Technical Memorandum:

Dover High School Sports Complex: Recommendations for Synthetic Turf Recycling in Technical Specifications

Community Services Department: Engineering Division

Date: May 23, 2025

I. Introduction

This memorandum summarizes research and discussions with industry professionals and various non-Dover, NH municipal staff regarding the recycling of synthetic turf. The purpose is to inform the City of Dover, NH, about best practices, potential challenges, and recommendations for incorporating robust recycling requirements into future synthetic turf installation and replacement projects' technical specifications. This research aims to ensure environmental responsibility throughout the lifecycle of synthetic turf fields in Dover.

II. Summary of Research and Discussions

The following information was gathered by the City Engineer for Dover, NH, Ken Mavrogeorge through a series of telephone conversations key figures in the synthetic turf industry and municipal recreation management, alongside a review of relevant documentation.

A. John Huard, Vice President of Installations at GeoSurfaces/TenCate

On May 23, 2025, a call with John Huard provided valuable insights into current recycling capabilities. TenCate operates a recycling center in Baton Rouge, LA, and utilizes a facility in Texas that employs a "superheating" process to revert turf materials to their pre-manufactured form. Critically, TenCate claims a 97% material return rate from their recycling process and can provide certification of recycling for materials. He noted that mechanical processes separate sand, crumb rubber, and turf components. Mr. Huard also indicated that market demand is likely driving manufacturers to develop more regional recycling facilities but details on the scaling up of recycling were unclear. Mr. Huard referred us to Chris Huntress, who developed specific recycling requirements for a project in Brookline, MA.

B. Kevin Chrisom, Parks Manager, Milton, MA Parks and Recreation Department

On May 23, 2025, a discussion with Kevin Chrisom provided insights into the challenges and public concerns surrounding synthetic turf projects, particularly in Milton, MA. Milton has prior experience with synthetic fields, including a high school football field and a fully synthetic baseball field.

Proposed Lower Giles Field Project:

The Town of Milton is pursuing a new synthetic field at Lower Giles Field, which has encountered significant appeals from abutting property owners. Despite these challenges, Mr. Chrisom indicated that the Town is motivated to proceed. The proposed multi-sport field would be adjacent to an existing synthetic turf baseball field (funded and maintained by the local Little League with a $7,000 annual contract) and near the high school's synthetic turf football field.

Lower Giles Field was previously used by the Milton High School football team but is no longer in use due to its severely deteriorated condition. The field was last reconstructed in 2014, but its condition worsened within approximately five years, despite a year of rest during the COVID-19 pandemic and the use of irrigation.

Project Status:

Lower Giles Field is located within jurisdictional buffer zones, requiring MassDEP approvals for reconstruction. The project was funded over three years ago by the local Select Board and was initially approved for reconstruction in 2022. However, ongoing appeals from abutting property owners have tied the project up in court. MassDEP has responded to these abutter concerns, and their response, along with third-party reviews and independent turf testing results, will be provided to the City of Dover, NH, due to similar resident concerns.

Environmental Concerns and Appeals to MassDEP:

Appeals filed with the Massachusetts Department of Environmental Protection (MassDEP) highlight several critical environmental concerns relevant to Dover, NH:

- **PFAS Contamination:** Opponents argue that MassDEP's conclusion of no PFAS in the proposed turf components is flawed. They cite a 2021 analysis by Alpha Analytical for the Martha's Vineyard Commission, which detected significant levels of PFAS and precursor chemicals in similar materials. This contrasts with a Eurofins report relied upon by Milton, which opponents claim lacked sufficient detail and was calibrated to detect PFAS only at parts per billion, potentially missing levels regulated in parts per trillion. The Alpha Analytical tests also revealed varying levels of lead, mercury, barium, cadmium, benzene, and other carcinogens.
- **Stormwater Runoff and Water Quality:** Concerns were raised about untreated discharges from the turf system into wetlands and Pine Tree Brook, a designated Cold Water Fishery. Stormwater runoff can pick up PFAS, other toxins, microplastics, and wood infill, degrading water quality. Synthetic fields can also radiate heat 40-60 degrees Fahrenheit higher than ambient air, leading to runoff temperatures exceeding 140 degrees Fahrenheit.
- **Microplastic Pollution:** Appeals noted that filtering systems are unlikely to capture all microplastics and infill, which can migrate via wind, player movement, and runoff. Estimates suggest fields can shed hundreds of pounds of microplastics and up to three tons of infill annually, posing significant threats to aquatic life.
- **Groundwater Contamination:** A warning letter from the Rhode Island Department of Environmental Protection and Health to Burrillville, concerning PFAS leaching from an artificial turf field into drinking water wells, underscores the risk to groundwater.

