



## MEMORANDUM

**TO:** Dr. Greg Baker, Superintendent

**FROM:** High School Turf Fields Advisory Group

**DATE:** March 23, 2016

**SUBJECT:** Turf Fields Recommendations

We are pleased to present the following document that provides information about the High School Turf Fields Advisory Group process and outlines recommendations related to upcoming turf field installations at Bellingham and Squalicum high schools, as well as design elements for the Sehome High School fields when they are installed.

This document is organized in five sections:

- I. Introduction
- II. Scope and schedule
- III. Summary of advisory group work and input from stakeholders
- IV. Recommended design elements
- V. Next steps

### **I. Introduction**

In December 2015, Bellingham Public Schools convened a 25-member High School Turf Fields Advisory Group representing staff, students, community members and parents. The group met five times, completed a day-long tour of regional fields and hosted a community meeting. The group was assisted by Bob Harding and Jeff Burke of DA Hogan and Associates, Inc. who are providing architectural landscaping and engineering services for the Bellingham and Squalicum field's projects.

The High School Turf Fields Advisory Group consisted of the following members:

- Steve Clarke, Assistant Superintendent of Teaching and Learning, Co-Chair
- Ron Cowan, Executive Director, Capital Projects/School Facilities, Co-Chair
- Curtis Lawyer, Capital Projects Manager
- Julie Denton, Executive Secretary, Capital Projects/School Facilities
- James Everett, Squalicum High School Principal
- Jeff Vaughn, Bellingham High School Principal
- Lisa Hust, Communications Technician
- Jonah Stinson, Director of School Safety and Emergency Management
- Matthew Read, Lead Utility/Grounds, Buildings and Grounds
- Patrick Brown, Squalicum Activities and Athletics Coordinator

- Colin Cushman, Sehome Activities and Athletics Coordinator
- Chad Larsen, Bellingham Activities and Athletics Coordinator
- Ted Flint, Bellingham Head Football Coach, Science and Physical Education Teacher
- David Kish, Squalicum Head Girls Soccer Coach and Math Teacher
- Kay Reilly, Squalicum Marching Band Teacher
- Kevin Ryan, Sehome Head Cross Country Coach, Head Track and Field Coach and Social Studies Teacher
- Steve Benner, Squalicum High School Parent
- Greg Hatch, Sports/Enrichment Manager, Bellingham Parks and Recreation
- Gary Hodge, Bellingham High School Parent and WWU Outdoor Maintenance Supervisor
- Brian Keeley, Shuksan Middle School Parent
- Molly McAtee, Bellingham High School Parent
- Amber Pitton, Whatcom Middle School and Roosevelt Elementary School Parent
- Brian Weeda, Squalicum High School Parent and Owner Performance Physical Therapy
- Nick Knutson, Bellingham High School Student Athlete
- William Swanson, Kulshan Middle School Student Athlete

## **II. Scope and Schedule**

This group was tasked with providing input and recommendations for design elements (e.g. field markings, lighting, fencing, seating, etc.) associated with synthetic turf field installations at Bellingham (BHS) and Squalicum (SQHS) high schools. They were also asked to provide input and recommend the type of turf and infill material for the new synthetic fields at Bellingham, Squalicum and Sehome high schools. Finally, they were charged with sharing their recommendations with the community to gather feedback.

The High School Turf Fields Advisory Group met five times December through February and hosted a community project update meeting on February 24 at Squalicum High School. The group considered feedback from the community to finalize their recommendation. Installation of the Squalicum High School field is set to begin in late spring 2016. The installation of the Bellingham High School field has been postponed until the spring 2017 due to the time needed to pursue alley and street vacations with the City of Bellingham. If granted, the vacations will allow for a full-sized football and soccer field at Bellingham High; without the vacations, the new field will accommodate a full-sized soccer field and a practice football field. Sehome's fields will be constructed when the school is replaced.

## **III. Summary of the advisory group's work and input from stakeholders**

The High School Turf Fields Advisory Group carefully considered and reviewed research about synthetic turf fields, listened to information from presenters, participated in group discussions and toured turf fields around the state.

### **Introduction to Turf Fields**

During the Dec. 17 and Jan. 6 meetings, Bob Harding and Jeff Burke from DA Hogan and Associates, Inc. provided group members with a synthetic turf workshop where they outlined synthetic turf field history, manufacturing and materials, types of infills, types of fiber (turf) and types of supplemental padding systems.

