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# ALTERNATIVE ANALYSIS
# MARSHALL SIMONDS MIDDLE SCHOOL ATHLETIC FIELD RENOVATION PROJECT

**Document:** Alternative Analysis for Field Renovations within an Intermittent Stream/Riverfront Area
**Location:** Marshall Simonds Middle School, Burlington MA.
**Date:** 12/28/25

## Executive Summary

The proposed project will replace the existing, heavily used natural grass athletic fields at Marshall Simonds Middle School with a redesigned synthetic turf field system to meet the School's year-round programming needs and to improve safety, durability, and field availability. Although the adjacent stream is intermittent, the Town of Burlington Wetlands Bylaw and Regulations treat mapped regulatory streams as subject to Riverfront Area jurisdiction. Accordingly, and consistent with the Massachusetts Wetlands Protection Act and Regulations (310 CMR 10.58) and local Burlington requirements, an Alternatives Analysis is provided for work proposed within the Riverfront Area.

This Alternatives Analysis summarizes existing site constraints, evaluates practicable alternatives (including reduced layouts and turf system material options), and documents the avoidance and minimization measures incorporated into the current design. The project has been substantially refined from the original concept to reduce resource area disturbance, including reducing the synthetic field scope from approximately 141,000 square feet to 106,000 square feet, further narrowing one field by approximately 10 feet along the Riverfront side, reducing walkway extents, eliminating additional parking, and relocating ADA access pathways away from wetland edges.

The project is also designed to improve stormwater management and Riverfront/wetland buffer function through enhanced pretreatment and a relocated and expanded rain garden/bioretention BMP with native plantings and bioretention media intended to support filtration and pollutant attenuation. In combination with long-term operation and maintenance measures, these improvements are intended to avoid significant adverse impacts to resource area interests and provide measurable water-quality and buffer-function improvements compared to existing conditions. The analysis concludes that no other practicable and substantially equivalent alternative would meet the project's purpose with less adverse effect on the Riverfront Area and adjacent wetlands.

## 1.0 Purpose and Need

The purpose of the project is to provide safe, reliable, and durable athletic field facilities for Marshall Simonds Middle School that can support the school and community's programmed demand while minimizing impacts to adjacent wetland and riverfront resource areas. The existing grass fields are unable to consistently meet the Town's usage needs due to seasonal limitations, weather-related closures, and surface conditions that affect playability and safety. The project is intended to deliver a field system that supports higher and more predictable use, reduces cancellations and closures, and provides an improved, maintainable surface consistent with school programming and community recreation needs.

## 2.0 Regulatory Context

This Alternatives Analysis is prepared to support local review under the Town of Burlington Wetlands Protection Bylaw and Regulations and state review under the Massachusetts Wetlands Protection Act (WPA) performance standards applicable to work within the Riverfront Area (310 CMR 10.58). The Riverfront Area performance standard requires demonstration that the proposed work represents the least environmentally damaging practicable alternative that meets

the project purpose, and that there is no practicable and substantially equivalent economic alternative with less adverse effects on the Riverfront Area and associated resource area interests.

This document evaluates alternatives consistent with that standard and documents how the project has been designed to avoid, minimize, and mitigate impacts to Riverfront and wetland resources to the maximum extent practicable.

**3.0 Site Setting and Constraints**

The athletic fields are located in a constrained setting with wetlands present on multiple sides of the site and Riverfront Area jurisdiction influencing project layout and access. The project must remain functionally integrated with existing school infrastructure (including access, programming, and supervision needs), which limits the practicability of relocating the fields to off-site locations. In addition, athletic field geometry, grading requirements, drainage design, and safety/runoff areas constrain the extent to which the field footprints can be reoriented without causing new or increased impacts to resource areas.

**4.0 Avoidance and Minimization – Design Revisions Implemented**

As part of the alternatives evaluation and in response to Conservation Commission comments, the project has been substantially redesigned to reduce disturbance to both the Riverfront Area and the adjacent wetlands.

Key avoidance/minimization measures incorporated into the current design include:

- **Reduced overall field scope:** The original synthetic field area concept totaling approximately **141,000 square feet** has been reduced to approximately **106,000 square feet** to reduce the extent of work within constrained riverfront/wetland-adjacent areas.
- **Additional footprint reduction along the Riverfront side:** One of the larger field footprints has been further reduced by approximately 10 feet on the Riverfront side to decrease Riverfront alteration, the associated disturbance, and to further increase the raingarden BMP.
- **No-Mow Area:** Proposed establishment of a no-mow buffer within 20 feet of the resource areas.
- **Reduced walkway impacts:** Walkway extents have been reduced relative to earlier concepts to avoid unnecessary encroachment and disturbance.
- **Eliminated parking expansion:** Any added parking spaces previously considered have been eliminated to reduce impervious area expansion and associated resource area impacts.
- **Relocated ADA access away from wetlands:** ADA access pathways have been relocated away from wetland edges to reduce proximity impacts and limit disturbance within wetland-adjacent zones.

