HUNTRESS ASSOCIATES
Landscape Architecture & Land Planning

May 26, 2020

Mr. Alex Elvin, General Planner
Martha's Vineyard Commission
PO Box 1447
Oak Bluffs, MA 02557

Re: Martha's Vineyard Regional High School – Athletic Field Improvements
(Amended DRI # 352)

Dear Mr. Elvin;

I received your email and staff questions dated May 13, 2020, regarding the MVRHS's Application for an amended DRI, as referenced above. I have coordinated our reply with the MVRPS and project team. The following is a listing of your questions and our responses.

GENERAL

1. What aspects of Option B, phase 1 of the Master Plan are still relevant to this project?

Response: The plans submitted for your review under the amended DRI include the following scope of work:

> *Field #1: A new 400m running track, multi-purpose synthetic turf field, sports lighting, pedestrian lighting, grandstands, press box, field house, walkways, parking, and associated site improvements.*
>
> *Field #2: Renovated natural grass multi-purpose field with improved irrigation, topsoil, drainage, and modified grading. The work also includes minor adjustments to the adjacent walkway.*

Please refer to the plan set entitled Athletic Field Improvements – Phase One, dated January 22, 2020, prepared by Huntress Associates, Inc. and the updated sheets L2, L3, L3.1, & L13 dated 4/28/20 for additional information.

2. Please provide a separate plan for pedestrian traffic on the site (acknowledged at 5/5/20 staff-applicant meeting).

Response: To be provided under separate cover.

3. Is the high school likely to pursue other phases or elements of the master plan in the future?

Response: Yes, but not at this time. The MVRHS Athletic Field Master Plan prepared by Huntress Associates, and approved by the MVRHS School Committee, informs the scope and scale of the proposed improvements. However, our Application is limited to the scope of work outlined in the

plan set entitled "Athletic Field Improvements – Phase One," dated January 20, 2020, Prepared by Huntress Associates, Inc. and updated information as noted in Question #1, above.

4. How will the high school coordinate spillover parking from Sharks and MV Soccer United games, or from other events?

Response: During the Sharks' season, we have had no issues regarding parking. With more than 409 parking spots available, we do not expect to have any parking issues for multiple events on campus.

5. What is the expected life span of the new track? How will it be disposed of at the end of its life?

Response: The track surface can be expected to provide a useful life of approximately 24 years. At the end of that time, the track surface would be removed, ground, and recycled for playground surfacing. The asphalt base would be pulverized in place, compacted, and made ready for a new asphalt surface.

COSTS AND MAINTENANCE

6. What will phase 1 of the project cost, and how will it be paid for?

Response: Phase One's estimated cost of construction is $7,729,928 to be paid for by donations other than Community Preservation Committee monies.

The applicant intends to have the construction of Phase One paid through private funds, which will be raised after this project has been approved and any modifications required by the MVC and/or Oak Bluffs Planning Board have been included in the final construction documents.

7. How will this project affect taxpayers in each Island town?

Response: As noted above, this project will be privately funded. However, it will positively affect every town's taxpayers by providing the island with a safe 400m running track facility for all to enjoy. The public will be able to walk/run laps, the junior high track teams will have their meets, and the Relay for Life will be able to return. The synthetic infield, absorbing hours of usage, will reduce the impact on our grass fields, help in their maintenance while reducing the nitrogen load to Sengekontacket Pond and the Lagoon. This reduction in nitrogen will help to foster the ponds' health, providing habitat for the shellfish. This project has the potential to generate hope and a sense of optimism as to what is possible to provide our MVRHS students and the island community without burdening our taxpayers. This Phase One will be both a source of pride and much-needed rejuvenation for our MVRHS Campus.

Costs proportional to the athletic campus's maintenance plan, as outlined in the Huntress Master Plan document, will become part of the regular yearly operational budget.

8. How much has MVRHS spent annually for maintenance of the current playing

fields since 2000?

Response: MVRHS began tracking Athletic Fields spending as a separate spending category beginning in FY18. From that time, MVRHS spent approximately $136,729 in FY18, $153,649 in FY19, and is budgeted to spend $155,500 in FY20.

9. Is the high school currently using best maintenance practices?

Response: The standards for Best Management Practices for Athletic Field Maintenance vary widely depending on the resources used as a reference. To that end, STMA (Sports Turf Manager's Association) announced on May 15, 2020, that they are beginning to prepare a recommended "Best Management Practices Guideline for Athletic Field Maintenance." Their guidelines are expected to be released next year.

We would be happy to answer any specific questions regarding the existing maintenance of the athletic fields. We have asked Mike Taus, Director of Facilities, to join one of our upcoming discussions regarding your review of the submitted DRI application.

10. Will the MVRHS purchase a maintenance package plan? How much would that cost?

Response: The project specifications include all required grooming and sweeping equipment and a two-year maintenance package for the synthetic turf field. This maintenance package includes twice-annual deep-tine grooming, sweeping, seam repair, topdressing, and impact testing. These sessions will also allow the MVRHS staff to work with the synthetic turf maintenance professionals and get extended training required to maintain the new field properly. In our experience, most clients feel comfortable maintaining the field with their staff after two years. In year three and beyond, the cost of an annual maintenance package is approximately $7500 per year.

11. How will the high school balance the additional maintenance needed for the fields with the maintenance needed inside the school itself?

Response: The introduction of a synthetic turf field will reduce the overall maintenance hours required for the athletic fields. Maintenance both in and out of the building has been brought to the forefront of our priorities to support programming. We will carefully balance these needs both inside and out. While there are currently plans to reapportion the efforts to maintain the fields with current staffing, we will monitor the effectiveness of the plan and make changes as necessary.

12. Is there a plan for incident response if unexpected contaminants get on the field? What would that cost per year?

Response: Should contaminants such as blood or vomit get on the field, we would anticipate that they would be washed through with clean water, as necessary. A potable water source and hose bib would be available from the new field house.

ENVIRONMENT

13. Has Huntress investigated the likelihood of the synthetic field shedding microplastics into the environment? Is there a way to capture particles smaller than the proposed 0.212 mm geotextile fabric, or is there a finer fabric?

Response: In our opinion, the greatest impact on microplastic reduction in synthetic turf fields has more to do with the selection and type of infill. SBR crumb rubber infill has long been a staple in artificial turf athletic fields. Numerous studies conducted by the US EPA, the European Chemical Agency (ECHA), and Norwegian Environmental Agency (EA) have classified SBR Crumb Rubber as a microplastic. Based on a range of health and environmental concerns, the European Chemical Agency (ECHA) proposed to the European Commission an immediate ban of SBR rubber infill as of 2022. Further, Norway's Environmental Agency (EA) is proposing new regulations to prevent the spread of microplastic from artificial turf into the environment. Solutions offered by both the EA and ECHA often include adding sediment filters to the drains or building physical barriers to contain the rubber infill. The migration of these particles was part and parcel to the EA and ECHA classifying them as microplastics

For the new field at Martha's Vineyard Regional High School, we propose a different path, ***don't use crumb rubber infill****. By eliminating the use of SBR crumb rubber as an infill product, we can significantly reduce the threat of microplastics, PAH, Lead, Zinc, and other heavy metals from your new field. Organic materials are abundant and provide a sustainable, renewable natural resource that can replace crumb rubber. The United States is home to the largest sustainable forestry industry in the world. We grow and farm trees that are then used to make fuel pellets to replace coal as the fuel source for power plants in Europe. The areas that grow trees as the raw material source are now growing more trees than they are harvesting, despite the growth in the use of biofuels. An organic material to replace SBR is a logical place to start. A wood product engineered explicitly as infill is now available and at a cost not much more than SBR rubber.*

We are proposing to use an organically grown and sustainably harvested wood product, BrockFILL, manufactured by Brock USA. We have asked Brock to send product samples, MSDS sheets, and promotional material directly to Adam Turner at the MVC. I am happy to discuss this further with you at a public hearing, and Brock has also offered to have a representative attend a public hearing and answer any questions you may have.

14. What fiscal and economic safeguards will be in place to protect the towns should the groundwater become contaminated as a result of the synthetic field?

Response: The best way to safeguard and protect the Towns from future groundwater contamination is to research and test the products we specify for the new multi-purpose synthetic turf field. Our project specifications require that the artificial turf vendor provide third-party independent testing certifying their products and manufacturing processes, including upstream suppliers, do not use any PFAS chemicals currently listed as part of California's Proposition 65 Regulations or identified as part of US EPA's Method 537 to manufacture the components of its turf field products, including the fibers, backing, and any coating materials. Third-party

independent test results must be provided in advance of the public bid solicitation. Please refer to our response to question #15 for information regarding acceptable third-party testing agencies.

Further, The MVRPS has offered to engage a third-party Massachusetts Licensed Site Professional (LSP) to provide peer review of the synthetic turf products we intend to use at MVRHS. With input from the MVC, the LSP peer review agent will develop acceptance testing protocols and guideline values for the protection of human health via exposure to the turf system from inhalation, ingestion, and direct (dermal) contact as well as for the potential impact on groundwater quality from the turf. Guideline values for human exposure will be developed with reference to standards issued by the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (DEP), the Massachusetts Contingency Plan (MCP), or other recognized standards. We recommend the acceptance testing protocols, and guideline values are developed to include total and leachable metals (MCP 14 metals and hexavalent chromium), total and leachable polycyclic aromatic hydrocarbons (PAHs), and total and leachable PFAS. Please refer to the attached proposal and scope of work provided by Cooperstown Environmental dated May 22, 2020 for a complete description of the proposed peer review services.

15. What firms will be involved in the PFAS/PFOS testing, and will the methods account for local environmental conditions? EPA Method 537 identifies 18 different PFAS in drinking water, but there are many thousands in existence.

Response: Presently, in the United States, the best reference to PFAS and PFOS regulations are contained within California's Proposition 65 Regulations and the US EPA's Method 537. In Massachusetts, The MADEP and MCP only list six (6) PFAs to be tested for drinking water standards. To be considered for use in the MVRHS project, the following requirements for third-party independent testing are being included in our project specifications:

1.06 SUBMITTALS

A. *Submit the following in accordance with the Conditions of the Contract and Division 1 Specifications: The synthetic turf vendor shall provide a statement certifying their products and manufacturing processes, including upstream suppliers, do not use any PFAS chemicals currently listed as part of California's Proposition 65 Regulations or identified as part of US EPA's Method 537 to manufacture the components of its turf field products, including the fibers, backing, and any coating materials. This certification must be confirmed through independent, third-party laboratory testing of the specified product. Third-party test results must be provided in advance of the bid.*

There are many third-party labs that could be considered for this testing. Two local examples include Eurofins labs out of Rhode Island and Alpha Analytical Labs located in Westborough, Massachusetts. You may find more information about both companies at www.eurofinsus.com *and* www.alphalab.com

16. How will fertilizers for the grass field be controlled so as not to negatively impact users or the environment?

Response: The following is the fertilization program as outlined in the Turf Field Annual Maintenance Plan included in the Athletic Field Master Plan and provided to the MVC as part of the DRI submission:

Fertilization Program - All athletic field areas and adjacent use areas.

