



CLIMATE EMERGENCY MOBILIZATION OFFICE



DATE: February 19, 2025

TO: The Honorable Members of the Energy and Environment Committee
c/o Eric Villanueva, Legislative Assistant
Office of the City Clerk
Room 395, City Hall
Los Angeles, CA 90012

SUBJECT: Climate Emergency Mobilization Office and Chief Heat Officer Report Relative to Council File No. 24-0602: Synthetic Grass / Artificial Turf / Polyfluoroalkyl Substances (PFAS) / Forever Chemicals / Health and Environmental Risks / Drought-Friendly Landscaping

Background

The City of Los Angeles is engaged in efforts to mitigate the impacts of extreme heat on public health and infrastructure, improve our heat and climate resilience, and reduce exposure to toxic materials. Extreme heat is the primary and most lethal climate hazard for the City of Los Angeles, with increasing severity of extreme heat events that are breaking records every year and are longer in duration and frequency, with higher temperatures. One of our roles as the Climate Emergency Mobilization Office (CEMO) includes transitioning and investing in more climate and heat-resilient infrastructure and materials that first do no harm which complement our zero emissions goals. Our City can create criteria that identifies neutral impact materials with zero or close to zero emissions and avoids contamination to our soil and water while also being cost effective. This would include uses of these materials for infrastructure, buildings, roads, parks, and overall built environment in order to avoid unintended consequences, liabilities, and costs.

In response to the City Council adopting the CF 24-0602 substitute motion on September 17, 2024 including instructions for the CEMO, this report summarizes the environmental, health, and heat impacts of synthetic grass/artificial turf, summarizes policies of other jurisdictions with respect to these products and provides recommendations for next steps.

Recommendations for the City Council:

1. **Cost-Benefit Analysis:** Identify funding and financing for a comprehensive independent study that includes a cost-benefit analysis and prioritizes and takes into account public health impacts, injury liability to the City, water contamination, the impacts of climate hazards such as extreme heat and rain storms, the costs of remediation, waste management and costs to our waste stream of artificial turf versus natural grass playing fields to then also provide a phased plan for such removal of synthetic turf, and any additional unforeseen unintended consequences, that is feasible to the City of Los Angeles.

2. **Community and Subject Matter Expert Engagement:** Involve public health experts and community subject matter experts in considerations related to alternatives to artificial turf, its installation, and maintenance. Consider the funding of a future independent report from public health experts. This effort should involve scientific experts from state agencies such as: CalEPA's Department of Toxic Substances Control (DTSC) and Office of Environmental Health Hazard Assessment (OEHHA), local research universities and public health experts such as UCLA Geffen School of Medicine, Fielding School of Public Health and the Labor Occupational Safety and Health Program (LOSH), USC Keck School of Medicine, and local advocacy groups such as the Climate Reality LA Chapter, Los Angeles Neighborhood Council Sustainability Alliance (LANCSA), Sierra Club Water Committee, as well as community partners, and labor unions.
3. **Develop an agreed upon strategy for assessing risks to the public,** and seek benign solutions that align with our climate resilience goals that are cost-effective alternatives to artificial turf products that don't use petroleum based products or any harmful chemicals. The alternatives should also reduce the impacts of extreme heat, another primary climate hazard the city is addressing. The CEMO recommends that the city develop a general strategy for assessing risk reductions and climate hazards such as extreme heat that artificial turf poses, phasing out this class of products, and as practicable and via council approved funding, replacing it with sustainable, eco-friendly alternatives such as natural turf and native plants. The city should also create protocols for evaluating the possible unintended consequences of untested technologies, solutions, and materials overall that appear to solve certain issues (drought, maintenance, demand for playing fields) but can have long-term impacts (public health, heat, environmental costs) and may not even solve the short-term issues (such as the requirement to water and maintain artificial turf).

