This is the fifth 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.

5. **Heat Island.**

Excessive temperature on artificial turf is a problem recognized by everyone, including plastic turf manufacturers. Although a major selling point for plastic turf has been the availability of the fields to be used in all weather conditions, the President of the Synthetic Turf Council, Rick Doyle, admits, "'Just as coaches have to reschedule games due to rain when they play on grass fields,' so too they need to reschedule or consider an alternative surface to play on when it's hot and sunny." https://www.npr.org/2008/08/07/93364750/high-temps-on-turf-fields-spark-safety-concerns

Estimates of the temperature difference on plastic turf relative to natural grass vary widely. Turfgrass Producers International, a professional organization of grass seed and sod producers, reports "artificial lawns have been documented to be up to 86.5 degrees Fahrenheit hotter than natural turf under identical conditions. On an average summer 90-degree day, the surface of artificial turf will be 165 degrees Fahrenheit." https://gvt.net/debunking-myths-around-artificial-turf/#:~:text=Myth%201%3A%20Artificial%20turf%20uses%20less%20water&text=According%20to%20Turfgrass%20Producers%20International,*F%20degrees%20%E2%80%94%20that's%20hot! It doesn't take an extreme heat wave, or an equatorial latitude, to create these dangerous conditions. Actual recorded temperatures of two adjacent fields at the University of Maryland, one plastic and one natural grass, indicated a temperature difference at the same time on the same day of 63 degrees Fahrenheit! The grass field was 94 degrees, the plastic turf next to it was 157 degrees. https://www.safehealthyplayingfields.org/heat-levels-synthetic-turf

Playing on plastic turf fields in summer can result in serious injury. A study by the New York City Health Department concluded "people can suffer dehydration, heatstroke and thermal burns at field temperatures above 115 degrees." https://www.npr.org/2008/08/07/93364750/high-temps-on-turf-fields-spark-safety-concerns. A burn can result after just two seconds of contact with a surface at 120 degrees. https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/

The problem is that plastic turf does not provide any of the natural cooling resulting from both the transpiration of natural grass and the evaporation of moisture from natural soil. Transpiration is the release of water vapor from a plant. The rate of transpiration increases as temperature rises. A typical leaf will transpire many times its weight of water over the course of a single year. A mature oak tree can transpire 40,000 gallons of water per year (an indication of the cooling effect we have already lost at the Episcopal Center for Children (ECC) site by the removal of over 60 trees.) Ironically, plastic fields are often "watered" to lower their temperature. Unfortunately, this is only a short-term solution; elevated temperatures return within 20 minutes.

Recognizing the heat problem, plastic turf manufacturers are now marketing several "fixes" which try to mimic the evaporative cooling provided naturally by grass. Unfortunately, this involves adding more synthetic materials to the infill, which they don't specifically reveal. Studies by Penn State University into the heat dangers of artificial turf looked at several of these products, **none of which were found to be effective**. https://plantscience.psu.edu/research/centers/ssrc/research/synthetic-turf-surface-temperature Some, akin to kitty litter, are designed to retain moisture which is first added by watering the product. The added water is then released slowly over the course of the day. But what is it? Industry literature on evaporative cooling suggests it could be acrylic polymer crystals or polyvinyl acetate. https://www.ishn.com/articles/104118-evaporative-cooling-draws-heat-from-your-body , https://www.tcoolturf.com/about-tcool Addition of these chemicals would render the "beneficial" effect of choosing an "organic" infill moot. Maret claims its plastic turf will address the heat issue, but it has so far not informed the neighborhood which variety of plastic turf it proposes to introduce to the ECC fields.

Columbia University researcher Stuart Gaffin says the heat effect of plastic turf is a problem with or without the more traditional black crumb rubber infill. Interviewed by NPR, Gaffin says "even without any black rubber added, the plastic blades of grass in synthetic turf trap a lot of heat. 'They're spongy and lightweight — and that means the solar energy that's absorbed quickly gets converted to high temperatures.' Without the natural system of evaporation that living grasses have, everything's working in one direction to turn sunlit turf fields into heat islands." https://www.npr.org/2008/08/07/93364750/high-temps-on-turf-fields-spark-safety-concerns Penn State studies corroborate this finding. They attributed the heat effect to the blades and backing, not the infill.

The heat that artificial turf traps is not a problem only for athletes on the field. The heat island of a plastic field will radiate heat even when not in use, affecting the surrounding microclimate — our neighborhood. Numerous studies have looked at the effect of artificial turf on surrounding air temperatures. They consistently show an increase in Land Surface Temperatures (LST). One study noted that heat radiating off artificial turf will keep temperatures from cooling off at night: "Urban Heat island effect is more prominent during the night than during the day." This will likely become worse as local residents use more air conditioning to compensate, pumping even more heat into the local environment

and creating a positive feedback loop. https://climateactionmoreland.org/2021/04/03/how-will-synthetic-turf-impact-urban-heat-island-and-microclimate-around-hosken-reserve/

The increased heat will adversely affect surrounding vegetation, both in neighbors' yards and on the ECC site. The iconic ring of Apostle trees could be at risk. The radiating heat will add to the cumulative stresses on our environment and can erase the gains made by locally added shade plants.

Facing the perils of climate change, why remove the beneficial cooling effect of natural grass and trees and replace them with a heat island?

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