1. *The Contractor shall be responsible for furnishing and supplying commercial fertilizer at the rates recommended by the soil analysis, but not less than the following rates and frequencies to all active playfield lawn areas, sodded areas, and recreational slopes. Rates may be altered based on a soil test recommendation as approved by the Martha's Vineyard Regional High School, but otherwise shall be as follows:*

    a. *Fall Fertilization - Between October 1 and 30, apply a 19-24-12 fertilizer to the lawns at the rate of 4 pounds per 1000 square feet. The nitrogen component must be at least fifty (50) percent slow-release organic source or ureaform. The fertilizer shall be evenly distributed and watered using caution that the water does not wash away the fertilizer and concentrate in areas.*

    b. *Spring Fertilization - Between April 1 and 15, apply a 34-03-11 fertilizer to the lawns at the rate of 4 pounds per 1000 square feet. The nitrogen component must be at least fifty (50) percent slow-release organic source or ureaform. The fertilizer shall be evenly distributed and watered using caution that the water does not wash away the fertilizer and cause it to concentrate in areas.*

    c. *Early Summer Fertilization - Between June 1 and 15, apply a 24-08-15 fertilizer to the lawns at the rate of 3 pounds per 1000 square feet. The nitrogen component must be at least fifty (50) percent slow-release organic source or ureaform. The fertilizer shall be evenly distributed and watered using caution that the water does not wash away the fertilizer and cause it to concentrate in areas.*

2. *Fertilizer shall be LESCO Fertilizer products or approved equal and shall conform to applicable state fertilizer laws. They shall be uniform in composition, dry, free-flowing, and delivered to the site in original, unopened containers, each bearing the manufacturer's guaranteed analysis. Fertilizer, which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted. Percent slow release, as shown above, shall be percent slow-release by weight of the nitrogen contents of the fertilizer, and derived from organic materials.*

3. *The areas shall be fertilized sufficiently to produce continuous healthy growth and an attractive appearance.*

4. *Apply the fertilizer only when the grass is dry. After the application, wash the material into the soil to prevent discoloration or burning of the grass.*

5. *When fertilizer is applied, Contractor shall provide proper posting as required by State law.*

According to Mike Taus, the MVRHS Facilities Director, they presently use approximately 50% of the fertilizer recommended in the maintenance plan, and they do not apply pesticides of any kind. The MVRHS is committed to working with the MVC to determine the best and most appropriate means to maintain the natural grass fields. We look forward to a continued discussion on this topic during the DRI review.

USAGE

17. Please provide a table or tables showing the following information (acknowledged at 5/5/20 staff-applicant meeting):

a. **Current annual use per field, and the projected annual use for phase 1 only.**
Response: Attached, you will find the 2020 MVRHS Field Usage by Sport spreadsheet prepared by Mark McCarthy, Director of Athletics.

b. **A list of sports offered at the high school, along with the playing seasons**
Response: Refer to the spreadsheet identified above.

c. **The number players per year, and which fields they use.**
Response: Refer to the spreadsheet identified above.

18. Does the school share the goal of not exceeding 680 hours of use on any of its grass fields, as recommended by Huntress? How close will phase 1 get to that goal?

Response: The MVRHS School Committed voted to adopt and accept the Athletic Field Master Plan prepared by Huntress Associates dated February 4, 2019. The table below shows the existing athletic field use analysis included in the Master Plan. With one (1) synthetic turf field taking an average of 1375 hours of use per year, the remaining five (5) renovated natural grass fields could expect to see an average of 425 annual hours of use. With proper renovation and maintenance we feel the natural grass fields could sustain 425 annual hours of use.

MVRHS - Existing Athletic Field Use Analysis

Plan Title	Annual Events	Hours/Event	Total Use Hours	Number of Fields	Annual Hours/Field
Existing Conditions	**1,400**	**2.5**	**3500**	**5**	**700**
Master Plan - Option A - 100% Natural Grass	1,400	2.5	3500	6	**583**
Master Plan - Option B - 100% Natural Grass	1,400	2.5	3500	6	**583**
Master Plan - Option C - 100% Natural Grass	1,400	2.5	3500	5	**700**
Master Plan Alternative - Use of Synthetic Turf					
Master Plan - Option A or B - **One (1) Synthetic Turf Field**	550	2.5	1375	1	**1375**
Master Plan - Option A or B - Five (5) Natural Grass Fields	850	2.5	2125	5	**425**
Master Plan - Option A or B - **Two (2) Synthetic Turf Fields**	1,100	2.5	2750	2	**1375**
Master Plan - Option A or B - Four (4) Natural Grass Fields	300	2.5	750	4	**188**

** Does not include 848 annual events associated with MV United, and 84 annual events associated with adult leagues. See proposed conditions use analysis for additional information.*

Sports Turf Managers Association - Recommendation **Well maintained natural grass fields can support between 680 - 820 hours of use per year.**

19. Has the high school considered MV Soccer United's intentions to use an expanded field network at the Boys and Girls Club? How would that affect the high school project?

Response: MVRHS has not considered MV United's intentions as stated, for they are not pertinent to this project. MV United is not using our athletic campus, not included in the existing usage hours, and therefore not affecting this project. We would welcome MV United to the renovated athletic campus as scheduling allows. Moreover, the Boys and Girls Club's current plans do not include an "expanded field network."

20. Will user fees for community use of the athletic facilities increase as a result of the project?

Response: MVRHS has a current policy applicable to the use of all of its facilities, including payment of a user fee. Said fees can be an essential revenue source, which can help cover the maintenance costs for its facilities. For example, user fees charged to groups using the Performing Arts Center are used to pay for that facility's maintenance costs. The MVRHS School Committee reviews these fees and policies regularly.

WASTEWATER

21. How many bathrooms already exist on-site? Only the two portable toilets?

Response: Currently, there are three (3) portable toilets on-site. There are two (2) permanent fixtures for women and three (3) fixtures men located near the varsity baseball field.

Phase One plans include a field house with seven (7) ADA compliant bathrooms containing a total of eight (8) fixtures for men, twelve (12) for women, and one (1) coed fixture in the training room. The new field house eliminates the need for portable toilets on-site and provides for full compliance with ADA guidelines.

22. Please provide information about how frequently the proposed tight tank will be pumped out, and where the effluent will be disposed of (acknowledged at 5/5/20 staff-applicant meeting).

Response: The proposed tight tank has a capacity of 18k gallons. The tank is sized to accommodate the proposed grandstand and fieldhouse during maximum use. I expect that we would need to pump the tank every 30 days, with an average of approximately 9000 gallons per month from August through November, and again in March through June. In the winter months the fieldhouse would have limited use. Attached, you will find a copy of an email correspondence from Mr. William Burke, Facilities Manager of the Edgartown Wastewater Treatment Facility dated May 14, 2020, regarding the available capacity at the Edgartown Facility.

23. Please provide a letter from the Oak Bluffs board of health stating their position on the installation of the tight tank, and a letter from the town sewer board stating that the project can be connected to the sewer system once space is available.

Response: The plans are presently under review by the Oak Bluffs Board of Health and Wastewater Commission. Upon completion of their study, we will forward those approvals for your records.

PLAYER SAFETY

24. What is meant by a critical fall height of 1.2 meters for the synthetic field?

Response: As the discussion of sports field safety continues to grow, specifically regarding the role of the surface in head and body impacts, there is an increasing focus on the use of a HIC test and a GMax test. In my opinion, both tests should be used, but for different reasons.

The HIC (Head Injury Criterion) Impact Test (ASTMF355E) is currently one of the most effective ways to measure the probability of head injury occurring from impact with a surface. This is one of the reasons World Rugby chose HIC as the standard for impact measurement in 2010. The Concussion Legacy Foundation reported that one out of every five concussions occurs when the head impacts the playing surface. With a recent focus on reducing concussions, the HIC test provided a better understanding of how a field will react during impact. With this test, a missile is dropped from various heights, and the impact of the fall is measured. Unlike the GMax missile, the HIC missile used is hemispherical and weighs 10.1 lbs, closely simulating the shape and weight of the average human head. Within the missile is a device that measures the acceleration of the missile at impact. The peak acceleration is used as a measure of impact severity. The HIC tests provide a value on a scale of 0 to 2000 and correlate to a drop height at which a score of 1,000 is achieved. This height is called the critical fall height. World Rugby has adopted a 1.2-meter standard, which means that at 1.2m, the HIC score must be less than 1000.

Please note that with a HIC test reading, a <u>higher</u> critical fall height is safer for the athlete. Conversely, with a GMax test reading, a <u>lower</u> impact test reading is safer for the athlete.

Another standard impact test is the GMax test, which is more effective in measuring body injury impact than a head injury. This test, ASTMF355A, involves dropping a 20.0-lb, flat-ended missile akin to a torso or body part in the same location and measuring the shock-attenuation performance of the field. In other words, the Gmax measures how well the field-turf absorbs the impact. This test method has been used for nearly 20 years in the synthetic turf industry and is derived from a test method used by Ford and GM in crash test dummies as far back as the 1960s. Three drops are taken at ten prescribed locations throughout the field, with the GMax score of each location being the average of the second and third drops. According to ASTM, no drop at any spot on the field can exceed a score of 200 G's. These standards have been the subject of much debate, and the Synthetic Turf Council has adopted a lower, upper limit of 165. The safety features built into your field include a resilient shock pad, natural infill, and a woven surface. Combined with a state-of-the-art drainage system, this field will provide a uniform playing surface with impact testing guaranteed to never go above 125 on a GMax test, and have a critical fall height of 1.8m on a Head Impact Criterion (HIC) Test. Both of those results mirror that to be found in the best natural grass fields.