These revisions demonstrate that the project team evaluated practicable alternatives and implemented meaningful reductions in footprint and associated disturbance while still meeting the project's functional purpose and use requirements.

**5.0 Alternatives Considered**

The alternatives evaluated include both layout and overall project options (how the fields and supporting features are arranged), and surface/infill options (which field system with various infill types, usage, performance, and maintenance.

Each alternative was then reviewed using the following practicability and environmental criteria:

- Ability to meet project purpose and program needs

- Avoidance/minimization of Riverfront Area and wetland-related impacts
- Constructability and compatibility with existing school infrastructure
- Lifecycle cost (capital + replacement frequency and operations and maintenance requirements)
- Long-term maintenance feasibility for the school
- Water quality considerations, including migration potential and treatment compatibility
- Seasonal usability and operational reliability (including cold-weather performance)

**5.1 Alternative 1 – No Build / Maintain Existing Conditions**

Under the No Build alternative, the existing natural grass fields would remain and continue to be maintained under current practices. This alternative does not meet the project purpose because the existing field conditions and seasonal limitations cannot reliably support school and community demand and do not resolve ongoing playability and safety concerns. Continued reliance on the grass system would likely result in recurring closures and inconsistent field availability. Routine operations and maintenance would also continue within resource areas, including activities such as mowing, watering, and turf treatments.

**5.2 Alternative 2 – Rehabilitate/Reconstruct Natural Grass Fields**

Natural grass rehabilitation (including grading, soil amendments, drainage improvements, reseeding/sodding, and irrigation where needed) was considered. While this alternative can improve short-term field conditions, it remains constrained by seasonal limitations, recovery time after heavy use, and weather-related closure requirements. Given the level of programmed demand and the operational need for consistent availability, a natural grass system is not expected to provide a substantially equivalent functional outcome without recurring closures, reduced scheduling capacity, and ongoing restoration cycles. Again, routine operations and maintenance would also continue within resource areas, including activities such as mowing, watering, and turf treatments.

**5.3 Alternative 3 – Off-Site Alternatives**

Off-site alternatives were reviewed at a screening level and determined not practicable due to the need for the athletic fields to remain adjacent to the existing school and associated infrastructure for functional, operational, and supervision reasons. Off-site locations would not provide a substantially equivalent outcome and would introduce additional land acquisition, permitting, access, and operational constraints outside the project purpose and schedule.

**5.4 Alternative 4 – Synthetic Turf with Reduced Footprint and Minimization Measures (Current Design)**

A synthetic turf alternative was evaluated and then iteratively refined to reduce impacts. The current design reflects the minimized footprint described in Section 4.0 and incorporates stormwater and restoration elements intended to protect adjacent resource areas. This alternative meets the project purpose and provides the most reliable long-term field availability for school and community programming while implementing avoidance and minimization measures to reduce Riverfront and wetland-adjacent disturbance.

**5.5 Alternative 5 – Synthetic Turf System/Infill/Padding Alternatives (Materials Alternatives)**

Recognizing the Commission's request that the alternatives analysis fully evaluate different synthetic turf system configurations and materials, the project evaluated a range of infill types, pad/shock layer configurations, and related system components, including:

- Crumb rubber (SBR) infill

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- TPE
- EPDM
- Alternative Infills (Brock Fill, Cork, and Coconut Organic Infills)
- Alternative pad/shock layer options

These alternatives were evaluated on cost, longevity, potential constituents of concern, availability/logistics, replacement frequency, maintenance needs, cold-weather usability, and feasibility for this specific site. Actual costs may vary based on market conditions, labor, and additional site requirements.

