



4 July 2026

Dear Los Angeles City Council President Harris-Dawson, Council Members Blumenfield, Nazarian, Raman, Yaroslavsky, Padilla, Rodriguez, Price, Hutt, Hernandez, Park, Lee, Soto-Martinez, Jurado, and McOsker:

We, Safe Healthy Playing Fields, Inc., are writing to you about the continuing installation of synthetic turf and lack of action on CF 24-0602 in Los Angeles.

SHFP is 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 a highly toxic, combustible, petrochemical, plastic product made primarily from polyethylene, the most highly produced and discarded plastic globally.¹

Failure to take definitive action to ban synthetic turf is giving sanction to petrochemical plastics industries to continue drilling off our coasts, to continue harming communities and the environment via fracking, ethane cracking, transporting toxic chemicals and pre-production pellets, manufacturing, use, and landfilling vs. illegal dumping of synthetic turf. It is continuing to allow increased harm to vulnerable populations and redlined, environmental and social justice communities, and to those communities where cancer clusters exist and continue to form or expand. It is a complete and total disregard of the 29 Neighborhood Councils, the 119 organizations that have signed petitions, and 131 individuals that have submitted letters in support of banning synthetic turf installations and prioritizing nature-based solutions.

It is also a total disregard of the millions of dollars of taxpayers money to purchase, dispose of and replace well in excess of 2 million ft² of plastic waste every 5 to 10 years on average, and the exorbitant upgrades for wastewater treatment plants that will never get rid of all of the microplastics, and none of the nanoplastics and toxic chemicals from synthetic turf.²

¹ 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>

² Liu, Y, Wang, B, Guo, J et al (1 Feb 2026). *"Per- and polyfluoroalkyl substances (PFAS) in wastewater treatment plants: an overview of their occurrence, fate, effects, and ecological risks."* Journal of Environmental Management; 399, 128630.
<https://www.sciencedirect.com/science/article/abs/pii/S0301479726000903>



North County
NCCCCA
Climate Change Alliance



PEER
PUBLIC EMPLOYEES
FOR ENVIRONMENTAL
RESPONSIBILITY



**CITIZENS FOR
LOS ANGELES
WILDLIFE**



Institute for Climate Change,
Environmental Health, and
Exposomics



5 GYRES
SCIENCE TO SOLUTIONS



CA NURSES
FOR ENVIRONMENTAL HEALTH & JUSTICE



**BRENTWOOD
ALLIANCE OF
CANYONS &
HILLSIDES**



Know your Environment.
Protect your Health.
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North County
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**Non Toxic
Communities**



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

2024 Research on four LA County estuaries, Los Angeles River, the Dominguez Channel, the San Gabriel River, and the Malibu Creek, found that the level of micro- and nanoplastic pollution polluting our waterways, beaches and the ocean is predominantly due to polyethylene and polypropylene, and is concentrated at the river mouths.³ The beaches are now forever contaminated with microplastics and their “forever” PFAS, and “everywhere” phthalate chemicals, and so much more.

With each 80,000 ft² regulation sized synthetic turf playing field losing 2 to 3 thousand pounds of microplastic blades alone each year,^{4,5} newer no-infill plastic turf containing 16 times more blades,⁶ and LA’s unhealthy relationship with plastic turf, how much more public and environmental health risk can one city endure? How much of the 1100 acres (equivalent of 870 football fields) of combustible plastic turf installed annually in California is LA responsible for?⁷

³ Hoemann, C, Bauer, CA, Fissore, C (9 Aug 2024). “Assessing meso-, micro-, and nanoplastic pollution in Los Angeles County estuaries.” Marine Pollution Bulletin; 206:116822.
<https://europemc.org/article/med/39116758>

⁴ Haan, S, Sherrington, C, Jamieson, O et al (23 Feb 2018). “Investigating options for reducing releases in the aquatic environment of microplastics emitted by (but not intentionally added in) products.” Final Report
[Eunomia 2018: Reducing Microplastics](#)

⁵ DTSC (27 Aug 2024). [Presentation Slides](#)

⁶ TenCate Pivot, PR Presswire release, 11 Feb 2025

⁷ Rust, S (17 Sep 2025). “As California installs more artificial turf, health and environmental concerns multiply.” Los Angeles Times.
<https://www.latimes.com/science/story/2025-09-17/californias-love-hate-relationship-with-artificial-turf>

Is it now a Council Member's individual choice to inflict harm on their uninformed constituents, the public at large, and the environment? Is it not a Council Member's ethical, moral, and legal duty to inform themselves prior to casting any votes that have such implications not for the next 5 to 10 years alone, but generations to come? And how much more cost should taxpayers be subjected to for removal of PFAS, other chemicals of concern, and microplastics from stormwater treatment, and even their own drinking water?

In 2024, SB676-Allen was enacted, allowing local jurisdictions to ban artificial turf. A legislative analysis noted:

*"...emerging research reveals that artificial turf incurs significant environmental problems through pollution, chemical run-off, and lack of recyclability...[contain] PFAS, and have been linked to numerous health problems including cancer, kidney and liver damage, birth defects, and harm to children's health."*⁸

To date, the cities of Millbrae,⁹ San Marino,¹⁰ Carmel,¹¹ San Fernando,¹² and Beverly Hills¹³ have enacted ordinances regarding synthetic turf. A growing number of other cities are considering the same within our state, across the country, and globally.

Climate Change / 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."¹⁴

UN Secretary-General António Guterres, March 2026

It was estimated that the cost of protecting LA county communities from climate change related effects between 2024 and 2040 is \$780 million per year for:¹⁵

⁸ SB676-Allen. Assembly analysis (23 July 2023). Author statement.
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB676

⁹ [Millbrae](#) artificial turf ordinance.

¹⁰ [San Marino](#) artificial turf ordinance.

¹¹ [Carmel](#) artificial turf ordinance.

¹² [San Fernando](#) artificial turf ordinance

¹³ [Beverly Hills](#) artificial turf ordinance

¹⁴ [Conley, J \(26 Mar 2026\). Common Dreams: UN Climate Report.](#)

¹⁵ [Cost Challenge A \\$12.5 Billion Bill to Protect Communities Through 2040](#)

- Extreme heat
- Changing precipitation
- Wildfires
- Rising sea levels,
- Climate-induced public health threats

Those cost predictions were prior to the January 2025 wildfires.

Climate change is increasing the number of people exposed to extreme heat globally.¹⁶ Young children and the elderly are the most vulnerable populations.

As a fossil fuel-based, petrochemical plastic product, synthetic turf is a climate change agent, off gassing methane and ethylene day and night, in ever increasing amounts. 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.^{17,18} GHG emissions from plastic turf are estimated to be 527 tons of CO₂e over a ten year period based on a model using a 84,830 sq ft field.¹⁹ This does not include the entire life cycle of the plastic turf, from cradle to grave and complete degradation.

Climate change presents a significant risk to student athletes.²⁰ An estimated 9,000 student athletes are treated for exertional heat illness each year.²¹ The heat from synthetic surfaces, even at reasonable ambient temperatures, can contribute to injuries due to an athlete's diminished functional level.

