

MEMORANDUM

TO: Boston Conservation Commission

FROM: Brandon Kunkel, Practice Leader, Weston & Sampson

DATE: September 28, 2022

SUBJECT: Charlestown High School Notice of Intent – Additional Information

Following the Conservation Commission hearing on September 21, 2022, for the Charlestown High School Field Replacement Project (DEP# 006-1895), additional information was requested to be provided on behalf of Boston Parks and Recreation Department. The following information specific to the synthetic turf studies, testing, degradation, and chemical background levels have been provided herein.

Independent Studies on the Exposure Risk of PFAS in Synthetic Turf

Weston & Sampson continues to gather additional information regarding the use of PFAS in the synthetic turf manufacturing processes to understand its potential to be released from the components that make up a synthetic turf carpet system, including the carpet backing, fibers, and various types of infill materials. The included memorandum provides a summary of independent third-party studies that Weston & Sampson is aware of to date.

Ultraviolet Degradation

Within the project specifications, it is required that the synthetic turf fabric must be ultraviolet radiation resistant. Currently, Weston & Sampson is not aware of scientific studies specific to impacts of ultraviolet radiation (UV) on turf carpet system relating to PFAS. Many manufacturers do test the carpets in simulated UV conditions using a QUV accelerated weathering chamber that tests the durability of carpet and infill. Simulations represent exposure to both UVA and UVB radiation for 10,000 testing hours that equates to 12 plus years of exposure.

In August 2019, the EPA held a webinar on synthetic turf infill specific to recycled tire crumb rubber infill, but did not consider EPDM virgin crumb rubber infill, that is to be specified at Charlestown High School. In summary, the findings from the report (EPA FRAP, dated July 2019) [Synthetic Turf Field Recycled Tire Crumb Rubber Research Under the Federal Research Action Plan Final Report: Part 1 - Tire Crumb Characterization Volume 1 \(epa.gov\)](#) support the premise that while chemicals are present in crumb

rubber, human exposure appears to be limited based on what is released into the air or simulated biological fluids. Please note, UV testing was not performed as part of the EPA FRAP.

The Evaluation of Health and Environmental Effects: Synthetic Turf prepared by Haley & Aldrich, dated June 2, 2021, states, *"In summary, the presence of chemicals in synthetic turf materials have been well documented. However numerous studies and reports have also demonstrated that the chemicals that are in the synthetic turf cannot come out of the materials at concentrations that would harm people or the environment. Consequently, synthetic turf systems, including turf blades and crumb rubber infill, are safe for contact and will not harm groundwater or surface water."*

Stormwater Run-Off Testing

The ability to test the stormwater run-off on an installed synthetic turf field is challenging. The difficulty is determining if chemicals identified in the sample are specifically leaching from the turf components. This is due to the ubiquitous presence of PFAS in the surrounding atmosphere and built environment resulting in accumulation of PFAS containing rain, dust, clothing fibers, shoes, plastic bottles, etc. that settle on/in the turf surface. By default, the stormwater running through the installed turf carpet will contain PFAS from all these sources and PFAS that may as result of the turf components cannot be identified specifically.

Should it be desired to collect stormwater from the field, the water may be collected at the nearest downstream manhole that ties the fields subsurface stormwater collection pipes into the larger stormwater collection system. See the included stormwater run-off diagram L130-Drainage Flow and Runoff Plan that identifies three manholes immediately downstream of the fields subsurface drainage system. The water must be collected prior to merging with the additional and larger sitewide stormwater system. The stormwater may be tested using EPA Method 533 or draft EPA Method 1633. These testing methods can be used to determine select per- and polyfluoroalkyl substances (PFAS) in storm water. Weston & Sampson does require pre-installation testing of the specific synthetic turf carpet that is to be installed at the project site, not a sample. The synthetic turf carpet and its components must be tested by an independent third-party laboratory and meet all the following requirements:

- a. Lead Content – ASTM F2765-09
- b. Drainage capability of 10" minimum / hour
- c. EPA Method 537 Modified laboratory analysis with isotope dilution DoD QSM 5.4 Table B-15 or Engineer approved equivalent showing non-detectable concentrations of all PFAS quantified by the analysis method utilized.

The pre-installation testing may serve as a baseline for comparison to post-installation testing as described above.

