Town of Arlington
Department of Health and Human Services
Office of the Board of Health
27 Maple Street
Arlington, MA 02476

Tel: (781) 316-3170
Fax: (781) 316-3175

Artificial Turf Study Committee Agenda
01/30/24

Meeting Date: January 30, 2024
Meeting Time: 5PM-6:30PM
Location: Zoom

Objectives:

1) To provide feedback/guidance to each working group on current research findings.
2) To further clarify additional research needs within working groups and any additional topic areas relevant to Artificial and Natural Turf fields.
3) To provide a uniform reporting structure/template for working groups to utilize.
4) To identify potential Subject Matter Experts to present to the Committee.

Agenda

I. Acceptance of Meeting Minutes
II. Correspondence Received
III. Working Group updates
   a. Health
   b. Safety
   c. Environmental
IV. Discussion: Report Format/Template
V. Discussion: Subject Matter Expert Presentations
VI. New Business
VII. Adjourn

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Artificial Turf Study Committee Meeting Minutes

Meeting Date: January 23, 2024
Meeting Time: 5PM-6:30PM
Location: Zoom

Objectives:

1) To provide feedback/guidance to each working group on current research findings.
2) To further clarify additional research needs within working groups and any additional topic areas relevant to Artificial and Natural Turf fields.
3) To identify potential Subject Matter Experts that members of the working groups would like to invite to a future meeting to present information to the Committee.

Committee Members present: James DiTullio, Chair; Natasha Waden, Clerk; Mike Gildesgame; Joseph Barr; Jill Krajewski; Joseph Connelly; Claire Ricker

Agenda

I. Acceptance of Meeting Minutes

Motion to approve meeting minutes from 01/16/2024 was made by Mike Gildesgame.

2nd by Jill Krajewski.

Vote:
- Mike Gildesgame, Yes
- Leslie Mayer, Absent
- Joseph Barr, Abstain
- Jill Krajewski, Yes
- Natasha Waden, Yes
- Marvin Lewiton, Absent
- James DiTullio, Yes

Approved (4-0 with 2 Absent and 1 Abstain)

II. Correspondence Received

Natasha Waden reviewed correspondence received from Joseph Connelly and Wynell Evans. No additional discussion by Committee Members.

III. Working Group updates

a. Health

This group is composed of Marvin Lewiton, Jill Krajewski and Natasha Waden. Lewiton was unable to attend this meeting, but did provide input/feedback to the health working group via email which was incorporated into the update provided by the group.

The group reported that they have begun drafting their section report which includes 3 major topics: 1) Mental and Physical health benefits; 2) Heat related illness; and 3) health risk associated with exposure to chemical/metals/other compounds found in Artificial Turf fields.

The group reported that while they are still working on reviewing research, thus far, the research indicates there is an important association connected to mental and physical well-being of children and adults as it pertains to participation and accessibility to athletics. The research reviewed in terms of heat related illness indicates that there is a temperature difference between artificial turf and natural turf fields, but some communities and organizations have implemented policies on the usage of such fields during periods of high heat/humidity as mitigation measures. The research reviewed in terms of health risks associated with exposure to chemicals/metals/components found in artificial turf fields indicates the presence of some of these, but the studies are limited to crumb rubber, and have been focused more on single exposures. While the studies seem to indicate low potential exposures and health risks, the group continues to study this area to get a better understanding. Additionally, the group has reached out to a few organizations/individuals such as other communities, epidemiologists, academic professors, and other state and local public health officials/organizations to help with identifying a speaker. The group is considering a speaker who can talk about risk analysis, epidemiology, and heat related illness, etc, but has not settled on the topic(s) yet.

The group also discussed the concerns about the layout of the report and whether or not the topics should be discussed in order of importance and how that might be determined.

b. Safety

This group is composed of James DiTullio, Leslie Mayer, and Joseph Connelly. Leslie was unable to attend this meeting, but did provide input/feedback to the Safety group during the weekly meeting which was incorporated into the update provided by the group.

This group reported that they have been exploring information from surrounding communities. Of particular interest to the group is the city of Malden who is in the process of constructing a new artificial turf field and intends to use an alternative infill to crumb rubber called Brock Fill. Although the group has not spoken directly with city officials, the group believes that Malden may have chosen this infill because it helps with keeping the field temperature down and is overall a safer material than crumb rubber. The group is hoping to connect with officials from Malden to learn more about their research and processes that has lead them to this point.

The conversation also focused on looking at a variety of other communities who are similar to Arlington that have begun or have already gone through a similar artificial turf review. The Committee seemed to agree that reviewing such communities and particularly the research materials and conclusions they came to, might be beneficial for this Committee to review. Some other communities mentioned included Lexington, Brookline, Boston, Springfield and Burlington.

c. Environmental
This group is composed of Mike Gildesgame, Joseph Barr, and Claire Ricker.

The group reported that they are still having difficulty finding studies which focus on alternative infill materials (as opposed to crumb rubber). Despite the group's efforts to connect with State Agencies, there has been no response. The only communication has been from Mass DEP in regards to potential changes to the Wetlands Protection Act, which would classify Artificial Turf as an impervious surface. The group pointed out that this change may impact how future assessments are done on artificial and grass turf fields that fall within Wetland Resource areas and how this classification may relate to heat island issues.

The group is still working on narrowing down the specific topics to be discussed and the depth in which these topics can be explored given the time frame and accessibility to information pertaining to each area. Specific areas mentioned include chemical pollution, storm water runoff, climate change resilience, ecological impacts, and soil impacts.

The group was able to connect with the Recreation Department at MIT and as such will be speaking more in depth to their architect to learn more about the heat effects of the turf. Additionally, the group will be speaking with a representative from Mass Municipal Association next week to discuss these various topics. The group is optimistic that between these additional connections and the other professionals they have already reached out to, that they will be able to identify a speaker(s).

The group also asked that the Committee provide the dates and times that will be available for speakers; a template for working groups to follow that will create uniformity in each of the working group section reports; and to identify who/how additional background information will be obtained for the final report. Background information discussed includes costs comparisons between artificial turf and natural turf fields, Arlington field use data, weather conditions, etc.

Jim DiTullio indicated that the project timeline would be discussed later on in the meeting (Agenda Item V). DiTullio acknowledged the difficulty with getting a response or information from state officials. Natasha Waden offered to reach out to the Office of Local and Regional Health, an agency that the Health Department connects with regularly, that may be able to help the Committee connect with the right person at the various State Departments/Divisions.

IV. Discussion: Additional Research Needs/Gaps

This discussion item was incorporated into each of the working group updates.

V. Discussion: Project Timeline

Jim DiTullio presented the following timeline for discussion with the Committee.

Tuesday 1/23	Full Meeting
Tuesday 1/30	Full Meeting
Tuesday 2/6	Full meeting/ guest speakers
Friday 2/9	Working groups submit bullet point outline of findings and recommendations to full committee
Tuesday 2/13	Full Meeting/ discussion of bullet point outlines/ guest speakers
Tuesday 2/20	No Meeting
Friday 2/23	Working groups submit section drafts to full committee
Tuesday 2/27	Full Meeting/ discussion of section drafts
Tuesday 3/5	Full Meeting/ discussion of final report drafting process and formulation of final recommendations- possible vote on tentative recommendations
Friday 3/8	Committee Releases draft report to public
Thursday 3/14	Full Meeting/ public meeting on draft report
Tuesday 3/19	Full Committee meeting final vote
Friday 3/22	Final report submitted to Select Board

The Committee agreed that despite the tight timeline, the dates are reasonable. Additionally, the Committee agreed that time would be allotted wherever needed in the schedule to accommodate speakers and that the timeline would continue to be reviewed and adjusted as needed. Additionally, a template will be circulated at the next meeting which will outline a standard format for which the working groups can follow when writing their section reports.

The Committee agreed that draft working group reports would be included as part of the meeting materials and would allow for public comment in the same fashion that public comment is accepted currently. Making the reports public will allow the public with several opportunities to comment. The Committee clarified that although it is not a requirement, the Committee still plans to hold a public meeting for commenting/feedback purposes.

However, the Members reiterated that the charge of the Committee is to provide a report to Town Meeting, and any debate about the report would be taking place at Town Meeting.

DiTullio informed the Committee that the authors of the warrant article that formed this Study Committee last spring have submitted a new warrant article for this spring's Town Meeting. This new article, if passed, would provide an extension to the Artificial Turf Study Committee to continue their work. It was unclear what might happen if Committee did not file a report and the proposed warrant article failed. However, the Committee reiterated their desire to complete the work by the current deadline, but acknowledge the potential safeguard to honor the work of the Committee.

It was decided that groups looking to bring in a guest speaker will need to inform DiTullio and Waden about potential dates/times so that the agenda can be set as necessary. Additional discussion was had in regards to allowing guest speaker who presented at the Artificial Turf forum last spring. There was some discussion that it might be best to hear from new speakers, but no formal decision was made regarding this matter.

A conversation about accessibility and collecting other background information was had. Waden suggested that whereas the Town does not have additional staff that can help to collect this information that it might possible for both she and Joe Connelly to take on some of this work and share it with the Committee. The Committee seemed to agree with that suggestion.

VI. Discussion: Subject Matter Experts

This agenda item was discussed under the working group updates.

VII. New Business

No new business was discussed.

VIII. Adjourn

Motion to adjourn was made by Joseph Barr.

2nd by Jill Krajewski.

Vote:

Mike Gildesgame, Not present for vote
Leslie Mayer, Absent
Joseph Barr, Yes
Jill Krajewski, Yes
Natasha Waden, Yes
Marvin Lewiton, Absent
James DiTullio, Yes

Approved (4-0, with 1 not Present and 2 Absent)

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ARTIFICIAL TURF COMMITTEE MEETING COMMENTS FROM THE CHAT

Date: January 23, 2024
Time: 5PM
Location: Remote Participation

Susan Chapnick

09:56
SC
Is the Health subgroup considering the precautionary principal in evaluation of cumulative risk?

Susan Chapnick

17:59
SC
If the committee is considering other communities, I think it would be balanced if you also consider the municipalities that have chosen to develop organically managed athletic fields rather than artificial turf and why they made that decision. For example, Springfield, MA.

Wynelle Evans

33:47
WE
Please see the report from consultant Horsley Witten Group to the Nantucket Land Council, using findings from their study on behalf of the Martha's Vineyard Regional HighSchool, which included Brockfill in its investigation: https://www.nantucketlandcouncil.org/wp-content/uploads/NPS-Athletic-Fields_NLC-Comment-Ltr-02_07_22.pdf

Susan Chapnick

01:06:06
SC
I would caution that for the Arlington background information, we currently have natural turf fields that are not well-constructed for wet weather and not maintained as well as they should. So comparing a new artificial turf field to our current natural fields is not a fair comparison. It should be a new artificial turf field compared to a new well-constructed organically managed natural turf field - Arlington has neither right now.

Wynelle Evans

01:07:44
WE
Thank you to all!

Human Health & Environmental Concerns - PFAS in Artificial Turf components

Susan D. Chapnick <s.chapnick@comcast.net>
Thu 1/25/2024 8:40 AM
To:BOH <BOH@town.arlington.ma.us>
Cc:mikeg125@gmail.com <mikeg125@gmail.com>;Claire Ricker <cricker@town.arlington.ma.us>;David Morgan <dmorgan@town.arlington.ma.us>

2 attachments (3 MB)
NEWMOA Conf 2022 - PFAS in Artificial Turf_Peaslee_Mello.pdf; MassDEP_PFAS FAQ for Consumers 2023-05-30.pdf;

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Natasha,

Please accept this public communication to the Artificial Turf Study Committee. I am forwarding this communication as an Arlington resident, environmental scientist, and conservation commissioner, but these communications/statements are my own and not a representation of the full commission.
After listening in on the Artificial Turf Study Committee meeting of 1/23/2024, I was surprised that the updates from the Human Health and Environmental subcommittees did not mention that they were investigating **PFAS** as a class of chemicals of concern in Artificial Turf.
I have attached a presentation from the NEWMOA (Northeast Waste Management Officials Association) Conference, April 2022, that reports on real examples - local to New England - where PFAS has been directly measured in artificial turf components or in leaching experiments meant to understand potential stormwater runoff of these toxic chemicals. The authors are Dr. Graham Peaslee, University of Notre Dame, and Kristen Mello, Councilor at Large, City of Westfield, MA.
This presentation summarizes data from:
1. Martha's Vineyard: leachate results from tests on synthetic grass blades, shock pad, and **Brockfill** - all contain PFAS - and Brockfill infill contains the highest amount of PFAS of these components and it exceeds the current proposed EPA limits.
2. Portsmouth, NH: "PFAS Free" synthetic turf actually contained PFAS; PFAS also detected downstream of High School artificial turf field
3. Franklin, MA: testing results in the Wetland downstream from artificial turf piles being stored in that area show high levels of PFAS up to 56.6 ppt for Total PFAS
4. Woodbridge, CT: testing results before and after installation of an artificial turf field show an increase in PFAS after installation
Reference links for all these data are included in the presentation slides.

I am sure that the Arlington BOH folks understand the real concerns of these toxic chemicals; however, the rest of the artificial turf study committee may not have the same background/information on PFAS. So, as a reference, I have also attached the MassDEP PFAS Fact sheet.

Thank you for considering the potential negative effects on human health and the environment of adding PFAS to our community through installation of artificial turf fields.

Respectfully submitted,
Susan
Susan D. Chapnick, M.S.

President & Principal Scientist
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www.neh-inc.com

NEH new environmental horizons, inc

Chapnick Email 1_Attach 1

PFAS in Artificial Turf

Graham Peaslee, University of Notre Dame, gpeaslee@nd.edu

Kristen Mello, WRAFT, klm.wraft@gmail.com

NEWMOA Conference, April 6, 2022

Introductions & Background

Kyla Bennett (left) and Tracy Stewart (right) at used turf piles in Franklin, MA.
Boston Globe, October 9, 2019

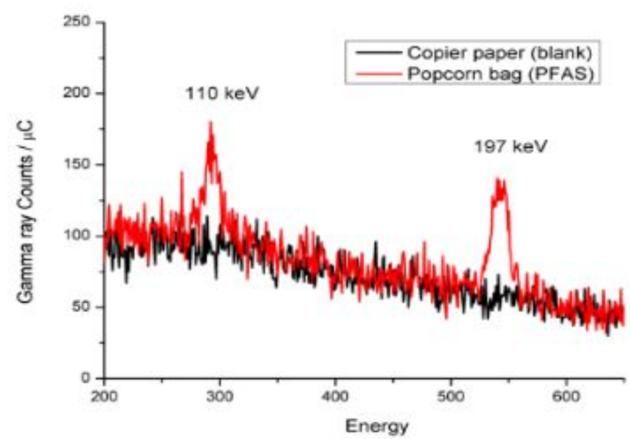
Why are there PFAS in my turfgrass?

Graham Peaslee & Heather Whitehead

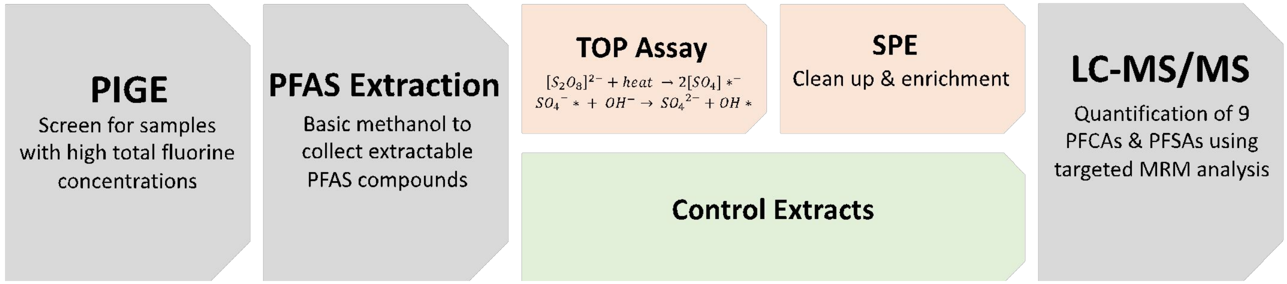
- We have screened dozens of different new and used turfgrass samples for total fluorine….

PIGE Analysis of Fluorine

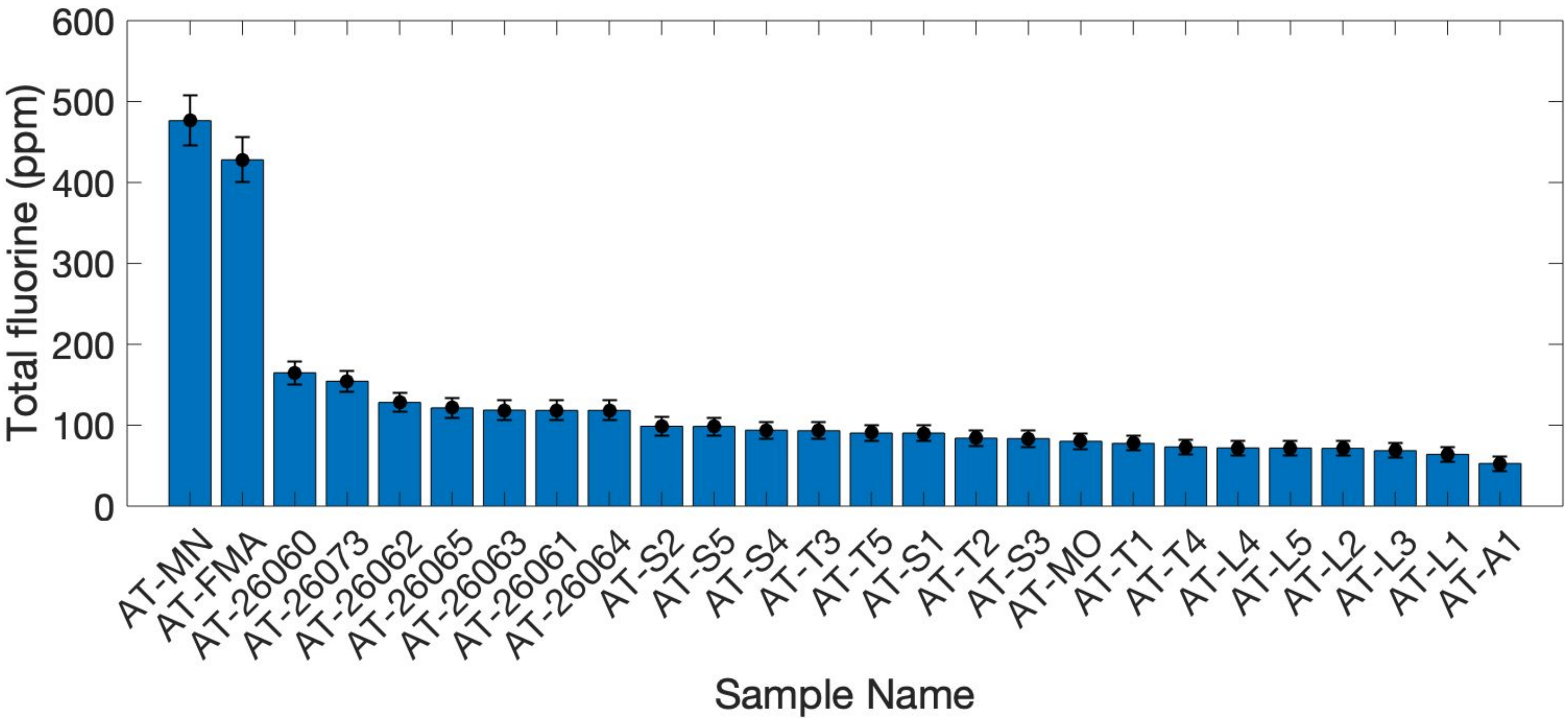
Fig. 3: PFAS-coated paper sample compared with uncoated paper. Irradiation time of 180 second with 9 nA of 3.4 MeV protons.



