends, have much lower thermal mass and higher emissivity. These properties allow them to absorb less heat during the day and release it more efficiently, resulting in a measurable reduction in both surface temperature and underlying heat stress.

Among these, GeoCool® infill has shown particularly promising results. Designed from natural mineral compounds, GeoCool is engineered to remain cooler than traditional infills by resisting heat absorption and facilitating evaporative cooling when moisture is present. Field testing has demonstrated that turf systems using GeoCool can achieve surface temperatures up to 30–40°F (17–22°C) cooler than comparable fields with SBR infill. When paired with breathable underlayers and high-albedo turf fibers, these systems show WBGT levels close to those recorded on natural grass fields, even in warm climates.

In addition to infill innovation, yarn technology has advanced significantly. Use of pigments and materials with higher solar reflectance (albedo), reducing the amount of solar radiation converted into heat. Yarn shape also plays a role, textured or ribbed fibers can reduce the surface area directly exposed to the sun and improve airflow between the blades, helping to disperse heat more effectively.

A parallel trend in the industry is the rise of non-infill systems, which eliminate the need for loose particles altogether such as Pivot™. This system often relies on dense, structured turf piles combined with integrated padding layers for shock absorption and play performance. By removing the infill, particularly heat-retaining rubber, these systems avoid one of the primary drivers of extreme surface temperatures. Non-infill turf systems are increasingly paired with evaporative base layers or capillary irrigation systems, particularly in European cities focused on sustainability and climate resilience.

Together, these innovations represent a significant leap forward in managing the thermal behavior of synthetic turf. When properly selected and designed, these systems provide a surface that remains far cooler than legacy rubber-filled fields, making them more comfortable and safer for athletes, children, and the broader public. These are not concepts but have been used successfully for several years all around the USA.

Other interesting innovations in urban research from the Netherlands (KWR Water Research Institute and City of Amsterdam) showed that new cooling turf systems can significantly reduce this, bringing peak surface temperatures close to natural grass levels by integrating subsurface water storage and evaporative cooling. Subsurface Capillary Irrigation Systems: Pioneered in Amsterdam, these systems store water beneath the field and use passive evaporation to reduce surface temperature significantly.

## Heat Stress (not only Surface Temperatures)

Understanding heat stress requires more than just measuring how hot a surface gets. While peak surface temperatures on synthetic turf can be very high, especially on older systems with rubber infill, heat stress itself is a more complex condition influenced by multiple environmental factors, including temperature, humidity, wind speed, and solar radiation. In the United States, the most widely accepted and scientifically validated tool for assessing heat stress in sports and outdoor environments is the Wet Bulb Globe Temperature (WBGT) index.

The WBGT is not the same as the regular air temperature. Instead, it combines measurements of ambient temperature, humidity, radiant heat (from sunlight), and wind speed into a single number that reflects the actual thermal stress on the human body. High humidity, for example, limits the body's ability to cool itself through sweating, which makes even moderate temperatures more dangerous. WBGT helps coaches, athletic trainers, schools, and parks departments make informed decisions about when it's safe to be active outdoors, regardless of whether the field is made of turf or natural grass.

National organizations like the National Athletic Trainers' Association (NATA) and the American Academy of Pediatrics (AAP) recommend using WBGT thresholds to guide sports practice, games, and outdoor activities, especially for children and adolescents who are more vulnerable to heat-related illnesses. Many states, including Georgia and Texas, have adopted mandatory WBGT monitoring protocols for high school sports, requiring activity modifications, hydration breaks, or cancellations when WBGT levels reach high or extreme zones.

In simple terms, WBGT offers a real-world snapshot of heat risk, not just a number on a thermometer. It considers how hard the body has to work to cool itself, based on actual environmental conditions. This is why modern turf systems should not be judged solely on peak surface temperature. Instead, systems should be evaluated on how they affect overall heat stress, including WBGT outcomes during peak-use times. Fortunately, as covered above, many of today's advanced turf systems using alternative infills, lighter yarns, and cooling designs now show WBGT values that closely match or even improve upon natural grass fields.



## Urban heat island (UHI)

The urban heat island (UHI) effect describes how urban environments become significantly warmer than surrounding rural areas due to the widespread use of heat-absorbing surfaces like asphalt, concrete, and dark roofing materials. Traditional synthetic turf systems, especially those that use black SBR rubber infill, can contribute to this problem by absorbing and re-radiating large amounts of solar energy, leading to elevated surface and ambient temperatures in their immediate vicinity.

However, it is important to recognize that not all turf contributes equally to the heat island effect. Modern synthetic turf systems have been specifically engineered to reduce their thermal impact. By replacing rubber infill with light-colored, low-heat materials such as cork, wood blends, or mineral-based alternatives, and by using reflective yarns and breathable base layers, these systems significantly lower surface temperatures. Some newer designs also incorporate subsurface irrigation or passive cooling layers that mimic the cooling function of natural grass through evaporation, further reducing their contribution to localized heating.

Field research has shown that well-designed cooling turf systems can perform comparably to, or even better than, other urban surfaces like sand-filled tennis courts or light-colored concrete in terms of thermal load. Importantly, while legacy rubber-based fields may amplify the UHI effect, modern turf can act as a neutral or even mitigating surface when part of a thoughtfully designed urban landscape.

When evaluating the environmental impact of synthetic turf, it's essential to distinguish between outdated systems that elevate urban heat and innovative systems that are actively engineered to counteract it. With the right materials and design features, synthetic turf can be a sustainable, heat-conscious solution for urban recreation areas.

### *Did you know:*

While it's true that turf is often warmer than natural grass, its surface temperature is generally lower than many other urban surfaces, such as asphalt, hard tennis courts, and various types of playgrounds and equipment.

| Surface Temperature | Turf (Rubber) | Turf (Pivot) | Road (asphalt) | Painted Tennis Court (Green) | Safety Surface Childs Playground (Blue) | Playground Slide (Metal) |
|---------------------|---------------|--------------|----------------|------------------------------|-----------------------------------------|--------------------------|
| Min                 | 85            | 87           | 88             | 89                           | 88                                      | 85                       |
| Mean                | 114           | 108          | 121            | 118                          | 119                                     | 122                      |
| Max                 | 135           | 121          | 142            | 139                          | 133                                     | 145                      |

**Note:** temperatures measured on a range of surface types on the same day all locations within 10 miles

## **Policy Implications and Future Research**

The widespread use of turf in public settings necessitates clearer national-level guidelines for heat exposure. While voluntary standards and local protocols exist, there is no unified federal approach to synthetic turf heat safety in the United States.

### ***Recommendations include:***

1. Mandating WBGT-based monitoring for all turf sports events.
2. Designing turf systems with proven cooling technologies and reduced WBGT heat stress levels.
3. Updating building codes and urban development policies to address UHI impact from large-scale artificial turf installations using WBGT data.
4. Funding continued research into materials science for low-heat polymers and sustainable infill.
5. Balancing usability, water conservation, and heat safety.



## Conclusion

The conversation around heat and synthetic turf is often oversimplified, focusing narrowly on surface temperature alone. While surface temperature is important, especially in the case of outdated turf systems that used black rubber infill, it does not provide a complete picture of heat risk. Heat stress is a multifactorial condition, influenced by humidity, wind, solar radiation, and surface properties, all of which are captured in the Wet Bulb Globe Temperature (WBGT) index. This index is already used widely across the United States to guide decisions in youth sports and outdoor activity settings and should be the primary reference tool for evaluating field safety, regardless of surface type.

What is clear from current evidence is that modern turf systems are fundamentally different from legacy products. Advances in infill composition, yarn materials, reflective coatings, and integrated cooling mechanisms mean that today's best-performing synthetic turf fields can match or even outperform natural grass when it comes to thermal safety. WBGT measurements from controlled field tests consistently show that properly engineered turf systems remain within safe zones under the same conditions where older systems exceed critical thresholds.

At the same time, this issue is not binary. The discussion should not be reduced to "turf vs. grass," but rather focused on performance, safety, and climate adaptability. Natural grass offers valuable ecological functions, but it also struggles in areas with water scarcity, high usage demands, or poor soil quality. Synthetic turf, when thoughtfully designed and maintained, can be a safe, sustainable solution, especially when paired with smart design strategies that address cooling and end-of-life impacts.

Further research is both necessary and valuable, not to delay progress, but to guide it. Policymakers, urban planners, and sports authorities should invest in comparative WBGT data to ensure decisions are based on science, not assumptions. The goal should not simply be to avoid heat, but to create safe, resilient outdoor spaces that serve people, protect public health, and respond to the realities of a changing climate.

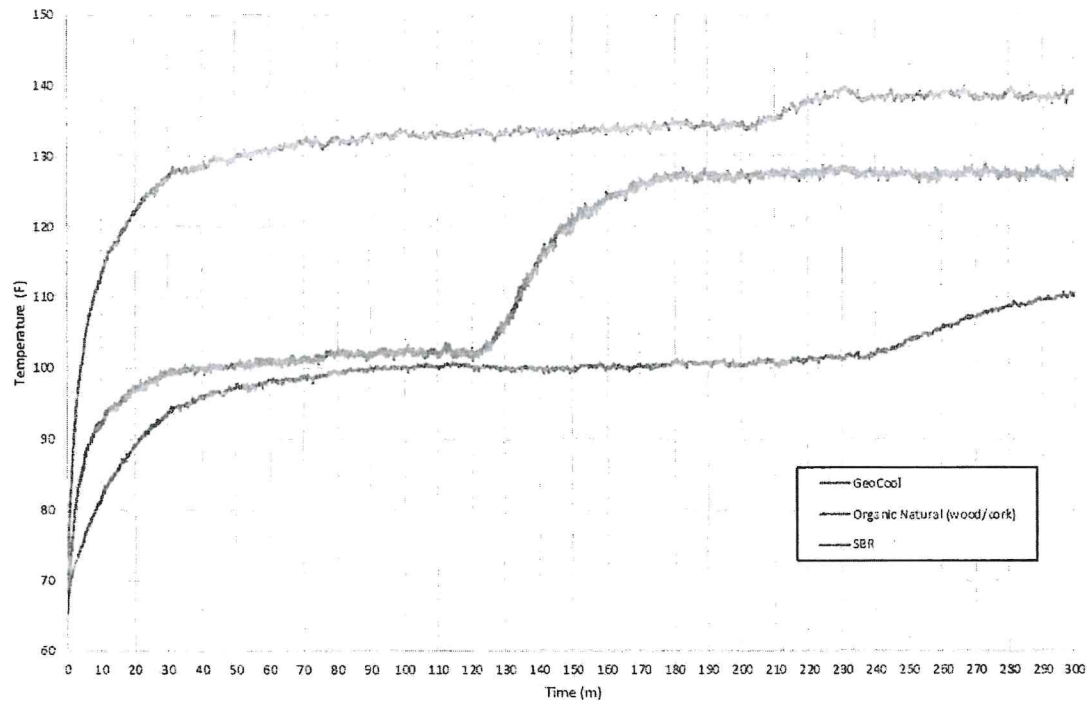
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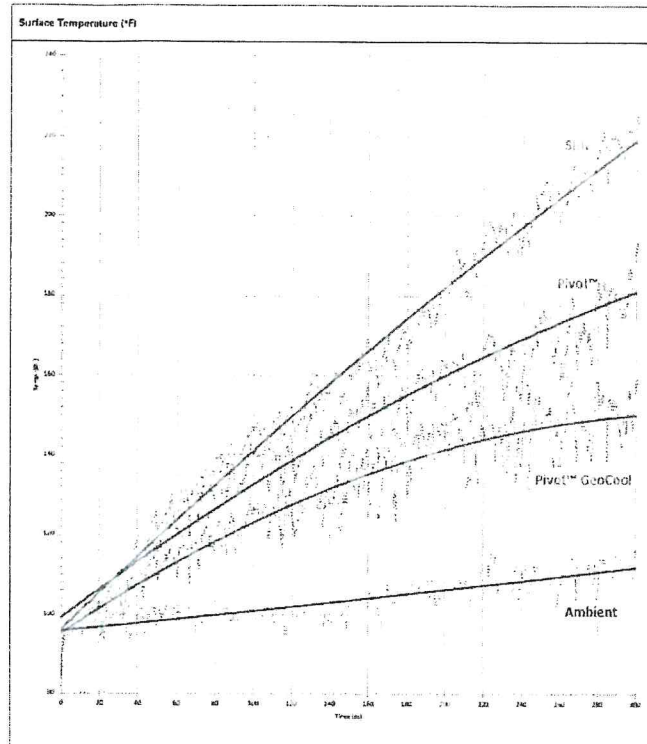


