January 29, 2026

Honorable Senator Boylan
The House Environment and Natural Resources Committee
via email:

Subject: **In Support of Bill No. H7141: An Act requiring Artificial Turf Chain of Custody**

Dear Honorable Senator Boylan and Members of the Committee,

I am writing to express my strong support for the proposed bill H7141 that requires the department of environmental management to establish a system to track the chain of custody of artificial turf installed on sports and playing fields in the state and associated reporting information. My written testimony contains supporting science-based evidence and references to support this bill.

I am an environmental chemist with over 30 years of experience in the planning and assessment of environmental data for use in regulatory compliance and risk assessment. I currently serve on the Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup Advisory Board and as a Conservation Commissioner in the Town of Arlington, MA. I am the former president and principal scientist of New Environmental Horizons, Inc. (NEH), a small women-owned business.

My strong support of this bill is based on three main points 1) artificial turf field materials are not adequately regulated in the state; 2) artificial turf fields have significant adverse impacts on the environment in terms of chemical pollution, plastic pollution, wildlife habitat disruption, biodiversity loss and excess heat; and 3) though there are "repurposing" facilities, there are currently no meaningful recycling options for artificial turf field systems.

1. **Artificial Turf Field materials are not adequately regulated in the state.**
   Tires are regulated in the state of RI as Solid Waste. Once tires are ground up for use as tire crumb rubber infill for artificial turf athletic fields, they are not regulated because they are considered a consumer product. The plastic carpet of artificial turf fields is also currently not regulated because it is considered a consumer product – though it will be regulated under the PFAS rules that go into effect in 2029. These are loop-holes in the state regulations that are not protective of human health and the environment because these plastic and tire-derived materials can leach numerous harmful chemicals at levels that exceed EPA regulatory levels.

   For example, tires have 1-2% (10,000 – 20,000 ppm) Zinc based on industry information. RIDEM does not have a regulatory standard for zinc in solid waste but in neighboring Massachusetts, the reportable concentration for a release of zinc = 1,000 mg/Kg (ppm) in soil (Massachusetts Contingency Plan for S-1 categorized soils).[1] This zinc standard is an order-of-magnitude lower than the amount of zinc in tire-derived materials. Recent data presented to the Town of Arlington, MA, Conservation Commission for permit requirements of an artificial turf field with tire crumb rubber

[1] 310 CMR: Department of Environmental Protection; 310 CMR 40.0000: Massachusetts Contingency Plan; Subpart I: Risk Characterization https://www.mass.gov/doc/310-cmr-400000-massachusetts-contingency-plan-mcp-1/download

infill showed that the concentration of zinc in the tire-derived material was 13,600 mg/Kg (ppm)[2] – within the range expected based on tire manufacturers' information. If we were to construct a natural playing field and added soil with 13,600 ppm of zinc in MA, the project would be considered a hazardous waste site. However, because there are no similar regulations for artificial turf materials, 400,000 lbs. of tire crumb rubber infill with hazardous levels of zinc can be placed on one typical 80,000 sq ft artificial turf athletic field – with no requirements for monitoring or chain of custody for the field at the end-of-life.

2. Artificial Turf Field materials have significant adverse impacts on the environment in terms of excess urban heat, chemical pollution, plastic pollution, and habitat and biodiversity

A. Excess Urban Heat

The fact that artificial turf fields have hotter surface temperature than natural grass fields has been well documented.[3] Natural grass fields also undergo "evapotranspiration" – grass leaves transpire, releasing water vapor and evaporation causes cooling.[4] Plastic fields cannot provide these cooling benefits.

Heat effects are considered a significant hazard to environmental resources because heated runoff can negatively impact cold water fisheries and aquatic environments. The EPA under the Clean Water Act requires temperatures not to exceed a rise of 3 °F (1.7 °C) due to a stormwater discharge to protect cold water fisheries.[5] These cold water fisheries can be adversely impacted by heated runoff from tire-derived materials that discharge to aquatic environments from artificial turf fields – thus it is important to know the distance to and name of the nearest downgradient surface water body – which is a requirement of H7141.