Summary of products, health risks and environmental impacts

Artificial turf athletic fields have been promoted over the past several decades for their reduced maintenance costs, presumed water conservation benefits, and energy savings, and they have been installed at many public and private facilities. The terms synthetic grass and artificial turf are similar and often used interchangeably, but the purpose and installation process differ. Synthetic grass is used for general aesthetic purposes such as landscaping (as a replacement for natural turf or shrubs), pet relief areas and miniature golf courses, and consists of longer synthetic fibers and a plastic or rubberized backing. Artificial turf is a more durable product used for higher contact activities, such as sports fields and playgrounds, and usually comprises three layers: synthetic fibers, backing, and a rubber, zeolite (mineral-based) or plant-based infill (PBI). The fibers of synthetic grass and artificial turf products are made with polypropylene and/or nylon (petroleum-based plastics), the rubber infill commonly from vulcanized used tires, and the backing can be from plastic or urethane mesh, depending on the turf's application.

Both the synthetic fibers and infill are components that can contain per- and polyfluoroalkyl substances (PFAS). PFAS are a category of complex synthetic chemicals with bonded fluoride and carbon atoms. Thousands of different PFAS are used to manufacture a wide variety of products, including artificial turf. The United States Environmental Protection Agency (EPA) is considering the environmental and health effects and regulations around this class of chemical

compounds.¹ California law prohibits juvenile products, textiles, and food packaging containing specified levels of PFAS from being distributed, sold, or offered for sale in the state, and requires the DTSC to adopt regulations for the enforcement of PFAS prohibitions and to ensure compliance with those provisions and regulations.² The DTSC is evaluating artificial turf for possible listing as a Priority Product under the Safer Consumer Products Regulations; a listing could result in removal of the product from the California market or removal or replacement of one or more chemicals of concern in the product.³

PFAS persists in the environment and can bioaccumulate, meaning that they can concentrate in plants, animals, and people. Exposure can be direct via skin contact or inhalation of volatilized compounds emitted by the material, which can be amplified with increased temperatures, especially during extreme heat incidents. Certain turf manufacturers in Southern California and elsewhere advertise that their products contain no PFAS. However, these claims have yet to be independently and completely verified. Much research has focused on the variety of contaminants found in artificial turf and the different types of infill used in its manufacture.^{4 5 6} Concerns have been raised about the polyaromatic hydrocarbons (PAHs), heavy metals (lead, zinc), PFAS, microplastics and other substances contained in these products and their effects on long-term sustainability, environmental contamination, human health hazards, and adverse impacts on wildlife. There is substantial research demonstrating that PFAS are a chemical component in synthetic turf, and that even when not carcinogenic as a stand-alone chemical, they can act synergistically and cause cancer through cumulative impacts and multiple pathways.⁷

Artificial turf products also create higher surface temperatures and contribute to higher thermal air temperatures as compared to natural grass, impacting exposure and injury to the users in various ways, while also exacerbating the urban heat island.⁸ The plastic and rubber components of the products have low albedo (reflectivity), which means they absorb solar radiation (heat energy), stay hotter for extended periods, and then release the radiated energy as heat back into the environment. The dozens of artificial turf athletic fields installed in the City of Los Angeles may contribute to increased local temperatures and potential increased heat health risks to our vulnerable communities. Local community groups, such as the LANCSA, and national environmental organizations have compared the risks and benefits of artificial turf to natural grass for playing fields and have documented concerns about the risks posed by

¹ *Per- and Polyfluoroalkyl Substances (PFAS)*. United States Environmental Protection Agency (EPA). <https://www.epa.gov/pfas>.

² Assembly bill No. 347 (AB-347). Ting. *Household product safety: toxic substances: testing and enforcement*. September 30, 2024. https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB347

³ California DTSC. *Background Document on Candidate Chemicals in Artificial Turf*. August 2024.

<https://dtsc.ca.gov/wp-content/uploads/sites/31/2024/07/Background-Document-on-Candidate-Chemicals-in-Artificial-Turf.pdf>

⁴ *Organic Contaminants in Tire Crumb Rubber*. Collaborative on Health and the Environment (CHE). January 27, 2022. <https://www.healthandenvironment.org/assets/images/Webinar%20Highlights%20Organic%20Contaminants%20in%20Tire%20Crumb%20Rubber.pdf>.