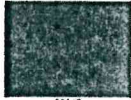
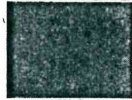
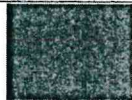
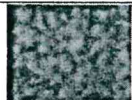
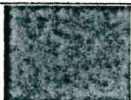
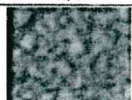
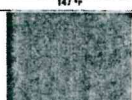
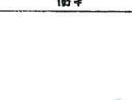
## Appendix: Data

### GeoCool - surface temperature vs time exposure



## Pivot, Pivot with GeoCool, and SBR Coparison - surface temperature vs time exposure



| Time (m) | Sample                                                                                        |                                                                                               |                                                                                                |
|----------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|          | Pivot™                                                                                        | Pivot™ with GeoCool                                                                           | SBR System                                                                                     |
| 0        | <br>90 °F  | <br>96 °F  | <br>90 °F  |
| 60       | <br>121 °F | <br>111 °F | <br>126 °F |
| 120      | <br>138 °F | <br>129 °F | <br>149 °F |
| 180      | <br>152 °F | <br>137 °F | <br>172 °F |
| 240      | <br>168 °F | <br>147 °F | <br>192 °F |
| 300      | <br>181 °F | <br>149 °F | <br>218 °F |



**McMillan, Acquanette (Netta)**

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**From:** D Woelke  
**Sent:** Sunday, May 3, 2026 12:37 PM  
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**Attachments:** Pasadena May 2026.pdf

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Dear Mayor Gordo, Vice Mayor Rivas, Council Members Hampton, Cole, Jones, Masuda, Madison, and Lyon:

Attached please find our comments in opposition to the above item. We would welcome any questions or concerns. We would also strongly recommend you convene a meeting with independent experts who do not have a financial interest in the outcome of continued use of plastic turf. Relying solely on staff to provide a myopic, unscientifically informed perspective is counterproductive and puts both public and environmental health at risk.

Respectfully submitted,

Dianne Woelke MSN, Board Member  
Safe Healthy Playing Fields, Inc.  
SHPFI is an all-volunteer nonprofit 501-c-3  
EIN: 83-424-3172





Pasadena City Council, 4 May 2026

Artificial Turf Replacement - Robinson Park and Villa Parke (New) Item 11(7)

## **Strongly OPPOSE**

Dear Mayor Gordo, Vice Mayor Rivas, Council Members Hampton, Cole, Jones, Masuda, Madison, and Lyon:

This letter is being sent to you by Safe Healthy Playing Fields, Inc., an all-volunteer 501-c-3 nonprofit organization. We are committed to educating communities, policymakers and elected officials about the health, safety and financial realities of plastic fields versus grass fields, and other synthetic surfaces for their parks and schools. Our constituency ranges from concerned individuals to community and civic organizations, legal, healthcare and science professionals, municipal leaders and state legislators.

Synthetic turf is made primarily from polyethylene, the most highly produced and discarded plastic globally.<sup>1</sup>

The proposed replacement of plastic turf at Villa Parke would be the **3rd installation since 2011**...if installed and open in January 2027, that is a **5.33 year life span on average!!**

3 plastic fields at Villa Parke constitutes:

- 108,900 pounds of plastic carpet waste for disposal (NOT recyclable!)
- 6,000 to 9,000 pounds of microplastic blades lost to air, water, and soil
- 1,800 pounds of microplastics from the carpet backing
- 1,200,000 pounds of infill

3 plastic fields at Robinson Park constitutes:

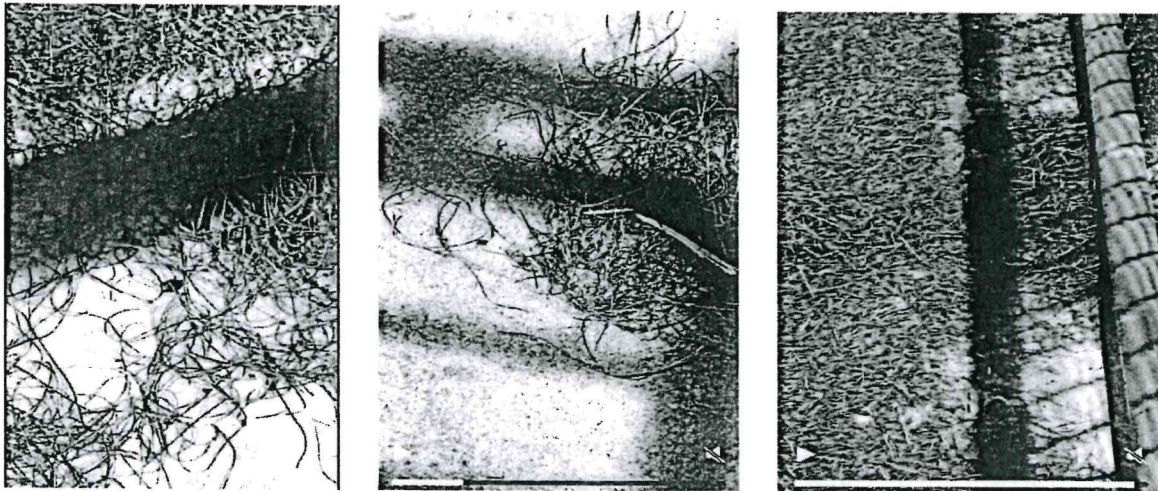
- 276,763 pounds of plastic carpet waste
- 13,840 to nearly 20,7600 pounds of microplastic blades lost to air, water and soil
- 4,152 pounds of microplastics from the carpet backing
- 2,767,659 pounds of infill

**EVERY 5.33 YEARS ON AVERAGE!**

---

<sup>1</sup> Dixon, D (18 Aug 2018). "Plastics aren't just polluting our oceans — they're releasing greenhouse gases." UNADAP (United Nations Association for Development and Peace).  
<https://www.unadap.org/post/plastics-aren-t-just-polluting-our-oceans-they-re-releasing-greenhouse-gase>





Villa Parke, 11 June 2024, microplastic synthetic turf blades

See microplastic blades shedding from sports fields [HERE](#) (12 year old AstroTurf field), [HERE](#) (3 month old TenCate Pivot field), and [HERE](#) (1.5 year old FieldTurf field).

Continuing use of synthetic turf, both in parks, residential, and commercial settings, is inconsistent with the City's Climate Action Plan and must be addressed in its updated plan to reflect:

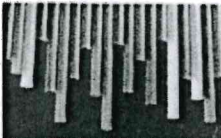
- Mounting threat of climate change and the need for climate adaptation and resilience
- Achieve long-term environmental sustainability
- Utilize resources effectively
- Reduce greenhouse gas emissions
- Protect the public health and safety
- Waste reduction
- Safety issues of drought, erosion, landslides, wildfires, and structure fires

## WORRIED ABOUT PLASTIC WASTE?

A synthetic turf field is the equivalent of



**3.2 million plastic bags**



**46 million plastic straws**

## Too POLLUTING!!

Like plastic straws & bags...

- Most synthetic turf is made from LDPE – low density polyethylene
- The most highly produced plastic globally
- The most frequently discarded material

### Impervious surfacing:

- Synthetic turf is classified as **impervious** by both the US EPA and the State of California. U.S. EPA has defined impervious surfaces:

*"...areas such as gravel roads...that will be compacted through design or use to reduce their impermeability." It further has defined impervious surfaces as...[a]ny surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, **artificial turf** and compacted gravel or soil."*

- Compaction, as well as the impervious plastic surface, result in increased runoff. Despite synthetic turf industry claims, laboratory testing is not the same as reality. Synthetic turf is unable to handle the amount of rain that comes with an atmospheric river or bomb cyclone.

*"Pollutants from aerial and terrestrial sources accumulate on impervious surfaces until runoff from a precipitation event carries sediment, nutrients, metals, and pesticides into stormwater drains and directly to local waterbodies. As impervious surfaces increase, stormwater runoff increases in quantity, speed, temperature, and pollutant load. When impervious surfaces reach 10–20% of local watershed area, surface runoff doubles and continues to increase until, at 100% impervious surface coverage, runoff is five times that of a forested watershed. Excessive stormwater runoff also increases the potential for flooding." US EPA Impervious Surface Fact Sheet*

- Synthetic turf creates 27,000 gallons of toxic runoff for every one inch of rain for every one acre of plastic installed.<sup>2</sup>
- Since 2015 (year synthetic turf was installed at Robinson Park), nearly **37.7 million gallons of toxic runoff from the 2 plastic fields alone have been washed into the stormdrains, the LA River, and to the ocean**, exclusive of runoff from yards and businesses with plastic turf.