Spectroscopic technique
Rapid (<180 seconds)
Non-destructive



PIGE Analysis: Artificial turf



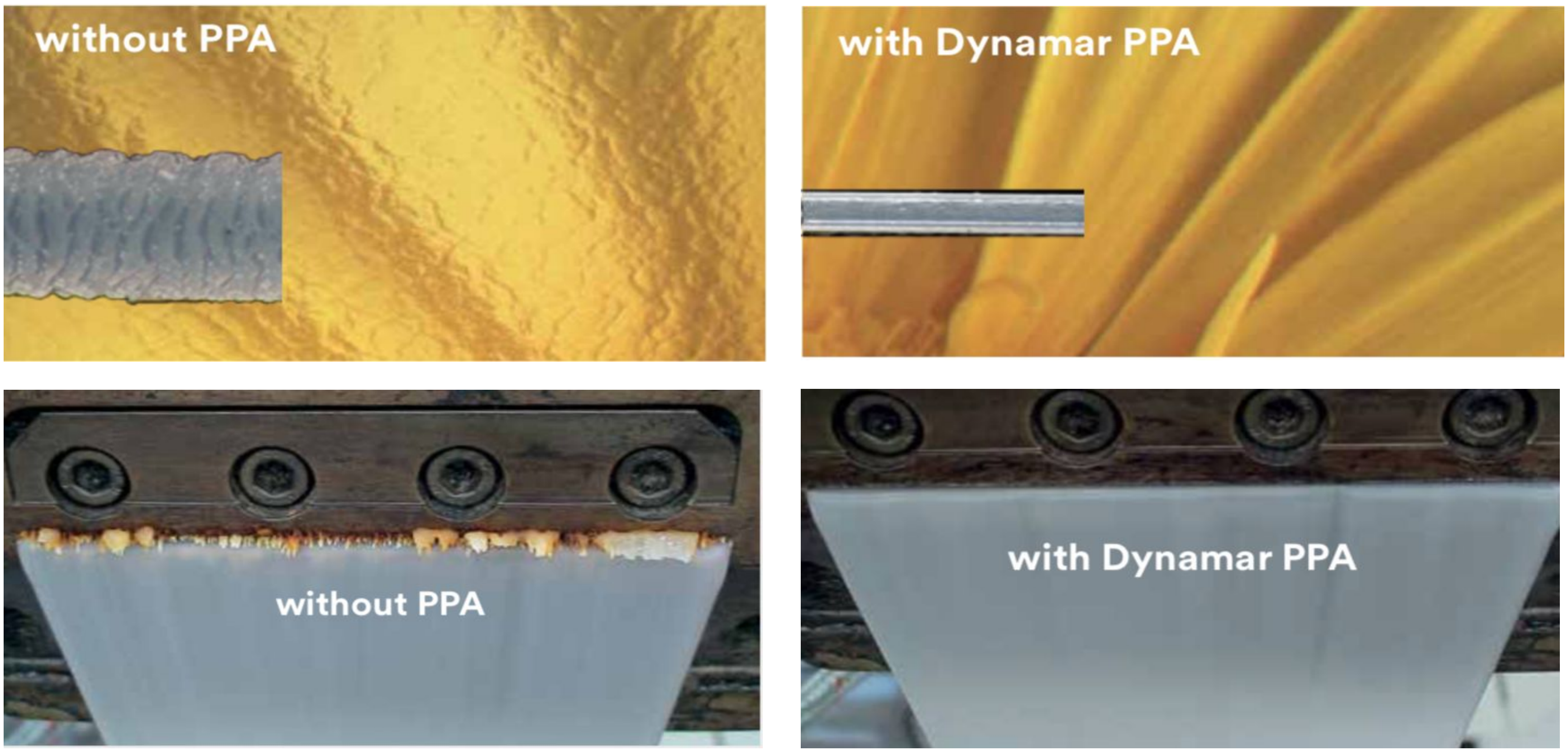
Why are there PFAS in my turfgrass?

Graham Peaslee & Heather Whitehead

- We have screened dozens of different new and used turfgrass samples for total fluorine….
- Where does this fluorine come from?

Polymer Processing Aids

- Improve production efficiency by reducing common issues such as melt fracture, & die build-up

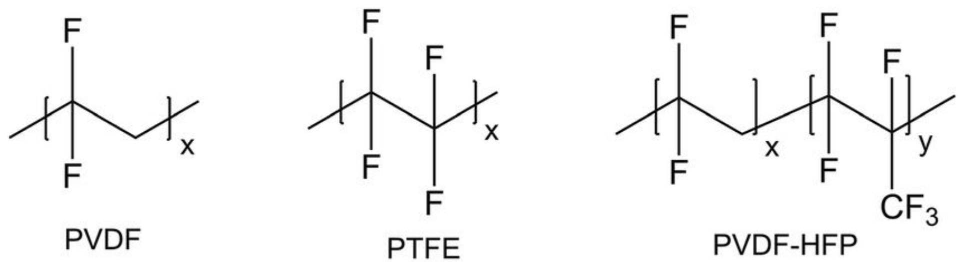


3M TM Dynamar TM Polymer Processing Additives Product Comparison Guide. 2016.

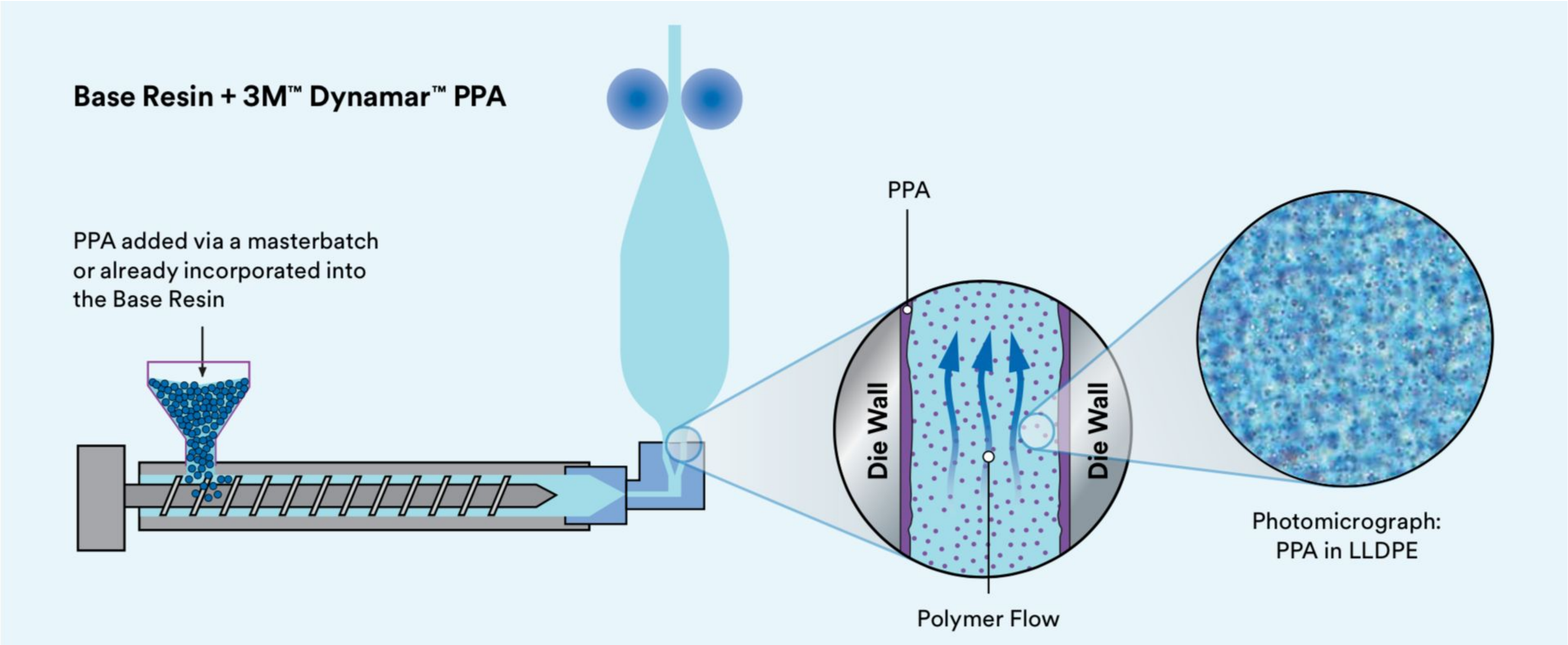
Vinylidene Fluoride & Hexafluoropropylene

- 50-95 weight % VDF
- 5-50 weight % HFP
- Ideal Fluorine to Carbon ratio is 1:2

Special Cases



- 100% VDF is PVDF
- > 65% VDF is PVDF Copolymer
- > 35% HFP is Fluoroelastomer (FKM)*
  - Chemical resistant O-rings, seals, tubing (Viton by DuPont)



- PPA is immiscible with the polymer and has a higher affinity for the metal surface, creating a slip surface
- Used at 20-2000 ppm in masterbatch depending on the application, type and concentration requires optimization

3M ™ Dynamar ™ Polymer Processing Additives Product Comparison Guide. 2016.

PPA Applications & Producers

- Food packaging
- Produce, grocery, and department store bags
- Liquids packaging

- 3M: Dynamar, Dyneon
- DuPont: Viton, Viton Free Flow
- Arkema: Kynar
- Daikin: Dai-El

Artificial Turf

3M FX-5911: Copolymer of VDF, HFP, & TFP

3M FX-9613: Copolymer of VDF & HFP + additives

Seiler, D. A et al., *Handbook of Industrial Polyethylene Technology* **2016**, 889-908.
3M TM Dynamar TM Polymer Processing Additives Product Comparison Guide. 2016.

Consultants Confirm

"...there is [*sic*] PFAS used in the extrusion of the fibers. That's true. There is. It's a polymeric compound called PVDF."

David Teter, at the meeting of the Standing Building Committee, Sharon, MA on January 21, 2020.

(https://sharontv.com/programs/government-meeting/)

"The PFAS in Synthetic Turf is not a contaminant. It is a slip agent that is intentionally added to the molten hydrocarbons in order to make the plastic grass blades free of defects."

Laura Green, at the meeting of the Board of Health, Oak Bluffs, MA on November 9, 2021.

(https://oakbluffs.zoom.us/rec/share/VNVkEYuze0E-gzoYmUi8umSRsOmAE-dUt1t92wo9s9Tzdf4UVW5jW5Dfw9hQMVc2.ZL_TP0WGKGIPLwcu)

Manufacturer Documents

City of
Portsmouth
Department of Public Works

MEMORANDU

TO: Suzanne Woodland, Acting Deputy City Manager

FROM: Peter Rice, Director of Public Works

DATE: 12/6/21

SUBJECT: Updated Information Regarding Manufacturing Process and New Athleti
Field

In follow up to the Memorandum of December 1, 2021 which is part of the City Council pack
staff has obtained the following additional information.

1. The manufacturer in Germany has produced Material Safety Data Sheets and the 3M additives used in their processes. Those MSDS sheets are attached.

   PVDF-HFP is a component of the additive. As was discussed at the Work Session, PVDF-HFP is a polymeric PFAS, namely a part of that very broad class of thousands c compounds covered under the general term of PFAS. It is not one of the PFAS of Concern for which the City tested.

3M™ Dynamar™ Polymer Processing Additive FX 5920A 08/21/18

3M

Safety Data Sheet

Document Group:	06-2189-6	**Version Number:**	44.05
Issue Date:	08/21/18	**Supercedes Date:**	08/21/18

SECTION 1: Identification

1.1. Product identifier
3M™ Dynamar™ Polymer Processing Additive FX 5920A

SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
Calcium Carbonate	471-34-1	< 5
Polyethylene Glycol	25322-68-3	60 - 70
Vinylidene Fluoride-Hexafluoropropylene Polymer	9011-17-0	25 - 35
Talc	14807-96-6	0.1 - 5 Trade Secret *

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

10.6. Hazardous decomposition products

Substance	Condition
Carbonyl Fluoride	At Elevated Temperatures
Formaldehyde	At Elevated Temperatures
Carbon monoxide	At Elevated Temperatures
Carbon dioxide	At Elevated Temperatures
Hydrogen Fluoride	At Elevated Temperatures
Toxic Vapor, Gas, Particulate	At Elevated Temperatures

Extreme heat arising from situations such as misuse or equipment failure can generate hydrogen fluoride as a decomposition product.

Pause for a little bit of detail…
Talkin' nerdy

Detection Limits vs Reporting Limits and Regulatory triggers

Constraints of Commercial Laboratory Requirements and Academic/Research Laboratory Flexibility with respect to protocol, sample prep, and matrix effects.

Limited data.

Field Component Test Results

Sharon, MA

TABLE 2 - Leachable SPLP PFAS results for the tested synthetic turf carpets by EPA Method 537(M). All results are in parts per trillion.

Analyte Class	Analyte Name	FieldTurf Vertex	FieldTurf Vertex Prime	SprintTurf 46-oz DFE
Perfluoroalkane Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluoropentane sulfonic acid (PFPeS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluorohexane sulfonic acid (PFHxS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluoroheptane sulfonic acid (PFHpS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluorooctane sulfonic acid (PFOS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluorononane sulfonic acid (PFNS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluorodecane sulfonic acid (PFDS)	< 4.8 U	< 4.6 U	< 4.9 U
	Perfluorobutanoic acid (PFBA)	< 4.8 U	< 4.6	
	Perfluoropentanoic acid (PFPeA)	< 4.8 U	< 4.6	
	Perfluorohexanoic acid (PFHxA)	< 9.6 U	< 9.3	
	Perfluoroheptanoic acid (PFHpA)	< 4.8 U	< 4.6	
	Perfluorooctanoic acid (PFOA)	< 1.9 U	< 1.9	
	Perfluorononanoic acid (PFNA)	< 4.8 U	< 4.6	
	Perfluorodecanoic acid (PFDA)	< 4.8 U	< 4.6	
	Perfluoroundecanoic acid (PFUnDA)	< 4.8 U	< 4.6	
	Perfluorododecanoic acid (PFDoDA)	< 4.8 U	< 4.6	
	Perfluorotridecanoic acid (PFTrDA)	< 4.8 U	< 4.6	
	Perfluorotetradecanoic acid (PFTeDA)	< 4.8 U	< 4.6	
Perfluoroalkyl Sulfonamides	Perfluorooctane sulfonamide (FOSA)	< 4.8 U	< 4.6	
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	< 4.8 U	< 4.6	
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	< 4.8 U	< 4.6	
	N-Methyl perfluorooctane sulfonamidoethanol	< 4.8 U	< 4.6	
	N-Ethyl perfluorooctane sulfonamidoethanol	< 4.8 U	< 4.6	
	N-Methyl perfluorooctane sulfonamidoacetic acid	< 4.8 U	< 4.6	
	N-Ethyl perfluorooctane sulfonamidoacetic acid	< 4.8 U	< 4.6	
(n:2) Fluorotelomer Sulfonic Acids	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	< 4.8 U	< 4.6	
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	< 4.8 U	< 4.6	
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	< 4.8 U	< 4.6	
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	< 4.8 U	< 4.6	

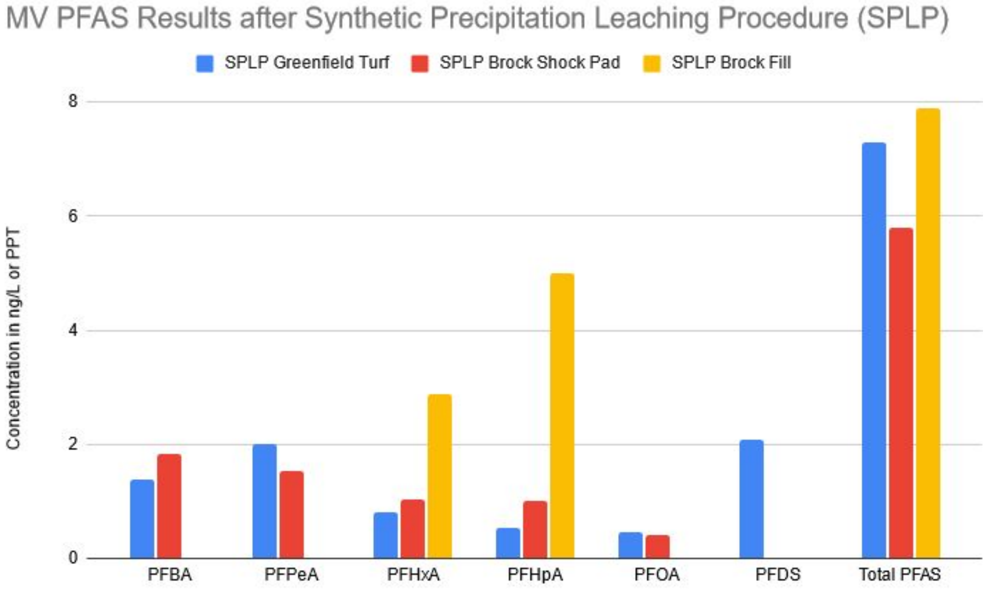
Perfluorobutanoic acid (PFBA)	< 4.8 U
Perfluoropentanoic acid (PFPeA)	< 4.8 U
Perfluorohexanoic acid (PFHxA)	< 9.6 U
Perfluoroheptanoic acid (PFHpA)	< 4.8 U
Perfluorooctanoic acid (PFOA)	< 1.9 U
Perfluorononanoic acid (PFNA)	< 4.8 U
Perfluorodecanoic acid (PFDA)	< 4.8 U

<u>Notes and Abbreviations</u>
PFAS: Per- and Polyfluoroalkyl Substances
SPLP: Synthetic Precipitation Leachate Procedure
U: Not Detected Above the MDL

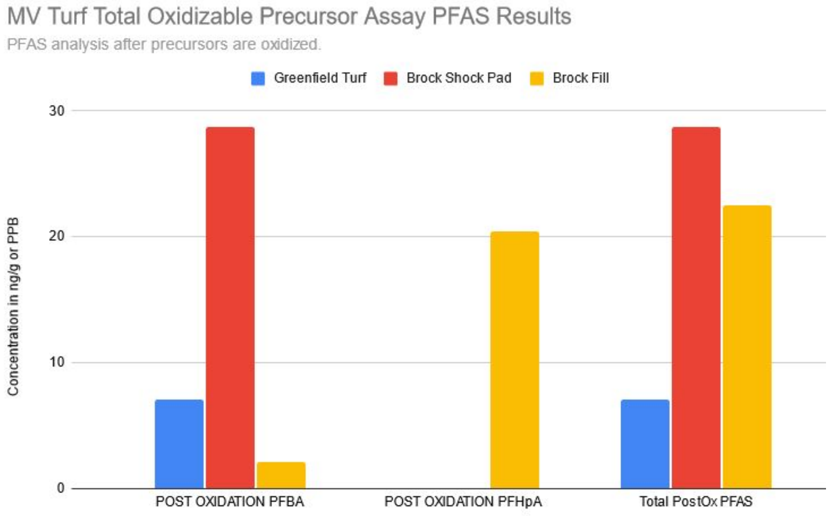
So Hypothetically… If	
PFHxS	4.7
PFHpA	4.7
PFOA	1.8
PFOS	4.7
PFNA	4.7
PFDA	4.7
PFAS6 Total	25.3 ng/L

https://drive.google.com/drive/folders/1ZgqrqLKBRLMJr-PdG8GF7R0p26qUnvBO

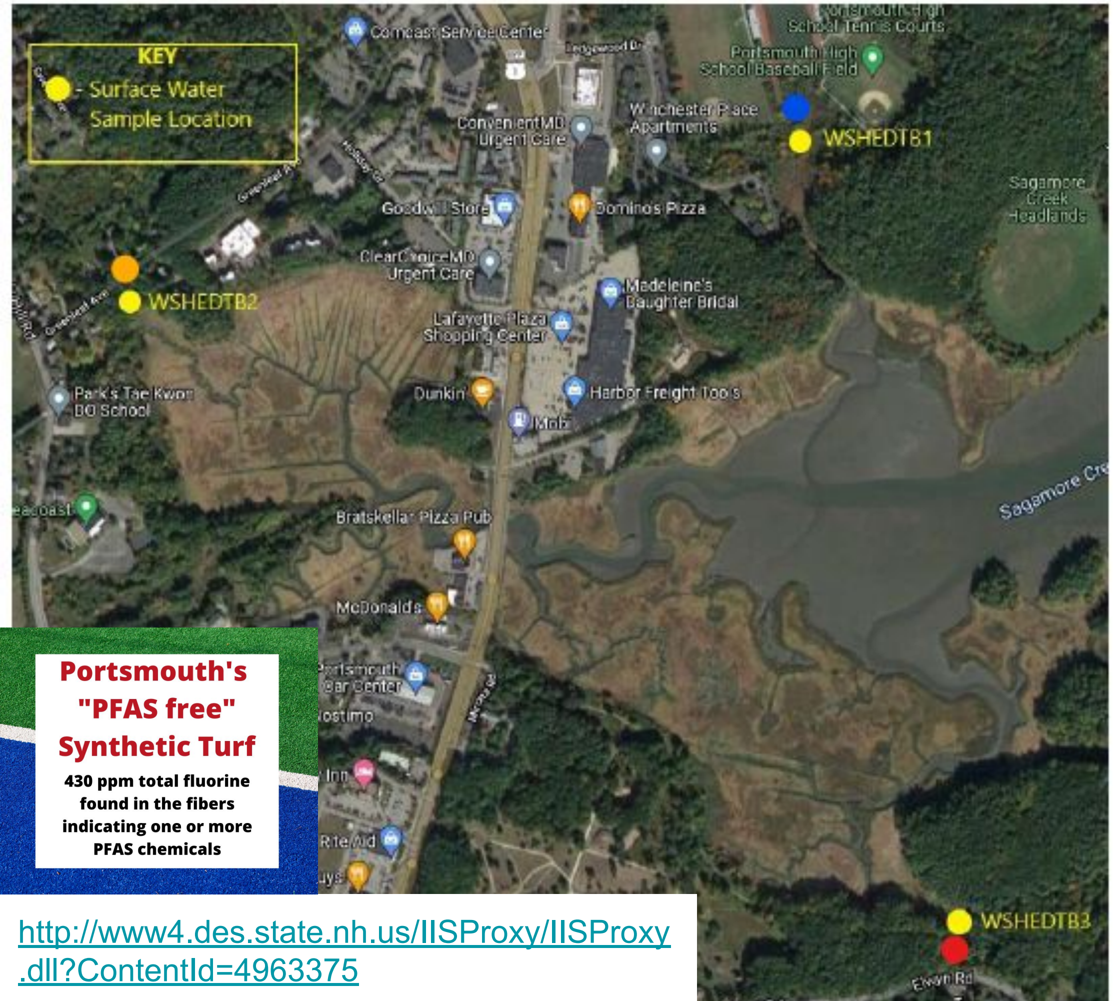
Field Component Test Results
Martha's Vineyard, MA