**Synthetic Turf Field Regional Tour**

On January 20, the group spent a day touring synthetic turf fields around Washington in order to see firsthand the different types of turf and infill materials. The fields toured represented four manufacturers, three turf types and four infill material types.

School	Location	Turf Manufacturer	Infill Material	Supplemental Pad
Edmonds-Woodway High School	Edmonds, WA	FieldTurf Revolution	SBR (crumb rubber)	Elastic Layer
Eastlake High School	Sammamish, WA	Sprinturf Dual Fiber	Coated SBR (coated crumb rubber)	Elastic Layer
Pacific Cascade Middle School	Issaquah, WA	FieldTurf Prestige	Nikegrind (ground Nike shoe rubber)	Elastic Layer
Kennedy High School	Burien, WA	Astroturf 3D	Nikegrind	Brock Powerbase
South Kitsap High School	Port Orchard, WA	Hellas Matrix	GeoFill (Coconut/Rice/Cork)	Elastic Layer



*(Left: The advisory group at Pacific Cascade Middle School.)*

During the tour, group members were able to ask school representatives questions about their fields and why they chose the types of infills and fibers that they did. Jeff Burke, a DA Hogan representative, gave information about the type of fields, their age and the use of the fields. Group members walked and jogged on the fields, bounced and rolled

balls, and felt the fibers and infills. Group members also noted how the fields were lit and field markings.

## **A Review of Infill Materials**

All synthetic turf fields require some type of infill material. Infill material is spread over the synthetic turf fibers (blades of 'grass') and settles between the fibers to help them stand up and, depending on the type of infill, provide additional cushioning.

Information about the eight major types of infill material appears below:

- **SBR (Styrene Butadiene Rubber)**, more commonly known as **crumb rubber**, comes from recycled vehicle tires. Concerns have been raised about the possible negative health impacts associated with crumb rubber infill. All synthetic turf fields in Whatcom County (Civic Field, Joe Martin, WWU, WCC, Lummi Nation School, Bellingham Sportsplex), as well as over 300 other turf fields in Washington state use crumb rubber for infill.
- **Coated SBR Crumb Rubber** is standard crumb rubber that is painted then coated with polyurethane. The idea is the paint encapsulates the crumb rubber; however, there is little information about possible health impacts of the polyurethane. It is currently used on two fields in Washington.
- **Nikegrind** is ground up Nike shoe rubber. It has not been studied as extensively as SBR crumb rubber. Because the information is proprietary there is no information about what is actually in the shoe rubber. It is currently used on three fields in Washington.
- **EPDM (Ethylene propylene diene monomer)** is a synthetic rubber. It is currently used on one field in Washington.
- **TPE (Thermoplastic elastomer)** is essentially the same material used to make plastic wine corks. It is currently used on one field in Washington.
- **Geofill** is comprised of coconut fiber, rice husks and cork. This organic fill degrades over time, resulting in the need for 2 to 5 percent of the infill needing to be replenished each year. In addition, the field must be kept moist and requires watering during the summer months. This organic infill can grow vegetation and bacteria. It is currently used on one field in Washington.
- **Zeofill** is a mineral, zeolite, and has been compared in look and feel to kitty litter. The mineral degrades over time requiring the infill to be replenished. In addition, the mineral and the degradation can cause dust which also poses a health risk. It is not used on any fields in Washington.
- **Purefill** is natural cork. It is not used on any fields in Washington.

### **Crumb Rubber (SBR) Infill**

As noted above, crumb rubber (SBR) is a recycled rubber product derived from vehicle tires. To create crumb rubber, recycled tires are washed and steel or tire cord is removed. Then the tire is ground into small granules to create the infill material.

Crumb rubber is by far the most widely used infill product for turf fields across the country, in Washington State and locally. Of the 327 synthetic turf fields in Washington, 319 (97.6%) use crumb rubber. All synthetic turf fields in Whatcom County including Joe Martin Stadium, Bellingham Sportsplex, Civic Field, Western Washington University, Whatcom Community College and Lummi Nation School use crumb rubber infill. In addition, according to Lance Calloway, Executive Director of Northwest Soccer Park, the new synthetic turf fields at Northwest Soccer Park will also use crumb rubber infill. Synthetic turf fields have been gaining

national attention lately due to concerns raised about the possible negative health impacts associated with crumb rubber infill. Because of the widespread use, popularity and possible health concerns, the advisory group spent several meetings learning about, discussing and reviewing research specific to crumb rubber. Below is a summary of their work and findings:

- Crumb rubber began being used on fields in the mid-90s and is now in use on thousands of fields around the country.
- Crumb rubber gained national attention when University of Washington goalkeeper coach, Amy Griffin, postulated that there could be a negative health effect caused by the crumb rubber after she observed a number of goalkeepers developing cancer. The group viewed news accounts of Coach Griffin's concerns including those by KOMO, NBC and ESPN. She has submitted a list of athletes who played on crumb rubber and developed cancer to the Washington State Department of Health for review. The Health Department is using this information to compare against normal rates of cancer to see if there is a correlation.
- Prior to their January 6 meeting, the group read information and several reviews listed on the Washington Department of Health and EPA websites related to turf as requested by Dr. Greg Stern, Health Officer for the Whatcom County Health Department.
- The group heard a presentation from Dr. Stern at their January 6 meeting. During the meeting he explained that rather than recommend a specific type of infill, he would discuss how health risks are assessed, and pointed out that there are risks and benefits associated with each material, and that there are gaps in information about toxicity in all of them. He wanted to provide a framework for the discussion of the health impacts of the infill materials, and review the major concerns, especially those that have been raised about crumb rubber.

He reviewed general concerns that have been raised about crumb rubber related to toxicity and potential to cause cancer, by reviewing basics of toxicity and basics of cancer epidemiology. Crumb rubber and other materials may contain toxins, but the toxicity depends on the exposure of a person to the toxins and to the release of the toxin from the material. Further, crumb rubber is the most extensively studied of the infill materials. The Washington Department of Health and the EPA have concluded that the results of studies so far have not indicated a significant health risk from its use, and both acknowledge that further study is needed. Given the extent of the studies that have been done, it becomes less likely that new information will show major health impacts.

Dr. Stern briefly mentioned alternatives to crumb rubber. He pointed out that although there are several categories of other infill materials; there are multiple sources of each type, and their composition isn't standardized. For example, dirt fields may contain toxic and carcinogenic substances, depending on prior use of the land, the composition of the soil and past and current additives, like fertilizers, pesticides and prior industrial uses. There is a higher risk of trauma playing on a dirt field than a synthetic turf field, and there are more bacteria in dirt fields than on artificial turf. Rice and coconut infill materials are natural organic materials, but they are not necessarily pristine. We don't know what the rice and coconut has been grown in and if that material contained any chemicals. In addition, bacteria can grow in this type of infill which might pose a health

hazard to some. Ground up athletic shoe materials (Nikegrind) may also contain toxins, and composition may vary from source to source.

Finally, Dr. Stern reminded the group about the health benefits of increased physical activity from increased access to athletic fields using artificial turf and said they should consider that when comparing health effects of artificial turf with natural turf, where use is more limited by the effects of weather.

- The group reviewed the Verdant Turf Report, a report commissioned by the Verdant Health Commission in Snohomish County. In 2015, the Verdant Health Commission hired Gradient Corporation, an environmental and risk sciences consulting firm to conduct screening level risk assessment and literature review associated with the use of artificial turf fields at Woodway High School. Appendix B of the report included conclusions from regulatory and other agencies including the Massachusetts Department of Public Health, the Connecticut Department of Public Health, the California Department Office of Environmental Health, the EPA, etc.
- The group reviewed a Synthetic Turf Literature Review Memorandum prepared by EMB Consulting, LLC for the Edmonds School District. The memorandum is a review of 32 separate documents related to synthetic or artificial turf/crumb rubber products. The objective of the memorandum was to summarize information from the literature related to the potential health risks associated with artificial turf and crumb rubber products and material. The memorandum does not present an opinion or professional assessment by EMB Consulting, on the use or health effects from artificial turf fields with crumb rubber. Rather, it is intended to provide an objective review and summary of the provided literature. A sampling of the documents reviewed include: New York City and Alberta (CAN) Studies of Artificial Turf Safety; State of Connecticut, Department of Public Health, Recent News Concerning Artificial Turf Fields; New York State Department of Environmental Conservation and New York State Department of Health, An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Fields; and the Connecticut Department of Public Health, Technical Fact Sheet – Health Questions about Artificial Turf.
- The group heard from Stewart Mhyre, Executive Director of Business and Operations for Edmonds School District, who told them about the process his district followed when selecting their infill material. Mhyre said the Edmonds School District reviewed two separate documents, one prepared by Gradient Corp, an environmental and risk science consulting firm specializing in toxicology, and a literature review for health risks associated with crumb rubber by EMB Consulting, LLC. After concluding their process, Mhyre said the district and school board felt confident with their decisions to move forward with the installation of synthetic fields with crumb rubber infill.
- The advisory group also contacted representatives from the University of Washington. The representatives noted that coach Amy Griffin is not a spokesperson for the University but is sharing her personal beliefs. Chip Lydum, Associate Athletic Director, Operations and Capital Projects said there has not been enough data to discourage the use of the synthetic turf fields with crumb rubber infill. He said the university cares about the health and safety of their athletes and encourages further study regarding crumb rubber. The University has no plans at this time to change their current fields.