B. **Chemical Pollution**

Toxic chemicals harmful to the environment, especially the more sensitive down gradient surface waters and wetlands, can migrate from Artificial Turf Field materials through leaching, airborne dust, volatilization, and physical migration of the weathered plastic blades and infill particles. Known toxic chemicals including metals (*e.g.*, lead, cadmium, zinc, etc.), polycyclic aromatic hydrocarbons (PAHs), phthalates, volatile organic compounds (VOCs including benzene), and PFAS have been documented.[6]

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[2] See Arlington HS – CAM 17 Test Results – Rubber, p.85 of pdf included in public documents: https://arlington.novusagenda.com/agendapublic/CoverSheet.aspx?ItemID=20461&MeetingID=2309https://arlington.novusagenda.com/agendapublic/CoverSheet.aspx?ItemID=20461&MeetingID=2309

[3] https://www.turi.org/content/download/13271/203906/file/Factsheet.Artificial_Turf.September2020.pdf.pdf
https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/
https://plantscience.psu.edu/research/centers/ssrc/documents/heat-progress-report.pdf
https://doi.org/10.1080/02656736.2019.1605096

[4] National Recreation and Park Association (NRPA), 2019. Synthetic Sports Fields and the Heat Island Effect https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/

[5] EPA, Clean Water Act, 314 CMR 4.00. Class B Waters https://19january2017snapshot.epa.gov/sites/production/files/2014-12/documents/mawqs-2006.pdf

[6] R. Massey, L. Pollard, & H. Harari, Journal of Environmental & Occupational Health Policy, February 23, 2020 (Vol 30, Issue 1): *Artificial Turf Infill: A comparative Assessment of Chemical Contents* https://journals.sagepub.com/doi/full/10.1177/1048291120906206

PFAS

The Rhode Island (RI) Department of Environmental Management and the RI Department of Health recently published a joint letter stating their concern for the potential for PFAS from an artificial turf field to contaminate groundwater, based on groundwater data obtained upgradient and downgradient of another artificial turf field installed in 2007 and resurfaced in 2021 in Burrillville, RI.[7] The well upgradient of this other field had been consistently at or below detection limits for PFAS; however, the downgradient well, which had shown detected PFAS of 20 to 30 ng/L (ppt), jumped to more than double that amount in June 2024, when PFAS was detected at 61 ng/L (as the sum of the six regulated PFAS compounds). This level is a significant exceedance of the RI Groundwater Quality standard for PFAS of 20 ng/L.

Therefore, again, it is critical to have an accounting of the distance to and the name of the nearest down gradient surface body of water from artificial turf fields – which this bill requires – such that potential sources of future contamination can be assessed.

Metals

Direct toxicity to aquatic organisms has been documented from surface runoff during rainstorms from Artificial Turf Fields with tire crumb rubber infill based on whole effluent toxicity and Zinc toxicity in a study performed by the Connecticut Department of Environmental Protection.[8]

Exceedances of the EPA National Recommended Water Quality Criteria - Aquatic Life Criteria (NWQC)[9] for Lead and Zinc have been demonstrated in data results for Artificial Turf component leachates presented to the Martha's Vineyard Commission[10].

The synthetic precipitation leachate procedure (SPLP) results presented by TetraTech in the MV report represent the potential for artificial turf materials to release chemicals during rain events using an EPA leachate method. The results show that Zinc is released from the artificial turf materials tested at levels that are four times higher than the EPA NWQC. This means that Zinc is more likely than not to leach from Artificial Turf Field materials during rain events and enter the environment in stormwater runoff. The following table represents the detected Zinc results that exceed the NWQC.