⁵ *Tire Crumb Exposure Characterization Report (Volumes 1 and 2)*. United States Environmental Protection Agency (EPA). <https://www.epa.gov/chemical-research/tire-crumb-exposure-characterization-report-volumes-1-and-2>.

⁶ Cheng, H., Hu, Y., and Reinhard, M. (2014). Environmental and Health Impacts of Artificial Turf: A Review. *Environmental Science & Technology*, 48(4), 2114-2129. <https://pubs.acs.org/doi/abs/10.1021/es4044193>.

⁷ Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS). United States National Institute of Environmental Health Sciences (NIEHS). <https://www.niehs.nih.gov/health/topics/agents/pfc>.

⁸ *Artificial Turf and Your Health* (Podcast). U.S. National Institute of Environmental Health Sciences (NIEHS). May 20, 2024. <https://www.niehs.nih.gov/research/supported/translational/peph/podcasts/2024/artificial-turf-and-your-health>.

artificial turf products.^{9 10 11}

Research warns of increased health impacts to workers engaged in manufacturing and installing these products as well as the general public utilizing artificial turf surfaces.¹² The relatively unyielding surface can lead to increased lower-body injuries when an athlete falls, slides, or pivots. Injuries can include sprains, torn ligaments, blisters, and burns. Plastic-based surfaces such as artificial turf and synthetic grass do not contain the beneficial indigenous microbes and of natural grass and soils, leading to potential harboring and transmission of viruses and bacteria harmful to humans. Children can be more susceptible to heat illnesses and chemical and pathogen exposure, as well as injuries to feet, ankles and knees.¹³

Synthetic grass and artificial turf also contribute to environmental degradation in several ways throughout the product's life-cycle. The manufacturing processes contribute to the continued use of petro-chemicals and release of hydrocarbon by-products. PFAS from these products can contribute to surface and groundwater contamination. Watering of artificial turf fields is still necessary for maintenance especially in summer and fall months to cool the surfaces in the Southern California climate. Significantly, the products have a finite life-cycle of a decade or so and need to be replaced; industry and environmental groups claim opposing views regarding how readily the components break down. Independent research shows they are difficult or impossible to recycle, leading inevitably to landfilling and impacts to the waste stream.¹⁴

Summary of Policies in other Jurisdictions

To date, no state, county or major city in the U.S. Southwest or West Coast has enacted an outright ban on the sales or installation of synthetic grass/artificial turf. The California state legislature has enacted several laws that would restrict the installation of artificial turf or synthetic surfaces. Several jurisdictions have restricted the use of synthetic grass for specifically water conservation purposes. At the state level, California SB 676¹⁵ was enacted on October 8, 2023 and amends Section 53087.7 of the Government Code to specify that the definition of "drought-tolerant landscaping" does not include the installation of synthetic grass or artificial turf, in effect allowing cities to prohibit artificial grass as an alternative as part of turf replacement and water-use reduction landscaping programs. During session year 2023-24, AB 1423¹⁶ would have prohibited a person or entity from manufacturing, distributing, selling, or offering for sale in the state any covered surface that contains regulated PFAS, including artificial turf or synthetic grass, commencing January 1, 2026. This bill was approved by the legislature but vetoed by the Governor.

⁹ SoCal Stop Artificial Turf Fact Sheet. The Climate Reality Project and LANCSA. <https://tinyurl.com/57u63s3t>

¹⁰ Safe Healthy Playing Fields. <https://www.safehealthyplayingfields.org/>

¹¹ Public Health Risks of Artificial Turf. Sierra Club. <https://www.sierraclub.org/loma-prieta/public-health-risks-artificial-turf>

¹² Chemicals: Synthetic turf fields contain a wide array of chemicals that are potentially harmful to young children and young athletes. Partnership for Healthy Playing Surfaces. <https://www.healthyplayingsurfaces.org/chemicals>.

¹³ Op. cit. *Artificial Turf and Your Health* (Podcast). U.S. NIEHS.

¹⁴ *Environmental Health Impacts of Synthetic Turf and Safer Alternatives* (Webinar). Collaborative on Health and the Environment (CHE). January 27, 2022. <https://www.healthandenvironment.org/che-webinars/96595>.