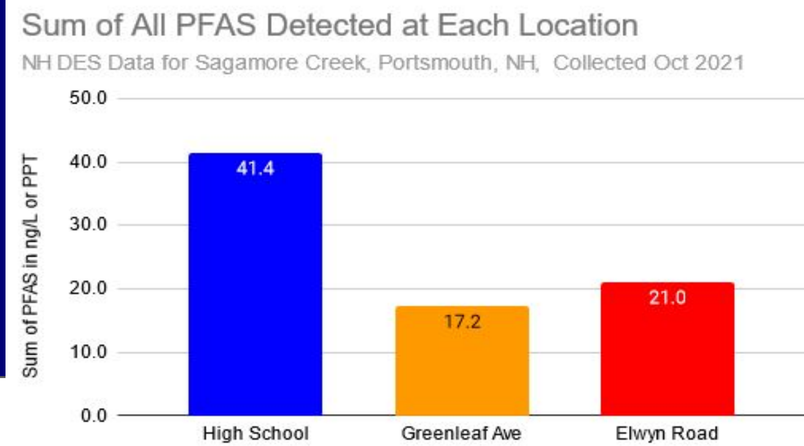
https://www.mvcommission.org/sites/default/files/docs/2021-02-26%20%28TurfAnalysisReport_FINAL%29.pdf

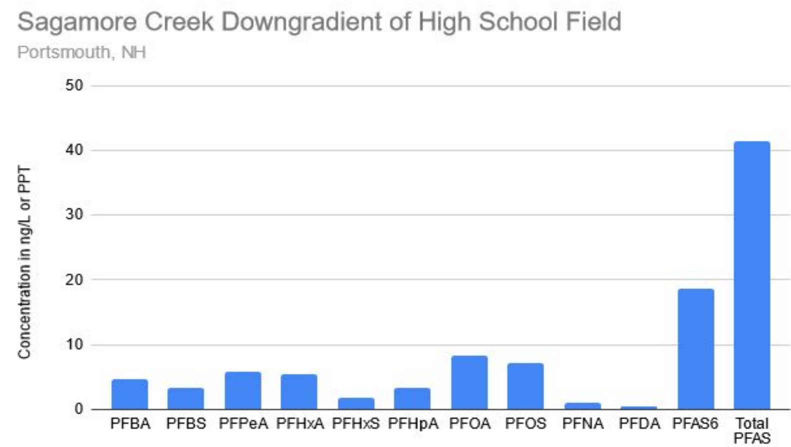


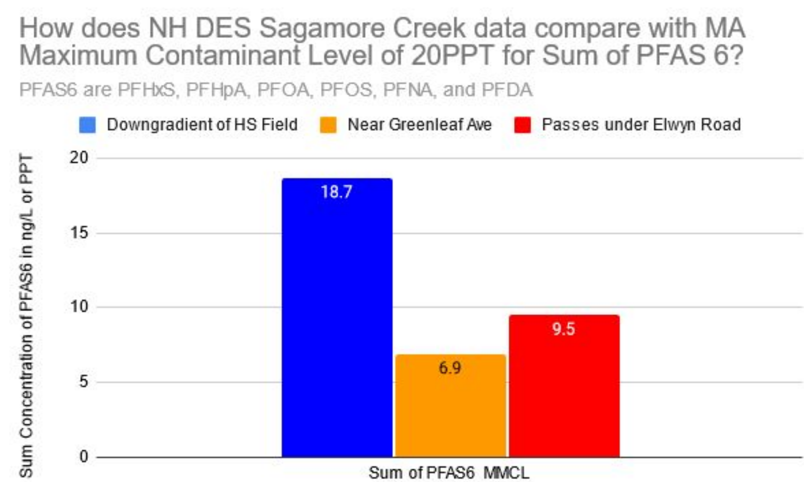
Real World Data
Portsmouth, NH



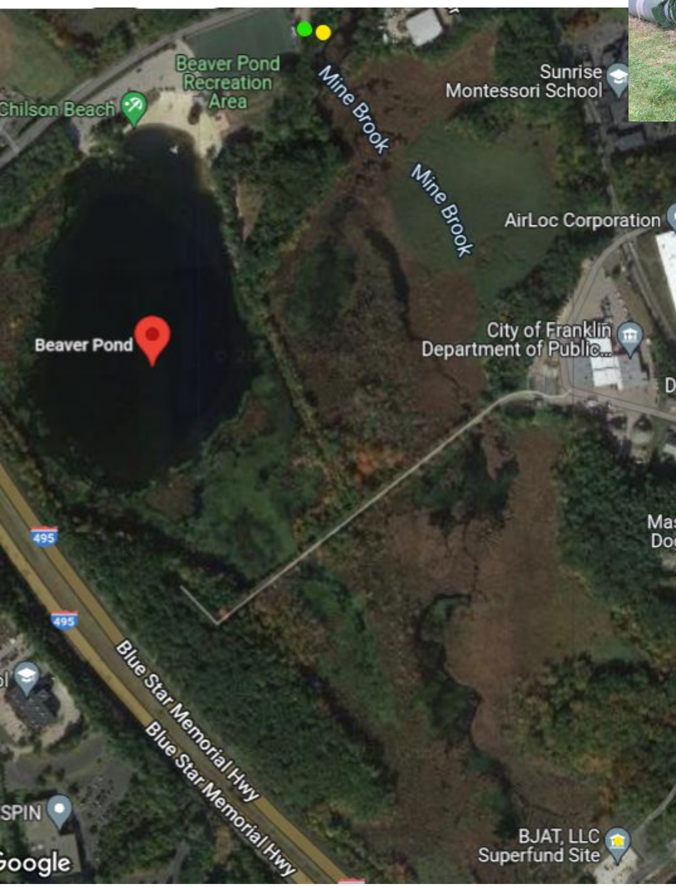
http://www4.des.state.nh.us/IISProxy/IISProxy.dll?ContentId=4963375

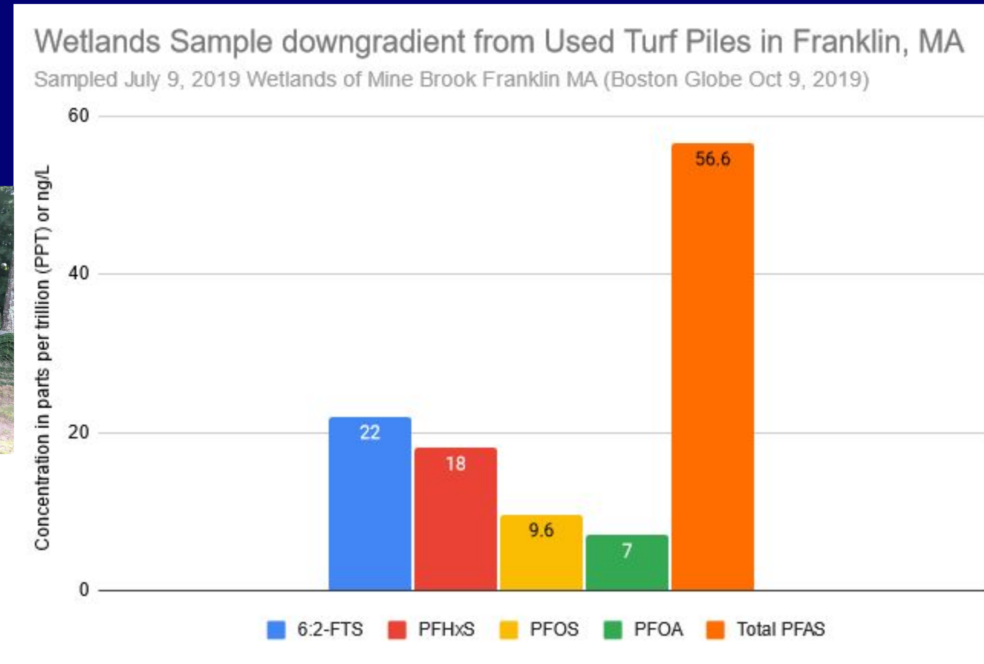


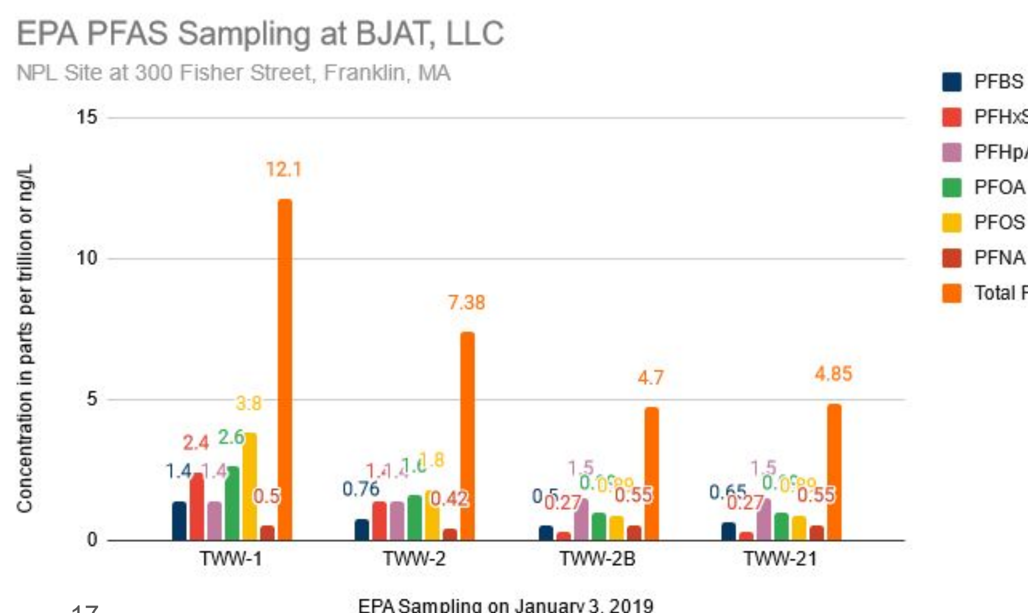




Real World Data
Franklin, MA



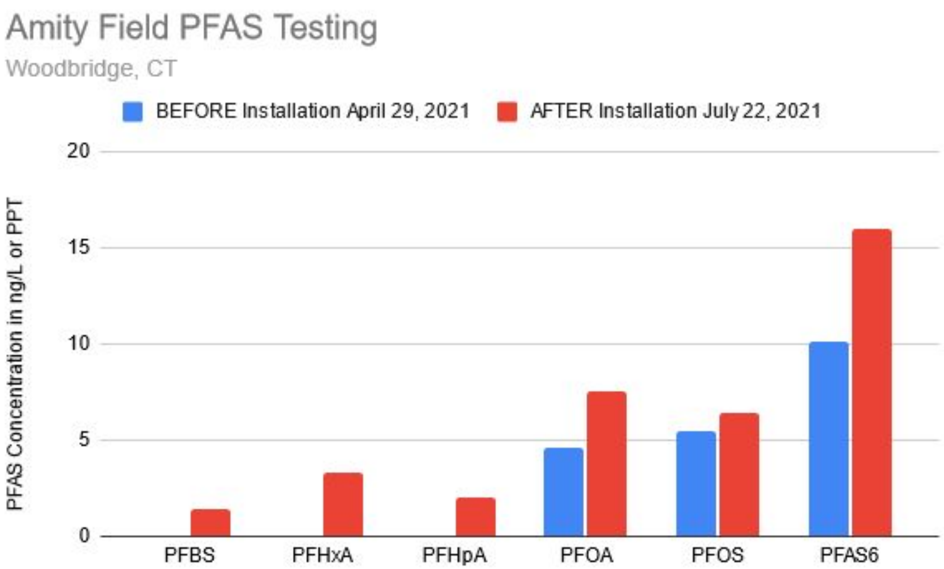




https://www.peer.org/wp-content/uploads/2019/10/10_10_19_Franklin_Wetland_Complaint-1.pdf

Real World Data

Woodbridge, CT



Metals: RCRA 6020	4/29/21	7/22/21
Arsenic	ND	ND
Barium	7.02 ug/L	6.99 ug/L
Cadmium	ND	ND
Chromium	ND	ND
Lead	ND	ND
Selenium	ND	1.18 ug/L
Silver	ND	ND

Neighbors File Appeal To Stop Artificial Turf Field

Date: September 03, 2020 | in: Top Stories, Town Depts. & Agencies

Two neighbors of Amity High School filed an appeal in New Haven Superior Court regarding the Town Plan and Zoning Commission decision to allow excavating and moving of earth materials for construction of an artificial turf field at the Johnson Football Field. The appeal states that the use of an athletic stadium employing artificial turf poses "unreasonable impacts to the health, safety and welfare of the community and the appellants."

https://woodbridgetownnews.com/neighbors-file-appeal-to-stop-artificial-turf-field/

Why are there PFAS in my turfgrass?

Graham Peaslee & Heather Whitehead

- We have screened dozens of different new and used turfgrass samples for total fluorine…
- Where does this fluorine come from?
- Likely that some fraction of PPAs sticks to or interlocutes in the plastic used in synthetic turf…
- We measure some short-chain PFCAs in run-off but there are a lot of polymer and polymer degradation products we do not measure by LC-MS/MS…

Unanswered Questions

Which PFAS are coming off the synthetic field system components? How much? How fast? By what mechanism(s)?

Eventual fate & transport? Bioavailability and toxicity?

How to safely recycle? How to phase out?

How to remediate?

Who is responsible?

Acknowledgements

Heather Whitehead, Jeff Gearhart, Tracy Stewart, Kyla Bennett, Rebekah Thomson, Diana Carpinone, Ayesha Khan, Ted Jankowski, Chandra Prasad, Susan Desmarais, Meegan Lancaster

NH DES

MassDEP

TURI

ITRC

Questions?

MassDEP Fact Sheet

Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water: Questions and Answers for Consumers

1. What are PFAS and how are people exposed to them?

Per- and Polyfluoroalkyl Substances are a group of chemical compounds called PFAS. Two PFAS chemicals, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), were extensively produced and are the most studied and regulated of these chemicals. Several other PFAS that are similar to PFOS and PFOA exist. These PFAS are contained in some firefighting foams used to extinguish oil and gas fires. They have also been used in a number of industrial processes and to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials (e.g., cookware) that are resistant to water, grease and stains. Because these chemicals have been used in many consumer products, most people have been exposed to them.

While consumer products and food are the largest source of exposure to these chemicals for most people, drinking water can be an additional source of exposure in communities where these chemicals have contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example, an airfield at which they were used for firefighting or a facility where these chemicals were produced or used.

2. What is the Massachusetts drinking water standard?

On October 2, 2020, MassDEP published its PFAS public drinking water standard or Massachusetts Maximum Contaminant Level (MMCL) of 20 nanograms per liter (ng/L), or parts per trillion (ppt) applicable to community (COM) and non-transient non-community (NTNC) systems for the sum of the concentrations of six specific PFAS. The six PFAS are: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA); and perfluorodecanoic acid (PFDA). MassDEP abbreviates this set of six PFAS as "PFAS6." This drinking water standard is set to be protective against adverse health effects for all people consuming the water. For information on the PFAS6 drinking water standard see: 310 CMR 22.00: The Massachusetts Drinking Water Regulations. For more information about the technical details behind the MMCL, see MassDEP's technical support document at: Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values.

3. What are the EPA Health Advisories and proposed MCLs for PFAS?

On March 14, 2023, the United States Environmental Protection Agency (EPA) announced proposed National Primary Drinking Water Regulations (NPDWR) for six Per- and Polyfluoroalkyl Substances (PFAS).

The EPA proposed regulations are draft regulations for limiting PFAS chemicals in Community (COM) and Non-Transient Non-Community (NTNC) public drinking water systems and are not enforceable until finalized. Currently, MassDEP is evaluating the proposed EPA regulations and will adopt regulations for public water suppliers (PWS) that are no less stringent than the final EPA regulations.

EPA's draft Maximum Contaminant Levels (MCLs) are:

- PFOA – 4.0 parts per trillion (ppt)
- PFOS – 4.0 ppt

PFHxS, GenX (HFPO-DA), PFNA, and PFBS – 1.0 Hazard Index (HI) (unitless)
For more information on the EPA proposed MCL, see EPA's Fact Sheet:
https://www.epa.gov/system/files/documents/2023-04/Public%20FAQs_PFAS_NPDWR_Final_4.4.23.pdf

MassDEP intends to provide comments to EPA on the proposed EPA MCLs. When EPA establishes MCLs for PFAS , which they have indicated will occur by the end of the year, MassDEP will adopt MCLs for these PFAS at least as stringent as EPA's.

For more information about EPA Health Advisories and the proposed MCLs for PFAS see Questions and Answers: Drinking Water Health Advisories for PFOA, PFOS, GenX, PFBS FAQs and https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas.

4. What health effects are associated with exposure to PFAS6?

The MassDEP drinking water standard is based on studies of the six PFAS substances in laboratory animals and studies of exposed people. Overall, these studies indicate that exposure to sufficiently elevated levels of the six PFAS compounds may cause developmental effects in fetuses during pregnancy and in breastfed infants. Effects on the thyroid, the liver, kidneys, hormone levels and the immune system have also been reported. Some studies suggest a cancer risk may exist following long-term exposures to elevated levels of some of these compounds.

It is important to note that consuming water with PFAS6 above the drinking water standard does not mean that adverse effects will occur. The degree of risk depends on the level of the chemicals and the duration of exposure. The drinking water standard assumes that individuals drink only contaminated water, which typically overestimates exposure, and that they are also exposed to PFAS6 from sources beyond drinking water, such as food. To enhance safety, several uncertainty factors are additionally applied to account for differences between test animals and humans, and to account for differences between people. Scientists are still working to study and better understand the health risks posed by exposures to PFAS. If your water has been found to have PFAS6 and you have specific health concerns, you may wish to consult with your doctor.

5. How can I find out about contaminants in my drinking water?

If you get your water from a public water system, you should contact them for this information. For a contact list for all public water systems in the Commonwealth you may visit:
https://www.mass.gov/media/831461/download

For private well owners see the Per- and Polyfluoroalkyl Substances (PFAS) in Private Well Drinking Water Supplies FAQ for more information.

6. What options should be considered when PFAS6 in drinking water is above MassDEP's drinking water

standard?