Attachments:

Exposure Risk to PFAS in Synthetic Turf, dated September 28, 2022

L130-Drainage Flow and Runoff Plan

MEMORANDUM

TO: Boston Conservation Commission

FROM: Steven LaRosa, Senior Technical Leader,
Brandon Kunkel, Practice Leader,
Marie Rudiman, Senior Risk Assessor, Weston & Sampson, Engineers, Inc.

DATE: September 28, 2022

SUBJECT: Exposure Risk to PFAS in Synthetic Turf

Since 2019, Weston & Sampson has actively been following the best available science regarding PFAS use in synthetic turf manufacturing and the potential for PFAS to be released from synthetic turf carpet systems. We have reached out to synthetic turf manufacturers, the Massachusetts DEP (MassDEP) for potential guidance¹, and performed in house review of many peer reviewed papers and articles focused on PFAS use in synthetic turf. In addition, we have had several synthetic turf manufacturers provide us with PFAS analysis results for products being installed at our projects. We also have an emerging contaminants workgroup that follows PFAS and industry organizations such as ITRC and federal/state/institutional (higher education) research and reporting.

The following references are used extensively by Weston and Sampson, Inc. regarding PFAS, their potential presence in artificial turf, environmental fate and potential risk to health and the environment.

- 1) Interstate Technology and Regulatory Council (ITRC) PFAS Guidance Document, June 2022.
<https://pfas-1.itrcweb.org/wp-content/uploads/2022/09/PFAS-Guidance-Document-9-2022.pdf>
- 2) PFAS Background in Vermont Shallow Soils, 2019; University of Vermont and Sanborn, Head & Associates.
<https://anrweb.vt.gov/PubDocs/DEC/PFOA/Soil-Background/PFAS-Background-Vermont-Shallow-Soils-03-24-19.pdf>
- 3) Synthetic Turf Laboratory Testing and Analysis Summary Report for Martha's Vineyard Commission, TetraTech, February 26, 2021.
https://www.oakbluffsma.gov/DocumentCenter/View/7435/TetraTech-MVC-2021-02-26-TurfAnalysisReport_FINAL
- 4) Synthetic Turf Laboratory Testing and Analysis Summary Report Martha's Vineyard Regional High School, Horsley Witten Group, March 1, 2021.

¹ In a phone conversation with C. Mark Smith from MassDEP (October 18, 2019), he indicated: 1) that the synthetic turf field data was from a news article (Boston Globe October 9, 2019) and not a study that could be vetted through peer review, 2) two samples is too small a sampling size to make any scientific conclusions, and 3) MassDEP is primarily focusing on potential human exposure to PFAS via drinking water at this time. MassDEP has not put out a formal statement on PFAS in synthetic turf fields.

- https://www.oakbluffsma.gov/DocumentCenter/View/7657/Horsley-Witten_Synthetic-Turf-LaboratoryTesting-and-Analysis-Report
- 5) Evaluation of PFAS in Synthetic Turf Memorandum for City of Portsmouth, TRC, June 7, 2022
https://www.cityofportsmouth.com/sites/default/files/2022-06/Technical%20Memorandum_Portsmouth_Final.pdf
 - 6) EPA Fact Sheet: 2010/2015 PFOA Stewardship Program
<https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program>
 - 7) Agency for Toxic Substances and Disease Registry, PFAS and Your Health.
<https://www.atsdr.cdc.gov/pfas/health-effects/index.html>

ARE THERE REGULATIONS FOR PFAS IN MATERIALS LIKE SYNTHETIC TURF?

The short answer is not specifically for synthetic turf. Manufacturers in the US have voluntarily phased out the use of PFOA and PFOS. PFAS use in materials is beginning to be regulated by some individual states. For example, Vermont currently prohibits intentionally added PFAS in firefighting foam, personal protective equipment (PPE), food packaging, rugs, carpets and ski wax. However, synthetic turf is not included in this ban. PFAS use in materials is also restricted by California Prop-65 and the European Union's REACH Standards. Prop-65 requires manufacturers to provide warnings on products which contain certain PFAS. The EU REACH requires manufacturers to provide notification of substances of "Very High Concern" in their products at concentrations over 0.1% by weight. Several PFAS are on the REACH Candidate List. A summary of the PFAS of concern for MassDEP, Prop-65 and EU REACH is included below:

Compound	CAS #	Reference
PFBS	375-73-5	REACH
PFHxS	355-46-4	REACH
PFOA	335-67-1	REACH Prop 65
PFOS	1763-23-1	Prop 65
PFOS precursors	various	Prop 65
PFNA	375-95-1	REACH, Prop 65
PFTTrDA	72629-94-8	REACH

As of 9/9/22

HAS SYNTHETIC TURF BEEN ANALYZED FOR PFAS?