Challenges with Natural Grass Fields:

Mr. Chrisom also highlighted the challenges Milton faces with maintaining natural grass fields. The Town Recreation staff consists of only four crew members, making it difficult to maintain grass fields, despite the Parks Manager's preference for them. For example, Andrews Park, considered a "high-performance" grass surface, shows significant bare spots and deterioration in aerial photographs. This field, used only for soccer and lacrosse and irrigated, requires rehabilitation roughly every 15 years at an estimated cost of $300,000. Annual maintenance for Andrews Park Field is estimated at $20,000. Mr. Chrisom noted that proper maintenance of each field would require a dedicated field crew chief.

C. Chris Huntress, President at Huntress Landscape Architects and Planners

Chris Huntress, interviewed on May 23, 2025, emphasized the importance of specifying recycling requirements. He prefers natural grass fields when feasible but acknowledges the demand for synthetic turf. He highlighted the "mechanical recycling process," which involves pulverizing turf components, as superior to "superheating" (chemical recycling) due to reduced pollution concerns. He noted that two new regional recycling facilities have come online in Calhoun, GA, and Rockland, MA, in addition to the Texas facility, addressing the need for closer recycling options.

He shared key requirements from the Brookline, MA, turf replacement project specifications:

- **Installer Responsibility**: The turf installer is responsible for removing, reclaiming, and recycling the existing synthetic turf system.
- **Material Recovery**: No less than 95% of infill must be extracted, and turf must be cut, rolled, and secured for transport.
- **Chain of Custody**: The installer must maintain a detailed chain of custody, including project name, site location, container serial numbers, transport dates (to and from site, and to recycling facility), and final processing date.
- **Transportation Costs**: The installer bears all costs associated with transporting materials to and from the site and to the recycling facility.
- **Certification of Compliance**: A Certificate of Compliance must be issued upon receipt and processing of the turf, confirming 100% recycling into post-consumer products.
- **Bond Requirement**: Chris typically requires a $50,000 bond from the turf supplier for the life of the turf, to be used for recycling even if the manufacturer is no longer in business. If the manufacturer is still operating, they are required to recycle the turf.

Chris also mentioned that woven-backed turf, produced by manufacturers like Greenfields (TenCate) and ACT Global, is superior for recycling as it avoids the challenging polyurethane membrane backing, though it can add $50,000-$60,000 to the cost per field. Shaw Turf offers "Cradle to Cradle Certified" products (Pad, Turf, and Infill) as a package, indicating a commitment to sustainable product design and recycling.

III. Key Concerns Addressed

Based on the research, several key concerns need to be addressed in Dover's approach to synthetic turf recycling:

A. Certification that Recycling is Carried Out

Ensuring that removed turf is actually recycled, rather than landfilled, is paramount. The Brookline, MA, model of requiring a detailed chain of custody and a "Certificate of Compliance" from the recycling facility is an effective mechanism. This documentation provides a verifiable record of the material's journey from removal to processing into new products. TenCate's ability to offer such certification is a positive indicator of the industry's willingness to invest in recycling technology.

B. Pollution from Chemical Recycling vs. Mechanical Recycling

The distinction between recycling processes is critical. Chris Huntress prefers the "mechanical recycling process," which involves pulverizing turf components, over "superheating" (a form of chemical recycling) due to concerns about pollution. While superheating can theoretically revert materials to their original form, the potential for air emissions or hazardous byproducts during such high-temperature processes warrants caution. Mechanical recycling appears to be a cleaner, more environmentally sound method, emphasizing physical separation and size reduction.

C. Pollution of Vehicles Transporting Old Turf Materials

The transportation of old turf materials poses a logistical and environmental challenge. Minimizing the distance to recycling facilities is crucial. The emergence of regional recycling centers in Calhoun, GA, and Rockland, MA, offers more geographically favorable options than the Texas facility for East Coast projects. Requiring the installer to manage and bear the cost of transportation incentivizes efficient logistics and potentially less polluting transport methods. Specifications should encourage the use of facilities that minimize transportation distances and potentially specify the use of cleaner-burning vehicles where feasible, although direct control over vehicle emissions may be difficult to enforce.

D. PFAS and Other Contaminants

The presence and potential leaching of PFAS and other harmful chemicals (lead, mercury, barium, cadmium, benzene) from turf components are significant environmental and public health concerns. The Milton, MA, case highlights the difficulty in verifying "PFAS-free" claims and the importance of rigorous, independent third-party testing that can detect contaminants at parts per trillion levels, consistent with EPA standards (e.g., EPA Method 1633).

E. Microplastics and Heat Island Effect

The shedding of microplastics and infill from synthetic fields, and their migration into surrounding ecosystems, is a serious environmental issue, particularly for aquatic life. The heat island effect, where turf fields significantly increase ambient temperatures and contribute to heated stormwater runoff, can harm cold water fisheries. Future specifications must address these concerns through material selection and design.