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<sup>2</sup> Cotrone, V (undated). "The Role of Trees and Forests in Healthy Watersheds: Managing stormwater, reducing flooding, and improving water quality." Penn State Extension.  
<https://extension.psu.edu/the-role-of-trees-and-forests-in-healthy-watersheds>



### Climate Change:

As a fossil fuel-based petrochemical product, synthetic turf is a climate change agent. Microplastics are both created by, and contribute to, climate change, and impede sequestration of greenhouse gasses in the ocean.<sup>3,4,5</sup>

Synthetic turf exploits natural resources, from cradle to grave, polluting air, water and soil throughout its predicted 1,000 years it takes to fully degrade.<sup>6</sup> From fracking of fossil fuels, to the manufacture of pre production plastic pellets (nurdles) in ethane cracker plants, to manufacturing, transport, use, and interim and final disposal, environmental and social justice communities are the most impacted.<sup>7</sup>

The resulting impact on climate change from plastics, microplastics<sup>8</sup> and synthetic turf are contributing factors to increased flood risk, toxic runoff,<sup>9</sup> and landslides.<sup>10</sup> In addition to being an impermeable surface, installation of synthetic turf often requires removal of trees, or contributes to their deaths by impeding water infiltration, thereby adding to the risk of landslides.

- 13,700 gallons of fossil fuel-based oil is needed to manufacture 80k feet<sup>2</sup> of synthetic turf (685 gallons of petroleum to produce 1 ton of plastic).

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<sup>3</sup> da Fonseca, EM, Gaylarde, CC (2025). "Climate change and microplastics: a two-way interaction." Emerg. Contam. Environ. Health; 4, 15.  
<https://www.oaepublish.com/articles/eceh.2025.09>

<sup>4</sup> Shen, M, Huang, W, Chen, M et al (1 May 2020). "Microplastic crisis: Un-ignorable contribution to global greenhouse gas emissions and climate change." Journal of Cleaner Production; Vol.254, 120138.  
<https://www.sciencedirect.com/science/article/abs/pii/S0959652620301852>

<sup>5</sup> Nawab, A, Khan, MY, Ihsanullah, I, et al (Feb 2026). "From pollution to ocean warming: The climate impacts of marine microplastics." Journal of Hazardous Materials: Plastics; (2), 100032.  
<https://doi.org/10.1016/j.hazmp.2025.100032>

<sup>6</sup> Chamas, A, Moon, H, Zheng, J (3 Feb 2020). "Degradation Rates of Plastics in the Environment." ACS Sustainable Chemistry & Engineering;(8)9.b  
<https://pubs.acs.org/doi/10.1021/acssuschemeng.9b06635>

<sup>7</sup> Staff writer (25 Jan 2024). "US: Louisiana's 'Cancer Alley' Dire Health Crisis From Government Failure to Rein in Fossil Fuels." Human Rights Watch  
<https://www.hrw.org/news/2024/01/25/us-louisianas-cancer-alley>

<sup>8</sup> Sunil, S, Bhagwat, G, Vincent, SGT, Palanisami, T (10 Oct 2024). "Microplastics and climate change: the global impacts of a tiny driver." Science of The Total Environment; (946),174160.  
<https://www.sciencedirect.com/science/article/abs/pii/S0048969724043080>

<sup>9</sup> Simpson, TJ, Francis, RA (Aug 2021). "Artificial lawns exhibit increased runoff and decreased water retention compared to living lawns following controlled rainfall experiments." Urban Forestry & Urban Greening; (63), 127232  
<https://www.sciencedirect.com/science/article/abs/pii/S1618866721002570>

<sup>10</sup> XXX

- Approximately 989 gallons of water are required to produce 1 square meter of plastic turf, estimated to be the equivalent of watering a square meter of natural grass for 18 years.<sup>11</sup>
- Potable water is required to clean the plastic turf to decrease color bleaching and plastic degradation that occurs with the higher salt and mineral contents of reclaimed water.
- According to a leading plastic turf manufacturer, up to 2,200 gallons of potable water are required every hour to cool the plastic surface to a temperature safe for play.<sup>12</sup>
- Synthetic turf off gasses methane and ethylene day and night, in ever increasing amounts.<sup>13,14</sup> Methane traps 90% more heat than carbon dioxide and is 21 times more potent. Land based plastics produce two times more methane and 76 times more ethylene than plastics found in waterways and oceans.
- GHG emissions are estimated to be 527 tons of CO<sub>2</sub>e over a ten year period based on a model using a 84,830 sq ft field.<sup>15</sup>

Landslides are also a significant concern post wildfire events<sup>16</sup> and are a significant concern in all cases where there are no requirements or limitations on impervious surfacing.<sup>17,18</sup>

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<sup>11</sup> Waterwise UK. "How to save water: Artificial Grass's Footprint." <https://www.waterwise.org.uk/save-water/>

<sup>12</sup> [TenCate Pivot 2024](#)

<sup>13</sup> Royer, SJ, Ferrón, S, Wilson, ST, Karl, DM (2018). "Production of Methane and Ethylene from Plastic in the Environment." PlosOne 13(8): e0200574. <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0200574&type=printable>

<sup>14</sup> Royer, SJ (12 Nov 2018). Letter to Mayor M Bowser, Washington DC regarding synthetic turf. [Letter to Mayor M Bowser](#)

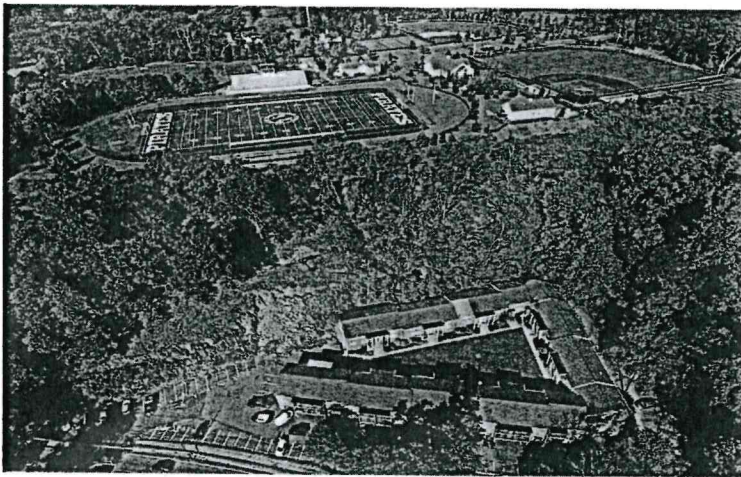
<sup>15</sup> Magnusson, Simon, Mácsik, Josef (July 2017). *Analysis of Energy Use and Emissions of Greenhouse Gases, Metals and Organic Substances from Construction Materials Used for Artificial Turf*. Resources, Conservation and Recycling Vol. 122, July 2017, Pages 362-372 <https://doi.org/10.1016/j.resconrec.2017.03.007>

<sup>16</sup> United States Geological Survey Program (2018). "The scientific background information for Emergency Assessment of Postfire Debris-Flow Hazards." <https://www.usgs.gov/programs/landslide-hazards/science/scientific-background>

<sup>17</sup> Strunsky, S (25 Oct 2021). "400-Year-Old N.J. Forest Cut Down for Fake Turf Field May Be to Blame for Rock Slide After Ida." NJ.com. <https://www.nj.com/news/2021/10/400-year-old-nj-forest-cut-down-for-fake-turf-field-may-be-to-blame-for-rock-slide-after-ida.html?outputType=amp>

<sup>18</sup> Vogt, E (26 Oct 2021). "NJ prep school's turf field blamed for rockslide that displaced 45 families." NJ 1015. <https://nj1015.com/nj-prep-schools-turf-field-blamed-for-rockslide-that-displaced-45-families/>





19

### Loss of Biodiversity:

- Soil - Synthetic turf impairs the microbiology and functions of soil by covering it with an impervious surface, disrupting carbon sequestration, photosynthesis, decomposition, and nutrient cycles.
- The resulting effect on organic exchanges impairs gas exchange, moisture uptake, the microbial population, and biochemical properties of the soil, leading to unhealthy soil, impaired plant growth, and eventual death.<sup>20</sup>

<sup>19</sup> Strunsky, Steve. 2021. "400-Year-Old N.J. Forest Cut Down for Fake Turf Field May Be to Blame for Rock Slide After Ida." NJ.com. Accessed 23 Oct 2023.  
<https://www.nj.com/news/2021/10/400-year-old-nj-forest-cut-down-for-fake-turf-field-may-be-to-blame-for-rock-slide-after-ida.html?outputType=amp>

<sup>20</sup> Millard, B (22 Jul 2025). "Artificial Turf Literature Review. Consolidating Understandings around the Environmental and Ecological Implications of Artificial Turf Systems." SeaBin Foundation, Australia.  
<https://seabinfoundation.org/artificial-turf-literature-review/>

- A healthy microbial system is essential to soil health and fertility.<sup>21,22,23</sup>
- Trees - Synthetic turf negatively impacts living plants through multiple mechanisms. Installation of artificial turf requires compaction of soil, which reduces root growth by reducing aeration. Because it is impervious, it does not allow adequate watering or rainfall into the soil. Toxic runoff from the plastic surfacing may allow waterlogging of plantings in low lying areas not immediately surrounded by the carpeting. The chemicals in the plastic and runoff can be toxic to the roots of living plants. The extreme heat created by the artificial turf greatly reduces or kills the soil biome integral to healthy soil with nutrients needed for growth, and prevents carbon sequestration into the soil, and oxygen production. These factors can ultimately result in living plant and tree deaths.
- Synthetic turf poses a significant global threat to wildlife and aquatic organisms via ingestion of microplastics and toxic chemical leachate, threatening our food chain.<sup>24</sup> It is estimated that >1500 species have ingested microplastics,<sup>25</sup> including high levels in air exhaled by dolphins via their blowholes.<sup>26</sup> Artificial turf in urban parks was found to reduce house sparrow populations by 60%.<sup>27,28</sup>

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<sup>21</sup> Hartmann, M, Frey, B, Mayer, J et al (31 Oct 2014). "Distinct soil microbial diversity under long-term organic and conventional farming." *ISME J*; 9, 1177–1194.  
<https://doi.org/10.1038/ismej.2014.210>

<sup>22</sup> Lindsey, AJ. Schiavon, M, Unruh, JB, Kenworthy, K (7 Jan 2025). "Urban Landscapes: Turfgrass Benefits." Department of Environmental Horticulture, University of Florida, *Grasses*;4(1), 3,  
<https://doi.org/10.3390/grasses4010003>

<sup>23</sup> Arachchige, PSP, Hettiarachchi, GM, Rice, CW et al (Sep/Oct 2024). "Direct evidence on the impact of organic amendments on carbon stabilization in soil microaggregates." *Soil Society of America J*; 88(5),1529-1544.  
<https://doi.org/10.1002/saj2.20701>