- ✓ Sensitive subgroups, including pregnant or nursing women, infants and people diagnosed by their health care provider to have a compromised immune system, should consider using bottled water that has been tested for PFAS6, for their drinking water, cooking of foods that absorb water (like pasta) and to make infant formula. Bottled water that has been tested for PFAS6, or formula that does not require adding water, are alternatives.
- ✓ For older children and adults, the MMCL is applicable to a lifetime of consuming the water. For these groups, shorter duration exposures present less risk. However, if you are concerned about your exposure while steps are taken to assess and lower the PFAS6 concentration in your drinking water, use of bottled water that has been tested for PFAS6 will reduce your exposure.
- ✓ Water contaminated with PFAS6 can be treated by some home water treatment systems that are certified to remove PFAS6 by an independent testing group such as NSF, UL, or Water Quality Association. These may include point of entry (POE) systems, which treat all the water entering a home, or point of use (POU) devices, which treat water where it is used, such as at a faucet.
- ✓ In most situations the water can be safely used for washing and rinsing foods and washing dishes.
- ✓ For washing items that might go directly into your mouth, like dentures and pacifiers, only a small amount of water might be swallowed and the risk of experiencing adverse health effects is very low. You can minimize any risk by not using water with PFAS6 greater than the MMCL to wash such items.
- ✓ The water can be safely used by adults and older children for brushing teeth. However, use of bottled water should be considered for young children as they may swallow more water than adults when they brush their teeth. If you are concerned about your exposure, even though the risk is very low, you could use bottled water for these activities.
- ✓ Because PFAS are not well absorbed through the skin, routine showering or bathing are not a significant concern unless PFAS6 levels are very high. Shorter showers or baths, especially for children who may swallow water while playing in the bath, or for people with severe skin conditions (e.g., significant rashes) would limit any exposure from the water.
- ✓ For pets or companion animals, the health effects and levels of concern to mammalian species, like dogs, cats and farm animals, are likely to be similar to those for people. However, because these animals are different sizes, have different lifespans, and drink different amounts of water than people it's not possible to predict what health effects an animal may experience from drinking water long-term with PFAS6 concentrations greater than the MMCL. There is some evidence that birds may be more sensitive to PFAS6. There is little data on PFAS6 effects on other species like turtles, lizards, snakes and fish. As a precaution, if you have elevated levels of PFAS6 in your water, you may wish to consider using alternative water for your pets. If you have concerns, you may also want to consult with your veterinarian.
- ✓ For gardening or farming, certain plants may take up some PFAS6 from irrigation water and soil. Unfortunately, there is not enough scientific data to predict how much will end up in a specific crop. Since people eat a variety of foods, the risk from the occasional consumption of produce grown in soil or irrigated with water contaminated with PFAS6 is likely to be low. Families who grow a large fraction of their produce would experience higher potential exposures and should consider the following steps, which should help reduce PFAS6 exposures from gardening:
    - o Maximize use of rainwater or water from another safe source for your garden.
    - o Wash your produce in clean water after you harvest it.
    - o Enhance your soil with clean compost rich in organic matter, which has been reported to

reduce PFAS uptake into plants.
  - Use raised beds with clean soil.

- **NOTE ON BOILING WATER:** Boiling water will not destroy these chemicals and will increase their levels somewhat due to water evaporation.
- **NOTE ON BOTTLED WATER:** Bottled water should only be used if it has been tested. The Massachusetts Department of Public Health (MDPH) requires companies licensed to sell or distribute bottled water or carbonated non-alcoholic beverages to test for PFAS. See https://www.mass.gov/info- details/water-quality-standards-for-bottled-water-in-massachusetts#list-of-bottlers- In 2022, the MDPH conducted a pilot surveillance program on PFAS in bottled water sold in Massachusetts. All bottled water test results met the MassDEP PFAS6 MCL and the US EPA's proposed MCLs.
- **NOTE ON POU and POE TREATMENT DEVICES:** Point of Use (POU) and Point of Entry (POE) treatment devices are not specifically designed to meet Massachusetts' drinking water standard for PFAS6, there are systems that have been designed to meet the USEPA's former Health Advisory of 70 ng/L for the sum of PFOS and PFOA. Any treatment device you use should be certified to meet the National Sanitation Foundation (NSF) standard P473 to remove PFOS and PFOA compounds so that the sum of their concentrations is below 70 ng/L. **Please be aware that 70 ng/L is significantly greater than the MassDEP's drinking water standard of 20 ppt for the PFAS6 compounds.** Many of these treatment devices certified to meet NSF standard P473 will likely be able to reduce PFAS6 levels to well below 70 ppt, but there are no federal or state testing requirements for these treatment devices. If you chose to install a treatment device, you should check to see if the manufacturer has independently verifiable PFAS6 monitoring results demonstrating that the device can reduce PFAS6 below 20 ppt. See more detailed information on POU/POE treatment systems in the Private Well Factsheet at https://www.mass.gov/info- details/per-and-polyfluoroalkyl-substances-pfas-in-private-well-drinking-water-supplies-faq

7. Where can I get more information on PFAS?

MassDEP PFAS Information. https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

Per- and Polyfluoroalkyl Substances (PFAS) in Private Well Drinking Water Supplies FAQ

Massachusetts Department of Public Health PFAS webpage: https://www.mass.gov/service-details/per-and-polyfluoroalkyl-substances-pfas-in-drinking-water

USEPA Health Advisories and the proposed MCLs for PFAS see Questions and Answers: Drinking Water Health Advisories for PFOA, PFOS, GenX, PFBS

Association of State Drinking Water Administrators PFAS webpage https://www.asdwa.org/pfas/

The Centers for Disease Control and Prevention's Public Health Statement for PFOS and PFOA can be found at: https://www.atsdr.cdc.gov/pfas/index.html

8. Where can I find more information about Treatment Devices for PFAS?

MassDEP information on drinking water treatment devices: https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water

NSF PFAS information: https://www.nsf.org/knowledge-library/perfluorooctanoic-acid-and-perfluorooctanesulfonic-acid-in-drinking-water

USEPA information on PFAS and treatment devices: https://www.epa.gov/research-states/pfas-treatment-drinking-water-and-wastewater-state-science and https://www.epa.gov/sciencematters/epa-researchers-investigate-effectiveness-point-usepoint-entry-systems-remove-and

UL information on PFAS and treatment devices: https://www.ul.com/offerings/testing-and-certification-water-filtration-products

The Water Quality Association information on PFAS, including treatment: https://wqa.org/resources/pfas/

For further information on PFAS in drinking water, including possible health effects, you may contact the Massachusetts Department Environmental Protection, Drinking Water Program at program.director-dwp@mass.gov or 617-292-5770.

Natural Grass Playing Field Case Study: Springfield, MA

Susan D. Chapnick <s.chapnick@comcast.net>
Thu 1/25/2024 12:55 PM
To:BOH <BOH@town.arlington.ma.us>

1 attachments (948 KB)
Natural+Grass+Playing+Field+Case+Study+Springfield+MA.+June+2019.pdf;

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Natasha,

Please accept this public communication to the Artificial Turf Study Committee. I am forwarding this communication as an Arlington resident, environmental scientist, and conservation commissioner, but these communications/statements are my own and not a representation of the full commission.

After listening in on the Artificial Turf Study Committee meeting of 1/23/2024, I understand that the committee is currently considering the information of other MA communities in terms of their decisions to permit/build/maintain artificial turf athletic fields. I also understand from Jim DeTullio's comments that the committee will also consider information of MA communities that decided to permit/build/maintain natural grass fields as an alternative to artificial turf fields.

The attached document, "Natural Grass Playing Field Case Study: Springfield, MA" authored by the Toxic Use Reduction Institute (TURI) of UMass, Lowell, gives a case study of organically managed grass fields in Springfield and discussed how the organic grass fields meet athletes' needs while also protecting the environment, which in this region of MA, is the Connecticut River Watershed area.

I believe that this case study is relevant to the committee's charge, with includes "a comparison of artificial turf to natural turf fields" (Warrant Article passed Town Meeting 2023).

For context, I also want to point out that TURI was created as an institute at UMass-Lowell in response to the Massachusetts Toxic Use Reduction Act (TURA) of 1989, which was designed to protect public health and the environment while enhancing the competitiveness of Massachusetts businesses. TURI provides information to inform policy on listing and delisting chemicals under TURA and also sponsors research into the development of cleaner, safer materials and technologies in support of compliance with TURA. TURI is considered a reputable resource for information on toxic use reduction in the state by MassDEP and the Office of Technical Assistance and Technology (OTA) under the Executive office of Energy and Environmental Affairs (EEOA). More information on TURI can be found here: https://www.turi.org/Our_Work/Policy/Chemicals_and_Policy

Respectfully submitted,
Susan

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Natural Grass Playing Field Case Study: Springfield, MA

Organic Grass Fields Meet Athletes' Needs and Protect Connecticut River Watershed

THE CITY OF SPRINGFIELD, Massachusetts, manages 12 properties, or a total of 67 acres, organically. This includes sports fields, park areas, and other public properties. Springfield's organically managed fields fully meet the community's needs for sports and other recreational activities, with high quality grass and soil.

Since starting the organic program in 2014, the city has doubled the number of properties in the program and experienced an increase in overall recreational use due to the improvement in soil and grass conditions.

This case study provides detailed information on the number of hours played at three parks in Springfield: two large complexes and one single, full-sized soccer field. Communities wishing to estimate the number of playable hours on a soccer field can use Treetop Park, the full-sized soccer field, as the most relatable model of the three parks discussed here. Treetop Park is used for approximately 1,050 hours of practice, play, and informal activity annually.

Children playing a pick-up soccer game on an organically-managed field in Springfield.

Aeration of the fields is a central element of successful organic maintenance. Other key elements include product application plans based on performance needs and soil testing for each field. Field management costs in 2018, including products, irrigation maintenance, and all labor costs, were just under $1,500 per acre across all the properties.

Springfield's organic management of natural grass has eliminated the need for pesticides, while providing a practical playing surface that fully meets the needs of athletes and others who use the parks. The Parks Department also notes that their field management choices help to protect water quality in the Connecticut River.

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

June 2019

Introduction

This case study has been developed by the Toxics Use Reduction Institute (TURI) as part of an effort to provide information to municipalities, schools, and other institutions as they make decisions about play surfaces. TURI has documented information on the materials often used in artificial turf playing fields.[1] TURI has also gathered information on natural grass fields and has developed a series of case studies to share experiences.

This case study focuses on the organic management of natural grass on city properties, including sports fields, by the Department of Parks, Buildings, and Recreation Management in the city of Springfield, Massachusetts ("the Parks Department"). This large, city-wide program includes management of nearly three million square feet, or 67 acres. However, the organic practices described in this case study can be used on grass properties of any size.

Forest Park baseball outfield. This area is converted to a soccer field in the fall.

Communities often have questions about whether natural grass can meet their athletic and recreational needs, and whether organic management of natural grass is cost-effective. TURI has compiled this case study so that other communities can learn from the successes in Springfield.

Overview

In 2014, the Springfield Department of Parks, Buildings, and Recreation Management made a commitment to begin organic management of its natural grass fields and parks. Springfield received support through a TURI grant to design and implement organic land care and grass turf management practices on municipal and school properties.

The city began with six pilot sites. Over time, the city expanded organic care practices to additional school properties and public land. As of June 2019, these properties include 12 organically managed sites (Table 1). The Parks Department hopes to expand the program city-wide within the next few years.

This case study provides information on maintenance and costs for all the fields currently under organic management. It also provides detailed use information on three individual field areas. Each of these fields is used for scheduled sports team activities. In addition, each field is used for other activities, such as concerts, pick-up games, and informal picnics.

Communities may have a variety of reasons for choosing organic practices for grass maintenance. For Springfield, the motivation was to protect the surrounding watershed and provide healthy playing spaces for youth.

[1] Massachusetts Toxics Use Reduction Institute. "Artificial Turf: Seeking Safer Alternatives for Athletic Playing Fields." Available at www.turi.org/artificialturf.

Table 1: Springfield organically managed properties in order from largest to smallest, June 2019		
Park	**Area (sq. ft.)**	**Sports/Other Information**
Blunt Park	757,508	Baseball, softball, football, soccer, lacrosse, and concerts
Forest Park Playing Field	733,165	Baseball, softball, football, soccer and concerts
Van Horne	459,994	Baseball, soccer, rugby concerts
Nathan Bill Park	306,662	Baseball, softball, soccer
Central High School	231,739	Baseball, soccer; two separate fields included in organic program
Treetop Park	117,771	Soccer
Sweeny Athletic Field at High School of Commerce	104,108	Athletic play and physical education classes
Court Square	74,862	Park in downtown Springfield across the street from City Hall; heavy foot traffic
Camp Wilder	64,577	Park with playground, pond, and small playing field; leisure sports; organically managed since construction
Terrace at Mason Square	25,350	Irrigated small park in downtown Springfield
Merrick Park	24,956	Small park in downtown Springfield
Mary Troy Park	22,700	Small park in the city; includes playground
Total organically managed area	**2,923,392**	

Project Design and Startup

The first steps in the organic management program were to conduct soil testing, identify priority actions to improve soil health, and allocate staff time for maintenance activities. Chip Osborne of Osborne Organics designed the testing protocol, analyzed results, and developed a detailed maintenance plan for the city.

Soil Testing

The soil testing provided information on physiochemical characteristics of the soil such as texture and acidity (pH), and levels of key nutrients such as phosphorus, potassium, nitrogen and calcium (Table 2). Soil testing also provided information on microorganisms in the soil, including bacteria, fungi, and nematodes. The correct balance of physiochemical and biological variables is essential to healthy soil and a healthy grass root system.

Since the project startup, Springfield has repeated selected soil tests every two to three years in order to estimate an accurate amount of fertilizer and other soil amendments to add to fields throughout the year.

Table 2: Variables measured during soil testing (examples)		
Physiochemical	**Nutrients**	**Biological**
Texture	Phosphorus	Total organic biomass
Moisture	Potassium	Active bacterial biomass
pH	Nitrate	Active fungal biomass
Organic content	Calcium	Nematodes

Source: Osborne, Chip. 2015. *Organic Land Care Project: Springfield, MA: Technical Review.* Report provided to Patrick Sullivan, Director, Springfield Parks Department.

Hours of Activity: Examples from Three Sports Fields

One of the questions frequently asked by decision-makers is how many hours of activity they will be able to schedule on a natural grass playing field. According to the Parks Department, organic management has improved the overall condition of these fields. Many hours of both formal and informal sports play occur on these fields, and there are few cancellations due to weather-related field conditions.

The Parks Department provided TURI with scheduled sports team use hours for two sports field complexes, Forest Park and Blunt Park, and one full-sized soccer field, Treetop Park.

Youth and adult (high school and adult league) sports teams generally use city fields from late March through late November. Hours of sports team use were estimated by multiplying the number of scheduled practices and games per week by the number of hours booked for each activity. Table 3 shows the number of weeks each sport is played per season, and the amount of time allotted for practices and games for each sport and age group.

Table 3: Weeks per season, hours of use per practice, and hours of use per game for each sport played on case study fields

Sport	Age Group	Weeks per Season	Hours per Practice	Hours per Game
Baseball/softball (Mid-March to June)	Adult	14	2	3
	Youth	14	1.5	2.5
Football (Mid-Aug to Nov)	Adult	14	3	3
	Youth	14	2	2
Soccer (Mid-Aug to Nov)*	Adult	14	2	2
	Youth	14	1.5	1
Lacrosse (Mid-April to June)	Adult	10	2	none **

*Soccer is played in both the spring and fall at Treetop Park. Treetop is the only park with a longer soccer season.

**Lacrosse games are not played on case study fields; only practice is held on these fields.

These fields are also used by Springfield residents for informal activities, such as pick-up games, or passive recreation, such as picnics. These activities take place during open park hours that have not been scheduled for team use, or on areas of the complex that are not in use during formally scheduled activities. Though this type of use is not formally tracked, the Parks Department noted steady use for unscheduled activities throughout the year. In the absence of data on informal activities, TURI estimated that Forest Park and Blunt Park were used for an additional 14 hours per week, and Treetop Park an additional seven hours per week, of informal/ unscheduled activity.

Cancellations

Baseball games and practices are rescheduled during active rain. In general, baseball field use is cancelled during rain because puddles form on the clay areas in the infield. This is unrelated to the organically managed grass, and is standard for baseball fields. An estimated total of 30 baseball games/practices were cancelled in 2018 in both Forest Park and Blunt Park, primarily due to rain at the time of the scheduled activity.

In contrast, soccer, football, and lacrosse generally do not need to be cancelled due to rain. Cancellations occur only if there has been heavy rain for an extended period of time (a full day or more). For soccer, football and lacrosse in 2018, there were 10 individual game or practice cancellations at Forest Park, zero cancellations at Blunt Park, and 12 individual game or practice cancellations at Treetop Park.

Forest Park: Baseball and Soccer Complex

The playing field area at Forest Park is around 730,000 square feet and includes four 60-foot diamonds and two 90-foot diamonds with converging outfields.[2] The fields are open seven days a week from dawn until dusk. Scheduled play occurs each weekday from 2 p.m. to 8 p.m., and weekend days from 9 a.m. to 7 p.m. During these time periods, the area is in continuous use by sports teams.

In the spring and summer, the sports complex is used primarily for baseball and softball team games and a few weeks of pre-season practices. An average of 20 adult and 25 youth baseball and softball team games were played weekly in the spring/summer season of 2018.

In the fall, the baseball outfields are merged together to form three soccer fields used for both team practices and games. In 2018, adult teams used the fields for 10 games and 10-15 practices per week. Youth teams used the fields for 15 games and 10-15 practices per week.

Over the course of 2018, sports teams used the Forest Park sporting complex just over 200 hours per week, or nearly 2,900 hours for the entire year, for sports practice and games. Adding estimated informal use time leads to an estimated total of nearly 3,300 hours per year. Table 4 shows the total number of hours used by adult and youth teams for each sport per season.

Table 4: Forest Park baseball and soccer complex (733,165 sq. ft.): Hours of use for sports practice and games, 2018

Sport	Age Group	Season	Total Use: Hours per Week*	Total Use: Hours per Season
Baseball/softball	Adult	Spring	67	940
	Youth	Spring	68	950
Soccer	Adult	Fall	40	560
	Youth	Fall	30	420
Total documented sports team use – all seasons			**205**	**2,870**
Estimated informal recreation hours			14	392
Estimated total hours – all seasons			**219**	**3,262**

*Baseball/ softball and soccer seasons were 14 weeks each. Informal use hours were calculated for 28 weeks. Hours do not account for cancellations. There were approximately 60 hours of baseball cancellations and 20 hours of soccer cancellations in 2018.

[2] "60 foot" and "90 foot" refers to number of feet between bases. The sizes of these fields are standard for baseball and softball diamonds.

Blunt Park: Baseball, Soccer, Football, and Lacrosse Complex

Blunt Park's field area measures around 760,000 square feet and is open from dawn until dusk. The sports complex contains four 60-foot fields and two 90-foot diamonds, along with space for other recreation. The complex is mainly used for baseball/softball, football, soccer, and lacrosse practices and games. The park is also used for pickup games and many other non-sports events, such as concerts, throughout the year. Table 5 shows the total number of hours used by adult and youth teams for each sport per season.

In spring and summer 2018, the fields were used for 35-40 adult baseball/softball practices per week before the start of the season. During the game season, they were used for an average of 20 adult games per week. Youth teams used the fields for 15-20 youth practices and an average of 10 games per week. Blunt Park outfields were also used for five youth lacrosse practices per week during the spring.

In the fall, these baseball/softball outfields are combined and converted into two football fields and one combination field area for soccer, football, and lacrosse. During the 2018 football season, the outfield complex was used for 15 adult and five youth football practices per week. The field was also used for eight adult and five youth football games per week. During the fall soccer season, the field was used for five adult and five youth practices per week throughout the season. In addition, the field was used for five adult lacrosse practices per week during the fall. The estimated hours of use by sports teams on the complex totaled just over 230 hours per week and just over 3,200 hours for the year. Including estimated informal recreation, the field complex was used for about 3,600 hours in 2018.

Table 5: Blunt Park baseball, soccer, football, and lacrosse complex (757,508 sq. ft.): Hours of use for sports practice and games, 2018

Sport	Age Group	Season	Total Use: Hours per Week*	Total Use: Hours per Season
Baseball/softball	Adult	Spring	70	980
	Youth	Spring	48	665
Lacrosse	Adult	Spring	10	100
Football	Adult	Fall	69	966
	Youth	Fall	20	280
Soccer	Adult	Fall	10	140
	Youth	Fall	8	105
Total documented sports team use – all seasons			**234**	**3,236**
Estimated informal recreation hours			14	392
Estimated total hours – all seasons			**248**	**3,628**

*Baseball/ softball, football, and soccer seasons were 14 weeks each. Lacrosse season was 10 weeks. Informal use hours were calculated for 28 weeks.

Hours do not account for cancellations. There were approximately 60 hours of baseball cancellations in 2018.

Treetop Park: Full-Sized Soccer Field

Treetop Park is around 118,000 square feet and is primarily reserved for scheduled soccer practices and games in the spring, summer, and fall. The field is used less frequently for informal recreation than Forest Park and Blunt Park, as the entrance to the parking lot is locked. Table 6 summarizes the number of hours used for each sport and age group in 2018.

Forest Park and Blunt Park both include multiple overlapping fields. In contrast, Treetop Park is a single, full-sized soccer field. Communities wishing to estimate number of playable hours on a soccer field can use Treetop Park as the most comparable model.

In spring 2018, the field was used for five adult and 10 youth practices per week, two weeks prior to the start of the official spring playing season. During the official season, the field was used for five adult and 10 youth games per week. In the fall, Treetop was used for five practices and five games by adult teams, and five practices and 10 games by youth teams per week. The soccer field was estimated to have been used by sports teams for about 60 hours per week and just over 850 hours for the year. If estimated informal use is included, usage in 2018 totals about 1,050 hours.