¹⁶ Perkins-Kirkpatrick, Gregory, CH, Vanos, JK et al (26 Mar 2026). "Deadly heat stress conditions are already occurring." Nature Communications; 17:2590.
<https://www.nature.com/articles/s41467-026-70485-1>

¹⁷ 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>

¹⁸ Royer, SJ (12 Nov 2018). Letter to Mayor M Bowser, Washington DC regarding synthetic turf.
[Letter to Mayor M Bowser](#)

¹⁹ 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>

²⁰ Morton, A (1 Apr 2026). "The Hetchinger Report: Climate Change Threatens Student Athlete Safety;" Hetchingerreport.org
<https://hetchingerreport.org/the-heat-is-on-as-climate-change-threatens-student-athlete-safety-states-try-to-adapt/>

²¹ Kerr, ZY, Casas, DJ, Marshall, SW, Comstock, RD (Jan 2013). "Epidemiology of exertional heat illness among U.S. high school athletes." J. Preventive Medicine.
pubmed.ncbi.nlm.nih.gov/23253644/

Heat stress is a leading cause of weather-related deaths. Extreme heat can exacerbate underlying diseases, such as asthma, cardiovascular disease,²² diabetes, mental health disorders, as well as increasing the risk for accidents and some infectious diseases. Heatstroke is a medical emergency with a high risk for death.

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 1st degree burn occurs in 15 minutes, becoming a 3rd degree burn (full skin-thickness) in 20 minutes
- At a surface temperature of 140°F, a 1st degree burn occurs in 3 seconds, and 3rd degree burn in 5 seconds
- Synthetic turf readily reaches 160°F to 180°F and has reached over 200°F



Children are not small adults. They are more readily impacted by heat illness due to:

- Heat production – Children have higher metabolic rates than adults which leads to higher production of more heat.
- Body surface area – Younger children absorb more heat because they have a greater body area to body mass ratio. For older children and teens, increased body fat and low fitness levels can be contributing factors.
- Blood circulation – Children are less able to cool their body temperature by shunting their blood from their body core to their body surface due to lower cardiac output and smaller blood volume.
- Sweat production – Children produce less sweat per gland and sweat at higher body temperatures than adults, reducing their body's ability to cool itself.
- Fluid replenishment – Children are less likely to self-regulate hydration if inadequately supervised.
- Between 2000–2019 approximately 489,000 heat-related deaths occurred annually.²³

²² Huo, S, Pulido, TR, Archer, RS (8 Mar 2026). "Heat and socioeconomic deprivation compound to drive coronary heart disease in Los Angeles." Front. Public Health, Sec. Health Economics; Volume 14 <https://doi.org/10.3389/fpubh.2026.1784078>

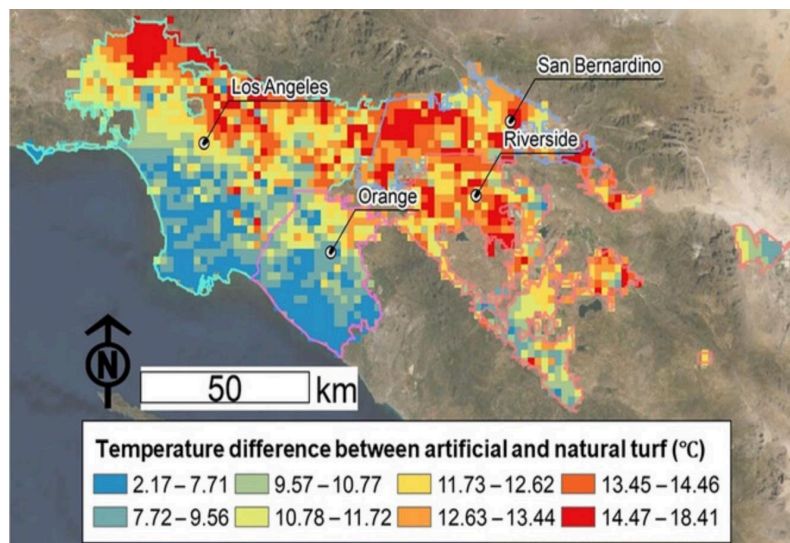
²³ [WHO. Climate change, heat and health. 29 Apr 2026](#)

- Heat-related deaths for people over 65 years of age increased by 85% between 2000–2004 and 2017–2021.⁷⁹
- From 2010–2020, there were more than 5,000 emergency room visits and 60 deaths per year due to heat-related illness in CA.²⁴

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.”²¹

The image below 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.



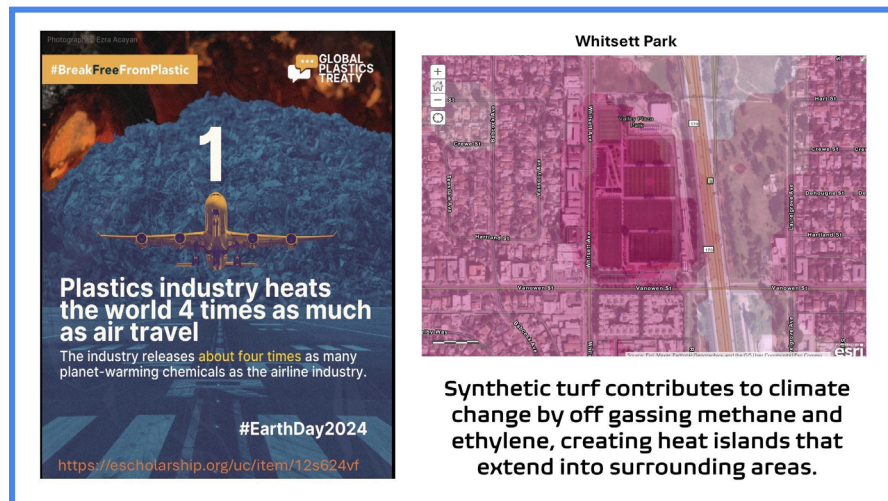
According to research published in 2025 by the American Academy of Pediatrics, the incidence of heat related illnesses rose by 170% between 2012 and 2023.²⁵ Research conducted by TenStrands on the impact of rising temperatures on counties, schools and students has shown a trend toward school closures or remote learning due to extreme heat. The report predicted more

²⁴ California Department of Public Health.(Rev. July 1, 2024).“CDPH Health Guidance for Schools on Sports and Strenuous Activities During Extreme Heat.”
<https://www.cdph.ca.gov/Programs/EPO/Pages/Extreme%20Heat%20Pages/extreme-heat-guidance-for-schools.aspx>

²⁵ 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>

than 120 days of high heat, impacting some 1.6 million students would occur in at least 16 counties, putting them at high risk for heat related illnesses by 2025, with an increasing number of extreme heat days impacting a growing number of counties, schools and students between 2025 and 2055.²⁶

Research released in March 2026 revealed significant temperature differences in parks, schools and playgrounds in Los Angeles, with underserved areas of South Los Angeles being hotter when compared to West Los Angeles. The differences were attributed to fewer open green spaces, more concrete, and plastic playgrounds and playing fields that trap heat, with temperatures high enough to burn exposed limbs.^{27,28}



Extreme heat caused eight schools in Harford County, two in Montgomery County, Maryland, and 52 schools in Philadelphia, Pennsylvania, and all outdoor activities for the public schools of Fairfax County, VA to close schools ahead of the end of the school year in June 2026.

A large number of events were cancelled across the country over the 4th of July weekend due to extreme heat. More cancellations are planned in LA County this week, also due to extreme heat.

WHO OF YOU WILL BE OUT THERE MEASURING TEMPERATURES ON PLASTIC PLAYING FIELDS ACROSS THE CITY TO KEEP PEOPLE SAFE?