25. Are there more head and knee injuries with artificial turf than natural turf?

Response: Injury rates to both head and lower extremities have been studied extensively in the US and abroad. Depending on the source, I could provide you with dozens of studies that show synthetic turf or grass to be considered a safer playing surface. The following is a link to the ***Penn State Center for Sports Surface*** *where you can find 51 independent studies regarding player safety.*

https://plantscience.psu.edu/research/centers/ssrc/research/synthetic-turf-injuries

As you will find, there are studies with varying results depending on the sport, surface, weight of the athlete, shoes, infill, age, level of play, sex, etc. Overall, I would consider the safest surface to be a well built and well-maintained natural grass field. In my experience, I have only found those conditions to exist in a few division-one college programs. Never have I seen a natural grass multi-purpose public high school field that I would consider as safe as the field we have designed for Martha's Vineyard Regional High School.

The safety features built into your field include a resilient shock pad, natural infill, and a woven surface. Combined with a state-of-the-art drainage system, this field will provide a uniform playing surface with impact testing guaranteed to never go above 125 on a GMax test and provide a critical fall height of 1.8m on a Head Impact Criterion (HIC) Test. Both of those results mirror that to be found in the best natural grass fields.

Perhaps the best answer to your question can be found in the attached letters from your own High School Coaches and Athletic Trainers who have worked with your athletes in your fields and reviewed the proposed fields' plans and specifications. Please find attached letters from Alyssa Laslovich, BOC Certified Athletic Trainer; Tania Laslovich, MVRHS Certified Athletic Trainer, Johanna Douglas, MVRHS Girl's Varsity Lacrosse Coach, and Don Herman, MVRHS Boy's Football Coach.

26. Will the synthetic field get hotter than a typical grass field? Please provide details.

Response: According to Penn State Center for Sports Surfaces *synthetic turf can get 35° to 55° F (20° to 30° C) hotter than natural grass. These studies were conducted on synthetic turf using SBR Crumb rubber as an infill product. As mentioned in response #13, the multi-purpose synthetic turf field proposed for MVRHS will include a natural, organic infill product called BrockFILL. One of the many advantages to using an organic infill product is the infill's natural properties hold and retain moisture, providing considerable temperature reductions when compared to traditional SBR rubber infill turf fields. In testing provided by the manufacturer, the BrockFILL field measured 33 degrees cooler than a traditional crumb rubber field. Plus, the lower thermal conductivity of BrockFILL reduced heat transmission through shoes and skin. The difference is even greater after a rain. Please refer to the attached BrockFILL brochure, including information on heat reduction, for additional information. MSDS sheets and physical samples have been sent to your office under separate cover.*

27. Is there any danger that the small particulates that make up the infill can be ingested, inhaled by athletes or get in their eyes?

Response: We are proposing to use an organic infill made by Brock USA. At present, there are no known risks regarding ingestion, inhalation or contact with Brockfill. MSDS sheets for all products have previously been submitted to the MVC.

28. What other risks are associated with synthetic fields (friction, sliding, etc.), and how have they been addressed by this plan?

Response: The Fédération Internationale de Football Association (FIFA) is a non-profit organization and international governing body of association football (Soccer in the US). Over the last 20 years, FIFA has developed a standard testing protocol for the synthetic turf to be used at the international level of World Cup competition to ensure the protection of professional soccer players worldwide. This protocol includes testing for skin abrasion, rotational resistance, vertical deformation, and other product and player safety standards. Attached to this report, you will find the independent third-party test results and FIFA certification for the Greenfields turf product we are proposing for use at Martha's Vineyard Regional High School. You will see that this product has met or exceeded the testing protocol in all areas.

Thank you for your time and consideration. Please let me know if you have any questions or require any additional information to begin your review.

Sincerely;
Huntress Associates, Inc.

Christian C. Huntress
President

Cc: Matthew D'Andrea – MVRPS Superintendent
Richard Smith – MVRPS Asst. Superintendent
Kimberly Kirk – Chair, MVRHS School Committee
Joseph Sullivan – Daedalus Projects, Inc.

May 22, 2020

By email: Chris@HuntressAssociates.com

Mr. Christian Huntress
Huntress Associates, Inc.
17 Tewksbury Street
Andover, MA 01810

Re: Proposal for Environmental Consulting Services
Martha's Vineyard Regional High School

Dear Mr. Huntress:

Cooperstown Environmental LLC (Cooperstown) is pleased to provide you with this scope of work and cost proposal to provide Environmental Consulting Services at the site of the Martha's Vineyard Regional High School (MVRHS) in Oak Bluffs, MA (the Site). This letter proposal provides our proposed scope, schedule, and budget to complete the work described herein.

PROJECT UNDERSTANDING

We understand that Huntress Associates, Inc. (HAI) was engaged in 2018 to develop a Master Plan for athletic field improvements at the MVRHS. HAI submitted the Master Plan to MVRHS in January 2019 with the installation of a synthetic turf multi-purpose athletic field selected as the preferred alternative. HAI proposed that the field be constructed using Greenfields USA MX Elite woven synthetic turf carpet, Brock BrockFill engineered wood infill, and a Brock YSR shock pad. The MVRHS School Committee subsequently voted 5-4 to approve the Master Plan.

Based on information that you have provided we also understand that the following environmental conditions have been identified:

- The proposed synthetic turf athletic field is not located adjacent to any Massachusetts Department of Environmental Protection (MassDEP)-delineated wetlands, including marshes, wooded swamps, or salt marshes. Therefore, no impact of stormwater effluent from the field to wetlands is expected.
- The proposed turf field is located at the boundary between the Lagoon Pond Watershed and the Sengekontacket Pond Watershed. The distance from the field to Upper Lagoon Pond is approximately 0.75 miles, and to Sengekontacket Pond is approximately 1.0 mile. Therefore, no impact of stormwater effluent from the field is expected to either Lagoon Pond or Sengekontacket Pond.
- A portion of the proposed turf athletic field is located within a MassDEP Zone II Wellhead Protection Area (WPA; Zone II #212). This Zone II WPA is for the protection of the Oak Bluffs Water District Farm Neck Road Wellfield, which is located approximately 2.2 miles downgradient of the field. Therefore, no impact of stormwater effluent from the field to the wellfield is expected. Because the Town of Oak Bluffs has a Water Resource Protection Overlay District (WRPOD), however, construction of the field requires a Special Permit from the Oak Bluffs Planning Board.
- Contamination from a group of chemicals known as Perfluoroalkyl and Polyfluoroalkyl substances, or PFAPFASas been identified in the Long Pond, Homer Pond, and Watcha Pond Watersheds. Activated-carbon treatment systems have been installed in at least 40 private wells

to remove PFAS from groundwater. The source of the PFAS contamination is from PFAS-containing aqueous film-foaming foam (AFFF) used at the Martha's Vineyard Airport. No potential impact of stormwater effluent from the field to these PFAS-affected watersheds is expected.

Finally, we understand that the Martha's Vineyard Commission (MVC) has expressed concern regarding potential human health risks and potential groundwater contamination associated with the products and materials, including the synthetic turf, infill, and resilient pad, comprising the turf system being proposed for use at MVRHS.

SCOPE OF SERVICES

Task 1 – Develop Acceptance Testing Protocols and Guideline Values

We propose to develop acceptance testing protocols and guideline values for the impact to human health via exposure to the turf system from inhalation, ingestion, and direct (dermal) contact as well as for the potential impact on groundwater quality from the turf. Guideline values for human exposure will be developed with reference to standards issued by the United States Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection (DEP), the Massachusetts Contingency Plan (MCP), or other recognized standards. The acceptance testing protocols, and guideline values will be developed for total and leachable metals (MCP 14 metals and hexavalent chromium), total and leachable polycyclic aromatic hydrocarbons (PAHs), and total and leachable PFAS.

Task 2 – Laboratory Testing of Synthetic Turf Components

We will oversee laboratory testing of the three components of the turf system (carpet, shock pad, and infill). Specifically, we will request the manufacturers direct-ship virgin product samples to Alpha Analytical Laboratory (Alpha) of Westborough, MA using chain-of-custody protocols as follows:

- Greenfields MX Elite Woven Synthetic Turf Carpet (1 square foot)
- Brock YSR Shock Pad (1 square foot)
- Brock BrockFill Organic Infill (1 kilogram)

Under contract to Cooperstown, we will request that Alpha analyze each sample as follows:

- Total MCP 14 metals and hexavalent chromium using EPA Methods 6020B, 7471B, and 7196A;
- Leachable MCP 14 metals and hexavalent chromium using EPA Methods 1311, 6020B, 7471B, and 7196A;
- Total PAHs using EPA Method 8270D-SIM (where possible, dependent on whether the sample can be dissolved by the extraction process);
- Leachable PAHs using EPA Methods 1311 and 8270D;
- Total PFAS (24 compounds) by EPA Method 537M (where possible, dependent on whether the sample can be dissolved by the extraction process); and
- Leachable PFAS (24 compounds) by EPA Methods 1312 and 537M.

The laboratory analyses will be requested for a standard turnaround time of 10 business days, however, because PFAS analyses are sometimes delayed due to high demand at the lab, this time is not guaranteed.

Task 3 – Baseline Testing of Soil and Groundwater

Baseline testing of current conditions at the field site including both soil and groundwater quality would be useful for identifying existing levels of potential contaminants in soil and groundwater so that future risks to human health and groundwater quality may be assessed and measured over time in order to quantify impacts of the turf. This testing should be completed prior to construction.

Following standard MassDEP sampling protocols, we will collect four surficial (0-1 foot depth) grab soil samples from the area where the field will be installed and analyze each sample for:

- Total MCP 14 metals and hexavalent chromium using EPA Methods 6020B, 7471B, and 7196A;
- Total PAHs using EPA Method 8270D-SIM; and
- Total PFAS (24 compounds) by EPA Method 537M.

As a cost-saving measure, we could collect the four grab samples and composite them into one laboratory sample.

We will utilize the existing monitoring well at the site and collect a sample of groundwater using low-flow sampling protocols and analyze the sample for:

- Dissolved MCP 14 metals and hexavalent chromium using EPA Methods 6020B, 7471B, and 7196A;
- Total PAHs using EPA Method 8270D-SIM; and
- Nitrates using EPA Method 353.2.

If the existing monitoring well is not available or if improperly located, we would discuss with you a revised proposal to install one or more wells.

All samples would be analyzed by Alpha using standard turnaround time of 1-2 weeks.

Task 4 – Risk Characterization

Cooperstown will compare the laboratory analytical results for the product samples and soil and groundwater samples to the risk-based guideline values developed in Task 1 to assess the potential risks under both current and proposed conditions to human health and the groundwater resource.

