This is the ninth in a series of articles, prepared by Chevy Chase citizens using public sources, that address the growing risks associated with artificial turf playing fields. Hazards of excessive heat and increased injury have long been documented. New findings on the extreme toxicity of PFAS in artificial turf call into serious question its continued use. Maret School plans to install nearly four acres of artificial turf for its field development at the Episcopal Center for Children at Utah and Nebraska Avenues.

9. **Where will Maret's plastic turf end up?**

Maret School plans to install nearly four acres of plastic turf at the Episcopal Center for Children (ECC). The *average* plastic field covers 1.76 acres and contains 40,000 pounds of plastic carpet and 400,000 pounds of infill material to hold that carpet in place. Maret's field would be more than twice that size. Additional infill needs to be added regularly to replace material washed or blown away, or carried off the field in players' socks, shoes, and hair. Plastic turf fields have a lifespan of 8-10 years. That means Maret will be introducing about one million pounds of material into our environment every 8-10 years. Where will it end up?

Regarding the material we can see – the rolls of carpet laden with infill - turf manufacturers claim their product is recyclable. In practice artificial turf is not recycled. It is dumped into landfills. Although made of materials which individually **could** be recycled, the technology to separate those materials, and to clean them sufficiently, is proving too difficult and too costly. To adopt the term introduced by McDonough and Braungart, in *Cradle to Cradle: Remaking the Way We Make Things*, artificial turf is a type of "hybrid monster" that defies recycling. Over the course of their 50-year lease, Maret would burden landfills with nearly six million pounds of refuse, leaching toxic contaminants including microplastics and "forever chemicals" into area watersheds.

The dumping of artificial turf is a huge environmental problem given the short lifespan of thousands of fields across the country. Because it is hard to dispose of responsibly, artificial turf has increasingly been dumped in "ravines, deserts, woods and empty lots" according to a 2019 article in *The Atlantic*. https://www.theatlantic.com/science/ archive/2019/12/artificial-turf-fields-are-piling-up-no-recycling-fix/603874 As a response, Maryland legislator Mary Lehman introduced a bill, HB857, requiring turf manufacturers to establish a chain of custody for every field sold in Maryland. The Department of the Environment would display all chain of custody information on

their website. Lehman's bill would hold owners accountable for the disposal of their plastic, but wouldn't solve the environmental problem of dealing with it.

As soon as it is installed, Maret's artificial turf will begin shedding material into the surrounding environment, a process that will continue as long as it sits on the ECC field and then wherever it is dumped afterwards. This contamination will consist of many things. Most obvious is the migration of the infill material. According to a 2012 article in *Recreation Management,* a typical field loses 2 to 5 tons of infill every year. We have yet to learn which infill Maret will use for their field, but there are no good options. Crumb rubber is laden with lead, other heavy metals, and known carcinogens. "Organic" infills are treated with pesticides, anti-bacterials, and other chemicals to extend their lifespan. Infills designed to counter heat effects, like "Envirofill," consist of silica encapsulated in polymer pellets, pellets covered with pesticides which burst, releasing silica into the air, creating an OSHA hazard.

The pollution we can't see is even more harmful.

The wear and tear of use, exposure to UV, and weather all wear away the plastic grass blades themselves, releasing microplastics into the environment. "Microplastics" are currently defined as particles of plastic less than 5 mm in size. Much of this "dust" is invisible to the eye, but athletes, fans, and neighbors will all be exposed to it and breathing it in. These microplastics can carry with them the chemicals used in their manufacture, including PFAS, and any other ingredients, which manufacturers are not required to reveal. These include additives like plasticizers to alter the behavior of the plastic, and coatings, like antimicrobials and fire retardants applied to the artificial turf after it's made.

These microplastic particles can also attach to the sweaty skin of athletes on the field. "Studies are beginning to demonstrate the contribution of skin exposure to the development of respiratory sensitization and altered pulmonary function. Not only does skin exposure have the potential to contribute to total body burden of a chemical, but also the skin is a highly biologically active organ capable of chemical metabolism and the initiation of a cascade of immunological events, potentially leading to adverse outcomes in other organ systems."
https://www.center4research.org/written-statement-to-greenwich-board-of-education-national-center-for-health-research/

Rain will wash microplastic particles into soil, and wherever stormwater runoff travels. One inch of water over one acre equals 27,000 gallons. Maret has promised to build for a 25-year storm, which involves up to 6 inches of water. For the area of artificial turf proposed, that means they will have to plan for 648,000 gallons of water in a 24-hour period from the artificial turf field alone. The

engineering at the field is designed to slow down the passage of this water, to give the surrounding area a chance to absorb it. Microplastics will seep deep into neighboring yards, contaminating soil and soil organisms. Overflow will run into the city stormwater system or down Nebraska Avenue, both of which discharge into Rock Creek Park.

Recent studies suggest "stormwater runoff as a significant entry pathway for microplastics into aquatic environments." https://www.sciencedirect.com/science/article/abs/pii/S004313542031318X Artificial turf is specifically mentioned as a source of these contaminants. That said, some point to the ubiquitous nature of plastic, and wonder how big a role artificial turf plays in overall plastic pollution. Microplastics are so small that it's very difficult to determine their origin. But one recent study in Spain looked at the presence of identifiable artificial turf fibers, larger than 5 mm, in river and ocean water near Barcelona. They found up to 20,000 artificial turf fibers per day in the Guadalquivir River in Andalusia, and up to 213,200 fibers from artificial turf per square kilometer in the coastal waters of the Mediterranean off Catalonia, within 1 km of the shore. Their conclusion was that "AT[artificial turf], apart from impacting on urban biodiversity, urban runoff, heat island formation, and hazardous chemical leaching, is a major source of plastic pollution to natural aquatic environments." https://www.sciencedirect.com/science/article/pii/S0269749123010965

Microplastics aren't just polluting rivers and oceans: they're also seeping into groundwater. A recent study published in PLOS One looked for microplastics in 159 globally sourced samples of tap water. Eighty one percent of their samples were contaminated with microplastics. The highest incidence of plastic contamination occurred in the United States, where up to 60.9 particles of plastic were found in 1 liter of tap water. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5895013/

From the moment it is introduced, Maret's artificial turf will be releasing toxic contaminants into our air, soil, and water. There is no way to contain it. Whether lying on the ECC field, "upcyled" after ten years to some other purpose, or dumped in a landfill, once produced, the artificial turf Maret purchases will continue to pollute. The only way to avoid this damage to our environment is to choose not to introduce this dangerous and completely unnecessary substance into our world

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