Table 6: Treetop Park soccer field (117,771 sq. ft.): Hours of use for sports practice and games, 2018

Sport	Age Group	Season	Total Use: Hours per Week*	Total Use: Hours per Season
Soccer	Adult	Spring	11	160
	Youth	Spring	12	170
Soccer	Adult	Fall	20	280
	Youth	Fall	18	245
Total documented sports team use – all seasons			**61**	**855**
Estimated informal recreation hours			7	196
Estimated total hours – all seasons			**68**	**1,051**

*Soccer is played year-round at Treetop Park. Spring and fall seasons were 14 weeks each. Informal use hours were calculated for 28 weeks.

Hours do not account for cancellations. There were approximately 24 hours of soccer cancellations in 2018.

Maintenance

Maintenance occurs throughout the playing season, and includes aeration and the application of organic products including fertilizer and soil amendments. Soil amendments are materials added to soil to improve physical and/or chemical properties. Table 7 shows the 2018 schedule for aeration and application of organic products for the three parks highlighted in this case study.

Aeration

Aeration is accomplished by pulling up plugs of soil and grass using a riding or push machine. This process relieves compaction of soil and thatching of grass and allows air, water, and added nutrients to penetrate the soil. Aeration can be a time-consuming process, but is arguably the most important step for maintaining healthy, organic grass.

All of the organically managed fields in Springfield are aerated four times per year (Table 7). The Park Environmental Specialist aerates all the fields, at times with the assistance of one additional staff member. Choosing the type of aerator to use depends on the size of the grass area. A riding aerator is used for large, open areas with space for wide, gradual turns. A smaller push aerator is used for smaller areas or tight spaces near sports equipment or trees.

Springfield's tractor-led aerator used for large areas

Fertilizers and Soil Amendments

Springfield uses organic fertilizers and soil amendments and utilizes services provided by PJC Organics, a small consulting company and fertilizer producer/distributor in Massachusetts. PJC organizes soil testing and recommends products and their application schedules for each park based on these results along with performance needs.

Recommendations include how many pounds of product are needed per field, per acre, and per application. These site-specific recommendations help avoid over-application of products.

Springfield uses an organic granular fertilizer made from soybean meal, feather meal, and potassium sulfate. Fertilizer is added to each field twice per year: once early in the summer, and again in late summer (Table 7). Springfield uses a Lely Broadcast Spreader to apply all products to fields.

Springfield also uses soil amendments including a soil conditioner and lime. The soil conditioner is made with biochar (charcoal), kelp, molasses, and soybean and is used to improve the chemistry, structure, and biological activity in the soil. Conditioner is added to the fields in the spring or early summer to jump-start microbial activity. Lime is added to the fields in October to adjust soil pH.

Key elements of Springfield's organic grass management:

- Soil testing for physical, chemical, and biological characteristics
- Aerating grass and soil
- Using organic fertilizer & soil amendments
- Mowing regularly

Table 7: Aeration and organic product applications schedule, 2018

Location	Field Aeration				Fertilizer		Conditioner	Lime
	Round 1	Round 2	Round 3	Round 4	Round 1	Round 2		
Blunt Park	May	Jun	Sep	Nov	Jun	Sep	Jun	Oct
Forest Park	Apr	Jun	Sep	Oct	May	Sep	Jun	Oct
Treetop Park	May	Jun	Aug	Oct	Jun	Oct	spring	Oct

This table shows only the fields highlighted in this case study. The other organically managed properties follow a similar schedule.

Costs

The majority of costs fall into three main categories: products, irrigation maintenance, and staffing. In general, costs associated with organic grass management often decrease after the first few establishing years, as the health of the soil and vegetation improves. The following are cost figures for 2018, the fourth year of Springfield's organics program.

Products

Products include organic fertilizer, soil conditioner and lime. The amount of product needed for a field depends on soil properties and intended use of individual fields. Grass seed was used to fill in small areas of heavy use, such as the areas in front of soccer goals. The amount of grass seed needed to accomplish this was small, and the cost was negligible for the year.

In 2018, Springfield used 440 pounds of fertilizer (total for two applications), 420 pounds of soil conditioner, and 230 pounds of lime per acre of land (Table 8). Springfield spent a total of $670 per acre, or $45,280 total, on soil products in 2018. A further breakdown of product cost estimates per organic property is shown in Table 9.

Irrigation Maintenance

Maintenance costs associated with irrigation include repairs on sprinkler heads and water lines, as well as the winterization of the system during months when the ground freezes. Springfield spent a total of $7,200 on irrigation maintenance in 2018 (Table 9).

The total cost for the Parks Department's organic management of 12 grass properties was $98,080 in 2018 (Table 9). Broken down by acre of land, the city paid around $1,460 per acre.

Table 8: Annual amount of soil products used and associated costs per acre in Springfield's organic management program, 2018

Product	Pounds Used per Acre	Cost per Acre
Fertilizer (two applications)	440	$410
Conditioner	420	$200
Lime	230	$60
Totals	**1,090**	**$670**

Totals are rounded to the nearest 10.

Table 9: Estimated annual costs for 12 organically managed grass properties in Springfield								
Products								
Location	**Acres**	**Fertilizer (per acre)**		**Soil conditioner (per acre)**		**Lime (per acre)**		**Total Cost**
		Pounds	**Cost**	**Pounds**	**Cost**	**Pounds**	**Cost**	
Blunt Park	**17.4**	**7,650**	**$7,190**	**7,220**	**$3,500**	**3,830**	**$1,030**	**$11,720**
Forest Park Playing Field	**16.8**	**7,410**	**$6,960**	**6,990**	**$3,390**	**3,700**	**$1,000**	**$11,350**
Van Horne	10.6	4,650	$4,370	4,380	$2,130	2,320	$630	$7,130
Nathan Bill Park	7.0	3,100	$2,910	2,920	$1,420	1,550	$420	$4,750
Central High School playing field	5.3	2,340	$2,200	2,210	$1,070	1,170	$320	$3,590
Treetop Park	**2.7**	**1,190**	**$1,120**	**1,120**	**$540**	**600**	**$160**	**$1,820**
Sweeny Athletic Field at High School of Commerce	2.4	1,050	$990	990	$480	530	$140	$1,610
Court Square	1.7	760	$710	710	$350	780	$100	$1,160
Camp Wilder	1.5	650	$610	620	$300	330	$90	$1,000
Terrace at Mason Square	0.6	250	$240	240	$120	130	$40	$400
Merrick Park	0.6	250	$240	240	$120	130	$30	$390
Mary Troy Park	0.5	230	$220	220	$110	120	$30	$360
Annual total for products on 12 fields								$45,280
Maintenance								
Irrigation maintenance	Includes all repairs: broken sprinkler heads, lines, startup, shutdown and winterization							$7,200
Labor								
Labor costs for all fields	Includes full-time staff and assistant for 120 days of work							$45,600
Annual total for products, maintenance, and labor on 12 fields								$98,080
Annual total for products, maintenance, and labor per acre								**$1,460**

Totals have been rounded to the nearest 10. Case study fields are highlighted in green text.

Summary and Lessons Learned

Between the beginning of the program in 2014 and the end of 2018, the city has doubled the number of properties in its organic program and experienced an increase in overall recreational use due to the improvement in soil and grass conditions. These results were accomplished through frequent aeration of the fields, and the creation of field-specific product application plans based on performance needs and soil testing for each field. Field management costs in 2018, including products, irrigation maintenance, and all labor costs, were just under $1,500 per acre across all the properties.

Springfield's experience is that the organically managed fields fully meet the community's needs for sports and other recreational activities. They have also found that all of the organically managed properties have higher quality grass and soil than those outside of the program.

The Parks Director notes that field needs have changed over time. In the past, there were few or no formally scheduled sports after the baseball season ended in early July. Today, sporting requirements continue throughout the year. The fields never shut down during open hours, and game cancellations are rare.

"The organically managed fields are definitely in better condition than they were before organic management. When you look at a natural meadow, it's self-sustaining. That's what we're replicating with our organic fields. And our parks are part of the Connecticut River watershed, all of our choices affect that broader ecosystem."

– Patrick Sullivan, Director, Springfield Parks Department

For 2018 use information, this case study focused on three fields: Forest Park, Blunt Park, and Treetop Park. Formal use of the Forest Park sports complex totaled about 2,900 hours by baseball and soccer teams, and about 3,300 hours per year with estimated informal use included. Blunt Park sports complex totaled about 3,200 hours of use by baseball, football, and lacrosse teams, and about 3,600 hours with estimated informal use included. Treetop Park was used about 850 hours by soccer teams, and a total of about 1,050 hours with an estimated informal use included. Treetop Park is the best field to use for comparison of playable hours on an individual field, as it is composed of a single, full-sized soccer field.

The Parks Department Director recommends using organic management as soon as a field is constructed, when possible. Camp Wilder, a field measuring 64,577 square feet and used for general recreation by a summer camp, has been managed organically since it was constructed. Planning for organic management at the beginning of the field's life saved Springfield time and money on restructuring soil and grass in the future.

Staff working on the organic program note that the process is time-consuming but that they derive satisfaction from the process and its results. They consider field aeration to be the most essential element of the program.

The Parks Department notes that their choices affect water quality in the Connecticut River, illustrating that there are broad advantages to choosing the organic approach. The Parks Department has set a goal of reaching out to homeowners to educate them about the advantages of organic grass management, further expanding the benefits of this project.

To view our video documenting the Springfield Parks Department's experience, visit:

www.turi.org/Our_Work/Community/Organic_Lawn_Care

Acknowledgments

This case study was prepared by Lindsey Pollard and Rachel Massey (Toxics Use Reduction Institute). Information for this case study was provided by Adam Anulewicz, Randy Piteo, Peter Krupczak, and Patrick Sullivan (Springfield Department of Parks, Buildings and Recreation Management); Chip Osborne (Osborne Organics); and Fred Newcombe (PJC Organics). Polly Hoppin and Liz Harriman provided input on the case study. Funding for the preparation of this case study was provided by the Heinz Endowments.

The Toxics Use Reduction Institute is a multi-disciplinary research, education, and policy center established by the Massachusetts Toxics Use Reduction Act of 1989. The Institute sponsors and conducts research, organizes education and training programs, and provides technical support to help Massachusetts companies and communities reduce the use of toxic chemicals.

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Artificial Turf Study Committee - cost table from 1/23/24 meeting packet

Susan D. Chapnick <s.chapnick@comcast.net>

Thu 1/25/2024 1:24 PM

To:BOH <BOH@town.arlington.ma.us>

Natasha and Artificial Turf Study Committee members:

Sorry for the multiple emails today, but I thought it would be easier to communicate if each email had a specific topic. This one concerns the Maintenance cost table comparison of artificial turf vs. natural grass that was presented in the meeting materials from the 1/23/24 meeting packet.
Could you please provide clarification of the following items?
1. Are these annual costs for 1 field or all of Arlington's fields?
2. If the costs are current costs for all fields, can they be broken down to compare 1 field of Artificial Turf compared to 1 field of Natural Grass?
3. Please clarify why the annual maintenance costs for artificial turf in the cost table submitted are much lower than the maintenance items/cost listed in the SportsTurf Managers Association (STMA) reference; Turfgrass Resource Center, Table "Comparative Guide: Equipment and Maintenance"
https://www.sportsfieldmanagement.org/wp-content/uploads/2017/11/Artificial-Turf-Booklet-2.pdf
Items in this reference with annual maintenance costs in 2006 dollars include:
-Painting (included in cost table submitted) $5,500
-Top Dressing / Infill $5,000
-Brushing/sweeping $3,000
-Disinfecting / Fabric Softener $220
-Carpet Repair (rips, joints) $4,500
-Water Cooling $7,500
-Weeding $750
4. I note that the cost table presents just maintenance costs, not including installation or replacement. Could the table be updated with installation and replacement costs, for example, for a 20-year lifecycle?

Thank you for answers to these questions so that we can develop a clearer understanding of the life-cycle costs of artificial turf fields vs. natural grass fields.

Respectfully submitted,
Susan

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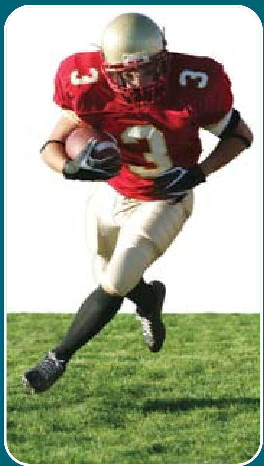
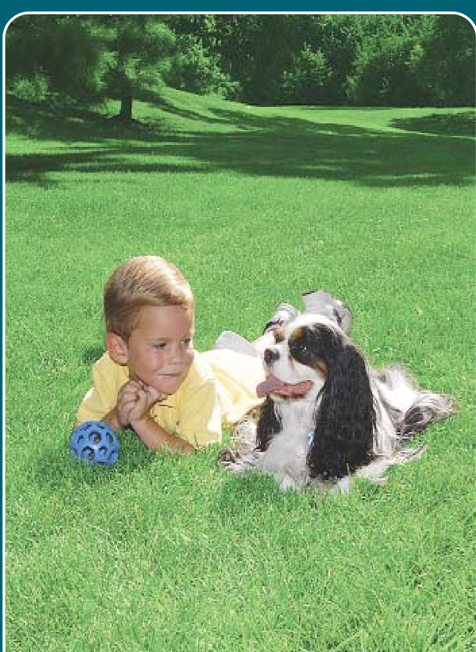
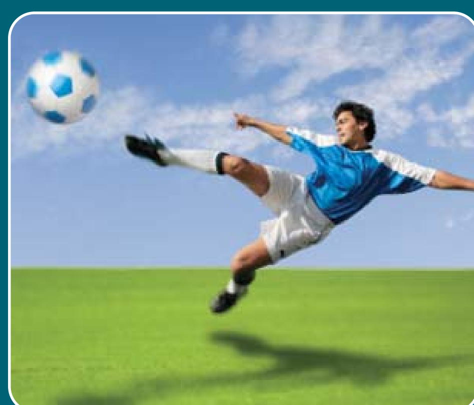


Natural Grass and Artificial Turf: Separating Myths and Facts





Published by the
Turfgrass Resource Center
www.TurfResourceCenter.org

PREFACE:

Natural Grass and Artificial Turf – Separating Myths and Facts

The intent of this publication is to present insightful information regarding the myths and facts about natural grass and artificial turf. Responsible questions about natural grass and artificial turf must be asked and answered truthfully with scientific data and facts, not with marketing materials and unsubstantiated claims. The information in this booklet is based on a literature review of scientific data, case studies and other information from industry professionals. The Turfgrass Resource Center considers this publication to be a positive step toward an honest dialogue.

Natural turfgrass playing surfaces have been used successfully for many years and there is a wealth of scientific data documenting their safety. With proper management and balanced use, natural grass fields have been proven to withstand and accommodate multiple sports team usage. While natural grass surfaces may become worn from excessive use, those portions of the fields can be easily, economically and quickly replaced. With proper management, the playability of a natural grass field, with a consistent and uniform playing surface, can be maintained year after year for a fraction of the cost of an artificial turf surface over its projected life expectancy. An entire natural turfgrass field could be replaced every year and have the worn parts of the field repaired, all at a significantly lower cost than installing and maintaining an artificial turf field.

A well maintained natural grass field may require water, fertilizer, pest management and mowing, but at significantly lower levels than often claimed by artificial turf sales people. An artificial turf field requires watering to cool the field to make it playable during warm days. What is generally omitted is the fact artificial turf fields need pesticides and disinfectants to prevent or eliminate mold, bacteria and other hazards that would otherwise be biodegraded by the natural environment of turfgrass fields. The maintenance equipment required for artificial turf fields is often underestimated. Companies produce entire lines of maintenance equipment for upkeep of artificial fields and for bringing them back to a playable condition.

While artificial turf has made improvements, artificial turf manufacturers continue attempts to simulate the exceptional playing surface that only natural grass provides. No matter what you call it – Artificial Turf, Synthetic Turf, Plastic Grass – it is a fact that

artificial surfaces lack most of the benefits provided by natural turfgrass. Many athletes, coaches, parents and spectators take for granted the significant benefits of natural grass. Over 20 such benefits are listed within this booklet. These numerous benefits confirm natural grass as the best sports surface, which is why artificial turf companies try so hard to replicate its look and feel.

Companies involved in the manufacture or marketing of artificial turf acknowledge they have a responsibility to address concerns about their products; however their products have a relatively short history from which to draw any proven results. It is disconcerting that very few people question the erroneous claims of marketing firms and consider their data to be factual. More scientific research is needed to directly address reliability, longevity and the potential negative impact of artificial turf with regards to safety, health and environmental issues.

> ***"Make all fields grass to prevent injuries."***
>
> ***This is number one of five written "common responses" by 1,511 National Football League (NFL) players in a playing surface survey.***[1]

Municipalities, schools and groups are beginning to wake-up to the potential problems and negative affects involved with artificial turf. Several have placed a moratorium on its use until more of these questions have valid, scientific answers based on proven data. Parents, athletic booster clubs, schools boards, athletic directors, coaches and local officials deserve answers to help them evaluate unsubstantiated claims.

Surveys of NFL players show that most athletes prefer a natural grass playing surface and feel it is the more desirable, premium surface. The fact that others have installed artificial turf surfaces is not an acceptable reason to ignore the research and facts.

Choosing the best playing surface for our children and athletes should not be taken lightly. Anyone interested in a sustainable future should be fully informed about the benefits of natural turfgrass to our ecosystem and concerned about the potential negative impact of using synthetic surfaces.

1 National Football League Players Association 2006 NFL Players Playing Surfaces Opinion Survey, www.NFLPlayerAssociation.com

Table of Contents

Introduction

The decision of whether to install artificial turf or natural grass is one that requires serious consideration of all related science-based information. Current trends should be put aside in favor of the facts that can have short- and long-term rewards or consequences. Unsubstantiated claims, over-statements, misstatements or misunderstandings and fads should not be part of the decision-making process.

While there are situations when artificial turf might be an appropriate choice, scientific research documents the significant environmental, health and safety benefits of natural grass which should be the first consideration.

The true costs of proper installation, care and maintenance of artificial turf fields varies as widely as those of natural grass. The key word is "proper," as in whatever it takes to maintain high quality fields. The most reliable means for estimating true costs is to request a comprehensive bid proposal from artificial turf and from natural turfgrass producers, inclusive of actual costs for pre-installation field preparation, installation, post-installation care and maintenance, annual and seasonal maintenance, and repair for an extended period of time such as five or ten years.

Safety and health benefits are a major concern when selecting a sports field surface.

Decision-Makers Need to Know

To make fiscally and environmentally sound decisions regarding the potential purchase and installation of artificial turf or natural grass in their communities, decision-makers have the responsibility to consider a wide range of issues and concerns. The following information has been assembled to help them make the appropriate decision.

What Is Artificial Turf?

Artificial turf was first invented in 1965. The first synthetic turf fields were not much more than green plastic indoor-outdoor carpet. At the time, some members of the industry thought that as more teams moved to an indoor stadium, grass would not grow as well and would require a substitute.

While artificial turf today has evolved from the plastic mats of old, the "turf" is still attached to such a mat, with the fibers composed of polyethylene lubricated with silicone. A layer of expanded polypropylene or rubber granules (made mostly from recycled car tires) and sand serve as an "infill" to add shock absorbency. It is recommended that this infill be replenished and/or redistributed on a regular basis.

The advantages of artificial turf lie in its ability to withstand heavy use, even during or immediately after a rainstorm. Fields enduring high traffic situations throughout the year (particularly winter) benefit from its durability and effective drainage systems when properly incorporated into the field design. However, this is not inexpensive. The construction of the artificial turf field at Brigham Young University cost 2.5 million dollars with 1.7 million dollars of that amount spent on subsurface and drainage.[3] Artificial fields require a different type – but just as extensive maintenance protocol – as natural grass, particularly if used regularly for a multitude of sports events.

The Roll of Natural Grass in Sports

As of 2006, the majority of professional sports fields still used natural grass. In the National Football League, two-thirds of the stadiums (20 fields) used natural grass while 11 stadiums used artificial turf. Even more dramatically, only four of 30 baseball stadiums chose artificial turf.

In Europe and North America, some soccer clubs converted to synthetic turf in the 1980s, but soon converted back to natural grass when both players and spectators complained. Not only did players find the hard surface unforgiving but the bounce of the ball was affected, changing the dynamics of the games. Although

Survey questions asked of 1,511 National Football League players: [2]

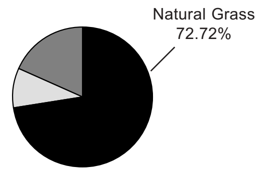
"What type of field do you prefer to play on?