TURI, April 2019 (updated): *Athletic Playing Fields – Choosing Safer Options for Health and the Environment* https://www.turi.org/content/download/11980/188623/file/TURI+Report+2018-002+June+2019.+Athletic+Playing+Fields.pdf

Lowell Center for Sustainable Production, UMass-Lowell. August 2024. *Per- and Poly-fluoroalkyl Substances (PFAS) in Artificial Turf: Academic, Municipal, and Other Testing Efforts*. https://www.uml.edu/docs/PFAS%20in%20Artificial%20Turf%20-%20Academic%20Municipal%20%26%20Other%20Tests%20Aug%202024_tcm18-386957.pdf

[7] Letter to Burrillville Town Council from the RI Department of Environmental Management and the RI Department of Health, August 15, 2024 https://www.burrillville.org/sites/g/files/vyhlif2886/f/uploads/doh_dem_letter_with_response_from_trc_1.pdf

[8] CTDEP, July 2010: *Artificial Turf Study: Leachate and Stormwater Characteristics* https://portal.ct.gov/-/media/DEEP/artificialturf/DEPArtificialTurfReportpdf.pdf

[9] USEPA, National Recommended Water Quality Criteria – Aquatic Life Criteria Table https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

[10] TetraTech, Synthetic Turf Laboratory Testing and Analysis Summary Report, for Martha's Vineyard Regional High School https://www.mvcommission.org/sites/default/files/docs/2021-02-26%20%28TurfAnalysisReport_FINAL%29.pdf

Lead and zinc showed exceedances of NWQC, as shown in the table below, which means that stormwater runoff from an artificial turf field is more likely than not to be toxic to organisms found down gradient in water bodies and wetland areas.

Lead and Zinc in Leachate from Artificial Turf Materials Compared to EPA NWQC

Metal [detected in Tetra Tech SPLP]	*NWQC Freshwater Acute* (µg/L)*	*NWQC Freshwater Chronic* (µg/L)*	Greenfield Turf SPLP (µg/L)	Brock Shock Pad SPLP (µg/L)	Brock Fill Infill SPLP (µg/L)	Mapei Ultra Bond SPLP (µg/L)	Sum of SPLP for 4 components (µg/L)
Lead	*65*	*2.5*	7 J	< 10	5 J	< 10	12
Zinc	*120*	*120*	< 200	374	105 J	85 J	564

*Freshwater criteria for metals are expressed as a function of hardness. The value given corresponds to a hardness of 100 mg/L.
J = result was detected below the sample-specific reporting limit but above the method detection limit
Results - Source: TetraTech report, 2021.[9]

6PPD-Quinone

A more recently discovered chemical, which is formed during weathering (UV / sunlight oxidation) of used tires, has been reported in peer-reviewed literature as a transformation product in tire crumb rubber.[11] This chemical, 6PPD-quinone, is acutely toxic to fish – meaning it is the cause of fish kills. Toxicity has been documented in several freshwater fish, including brook trout, brown trout, and rainbow trout,[12,13] all of which are found in RI.[14] EPA recently published in 2024 an extremely low Acute Freshwater Aquatic Life Screening Value for 6PPD-quinone of 11 ng/L (ppt) under the Clean Water Act, section 304(1)(2)(B), for the protection of aquatic life.[15]

Tire crumb rubber infill is the most commonly used infill in Artificial Turf Fields. Environmental evidence of leaching of 6PPD-quinone in stormwater runoff from tire crumb rubber infill has been reported at 159 ng/L [16] -- which exceeds the EPA value by an order-of-magnitude. Lab experiments have also proven 6PPD-quinone to be present in leachate from tire crumb rubber infills.[17]

[11] Zhao, H.N., et al., 2023: Screening P-PhenylendiamineOxidants, Their Transformation Products, and Industrial Chemical Additives in Crumb Rubber and Elastomeric Consumer Products. Environ. Sci. Technol. 2023, 57, 2779-2791; https://pubmed.ncbi.nlm.nih.gov/36758188/