<sup>24</sup>

<sup>25</sup> Santos, RG, Machovsky-Capuska, GE, Andrades, R (2021). "Plastic Ingestion as an Evolutionary Trap: Toward a Holistic Understanding." *Science*; 373, 56–60.  
<https://pubmed.ncbi.nlm.nih.gov/34210877/>

<sup>26</sup> Dziobak, MK, Fahlman, A, Wells, RS (16 Oct 2024). "First evidence of microplastic inhalation among free-ranging small cetaceans." *PlosOne*.  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0309377>

<sup>27</sup> Ponce-Bernat, E, Gil-Delgado, JA, López, GM (20 Feb 2020). "Sharp decrease in sparrows caused by use of artificial grass in city parks." *Phys.org*  
<https://phys.org/news/2020-02-sharp-decrease-sparrows-artificial-grass.pdf>

<sup>28</sup> Sánchez-Sotomayor, D, Martín-Higuera, A, Gil-Delgado, JA (2023). "Artificial grass in parks as a potential new threat for urban bird communities." *Bird Conservation International*;33, e16, 1–8.  
<https://doi.org/10.1017/S0959270922000119>



- Microplastics have been found in birds' lungs,<sup>29</sup> and in the abdomens of fledgling puffins on remote islands in high volumes leading to death.<sup>30</sup>
- It is estimated that roughly one million seabirds and 100,000 marine mammals are killed annually from plastic in our oceans. In its 2024 Report, the World Wildlife Fund reports a loss of 73% of wildlife populations in the period from 1970 to 2020.<sup>31</sup>
- PFAS, micro- and nanoplastics have been found in sea spray.<sup>32,33</sup>
- Synthetic turf releases 2k to 3k microplastic blades per playing field each year. Newer "no infill" versions have 16 times more blades. The plastic carpet backing and shock pads also release large amounts of microplastics.<sup>34</sup>
- Synthetic turf is implicated in increasing frequent red tides and toxic algal blooms.<sup>35</sup>

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<sup>29</sup> Tokunaga, Y, Okochi, H, Tani, Y et al (Apr 2023). "Airborne microplastics detected in the lungs of wild birds in Japan." *Chemosphere*; 321,138032.  
<https://www.sciencedirect.com/science/article/pii/S0045653523002990>

<sup>30</sup> Lavers, J, Bond, AL, Hutton, I (Apr 2024). "Plastic ingestion by Flesh-footed Shearwaters (*Puffinus carneipes*): Implications for fledgling body condition and the accumulation of plastic-derived chemicals." *Environmental Pollution*; (187)124-129.  
<https://www.sciencedirect.com/science/article/abs/pii/S0269749113006532>

<sup>31</sup> World Wildlife Federation (2024). "Living Planet Report: 2024. Nature is Disappearing: The Average Size of Wildlife Populations Has Fallen By a Staggering 73%."  
<https://livingplanet.panda.org/en-US/>

<sup>32</sup> Bø, S, Johansson, JH, Tunved, P et al (15 Dec 2021). "Sea spray aerosol (SSA) as a source of perfluoroalkyl acids (PFAAs) to the atmosphere: Field evidence from long-term air monitoring." *Environmental Science & Technology*; (56), 1: 228-238.  
<https://pubs.acs.org/doi/10.1021/acs.est.1c04277>

<sup>33</sup> Lambert, S, Vercauteren, M, Catarino, AI et al (15 June 2024). "Aerosolization of micro- and nanoplastics via sea spray: Investigating the role of polymer type, size, and concentration, and potential implications for human exposure." *Environmental Pollution*; (351), 124105  
<https://www.sciencedirect.com/science/article/abs/pii/S0269749124008194>

<sup>34</sup> Kole, PJ, Van Belleghem, F, Stoorvogel, JJ, et al (10 Dec 2023). "Tire granulate on the loose: How much escapes turf? A systematic literature review." *Science of The Total Environment*; (903)166221.  
<https://doi.org/10.1016/j.scitotenv.2023.166221>

<sup>35</sup> Ren, X, Mao, M, Feng, M et al (1 Mar 2024). "Fate, abundance and ecological risks of microcystins in aquatic environment: The implication of microplastics." *Water Research*; Volume 251, 121121.  
<https://www.sciencedirect.com/science/article/abs/pii/S0043135424000228>

- Synthetic turf blades constitute 12 to 15% of mesoplastics found in waterways and the ocean, and over 50% in near surface waters,<sup>1</sup> as reported by researchers in Australia,<sup>36</sup> Spain,<sup>15</sup> China,<sup>37</sup> Japan,<sup>38</sup> Canada,<sup>39</sup> the United Kingdom,<sup>40</sup> and the US.<sup>41,42</sup>
- Economic and social costs in the U.S. from plastic are conservatively estimated to be between \$436 billion and \$1.109 trillion across the entire plastics life cycle, from cradle to grave (fossil fuel extraction, ethane cracking, production, use, disposal, and mismanagement).<sup>43</sup>

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<sup>36</sup> Mylius, K (11 July 2024). *"Keep the Fake Plants and Turf Out of the Surf: A call to action to reduce the use of artificial grass and plants in our cities, preserving natural greenery and its benefits, and cleaning the Ocean."* SeaBin Foundation, Australia.

<https://seabinfoundation.org/keep-the-fake-plants-and-turf-out-of-the-surf/>

<sup>37</sup> Wang, T, Li, B, Zou, X (1 Oct 2019). *"Emission of primary microplastics in mainland China: Invisible but not negligible."* Water Research; Vol. 162, Pages 214-224.

<https://www.sciencedirect.com/science/article/abs/pii/S004313541930555X>

<sup>38</sup> Harusato, A, Kato, M ( *"Mechanisms of Generation and Ecological Impacts of Nano- and Microplastics from Artificial Turf Systems in Sports Facilities."* Environments; Vol 12 Issue 4 1.

<https://www.mdpi.com/2076-3298/12/4/109>

<sup>39</sup> Klasios, N (Aug 2025). *"Understanding and Managing Artificial Turf Impacts on Rainwater, Urban Heat, and Biodiversity for the City of Vancouver."* Sustainability Scholar Project 2025-042.

[https://sustain.ubc.ca/sites/default/files/2025-042\\_Understanding%20and%20Managing%20Artificial%20Turf\\_Klasios.pdf](https://sustain.ubc.ca/sites/default/files/2025-042_Understanding%20and%20Managing%20Artificial%20Turf_Klasios.pdf)

<sup>40</sup> FIDRA.org *"Defra report states artificial pitches are the main source of intentionally added microplastic pollution in the UK."*

<sup>41</sup> SFEI. 2024. *The Pulse of the Bay: Contaminants of Emerging Concern.* SFEI Contribution #1219. San Francisco Estuary Institute, Richmond, CA.

<sup>42</sup> Shahariar, NK, Haque, A, Holsen, T, Baki, ABM (14 Oct 2025). *"Land Use and Rainfall as Drivers of Microplastic Transport in Canal Systems: A Case Study from Upstate New York."*

[https://www.preprints.org/frontend/manuscript/ca46e83151c4edefa27979d272ea4561/download\\_pub](https://www.preprints.org/frontend/manuscript/ca46e83151c4edefa27979d272ea4561/download_pub)

<sup>43</sup> Lauer, N, Vegh, T, Nowlin, M et al (July 2025). *'The Social Cost of Plastic to the United States.'* Duke University, Nicholas Institute for Energy, Environment & Sustainability.

<https://nicholasinstitute.duke.edu/sites/default/files/publications/the-social-cost-of-plastic-united-states.pdf>



- Researchers in Australia,<sup>44</sup> Spain,<sup>15</sup> China,<sup>45</sup> Japan,<sup>46</sup> Canada,<sup>47</sup> the United Kingdom,<sup>48</sup> and the US<sup>49,50</sup> have all reported finding microplastic synthetic turf blades in waterways.

California based agencies and research organizations concerned with microplastics and synthetic turf for its contamination of our waterways and the ocean:

- California Ocean Protection Council<sup>51</sup>
- San Francisco Estuary Institute<sup>52</sup>
- Heal the Bay<sup>53</sup>
- National Resource Defense Council<sup>6</sup>
- LA Waterkeeper<sup>6</sup>
- Sierra Club<sup>54</sup>
- SurfRider Foundation<sup>55</sup>

<sup>44</sup> Mylius, K (11 July 2024). "Keep the Fake Plants and Turf Out of the Surf: A call to action to reduce the use of artificial grass and plants in our cities, preserving natural greenery and its benefits, and cleaning the Ocean." SeaBin Foundation, Australia.  
<https://seabinfoundation.org/keep-the-fake-plants-and-turf-out-of-the-surf/>

<sup>45</sup> Wang, T, Li, B, Zou, X (1 Oct 2019). "Emission of primary microplastics in mainland China: Invisible but not negligible." Water Research; Vol. 162, Pages 214-224.  
<https://www.sciencedirect.com/science/article/abs/pii/S004313541930555X>

<sup>46</sup> Harusato, A, Kato, M ( "Mechanisms of Generation and Ecological Impacts of Nano- and Microplastics from Artificial Turf Systems in Sports Facilities." Environments; Vol 12 Issue 4 1.  
<https://www.mdpi.com/2076-3298/12/4/109>

<sup>47</sup> Klasios, N (Aug 2025). "Understanding and Managing Artificial Turf Impacts on Rainwater, Urban Heat, and Biodiversity for the City of Vancouver." Sustainability Scholar Project 2025-042.  
[https://sustain.ubc.ca/sites/default/files/2025-042\\_Understanding%20and%20Managing%20Artificial%20Turf\\_Klasios.pdf](https://sustain.ubc.ca/sites/default/files/2025-042_Understanding%20and%20Managing%20Artificial%20Turf_Klasios.pdf)

<sup>48</sup> FIDRA.org "Defra report states artificial pitches are the main source of intentionally added microplastic pollution in the UK."

<sup>49</sup> SFEI. 2024. The Pulse of the Bay: Contaminants of Emerging Concern. SFEI Contribution #1219. San Francisco Estuary Institute. Richmond, CA.

<sup>50</sup> Shahariar, NK, Haque, A, Holsen, T, Baki, ABM (14 Oct 2025). "Land Use and Rainfall as Drivers of Microplastic Transport in Canal Systems: A Case Study from Upstate New York."  
[https://www.preprints.org/frontend/manuscript/ca46e83151c4edefa27979d272ea4561/download\\_pub](https://www.preprints.org/frontend/manuscript/ca46e83151c4edefa27979d272ea4561/download_pub)

<sup>51</sup> [California Ocean Protection Council Statewide Microplastics Strategy](#)

<sup>52</sup> SFEI. 2024. The Pulse of the Bay: Contaminants of Emerging Concern. SFEI Contribution #1219. San Francisco Estuary Institute. Richmond, CA.