Task 5 – Report

Cooperstown will produce a summary report describing the work conducted, the analytical data, the results of the risk characterization, and recommended next steps, if any.

Task 6 – Project Support

Upon your request, Cooperstown would be available to conduct further engineering support, Licensed Site Professional (LSP) Services, presentations at public meetings, assistance with public outreach, or other associated tasks.

COST ESTIMATE

We propose a time and materials billing approach, invoicing per our hourly labor billing rates plus direct expenses, which are billed at cost plus fifteen percent. The estimated budget for this work is $15,000 - $20,000 and we would communicate with you regarding any potential exceedances of this budget estimate. We request a retainer of $3,000. Invoices are issued monthly and are due upon receipt.

Please authorize this proposal below and the attached contract and return both with the retainer. We look forward to assisting you on this project.

Very sincerely yours,
Cooperstown Environmental LLC

James T. Curtis

James T. Curtis, P.E., LSP
President

Accepted by: _____

Title: _____

For: _____

Date: _____

MVRHS Field Usage by Sport
2020

High School Sport Field Usage

Team	Weeks Scheduled	Events/week	Event/annually	# of participants	Current field(s) used	Estimated Fans/contest	Total Home Games	Season Used	Anticipated Fields Used Phse 1
V Boys soccer	13	6	78	20	Stadium/JV Baseball/Bus lot	50	9	Fall	Turf/Current JV Baseball
JV Boys soccer	13	6	78	22	JV Baseball/Bus lot	20	8	Fall	Turf/Current JV Baseball
V Girls soccer	13	6	78	20	Stadium/JV Baseball/Bus lot	40	9	Fall	Turf/Current JV Baseball
JV Girls soccer	13	6	78	25	JV Baseball/Bus lot	20	8	Fall	Turf/Current JV Baseball
V Football	14	6	84	30	Stadium/Current Track Infield	350	5	Fall	Turf/current track infield
JV Football	14	6	84	15	Stadium/Current Track Infield	50	5	Fall	Turf/current track infield
V Boys lacrosse	11	6	66	35	Stadium/Bus lot	50	9	Spring	Turf/Bus lot field
JV Boys lacrosse	11	6	66	15	Stadium/Bus lot	20	8	Spring	Turf/Bus lot field
V Girls lacrosse	11	6	66	15	Stadium/Field Hockey	50	9	Spring	Turf/Bus lot field
JV Girls lacrosse	11	6	66	15	Stadium/Field Hockey	20	8	Spring	Turf/Bus lot field
V Field hockey	13	6	78	22	Field Hockey	50	9	Fall	Turf/Bus lot field
JV Field hockey	13	6	78	25	Field Hockey	25	9	Fall	Turf/Bus lot field
Spring track	10	5	50	60	Current Track/Infield/Jav Area	50	4	Spring	Track
Sailing	11	6	66	12	Sailing Camp	6	4	Spring	Sailing Camp
		Total	**1016**	**331**		**801**	**90**		
Indoor Sports									
Boys Basketball F/JV/V	18	6	108	38	Gym	150	6/10/2010	Winter	Gym
Girls Basketball JV/V	18	6	108	25	Gym	50	10/10	Winter	Gym
Boys Ice Hockey JV/V	18	6	108	40	Rink	100	6/10	Winter	Rink
Girls Ice Hockey JV/V	18	6	108	40	Rink	50	2/10	Winter	Rink
Boys and Girls Swimming	18	6	72	30	YMCA Pool	25	4/4	Winter	YMCA Pool
Boys and Girls Indoor Track	18	6	108	65	Track/Gym/Wheaton for meets	20	0	Winter	Track/Gym/Wheaton for meets

Youth Sport Usage Currently at HS

Program	Weeks Scheduled	Events/week	Events/Annually
Middle School Track (80 athletes)	4	1	4
MV Youth football	8	5	40
MV Youth flag football	6	4	24
Girls & Boys Youth lacrosse	16	16	256
Babe Ruth Baseball	16	5	80
		Total	**404**

Summer Camps

Program	Events		
Mass Youth Soccer	10		
Club camp	5		
Metter's camp	20		
Field Hockey	5		
Track Camp	5		
Football	5		
Total	**50**		

Potential Users who Have requested the use of the High School Fields

MV United

Program	Events		
MV United Spring Rec	72		
MV United Travel Spring	512		

MV United Island Fall League	192		
MV United Soccer Tournament if the facilty would allow multiple fields (150 Teams)	72		
Total	**848**		

Adult Leagues

Program	Events		
Open Soccer League	16		
Over 40 Men's soccer	24		
Women's League	20		
99 League	24		
Total	**84**		

Total Current Usage	**1470**
Total Potential Usage	**2402**

Chris Huntress

From: William Burke <wburke@edgartown-ma.us>
Sent: Thursday, May 14, 2020 1:26 PM
To: Chris Huntress
Cc: Joe Rock; Pia Webster
Subject: FW: MVRHS - Wastewater Disposal

Hello Chris,
We at the Edgartown wastewater treatment facility are glad to assist the MVRHS in their new athletic field endeavor. I do not anticipate there being any issues with accepting tight tank wastewater from the field house bathrooms. Any information you can send us concerning anticipated tank volumes and the need for pumping would be appreciated.
Regards,
William Burke
Facilities Manager
Edgartown WWTF

From: Pia Webster [mailto:pwebster@edgartown-ma.us]
Sent: Thursday, May 14, 2020 10:52 AM
To: William Burke; Joe Rock
Subject: Fwd: MVRHS - Wastewater Disposal

Forwarded Conversation

Subject: MVRHS - Wastewater Disposal

From: **Chris Huntress** <chris@huntressassociates.com>
Date: Thu, May 14, 2020 at 9:30 AM
To: pwebster@edgartown-ma.us <pwebster@edgartown-ma.us>
Cc: Sullivan, Joseph <JSullivan@chacompanies.com>, Kirk Kimberly <kkirk.smi@gmail.com>

Good Morning Ms. Webster. I am hoping you can connect me with the right person to answer a few questions. I am working with the MVRHS on a new athletic field project and part of the proposal includes a new field house with bathrooms. Presently, we are proposing a tight tank with a connection to the municipal line in OB. OB Wastewater has told us it may be up to three years before we could tie into their municipal system, so we would need an alternate location to dispose of the waste from the tight tank during that time. We have plans and calculation for the disposal system and are presently reviewing those with the OB Board of Health and the OB Wastewater Commission.

I am looking to find out if Edgartown would have capacity to accept the waste from the tight tank until such time as the OB system capacity becomes available. Please let me know where I might best direct these questions…thanks in advance for your help.

Chris

Christian C. Huntress, RLA

President

HUNTRESS *Sports*

17 Tewksbury Street

Andover, MA 01810

c: 978.758.6290

p. 978.470.8882

f. 978.470.8890

www.huntressassociates.com

www.sportsfieldaerials.com

From: **Pia Webster** <pwebster@edgartown-ma.us>
Date: Thu, May 14, 2020 at 10:51 AM
To: Chris Huntress <chris@huntressassociates.com>
Cc: Sullivan, Joseph <JSullivan@chacompanies.com>, Kirk Kimberly <kkirk.smi@gmail.com>

Dear Chris:

I'm referring your e-mail to our new Facilties Manager, William G. Burke.

Pia
--
Pia Webster
Admin Assistant
Edgartown Waste Water Dept
pwebster@edgartown-ma.us
508.627.5482

Oak Bluffs Planning Board

From: Alyssa Laslovich <lyss.laslovich@gmail.com>
Sent: Tuesday, February 11, 2020 3:47 PM
To: Oak Bluffs Planning Board; turner@mvcommission.org
Subject: For the Turf Fields

Good afternoon,

My name is Alyssa Laslovich, I am a BOC certified and MA licensed athletic trainer and alumni of Martha's Vineyard Regional High School. **I am writing to you today in full support of the Huntress Associates Master Plan for a synthetic turf field at the High School.**

As a previous student-athlete at MVRHS it is enlightening to see the school and community grow and develop and provide safe, clean and environmentally friendly environments for its people. Current conditions of the fields are sub-par, and while I was an athlete it had made games and practices due to weather and safety. With turf fields you can have increased playing time since turf stands up better to weather conditions such as rain and snow. After graduating I've had the opportunity to play and work on turf fields and experience its benefits. It would have been an incredible addition to the community while I was there and I would hope that current and future students get the experience they deserve that I wasn't able to have.

As a health care professional in athletics and orthopedics I would also like to advocate for the benefits that turf fields provide. Benefits of which I have personally seen working at other high schools that have utilized turf fields to its full advantage.

- It would be free of natural hazards such as rocks, holes and slopes which can be a very common source of fall and injury.
- It offers a larger about of shock absorption opposed to the grass and dense/compacted soil that it is now. This can prevent a wide variety of injuries by softening the impact of falls and impact.
- It is safe for participants, free of pesticides, fertilizers and other items needed to maintain grass fields, all of which can exacerbate asthma and allergies. While the turf field proposed is fourth generation, recycled materials, with organic wood mulch infill, with a woven backing which does not contain PFAS.
- It requires less resources and maintenance and it's saving water

These are just a few of the reasons why turf would be beneficial for MVRHS and the rest of the community. I am proudly supporting this plan, please vote in favor!

Sincerely,
Alyssa Laslovich ATC, LAT

Oak Bluffs Planning Board

From: Donald Herman <hermanmv@comcast.net>
Sent: Saturday, February 08, 2020 9:51 AM
To: Oak Bluffs Planning Board
Subject: yes to Phase 1

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Chairperson Ewell Hopkins February, 2020

Oak Bluffs Planning Board,

I am excited that your committee is considering application of a synthetic turf field at our high school. I know this process has been long and not without controversy.

I have coached football on Martha's Vineyard for thirty years. During that time I have played on every type of surface available.

I can honestly say that a synthetic turf field is the way to go, especially here on our island. I started coaching and teaching physical education here in the fall of 1988 and consider myself the local expert on the conditions of our existing game fields. My teams have played on all types of surfaces during this same time: natural grass, artificial turf, and various types of synthetic turf. During my tenure I have witnessed every attempt to make our game field surfaces better. Sadly, all of those efforts and costly expenses have failed. Our grass fields incur too much use, we have so many teams using the same fields during the fall and spring seasons it does not allow for proper recovery and growth. The only true growing season is the two and a half months in the summer, which is not the optimal time for grass growth.

Every year, on the day before the football teams first home game, I have the players line up on one end of the game field and we walk the entire length of the field looking for holes. Each year we find dozens of holes, that if not filled in, could lead to serious injury. This year was no exception. This is a non-issue with a turf field.