Responses:

72.72 % Natural Grass

18.09% Artificial Turf

9.19% No preference



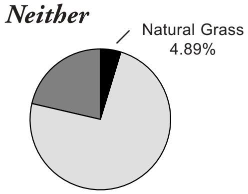
"Which surface do you think causes more soreness and fatigue to play on?"

Responses:

4.89% Natural Grass

73.87% Artificial Turf

21.24% Neither



2 "National League Players Association 2006 NFL Players Playing Surfaces Opinion Survey", *Op. cit.* Questions 8 and 2

3 C. Frank Williams and Gilbert Pulley, "Synthetic Surface Heat Studies," Brigham Young University, www.byu.edu, p 2

Grass strength is important for a successful sand based sports field.

Photo: A turfgrass stretching device used to measure grass strength

"Although many types of turf undergo university trials, there is a lack of information on the long term impact of artificial turf."

Photo: Folsom High School, Folsom, CA

the Federation International de Football Association (FIFA) allows the use of synthetic turf,* some international soccer teams absolutely refuse to play on artificial turf.

Although many types of turf undergo university trials, there is a lack of information on the long-term impact of artificial turf. While government organizations like the Department of Agriculture and the Environmental Protection Agency exist to educate users and oversee the effects of natural grass, there are no government restrictions or guidance in reference to artificial turf.

While modern artificial turf has evolved considerably, so has modern natural grass. Natural grass fields of yesterday that were often muddy, rough or simply unplayable have been replaced with modern turfgrass varieties developed for greater durability, even under heavy traffic conditions. Different types of natural grass fields are referred to throughout this document; the most modern fields have significant drainage, at least 90 percent uniform sand in the profile mix, and the best varieties of sports turfgrass.

Natural soil or native soil fields have soil compaction and drainage limitations that are overcome with the improved, soil-modified fields. Native soil fields should only be used when they are necessitated by financial limitations. For native soil fields to have any hope of providing quality turf under average traffic conditions, they must have proper pitch and adequate drainage.

A Standard of Comparison

In both theoretical and practical terms, a fair comparison between natural grass and artificial turf should include the most modern, technologically advanced fields available on both counts.

The following information examines six major considerations one should use when comparing artificial turf and natural grass: 1) safety issues; 2) cost analysis of various sports fields; 3) wear, durability and maintenance of field surfaces; 4) human safety and health issues; 5) environmental issues; and, 6) future research issues.

Part I: Sports Field Surfaces: Opinions of NFL Players and Professional Organizations

The National Football League Players Association (NFLPA) announced the results of a league-wide player survey concerning NFL club's playing surfaces. The written survey, directed by the

* FIFA's marketing department promotes artificial turf fields, recieving significant contractor fees for FIFA-approved turf fields

Board of Player Representatives, was conducted by staff members at team meetings during September through November, 2006. A total of 1,511 active NFL players from all 32 teams voluntarily filled out survey forms. This survey is conducted every two years.[4]

The survey revealed that 72.72% of the players prefer to play on a natural grass surface: 18.09% selected artificial turf; but, when playing on artificial turf, 90.85% of the players wanted the softer "infill" which causes a safer playing surface – making the artificial turf field more like a well maintained natural grass field.

The last part of the survey asked for additional comments. Number one of the five most common responses by players was "Make all fields grass to prevent injuries."

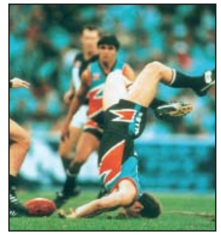
After one of the earlier NFLPA surveys related to field surfaces, former Executive Director Gene Upshaw stated: "In this survey, we have heard from the true experts on playing surfaces – the players."[6]

More details from the 2006 NFLPA survey are included throughout this report. In addition, there is information on safety and health issues related to artificial turf and natural grass in Part 4.

Synthetic Fields are Being Called Into Question All Over the World

In spite of aggressive lobbying from synthetic turf marketing groups, safety and health problems related to synthetic surfaces have caused concerns and moratoriums throughout the world. Dr. Guive Mirfendereski, editor at www.synturf.org, published the following articles: *

- The Scottish Premier League banned synthetic pitches for competition matches.
- The Italian Minister of Health found that synthetic turf fields are potentially carcinogenic (cancer producing substance).
- The Center for Disease Control and the Mount Sinai Children's Environmental Health Center issued warnings about the hazards of artificial turf.
- Norway has banned synthetic turf.
- The UEFA (Union of European Football Associations) has ordered that the 2008 European Champions League final must take place on natural grass.



"Thank goodness the turf [grass] tore instead of my spinal cord! My playing career, and possibly my life, was saved by the softness of the surface." [5]

Jason Dunstall
Australian Football League

"This artificial grass was a disaster. It hurt my feet. I really hope we don't get this in the Amsterdam Arena. If this is the future, I'd better stop playing football [soccer]"**

Rafael van der Vaart
Soccer player for Ajax Amsterdam
The Netherlands

4 "The NFL Players Playing Surfaces Opinion Survey," *Op. cit.*
5 Wendell Mathews, Ph.D., "Editorial Comment: A Photo Worth a Thousand Words," Turf News, November/December, 1999, p. 11
6 Wendell Mathews, *Ibid*
* Guive Mirfendereski is an attorney in private practice. He manages the website www.SynTurf.org , a public interest clearinghouse for information related to artificial turf fields.
** From "Why choose natural turf? A discussion on natural versus artificial turf for sport and leisure applications," by the European Seed Association, 2006

■ All seven professional baseball stadiums in development at the time of this writing will have natural grass, including Cisco Field (Oakland A's). AT&T Park has always had natural grass. Monster Park (Candlestick) returned to natural grass in 1979. Only five synthetic pro stadiums still remain; two of these will be abandoned by major league baseball in 2009.

■ The NFL Players Association repeatedly renounces synthetic turf in its biannual polls because of its tendency to aggravate injury.

■ A growing number of communities in California are opposing the installation of synthetic fields, including San Carlos, Woodside, Danville and Atherton.

■ Two stadiums were closed in New Jersey in 2008 by the recommendation of the New Jersey Department of Health after it found high levels of lead in the stadium's nylon-fiber artificial turf.

■ A Dutch investigation stated: "the leaching of zinc [from a synthetic turf surface] is a major concern."

■ South Korea's Education Ministry began investigating the safety of recycled rubber granules following student complaints of nose and eye irritation.

■ The Swedish Chemical Agency recommended that tire waste not be used in constructing synthetic turf fields because the product releases hazardous materials.

■ The non-profit organization, Environment and Human Health, Inc. (www.ehhi.org), has called for a moratorium on synthetic surfaces.

■ State legislators in California, New York, New Jersey and Minnesota have called for a moratorium.

■ The U.S. Consumer Product Safety Commission is investigating potential hazards from lead in artificial turf sports fields.

■ The Attorney General of Connecticut has called for further studies associated with risks related to artificial turf.

Crumb rubber is used in the base below the surface of the artificial turf carpet– "Inhalation of components of tire rubber or dust particles from tire rubber can be irritating to the respiratory system and can exacerbate asthma."

Dr. Joseph P. Sullivan
An Assessment of Environmental Toxicity and Potential Contamination from Artificial Turf using Shredded or Crumb Rubber*

Part 2: Cost Analysis of Various Types of Sports Fields

Since conditions and requirements vary, there is no single definitive answer or figure to describe the costs of constructing and maintaining a natural grass field or a synthetic field.

Just as natural grass sports fields have an installation cost range because of base soil conditions and their preparation, the installation cost of an artificial turf sports field can vary from basic to premium. As previously mentioned, the artificial turf field at Brigham Young University is a premium installation that cost 2.5 million dollars (of that amount, 1.7 million was spent for the subsurface and drainage system)[7]

Therefore, consulting the experiences of other field builders and users provides a method of estimating costs.

Field Construction Types and Costs

Because many factors contribute to the fields' construction costs, your sports turf manager should research recent similar construction. For further information, contact STMA (Sports Turf Management Association) at 800/323-3875.

The Turfgrass Resource Center asked Mike Kelly, a professional sports field contractor, to describe basic types of sports field installations and to give cost estimates. Mike Kelly's company installs both artificial turf fields and natural grass fields at approximately a 50-50 ratio.[8] He reported: "We construct a number of sand based fields and lay the base of a number of synthetic fields per year. The contractor's primary concern is to find what the customer needs: questions include: 1) What type of sports are played? 2) How often will the field be used? and, 3) What are the annual, local weather conditions? A high sand based field if installed correctly will play as well in the rain as in dry weather. All of the fields described in this report are based on 85,000 square feet. Costs apply to a normal high school and college sports field or a recreational facility in a city park."

Myth: ***Artificial turf saves money because of its longevity.***

Fact: ***While the factors influencing costs vary from field to field, construction costs for an artificial turf field generally far outweigh construction costs for a natural field.*****

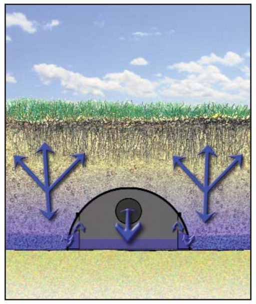
Native Soil Field: Field player performance will vary greatly on a native soil field. Some of these fields are great while others are terrible. The native soil structure and soil type will be the biggest performance factor. Seldom do we consider this an option unless the native soils are very sandy. The largest cost of this type of field is the site grading and the drainage system.

Typical cost for this type of field is **$50,000 – $150,000***

Sand Based Field: These fields are the proven performance standard for a good athletic field. A sand based field will require a uniform size and structure (medium sand, semi-angular) of sand particles. The sand percentage will be 95-99% with 1.0 to 2.5% organics. It has very little silt or very fine sand. This field will drain at approximately 10 inches or greater per hour and have

* Joseph P. Sullivan, Ph.D., "An Assessment of Environmental Toxicity and Potential Contamination from Artificial Turf using Shredded or Crumb Rubber," Ardea Consulting, March 28, 2006, page 2. This literature review was initiated by Turfgrass Producers International and is available at http://www.turfgrassod.org/trc/index.html

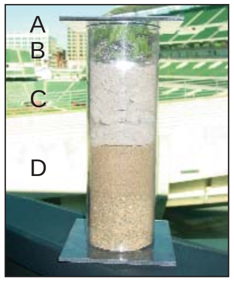
7 Williams and Pulley, "Synthetic Surface Heat Studies," Brigham Young University, *Op. cit.*
8 "The Cost of Field Construction in the Midwest," Turfgrass Resource Center, http://www.turfgrassod.org/trc/index.html
* All costs quoted in Part 2 are United States dollars unless otherwise stated. Mike Kelly provided this information in 2008 with the understanding that—with time—decision makers must factor in inflation percentages and the price increases of materials and labor.
** The information throughout Part 2 documents this statement.



Construction profile for a sand based field. Two inch rock layer and sand to appropriate depth 12-18 inches.

Photo and information: Rehbein Excavating, Inc.

Construction profile for a synthetic field.



A: Artificial Turf Level
B: Rubber/Sand Mix
C: Rock (#57 stone)
D: Pea Gravel and/or old sand base

Photo and information: Darian Daily, Head Groundskeeper, Paul Brown Stadium, Cincinnati, Ohio

good resistance to compaction.

Typical cost of this type of field is **$250,000 – $350,000**.

Sand Based Mesh Element Field: This ReFlex Mesh Element Field is built similar to a sand based field, however it incorporates segments of polypropylene netting into the top 4 in. of the profile. The inclusion of the mesh increases pore space which gives more water and air holding capacity, increases infiltration rates, improves surface stability, decreases divots and improves the recovery time because the plants are healthier.

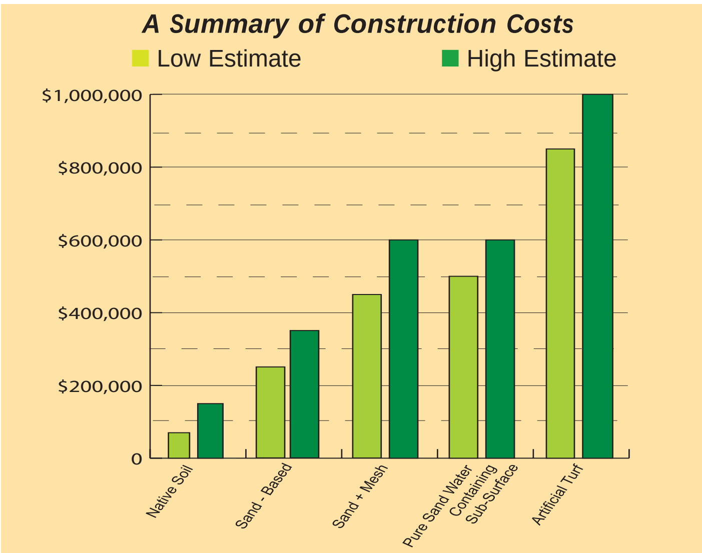
Typical cost of this type of field is **$450,000 – $600,000**

Pure Sand Based Water-Contained Sub-Surface System Field: This is a new type of natural grass field that requires less than 50 percent of the water of a normal sand based field.

Typical cost of this type of field is **$500,000 – $600,000**.
(There would be an additional cost if you include Reflex mesh elements.)

Synthetic Field: Synthetic turf is filled with a ground rubber material to cushion the users of the field. The sub-base is composed of a hard, chipped rock material that will drain water freely. This is generally 6 in.-10 in. of course rock material and approximately 2 in. of fine granular chips. Please note that the carpet on synthetic fields needs to be replaced every 8-10 years. The cost of the carpet replacement is projected at $500,000+ in today's dollars.

Typical costs of these fields are **$850,000 – $1,000,000**.



Comparative Maintenance Cost

The cost estimate for a sports field must include the annual maintenance costs. This seems obvious, but there has been misinformation related to artificial turf fields. An *Athletic Turf News* article reported: "Maintaining synthetic turf systems is not as inexpensive or as 'labor free' as some people may have been lead to believe."[9] That was the "take-home message" from the Michigan Sports Turf Managers Association's (MiSTMA) Synthetic Turf Infill Maintenance Seminar held at the Detroit Lions' practice facility in Dearborn, MI. Details of maintenance costs at Michigan State University are presented below. The following information presents construction costs, plus maintenance costs. Some of the reports amortized costs over a specific period of time to give a realistic understanding of annual costs.

Artificial Turf Sports Field Maintenance Costs

The Michigan Sports Turf Managers Association sponsored a seminar titled "Synthetic Turf Infill Maintenance" held at the Detroit's Lion practice facility in Dearborn, MI. Amy J. Fouty, CSFM, athletic turf manager for Michigan State University, presented details about the cost of maintaining MSU's synthetic turf indoor three-year-old practice field. Fouty presented the following:[10]

MAINTENANCE COSTS

Total straight hourly cost (Field only; 280 hours at $18 per hour; benefits not included)	$5,040
Total supply cost	$6,220*
Total equipment cost for the year (This includes a sweeper ($1,500); a broom ($500); and, a groomer ($1,500)	$3,500
Total outside contractor repairs	**$ 8,000**
TOTAL cost 2004-2005	**$22,760**

SYNTHETIC TURF MAINTENANCE EQUIPMENT

Equipment to spray water	$1,000 to $35,000
Sweeper	$1,500 to $20,000
Broom	$500 to $3,000
Painter	$500 to $3,000
Groomer	$1,500 to $2,000
Cart (to tow equipment)	$2,500 to $16,000
Field Magnet	$500 to $1,000
Rollers	$250 to $2,000
TOTAL	**$8,250 to 82,000**

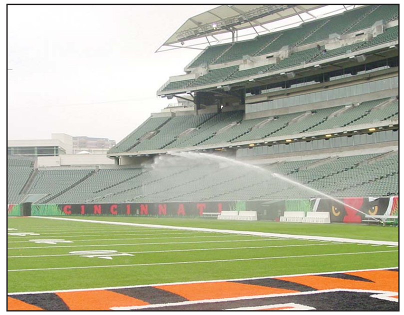


Photo: Darian Daily

Water cooling and cleaning the synthetic turf using irrigation. The field should also be treated with chemicals to eliminate bacteria and mold.

9 Lynne Brakeman, "Experts spell out the true cost of synthetic turf maintenance," *Athletic Turf News*, May 24, 2005, p.1
10 Lynne Brakeman, *Ibid*, pp 3 and 4
*Note: the supply cost summary does not include the application of crumb rubber one time a year using 10 tons as "top dressing" at $500 per ton ($5,000 dollars). Adding this figure, the summary total would be $27,760.

Comparative Guide: Equipment and Maintenance

The following is a basic comparative guide presenting a broad range of estimates. The information has been gathered by The Turfgrass Resource Center from research reports, seminar presentations, published articles, manufacturers, suppliers, and personal conversations with field contractors and field managers. Estimates are given only as a general guide. Each potential buyer must gather their own information as it relates to field type, field size, geographic location, area labor costs, amount of site work required, irrigation or water/cooling needs, and the number of estimated games or activities. The SportsTurf Managers Association's *A Guide to Synthetic and Natural Turfgrass for Sports Fields* is a good source to begin a comparative study of selection, construction and maintenance considerations.[11]

Cost of Equipment, Supplies and Labor Required for Maintaining Artificial Turf and Natural Grass:

Artificial Turf		Natural Grass	
Water (for cooling)	$6,000-35,000	Irrigation	$6,000-35,000
Sprayer for water application	$1,000-35,000	Equipment for irrigation	$3,000-31,000
Sweeper	$1,500-20,000	Mower	$13,000-69,000
Mechanical Broom	$500-3,000	Fertilizer Applicator	$1,000-3,000
Line Painter	$500-3,000	Painter, line	$700-3,000
Groomer	$1,500-2,000	Rollers	$2,000-4,000
Cart (for towing equip.)	$7,000-16,000	Cart (for towing equip.)	$7,000-18,500
Field Magnet	$500-1,000	Aerator	$3,500-17,000
Rollers	$250-2,000	Vacuum	$2,100-5,000
Top Dresser	$4,500-10,000	Top Dresser	$4,500-20,000
Total	**$23,250-127,000**	**Total**	**$42,800-205,500**

Annual Maintenance Required for:

Artificial Turf		Natural Grass	
Painting/removal (various sports)	$1,000-10,000	Painting (various sports)	$800-12,300
Top Dressing/Infill	$5,000*	Top Dressing (sand)	$0-5,400
Brushing/sweeping	$1,000-5000	Dragging	$0-200
Disinfecting/Fabric Softener	$220*	Fertilizers	$1,200-11,000
Carpet Repair (rips, joints)	$1,000-8,000*	Pesticides	$650-6,300
		Aeration	$700-960
Water Cooling	$5,000-10,000	Sod Replacement	$833- $12,500
Weeding	$500-1,000	Irrigation	$300-3,000
Total	**$13,720- $39,220**	**Total**	**$8,133- $48,960**

*Michigan State University/Brakeman, *Op. cit.*, p4

11 SportsTurf Managers Association, "A Guide to Synthetic and Natural Turfgrass for Sports Fields," www.STMA.org (Click PDF version to access complete guide of 19 pages)

Natural Grass Sports Field Maintenance Cost

The costs for maintaining a natural grass field vary based upon field type and size (native soil or one of the sand-based fields) and a number of factors listed on page 12 of this report. Costs can range from $8,000 to $49,000. The SportsTurf Managers Association's comparative study includes examples in the low range of the scale:

1. **A Denver-area native soil field** with Kentucky bluegrass and perennial ryegrass that hosts approximately 110 soccer events annually will spend between $5,500 and $8,000 per year to maintain that field (not including equipment and labor).

2. **In New York state, a high school native soil field** with perennial ryegrass and Kentucky bluegrass that hosts approximately 15 fall football games and 30 LaCrosse games in the spring will spend approximately $4,000 annually (not including equipment and labor).

3. **A Denver-area sand modified field** constructed of 90% sand and 10% peat, with four varieties of Kentucky bluegrass that hosts 35 football games and 10 other events, is between $9,000-$11,000 annually (not including equipment and labor).

Sports Field Construction and Maintenance–Researching the Total Costs

Numerous websites present comparative studies about total sports field cost. For example, the Turfgrass Information File, (TGIF) at Michigan State University has hundreds of articles related to artificial turf sports fields and natural grass sports fields.* The following are examples of research and case studies.

The SportsTurf Managers Association Guide

The SportsTurf Managers Association recently produced a guide to construction and maintenance of all field types that demonstrates the affordability of natural grass. This 19-page guide is a good beginning for a general comparative study.[12]

Synthetic Turf/infill ....$7.80-$10.75 per sq. ft. ($83.96-$115.71 per m²)

Natural grass/sand and drainage .$6.50-$7.95 per sq. ft. ($69.97-$85.57 per m²)

Natural grass with sand cap.........$3.50-$5.25 per sq. ft. ($37.67-$56.51 per m²)

Natural grass with native soils ......$2.50-$5.25 per sq. ft. ($26.91-$56.51 per m²)

Natural grass with on-site native soil ....less than $1 per sq. ft. ($10.76 per m²)

Using SportsTurf's guide to estimate costs:

■ ***Synthetic field:***

85,000 sq. ft. X $10.75 = $913,750

■ ***Natural grass field with sand and drainage:***

85,000 sq. ft. X $7.95 = $675,750

The natural grass field is a difference of $238,000

12 SportsTurf Managers Association, "A Guide to Synthetic and Natural Turfgrass for Sports Fields," *Op. cit*
*For further reading about turf field issues and management, use the TGIF database online. Members can access directly via their organization website. Others can subscribe individually; see http://tic.msu.edu for further details.