<sup>53</sup> [Heal the Bay, NRDC, LA Waterkeeper. letter to LA Council File 24-0602 2024](#)

<sup>54</sup> <https://www.sierraclub.org/san-francisco-bay/marin/synthetic-turf>

<sup>55</sup> <https://www.surfrider.org/news/artificial-turf-why-we-shouldnt-choose-plastic-over-plants>

### Human Health Impacts:

Plastic endangers human health throughout its lifecycle.<sup>56,57</sup>

- Children, other vulnerable populations, and workers are exposed to PFAS, phthalates, UV inhibitors, colorants, antimicrobials, flame retardants, and other chemicals of concern used in the manufacturing of synthetic turf and primary microplastic infill materials.
- Workers involved in fracking, ethane cracker and manufacturing plants, mining sites (silica sand), those who install, remove, and transport synthetic turf, those who work at locations collecting/selling used plastic turf carpets, and landfill workers are all at risk via dermal exposure, inhalation, and ingestion.
- Microplastics have been found in virtually every human body organ and fluid. They are able to cross the blood/brain barrier, have been found in bone marrow, carotid arteries, semen, both maternal and fetal sides of the human placenta, in the stool of newborn infants, human breast milk, and more.<sup>58</sup>
- Inhalation of microplastics are associated with asthma, lung fibrosis, and lung cancer.<sup>59</sup>
- Microplastics are negatively impacting the cardiac health of those living in the coastal region.<sup>60</sup>
- Research indicates microplastics are linked to cancer.<sup>61</sup>
- There is an age related risk for cancer from playing on synthetic turf:

*“...there are cancer risks probability occurs as a result of chemical exposure from artificial turf. Cancer risk probability for different age categories was in the order: 7–15 years > 3–6 years > 19–22 years > 16–18 years > 23–55 years > 56–70 years.”<sup>62</sup>*

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<sup>56</sup> Landrigan, PJ (6 Mar 2024). “*Plastics, Fossil Carbon, and the Heart.*” N Engl J Med;390(10),948-950. <https://www.nejm.org/doi/full/10.1056/NEJMe2400683>

<sup>57</sup> Landrigan PJ, Raps H, Cropper M et al (2023). “*The Minderoo-Monaco Commission on Plastics and Human Health.*” Annals of Global Health: 89(1): 23, 1–215. <https://doi.org/10.5334/aogh.4056>

<sup>58</sup> Marfella, R, et al. “*Microplastics and Nanoplastics in Atheromas and Cardiovascular Events.*” The N Engl J Med;390,(1),(900–910. <https://www.nejm.org/doi/full/10.1056/NEJMoa2309822>

<sup>59</sup> Thapa, R, Schlesinger, MA, Panth, N et al (Jan 2026). “*Inhaled microplastics and lung health: Immunopathological effects and disease implications.*” Food Bioscience;Vol. 75,108036. <https://doi.org/10.1016/j.fbio.2025.108036>

<sup>60</sup> Makawana, B, Khadke, S, Kumar, A et al (18 Jun 2025). “*Marine Microplastic Levels and the Prevalence of Cardiometabolic Diseases in US Coastline Counties.*” Journal of the American Heart Association;14(13). <https://doi.org/10.1161/JAHA.124.039891>

<sup>61</sup> Cirillo, F, Giani, F, Sergi, V et al (1 Mar 2026). “*The hidden threat: Microplastics and cancer biology.*” Journal of Hazardous Materials; Vol 505, 141332. <https://www.sciencedirect.com/science/article/pii/S0304389426003109>

<sup>62</sup> Mohammed, AMF, Saleh, IA, Abdel-Latif, NM (29 Mar 2023). “*Hazard assessment study on organic compounds and heavy metals.*” Heliyon: (9),4, e14928 <https://doi.org/10.1016/j.heliyon.2023.e14928>



- Young soccer players in San Diego, CA were found to have PFOS (one of over 16,000 PFAS chemicals) on their hands after playing on synthetic turf.<sup>63</sup>
- The US EPA has declared there is no safe level of PFOS.<sup>64</sup>
- PFAS can be absorbed through the skin, posing increased risk for the multiple non-communicable diseases and cancers known to be associated with PFAS.<sup>65</sup>
- PFAS has been found to act synergistically with microplastics to cause cancer.<sup>66</sup>
- Both new and used synthetic turf have been shown to cause endocrine disruption and negative cardiometabolic impacts when exposed to human cell lines.<sup>67,68</sup>
- Health care related burden based on 2018 data:
  - ☐ Attributable burden of plastic related disease in the U.S. from PBDEs (polybrominated diphenylethers), phthalates, bisphenols, and PFAS are on the order of \$400 billion annually.
  - ☐ \$66.7 billion (\$64.7 billion-67.3 billion) was due to phthalate exposure.
  - ☐ \$22.4 billion was due to PFAS exposure<sup>69</sup>

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<sup>63</sup> Amenabar, T (Mar 2024). "Study eyes safety of turf fields for kids: Scientists team up with San Diego Surf soccer club to discover if 'forever chemicals' pose risk." San Diego Union Tribune, originally published in the Washington Post.  
[https://enewspaper.sandiegouniontribune.com/infinity/article\\_popover\\_share.aspx?guid=7f93edcb-cd5b-4f9d-b8e4-ed57343daefc&share=true](https://enewspaper.sandiegouniontribune.com/infinity/article_popover_share.aspx?guid=7f93edcb-cd5b-4f9d-b8e4-ed57343daefc&share=true)

<sup>64</sup> US EPA (9 Apr 2024). Fact Sheet: "PFAS National Primary Drinking Water Regulation."  
[https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr\\_fact-sheet\\_general\\_4.9.24v1.pdf](https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr_fact-sheet_general_4.9.24v1.pdf)

<sup>65</sup> Ragnarsdóttir, O, Abdallah, MAE, Harrad, S (June 2024). "Dermal bioavailability of perfluoroalkyl substances using in vitro 3D human skin equivalent models." *Environment International*; (188), 108722.  
<https://www.sciencedirect.com/science/article/pii/S0160412024003581#ak005>

<sup>66</sup> Sands, M, Sachdeva, A, Bukavina, Irudayara, J (1 Dec 2025). "Synergistic toxicity of PFAS and microplastic mixtures across five human cell lines." *Environmental Pollution*; (386)127256.  
<https://www.sciencedirect.com/science/article/pii/S0269749125016306>

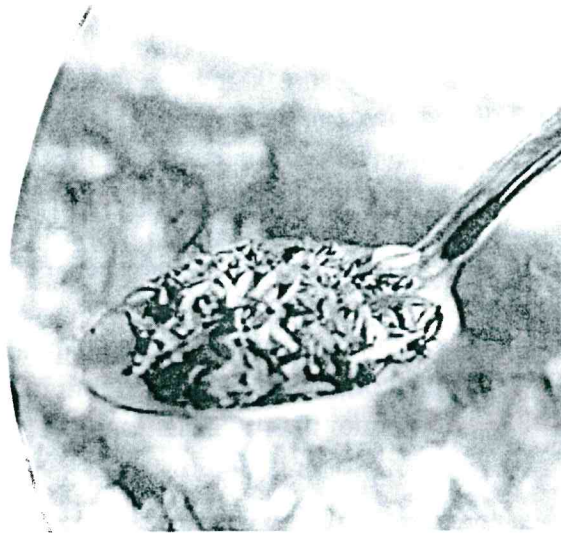
<sup>67</sup> Siegela, KR, Murraya, BR, Gearhart, J, Kassotis, CD (2024). "In vitro endocrine and cardiometabolic toxicity associated with artificial turf materials." *Environmental Toxicology and Pharmacology*; (111), 104562.  
<https://doi.org/10.1016/j.etap.2024.104562>

<sup>68</sup> Kassotis, C (23 Sep 2024). "Endocrine and cardiometabolic toxicity of artificial turf associated materials." Video of presentation at NYU Langone Health symposium on plastics research.  
<https://www.youtube.com/watch?v=q8MDXyQKnFA>

<sup>69</sup> Trasande, L, Krithivasan, R, Park, K et al (Feb 2024). "Chemicals Used in Plastic Materials: An Estimate of the Attributable Disease Burden and Costs in the United States." *Journal of the Endocrine Society*; (8), 2.  
<https://doi.org/10.1210/jendso/bvad163>

**In humans, micro-  
and nano-plastics  
have been found in:**

- |                       |                            |
|-----------------------|----------------------------|
| • Arteries (clots)    | • Ovarian follicular fluid |
| • Blood               | • Penis                    |
| • Brain               | • Placenta fetal/maternal  |
| • Breastmilk          | • Semen                    |
| • Bone marrow         | • Skeletal muscle          |
| • Feces adult/newborn | • Spleen                   |
| • Heart               | • Stomach                  |
| • Kidneys             | • Testes                   |
| • Liver               | • Tonsils- children        |
| • Lungs               | • Uterus                   |
| • Lymph nodes         |                            |



Health care and research institutions with resolutions on synthetic turf:

- The California Medical Association<sup>70</sup>
- Santa Clara County Medical Association<sup>71</sup>
- Children's Environmental Health Center, Mt. Sinai Hospital, New York City<sup>72</sup>
- Physicians for Social Responsibility<sup>73</sup>
- Climate Code Blue (Physician activists)<sup>74</sup>
- The Consortium for Children's Environmental Health<sup>75</sup>
- The Silent Spring Institute<sup>76</sup>
- Lowell Center for Sustainable Production, Univ. of Mass., Lowell<sup>77</sup>

<sup>70</sup> California Medical Association. (16 Aug 2024). Resolution 101-24: Removing Artificial Turf in Schools, Parks and Public Spaces.

<sup>71</sup> Santa Clara County Medical Association (24 Jun 2024). "Policy Recommendation on the Use of Artificial Turf on Landscapes, Schools and Playing Fields."

<sup>72</sup> Evans, SF, Harari, H (25 May 2025). "Position Statement on the Use of Artificial Turf Surfaces." The Children's Environmental Health Center, Mt. Sinai Hospital, New York, New York.  
<https://mountsinaiexposomics.org/position-statement-on-the-use-of-artificial-turf-surfaces/>

<sup>73</sup> Physicians for Social Responsibility

<sup>74</sup> Climate Code Blue: Physician Activists

<sup>75</sup> The Consortium for Children's Environmental Health

<sup>76</sup> Silent Spring Institute (Sep 2024). Public comment letter submitted to DTSC, Candidate Chemicals in Synthetic Turf, document id 9644.  
<https://calsafer.dtsc.ca.gov/workflows/Comment/15588/?from=search>

<sup>77</sup> Pollard, L, Massey, R (Aug 2024). "Per- and Poly-fluoroalkyl Substances (PFAS) in Artificial Turf: Academic, municipal, and other testing efforts." Lowell Center for Sustainability, University of Massachusetts, Lowell.