[12] Brinkman, M., et al. 2022. Acute Toxicity of the Tire Rubber-Derived Chemical 6PPD-quinone to Four Fishes of Commercial, Cultural, and Ecological Importance, March 2022; https://pubs.acs.org/doi/10.1021/acs.estlett.2c00050

[13] ITRC, Summer 2023. What We Know: 6PPD and 6PPD-quinone. https://6ppd.itrcweb.org/wp-content/uploads/2023/09/6PPD-Focus-Sheet-Web-Layout-9.pdf

[14] https://www.mass.gov/info-details/trout-identification-and-fishing-tips

[15] EPA Federal Register, 6/13/2024: Acute Freshwater Aquatic Life Screening Values for 6PPD and 6PPD-quinone. https://www.federalregister.gov/documents/2024/06/13/2024-13009/acute-aquatic-life-screening-values-for-6ppd-and-6ppd-quinone-in-freshwater

[16] Kryuchkov, F., et al., 2023. Presence of 6PPD-quinone in Runoff Water Samples From Norway Using a New LC-MS-MS Method. Front. Environ. Chem. 4:1194664. https://doi.org/10.3389/fenvc.2023.1194664

[17] McMinn, M. H. et al. 2024. Emerging investigator series: in-depth chemical profiling of tire and artificial turf crumb rubber: aging, transformation products, and transport pathways. Environ. Sci: Processes & Impacts, August 2024, 26, 1703; *https://doi.org/10.1039/d4em00326h*

Therefore, again, it is critical to have an accounting of the distance to and the name of the nearest down gradient surface body of water from artificial turf fields – which this bill requires.

C. Plastic Pollution

Broken plastic blades and infill particles from Artificial Turf Fields continually migrate into the environment during routine play, storm events, and snow plowing, resulting in macroplastic and microplastic pollution. In April 2023, the REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Committee voted to prohibit microplastics intentionally added to products within the European Union (EU). The EU specifically acknowledged the negative impact of tire crumb rubber infills as microplastic pollution and in September 2023 enacted a ban on the sale of products containing intentionally added microplastics – including in this ban "granular artificial turf infill".[18] A recent case study from Norway (April 2025)[19] revealed that 900 kg/field (1,984 lbs/field) of tire crumb rubber is lost from artificial turf athletic fields annually.

I have first-hand knowledge of artificial turf plastic blades and tire crumb rubber infill particles migrating into the environment -- see the following pictures from several artificial turf fields in MA.

Snow-plowed artificial turf field – tire crumb rubber on snow piles (Arlington, MA 2021)

[18] Zuccaro, P., et al. 2024. The European Union ban on microplastics includes artificial turf crumb rubber infill: other nations should follow suit. *Environmental Science & Technology, v.58*, 6, 2591–2594. https://doi.org/10.1021/acs.est.4c00047

[19] Sundan, Siri Marie Bo, et al. 2025. Dynamic material flow analysis of microplastics lost from artificial turfs: A case study from Norway. Science of the Total Environment, Vol 973, 10 April 2025, 179159. https://www.sciencedirect.com/science/article/pii/S0048969725007946

Tire-waste crumb rubber infill migration off of the artificial turf field shown as black pellets on natural grass to the right of the field (S. Chapnick, Arlington, MA 2022)

Tire-waste crumb rubber infill and broken plastic blades in artificial turf field perimeter drain (Arlington, MA 2022)

D. Habitat and Biodiversity Loss

Plastic is not habitat. Aquatic and wildlife habitats are degraded by placing plastic athletic fields into the environment -- due to chemicals that leach during rain events and the pollution from the weathered plastic particles, themselves, as documented above. Adverse effects on fish due to consuming microplastic particles have been documented.[20] Furthermore, recent scientific evidence

[20] Aslam, M., et al. (2023). Risk assessment of microplastics in fish assemblage based on ecological preferences in an interconnected and polluted river system. Human and Ecological Risk Assessment, 2023, Vol. 29, Nos. 7-8, 1109-1133 https://doi.org/10.1080/10807039.2023.2239942

has been published showing adverse effects of plastic playing fields *vs*. natural grass on urban bird populations in terms of diversity, species richness, and abundance.[21]

Artificial Turf Fields cause a loss of foraging and prey availability for birds and small mammals and disrupt habitat connectivity for wildlife passage. Plastic fields create a barrier to wildlife passage -- wildlife connectivity is a critical environmental value in urban environments – especially in areas with surface water and riverfront.