²⁶ [Cal Data Initiative. Extreme Heat](#), Ten Strands

²⁷ Agatep, A, Fisher, JB, Tacazon, K et al (18 Mar 2026). "Thermal inequities in public parks and open spaces in Los Angeles determined by remote sensing." Nature Portfolio Journal: Urban Sustain; (6) 61. <https://doi.org/10.1038/s42949-026-00366-5>

²⁸ Douglas, JA, Fisher, JB, UCSB, Eastyards Non-Profit (6 Apr 2026). "Mapping urban heat from space reveals dangerous inequities in LA public parks." UC Irvine News. <https://publichealth.uci.edu/2026/04/07/mapping-urban-heat-from-space-reveals-dangerous-inequities-in-la-public-parks/>

Human Health Impacts:

Plastic endangers human health throughout its lifecycle.^{29,30}

- New research indicates 600 quadrillion microplastics are released annually from land based plastics, with an additional 26 quadrillion released from ocean based plastics.³¹
- 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 from primary microplastic infill materials, and shedding secondary micro- and nanoplastics shed from plastic fields.
- 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.³²
- Inhalation of microplastics is associated with asthma, lung fibrosis, and lung cancer.³³
- Microplastics are negatively impacting the cardiac health of those living in the coastal region.³⁴

²⁹ 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>

³⁰ 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>

³¹ Callaway, KR (22 Jan 2026). “*Scientists just calculated how many microplastics are in our atmosphere. The number is shocking: A new estimate suggests land sources eject 600 quadrillion pieces of microplastic into the atmosphere every year.*” Scientific American. <https://www.scientificamerican.com/article/scientists-just-calculated-how-many-microplastics-are-in-our-atmosphere-the/>

³² 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>

³³ 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>

³⁴ 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>

- PFAS, micro- and nanoplastics have been found in sea spray.^{35,36}
- PFAS has been found to act synergistically with microplastics to cause cancer.^{37,38}
- 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.”³⁹

- 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.⁴⁰
- The US EPA has declared there is no safe level of PFOS.⁴¹
- PFAS can be absorbed through the skin, posing increased risk from the multiple non-communicable diseases and cancers known to be associated with PFAS.⁴²

³⁵ 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>

³⁶ 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>

³⁷ 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>

³⁸ 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>

³⁹ 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>

⁴⁰ 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

⁴¹ 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

⁴² 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>

- Both new and used synthetic turf have been shown to cause endocrine disruption and negative cardiometabolic impacts when exposed to human cell lines.^{43,44}
- Due to the prolonged degradation time for plastic, synthetic turf is a consumer product that will continue polluting the environment with micro- and nanoplastics, toxic chemicals, and bacteria for centuries.⁴⁵
- Products used in best management practices (BMPs) to theoretically reduce loss of plastic blades and infill actually contribute more secondary micro- and nanoplastics to air, water, and soil than they prevent from leaving synthetic turf fields.
- Synthetic turf releases 2k to 3k pounds of meso- and 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.⁴⁶

Microplastics

- Plastics are synthetic materials made from organic polymers and variety of additives
- Microplastics - small pieces of plastic with a maximum dimension of 5 mm
- Artificial turf is a source of secondary microplastics
 - 0.5% to 0.8% of artificial turf fiber loss per year due to microplastic weathering = 2,000 to 3,000 pounds per year of escaped microplastics
- **Significant exposure potential**
 - Persistent and mobile in environment
 - Widespread exposure for humans and non-human organisms



⁴³ 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>

⁴⁴ 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>

⁴⁵ 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>

⁴⁶ 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>

- Synthetic turf blades constitute 12 to 15% of mesoplastics found in waterways and the ocean, and over 50% in near surface waters,⁴¹ as reported by researchers in Australia,⁴⁷ Spain,⁴⁸ China,⁴⁹ Japan,⁵⁰ Canada,⁵¹ the United Kingdom,⁵² and the US.^{53,54}
- Microplastics are both created by, and contribute to, climate change, and impede sequestration of greenhouse gasses in the ocean.^{55,56,57}
- 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

⁴⁷ 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/>

⁴⁸ De Haan, WP, Quintana, R, Vilas, C, C  zar, A et al (1 Oct 2023). “The dark side of artificial greening: Plastic turfs as widespread pollutants of aquatic environments.” Environmental Pollution; 334, 122094.
<https://www.sciencedirect.com/science/article/pii/S0269749123010965?via%3Dihub>

⁴⁹ 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>

⁵⁰ 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>

⁵¹ 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

⁵² [FIDRA.org “Defra report states artificial pitches are the main source of intentionally added microplastic pollution in the UK.”](https://www.fidra.org.uk/defra-report-states-artificial-pitches-are-the-main-source-of-intentionally-added-microplastic-pollution-in-the-uk/)

⁵³ [SFEI. 2024. The Pulse of the Bay: Contaminants of Emerging Concern. SFEI Contribution #1219. San Francisco Estuary Institute. Richmond, CA.](https://www.sfei.org/research/the-pulse-of-the-bay-contaminants-of-emerging-concern)

⁵⁴ 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

⁵⁵ 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>

⁵⁶ 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>

⁵⁷ 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>

to grave (fossil fuel extraction, ethane cracking, production, use, disposal, and mismanagement).

NICHOLAS INSTITUTE FOR ENERGY, ENVIRONMENT & SUSTAINABILITY STUDY, DUKE UNIVERSITY

The Social Cost of Plastic to the United States

As of July 2025, the annual social costs of plastic to the United States are conservatively estimated to be between \$436 billion and \$1.109 trillion across the entire plastics life cycle, from cradle to grave: from fossil fuel extraction, production, use, disposal, and mismanagement.

Greenhouse gas emissions (\$6.4 billion–\$15.9 billion annually): *“contribute to climate-related harms, rising healthcare costs, and reduced agricultural productivity.”*

Increased disease and mortality from oil and gas extraction (\$2.9 billion–\$31.9 billion annually): fracking emits toxic pollutants (i.e. nitrogen dioxide and PM2.5) *“contributing to asthma and mortality, in nearby low-income and marginalized communities.”*

Increased disease and mortality from plastics use (\$410 billion–\$930 billion annually): *“Exposure to toxic chemicals in plastics—such as phthalates, PFAS (per- and polyfluoroalkyl substances), BPA (bisphenol A), and flame retardants—is linked to adverse health outcomes, including cancer, cardiovascular disease, reproductive disorders, and neurological harm. These exposures are associated with healthcare expenses, lost productivity, and premature mortality...likely a significant underestimate of the full cost.”*

Landfilling (\$2.9 billion annually): Most plastic waste in the United States is disposed of in landfills. direct costs (i.e. tipping fees) *“Broader harms, such as lowered property values and environmental degradation near landfills, remain unquantified in the literature reviewed.”*

Plastic litter clean-up (\$9.8 billion–\$13.3 billion annually): *“Removing plastic litter from roadsides, waterways, and public spaces poses costs to state and local governments, nonprofits, and businesses who are largely responsible for cleaning up mismanaged waste in support of public health and community aesthetics.”*

Damage to fisheries, marine shipping hazards, loss of tourism (\$3.0 billion annually): *“Mismanaged plastic waste in the marine environment damages boats, deters visitors from polluted beaches, and reduces fishery yields. Estimated losses to marine industries from these harms include \$2.0 billion to tourism, \$88 million to fisheries, and \$909 million to marine shipping.”*

Loss of marine ecosystem services (\$1.4 billion–\$112 billion annually): *“Marine plastic pollution degrades ecosystem services.”*⁵⁸

⁵⁸ 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>

With well over \$12 billion committed to updating 7 of over 900 waste water treatment plants (WWTPs) in California, and some locations running into significant cost overruns, removal of toxic chemicals, such as PFAS, and microplastics in WWTPs is an ever growing taxpayer burden.⁵⁹ Not all microplastics can be removed, and virtually none of the nanoplastics and chemicals. Research shows a reduction in microplastics, and higher concentration of PFAS in effluent from water treatment plants when compared to influent. Choosing to continue the installation of synthetic turf is both shortsighted and irresponsible.

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).

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

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



With babies being born pre-polluted with both microplastics and per- and polyfluoroalkyl substances, known as PFAS or “Forever Chemicals”, and the rising rate of childhood cancers, why would you want to contribute to further pollution of young minds and bodies?