California agencies are calling for nature-based solutions to climate change:

- Natural Resources Agency<sup>78</sup>
- Department of Insurance<sup>79</sup>
- Department of Land Use and Climate Innovation<sup>80</sup>
- Ocean Protection Council<sup>81,82</sup>

**Extreme heat:**

***“Every Key Climate Indicator is Flashing Red. Humanity has just endured the 11 hottest years of record. When history repeats itself 11 times, it is no longer a coincidence. It is a call to act.”***<sup>83</sup> UN Secretary-General António Guterres, March 2026

Climate change is increasing the number of people exposed to extreme heat globally. Young children and the elderly are the most vulnerable populations.

Heat stress is a leading cause of weather-related deaths. Extreme heat can exacerbate underlying diseases, such as asthma, cardiovascular disease, diabetes, mental health disorders, risk for accidents and some infectious diseases. Heatstroke is a medical emergency with a high risk for death.

- Between 2000–2019 approximately 489,000 heat-related deaths occur annually.<sup>84</sup>
- Heat-related deaths for people over 65 years of age increased by 85% between 2000–2004 and 2017–2021.<sup>79</sup>
- From 2010–2020, there were more than 5,000 emergency room visits and 60 deaths per year due to heat-related illness in CA.<sup>85</sup>

[https://www.uml.edu/docs/PFAS%20in%20Artificial%20Turf%20-%20Academic%20Municipal%20%26%20Other%20Tests%20Aug%202024\\_tcm18-386957.pdf](https://www.uml.edu/docs/PFAS%20in%20Artificial%20Turf%20-%20Academic%20Municipal%20%26%20Other%20Tests%20Aug%202024_tcm18-386957.pdf)

<sup>78</sup> [California Department of Natural Resources](#)

<sup>79</sup> [California Department of Insurance](#)

<sup>80</sup> [LCI. Nature Based Solutions](#)

<sup>81</sup> [OPC. Nature Based Solutions](#)

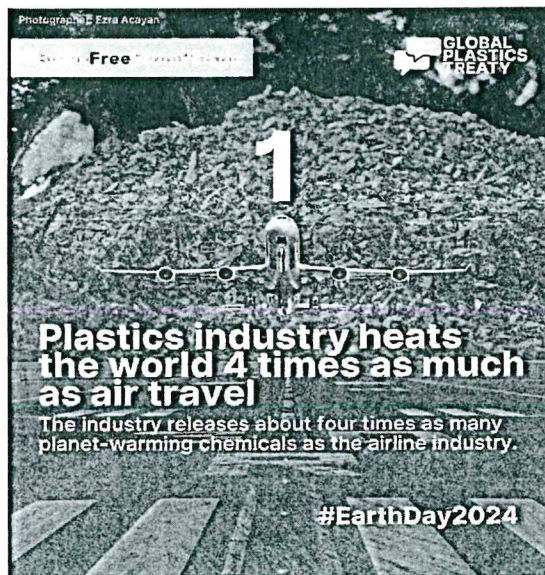
<sup>82</sup> [OPC. Nature Based Solutions. microplastics reduction](#)

<sup>83</sup> [Conley, J \(26 Mar 2026\). Common Dreams: UN Climate Report.](#)

<sup>84</sup> [WHO. Climate change. heat and health. 29 Apr 2026](#)

<sup>85</sup> California Department of Public Health.(Rev. July 1, 2024).“*CDPH Health Guidance for Schools on Sports and Strenuous Activities During Extreme Heat.*”

- Emergency room visits for heat related illnesses increased 170% between 2012 and 2023.<sup>86</sup>
- Those living in Southern California's coastal zones are more susceptible to heat related illness than those living in hotter inland areas.<sup>87</sup>
- Synthetic turf readily reaches temperatures of 160-180°F, and can reach over 220°F.
- Synthetic turf playing fields create heat islands that extend into surrounding areas; they are visible from satellites.
- 9,000 student athletes are treated annually for heat related illnesses; synthetic turf is a contributing factor.
- Deaths among high school football players from heat stroke doubled from 2015 to 2017 when compared to the 5 preceding years.<sup>88</sup>
- Football players are eleven times more likely to suffer a heat related illness.<sup>81</sup>



Lawrence Berkeley National Laboratory<sup>89</sup>

<https://www.cdph.ca.gov/Programs/EPO/Pages/Extreme%20Heat%20Pages/extreme-heat-guidance-for-schools.aspx>

<sup>86</sup> Merritt, TA, Bhatia, S, Solomon, C, Yu, A (Aug 2025). "Heat-Related Illness Trends at a Pediatric Health Care System, 2012 to 2023." *Academic Pediatrics*; 25,(6), 102855.  
<https://www.sciencedirect.com/science/article/abs/pii/S1876285925000804>

<sup>87</sup> Guirguis, K, Basu, R, Al-Delaimy, WK et al (2018). "Heat, disparities, and health outcomes in San Diego County's diverse climate zones." *GeoHealth*; 2, 212–223.  
<https://doi.org/10.1029/2017GH000127>

<sup>88</sup> Wertheim, J (Oct 2022). "With Hotter Temperatures Come More Football Deaths. And Black high school players are disproportionately affected." *Sports Illustrated*.  
<https://www.si.com/high-school/2022/10/07/football-climate-change-daily-cover>

<sup>89</sup> Karali, N, Khanna, N, Shah, N (12 Apr 2024). "Climate Impact of Primary Plastic Production." Lawrence Berkeley National Laboratory Publications.

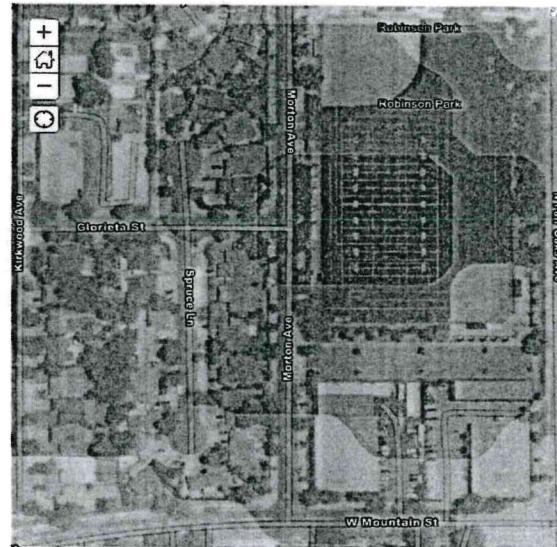


## HEAT ISLANDS:

Villa Parke

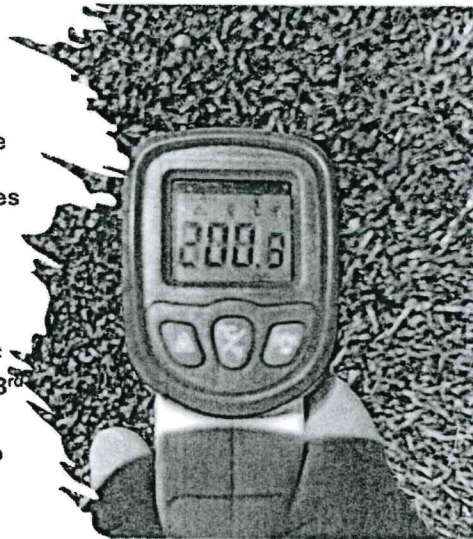


Robinson Park



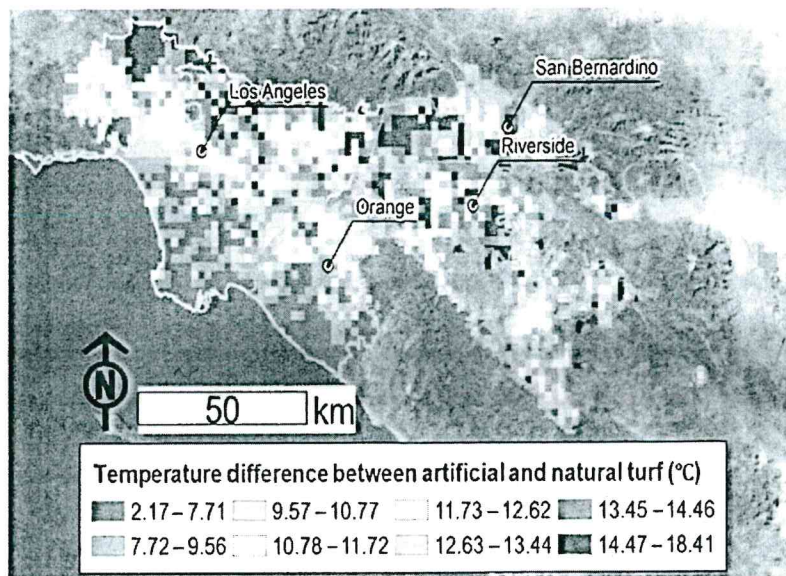
### Injuries: Thermal Burns

- Synthetic turf and plastic surfacing are always hotter than concrete, asphalt, natural grass and other natural surfaces
- At a surface temperature of 118°F a 1<sup>st</sup> degree burn occurs in 15 minutes, becoming a 3<sup>rd</sup> degree burn (full skin-thickness) in 20 minutes
- At a surface temperature of 140°F, a 1<sup>st</sup> degree burn occurs in 3 seconds, and 3<sup>rd</sup> degree burn in 5 seconds
- Synthetic turf readily reaches 160°F to 180°F and have reached over 200°F



A study published in 2024 compared natural grass lawns to xeriscaped lawns, and natural grass playing fields to synthetic turf fields within 0.5 miles of each other in Los Angeles, Riverside, San Bernardino and Orange Counties. The authors note that recommending xeriscaping over drought tolerant Bermuda hybrid grasses will lead to warmer temperatures.

*"During the summer, turfgrass residential lawns could be ~40°C cooler compared to artificial turf. Despite being cooler than artificial turf, xeriscape lawns could be up to 30°C warmer than natural turf lawns."*<sup>21</sup>



The above image is from data collected in 2013 and 2014, before the proliferation of synthetic turf, then believed to be a water saving measure during drought conditions.

### **Not recyclable; Not sustainable:**

Less than 6% of plastics are recycled.<sup>90</sup> Made of mixed plastics, synthetic turf is not recyclable, not sustainable and is a linear, not a circular product. Synthetic turf does not meet any definition of sustainability. The synthetic turf industry misrepresents its products when they make claims related to sustainability and environmentally friendliness. It is not enough to use the vernacular of the day.