IV. Recommendations for Dover, NH's Technical Specifications

To implement effective recycling requirements and address environmental concerns, the City of Dover should consider the following in its technical specifications for synthetic turf installation projects:

1. **Mandatory Recycling Requirement**:
    - Include a clear and non-negotiable clause stating that the removal, reclamation, and recycling of the existing synthetic turf system are mandatory components of the project.
    - Specify a minimum material recovery rate (e.g., "no less than 95% of infill extracted, and 100% of turf material recycled into post-consumer products").
2. **Preference for Mechanical Recycling**:
    - Stipulate a preference for mechanical recycling processes over chemical or thermal processes (e.g., superheating/pyrolysis) to minimize potential air and water pollution.
    - Require the contractor to identify the proposed recycling facility and its primary recycling method during the bidding process.
3. **Certification and Chain of Custody**:
    - Require the synthetic turf installer to maintain a comprehensive chain of custody for all removed materials. This should include:
        - Project name and site location.
        - Serial numbers or unique identifiers for all containers/rolls of turf.
        - Dates of material departure from the project site.
        - Dates of material arrival at the recycling facility.
        - Date of final processing into post-consumer products.
    - Mandate the issuance of a "Certificate of Compliance" from the recycling facility, referencing the project details and confirming the quantity and type of materials recycled into post-consumer products.
4. **Manufacturer/Installer Responsibility and Financial Assurance**:
    - Clearly assign responsibility for all removal, reclamation, transportation, and recycling operations to the synthetic turf installer.
    - Consider requiring the turf supplier or installer to post a **$50,000 bond** for the life of the turf. This bond would be accessible by the City to cover recycling costs in the event the manufacturer or installer is no longer operational at the end of the turf's life.
5. **Material Selection for Enhanced Recyclability and Environmental Performance**:
    - **Woven Backing**: Strongly encourage or require the use of synthetic turf with woven backing (e.g., from Greenfields/TenCate or ACT Global) to avoid problematic polyurethane membranes, even if it entails a higher initial cost.
    - **PFAS-Free Certification**: Demand rigorous, independent third-party testing (e.g., EPA Method 1633) for all turf components (turf fibers, infill, shock pads) to certify the absence of PFAS and other identified carcinogens (lead, mercury, barium, cadmium, benzene) at detection limits consistent with current regulatory standards (parts per trillion). The contractor should provide detailed test reports, not just manufacturer letters.
    - **Cradle to Cradle Certification**: Research and consider requiring "Cradle to Cradle Certified" products (like those offered by Shaw Turf) for pad, turf, and infill as a package. This certification indicates a product's commitment to material health, recyclability, and sustainable manufacturing.
6. **Local/Regional Recycling Utilization**:
    - Encourage or prioritize the use of recycling facilities located within a reasonable geographic proximity to Dover (e.g., the Rockland, MA, or Calhoun, GA, facilities) to reduce transportation-related pollution and carbon footprint.
7. **Addressing Environmental Impacts Beyond Recycling**:
    - **Stormwater Management**: Require advanced stormwater management systems that effectively capture and treat runoff from synthetic fields to prevent the discharge of

microplastics, infill, and potential chemical leachate into natural waterways. This may include more effective filtration systems than simple screens.

- **Heat Mitigation**: Explore design considerations or materials that mitigate the heat island effect of synthetic fields, especially near sensitive aquatic environments. Milton, MA's Lower Giles Field design utilizes Brockfill wood fibers as infill. According to the Town it was select because it is biodegradable, non-toxic, is cooler than crumb rubber, and is made in the USA.
- **Microplastic Containment**: Implement design features and maintenance protocols specifically aimed at minimizing microplastic and infill migration off the field.

V. Conclusion

The recycling of synthetic turf is a complex but increasingly feasible endeavor accordingly those familiar with the synthetic turf design and construction industry. By integrating comprehensive recycling requirements into our technical specifications, the City of Dover can ensure that future synthetic turf installations are not only high-performance recreational assets but also environmentally responsible investments. Emphasizing mechanical recycling, robust certification processes, financial assurance through bonds, and careful material selection (especially regarding PFAS and woven backings) will be key to achieving these goals. Continued monitoring of industry advancements in recycling technologies and material science will be essential to adapt and improve these specifications over time.

Aerial Photographs of Lower Giles Field

Engineering
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Vertical
Thu Apr 25 2019


Vertical
Sat Mar 27 2021


Vertical
Mon Jun 28 2021


Vertical
Wed Aug 3 2022


Vertical
Thu Apr 10 2025

Aerial Photographs of Andrews Park Field at Belcher Circle

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