**Table 1. Field Options:**

| **Criteria** | **Retain/Replace Natural Grass Field** (Not Practicable; Does not Meet Project Purpose) | **Synthetic Turf with Alternative Infill (e.g., TPE, Organic)** (Not Practicable; Disproportionate Costs; Infill Material/Performance Constraints) | **Synthetic Turf with Sand/Crumb Rubber Infill** (Practicable; Meets Project Purpose; Proven System w/ Predictable Cost and Product Availability) | **Additional Information** |
|---|---|---|---|---|
| Construction Cost | ~$2.1M | ~$2.9M–$3.2M **(Cost-Prohibitive)** | ~$2.6M | Grass Fields have a lower upfront cost than Synthetic Turf Fields |
| Longevity / Durability | 5–8 years **(Not Practicable)** | 10–15 years **(Typical)** | 10–15 years **(Typical)** | Grass Fields: Compaction/Settling occurs over time. Additional re-grading and disturbance to riverfront area will be needed due to more frequent soil/grass repairs and fields have shorter warranty |
| Usability | ~25 hours/week & seasonal **(Not Practicable)** | 70+ hours/week (extended by lighting) **(Typical)** | 70+ hours/week (extended by lighting) **(Typical)** | Alternative organic infills introduce frequent freezing during colder months in New England, limiting extended field use |
| Availability / Logistics | Materials Readily available | Certain infills are hard to source and expensive **(Cost-Prohibitive)** | SBR Rubber is industry standard and easily available | N/A |
| Annual Maintenance | ~$30 – 50k **(Cost Prohibitive)** | ~$12 - $25K **(Cost Prohibitive)** | ~$6 - $8K | - Grass Fields: Maintenance includes mowing, irrigation, fertilizing, seeding, sodding, etc.<br>- Fields with alternative infills require frequent infill replacements due to the migratory nature of the organic infills. TPE and EPDM rubber are more expensive to replace<br>- Fields with SBR rubber have overall lower replacement cost and maintenance<br>- Turf fields require limited grooming |
| Potential Environmental Impact | Increased chemical and fertilizer uses, increased irrigation needs, additional runoff impacts, and mowing within the riverfront area | Lower theoretical risk; lacks long-term performance data and infills are not cost-effective | Design includes engineered, enhanced stormwater drainage, new rain garden, and wetland restoration. Lower risk when maintained properly and O&M plan is followed | - Alternative infill materials (e.g., TPE or organic infill) were evaluated. While these products may offer certain perceived benefits, long-term performance and cost make them prohibitive.<br><br>- For Turf with SBR Rubber proposed design, robust rain garden with bioretention medium was designed to address Conservation's concern about PFAS and 6PPD-q. Additional monitoring and testing proposed under the O&M plan, including a 20 FT no-mow buffer within the riverfront area. |

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| Criteria | **Retain/Replace Natural Grass Field** (Not Practicable; Does not Meet Project Purpose) | **Synthetic Turf with Alternative Infill (e.g., TPE, Organic)** (Not Practicable; Disproportionate Costs; Infill Material/Performance Constraints) | **Synthetic Turf with Sand/Crumb Rubber Infill** (Practicable; Meets Project Purpose; Proven System w/ Predictable Cost and Product Availability) | **Additional Information** |
|---|---|---|---|---|
| Design Intent | Fails to meet extended usability, this option has increased maintenance costs, and increased riverfront area disturbances | Some infills do not meet performance standards and contain higher cost with unproven durability in New England weather. | Meets performance and cost standards. Meets 310 CMR 10.58(5) requirements due to enhanced stormwater design. | See Below |
| Details | - Existing grass field is currently mowed but requires constant maintenance, water, and repairs due to its high usage. Field has poor infiltration, and high runoff into resource areas<br><br>- A grass field does is not practicable and does not meet the purpose and intent of the project | - Synthetic Turf is manufactured PFAS free<br><br>- Alternative infill materials (e.g., TPE or organic infill) were evaluated. While these products may offer certain perceived benefits, they introduce substantial additional upfront cost relative to a conventional infill system and require different installation methods, increased maintenance, and more frequent infill replenishment depending on the product and site conditions. In addition, product availability, supplier warranties, and long-term performance in New England freeze–thaw conditions can vary by manufacturer and infill type, creating uncertainty for lifecycle cost and field operability. For these reasons, this alternative is not practicable for the Project given budget constraints and the need for a durable, warrantable system that reliably meets the Project purpose. | - Synthetic Turf is manufactured PFAS free<br><br>- Infill savings allow enhanced filtration and stormwater treatment through enhanced rain garden, BMPs, and wetland restoration, all to improve and protect the riverfront area | - The proposed synthetic turf system with a sand/crumb rubber infill is a widely used, industry-standard approach for municipal and school athletic fields and represents a practicable, durable, and warrantable design. This system is readily available from multiple manufacturers, can be competitively bid, and has an established performance history under New England climate conditions (including freeze–thaw cycles). It provides consistent playability, improved drainage and field resiliency, and supports the high level of use anticipated at this facility while reducing field downtime associated with irrigation demands, turf loss, and soil compaction typical of natural grass under intensive use<br><br>- As designed, the proposed system is compatible with the project's stormwater management and restoration measures and can be implemented without additional Riverfront Area impacts beyond those proposed, making it the most practicable alternative that meets the project purpose. The project has been designed to avoid and minimize impacts to protected resource areas to the maximum extent practicable and, where alteration is unavoidable, to limit disturbance and provide appropriate mitigation consistent with applicable performance standards |