¹⁵ Senate Bill No. 676 (SB-676). Allen. *Local Ordinances and regulations: drought-tolerant landscaping*. October 10, 2023. https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202320240SB676.

¹⁶ Assembly Bill No. 1423 (AB-1423). Schiavo. *Product safety: PFAS: artificial turf or synthetic surfaces*. September 14, 2023. https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202320240AB1423.

Two additional failed bills, SB 499 and AB 2947 were held in Committee and would have impacted the future installations of synthetic turf products. SB 499,¹⁷ the School Facilities: School Extreme Heat Action Plan Act of 2023, proposed to replace all low specific heat surfaces (asphalt, concrete, artificial turf) with high specific heat surfaces (natural grass, cool pavement and other natural systems) that can absorb heat energy without transferring the heat to the surrounding area and raising local temperatures. AB 2947,¹⁸ the “Water: turfgrass conversion” bill was introduced in early 2024 and would have prohibited turf replacement programs from funding conversions to artificial turf for water conservation purposes.

Among the few smaller California cities that have enacted restrictions, the City of Millbrae, California adopted Ordinance 806, § 1 in October 2023 to prohibit all installation of synthetic grass and artificial turf, effective January 1, 2024.¹⁹ Residents will have to replace all existing artificial turf by January 2028. The Ordinance comes after a two (2) year temporary ban while Millbrae did an assessment on the environmental impact of artificial turf.²⁰ The City of San Marino adopted Ordinance No. O-23-1410²¹ in October 2023 which established a temporary moratorium on artificial turf installation. The City of San Marino later adopted Ordinance No. O-24-1413²² in September 2024, extending the moratorium and prohibiting the installation of artificial turf and synthetic grass. The decision was based on studies which included an EPA July 2019 report²³ and an ongoing study by the California OEHHA.²⁴

In 2024, the County of Santa Clara Board of Supervisors and the City of Sunnyvale City Council voted separately to proceed with studies comparing the use of artificial turf with natural groundcovers. To date these studies have not been released and therefore results and conclusions are pending. In April 2024, the County of Santa Clara commissioned a report²⁵ ²⁶ on environmental health and safety ramifications of artificial turf, and a proposed vote on banning artificial turf for athletic fields failed in January 2025.²⁷ In the interim, the Santa Clara County Medical Association (SCCMA) issued a policy letter in June 2024, recommending that due to

¹⁷ Senate Bill No. 499 (SB-499). Menjivar. *School facilities: School Extreme Heat Action Plan Act of 2023*, Sec. 2, Art. 5, § 17615.2(b). May 19, 2023. https://leginfo.ca.gov/faces/billCompareClient.xhtml?bill_id=202320240SB499.

¹⁸ Assembly Bill No. 2947 (AB-2947). Lackey. *Water: Turfgrass Conversion*. April 8, 2024. https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202320240AB2947&search_keywords=artificial+turf

¹⁹ City of Millbrae Municipal Code Title 8, Chapter 8.65. *City of Millbrae Synthetic Grass and Artificial Turf Ordinance*. Ordinance No. 06, § 1. October 24, 2023. <https://ca-millbrae.civicplus.com/276/Prohibition-of-Artificial-Turf>.

²⁰ *Millbrae bans artificial turf: Council votes unanimously to prohibit synthetic grass and enact maintenance requirements for current installations*. Alyse DiNapoli, The San Mateo Daily Journal. Archived from original publication (October 30, 2023). https://www.smdailyjournal.com/news/local/millbrae-bans-new-artificial-turf/article_c325995c-7688-11ee-8e80-bb4d2a753170.html.

²¹ City of San Marino Ordinance No. O-23-1410. *Temporary moratorium on the installation of artificial turf and plastic grass*. <https://cms9files.revize.com/cityofsanmarino/O-23-1410%20Extending%20the%20Term%20of%20Ordinance%20No%20O-21-1385-U.%20Establishing%20a%20Temporary%20Moratorium%20on%20the%20Installation%20of%20Artificial%20Turf%20and%20Synthetic%20Grass.pdf>.