My three grown children played soccer, field hockey, baseball, and softball here while in high school. Our field surfaces made it difficult to play the game the proper way. Players never knew when the ball would hit a divot or hole and take an errant bounce. This is a non-issue with turf fields.

One of the real benefits to synthetic turf over grass is the ability to use the field in all conditions. One rain storm before a game and the grass field is destroyed for the season, possibly the entire year.

The maintenance cost of synthetic turf is less than grass. There are no needs for: loam, sprinkler systems, grass seed, fertilizer, mowing, lining, and labor to maintain grass.

The new fourth generation synthetic turf fields using the two inch thick shock pad, included in the Huntress design, lowers concussions, knee and ankle injuries. The MIAA (Mass Interscholastic Athletic Association) will not allow tournament games, past the second round or after Thanksgiving, to be played on

grass fields for fear of poor field conditions or frozen ground. Our entire community deserves this and will benefit from having a synthetic turf field.

I appeal to you to not let any personal agendas interfere with how the majority of our island towns have voted on this issue. With the monies for this facility coming from donations and not taxpayers, I don't see how you can turn this opportunity down. I look forward to talking, in person, to your committee.

Respectfully,

Donald Herman

Head Football Coach

Oak Bluffs Planning Board

From: Johanna Douglas <johadoug@gmail.com>
Sent: Saturday, February 08, 2020 10:50 AM
To: Oak Bluffs Planning Board
Subject: Supporting the new field complex

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Dear Chairperson Ewell Hopkins,

My name is Johanna (Jo) Douglas and I am the Head Coach of the Girls' Varsity Lacrosse team at MVRHS.

I am writing to support the new field complex (Phase One of Huntress' Associates Master Plan). The turf field will allow my girls to have a safe playing field -- one without divots and bumps -- and allows us to play after a rain or snowstorm without worry of tearing up the field. The new facility with locker rooms and public bathrooms are much needed in close proximity to the field, so that my team isn't waiting in line at the porta-potty before the game. Providing these enhancements will show our athletes that we care about their sports, their team-mentality, and their community spirit.

Thank you for your support,
Jo

Oak Bluffs Planning Board

From: Tania Laslovich <tlaslovich@mvyps.org>
Sent: Monday, February 10, 2020 3:16 PM
To: Oak Bluffs Planning Board; turner@mvcommission.org
Subject: MVRHS Athletic Fields

To the Oak Bluffs Planning Board and the MV Commission,

I am the Certified Athletic Trainer at MVRHS and **I am in full support of the Huntress Associates Master Plan for a synthetic turf field at the High School.**

Here are some reasons why I support this:

- Since 2005, when I began my employment at MVRHS, I have seen countless injuries sustained due to the poor field conditions.
- Injury Prevention - A new turf field will provide a consistent surface free from ruts, holes, debris, and changes in slope that contribute to injury.
- Injury Prevention - The fields our students currently play on are rock hard and have no cushion. The padding in a turf field adds an extra layer of shock absorption. This is designed to lessen the impact when and athlete is tackled or falls. This could prevent numerous injuries including concussions. Over the years, I have managed hundreds of concussed athletes. Head vs. ground is a very common method of injury. This extra shock absorption could greatly reduce the number of concussions.
- Illness Prevention - Reduction of airborne dirt, dust, fertilizer, goose droppings, and whatever else from the ground that is in that dust cloud that our athletes breathe into their lungs on the dry days. This dust can exacerbate allergies and asthma. Even mowing the grass causes an increase in symptoms of those with allergies and asthma.
- Health Promotion - It is so important for kids to be active. I feel that more students would want to participate in athletic activities when they are proud of their school and facilities.
- Weather Resistant - It is horrible to see what one football game in the rain does to our field. Playing one game in the rain ruins the field for the whole season. A turf field would not sustain this type of damage and is capable of supporting even more activity.
- Safe - The turf field proposed is fourth generation, recycled materials, with organic wood mulch infill, with a woven backing which does not contain PFAS.

These are just some of the reasons I support this turf field. It is my opinion that a turf field would greatly benefit our students. Please vote in favor of this project.

Respectfully,

Tania Laslovich, LAT, ATC, ITAT
Athletic Trainer - Sports Medicine
Martha's Vineyard Regional High School
Mobile 508-627-2839
Fax 508-696-6043

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Modern Artificial Turf

3 POINTS OF SAFETY

IMPACTS

HEAT

TRACTION

IT ALL STARTS WITH THE ATHLETE.

BROCK®
COOLER. FASTER. SAFER.

Artificial turf with crumb rubber over stone was a great step forward 30 years ago, but that's now yesterday's field design. Today's quality artificial turf systems more closely mimic a great natural turf field by effectively addressing the . . .

3 POINTS OF SAFETY

1

IMPACTS

A great surface absorbs big impacts and is firm and fast to run on.

2

HEAT

Heat stress is a safety issue. A cooler surface can improve hydration, performance and recovery.

3

TRACTION

Foot stability and faster cleat release may result in lower incidence of ligament injuries, plus better speed.

1. IMPACTS

Preventing concussions in sports has become a national priority. Studies show 1 in 5 concussions occurs by a head to surface impact. And higher energy body impacts with the surface also take their toll.

HEAD INJURY CRITERION (HIC)

The HIC test correlates with the likelihood and severity of a head injury, has been used to test playground surfaces for decades, and was adopted by ASTM for athletic fields in 2016. The HIC impact test drops a 10.1 lb. hemisphere projectile (curved like a human head) multiple times from increasing heights and determines the Critical Fall Height of the surface. The higher the Critical Fall Height, the safer the surface. A good natural grass field will produce a *minimum* critical fall height of about 6 feet or higher. Doing both the Gmax and HIC tests gives a more comprehensive picture of how the field is performing from an impact safety standpoint.

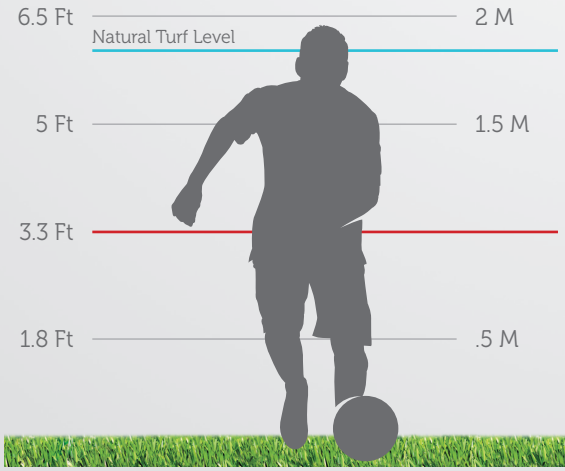
GMAX

The GMax test is not correlated with head injury risk. The GMax test drops a 20 lb. flat missile from just 2 feet high. The higher the GMax value, the harder the surface. A good natural grass field (the benchmark for a quality athletic field) will produce a GMax below 100, and often below 80.

Artificial turf over stone will produce a GMax above 140 and frequently higher, meaning far more impact energy is absorbed by the body rather than by the surface. Turf over a Brock Shock Pad will mimic the low Gmax of natural grass without making the field soft to run on. (Study: University of TN Dept. of Biomechanics, 2016)

HIGH PERFORMANCE SHOCK PADS

Only turf over a Shock Pad can reach safety ranges found in natural grass.



1.8 METER

A 2" TURF OVER A BROCK POWERBASE YSR SHOCK PAD CAN ATTAIN A CRITICAL FALL HEIGHT OF 1.8 METER OR HIGHER

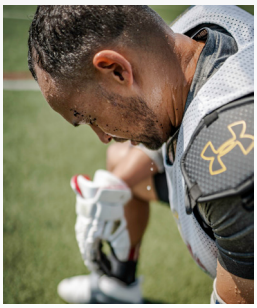
CRITICAL FALL HEIGHT
NOTE: HIGHER IS BETTER

1 METER

A 2" TURF INSTALLED WITHOUT A SHOCK PAD HAS A CRITICAL FALL HEIGHT OF ONLY 1 METER

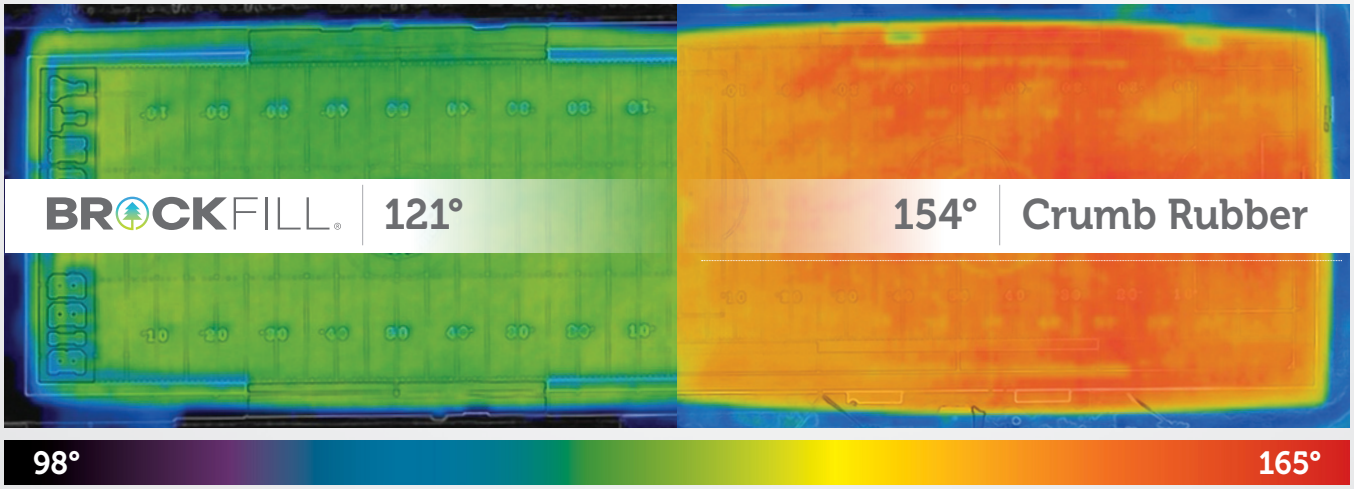
2. HEAT

Heat stress is a major safety issue with artificial turf. In many areas in the U.S., temperatures of an artificial turf field with crumb rubber can exceed 180 degrees F.