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**Table 2. Infill Options:**

| Option | Cost (Approximate) | Longevity | Potential Environmental Impact | Availability & logistics | Maintenance | Feasibility on MSMS + Riverfront Notes |
|---|---|---|---|---|---|---|
| Crumb rubber (SBR) & Sand | $82,000 (no Pad needed) **(Practicable; Lowest Cost)** | Lasts for the life of the turf (10-15 years)<br><br>Top dressing every 3-5 years (4-6 years when O&M Plan is followed) | Recycled tire chemicals/metals possible; product-specific variability (see feasibility section).<br><br>EPA's multi-agency 2021 crumb rubber research is frequently cited as not finding "significant evidence of risk". 6PPD-q is an emerging stormwater concern tied to affecting a particular type of fish in CA due to tire wear from roadway driving. | Widely available and proven supply chain. | Grooming + infill management; GMAX Testing needed | Feasible; strong usability; Cold weather playability, longer season, supports high weekly use; Tires sourced responsibly from Canada/America. Chinese tires prohibited; Robust containment & collection measures provided. |
| Brock Fill | $106,000<br><br>$381,600 (with Pad and additional Sand) **(Not Practicable)** | Lasts ~8 yrs; replace 10 to15% every 2–3 yrs | Made from engineered wood particles. | Available via specialty vendor | Higher maintenance as material is replaced more often. GMAX Testing needed. | Material is light and washes away during heavy storm events until infill has settled. Requires double the sand. Material prone to freezing, reducing playability/season. |
| TPE | $296,800<br><br>$508,800 (with Pad) **(Not Practicable; Cost Prohibitive)** | Long-lasting (8-10 yrs) but product-specific; still needs infill top-offs | Lower metals in screening tests; still may contain additives | Available via specialty vendors | Similar to SBR; | Perceived improved water-quality profile vs SBR; still has microplastic considerations |
| EPDM | $455,800<br><br>$657,200 (with Pad) **(Not Practicable; Cost Prohibitive)** | Long-lasting (8-10 yrs) but product-specific; still needs infill top-offs | Synthetic polymer; additives vary by product selection | Available | Similar to TPE | Feasible; needs same containment strategy as other loose infills |
| Coconut Husk | $286,000<br><br>$498,200 (with Pad) **(Not Practicable; Cost Prohibitive** | Lasts ~6-8 yrs; replace 15 to20% every 2–3 yrs | Although plant-based and derived from natural materials, but not risk free due to processing treatment and additives like binders, coatings, or antimicrobial agents. Over time, moisture retention and debris can contribute to localized mold/mildew or weed growth, which may require herbicides/pesticides. | Specialized supply chain | Higher maintenance as material is replaced more often, higher float/migration. GMAX Testing needed. | Material is prone to washing away during heavy rain storm events and prone to freezing, reducing playability/season. |
| Cork | $392,200<br><br>$604,200 (with Pad) **(Not Practicable; Cost Prohibitive** | Lasts ~6-8 yrs; replace 15 to20% every 2–3 yrs | Plant-based infill options are derived from natural materials, but they are not necessarily risk-free; some products may include processing treatments or additives (e.g., binders, coatings, or antimicrobial agents). Over time, moisture retention and accumulated debris can contribute to localized mold/mildew or weed growth, which may require routine maintenance and, if needed, targeted treatment." | Available via specialty vendors. May require watering during installation. | Higher maintenance as material is replaced more often. Higher float/migration. GMAX Testing needed. | Material is prone to washing away during heavy rain storm events and prone to freezing, reducing playability/season. |

**Usability and operations consideration (seasonal performance):** The alternatives evaluation explicitly considered seasonal usability and operational reliability. In general, synthetic turf systems are intended to provide greater scheduling capacity and fewer weather-related closures than natural grass. Infill selection can also influence shoulder-season performance and operational requirements. For example, systems requiring moisture management or involving lighter-weight organic infills may introduce additional operational constraints (e.g., moisture monitoring, irrigation, grooming frequency, and post-storm redistribution needs). Conversely, more conventional infill systems are typically easier to maintain and may provide more predictable performance during cold-weather periods, reducing the likelihood of avoidable closures and improving overall usability.