²² City of San Marino Municipal Code Secs. 14.18.07, 23.16.03, and 23.16.24. Ordinance No. O-24-1413. September 27, 2024. [https://cms9files.revize.com/sanmarinoca/planning/O-24-1413%20Artificial%20Turf%20\(Singed\).pdf](https://cms9files.revize.com/sanmarinoca/planning/O-24-1413%20Artificial%20Turf%20(Singed).pdf).

²³ *July 2019 Report: Tire Crumb Rubber Characterization*. United States Environmental Protection Agency (EPA). July 25, 2019. <https://www.epa.gov/chemical-research/july-2019-report-tire-crumb-rubber-characterization-0>.

²⁴ *Synthetic Turf Studies*. California Environmental Protection Agency (Cal EPA), Office of Environmental Health Hazard Assessment (OEHHA). <https://oehha.ca.gov/risk-assessment/synthetic-turf-studies>.

²⁵ *Santa Clara County to study ban on artificial turf*. B. Sakura Cannestra. San José Spotlight. April 17, 2024. <https://sanjosespotlight.com/santa-clara-county-to-study-ban-on-artificial-turf-athletics-sports-fields-grass/>.

²⁶ Santa Clara County Board of Supervisors, April 16, 2024 meeting, Board referral #24-5361. *Prohibiting Artificial Turf Installation on County Property*. <https://santaclaracounty.primegov.com/Portal/viewer?id=0&type=7&uid=19708cbc-a495-4ca0-94a9-13ccd8b80976> Meeting minutes: santaclaracounty.primegov.com/Public/CompiledDocument?meetingTemplateId=1404&compileOutputType=1

²⁷ Sheynar, G. *Push to phase out synthetic turf fields meets resistance*. Palo Alto online. January 31, 2025.

<https://www.paloaltoonline.com/santa-clara-county/2025/01/31/push-to-phase-out-synthetic-turf-fields-meets-resistance/>

health effects, injury concerns and environmental impacts, artificial turf not be used on playing fields or other types of landscaping and that existing artificial turf be replaced with natural turf at the end of its useful life. The policy letter follows several years of research and issuance of recommendation letters from SCCMA to local jurisdictions and schools in Santa Clara County warning about the health risks, environmental dangers and costs of artificial turf.²⁸ Santa Clara County Supervisor District 3 maintains a “Plastic Turf FAQ” webpage.²⁹ In September 2024 the City Council of Sunnyvale in Santa Clara County voted to fund a study on the impacts of artificial turf used for athletic fields.³⁰ No conclusions can be drawn from this study as research and benchmarking for the study is currently underway and a scope of work has yet to be released.³¹

The States and local jurisdictions of Arizona, Nevada and Colorado focus on water conservation methods for residential and commercial properties: reducing outdoor irrigation, utilizing desert-adapted plants, and eliminating non-functional natural turf, rather than restricting or banning artificial turf/synthetic grass for its environmental and public health risks. At the state level, Arizona passed HB 2131³² in 2022, which prohibits planned community and homeowner associations (HOAs) from banning artificial grass if the community allows natural grass. In 2023 the Scottsdale City Council approved Ordinance 49260 that bans new homes from having real grass in yards³³ and the City of Tucson, Arizona passed Ordinance 12005 in 2023 which prohibits all non-functional grass to strictly focus on water conservation.³⁴ In 2021 the State of Nevada legislature passed AB 356³⁵ which prohibits watering nonfunctional turf, grass areas not providing functional use, and requires the removal of all nonfunctional turf by the end of 2026. The Southern Nevada Water Authority encourages residents to change non-functional grass areas into drought-tolerant landscaping,³⁶ and prohibits new installations of natural turf requiring irrigation. Similarly inspired solely by water conservation measures, the State of Colorado legislature passed SB 24-005³⁷ which as of January 1, 2026, will prohibit local governments from allowing the installation, planting, or placement of nonfunctional turf and artificial turf on commercial, institutional, or industrial property, common interest community property, or a street right-of-way, parking lot, median, or transportation corridor as well as at state facilities. Residential properties and artificial turf used on athletic fields are exempted from the legislation.