Based on data from 2018, the health care related burden of plastic related to 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, while \$22.4 billion was due to PFAS exposure.⁶⁰

⁵⁹ (15 Jan 2026). “California Wastewater Treatment Plants.” Water and Wastewater dot com. <https://www.waterandwastewater.com/california-wastewater-treatment-plants/>

⁶⁰ 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>

Health care and research institutions with resolutions on synthetic turf (not comprehensive):

- **The California Medical Association**⁶¹
- Santa Clara County Medical Association⁶²
- Children's Environmental Health Center, Mt. Sinai Hospital, New York City⁶³
- Physicians for Social Responsibility⁶⁴
- Climate Code Blue (Physician activists)⁶⁵
- The Consortium for Children's Environmental Health⁶⁶
- The Silent Spring Institute⁶⁷
- Lowell Center for Sustainable Production, Univ. of Mass., Lowell⁶⁸

The Los Angeles Unified School District is transitioning away from synthetic turf in elementary and middle schools, and replacements and installations at high schools are on hold. Sacramento City Unified School District is considering the same.

Mental Health Benefits of TRUE Green Space:

The lack of open true green, not fake green spaces, negatively impacts academic success, mental health, and violence.

Natural green spaces have been shown to mitigate aggressive behavior in adolescents⁶⁹ and

⁶¹ [California Medical Association. \(16 Aug 2024\). Resolution 101-24: Removing Artificial Turf in Schools, Parks and Public Spaces.](#)

⁶² [Santa Clara County Medical Association \(24 Jun 2024\). "Policy Recommendation on the Use of Artificial Turf on Landscapes, Schools and Playing Fields."](#)

⁶³ 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://mountsinaiaexposomics.org/position-statement-on-the-use-of-artificial-turf-surfaces/>

⁶⁴ [Physicians for Social Responsibility](#)

⁶⁵ [Climate Code Blue: Physician Activists](#)

⁶⁶ [The Consortium for Children's Environmental Health](#)

⁶⁷ 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>

⁶⁸ 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.
https://www.uml.edu/docs/PFAS%20in%20Artificial%20Turf%20-%20Academic%20Municipal%20%26%20Other%20Tests%20Aug%202024_tcm18-386957.pdf

⁶⁹ Younan, D., Tuvblad, C., Lianfa, L. et al (2016). "Environmental Determinants of Aggression in Adolescents: Role of Urban Neighborhood Greenspace." J Am Acad Child Adolesc Psychiatry; 55(7):591–601.

significantly reduce the growing risk of psychiatric disorders,⁷⁰ and suicide mortality.⁷¹

Natural green spaces also reduce health risks such as asthma.⁷² Korean researchers have found that children who play on microplastic used tire crumb playground surfaces are 10 times more likely to develop cancer than those who play on soil.⁷³ Soil imparts immunity, plastic and used tire crumb does not. Less plastic means greater health benefits, as corroborated by a recent Finnish study.⁷⁴

The American Psychological Association finds:⁷⁵

“...exposure to nature has been linked to a host of benefits, including improved attention, lower stress, better mood, reduced risk of psychiatric disorders and even upticks in empathy and cooperation.”

Initially published in Center for Climate, Health, and the Global Environment, Harvard.⁷⁶

“Studies have found that students who attend schools with green spaces tend to have better grades, higher test scores, and better attendance rates than those who do not.”

<https://pubmed.ncbi.nlm.nih.gov/27343886/>

⁷⁰ Engeman, K., Pedersen, C.B., Arge, L., Svenning, J.C. et al (2019). “Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood.” Proceedings of the National Academy of Sciences (PNAS.org) of the United States of America <https://www.pnas.org/doi/10.1073/pnas.1807504116>

⁷¹ Asri, AK, Tsai, HJ, Wong, PY et al (4 Jul 2022). “Examining the Benefits of Greenness on Reducing Suicide Mortality Rate: A Global Ecological Study.” Front. Public Health, Sec. Environmental Health and Exposome;;(10)902480. <https://doi.org/10.3389/fpubh.2022.902480>

⁷² Dong, Y, Liu, H, Zheng, T (13 Jan 2021). *The Impacts of Green Space Structure on Asthma in Toronto, Canada*. Med. Sci. Forum; 4(1), 6. <https://doi.org/10.3390/ECERPH-3-09123>

⁷³ Tarafdar, A, Oh, MJ, Nguyen-Phuong, Q et al (2020). “Profiling and Potential Cancer Risk Assessment on Children Exposed to PAHs in Playground Dust/Soil: A Comparative Study on Poured Rubber Surfaced and Classical Soil Playgrounds in Seoul.” Environ Geochem Health 42, 1691–1704 <https://doi.org/10.1007/s10653-019-00334-2>

⁷⁴ Westin, P (25 Oct 2025). “How a radical experiment to bring a forest into a preschool transformed children’s health.” The Guardian. <https://www.theguardian.com/environment/2025/oct/29/soil-sandpit-children-dirty-biodiversity-finnish-nurseries-research-microbes-bacteria-aoe>

⁷⁵ Weir, K. (2020). Nurtured by nature: Psychological research is advancing our understanding of how time in nature can improve our mental health and sharpen our cognition. American Psychological Association. <https://www.apa.org/monitor/2020/04/nurtured-nature>

⁷⁶ Bowning, M, Rigolon, A (1 Feb 2019). “School Green Space and Its Impact on Academic Performance: A Systematic Literature Review.” Int J Environ Res Public Health;16(3):429. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6388261/>



Injuries:

Independent peer-reviewed research consistently shows significantly increased non-contact lower extremity injuries⁷⁷ and concussions^{78,52} particularly for children⁵² playing on synthetic turf is a contributing factor.

- 315,000 to 850,000 concussions every year occur among high school athletes.
- Repeated concussions increase risk of Chronic Traumatic Encephalopathy (CTE)/
- The Concussion Legacy Foundation reported that repetitive brain trauma is associated with CTE and has been found in 17 year olds. 41.4% of athletes under age 30 show signs of CTE.⁷⁹
- In high school American football players, concussions occur when head impacts approach 95 g.
- For youth American football players aged 9-14; 62.4 ± 29.7 g was the threshold for concussions.
- Research published Jan 2024 showed significantly greater impact deceleration on synthetic turf compared to natural grass surfaces, showing greater potential for concussions on synthetic fields.⁸⁰

In a study of 953 student athlete injuries published in 2021, 61% occurred on synthetic, while 39% were on natural grass. The injuries included torso, and upper and lower limb injuries, and

⁷⁷ Gould, HP, Lostetter, SJ, Samuelson, ER, Guyton, GP (May 2023). "Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: A Systematic Review." Am J Sports Me; 51(6): 1615-1621.
doi: [10.1177/03635465211069562](https://doi.org/10.1177/03635465211069562)

⁷⁸ [The Concussion Legacy Foundation. \(2015\). White Paper: The Role of Synthetic Turf in Concussion.](#)

⁷⁹ Ober, M (28 Aug 2023). 41% of Young Athletes Show Signs of CTE. Neuroscience News.
<https://neurosciencenews.com/cte-young-athletes-23847/>

⁸⁰ Villanueva, N, Chun, I, Fujiwara, A et al (Jan 2024). "Impact Deceleration Differences on Natural Grass Versus Synthetic Turf High School Football Fields." Hawaii Journal of Health; 82 (1) 4-10.
http://hawaiijournalhealth.org/past_issues/HJHSW_Jan24.pdf

included football, girls and boys soccer and rugby teams, in descending order of the number of injuries reported.⁸¹

In a meta analysis published in the American Journal of Sports Medicine, a comprehensive review of 53 studies that focused on injuries on artificial turf vs. natural grass fields. The systematic review of articles found that among non-contact injuries:

“...[the] greatest proportion of articles reported a higher foot and ankle injury rate on artificial turf compared with natural grass, both with old-generation and new-generation turf. Similar knee and hip injury rates were reported between playing surfaces for soccer athletes on new-generation turf, but football players, particularly those at high levels of competition, were more likely to sustain a knee injury on artificial turf than on natural grass.”