We are aware of a number of studies performed on synthetic turf components for PFAS content. Currently only between 30 and 70 individual PFAS can be identified and quantified by commercial laboratory methods. The identified PFAS include all of those in the table above (MassDEP, REACH, Prop 65). PVDF-HFP is not currently quantified by any of the available testing methods.

We have had PFAS analyses performed on synthetic turf at several of our projects and have access to the data collected at several other projects. The lab data for the synthetic turf products analyzed consistently show individual PFAS concentrations less than or slightly above detection levels. The majority of the concentrations reported are so low that they are "estimated" by the laboratory. The concentrations reported in synthetic turf are below the "background" concentrations reported in rural area soils likely through atmospheric deposition.

Destructive testing (TOP Assay Method). of the synthetic turf components has also been performed during studies at Portsmouth, NH and Martha's Vineyard, MA. This testing and analysis expose the materials being tested to a caustic condition (>12pH) and high heat (185 F) to breakdown "precursor" PFAS into "terminal" PFAS that are measurable by the laboratory methods. Please note the preparation of the sample does not represent natural conditions. It is a method to enhance the destruction of the turf under extreme conditions. Also, this is a very simplified description of the method and data interpretation. The TOP results also report PFAS at "estimated" concentrations to concentrations just above the detection levels.

The Martha's Vineyard Report, *Synthetic Turf Laboratory Testing and Analysis Summary Report for Martha's Vineyard Commission, TetraTech, February 26, 2021*) indicates that the concentrations of PFAS observed by all of the analyses performed on synthetic turf components are "...consistent with background concentrations in natural soil or at concentrations well below referenced risk-based standards..."

A third-party consultant hired by Martha's Vineyard reviewed the study and concluded "...Based on the results presented...PFAS...have been detected in the field components at concentrations consistent with background and/or below the applicable comparison values. We agree with the report conclusion that the overall risk to human health through a direct contact exposure with the field components is de minimis."

Portsmouth, NH related testing of synthetic turf components has included testing the components as received, via the TOP method and through a leaching procedure. This study concluded: "Based on this evaluation, the detection of very low levels of a limited number of PFAS in the synthetic turf components does not represent a human health risk to those using the synthetic turf ballfields."