Circular products<sup>91</sup> are “...those products that have reduced or completely no need for virgin resources and are designed with the end of their life in mind.”

The United Nations defines sustainable development<sup>92</sup> as “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

<sup>90</sup> Dell, J, Enck, J (May 2022). “The Real Truth about the US Plastic Recycling Rate.” Beyond Plastics. <https://static1.squarespace.com/static/5eda91260bbb7e7a4bf528d8/t/62b2238152acae761414d698/1655841666913/The-Real-Truth-about-the-US-Plastic-Recycling-Rate-2021-Facts-and-Figures-5-4-22.pdf>

<sup>91</sup> “What is a circular product?” Circular Tayside, United Kingdom. <https://circulartayside.co.uk/what-is-a-circular-product-and-business-model/>

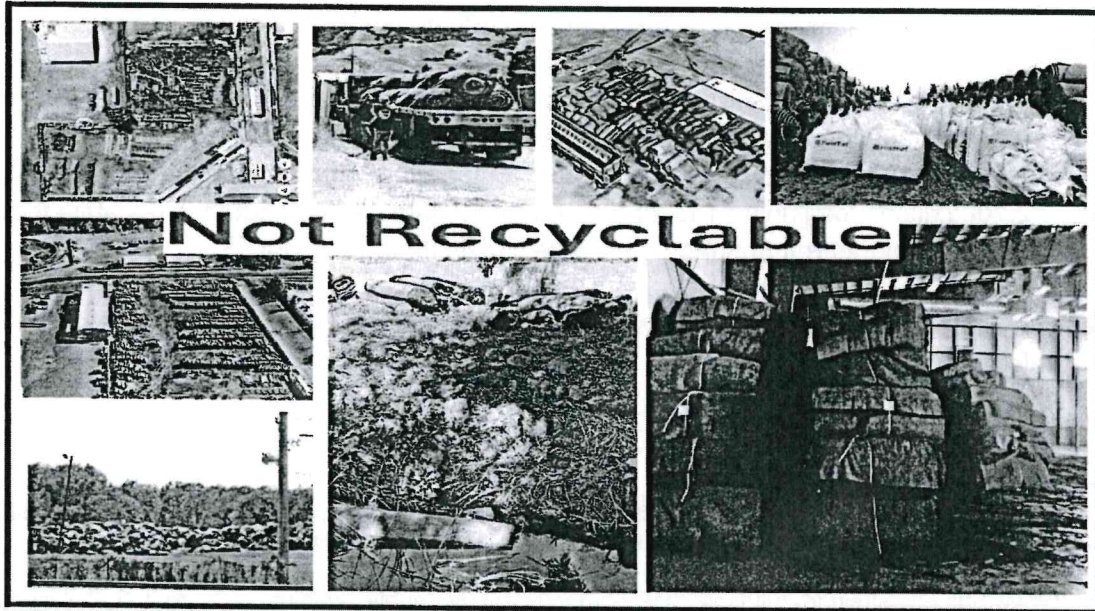
<sup>92</sup> United Nations (2024). “Sustainable Development Agenda: What is sustainable development?” <https://www.un.org/sustainabledevelopment/development-agenda/#1b1981a30bdd8fde2>



The UCLA Sustainability Committee<sup>93</sup> notes: *"In simplest terms, sustainability is about our children and our grandchildren, and the world we will leave them".*

The Rutgers Center for Sustainable Materials<sup>94</sup> definition:

*"Sustainable materials are materials used throughout our consumer and industrial economy that can be produced in required volumes **without depleting non-renewable resources and without disrupting the established steady-state equilibrium of the environment and key natural resource systems.**"*



### *Hidden costs: what is staff not telling you?*

The hidden "extras" with artificial turf projects:

- Environmental Impact Reports; CEQA filings and directed requirements.
- Irrigation systems. \*Failure to clean plastic fields can void warranties and put athletes at risk. Necessary to cool the surface to playable temperature.
- Drainage/catchment systems.
- Annual GMax testing- ~\$1,515. More frequently if it fails testing.
- Annual infill replenishment- 1.5 to 5 tons of chosen infill \*plant-based infill is generally 4.5 times more expensive than used tire crumb.
- New maintenance equipment.
- Maintenance agreement costs (required by some manufacturers).

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<sup>93</sup> UCLA Sustainability Committee, quoting UN World Commission on Environment and Development  
<https://www.sustain.ucla.edu/what-is-sustainability/>

<sup>94</sup> Rutgers University. "What are Sustainable Materials?" Department of Materials Science and Engineering, Center for Sustainable Materials. Accessed 26 Jan 2025.  
<https://mse.rutgers.edu/center-sustainable-materials>

- Increased water to cool plastic surface to playable temperature.
- Cleaning solvent. \*Failure to follow maintenance requirements will nullify warranties.
- Pesticides for weed eruption (Some manufacturers call for glyphosate, Specticide).
- Removal costs.
- Transportation and disposal costs (potential for disposal in hazardous waste landfills).
- Water to clean synthetic fields of bacteria,<sup>95,96</sup> secretion of human fluids, waste left by pets and wildlife; often a requirement to maintain warranty. Failure to clean causes build up of bacteria, which is more prevalent in older synthetic surfaces.<sup>97,98</sup>
- Some plant based infill requires 3,200 gallons of (potable) water every 3 to 4 days to maintain hydration.<sup>99</sup> Others infills require 6,500 to 8,000 gallons per 80,000 feet<sup>2</sup> of synthetic turf every 3 to 4 weeks based on humidity.<sup>100</sup>
- Water to cool the temperature synthetic turf to that of natural grass is greater than water required to maintain drought tolerant Bermuda grass varieties.<sup>101</sup>
- Amount of water to cool the surface "to a temperature comparable to natural grass" is 2,200 gallons, beginning 1 to 2 hours prior to a game and repeated to maintain the cooler temperature throughout play (effect lasts 20 to 50 mins).<sup>102</sup>

We have plenty of examples of projects where costs exploded...just ask us and we can provide more info!

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<sup>95</sup> US EPA (6 Aug 2019). "U.S. Federal Research Action Plan (FRAP) on Recycled Tire Crumb Rubber Used on Synthetic Turf Playing Fields and Playgrounds. Final Report Part 1 – Tire Crumb Characterization EPA Tools and Resources Webinar." slide 20  
[https://www.epa.gov/sites/default/files/2019-08/documents/tc\\_public\\_webinar\\_-\\_august\\_6\\_2019.pdf](https://www.epa.gov/sites/default/files/2019-08/documents/tc_public_webinar_-_august_6_2019.pdf)

<sup>96</sup> Valeriani, F, Margarucci, LM, Gianfranceschi, G et al (28 Aug 2019). *Artificial-turf surfaces for sport and recreational activities: microbiota analysis and 16S sequencing signature of synthetic vs natural soccer fields*. Heliyon: Heliyon 5 (2019) e02334.  
<https://doi.org/10.1016/j.heliyon.2019.e02334>

<sup>97</sup> Bass, JJ, Hintz, DW (2013). "Determination of Microbial Populations in a Synthetic Turf System," Skyline - The Big Sky Undergraduate Journal: 1(1), Article 1.  
<https://scispace.com/pdf/determination-of-microbial-populations-in-a-synthetic-turf-1jfau95sd7.pdf>

<sup>98</sup> Keller, M, Turco, RF, Gray, MB, Sigler, V (2020). "The Fate of Methicillin-Resistant *Staphylococcus aureus* in a Synthetic Turf System." Sports Health: 12(3), 263-270.  
<https://pmc.ncbi.nlm.nih.gov/articles/PMC7222665/>

<sup>99</sup> [Shaw Sports Turf infill](#)

<sup>100</sup> [FieldTurf 2021](#)

<sup>101</sup> Kanaan, A, Sevostianova, E, Leinauer, B, Sevotianov, I (2020). "Water Requirements for Cooling Artificial Turf."  
 Up loaded copy: [https://doi.org/10.1061/\(ASCE\)IR.1943-4774.0001506](https://doi.org/10.1061/(ASCE)IR.1943-4774.0001506)

<sup>102</sup> [TenCate Pivot 2024](#)



### **Hours of play myth:**

The industry and staff who support plastic turf more often than not skew the hours of play. Beware that more hours of play also means more exposure to toxic chemicals, more risk for non-communicable diseases and cancer, more rapid breakdown of the plastic, more expense for more frequent landfilling and replacement (you are on your 3rd replacement in 17 years), and more legal liability exposure.

Comparisons related to number of hours of play may be skewed significantly as they are most often based on the number of hours reserved for a given playing field, and not on the actual hours of play.

*"Hours of play as reported is based on permits, not actual on the ground play time. This is critical because synthetic turf is fenced, locked and often not used even during permitted time blocks, and not outside of those times. The [natural] grass fields, in contrast, see almost constant play during, and outside of permitted time, because they are typically NOT fenced and locked. So, if a team cancels practice or a game during permitted time on grass, others will certainly see it is empty and play on it anyway."*

Dr. Kathy Michaels, NIH researcher, ret., Board Member, Safe Healthy Playing Fields, Inc; public testimony, Montgomery County, Maryland, 2025.

This was also prominently elucidated as early as a 2014 article in a Forbes Magazine, revealing revealing how proponents of artificial turf manipulate information.<sup>103</sup> This dynamic was most recently affirmed last year in a letter submitted to CA DTSC by the University of Massachusetts Lowell Center for Sustainable Production, regarding DTSC's background document on Candidate Chemicals in Artificial Turf. Dr. Rachel Massey noted:

*"Regarding play times, we have documented examples of sustainably managed grass athletic fields that meet the play hours needed by communities. Grass athletic field consultants explain that with proper maintenance, a grass field will accommodate as much play as needed. We have also encountered instances in which artificial turf vendors assign different "weights" to different activities. For example, one hour of a heavy activity such as football may be counted as more than one hour of use. It can be important to understand these weightings when assessing the expected life span and cost effectiveness of the product."*<sup>104</sup>

New technologies that can be used for both artificial and natural grass playing fields

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<sup>103</sup> Ozanian, M (2014). "How Taxpayers Get Fooled On The Cost Of An Artificial Turf Field." Ozanian is the self-described "Traffic cop at the intersection of money and sports" of Forbes Magazine. <https://www.forbes.com/sites/mikeozanian/2014/09/28/how-taxpayers-get-fooled-on-the-cost-of-an-artificial-turf-field/>

<sup>104</sup> Massey, R (30 Sep 2024). "Comments on California DTSC's Background Document on Candidate Chemicals in Artificial Turf." Lowell Center for Sustainable Production, Univ. of Mass., Lowell. LCSP letter to DTSC

include programs that can be installed at select locations around a sports field to track actual field use time, and can be used for maintenance scheduling and records management.<sup>105,106</sup> Of note, field use time was noted to be consistently overstated based on data from at least one of the systems.<sup>107</sup>

Despite the theoretical advances in technology in synthetic turf, their “useful life” has not increased.