The authors noted that **the few studies suggesting a higher rate of injury on natural grass “received financial support from the artificial turf industry.”**⁴³

Exposure to Methicillin-resistant Staphylococcus aureus (MRSA)⁸² and other bacteria⁸³ are a potentially life threatening consequence of dermal abrasions, known as turf burns, due to friction on synthetic turf. Inhalation and ingestion are additional exposure pathways.

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.⁸⁴ From fracking of fossil fuels, to the manufacturing of pre-production plastic pellets (nurdles) in ethane cracker plants, to

⁸¹ Paliobeis, A, Sivasundaran, L, Knapik, D et al (Jul/Aug 2021). *“Injury incidence is higher on artificial turf compared with natural grass in high school athletes: a retrospective cohort study.”* Current Orthopaedic Practice 32(4):p 355-360,
https://journals.lww.com/c-orthopaedicpractice/Abstract/2021/07000/Injury_incidence_is_higher_on_artificial_turf.6.aspx

⁸² 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.”*
https://www.epa.gov/sites/default/files/2019-08/documents/tc_public_webinar_-_august_6_2019.pdf slide 20

⁸³ Valeriani, F, Margarucci, LM, Gianfranceschi, G et al. (Aug 2019). *“Artificial-turf surfaces for sport and recreational activities: microbiota analysis and 16S sequencing signature of synthetic vs natural soccer fields.”* Heliyon; 5(8): e02334.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6728760/>

⁸⁴ 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>

manufacturing of the plastic carpet, transport, use, and interim and final disposal, environmental and social justice communities are the most impacted.⁸⁵

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

- California Ocean Protection Council⁸⁶
- San Francisco Estuary Institute⁸⁷
- Heal the Bay⁸⁸
- National Resource Defense Council⁶
- LA Waterkeeper⁶
- Sierra Club⁸⁹
- Surfrider Foundation⁹⁰
- California Coastal Commission^{91,92}

Socioeconomic and Equity Issues:

Indigenous, Black, Latinx, and other minority groups, tend to live in communities that have long been impacted by pollution, climate change, open green space, canopy tree cover,⁹³ and cooling centers. These communities bear a higher burden of health-related issues, decreased access to health care and to information due to cultural and language barriers, and often feel left out of the decision-making process.⁹⁴

Environmental and social justice (EJ/SJ) communities have higher exposures to toxic chemicals

⁸⁵ 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>

⁸⁶ [California Ocean Protection Council Statewide Microplastics Strategy](#)

⁸⁷ [SFEI. 2024. The Pulse of the Bay: Contaminants of Emerging Concern. SFEI Contribution #1219. San Francisco Estuary Institute. Richmond, CA.](#)

⁸⁸ [Heal the Bay. NRDC. LA Waterkeeper. letter to LA Council File 24-0602 2024](#)

⁸⁹ Sierra Club California  [Oppose Synthetic Turf.pdf](#)

⁹⁰ <https://www.surfrider.org/news/artificial-turf-why-we-shouldnt-choose-plastic-over-plants>

⁹¹ https://www.califaep.org/docs/CEQA_Handbook_2025combined.pdf

⁹² [CA Coastal Commissioners comments on synthetic turf, synthetic turf, microplastics](#)

⁹³ Leland, J (20 Aug 2021). "Why an East Harlem Street Is 31 Degrees Hotter Than Central Park West If you want to map inequality in New York, you can just count trees." New York Times.
https://www.nytimes.com/2021/08/20/nyregion/climate-inequality-nyc.html?unlocked_article_code=1.eE8.JFJV.A60qNvjU75HA&smid=url-share

⁹⁴ Together for Justice (n.d.). "10 Examples Of Environmental Social Justice Issues."
<https://togetherforsocialjustice.com/environmental-social-justice-issues/>

in air, water, and soil.^{95,96} They are more likely to be located near oil wells and refineries, underground gas storage tanks and pipelines,⁹⁷ landfills,⁹⁸ recycling facilities, SuperFund,⁹⁹ and polluting manufacturing sites.

Inequities in outdoor greenspace experienced in environmental and social justice communities cannot be corrected with the use of artificial turf playing fields or playgrounds. Impervious surfacing decreases the amount of green space, adds to the heat island effect, exposes vulnerable populations to toxic chemicals, adds to pollution of water via increased runoff; to the air via off gassing of greenhouse gasses; to the soil via removal of topsoil, compaction, and overheating; to all via microplastic pollution.

Open green spaces and gardens around homes, workplaces and schools provide places to relax, gather socially, recreate, and create a sense of community. Plastic does not enhance those benefits.

Loss of open green space impacts mental health via increased heat, and lack of air conditioning, and poor air quality. It increases attention, empathy, cooperation, lowers stress, improves mood, and has been shown to reduce psychiatric disorders.¹⁰⁰ Green schools have

⁹⁵ Shaw-Wakeman, T, Cunliffe, Z (2024). *"The Life of Plastic: Black Women are Overexposed & Underprotected."* Black Women for Wellness, Los Angeles.
<https://bwwla.org/the-life-of-plastic-black-women-are-overexposed-underprotected/>

⁹⁶ Terrell, KA, St Julien, G (13 Jan 2022). *"Air pollution is linked to higher cancer rates among black or impoverished communities in Louisiana."* Environmental Research Letters; 17, (1).
<https://iopscience.iop.org/article/10.1088/1748-9326/ac4360>

⁹⁷ Department of Public Health. (24 Aug 2024). *"Community Health Profiles."* County of Los Angeles.
<https://apps.gis.lacounty.gov/static/DPH/chp-reports/CHP%20Report%20-%20County%20of%20Los%20Angeles%20-%20Environmental%20Justice.pdf>

⁹⁸ Lewis, R (22 Aug 2023). *"Toxic trash: California's aging hazardous waste sites have troubling safety records."* CalMatters.
<https://calmatters.org/environment/2023/08/california-hazardous-waste-sites-permit-2/>

⁹⁹ Johnson, M, West, C (27 Apr 2024). *"EPA Superfund Sites and Poor Health in Los Angeles County An assessment of community health in a 5 mile proximity to Superfund sites in relation to health insurance."* ArcGIS Story Maps.
<https://storymaps.arcgis.com/stories/75978b4e605e42aa98c05c83acd7bd56>

¹⁰⁰ Weir, K. (2020). *"Nurtured by nature: Psychological research is advancing our understanding of how time in nature can improve our mental health and sharpen our cognition."* American Psychological Association.
<https://www.apa.org/monitor/2020/04/nurtured-nature>

the potential to improve attendance, grades and test scores.^{101,102} Higher levels of green spaces decrease aggression in adolescents.¹⁰³ These benefits cannot be replicated in overheated, densely populated, fake green environments.

Equity in sports does not mean equality, either.¹⁰⁴ Equality is providing the same resources to everyone, while equity is providing resources based on need. When public playing fields are privatized, whether by a formal lease, maintenance agreement, or joint use agreement, barriers are created that widen the equity gap, creating a “pay for play” scenario, in which low income residents may be left out.