WESTON & SAMPSON SUMMARY

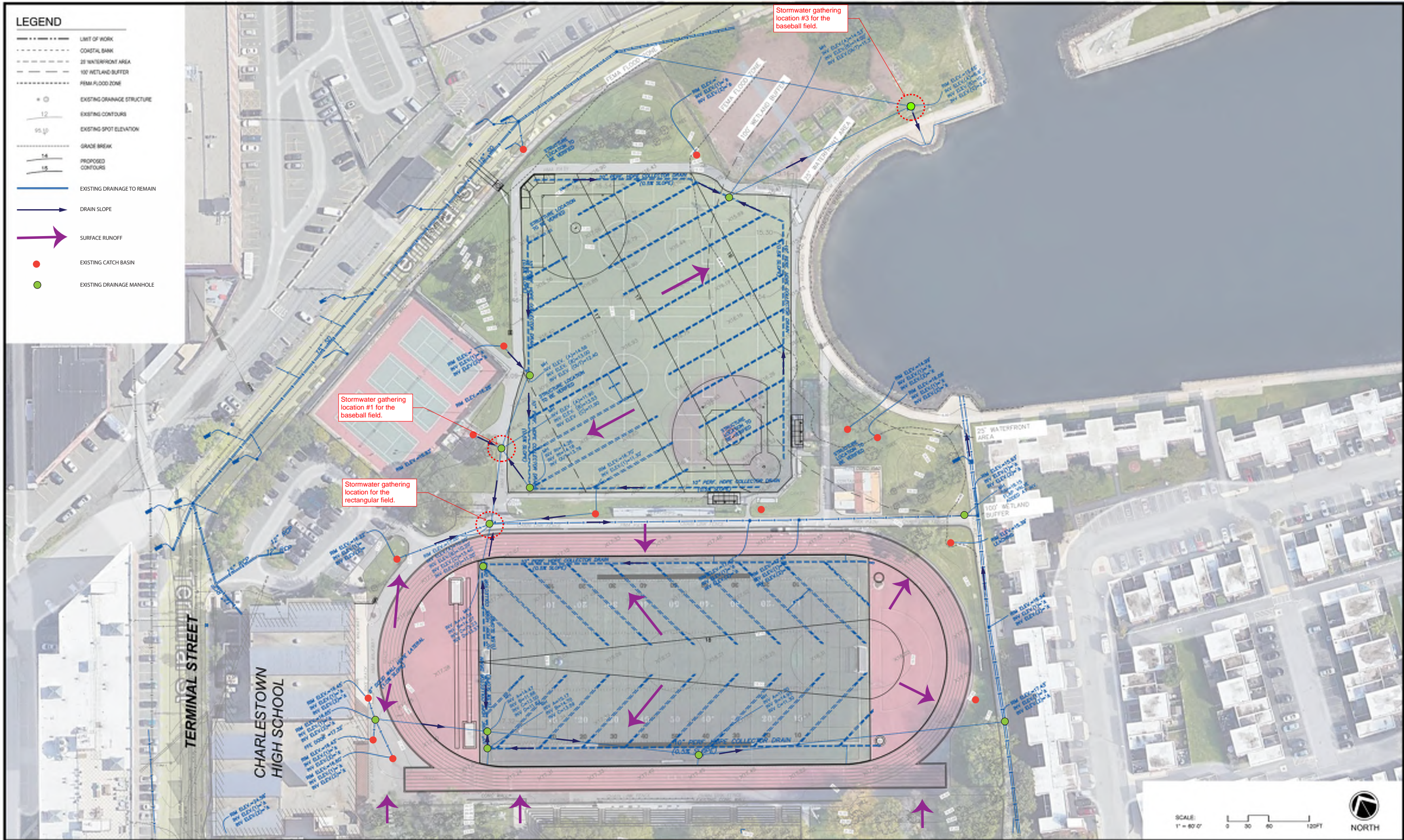
Based upon the information we have reviewed to date, the trace concentrations of PFAS identified in synthetic turf components which we have tested or reviewed pose No Significant Health Risk to field users or the environment.

To support a condition of No Significant Health Risk related to PFAS, our specifications for synthetic turf products are updated frequently to stay current with the Best Available Technology and PFAS science and require:

- 1) Certification from manufacturer that each component meets the current California Prop 65 and European REACH standards.
- 2) Each component to be installed (same batch as will be placed at our project) must be tested for the presence of PFAS. The testing results must be provided under notarized letter for review prior to approval for installation and indicate the following:
 - a. All products provided for incorporation into the synthetic turf system do not contain PFAS as quantified by EPA Method 533 Modified, EPA Method 537 Modified with isotope dilution, DoD QSM 5.4 Table B-15 or Engineer approved equivalent. The PFAS testing method utilized must report at least 29 PFAS compounds including the PFAS regulated by the STATE, and on the most current European Union REACH and California Proposition 65 compound lists.
- 3) Weston & Sampson will continue to review scientific journals, conferences, and reports to stay abreast of the state of the science related to PFAS use and presence in synthetic turf.

LEGEND

- LIMIT OF WORK
- - - COASTAL BANK
- - - 25' WATERFRONT AREA
- - - 100' WETLAND BUFFER
- - - FEMA FLOOD ZONE
- EXISTING DRAINAGE STRUCTURE
- 12 EXISTING CONTOURS
- 95.15 EXISTING SPOT ELEVATION
- GRADE BREAK
- 14 PROPOSED CONTOURS
- 18
- EXISTING DRAINAGE TO REMAIN
- DRAIN SLOPE
- SURFACE RUNOFF
- EXISTING CATCH BASIN
- EXISTING DRAINAGE MANHOLE



SCALE: 1" = 60' 0"
 0 30 60 120 FT
 NORTH



Prepared By:
Weston & Sampson

Consultant Project No.: EN021-0493

No.	Date	Revision

Approved By: _____ Date: _____

Project Name: **IMPROVEMENTS TO CHARLESTOWN HIGH SCHOOL ATHLETIC FIELDS - FOR PERMITTING PURPOSES ONLY -**

SPRD Project No.	CPR000X
Date	9/19/2022
Scale	AS SHOWN
Drawn	L.C. AG
Checked	BK

Sheet Name: **DRAINAGE FLOW AND SURFACE RUNOFF PLAN**

SHEET: **L130**