BrockFILL® COOLS THE FIELD

We measured two adjacent fields in the same location, with the same turf product, the same day, the same time, and both were dry. The BrockFILL field measured 33 degrees cooler than the crumb rubber field with a cooling agent added. Plus the lower thermal conductivity of BrockFILL reduced heat transmission through shoes and skin. The difference is even greater after a rain.



A cooler surface can reduce dehydration which in turn can reduce risk of injury.

"The risk of heat cramps increases when you aren't properly hydrated. As your body loses water during physical activity, your muscles can become tense. This interferes with your athletic performance and can make you more likely to injure yourself. Muscle strains, tears, and bone fractures are common effects of exercising with tense, cramped muscles."

–Orthoatlanta, Orthopedics and Sports Medicine.

The artificial turf industry has known for years it has a heat problem, but the use of cheap black crumb rubber has prevented a solution. **Until now.**

3. TRACTION

Recent NFL and NCAA studies found a higher incidence of lower extremity injuries (ankles and knees) on artificial turf when compared to quality natural grass. Athletes want a surface that is stable under foot. Rubber infill can cause the foot to rock and slide, leading to less stability through the movement. Increasing foot stability and producing a faster release time from the surface (like natural grass does) may be an important factor in lowering these painful and dangerous injuries.

27% ↑

NFL Study*

showed 27% increase in surface-caused lower extremity injuries on artificial turf vs natural turf.

2.9X ↑

NCAA Study*

2.9 times higher incidence of PCL tears on synthetic vs natural turf.

* NFL: 2012-2016, all 32 NFL teams.
NCAA: Study published in 2019 by the American Journal of Sports Medicine using data from 2004-2013 seasons, data included 3+ million subjects.

Traction: Rubber vs. BrockFILL

When you see the plumes of crumb rubber in a game, that is an indication of infill movement and foot sliding that can be avoided with a more stable infill. This instability is one reason athletes prefer to play on natural turf vs. artificial turf with rubber.

Using high-speed photography, you can see how a more stable infill will provide better traction. In a study conducted by Colorado State University Biomechanics, more foot movement and longer cleat release time was seen on turf with crumb rubber vs turf with BrockFILL. In separate testing at the University of Tennessee, artificial turf with BrockFILL showed traction forces similar to high quality Bermuda and Kentucky Blue grass natural turf.

There is one other important point of safety that doesn't directly deal with the game: **THE SAFETY OF OUR PLANET.**

As thousands of artificial turf fields are being replaced each year and more new ones are being built, millions of pounds of plastic and rubber waste are being generated without any recycling solution. Crumb rubber is a microplastic and ends up in our waterways and food. Crumb rubber infill, once hailed as a recycling solution for old tires, is now going to the very landfill it was supposed to avoid. Or worse, the field is rolled up, left in huge piles and "forgotten."

Brock USA is a company that is focused on both the safety and performance of the athlete, and a healthy future for our planet. Brock PowerBase Shock Pads are the only ones that are Cradle to Cradle Certified, meaning they can be recycled indefinitely. BrockFILL is a purely organic infill grown and processed here in America that can be composted when the field is replaced.

We believe the world cannot afford for us to build artificial fields using components that have no end of life environmental solution, nor ones that don't provide a safer field for athletes of all ages and abilities. At Brock, our purpose is to provide effective and affordable solutions to these problems.

Please join us.

Dan Sawyer
Founder and CEO

US Patents: 8,236,392, 8,353,640 and D637318 and other patents pending.

FSC®

FIFA LABORATORY TEST REPORT

Test manual 2015
01.01.2015

Product	Iron Turf 50 s sbr SP14
FIFA Licensee	Greenfields B.V.
Test Institute	Sports Labs Ltd.

Test Number	76982
External Test Number	19275/2507
Date of Test	28.01.2019
Test Result	Passed
Quality Level	FIFA Quality & Quality PRO
Test Type	Initial

Licensee

Main Address

Name	Greenfields B.V.
Address	G. van der Muelenweg 2
ZIP / City	7443 RE / Nijverdal
Website	www.greenfields.eu
Contact Email	info@GreenFields.eu
Contact Phone	+31/548633333

Test institute

Main Address

Name	Sports Labs Ltd.
Address	1 Adam Square Brucefield Industrial Park
ZIP / City	EH54 9DE / LIVINGSTON
Website	
Contact Email	
Contact Phone	

Approval

Test Institute Director	Sean Ramsay
Signature	
Date	22.01.2019

Test Institute Engineer	Craig Melrose
Signature	
Date	22.01.2019

1 – Test Results

Name	Comment	Result
1 - Summary		
Vertical ball rebound FIFA Quality		Passed
Vertical ball rebound FIFA Quality Pro		Passed
Angeled ball rebound FIFA Quality		Passed
Angeled ball rebound FIFA Quality Pro		Passed
Reduced ball roll FIFA Quality		Passed
Reduced ball roll FIFA Quality Pro		Passed
Shock absorption FIFA Quality		Passed
Shock absorption FIFA Quality Pro		Passed
Deformation FIFA Quality		Passed
Deformation FIFA Quality Pro		Passed
Rotational resistance FIFA Quality		Passed
Rotational resistance FIFA Quality Pro		Passed
Skin / surface friction		Passed
Skin abrasion		Passed
1 - Test Details | Object		
Product Name		Iron Turf 50 s sbr SP14
Product ID		-
Synthetic Turf System		Iron Turf 50
Performance infill		SBR
Stabilising infill		Sand
Shock-pad or elastic layer		SP 14
Sub-base composition		Concrete
2 - Test Details | Test Institute		
Date(s) of test		28.01.2019
Report created by		Craig Melrose
Other Test Engineer on site		
Laboratory Test report number		19275/2507
Test Institute Project number		19275
3 – Product Declaration (Manufacturer)		
Manufacturer		TenCate US
Tuft pattern		Woven, 2 yarns/8 Tufts Per Bundle ($ Tufts Per Yarn)
Yarn manufacturer | yarn 1		TenCate Grass
Product name, code | yarn 1		MS D365/6
Pile yarn profile | yarn 1		Diamond Shaped yarn
Pile thickness (µ m) | yarn 1		365.0

Name	Comment	Result
Pile colour (RAL) | value 1 | yarn 1		6010
Pile colour (RAL) | value 2 | yarn 1		6025
Pile colour (RAL) | value 3 | yarn 1		
Pile width (mm) | yarn 1		1.05
Number of tufts/m2 | yarn 1	ISO1773	7000.00
Pile length (mm) | yarn 1	ISO 2549	50.00
Pile weight (g/m2) | yarn 1	ISO 8543	938.00
Pile yarn characterization | yarn 1		PE Monofilament XWR
Pile yarn dtex | yarn 1		13200
Yarn manufacturer | yarn 2		TenCate Grass
Product name, code | yarn 2		XPS 8800/1
Pile yarn profile | yarn 2		Fibrillated
Pile thickness (µ m) | yarn 2		121.0
Pile colour (RAL) | value 1 | yarn 2		6010
Pile colour (RAL) | value 2 | yarn 2		6025
Pile colour (RAL) | value 3 | yarn 2		
Pile width (mm) | yarn 2		10.00
Number of tufts/m2 | yarn 2	ISO1773	7000.00
Pile length (mm) | yarn 2	ISO 2549	50.00
Pile weight (g/m2) | yarn 2	ISO 8543	626.00
Pile yarn characterization | yarn 2		XPS Fibrillated
Pile yarn dtex | yarn 2		8800.0
Yarn manufacturer | yarn 3		
Product name, code | yarn 3		
Pile yarn profile | yarn 3		
Pile thickness (µ m) | yarn 3		
Pile colour (RAL) | value 1 | yarn 3		
Pile colour (RAL) | value 2 | yarn 3		
Pile colour (RAL) | value 3 | yarn 3		
Pile width (mm) | yarn 3		
Number of tufts/m2 | yarn 3	ISO1773	
Pile length (mm) | yarn 3	ISO 2549	
Pile weight (g/m2) | yarn 3	ISO 8543	
Pile yarn characterization | yarn 3		
Pile yarn dtex | yarn 3		
Primary backing | Product name, code		Woven/Integral
Primary backing | Manufacturer		TenCate

Name	Comment	Result
Re-enforcement scrim | Product name, code		-
Re-enforcement scrim | Manufacturer		-
Secondary backing | Product name, code		PU
Secondary backing | Manufacturer		Textile Rubber
Secondary backing | Dry application rate (g/m2)		678.0
Carpet | Minimum tuft withdrawel force (N)		>80
Carpet | Carpet mass per unit area (g/m2)		3050.0
Method of jointing		Bonded
Bonded joints | Adhesive brand name		149 2C-Turf Adhesive
Bonded joints | Adhesive manufacturer		HB Fuller
Bonded joints | Application rate (g/m)		300 - 350 g/m
Bonded joints | Jointing film brand name		Seaming tape 145
Bonded joints | Jointing film manufacturer		CECO
Stitched seams | Tread brand name/product code		
Stitched seams | Tread manufacturer		
Stitched seams | Stitch rate (stitch per lm)		
Performance Infill | Product name, code		SBR
Performance Infill | Manufacturer		Genan GmbH
Performance Infill | Material type		Genan FINE
Performance Infill | Material grading		0.7 - 2.0 mm
Performance Infill | Particle shape	prEN 14955	Spherical, moderate angular
Performance Infill | Particle size range	EN 933-Part 1	0.7 - 2.0 mm
Performance Infill | Bulk density (g/cm3)	EN 1097-3	0.490
Performance Infill | Application rate (kg/m2)		9.8
Stabilising Infill | Product name, code		Sand
Stabilising Infill | Manufacturer		Filcom

Name	Comment	Result
Stabilising Infill | Material type		Filter sand
Stabilising Infill | Material grading		0.5 - 1.0 mm
Stabilising Infill | Particle shape	prEN 14955	Rounded
Stabilising Infill | Particle size range	EN 933-Part 1	0.5 - 1.0 mm
Stabilising Infill | Bulk density (g/cm3)	EN 1097-3	1.56
Stabilising Infill | Application rate (kg/m2)		13.9
Shockpad, E-layer | Product name, code		SP 14
Shockpad, E-layer | Manufacturer		Brock
Shockpad, E-layer | Type		Shock pad
Shockpad, E-layer | Composition		Performance Base SP14 Expanded Polypropylene
Shockpad, E-layer | Bulk density (g/cm3)		0.06
Shockpad, E-layer| Thickness	EN 1979	14.0
Shockpad, E-layer | Shock absorption (%)	FIFA 4a	62.0
Shockpad, E-layer | Deformation	FIFA 5a	3.0
Shockpad, E-layer | Tensile strength (N)		0.15
Shockpad, E-layer | Mass per unit area (kg/m2)		0.9
Other, detail		
4 – Product Identification		
Artificial Turf | Carpet mass per unit area [g/m2]		2986
Artificial Turf | Tufts per unit area [m2]		7000
Artificial Turf | Pile lenght above backing [mm]		50.0
Artificial Turf | Pile weight [g/m2]		1543
Artificial Turf | Water permeability of carpet [mm/h]		2791
Artificial Turf | Free pile height		18
Performance infill | Particle size range [mm]		0.8 - 2.5 mm
Performance infill | Particle shape		A2
Performance infill | Bulk density [g/cm3]		0.425