### **Wildfire risk:**

Synthetic turf is a combustible petrochemical product. Research in three countries has shown it is neither ember or flame resistant.<sup>108,109,110</sup>

*“Glowing embers, as are commonly blown in front of an advancing bushfire, have a temperature of around 700-800°C, and the flame of a burning leaf has a temperature of around 700°C. Strips of polyethylene can be ignited with the flame of a match which has a temperature of around 700°C.”<sup>111</sup>*

*“Over the past two decades, we saw a 250 percent increase in fire speed across the West that I don’t see slowing down anytime soon.” Fire ecologist, Jennifer Balch.<sup>112</sup>*

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<sup>105</sup> Field Turf Genius, how it works

<sup>106</sup> FieldTurf Genius, product details

<sup>107</sup> FieldTurf Genius Artificial Intelligence system

<sup>108</sup> Kukfisz, B (2018). “*The Degree of Flammability for an Artificial Grass Surface System.*” The Main School of Fire Service, Faculty of Fire Safety Engineering, Warsaw, Poland.  
<https://doi.org/10.1051/e3sconf/20184500038>

<sup>109</sup> Horticulture Innovation Australia Limited (Apr 2020). “*Living Turf Fire Benefits Study - Literature review.*” GHD Australia.  
<https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/tu17008-literature-review-living-turf-fire-benefits-study.pdf>

<sup>110</sup> Paturel, A (2021). “*Fire performance of artificial turf structures : small-scale testing and development of fireproofing strategies.*” Material chemistry. Université de Lille, France. Doctoral thesis.  
[https://theses.hal.science/tel-03561379v1/file/These\\_PATUREL\\_Angeline.pdf](https://theses.hal.science/tel-03561379v1/file/These_PATUREL_Angeline.pdf)

<sup>111</sup> Horticulture Innovation Australia Limited (Apr 2020). “*Living Turf Fire Benefits Study - Literature review.*” GHD Australia.  
<https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/tu17008-literature-review-living-turf-fire-benefits-study.pdf>

<sup>112</sup> Deng, J (11 Jan 2025). “*The Dichotomy of a Deadly Paradise—How Urban Sprawl and Climate Change Fuel LA’s Fires.*” Inside Climate News.  
<https://insideclimatenews.org/news/11012025/los-angeles-wildfires-in-altadena-and-pacific-palisades/>



- Synthetic turf increases toxic exposures during and after wildfires.<sup>113,114</sup>
- And, it contributes to escalating insurance costs.<sup>115,116,117</sup>



Pacific Palisades

Concord, CA

Alta Dena

<sup>113</sup> Schlanger, Z (15 Jan 2025). "What Happens When a Plastic City Burns." The Atlantic.  
<https://www.theatlantic.com/science/archive/2025/01/los-angeles-fire-smoke-plastic-toxic/681318/>

<sup>114</sup> Staff writer (17 Jan 2025). "Plastic Chemicals in Wildfire Smoke and How to Protect Yourself." Plastic Soup Coalition.  
<https://www.plasticpollutioncoalition.org/blog/2025/1/17/plastic-chemicals-in-wildfire-smoke-and-how-to-protect-yourself>

<sup>115</sup> Mandel, A, Battiston, S, Monasterolo, I. (5 Feb 2025). "Mapping global financial risks under climate change. Nature, Climate Change.  
<https://doi.org/10.1038/s41558-025-02244-x>

<sup>116</sup> Sherriff, L (18 Mar 2024). "Climate change is fuelling the US insurance problem." British Broadcasting Corp.  
<https://www.bbc.com/future/article/20240311-why-climate-change-is-making-the-us-uninsurable>

<sup>117</sup> Capani, C (7 May 2024). "Aviva issues flood risk warning as residents turn to artificial lawns." Insurance Times; United Kingdom.  
<https://www.insurancetimes.co.uk/news/aviva-issues-flood-risk-warning-as-residents-turn-to-artificial-lawns/1451833.article>

### Alternatives exist:

Avoidance of microplastics, toxic chemical exposure to people and planet, reduction of greenhouse gasses, and plastic pollution, and in support of a cooler environment, improved human health,<sup>118</sup> and biodiversity lies in nature-based solutions.

Natural grass actively sequesters carbon dioxide and provides a cooling function that is especially dramatic when compared to the heat generated by synthetic turf. Grass naturally filters toxins, performs important eco-services for the soil beneath, and provides widely dispersed rainwater infiltration allowing absorption and recharging of the water table. Additionally:<sup>119</sup> Research suggests that:

- Natural grasses can accumulate and deposit carbon into the soil by approximately one-half ton of carbon per acre per year for 30 to 40 years.
- 5,000 square feet of natural grass lawns can provide enough oxygen for approximately 28 residents - something sorely needed in our overbuilt environment.<sup>120</sup>
- Desert and drought tolerant Bermuda hybrid grasses can save water.
- **Regenerative / organic management, and zero emission maintenance equipment mitigate greenhouse gas emissions, reduce costs over time, and increase carbon sequestration.**<sup>121</sup>

Newer drought and desert tolerant Bermuda grass hybrids have been developed for high use playing fields, and can also be used in residential and commercial properties. One such natural grass hybrid, Tahoma31,<sup>122</sup> uses 60% less water and can stay green for six weeks, potentially reducing water usage to two to three waterings per summer. It has sterile seeds and is non-invasive. Other drought tolerant varieties, grown in the Coachella and San Fernando Valleys, as well as Stockton and other locations, include Coachella, Bandera, Legion and other Bermuda hybrids.

Recent examples of natural grass installations include:<sup>123</sup>

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<sup>118</sup> Braun, RC, Mandai, P, Nwachukwu, E, Stanton, A (17 Oct 2024). "*The role of turfgrasses in environmental protection and their benefits to humans: Thirty years later.*" Crop Science; (64)2, pp2909-3618.  
<https://doi.org/10.1002/csc2.21383>

<sup>119</sup> The Lawn Institute. "*Carbon Sequestration.*" Accessed 2 Feb 2025.  
<https://www.thelawninstitute.org/environmental-benefits/carbon-sequestration/>

<sup>120</sup> The Lawn Institute. "*Fresh Oxygen Production by Natural Grass Lawns in the United States.*"  
[https://www.thelawninstitute.org/wp-content/uploads/2021/02/TLI-FreshO2production\\_US-Final.pdf](https://www.thelawninstitute.org/wp-content/uploads/2021/02/TLI-FreshO2production_US-Final.pdf)

<sup>121</sup> [Beyond Pesticides, organic management cost comparison](#)

<sup>122</sup> [Tahoma31 Project List](#)

<sup>123</sup> CSA Holdings dba Sports Field Services. Natural grass field projects list, 2024  
<https://resources.finalsite.net/images/v1717629232/nmusdus/jsaurekoqcirbnudr5hs/MO2024-0004CSAHoldingsInc.pdf>



- Newport Harbor and Costa Mesa High Schools, renovation of football fields - \$166,020 + \$16,000 bid allowance.
- May 2024, Blair Park, San Bernardino - in conjunction with Dodger's Foundation, 3 baseball diamond renovations - \$390,000.
- June 2024, LA Chargers, 3 practice field installations, 220,000 ft<sup>2</sup> - \$4,000,000.<sup>124</sup>
- June 2024, UCLA Soccer Fields renovations - \$550,000.
- July 2024, LA Football Club Practice Fields renovations - \$60,000.
- August 2024, Point Loma Nazarene University, San Diego: installation of irrigation systems; baseball and football field installations- \$1,400,000.

Desert and drought tolerant natural grasses to help cool the environment and reduce plastic pollution, use 30 to 60% less water, and support biodiversity. California native plants that support pollinators, and mini watersheds to reduce toxic runoff, protecting soil, air, waterways and the ocean can help protect both public and environment health of residents and visitors.<sup>125</sup>

Both synthetic turf and microplastics are coming under regulation by the California Department of Toxic Substances Control.

Grants are turning towards nature based solutions. Plastic is not a solution!

We ask for you "NO" vote on this item and ask that you redirect your efforts to support both public and environmental health. We ask that you look beyond the greenwashing, the glitzy websites, and the glossy brochures. We also ask that you consider why so much effort has been undertaken to push plastic and undermine education on the related science in Pasadena.

Respectfully submitted,

Diana Conway, President  
 Dianne Woelke MSN, Board Member  
 Safe Healthy Playing Fields, Inc.  
<https://www.safehealthyplayingfields.org>  
 SHPFI is an all-volunteer nonprofit 501-c-3




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<sup>124</sup> [Building The Bolt: How The NFL's Newest Facility Was Made](#)

<sup>125</sup> [Surfrider Ocean Friendly Gardens Program](#)

**From:** Laura Fleming <  
**Sent:** Monday, May 4, 2026 4:00 PM  
**To:** PublicComment-AutoResponse  
**Cc:** Lyon, Jason  
**Subject:** Agenda item 12: CIP Budget and Artificial Turf

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Dear Mayor Gordo and City Councilmembers:

I am a resident of District 7 and the Environmental Sustainability Manager at Polytechnic School. I also serve on the Environmental Advisory Commission.

I understand the demand for playing fields in Pasadena, but artificial turf is not a responsible choice for the City due to its high costs and the myriad environmental and public health concerns associated with it. The EAC wrote a memo advising the City Council about these concerns in November 2024. At Polytechnic, we considered installing an artificial turf field in 2023 and decided against it for the reasons outlined in the EAC's memo.

Geo infill may reduce the extreme heat by 20 degrees, but when temperatures rise above 95 degrees (and we're predicted to have another month's worth of above 95 degrees by 2050), artificial turf with geo infill can still reach temperatures of 130 - 160 degrees. This exacerbates the urban heat islands within our city in an area of Pasadena with less tree cover, further impacting our disadvantaged communities.

I urge the City Council to spend more time studying this issue before choosing to fund replacing these fields with expensive and toxic artificial turf. Natural grass is far less expensive when expenses are looked at over the life cycle of an artificial turf field. Returning to natural grass is a one-time expense. Artificial turf must be replaced every eight years. Geo infill, although less toxic than tire rubber infill, is 25% more expensive, adding to the City's budget woes.

Changing out the fields will mean that there is downtime for either surface. And yes, sod may require another 3-4 weeks to set before soccer or other hard play can commence, but it is an investment in time that provides health benefits to our youth and adult athletes.

Laura Fleming  
District 7

04/20/