**Migration/containment considerations:** The evaluation also considered that some infill systems—particularly lighter or lower-density infills—may be more prone to displacement and redistribution during storms or snow management operations. As a result, the preferred system is paired with design-level controls (stormwater treatment and solids capture measures, maintenance commitments, and operational controls) intended to prevent off-site migration and protect adjacent Riverfront and wetland resources.

### 5.5 Alternative 5 – Off-Site Alternatives

Off-site alternatives were reviewed at a screening level and determined not practicable due to the need for the athletic fields to remain adjacent to the existing school and associated infrastructure for functional, operational, and supervision reasons. Off-site locations would not provide a substantially equivalent outcome and would introduce additional land acquisition, permitting, access, and operational constraints outside the project purpose and schedule.

## 6.0 Selected Alternative and Mitigation/Protection Measures

Based on the evaluation of alternatives, the selected alternative is the refined synthetic turf project described in Section 4.0, supported by the materials/system evaluation summarized in Tables 1 and 2, and paired with a comprehensive mitigation and long-term operations and maintenance plan.

Key protection measures include:

- **Stormwater treatment and water quality improvements:** The project incorporates a new rain garden / bioretention BMP, which has been relocated and increased in size to improve treatment performance and site fit. The system includes bioretention media intended to support filtration and pollutant attenuation, and it is paired with proposed native plantings to improve Riverfront buffer function and support long-term stability.
- **Avoidance of new unnecessary impacts:** As summarized above, walkways were reduced, parking expansion was eliminated, and ADA access was relocated away from wetland edges to reduce proximity impacts.
- **Operational controls and maintenance commitments:** The preferred alternative is intended to be implemented with an operations and maintenance approach that addresses solids and sediment management, infill management, and BMP performance over time, including periodic inspection and maintenance of stormwater features and outfalls.
- **Material controls (procurement/specification):** The project will incorporate material disclosure and specification requirements consistent with agency expectations (e.g., manufacturer documentation, submittals, and product-specific certifications/requirements as applicable), including the Town's requested material restrictions (e.g., PFAS-related requirements, if included in the specifications) and product documentation.

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**7.0 Conclusion – Practicability and Least Environmentally Damaging Alternative Finding**

Based on the alternatives evaluated, the proposed Marshall Simonds Middle School athletic field project, as redesigned, represents the least environmentally damaging practicable alternative that meets the project's purpose and need while minimizing impacts within the Riverfront Area and avoiding wetland impacts to the maximum extent practicable, consistent with the Town of Burlington Wetlands Protection Bylaw/Regulations and the Massachusetts Wetlands Protection Act Riverfront Area performance standard (310 CMR 10.58).

As demonstrated by the iterative design refinements, the project has been substantially reduced and reconfigured to decrease disturbance to resource areas. The original synthetic field scope of approximately 141,000 square feet has been reduced to approximately 106,000 square feet, including a further reduction of one of the larger fields by approximately 10 feet along the Riverfront side to minimize Riverfront alteration. The design has also reduced walkway extents, eliminated proposed parking expansion, and relocated ADA access pathways away from wetlands. These measures reflect a meaningful avoidance and minimization effort and demonstrate that further reductions would compromise the project purpose or shift impacts in a manner that is not environmentally preferable or practicable.

In addition, the project incorporates a comprehensive mitigation and long-term protection package including a new relocated and expanded rain garden / bioretention BMP, native plantings, and bioretention media intended to support filtration and pollutant attenuation and improve water quality prior to discharge. With the stormwater treatment and restoration measures, operational controls, and maintenance commitments included in the project package (and as documented in associated reports and plans), the preferred alternative is expected to avoid significant adverse impacts to Riverfront resource area interests.

Accordingly, when considered as a whole, the preferred alternative provides the best balance of (1) meeting the project purpose, (2) minimizing Riverfront and wetland-adjacent impacts to the maximum extent practicable, and (3) providing meaningful stormwater treatment, restoration elements, and long-term protection measures. For these reasons, the project, as redesigned, is the most practicable alternative that meets the project's purpose and need and minimizes Riverfront Area and wetland impacts while incorporating mitigation measures intended to protect adjacent resource areas over the life of the project.