Myth: *Artificial turf requires little maintenance, and therefore, little if any annual costs.*

Fact: *While in some cases, annual maintenance costs may be lower for artificial turf, there are still significant costs involved. Artificial turf fields still require personnel and equipment for dragging, cleaning, carpet repair and infill additions and water/cooling. When maintenance and construction costs are combined, natural grass fields generally average out to less cost per year than artificial fields.*

Information throughout Part 2 documents this statement

University of Missouri Case Study

Brad Fresenburg, a turfgrass specialist at the University of Missouri, Division of Plant Sciences, completed a comparison study of natural grass and artificial turf. Like many studies, Fresenburg found that when annual maintenance costs and installation costs were combined, natural grass fields were a better value. He calculated an annual average cost for each field type, based on a 16-year scenario:

Native soil based field	$33,522
Sand based field	$68,545
Sand-cap grass field	$49,318
Basic synthetic field	$65,846

Fresenburg notes that for the cost of installing a synthetic field, an organization could install a natural sand-cap grass field, then place the remaining money into a maintenance fund.[13]

Hidden Costs

Michigan State University Athletic Turf Manager Amy Fouty found that not only was artificial turf not maintenance free, but that maintenance costs alone were only part of the expense. Fouty's annual equipment budget varied from $8,250 to almost $82,000. The need for outside contractors to consult or train maintenance staff could cost as much as $3,000 a day, resulting in $30 to $70 per linear foot for repairs.

Unlike natural grass, artificial turf cannot regenerate and grow in or be quickly sodded to fill spots or damage marks. One university recorded an annual cost of $13,000 to repair damage and replenish the field (seam repairs – $8,000, application of crumb rubber – $5,000).[14]

On another professional field, repeated painting of an artificial field as it changed from one sport to another and back again totaled more than $100,000 in one year.

A Comparative Cost Study

Dr. A.J. Powell, a leading turfgrass agronomist with the University of Kentucky, conducted a research study to analyze costs involved with installing and maintaining both natural grass and synthetic fields.

13 Brad Fresenburg, "Synthetic turfgrass costs far exceed natural grass playing fields." (2005), Tables are available in a Power Point format.
14 Lynne Brakeman, "Experts Spell out the True Cost..." *Op. cit.*, pp 3 and 4

Contrary to others' experience, Dr. Powell felt that installing a new sand based field would actually cost more than an artificial FieldTurf construction. However, because the synthetic field would need to be replaced after approximately eight years, the long-term value favors the natural grass field. Properly installed and maintained quality natural grass remains viable for at least twice as long, exponentially increasing the costs for a synthetic field based on the need to tear up, totally remove and reinstall new artificial turf every eight to ten years or even more often.[15]

Disposal Costs

For the removal and disposal of an artificial surface, sports field managers can expect these costs to run at least $1.75 - $2.25 per sq. ft., not including transportation costs and any landfill surcharges that disposal might incur. This cost will arise in conjunction with a new field's construction, boosting the up-front costs required. Many of the modern artificial turf fields installed in the last decade will be reaching this stage in a few years, raising the awareness of these costs.[16]

Cost and Warranty Concerns: Questions to Ask

Officials making a decision about installing an artificial turf field should be prepared to ask the contractor critical questions.

The ancient Latin axiom is especially pertinent: "caveat emptor"– let the buyer beware.

The initial purchase price of an artificial surface (sports field or home lawn) is many times greater than a natural grass area; however, promoters of the artificial products maintain that tremendous costs savings will be forthcoming because of reduced maintenance costs, as well as the product's warranty.

Because many of the artificial products are relatively new and not tested over time and through use, claims about no-cost or low-cost maintenance requirements that are consistently made by promoters of artificial surfaces may prove to be highly exaggerated. Consider:

1. Will the artificial turf manufacturing and installation company provide a warranty specifying the expected life of the product?

2. Given the fact that several artificial turf manufacturing companies have gone bankrupt, will the selling firm provide a warranty bond for the life of the product, ensuring the buyer has some legitimate recourse in the event of failure?

3. What is the longest period of time the artificial field being specified has been in use (at a level of use at least as great as the area being considered)?

4. What conditions or maintenance practices will void the field's warranty?

15 Lynne Brakeman, "Natural Turf or Synthetic Turf: The Numbers Game", *Athletic Turf News*, May 21, 2005, p1
16 SportsTurf Managers Association, *Op. cit*

“The goal of this report is to present insightful questions and answers about artificial turf and natural grass based on professional knowledge, case studies and scientific data – not promotional campaigns, marketing materials and unsubstantiated claims.”

5. Does a single warranty cover all aspects of the artificial field’s soil base preparation, base materials, artificial turf materials, top-dressing, irrigation system, etc.; will there be separate warranties and warranty voiding conditions for each element, some of which could contravene each other?

6. What is the minimum and maximum financial investment in specialized equipment that must be purchased to maintain the artificial field at a level that will provide maximum playing conditions and maintain the warranty?

7. What level of manpower (ground crew) is required to maintain an artificial field, compared to a natural grass field? Has any crew size or man-hour requirements been reduced with the installation of an artificial turf area?

8. What level of technical training is supplied, recommended or required for the ground crew in order to properly maintain the area and the warranty conditions?

9. What are the warranty requirements or recommended processes to address each of the following repair or replacement demands of the artificial surface:

a. Damage caused by cigarette burns? Burns to larger areas?
b. Discoloration of areas caused by wear pattern differences?
c. Replacement of areas caused by wear or other physical or weather-related damage?

Part 3: Problems with Wear, Durability and Maintenance of Artificial Turf

Although made of non-living synthetic materials, artificial turf cannot endure without continual maintenance and repair.

Ford Field, a synthetic turf surface, is a multi-use facility built in 2002. Home of the Detroit Lions, the venue was designed to host 120 events a year. Sports Field Manager Charlie Coffin and the field owners “were sold these fields on the basis that there would be no maintenance. That just wasn’t true,” says Coffin.[17]

Since the field was covered, planners decided that the field didn’t need a drainage system. Contamination and erasing paint lines are now significant issues with no rainfall and nowhere for water to flow when applied.

Synthetic surfaces require: 1) additional “infill” below the artificial turf; 2) water treatment because of unacceptable high temperatures; 3) chemical treatment to disinfect against bacterial and mold growth; 4) sprays to stop static cling and odors; 5) constant monitoring of the drainage system; 6) a difficult procedure for erasing and repainting field lines; and, 7) removing organic matter.

17 Lynne Brakeman, “Experts Spell out the True Cost...” *Op. cit.*

On the other hand, natural grass can be easily and inexpensively treated to propagate self-repair because of the inherent, regenerative character of a living plant. Other natural grass benefits that help with sports field maintenance are listed beginning on page 27 of this booklet.

The following information and case studies address some of the problems associated with the wear, durability and maintenance of artificial turf.

Replenishing field’s infill: Since infill needs to be replenished repeatedly over the life of a synthetic field, a new concern is discovering what became of the “old infill.” How much of it ends up where? As infill is played on, some of it merely settles. Some of it breaks down, allowing part of the field to literally walk away with players after each use, stuck on their cleats, uniforms and bodies. Some of it washes away with a drainage system and even rain run-off. The extent of the effects of this “runaway” infill are still unknown.

Drainage problems below the field surface: Ford Field, mentioned earlier, was an unfortunate synthetic indoor surface installation that created problems. Since the indoor field was covered, planners decided the field did not need a drainage system. Contamination and erasing paint lines became significant issues with nowhere for water to flow when the surface needed cleaning and chemical applications to stop bacterial growth. All synthetic surfaces – whether indoors or outdoors – need a drainage system. Decision makers who are considering a synthetic surface need to ask

Synthetic/artificial sports fields are covered with a fiber carpet (polyethylene/nylon) that breaks down with time, weather and use. These photos are of a seven-year-old field in Lucchesi Park, Petaluma, CA (2008). The abrasive nature of the sand/rubber sub-structure causes seams to split and holes to form.

Unless properly treated with chemicals that disinfect, a synthetic surface can harbor bacteria and mold. Many non-professional fields are not properly cleaned or disinfected.

Photo source: http://sfparks.googlepages.com in collaboration with www.SynTurf.org specific questions about these complex systems that sometimes work incorrectly or inefficiently. Two case studies illustrate this problem:

***MYTH:** Synthetic fields drain water better than natural grass.*

***FACT:** Owners of artificial turf fields are discovering problems with the drainage systems.*

Example 1–Brigham Young University Artificial Sports Field: When this university's synthetic field was installed, the company claimed a drainage rate of 60 inches (152 cm) per hour. A system under the artificial carpet was designed to move water from the surface into an extensive drain mat system. The drainage system made up two thirds of the overall cost of the field (in this case, US $1.7 million of US $2.5 million total costs). After installation, B.Y.U. found the surface to be hydrophobic and the undersurface poorly engineered, leading to water retention rather than drainage, with the drain mat typically seeing little or no water.

In a report by Dr. C. Frank Williams and Dr. Gilbert E. Pulley, there is an evaluation statement about the problems with the 1.7 million under-surface drainage system: "That seems like a high price to pay for something that does not work!"[18]

***MYTH:** Artificial fields are more durable than natural grass fields.*

***FACT:** Natural grass has been cultivated to endure a wider variety of conditions than ever and has the added benefit of being capable of self-repair.*

Example 2–Portage High School, Indiana: When this high school installed its artificial turf, it was "ballyhooed for its ability to handle large amounts of rain," yet ended up unplayable after the first heavy rain. Officials found that the field was not draining, nor were the sidelines. The ball would not bounce or roll due to where the water remained on the field. Coach Danny Jeftich of the opposing team noted that, "It was a hard rain, but it should've drained much faster," citing that he had observed better drainage on natural grass fields. "Last year, there was a downpour before the semi-state [finals], and it drained in 10, 15 minutes," said Jeftich in reference to the grass fields.[19]

Maintenance needs of a synthetic turf surface: The Michigan Sports Turf Managers Association (MiSTMA) sponsored a "Synthetic Turf Infill Maintenance Seminar" in May of 2005. The "take-home message" was "Maintaining synthetic turf systems is not as inexpensive or as 'labor free' as some people may have been led to believe."[20] The following are a few examples of maintenance problems:

Example 1–Cleaning and disinfecting the surface: Whether by hand or with field magnets, small objects and materials must be meticulously removed; liquids or other residues must be thoroughly cleaned and disinfected. Some common elements that field managers must cleanse or remove after events

18 Williams and Pulley, "Synthetic Surface Heat Studies," Brigham Young University, *Op. cit.*
19 Jim Peters, "Field fails first test," *The Times of Northwest Indiana*, September 29, 2005
20 Lynne Brakeman, "Experts Spell out the True Cost..." *Op. cit.*

include: blood, spit, urine, vomit, food, beverages, gum, metal particles, wooden splinters and animal droppings.

Question: As chemicals and sprays are repeatedly applied and washed off, what effect do these have on the groundwater supply?

Photo: Infill rubber particles spilling out onto a soil surface.

Since "infill" (rubber particles and sand below the synthetic surface) needs to be replenished repeatedly over the life of a synthetic field, a new concern is discovering what becomes of the old infill material. Some of it spills out and is washed away into a drainage system, creating a growing concern about water contamination.

Example 2–Field lines: While an artificial surface may seem smoother, lines are not easier to apply and remove. Painting lines has been found to create problems because the paint soon spreads, leading to messy lines and unsafe, slippery conditions. Other methods for creating lines on artificial turf is to "tuft-in" colored pieces, glue in sections or stitching during manufacturing. These efforts all come at a cost to accommodate various sports such as lacrosse, soccer and football. (See photo page 17)

Example 3–Static cling: Static cling is a nuisance for synthetic turf fields and requires diluted fabric softener to be sprayed on the field. The softener also serves to retard the odor – described by some as the smell of "old tires and locker rooms" – that comes from the rubber infill. However, the application of softener can make the field slippery for players.

Part 4: Safety and Human Health Issues Related to Artificial Turf

Safety and human health issues are a major concern related to synthetic surfaces. The following information and studies raise concerns and questions that all decision-makers must take seriously. A list of pertinent questions begins on page 30.

Extreme temperatures

Artificial surfaces cannot be played on all the time. Temperatures on the surface of artificial turf can sometimes reach more than half again the air temperature causing dangerous burns, with water providing cooling only for a limited time.

The danger of artificial turf is that the rubber and plastic materials used absorb more of sunlight's heat energy than natural grass, causing extraordinarily high temperatures.

Brad Fresenburg
University of Missouri

Case study: University of Missouri (M.U.): Brad Fresenburg, turfgrass specialist from the University's Division of Plant Sciences, explains the danger of artificial turf is that the rubber and plastic materials used absorb more of sunlight's heat energy than natural grass, causing extraordinarily high temperatures. His observations found that on a 98° F (37° C) day, MU's Faurot Field had a surface temperature of 173° F (78° C). The temperature of the nearby natural grass was only 105° F

(41° C). Even at head-level, the temperature over the artificial turf was 138° F (59° C).[21]

Case study: Brigham Young University (B.Y.U.): In 2002, Brigham Young University installed artificial turf on one half of its practice field, leaving the other half a sand-based natural grass field. After observing exceedingly hot temperatures from the synthetic turf – including a case where one coach received blisters on his feet through his tennis shoes – Drs. Frank Williams and Gilbert Pulley launched a scientific comparison of the two turf types. For this study, the artificial turf area was examined as two separate fields: the football field and the soccer field.

An artificial turf surface generates exceedingly hot temperatures– one coach at the University of Missouri received heat-related blisters on his feet through his tennis shoes.

The Safety Office at BYU has set 120° F (49° C) as the maximum safe temperature that a playing surface can reach, since temperatures of 122° F (50° C) can cause skin injury in less than 10 minutes.

The field study compared not only surface temperatures, but also soil temperatures, temperatures in shade, and the cooling effects of water.

Surface temperatures of playing fields were compared with the temperatures of other common surfaces for perspective:

Table 1 Surface–Average Surface Temperature between 7:00 AM and 7:00 PM

Soccer (artificial turf)	117.38° F (47° C)	high 157° F (69° C)
Football (artificial turf)	117.04° F (47° C)	high 156° F (69° C)
Natural Grass	78.19° F (26° C)	high 88.5° F (31° C)
Concrete	94.08° F (34° C)	
Asphalt	109.62° F (43° C)	
Bare Soil	98.23° F (37° C)	

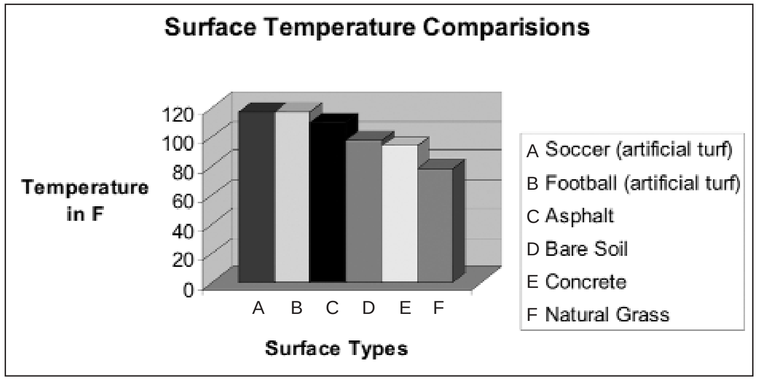
Table 2 2 inch depth–Average Soil Temperature between 7:00 AM and 7:00 PM

Soccer (artificial turf)	95.33° F (35° C)	high 116° F (47° C)
Football (artificial turf)	96.48° F (36° C)	high 116.75° F (47° C)
Natural Grass	80.42° F (27° C)	high 90.75° F (33° C)
Bare Soil	90.08° F (32° C)	

Table 3 Shade–Average Temperature between 9:00 AM and 2:00 PM

Surface Temperature of Natural Grass	66.35° F (19° C)	high 75° F (24° C)
Surface Temperature of Artificial Turf	75.89° F (24° C)	high 99° F (37° C)
Average Air Temperature	81.42° F (27° C)	

21 Brad Fresenburg, "Synthetic Turf Playing Fields, Present Unique Dangers," *Applied Turfgrass Science*, November 3, 2005. University of Missouri



Other startling observations from the study included:

- 200° F (93° C) was the highest surface temperature recorded (on artificial turf) on a 98° F (37° C) day.
- Even during Utah's cool October weather, the surface of the artificial turf reached 112.4° F (44.7° C) – 32.4° F (18° C) higher than the air temperature

When water was used to cool the surfaces of the natural grass and artificial turf, the natural grass remained cool for so long that only the artificial turf's temperature was recorded at five and 20 minutes after wetting.

Even during Utah's cool October weather, the surface of the artificial turf reached 112.4 F (44.7 C)—32.4 F higher than the air temperature.

A water application cooled the surface of the synthetic field from 174° F (79° C) to 85° F (29° C) but after five minutes the temperature rebounded to 120° F (49° C) (the limit of what BYU considers safe). After 20 minutes, the temperature rose to 164° F (73° C).[22]

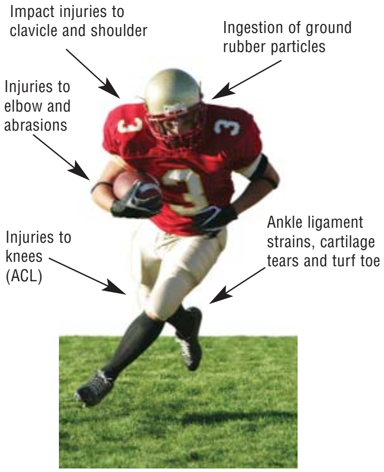
Injuries: The Science of Traction and Release

Turfgrass specialist Brad Fresenburg of the University of Missouri Division of Plant Sciences explains that many injuries are due to greater levels of torque, velocity and traction found in conjunction with artificial turf. Fresenburg performed tests on Missouri's own Faurot Field showing that potential pressure on joints and bones is increased from, "the inability of a fully planted cleat-wearing foot to divot or twist out, an action that releases force."

He noted that while some might see divots or ripped-out grass from natural grass as damage, it is actually a healthy sign indicating that the surface is doing its job of yielding to the athletes' impact, being less likely to cause significant injury. And unlike artificial turf, natural grass has the ability to regenerate or be repaired relatively easily.[23]

22 Williams and Pulley, "Synthetic Surface Heat Studies," Brigham Young University, *Op. cit.*
23 Brad Fresenburg, "Synthetic Turf Playing Fields, Present Unique Dangers," *Applied Turfgrass Science*, November 3, 2005. University of Missouri, *Op. cit.*

What are the health concerns related to the ingestion of ground rubber particles that takes place from sliding face-first on the surface or dropping and re-inserting a particle-covered mouthpiece onto the field?



Common Injuries on Artificial Turf

Certain types of injuries are being seen more often due directly to artificial turf and its inherent make-up and inflexibility, including:

- **Turf toe** (first metatarsophalangeal joint sprain) is a painful "jam" or hyperextension of the big toe. It occurs when the cleats of a players shoe grab the artificial turf mesh and cause an overextension of the big toe. (See illustration)
- **ACL** (Anterior Cruciate Ligament) injuries are one of the more common types. It is a sprain or rupture of the ACL. The problem is linked to shoe-surface traction which is higher on artificial turf than on natural grass.
- **Foot lock** (caused when the foot is prevented from turning, also placing stress on the knees)
- **Turf burn** part abrasion and part burn—is caused when an athlete's skin slides across artificial turf. These burns happen frequently due to the fact that athletes slide farther on artificial turf due to the lower co-efficient of friction than natural grass, particularly when wet. The sliding action in combination with the friction generates heat, producing the burn, exposing the body to infection.[24] (See page 23)
- **Heat exhaustion**
- **Concussion**

An example of Turf Toe

An example of ACL

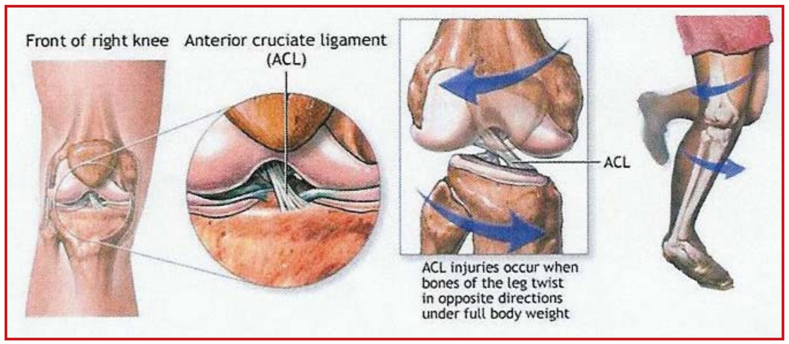


Photo Source: Medical photos are found on multiple webpages, for example: http://images.google.com/images?