- Research on crumb rubber synthetic turf fields is ongoing, including research by the Environmental Protection Agency and others.

### **Community Project Update Meeting**

The High School Turf Fields Advisory Group held a project update meeting on Feb. 24 at 6 p.m. at Squalicum High School. The meeting was widely publicized. All families and our community members list were invited via email (approximately 11,000 people). Neighbors around Squalicum and Bellingham were sent letters to their homes (approximately 300 people). Principal James Everett called to remind and invite Squalicum High School families (approximately 1,300 people) and the information was posted on the district, Bellingham and Squalicum websites.

About 40 people attended the community meeting including the High School Turf Fields Advisory Group.

The group shared their findings and process with the community and fielded questions during the presentation. Community members had a variety of questions including the following:

- What downtime can be expected for the project?
- When will construction begin?
- Will the fields be lit?
- How safe is the crumb rubber infill?
- What will the district do if the crumb rubber is found to be harmful?
- What do fields in Bellingham use now, i.e. Civic, WCC, WWU?
- What is the maintenance and replacement costs for the fields?
- What information/studies did the advisory group review?

While a handful of community members expressed concern about possible future health risks associated with crumb rubber, the majority of attendees were generally supportive of both the work and recommendations of the advisory group.

After the meeting, the community was given the opportunity to submit further feedback to the Department of Communications and Community Relations. One feedback form was returned and ten emails were received. From the ten emails, five were from the same family. The emails contained both praise and concern of the advisory group's work. Below is a summary of the feedback:

- Has an environmental impact and cost assessment been done?
- Advocate for keeping lacrosse lines on proposed fields.
- Concerns about how the turf changes the game, including impacts on cost, health and the environment.
- Concerns about toxicology of crumb rubber and potential injury from the field turf.
- Questions the impact of surface temperatures on fields during the summer and how this could increase heat stroke, burns and/or exposure to crumb rubber.

- Can the advisory group put money toward improving and maintaining current grass fields? Or expanding to other grass fields?
- Appreciation of the advisory group’s “very thoughtful work” and the adaptability of the new fields for different sports.

#### **IV. Recommended Design Elements For All Fields**

##### **Infill**

After careful consideration of the research reviewed, information from presenters, group discussions and a review of community input, the advisory group recommends using crumb rubber with silica sand as the field infill. Our decision is based on the following:

- Crumb rubber is the most extensively tested of the infill materials.
- Results of those studies have not indicated a significant health risks from its use.
- The Washington State Department of Health states, “*A public health risk appears unlikely based on the available research and data we have reviewed.*”
- The EPA states, “*Current information from a number of studies does not show an elevated health risk from playing on fields with tire crumb. However, these studies do not comprehensively address the concerns about the potential health risks associated with exposure to tire crumb.*”
- The Verdant Turf Report concluded, “*Based on the data publically available for this analysis, the chemical levels found in FieldTurf crumb rubber and GeoTurf infill do not present a risk to people playing on or using the fields with these products. These conclusions are consistent with those of multiple regulatory agencies that have evaluated the risk from artificial turf products in general (e.g., CalOEHHA, 2007; New York City Department of Health and Mental Hygiene, 2009; US EPA, 2009; Connecticut Dept. of Public Health, 2010; CalOEHHA, 2010), including evaluations that are more complex than this screening level assessment. Although there are limitations with a screening level risk assessment such as this one, the consistent conclusion that the data do not indicate an increased risk of health effects from chemical exposure lends additional support to our conclusion.*”
- The summary review of 32 literature documents related to the potential health risks associated with artificial turf and crumb rubber conducted by EMB Consulting, LLC states, “*There does not appear to be any scientific evidence or causal link to corroborate the findings in the KOMO report,*” and “*Studies that appear to exhibit rigorous scientific validity find no additional risk from the chemicals or physical properties of artificial turf and crumb rubber. Many of the studies note that the chemicals are already prevalent in our environment. The addition of exposures from turf fields with crumb rubber do not appear to increase risk above what is already present in the population. The studies acknowledge that turf field materials contain hazardous constituents and that the public, notably children, are in contact with these hazardous constituents. What has not been demonstrated, however, is an exposure pathway by which the constituents can enter the body of the field users and do damage or initiate disease. For a hazardous material to actually present a risk for the end user there has to be a pathway of exposure and a way for the chemical to do damage. All studies acknowledge that additional data is needed to more fully assess potential exposures and possible health risks associate with the use of*