Considerations for Risk Reduction

The following are considerations from CEMO for measures regarding the current and future use of artificial turf and synthetic grass at City facilities.

²⁸ *Environmental Health*. Santa Clara County Medical Association. <https://www.sccma.org/programs/environmental-health.aspx>.

²⁹ County of Santa Clara, Supervisor Otto Lee District 3. *Plastic Turf FAQ*. <https://d3.santaclaracounty.gov/take-action/plastic-turf-faq>

³⁰ *Sunnyvale to Study State of its Grass Fields*. Silicon Valley Voice. svvoice.com/sunnyvale-to-study-state-of-its-grass-fields/

³¹ City of Sunnyvale. *Study issues underway*. (webpage) n.d.

<https://www.sunnyvale.ca.gov/your-government/governance/city-council/study-issues-and-budget-proposals/study-issues-underway>

³² Arizona House Bill 2131. <https://legiscan.com/AZ/text/HB2131/id/2470213>

³³ City of Scottsdale Municipal Code. Sec. 49-260. - *Prohibition of Mandatory Turf Conditions by Owner's Associations*.

https://library.municode.com/az/scottsdale/codes/code_of_ordinances?nodeId=VOLI CH49WASESEDI ARTVIIWACO DIV2DRMA S49-260PRMATUCOOWAS

³⁴ City of Tucson Muni Code 7.6. https://codelibrary.amlegal.com/codes/tucson/latest/tucson_az_udc/0-0-0-5860

³⁵ Nevada Legislature AB 356. <https://www.leg.state.nv.us/App/NELIS/REL/81st2021/Bill/7910/Overview>

³⁶ Southern Nevada Water Authority. <https://www.snwa.com/>

³⁷ Colorado General Assembly SB24-005. <https://leg.colorado.gov/bills/sb24-005>

Environmental, Safety and Health Considerations:

- **Chemical Runoff and Off-gassing:** Artificial turf has been shown to release harmful chemicals, including heavy metals and PFAS, into soil, air, and water. These chemicals can be harmful to human health and are non biodegradable.
- **Water Usage:** Consider the amounts and costs of water use to cool and clean artificial turf athletic fields in comparison to natural grass fields. Water may be used several times a day, especially during athletic games usage, to prevent skin burns and other injuries.
- **Urban Heat Island effects:** Consider impacts from large installations of artificial turf on the urban heat island effect, increasing energy demand for cooling and reflected heat in the most heat-risk impacted communities. Research shows artificial turf has higher surface temperatures as compared to natural grass.
- **Climate Budget-GHG Inventory:** Consider including emissions from all phases of product life-cycle (manufacturing, installation, transport, and disposal) in the city's GHG Emissions Inventory.
- **Evaluate Environmental Impact:** Conduct assessments to compare the water and air contamination and toxic exposures generated by artificial turf versus natural grass.

Health Risks and Injury Considerations:

- **Heat Stress and Injury:** Measure and monitor temperatures on artificial turf fields, especially during hot weather in comparison to natural grass fields. Artificial turf temperatures may increase the risk of certain injuries, particularly burns and abrasions and may also contribute to increased risk of heat exhaustion or heat stroke.
- **Harder Surfaces and injuries:** Artificial turf can be harder and less forgiving than natural grass, increasing the risk of injuries such as sprains, joint pain, and concussions.
- **Pathogen and chemical exposure:** Artificial turf can harbor bacteria and other pathogens, which can lead to transmission to humans using the fields, causing skin infections and other health problems. Synthetic fibers and their by-products may cause negative health impacts through contact and exposure.

Conclusion

Artificial turf, while often marketed as a low-maintenance solution, poses significant risks, costs, and both environmental and health concerns. There is enough evidence that points to serious concerns for health and sustainability from these products that warrants consideration of an immediate ban or at least serious limitation of new installation and use at city facilities, especially athletic fields used by children. It is important to note that while these are some of the potential health risks associated with artificial turf, the extent of the risk can vary depending on factors such as the specific type of turf, the frequency of use, and individual susceptibility. The City of Los Angeles should consider a moratorium on artificial turf installations, until these costs and environmental and public health concerns are studied and verified by independent sources.