Name	Comment	Result
Performance infill | Infill depth [mm]		22
Performance infill | Thermographic analysis | organic [%]		64
Performance infill | Theremographic analysis | inorganic [%]		36
Stabilising infill | Particle size range [mm]		0.5 - 1.0 mm
Stabilising infill | Particle shape		B2
Stabilising infill | Bulk density [g/cm3]		1.54
Shock pad / E-layer | Shock absorption [%]	if part of supplied system	62.0
Shock pad / E-layer | Deformation	if part of supplied system	3.1
Shock pad / E-layer | Thickness	if part of supplied system	14.0
Other, detail		
5 – Test Results | Ball / Surface interaction		
Vertical Ball Rebound | Initial | Dry (Quality)	0.6 - 1m	0.82
Vertical Ball Rebound | Initial | Dry (Pro)	0.6 - 0.85m	0.82
Vertical Ball Rebound | Initial | Wet (Quality)	0.6 - 1m	0.75
Vertical Ball Rebound | Initial | Wet (Pro)	0.6 - 0.85m	0.75
Vertical Ball Rebound | after simulated wear | 3'000 cycles (5*)	0.6 - 0.85m	0.85
Vertical Ball Rebound | after simulated wear | 6'000 cycles (5*)	0.6 - 1m	0.94
Vertical Ball Rebound | after simulated wear | 3'000 cycles (20*)	0.6 - 0.85m	
Vertical Ball Rebound | after simulated wear | 6'000 cycles (20*)	0.6 - 1m	
Angeled Ball Rebound | Dry	45 - 80 %	52
Angeled Ball Rebound | Wet	45 - 80 %	68
Reduced Ball Roll | Initial | Dry (Quality)	4 - 10 m	6.7
Reduced Ball Roll | Initial | Dry (Pro)	4 - 8 m	6.7

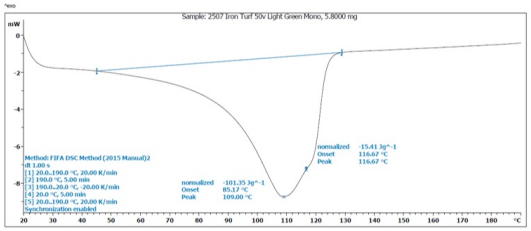
Name	Comment	Result
Reduced Ball Roll | after simulated wear | 3'000 cycles (5*) | Dry	4 - 8 m	7.0
Reduced Ball Roll | after simulated wear | 3'000 cycles (5*) | Wet	4 - 8 m	7.2
Reduced Ball Roll | after simulated wear | 3'000 cycles (20*) | Dry	4 - 8 m	
Reduced Ball Roll | after simulated wear | 3'000 cycles (20*) | Wet	4 - 8 m	
Reduced Ball Roll | after simulated wear | 6'000 cycles (5*) | Dry	4 - 12 m	7.7
Reduced Ball Roll | after simulated wear | 6'000 cycles (5*) | Wet	4 - 12 m	7.9
Reduced Ball Roll | after simulated wear | 6'000 cycles (20*)| Dry	4 - 12 m	
Reduced Ball Roll | after simulated wear | 6'000 cycles (20*)| Wet	4 - 12 m	
Shock absorption | Initial | Dry (Quality)	57 - 68 %	67.9
Shock absorption | Initial | Dry (Pro)	62 - 68 %	67.9
Shock absorption | Initial | Wet (Quality)	57 - 68 %	68.0
Shock absorption | Initial | Wet (Pro)	62 - 68 %	68.0
Shock absorption | after simulated wear | 3'000 cycles (5*)	62 - 68 %	62.2
Shock absorption | after simulated wear | 3'000 cycles (20*)	62 - 68 %	
Shock absorption | after simulated wear | 6'000 cycles (5*)	57 - 68 %	61.1
Shock absorption | after simulated wear | 6'000 cycles (20*)	57 - 68 %	
Shock absorption | 50°C	57 - 68 %	67.60
Shock absorption | -5°C	57 - 68 %	64.30
Deformation | Initial | Dry (Quality)	6 - 11 m	9.9
Deformation | Initial | Dry (Pro)	6 - 10 m	9.9
Deformation | Initial | Wet (Quality)	6 - 11 m	10.0
Deformation | Initial | Wet (Pro)	6 - 10 m	10.0

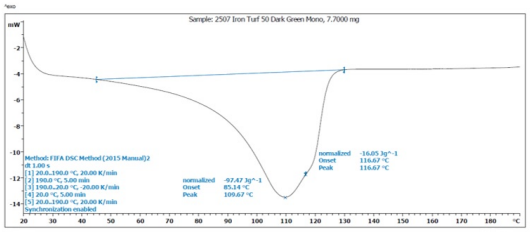
Name	Comment	Result
Deformation | after simulated wear | 3'000 cycles (5*)	6 - 10 m	8.1
Deformation | after simulated wear | 3'000 cycles (20*)	6 - 10 m	
Deformation | after simulated wear | 6'000 cycles (5*)	6 - 11 m	7.7
Deformation | after simulated wear | 6'000 cycles (20*)	6 - 11 m	
Rotational Resistance | Initial | Dry (Quality)	27 - 48 Nm	36
Rotational Resistance | Initial | Dry (Pro)	32 - 43 Nm	36
Rotational Resistance | after simulated wear | 3'000 cycles (5*)	32 - 43 Nm	37
Rotational Resistance | after simulated wear | 3'000 cycles (20*)	32 - 43 Nm	
Rotational Resistance | after simulated wear | 6'000 cycles (5*)	27 - 48 Nm	40
Rotational Resistance | after simulated wear | 6'000 cycles (20*)	27 - 48 Nm	
Other, detail		Wet Rotational Resistance = 35 Nm
5 – Test Results | Player / Surface interaction		
Skin / surface friction | Dry	0.35 - 0.75 µ	0.69
Skin / surface friction | Dry | 3'000 cycles	0.35 - 0.75 µ	0.65
Skin / surface friction | Dry | 6'000 cycles	0.35 - 0.75 µ	0.64
Skin abrasion | Dry	± 30 %	-20
Skin abrasion | Dry | 3'000 cycles	± 30 %	-20
Skin abrasion | Dry | 6'000 cycles	± 30 %	-21
6 – Environmental impact (arficial, light, water)		
Pile yarn 1 | Colour change | after artificial weathering	≥ Grey scale 3	Lime 5, Field 4 - 5
Pile yarn 2 | Colour change | after artificial weathering	≥ Grey scale 3	Lime 4 - 5, Field 5
Pile yarn 3 | Colour change | after artificial weathering	≥ Grey scale 3	
Pile yarn 1 | Yarn tensile strength | after artificial weathering	Change ≤ 50 %	Lime 2 %, Field 1 %
Pile yarn 2 | Yarn tensile strength | after artificial weathering	Change ≤ 50 %	Lime 1 %, Field 3 %

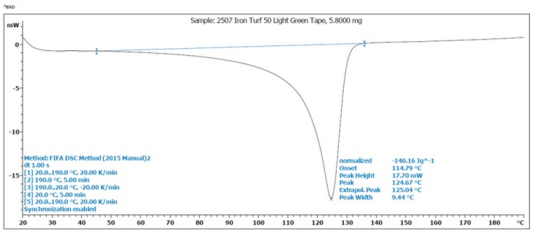
Name	Comment	Result
Pile yarn 3 | Yarn tensile strength | after artificial weathering	Change ≤ 50 %	
Polymeric infill | Colour change | after artificial weathering	≥ Grey scale 3	4 - 5
Polymeric infill | Visual change in composition | after artificial weathering	No change	No Change
Complete system | Water permeability	> 180 mm/h	1473
Stitched joints | Strength | un-aged	≥ 1000N/100mm	
Stitched joints | Strength | water aged	≥ 1000N/100mm	
Bonded joints | Strength | un-aged	≥ 75/100mm	139
Bonded joints | Strength | water aged	≥ 75/100mm	147
Carpet tuft | Withdrawal force | un-aged	≥ 30N	114
Carpet tuft | Withdrawal force | water aged	≥ 30N	121
Heat | Category	for information	Category 3
Splash | Characteristics	for information	> 1.5 %
7 - Miscellaneous (shock pad, sub-base - if part of the system)		
Shock Pad / E-layer | tensile strength | un-aged	≥ 0.15 MPa	0.15
Sub-base | Composition		
Sub-base | Particle size range		
Sub-base | Particle shape		
Sub-base | Thickness		
Sub-base | Compaction & test method		
Other, detail		