*artificial turf fields with crumb rubber. In the meantime, leading public health agencies, such as the EPA and Consumer Product Safety Commission, are supporting continued use of artificial turf fields with crumb rubber.”*

- The University of Washington is continuing to use crumb rubber on its synthetic turf fields.
- Crumb rubber infill provides additional cushioning for impact related events (concussions; head and body trauma).
- Crumb rubber provides continued protection for the life of the field because it is resilient to compaction.

### **Fiber Type**

The group recommends using a combination type fiber. The combination fiber includes both monofilament and slit-film fibers. Monofilament fields are often used strictly for soccer fields, while slit-film is commonly used for multi-purpose fields. Monofilament fibers tend to stand up longer than slit-film, therefore in using a combination type fiber the group believes field longevity will be increased.

### **Supplemental Padding System**

In addition to the fiber and infill material, we are recommending all of our fields have a protective elastic layer pad installed underneath the artificial turf. This pad will provide an additional level of protection from head and body trauma due to contact with the field after a fall. The lifespan of the pad is twenty to thirty years or approximately two to three field installations.

### **Field Markings, Lighting and Seating**

All fields should provide field markings for soccer, football, as well as boys' and girls' lacrosse and field lighting. Some amount of spectator seating needs to be provided at each field. Alternate bids should be solicited for center logos, as well as end zone lettering. Since there is no difference in cost, 'five yard shading' should be left to the individual school. The options below show that Bellingham High School prefers no shading while Squaticum High School prefers a darker/lighter shading every five yards.

## Squalicum High School

The proposed field includes markings for regulation football, soccer and lacrosse. The design also includes placement of several field events such as shot put, long jump, pole vault, etc. The existing running track would be resurfaced. This design includes bleachers that will provide spectator seating.



## Bellingham High School

Depending on the outcome of vacating the alley west of the proposed field and a portion of Franklin Street, the advisory group recommends two options for Bellingham High School:

### *Bellingham High School Preferred Option*

This design is contingent on the successful outcome of vacating the alley west of the proposed field and a portion of Franklin Street.



## Bellingham High School Option A

Option A assumes we are unsuccessful in vacating the alley and a portion of Franklin Street. It includes a practice football field, and regulation markings for soccer and lacrosse. To the south of the field, bleachers would provide spectator seating. A new tennis court will be part of an alternate bid item if we can find a satisfactory solution to relocate an existing diesel fuel tank located under the new tennis court.



## V. Next Steps

These next steps are contingent on your review and subsequent decisions related to our recommendations. While these next steps are part of the process we need to remain on schedule for *possible* construction later this spring and summer, they do not commit us to the performing the projects in the event a decision is made to postpone them.

District staff continue to work on a number of fronts including the State Environmental Policy Act (SEPA) process, easements for electrical service, plan review, etc. associated with the Squalicum High School project. Assuming the project is not postponed, the thought is to bid the

project in April, begin construction in May and have the improvements completed by mid-August.

District staff has initiated the alley and street vacation process with the City of Bellingham. Because of the need for alley and street vacations associated with the Bellingham High School Turf Field Project, construction of the new fields at Bellingham will take place in the spring and summer of 2017, unless the project is postponed.

## **VI. Conclusion**

We have greatly enjoyed our work and want to thank you for the opportunity to be involved in the planning of our first synthetic turf fields in Bellingham Public Schools. We are excited to see the furthering of The Bellingham Promise to our students and the additional recreational opportunities that will be available to our community as a whole as a result of the construction of these new fields.

Please let us know if you have any questions or need additional information about our recommendation or process.