Suggestions to improve equity in sports:

- Removing fences
- Ensuring residents have more access to parks and playing fields than organized teams from other cities
- Offering scholarships or reduced fees based on income

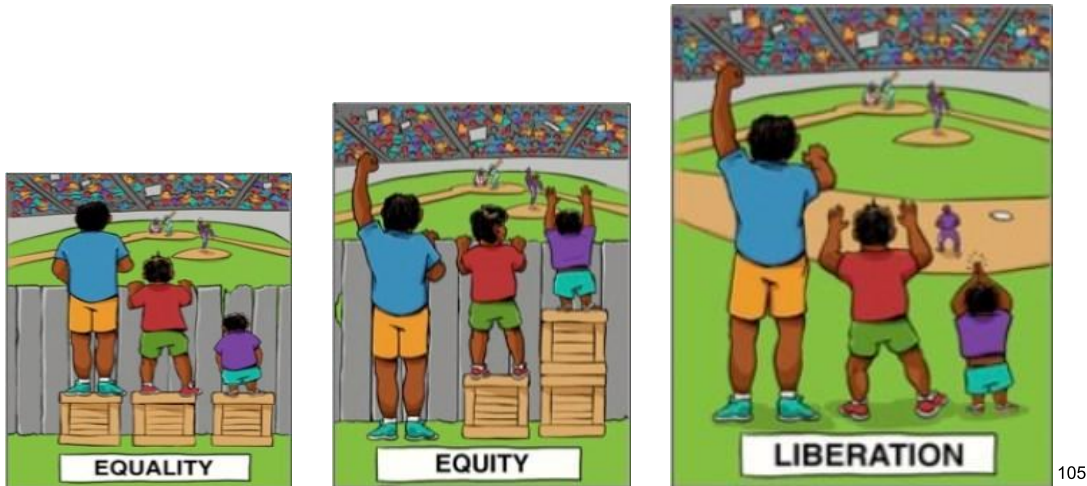
Lastly, equity does not mean exposing vulnerable populations to more impervious surfacing, creating more heat islands, adding more pollution and toxic chemical exposure to students, coaches, staff, visitors, all park goers...for years to come.

¹⁰¹ Hodson, CB, Sander, HA (Apr 2017). “*Green urban landscapes and school-level academic performance.*” *Landscape and Urban Planning*; 160, 16-27
<https://doi.org/10.1016/j.landurbplan.2016.11.011>

¹⁰² Kuo, M, Klein, SE, Browning, M, Zaplatosch, J (Feb 2020). “*Greening for academic achievement: Prioritizing what to plant and where.*” *Landscape and Urban Planning*; 206, 103962
<https://doi.org/10.1016/j.landurbplan.2020.103962>

¹⁰³ Kuo, F. E., & Sullivan, W. C. (2001a). Aggression and violence in the inner city, effects of environment via mental fatigue. *Environment and Behavior*, 33, 543–3571.
<https://doi.org/10.1177/00139160121973124>

¹⁰⁴ Woods, M (2016). “*Equality, equity and the role of fairness in inclusive sport.*” *Inclusive Sports Design*.
<https://www.inclusivesportdesign.com:equality-equity-and-the-role-of-fairness-in-inclusive-sport>



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Everyone *DESERVES* natural grass fields!

Not Recyclable; Not Sustainable:

Less than 6% of plastics are recycled.¹⁰⁶ Made of highly variable formulations 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 environmental friendliness. It is not enough to use the vernacular of the day.

Circular products¹⁰⁷ 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 development¹⁰⁸ as “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

The UCLA Sustainability Committee¹⁰⁹ notes: “In simplest terms, sustainability is about our children and our grandchildren, and the world we will leave them”.

¹⁰⁵ Woods, M (2016). “Equality, equity and the role of fairness in inclusive sport.” Inclusive Sports Design. <https://www.inclusivesportdesign.com/equality-equity-and-the-role-of-fairness-in-inclusive-sport>

¹⁰⁶ 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

¹⁰⁷ “What is a circular product?” Circular Tayside, United Kingdom. <https://circulartayside.co.uk/what-is-a-circular-product-and-business-model/>

¹⁰⁸ United Nations (2024). “Sustainable Development Agenda: What is sustainable development?” <https://www.un.org/sustainabledevelopment/development-agenda/#1b1981a30bdd8fde2>

¹⁰⁹ UCLA Sustainability Committee, quoting UN World Commission on Environment and Development <https://www.sustain.ucla.edu/what-is-sustainability/>

The Rutgers Center for Sustainable Materials¹¹⁰ 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.**”*

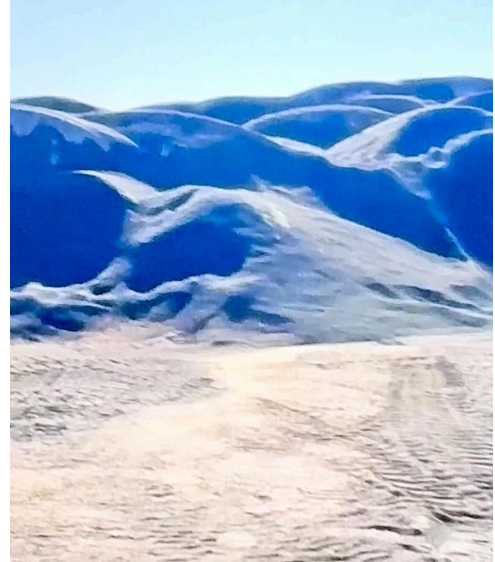


Each regulation sized field is over 40,000 pounds of plastic carpet, over 400,000 pounds of infill, plus the shockpad. Approximately 230 rolls with 18 rolls per flatbed truck to haul away.

¹¹⁰ 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>



Thousands of rolls discarded on agricultural land in a watershed in Riverside county - including fields from Los Angeles



Mountains of used tire crumb infill

Impervious Surfacing:

The synthetic turf industry is making false claims, and issuing worthless certificates, claiming PFAS free, permeability, and more. This company is owned by a board member, and immediate past chair of the Synthetic Turf Council, and linked to the West Coast Vice President of TenCate Grass.

CERTIFICATE OF COMPLIANCE



Firefly Sports Testing
78 Londonderry Tpk, Unit D5
Hooksett, NH 03106

CERTIFICATE OF COMPLIANCE

Certificate Number: 2025-100344-01A

Applicant	Sprinturf 146 Fairchild St, Suite 150 Daniel Island, SC 29492
Manufacturer	Sprinturf 146 Fairchild St, Suite 150 Daniel Island, SC 29492
Product Model Number	46oz DFE Field Green D532241/T543046
Test Standard	EPA 1633
Test Report Number	100344-01
Test Date	3/19/2025
Validation Agency	Firefly Sports Testing 78 Londonderry Tpk, Unit D5 Hooksett, NH 03106
Validation Date	4/25/2025



Firefly Sports Testing certifies that the sample(s) identified in this certificate have been tested in accordance with the method(s) and specification(s) listed herein. The submitted sample(s) were evaluated under the conditions stated in the associated test report. Testing conducted in accordance with EPA Method 1633 detected no PFAS compounds above the method's reporting limits. This certificate applies only to the specific sample(s) tested and the conditions at the time of testing.

Approved By


 Jeff Gentile
 Co-Founder & CFO

Tel: 603-715-5453

Website: www.fireflysportstesting.com



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INFILTRATION

Equipment	Single or Double Ring Infiltrometer	Double Ring Infiltrometer	Non-Confined Area Flood Test Apparatus
Applicable Standards	EN 12616	ASTM D3385	ASTM F2898



#TestingTuesday
#LetsTalkTesting
#TestedByFirefly
#TestOfTheWeek
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#sports
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#infiltration

June 10, 2025

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File No.: 202464217669
Date Filed: 10/18/2024

Limited Liability Company Name		
Limited Liability Company Name	FIREFLY ATHLETICS, LLC	
Jurisdiction		
Limited Liability Company is Formed in	NEW HAMPSHIRE	
Authority Statement		
This LLC currently has powers and privileges to conduct business in the state, foreign country or other jurisdiction entered above.		
Street Address of Principal Office of LLC		
Principal Address	78 LONDONDERRY TURNPIKE UNIT D5 HOOKSETT, NH 03106	
Mailing Address of LLC		
Mailing Address	78 LONDONDERRY TURNPIKE UNIT D5 HOOKSETT, NH 03106	
Attention		
Rachel Dupont		
Street Address of California Office of LLC		
Street Address of California Office		None
Agent for Service of Process		
Agent Name	David Digeronimo	
Agent Address	30934 CURRAN CT VALLEY CENTER, CA 92082	
Consent to Service of Process		
The Secretary of State is appointed as the agent of the foreign (out-of-state) limited liability company for service of process if the agent has resigned and has not been replaced or if the agent cannot be found or served with the exercise of reasonable diligence.		