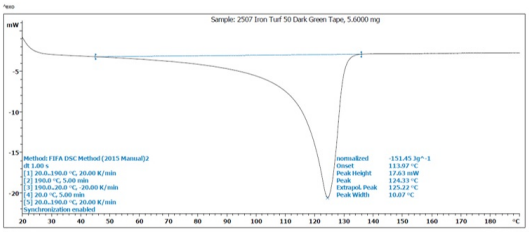
2 – Test Images

DSC Diff. Scan. Colorimetry scans of pile yarn

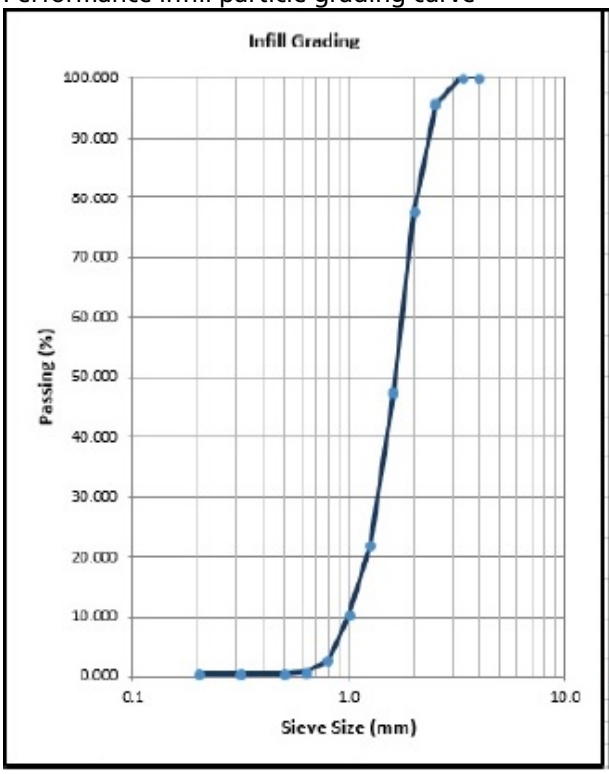






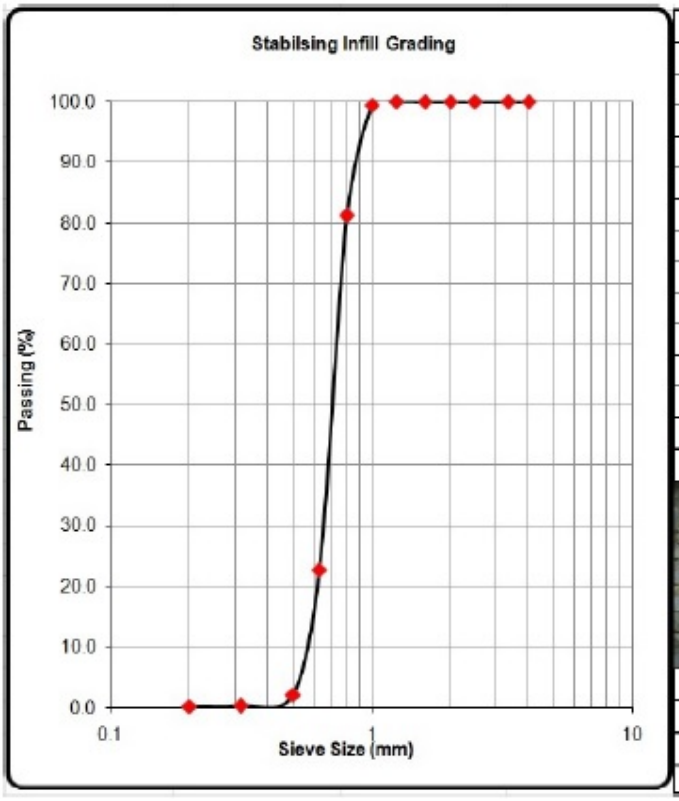


Performance infill particle grading curve



Sieve Size (mm)	Passing (%)
4.000	100.0
3.350	100.0
2.500	95.7
2.000	77.7
1.600	47.4
1.250	22.1
1.000	10.2
0.800	2.6
0.630	0.8
0.500	0.5
0.315	0.5
0.200	0.5
Passing to base tray	0.5

Stabilising infill particle grading curve

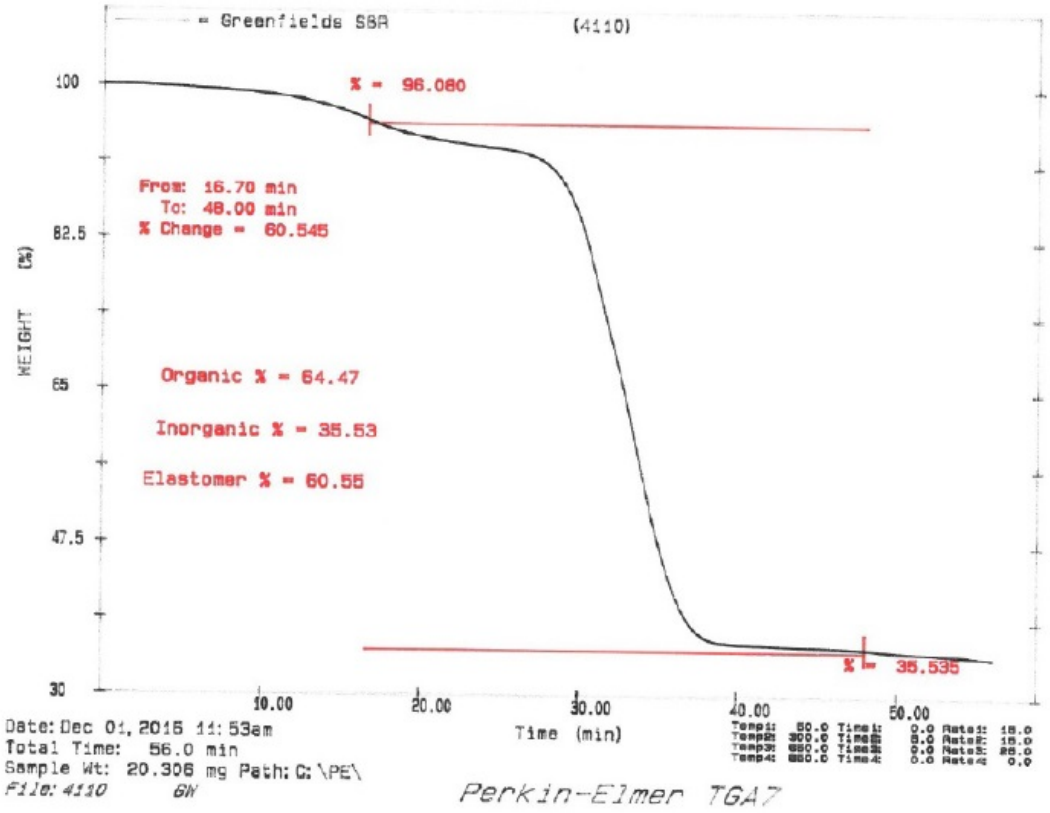


SIEVE SIZE (mm)	PASSING %
4.000	100.0
3.350	100.0
2.500	100.0
2.000	100.0
1.600	100.0
1.250	100.0
1.000	99.4
0.800	81.2
0.630	22.5
0.500	2.1
0.315	0.2
0.200	0.1
Passing to base tray	0.0

PARTICLE PICTURE

PARTICLE SHAPE DESIGNATION	
B2	
BULK DENSITY	
1.544	Mg/m³

TGA of performance infill



Simulated wear - Before 1

Pre-Wear

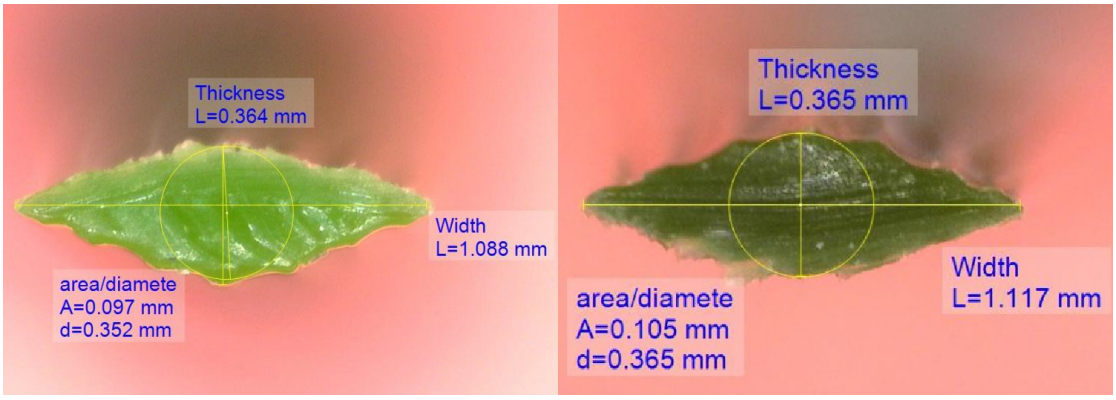
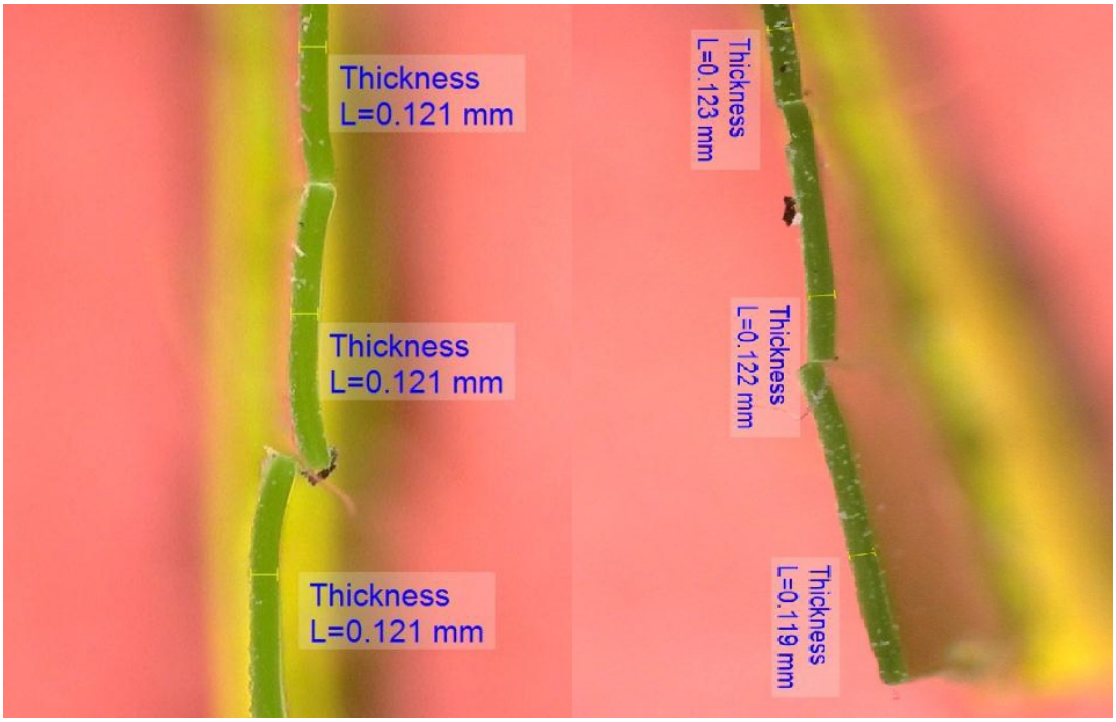
Simulated wear - After 1

3000 Lisport XL Cycles

Simulated wear - After 2

6000 Lisport XL Cycles

Yarn Characteristics - 1



Yarn Characteristics - 2