3. No Meaningful Recycling Exists

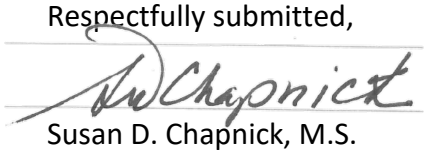
Current evidence shows that artificial turf cannot be meaningfully recycled. Therefore, disposal can be a concern in terms of further impacts to the environment. The Synthetic Turf Council "Guide to Recycle, Reuse, Repurpose, and Remove Synthetic Turf Systems" 2017 states "the carbon footprint of a particular recycling/end-of-life option (such as trucking long distances) may be integrated into the decision-making process and lead responsible parties to invalidate such an option. It is important to investigate all recycling and reuse options in the region before choosing to landfill."

The hope has been that the products of "advanced / chemical recycling" could be used to make new plastics; however, these use pyrolysis to decompose plastics at elevated temperatures – the products of pyrolysis are low-value fuels and other chemicals. Variability in the feedstock – in other words, because artificial turf components are different plastic and rubber materials – poses significant challenges to "recycling" and the pyrolysis adds to chemical pollution and does not produce new durable plastic products.[22]

Conclusion - Based on the weight-of-evidence of the science and personal observations, I support the requirement for reporting, tracking, and documenting the chain of custody and other related information as required by Bill H7141 for artificial turf fields to protect the environment, especially to protect the more vulnerable down gradient surface waters and wetlands in RI.

Thank you for your consideration of this important bill H7141.

Respectfully submitted,



Susan D. Chapnick, M.S.

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[21]Sánchez-Sotomayor, D. et al. 2023. Artificial grass in parks as a potential new threat for urban bird communities. *Bird Conservation International*. 2023;33:e16. https://doi.org/10.1017/S0959270922000119

[22] Ted Schettler, MD, MPH, Science Director, Science and Environmental Health Network, CHE (Collaborative for Health & Environment). "Advance Recycling" of Plastics: Largely waste disposal by another name (Part 1) and (Part 2), October & November 2023. https://www.healthandenvironment.org/latest-research/blog/advanced-recycling-of-plastics-largely-waste-disposal-by-another-name-(part-1) https://www.healthandenvironment.org/latest-research/blog/advanced-recycling-of-plastics-largely-waste-disposal-by-another-name-(part-2)

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Susan Chapnick is the former President and Principal Scientist of New Environmental Horizons, Inc. (NEH), an environmental chemistry consulting firm specializing in the planning and evaluation of environmental data. She is recognized as a technical expert with over 30 years of experience in analytical chemistry and quality assurance of environmental measurements for complex investigations in support of Natural Resource Damage Assessments, USEPA Superfund, US Army Corps of Engineers, and state-led programs. Ms. Chapnick received the Conservation Commissioner of the Year Award in March 2025 "for extraordinary contributions to natural resource protection in the Commonwealth of Massachusetts" by the Massachusetts Association of Conservation Commissions (MACC). Ms. Chapnick also leads local policy changes towards Climate Change Resilience and adaptation planning in wetland resource areas as the current Vice-Chair (and former Chair) of the Conservation Commission in the Town of Arlington, MA. Additionally, Ms. Chapnick serves on the Science Advisory Committee for the MassDEP Bureau of Waste Site Cleanup where she assists in development of environmental regulations and technical guidance. Ms. Chapnick holds a Master of Science in Marine Science from the University of South Carolina and a Bachelor's degree in Biological Sciences from Barnard College, Columbia University, New York.