B3126-343 10/18/2024 11:16 AM Received by California Secretary of State

Despite industry claims, synthetic turf is classified as **impervious** by both the US EPA and the State of California. US 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](#)

The resulting impact on climate change from plastics and microplastics,¹¹¹ including those from synthetic turf, are contributing factors to increased flood risk, toxic runoff,¹¹² and landslides.¹¹³ **Synthetic turf creates 27,000 gallons of toxic runoff for every one inch of rain for every one acre of plastic installed.**¹¹⁴

In addition to being an impervious 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

¹¹¹ 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>

¹¹² 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>

¹¹³ Vogt, E (26 Oct 2021). “NJ prep school’s turf field blamed for rockslide that displaced 45 families.” NJ 1015. (link next page?)
<https://nj1015.com/nj-prep-schools-turf-field-blamed-for-rockslide-that-displaced-45-families/>

¹¹⁴ 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>

landslides. Landslides are also a significant concern post wildfire events¹¹⁵ and are a significant concern in all cases where there are no requirements or limitations on impervious surfacing.¹¹⁶



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.¹¹⁷ A healthy microbial system is essential to soil health and fertility.^{118,119,120}

¹¹⁵ United States Geographical 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>

¹¹⁶ 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>

¹¹⁷ 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/>

¹¹⁸ 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>

¹¹⁹ 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>

¹²⁰ 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>

- 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, even when 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.¹²¹ It is estimated that >1500 species have ingested microplastics,¹²² including high levels in air exhaled by dolphins via their blowholes.¹²³
- Artificial turf in urban parks has been found to reduce house sparrow populations by 60%.^{124,125}
- Microplastics have been found in birds' lungs,¹²⁶ and in the abdomens of fledgling puffins on remote islands in high volumes leading to death.¹²⁷

¹²¹ Wiseman, L (8 Apr 2026). "Artificial Grass and Its Impact." World Wildlife Federation.
<https://www.wwf.org.uk/articles/artificial-grass-and-its-impact>

¹²² 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/>

¹²³ 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>

¹²⁴ 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>

¹²⁵ 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>

¹²⁶ 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>

¹²⁷ 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>

- 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 2020.¹²⁸
- Synthetic turf is implicated in increasing frequent red tides and toxic algal blooms.¹²⁹

Wildfire risk:

“Los Angeles has, on average, greater wildfire likelihood than 96% of communities in the US.”¹³⁰

Synthetic turf is a combustible petrochemical product. Research in three countries has shown it is neither ember or flame resistant.^{131,132,133}

“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.”¹³⁴

“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.¹³⁵

¹²⁸ 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/>

¹²⁹ 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>

¹³⁰ <https://apps.wildfirerisk.org/explore/wildfire-likelihood/06/06037/0600044000>

¹³¹ 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>

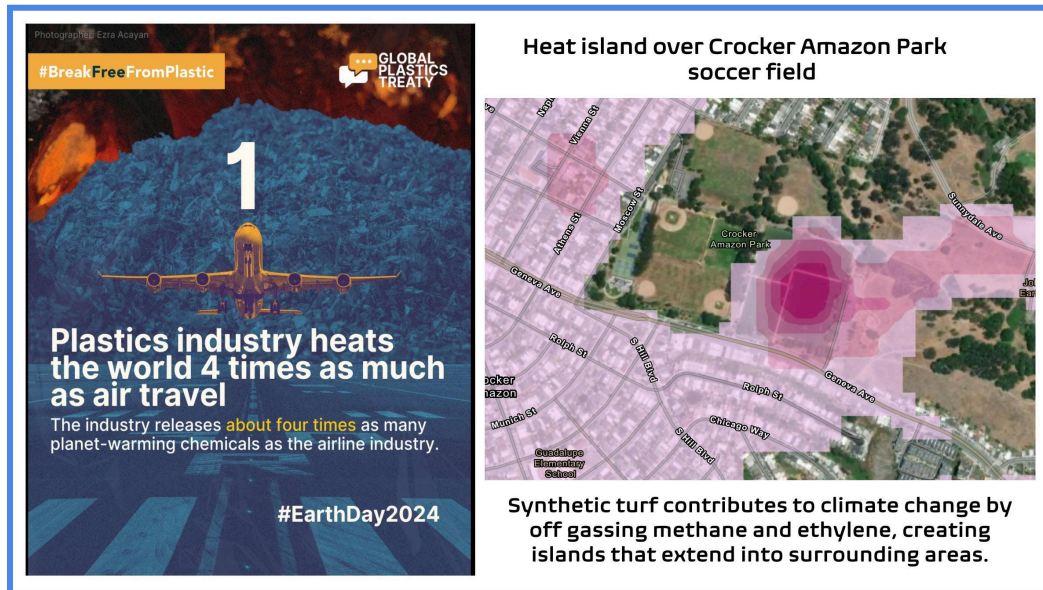
¹³² Horticulture Innovation Australia Limited (Apr 2020). *“Living Turf Fire Benefits Study - Literature review.”* GHD Australia.
<https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/tu17008-literature-review-living-turf-fire-benefits-study.pdf>

¹³³ 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

¹³⁴ 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>

¹³⁵ Deng, J (11 Jan 2025). *“The Dichotomy of a Deadly Paradise—How Urban Sprawl and Climate Change Fuel LA’s Fires.”* Inside Climate News.

Synthetic turf contributes to climate change by off-gassing methane, ethylene and CO₂ - 527 tons of CO₂e per 10 year use period for an 84,830 square foot plastic field.¹² The production of plastics contributes 4x more greenhouse gases than the entire aviation industry.¹³⁶ Synthetic turf increases toxic exposures during wildfires.^{137,138} The use of synthetic turf contributes to escalating insurance costs.^{139,140,141}



<https://insideclimatenews.org/news/11012025/los-angeles-wildfires-in-altadena-and-pacific-palisades/>

¹³⁶ Karali, N, Khanna, N, Shah, N (12 Apr 2024). "Climate Impact of Primary Plastic Production." Lawrence Berkeley National Laboratory Publications.
<https://escholarship.org/uc/item/12s624vf>

¹³⁷ 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/>

¹³⁸ 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>

¹³⁹ 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>

¹⁴⁰ 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>

¹⁴¹ 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>



Pacific Palisades 2/2025



Concord, CA 2025¹⁴²



Alta Dena 2/2025



A fire caused significant damage to a newly-installed football field at Mt. Diablo High School in Concord and police say fireworks may be to blame.

¹⁴² [New TenCate Pivot plastic turf field destroyed by fire](#)

Continuing to add petrochemical, impervious, combustible surfacing to Los Angeles, or anywhere, is a recipe for disaster...even more so in hilly areas with winding roads, and limited evacuation routes.^{143,144}

Not CEQA Exempt!

In December of 2023, the California Coastal Commission disallowed the University of California Santa Barbara from installing synthetic turf at the Caesar Uyesaka Stadium, citing microplastics, concerns related to water contamination and lack of conformity with the University's sustainability policies.¹⁴⁵ It has not allowed synthetic turf in the Coastal Permit Zone since 2023.¹⁴⁶

"[Artificial turf] cannot be considered the environmentally superior alternative..." and cited microplastics as a primary concern. The Coastal Commission also noted that "Section 21080.5(d)(2)(A) of CEQA prohibits the Commission from approving a proposed development if there are feasible alternatives or feasible mitigation measures available that would substantially lessen any significant adverse effect which the activity may have on the environment."¹⁴⁷

The Commission also disallowed removal of trees.

