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Nesra Engineering, LLC

Updated Letter: Environmental Considerations for Crumb Rubber Infill – Marshall Simonds School

To: Burlington Conservation Commission
From: Nesra Engineering, LLC
Date: November 2, 2025

Introduction

This letter provides updated information regarding the environmental performance and containment measures associated with the use of crumb rubber infill in the proposed synthetic turf systems at the Marshall Simonds School Athletic Field Improvements project. The project design has been revised to include one full-size multipurpose field and one smaller youth/practice field, along with a bioretention rain garden that captures and treats all runoff from both fields and adjacent walkways prior to discharge.

The focus of this correspondence is the project's alignment with the Town of Burlington Wetlands Protection Bylaw and MassDEP Stormwater Standards, as they relate to the protection of resource areas, water quality, and habitat.

Environmental Containment and Stormwater Protection

While national and international studies have shown that chemical leaching from crumb rubber occurs at very low levels, the design at Marshall Simonds has been developed to further minimize any potential transport of particulates or compounds to resource areas. The following engineered features are incorporated into the system:

1. **Reduced Turf Area and Material Volume** – The replacement of one full-size field with a smaller youth/practice field has reduced the overall crumb rubber quantity and associated infill surface area, proportionally lowering the potential for material migration.
2. **Infiltrating Field Base** – Each turf field is underlain by an engineered stone storage layer designed to capture, infiltrate, and attenuate all precipitation reaching the surface. The turf carpet and infill layer are entirely permeable, and all stormwater passes vertically through multiple layers of stone and geotextile filtration media before entering the underdrain system.

3. **Bioretention Rain Garden** – All underdrain discharges are routed to a bioretention system that provides additional treatment through sedimentation, filtration, and vegetative uptake. This ensures that any fine particulates or trace constituents are captured before water infiltrates or enters existing infrastructure.

4. **No Untreated or Direct Discharge** – There are no direct outlets from the turf fields or walkways to any wetland, stream, or resource area. All flows receive treatment consistent with enhanced (≥ 90 %) TSS removal, as required for Outstanding Resource Waters.

5. **Operational Controls** – The Operations & Maintenance Plan requires regular inspection of field edges, sweeping of walkways, and maintenance of the rain garden and drainage structures to ensure long-term containment of materials and continued water-quality protection.

Collectively, these measures result in improved hydrologic function and reduced pollutant loading compared to existing conditions, which currently allow untreated surface runoff to sheet-flow toward nearby resource areas.

Addressing 6PPD-Quinone and Chemical Concerns

Studies identifying 6PPD-quinone (6PPD-q) toxicity have linked impacts to roadway runoff containing tire-wear particles, not to synthetic turf systems in controlled environments. The proposed fields are fully contained and infiltrating, and any stormwater from the system is filtered through engineered stone and bioretention soils prior to infiltration. These multiple barriers effectively prevent off-site transport of tire-derived constituents.

No regulatory agency, including MassDEP or the EPA, has restricted or prohibited the use of crumb rubber infill based on 6PPD-q or related findings. The combination of vertical infiltration, subsurface treatment, and vegetated filtration provides a multi-layer defense that exceeds the standard level of protection expected under the Wetlands Protection Act.

Summary and Findings

From a conservation standpoint, the revised design results in a net environmental improvement relative to existing site conditions. The system:

- Reduces overall turf surface and infill volume;
- Provides complete on-site stormwater capture, infiltration, and filtration;
- Eliminates any untreated discharges to wetlands or surface waters; and

- Achieves enhanced water-quality treatment required for Outstanding Resource Waters.

Accordingly, the use of crumb rubber infill in this project does not pose a measurable risk to the surrounding wetland resource areas and aligns fully with the intent of the Town of Burlington Wetlands Protection Bylaw and Massachusetts Stormwater Standards.

Professional Scope and Disclaimer

Nesra Engineering, LLC is a civil engineering firm specializing in site design and stormwater management. Our evaluation and recommendations are based on current design standards, site-specific conditions, and publicly available information from federal and state environmental agencies. We are not environmental toxicologists or chemists, and this letter does not constitute a toxicological risk assessment or legal opinion.

The conclusions herein are based on the best available data and engineering judgment as of November 2025. Should new scientific findings or regulatory guidance emerge regarding synthetic turf materials or tire-derived compounds, we will review such information and incorporate any necessary adjustments into future projects.

References

- **U.S. Environmental Protection Agency (EPA).** (2021). *Federal Research on Recycled Tire Crumb Used in Playing Fields and Playgrounds*.
- **European Chemicals Agency (ECHA).** (2020). *Crumb Rubber in Synthetic Turf*.
- **Tian, Z. et al.** (2021). *A Ubiquitous Tire Rubber–Derived Chemical Induces Acute Mortality in Coho Salmon*. *Science,* 371(6525), 185–189.
- **RIVM – National Institute for Public Health and the Environment.** (2018). *Health Risks of Playing on Synthetic Turf Made from Recycled Rubber*.