24 "Why Choose Natural Turf? A discussion on natural versus artificial turf for sport and leisure applications," the European Seed Association, 2006

Good Bacteria, Bad Bacteria

Different types of bacteria serve different purposes in the world of athletic fields. Soils in natural grass fields contain helpful bacteria which naturally sanitize the surface by decomposing human body fluids, algae and animal excrements. Artificial turf lacks significant populations of these natural cleansers, leaving the job of sanitation to man-made cleansers, which then must be flushed to leave the surface safe for athletic play. But other bacteria, such as that found in sand and rubber infill of artificial turf, can cause infection and even life-threatening health problems. Because sand and artificial turf has a lower microbiological activity than soil, harmful bacteria do not have to compete with beneficial microbes that grow in turfgrass root zones, allowing the harmful bacteria to multiply to dangerous levels, creating an increased opportunity for dangerous infection. Brad Fresenburg, turfgrass specialist from the University of Missouri's Division of Plant Sciences, describes how synthetic fields are virtual breeding grounds for harmful bacteria due to the combinations of warmth, moisture, sweat, spit and blood.[25]

MYTH: ***The new-generation artificial turf utilizes sand and rubber-based infill to minimize injuries from skids and falls.***

FACT: ***The abrasiveness of the carpet fibers above the rubber/sand infill gives the player turf burns that can open the way for infection.***

The Life-Threatening Danger of MRSA

In a 2005 issue of the *New England Journal of Medicine*, seven doctors reported on a research project related to Methicillin-resistant Staphylococcus aureus (MRSA) an emerging cause of infections outside of health care settings. The doctors focused on an outbreak of abscesses due to MRSA among members of a professional football team and examined the transmission and microbiologic characteristics of the outbreak strain. The report stated: "From our player survey and observational study of games and practices, we found that skin abrasions occurred frequently among players ... Players reported that abrasions were more frequent and severe when competition took place on artificial turf than when it took place on natural grass."

The report also stated: "Findings from our investigation underscore the importance of certain factors at the player level and at the team level that could have facilitated the spread of the clone in this setting. One important player-level factor was skin abrasions, or turf burns. MRSA skin abscesses developed at sites of the turf burns on areas of the skin not covered by a uniform (e.g., elbows and forearms) these abrasions were usually left uncovered, and when combined with frequent skin-to-skin contact throughout the football season, probably constituted both the source and the vehicle for transmission."[26]

An example of skin abrasion

"Players reported that abrasions were more frequent and severe when competition took place on artificial turf..."

New England Journal of Medicine article

25 Brad Fresenburg, "Synthetic Turf Playing Fields, Present Unique Dangers," *Applied Turfgrass Science*, November 3, 2005. University of Missouri, *Op. cit.*
26 "A Clone of Methicillin-resistant Staphylococcus aureus among Professional Football Players," www.nejm.org, February 3, 2005. This study uses "clone" or "MRSA clone" throughout the text.

The report also makes several recommendations to control or prevent the spread of MRSA. The full report can be obtained at www.nejm.org (February 3, 2005).

Diagnosis: MRSA

During the 2003 football season, researchers from the CDC (Center for Disease Control) found eight cases of MRSA in five members of the St. Louis Rams. Skin scrapings proved that a turf burn from synthetic turf had provided the entry point. MRSA was then passed amongst the players in a variety of ways, such as sharing towels or using locker room facilities that were not completely disinfected. After a game with the San Francisco 49ers, some members of that team were also diagnosed with MRSA.[27]

MYTH:
An artificially created surface is more sterile.

FACT:
The materials used for synthetic turf fields and infill not only carry harmful bacteria, but trap unsanitary body fluids, opening the way for infection; chemicals used for sanitation can create additional problems.

Information throughout Part 4 documents this statement

MRSA is not a condition limited to the professional sports teams. College and high school players have been diagnosed across the country, including confirmed cases in Connecticut, Texas, Illinois and Pennsylvania.

Following this news, one synthetic turf supplier has voluntarily started to offer free, life-time decontamination services to existing customers based on the levels of bacteria found in its sand infill. The decision came after independent research commissioned by the company showed infill containing sand had 50,000 times the bacterial count as that of all-rubber infill.

Athletic Turf News reported that an officer of the company was "stunned" by the results of the study and committed to sanitation techniques which were expected to be needed monthly for each field containing the sand infill. He was also quoted as saying that the synthetic turf company would "strongly encourage others in the industry to do the right thing and follow our lead."[28]

Because bacteria genes can become resistant, care must be taken to clean fields, equipment, uniforms, towels and locker rooms to kill MRSA.

Toxicity from Rubber

Recycled rubber contains heavy metal substances such as aluminum, cadmium, chromium, copper, iron, magnesium, manganese, molybdenum, selenium, sulfur and zinc, in addition to lead that may have been absorbed into the rubber while in use as an automobile tire. Many of these can be toxic. According to Dr. Linda Chalker-Scott, a horticulturist with Washington State University, "There is no question that toxic substances leach from rubber as it degrades, contaminating the soil, landscape plants and associated aquatic systems."[29]

27 Phil Taylor, "A Menace in the Locker Room." SI.com, February 23, 2005
28 *Athletic Turf News*, March 20, 2008

"There is no question that toxic substances leach from rubber as it degrades, contaminating the soil, landscape plants and associated aquatic systems."

Dr. Linda Chalker-Scott Washington State University

Some have argued that when old tires are exposed to the elements, they become less harmful; evidence from other studies shows this thought to be incorrect. In one study, it was observed that the materials that leached out of washed, used tires were more toxic to rainbow trout than that from washed new tires.[30] The U.S. Department of Agriculture also found that when recycled tire rubber is used as garden mulch, the zinc from the rubber leaches into the soil, impairing plant growth.[31]

Breaking It Down

As synthetic fields degrade with use, the materials used break down into smaller and smaller pieces. These tiny microfibers from the field can be easily inhaled, especially when a player falls and/or slides across the synthetic surface. Many paints and metals already carry warning labels. How will the dust from these particles effect athletes and maintenance staff? One Massachusetts doctor suggests that the world could be looking at another asbestos curse down the line, complete with lawsuits that could ruin schools or public systems.[32]

Skin and Lung Effects

In his scientific review of published literature related to artificial turf, Dr. Joseph Sullivan found that the tire rubber used for infill could have damaging effects on the human body. He noted that "the most detrimental health effect resulting from direct exposure to tire rubber appears to be either allergic or toxic dermatitis." Since athletes playing on artificial turf not only come into contact with the rubber but often do so with great force (such as during a fall or tackle), the potential for skin absorption is high. It is estimated that 6% to 12% of the population is allergic to rubber in some form.

Dr. Sullivan also found that "inhalation of components of tire rubber or actual particles of tire rubber can be irritating to the respiratory system and can exacerbate asthma." Dr. Sullivan cites the basis of these concerns in studies of rubber workers in tire production, noting that these workers have been documented to suffer greater incidence of chronic cough, chronic phlegm, chronic bronchitis, shortness of breath, and tightness in the chest than unexposed workers. Again, the potential for such damaging effects is clear when one considers that athletes spend hours every week stirring up

29 Dr. Guive Mirfendereski, "Take a Pass at Fake Grass", www.SynTurf.org, March 29,2006
30 Joseph P. Sullivan, *Op. cit.*
31 Lindsey Hodel, "Gardners: Tread Lightly–Green Gazette–Rubber Mulch," *Mother Earth News,* April-May 2003
32 Dr. Guive Mirfendereski, *Op. cit.*

these minute particles while breathing rapidly during exertion.[33]

Potential Cancerous Effects

Perhaps the most frightening observation noted by Dr. Sullivan is the potential for mutagenic or cancer causing effects when people are exposed to used rubber tire particles. He notes that the exposure of human cells in lab cultures to rubber dust has proven to be toxic, and that not one but three chemicals used in tire production proved positive in tests for mutagenicity, meaning they have the potential to cause human cancer. Dr. Sullivan cites one study's results where under laboratory conditions, human cells exposed to tire debris organic extract for 72 hours demonstrated a modified physical appearance and an increase in DNA damage.

Dr. Sullivan's literature review found that "inhalation of components of tire rubber or actual particles of tire can be irritating to the respiratory system and can exacerbate asthma."

ABC News Video and CNN Report Review the Problem of Lead Content in Artificial Turf:

Artificial turf is being installed more and more on school playgrounds and athletic fields. Concerns about health hazards related to lead content in the artificial turf nylon fibers have been serious enough that fields have been closed and an investigation by the Consumer Product Safety Commission is under way. ABC News reviewed the issue in a news cast titled "Unhealthy Playing Fields." For details, see ABCNews.com (search: sportsfields)

CNN reported that New Jersey's epidemiologist, Dr. Eddy Bresnitz, said fibers and dust created through wear and weathering might become airborne, where they could be inhaled or swallowed.[34]

33 Joseph P. Sullivan, *Op. cit.*
34 "U.S. looking at lead levels in artificial turf," CNN.com, April 26, 2008

Part 5: Environmental and Cultural Benefits of Natural Grass

The human race lives within two environments. One is the natural environment and the other is a created society – a secondary environment superimposed upon the natural. Grasses and other green plants are important for an environmental balance. From the natural environment, societies have cultivated turfgrasses that give significant benefits to the existence, growth and welfare of lives. In this booklet the emphasis has been on natural grass benefits that affect the safety and health of those who play on athletic fields. The following sets of "before" and "after" photographs dramatically illustrate many benefits.

Set I: Tiannenmen Square, Beijing

Before: *Tiannenmen Square, the site of the 1989 riots, was originally a solid gray mass of concrete.*

After: *In 1998 the Chinese government tried to soften the hard-line anti-western view by tearing up much of the cement and installing turfgrass, giving it a more natural appeal.*

Set II: Parque Tezozomoc, Mexico

Before: *This bleak seventy acre industrial area was located in one of Mexico City's most polluted areas.*

After: *The land was used to create a park for a community of one million people. The project was finished in four years, applying ecological concepts that included large areas of turfgrass.*

Returning turfgrass areas in China. During the Communist purges in China, it was decided to eliminate symbols of capitalism. A part of the purge was to remove green lawns and cut down many trees.

The effects to the environment were both immediate and long lasting. The lack of turfgrass and shade trees caused cities to become "heat islands," where temperatures became much higher than in rural areas. Air pollution from dust and smog increased due to a lack of natural turfgrass to trap these materials.

The lack of turfgrass also increased erosion, raising levels of pollution and damaging water quality in ponds, streams, rivers and lakes. While Chinese leaders are now working with Westerners to restore the landscapes, it will take decades to re-establish an environmental balance.

However, returning turfgrass to Tiannenmen Square was not just an ecological decision – it was also a psychological decision. Turfgrass gives the Square a more user-friendly appearance – a sense of social harmony and quality of life.

The benefit of turfgrass to heal polluted areas: Parks are often the only green places left amid gray city walls. Parks offer beauty, recreation and tranquility, serving as an oasis that can be remedial and restorative to those who enter from their man-made environment. In Mexico, turfgrass played a significant role in transforming Parque Tezozomoc into a park with significant ecological and psychological benefit.

In one of Mexico City's most polluted areas, in the middle of an industrial and working-class district, was a space of seventy acres. Authorities planned a cultural and recreational open space. The area was transformed into a park for a community of one million people. The park was designed to recreate the topography and lagoons of the valley of Mexico as they were in the 15th century – a symbolic vision of the region's historical and ecological roots.

"Grass is what saves and holds the water that keeps life good and going...It keeps the falling rain from flushing away. Blades of grass take water from the air and transpire it into the ground. That works the other way around too. Because grass blades help put water back into the air so that rain can fall again." [36]

Theodore Roosevelt
President of the United States (1901-1909)

There are numerous examples of turfgrass benefits within the natural environment and the man-made, cultural environment. The following is a list of major benefits.[35]

Rainwater entrapment, retention and ground recharge: Groundwater recharge refers to the retention and use of water – especially rainwater – as it soaks into the ground surface. There is little groundwater retention when the soil surface is bare or when there are impervious surfaces such as streets, driveways, parking lots, and roofs. As a result the rate of surface runoff increases and the time that elapses before runoff decreases. A thick, healthy area of turfgrass reduces rainwater runoff to practically nothing. The turfgrass areas and the soil beneath create a near ideal medium to purify water as it leaches through the root zone and the soil into underground aquifers.

Temperature modification: People function best physically and mentally with a given range of climactic conditions. The major elements to be considered are air temperature, solar radiation, humidity, and air movement. Turfgrass plays an important role in controlling climate. Turfgrass is one of the best exterior solar radiation control ground covers because it absorbs radiation and converts it to food for growth through photosynthesis. Grass surfaces reduce temperature extremes by absorbing the sun's heat during the day and releasing it slowly in the evening.

35 The benefits are a summary of information from "Lawn and Sports Turf Benefits" by Dr. Eliot C. Roberts and Beverly C. Roberts, www.TheLawnInstitute.org
36 Ibid., page 12

The significance of temperature modification related to sports field surfaces – especially the extreme temperatures generated by synthetic surfaces – is discussed in this booklet beginning on page 19.

Soil building capacity of turfgrass: Topsoil takes thousands of years to develop. It is lost quickly by wind and water erosion. Turfgrasses send many fine rootlets into crevices of the soil where they grow and, as they decay, add organic matter to the soil. Grass is the most effective plant in conditioning the soil. Natural grass roots are continually developing, dying, decomposing and redeveloping. Every individual plant of Kentucky bluegrass produces about three feet of leaf growth under favorable growing conditions each year. The average lawn produces clippings at the rate of 233 pounds per 1,000 square feet a year. By leaving clippings on the lawn and by allowing them to decay, the equivalent of three applications of lawn fertilizer is made. This process builds humus, keeps soils microbiologically active and, over time, improves soils physically and chemically. Grass improves the soil by stimulating biological life and by creating a more favorable soil structure for plant growth.

Turfgrasses generate oxygen: Turfgrasses release significant amounts of oxygen into the air. Air is cleansed by plants through photosynthesis. Green plants take carbon dioxide and water and use sunlight energy in photosynthesis, producing organic compounds and releasing oxygen to the environment. "All life, with minor exceptions, is now, and forever has been, entirely dependent upon photosynthesis and the plant."[37]

Natural grasses absorb pollutants from the air: Progress has been made in upgrading our air quality but recently the levels of nitrogen oxide, sulfur dioxide and particulate matter are increasing. Plants absorb gaseous pollutants into their leaves and assimilate them, helping to clean the air and create oxygen.

Natural grass is regenerative: Natural grass can be easily and inexpensively treated to propagate self-repair because of the inherent regenerative character of the living plant.

Soil erosion control

Increased property values

Community pride and Urban heat reduction

Quality living

New drought resistant turfgrass research

37 Ibid., page 14

Part 6: Safety and Health Concerns: Questions Related to Artificial Turf

Health and safety are two major principles that guide many of the decisions individuals, parents, athletes, coaches and appointed or elected officials must make on a daily basis. When decisions impact children or the environment, ignorance is no excuse, neither is falling under the guile of an agenda-driven or commission-driven salesperson.

Ground tire rubber is used in some artificial fields as an impact-softening base. The toxic content (including heavy metals) of tires prohibits their disposal in landfills or through ocean dumping. Yet, this toxic material is being allowed (in large quantities) where children and professional athletes come into direct contact with it.

1. Should the presence of potentially toxic ground rubber on a sports field or home lawn be a concern to decision-makers, athletes, coaches, spectators and parents?

2. For those firms who make claims of using shredded athletic shoes, what percentage of this type of rubber is being used (if any), versus ground tire rubber?

3. What is the heavy-metal and/or toxic material analysis of the ground rubber?

4. What are the short-term and long-term health effects for athletes and spectators to the inhalation of the ground rubber dust?

5. What are the health concerns related to the ingestion of ground rubber particles that takes place from sliding face-first on the surface or dropping and re-inserting a particle-covered mouth-piece into ones mouth?

6. When additional ground tire rubber is periodically added to the field, are potential health and environmental concerns about the toxicity of this material also renewed?

Temperatures on artificial fields have been documented to be upwards of 86.5 degrees (F) hotter than natural grass fields under identical conditions. For example, at one location, when the natural grass surface temperature was 93.5 degrees (F), the measured artificial field temperature was 180 degrees (F).

1. What length of time can players of different ages (particularly the very young and/or very old) be safely exposed to this heat level?

2. If watering artificial turf reduces the field temperature, what is the length of time the temperature is reduced, and by how many degrees?

3. Does the requirement to have a field-watering system negate some of the projected cost-savings of artificial turf?

4. Although artificial fields are sold on a basis of being able to utilize the field 7 days a week, 24 hours a day, what outdoor temperature levels will cause the field to be closed because of potential health concerns to participants? Similarly, what lesser temperatures will cause participants to be so uncomfortable as to not enjoy playing on the surface?

Field sanitation that includes removal of bodily fluids (spittle, blood, sweat, vomit, urine), and/or bird or animal droppings may present a unique problem for artificial fields.

1. Will the use of antiseptic cleaners properly sanitize the area? How frequently must the field be sanitized?

2. Will the use of these sanitizing cleaners invalidate the surface's product warranty?

3. Do the sanitizing cleansers or the scrubbing process damage the artificial fibers and lessen the projected life expectancy of the product?

4. How much time, equipment and manpower must be budgeted to ensure a reasonably sanitary playing surface?

Abrasive surfaces can result in difficult-to-heal injuries, particularly in the presence of bacterial or viral pathogens.

1. What standards of abrasiveness have been established for artificial products?

2. Are parents, coaches and sports medical personnel trained to recognize the potential seriousness of abrasive wounds caused by artificial surfaces and prepared to treat them properly?

Field hardness (either too hard or too soft a surface) can result in serious chronic or immediate athletic injury.

1. What standards of artificial turf installation and maintenance have been developed to ensure field-wide, season-long uniformity and consistency, particularly when different field uses (i.e., soccer, football, marching bands, concerts, etc.) are allowed or encouraged?

2. What is the correlation between the potential for increased on-field players' speed and the incidence of serious injuries?

Athlete Health and Career-Longevity can be seriously jeopardized by exposure to extreme temperatures; playing on overly hard or overly soft surfaces, greater speed at point of impact (with the field or other players) and staphylococcus (staph) infections caused by parasitic bacterium present on the playing surface.

1. What specific sports injury studies have been conducted to document the safety of artificial sports surfaces?

2. What specialized equipment, particularly footwear and padding, is recommended or required to address sports injury concerns that occur frequently on artificial fields?

3. Has the health-care profession developed hydration guidelines for athletes at different ages, performing on hot artificial fields to reduce or avoid serious or even life threatening dehydration situations?

4. What field maintenance practices and disinfectants are recommended or required to address bacteria that may remain on an artificial surface?

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Artificial Turf Fields

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Thu 1/25/2024 12:05 PM

To:BOH <BOH@town.arlington.ma.us>

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hello Natasha: Please include my letter to the Artificial Turf Study Committee.

Hello Committee members. I am a registered landscape architect who has done work in the field for almost 50 years. My firm's work is mostly public work and includes parks, playgrounds and bike trails. The parks we design and oversee the construction of often include playing fields.

My concern is that the long term affects of the artificial turf have been studied and are being studied carefully. My understanding is that new materials are being developed that get away from the rubber and current materials currently being used. My first priority in this debate is the future health of the children using these fields.

My largest client for the last two decades has been the Executive Office of Energy and Environmental Affairs where I help run a program called the Gateway City Parks program. NO artificial turf fields are funded by this agency. We work in the 24 poorest cities so the concern for environmental justice is paramount. But why not for Arlington?

Also, I was one of a handful of people who help start the Community Preservation Act in 2001, and am now chair of the Arlington CPAC. The Community Preservation Act also does not fund artificial turf fields either for the same reasons I have stated above.

I am not naïve and know that many communities are going to their CPA committees and asking for their fields construction and then raising the money for the artificial turf privately because CPA will not pay for it. In my opinion, this strategy is short sighted, and harmful to the young users of the fields.

I know that our need for fields is intense but is it worth sacrificing the health of our children.

Clarissa Rowe, Registered Landscape Architect, Brown, Richardson & Rowe Inc.