CEQA guidelines were recently updated, changing the section analogous to the one quoted by the Coastal Commission to § 21002. APPROVAL OF PROJECTS; FEASIBLE ALTERNATIVE OR MITIGATION MEASURES, though the wording and intent of the law remains unchanged.¹⁴⁷

The city council, board of supervisors, and board of education members should be acutely aware that in any decision regarding synthetic turf or other projects, that YOU are the lead agency regarding all documentation related to CEQA. If staff or consultants intentionally or unintentionally mislead you regarding CEQA requirements, that falls on you, not the staff nor consultants. This includes any claims or filings related to NOEs (Notice of Exemption) or MNDs (Mitigated Negative Declaration). Additionally, be aware that claims that a project was approved by the Division of State Architect (DSA) and meets CEQA requirements is also untrue. The DSA is limited to reviewing school construction projects for building code compliance and structural safety. They play no role in CEQA, and have no authority to approve any projects under CEQA.

¹⁴³ <https://www.pnas.org/doi/10.1073/pnas.2535081123>

¹⁴⁴ <https://www.mercurynews.com/2026/06/08/is-your-community-wildfire-death-trap-study-deaths-number-es-cape-routes/>

¹⁴⁵ [Notice of Impending Development UCS-NOID-0002-23 \(Baseball Stadium Turf\) for Public Hearing and \[California Coastal\] Commission Action at the December 13, 2022](#)

¹⁴⁶ [CA Coastal Commissioners comments on synthetic turf, microplastics](#)

¹⁴⁷ https://www.califaep.org/docs/CEQA_Handbook_2025combined.pdf

Additionally, the Governor's Office on Land Use and Climate Innovations, together with the Department of Natural Resources now oversees CEQA. They are acutely aware of the urgency of plastics in our environment, and the circumvention of the CEQA process by many local jurisdictions, as is the California Coastal Commission.

Playable Hours 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, 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 synt[thetic]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 how proponents of artificial turf manipulate information.¹⁴⁸ 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."*¹⁴⁹

¹⁴⁸ Ozanian, M (2014). "How Taxpayers Get Fooled On The Cost Of An Artificial Turf Field." Forbes Magazine.

<https://www.forbes.com/sites/mikeozanian/2014/09/28/how-taxpayers-get-fooled-on-the-cost-of-an-artificial-turf-field/>

¹⁴⁹ 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](#)

Student athletes are not elite athletes. Pushing them to perform in extreme heat with a WBGT up to 92°F the inland desert region (CIF Category 3),¹⁵⁰ is inviting preventable heat illness, heat stroke and death...as well as the high risk for legal liability.

OF NOTE:

Synthetic turf is not “set it and forget it.” It is high maintenance...if you wish to preserve warranties, and not harm children and athletes, or increase your risk of lawsuits.

- It is not 24/7 play. High play = faster replacement.
- Synthetic turf requires toxic chemicals for cleaning and weed abatement.
- Synthetic turf requires vast amounts of POTABLE water to clean and cool the surface to a playable temperature, and repeatedly throughout play.

Decision Making Criteria	Regenerative/Organic Maintenance	Conventional Grass	Synthetic Turf
20 Year Total Cost	\$180k - \$390k	\$210k - \$410k	\$1.35M - \$2.0M +
Maintenance costs / Year	\$1500 - \$4500 / acre	\$4,000 - \$6,000 / acre	\$10k - 15k / field
Hours of maintenance / Year	75 - 100	250	350
Playable Hours	1500 - 3630 [†]	650 - 800*	2,000 - 2,500**
Water Use	40 to 60% less Bermuda hybrids	Moderate - High	High Potable water required Cleaning; cooling; hydration of plant based infills
Water Contamination	None; no synthetic inputs; is not a “product swap”	Mod to High Synthetic fertilizer, Pesticide use	High toxic leachate with rainfall, cleaning, hydration

PLAYABLE HOURS

“Several manufacturers were contacted and asked to verify this statistic. As of the writing of this report, no response has been received. Likely, it is an estimate based on the assumption that artificial turf can withstand round-the-clock play and would be played on for almost the entirety of the year over 8 hours a day.”

* Unverified claims made by synthetic turf industry.

** All monitoring and maintenance systems show playable hours ~30% of claims made; closures for heat and particulate matter are not playable hours.

https://www.veronanj.org/media/Sustainable%20Verona/2024/Centennial%20Field%20-%20Turk%20Study/Verona%202024%20Final%20Report_.pdf

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 (made of plastics, contributing to unrecyclable plastics, microplastic pollution)
- 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).
- Increased POTABLE 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, Spectracide).
- Removal costs.
- Transportation and disposal costs (potential for disposal in hazardous waste landfills).
- POTABLE Water to clean synthetic fields of bacteria,^{151,152} 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.^{153,154}
- Increased legal liability.

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,¹⁵⁵ 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 spersed rainwater infiltration allowing absorption and recharging of the water table. Additionally:¹⁵⁶ Research suggests that:

¹⁵¹ 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

¹⁵² 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>

¹⁵³ 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>

¹⁵⁴ 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/>

¹⁵⁵ 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>

¹⁵⁶ The Lawn Institute. "Carbon Sequestration." Accessed 2 Feb 2025.
<https://www.thelawninstitute.org/environmental-benefits/carbon-sequestration/>

- 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.¹⁵⁷
- 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.**¹⁵⁸

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, Tahoma31,¹⁵⁹ 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 Fernando Valleys, Ramona, as well as Stockton and other locations, include Coachella, Bandera, Legion and other Bermuda hybrids.

Development of college credit courses in regenerative / organic turf management would provide an opportunity to showcase the state mandated K-12 Core Curriculum on Climate Change, and allow students to transition to colleges and universities as a path to high paid green jobs for the future. This would also provide an opportunity to meet state requirements for composting organic waste,^{160,161} which can be used in regenerative/organic field maintenance. This has the added benefit of composting locally, saving money, reducing the carbon footprint associated with transportation rather than shipping green waste to more remote locations.

Beyond Pesticides offers a two year program that includes reviewing expenditures, soil testing, training staff in organic natural turf management, and two years of monitoring progress. They do not do installations or maintenance.¹⁶²

With both synthetic turf and microplastics coming under regulation by the California Department of Toxic Substances Control,^{163,164} and grants moving to nature based solutions, it is time to GET REAL with natural grass and other nature based solutions!

¹⁵⁷ 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

¹⁵⁸ [Beyond Pesticides, organic management cost comparison](#)

¹⁵⁹ [Tahoma31 Project List](#)

¹⁶⁰ [SB 279](#)

¹⁶¹ [SB1383](#)

¹⁶² [Beyond Pesticides Sustainable Parks Program](#)

¹⁶³ [DTSC Technical Document for Artificial Turf Containing Perfluoroalkyl or Polyfluoroalkyl Substances](#)

¹⁶⁴ [California finalizes regulation adding microplastics to candidate chemicals list](#)

Failure to take definitive action to ban synthetic turf is giving sanction to petrochemical plastics industries to continue drilling off our coasts, to continue harming communities and the environment via fracking, ethane cracking, transporting toxic chemicals and pre-production pellets, manufacturing, use, and landfilling vs. illegal dumping. It is allowing the plastic turf industry, and those receiving incentives for installation, to laugh all the way to the bank ...every 5 to 10 years on average

Use of taxpayer money to harm children, other vulnerable populations and communities, the environment, and the economy can no longer be tolerated.

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

