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December 5<sup>th</sup>, 2018

Kathryne Cho, PE  
Civil Engineer  
City of Newport Beach – Public Works Department  
100 Civic Center Drive, Bay 2D, Newport Beach, CA 92660

**Re: Synthetic Turf Safety  
Grant Howald Park**

Dear Kathryne,

Thank you for forwarding the comments and concerns you've received to-date regarding the safety of synthetic turf for the proposed Grant Howald park renovation. While there is little doubt that synthetic turf fields provide increased access and greatly reduced water demands – those benefits are of no merit if the nature and composition of the playing surface itself presents hazards to the users. As such, with the increased use of synthetic turf some 15 years ago our office was asked to consider incorporating synthetic turf fields in the design of sports parks by many municipalities throughout southern California.

In response, our firm began the review of available published material regarding the testing and evaluation of, in particular, SBR (crumb rubber) infill-based turf. Crumb rubber infill is by far the most widely incorporated infill product for synthetic based fields. As a recycled tire product, this material is often in question regarding the safety and suitability of synthetic turf fields. States, universities, health departments and laboratories have provided for the ongoing available research. Following such studies and testing, their methodologies and conclusions have been made available for the general public to review and assess as they consider incorporating synthetic fields in their recreation programs.

In the course of our review and evaluation of the available literature, our firm has found and do believe that appropriately designed crumb rubber infill based turf systems provide no discernable health hazards to recreational, collegiate or professional participants who play on this surface. While we encourage and support each individual and / or agency to embark upon their own review of available literature – the available findings which were particularly salient to us are noted below. For reference, we noted some select excerpts as well as the link to the specified documents that we found helpful: 8, 13, 21, 34, 55, 89, 144, 233

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**Regarding concerns related to carcinogens and toxicity of crumb rubber:**

- The **Connecticut Department of Public Health** found
  - "...no support for a finding of elevated cancer risk from inhalation or ingestion of chemicals derived from recycled tires used on artificial turf fields".

- <http://cdn.ecoreintl.com/marketing/ecore/Connecticut-Reaffirms-Safety-of-Artificial-Turf.pdf>
- The **Massachusetts Department of Public Health** stated that
  - "...scientific literature continues to suggest that exposure opportunities to artificial turf fields are generally not expected to result in health effects".
  - <http://www.foreverlawn.com/wp-content/uploads/2015/05/commonwealthofMass.pdf>
- The **Washington Department of Public Health** said,
  - "A public health risk appears unlikely based on the available research and data we have reviewed."
  - "Available research suggests exposures from crumb rubber are very low and will not cause cancer among soccer players"
  - "available research does not suggest that crumb rubber presents a significant public health risk"
  - <https://www.doh.wa.gov/CommunityandEnvironment/Schools/EnvironmentalHealth/syntheticTurf>
- **FIFA**, the world governing body for soccer recently published a letter regarding the potential risk of SBR which concluded:
  - "While it will never be possible to exclude risk completely or prove this negative, the newer studies have confirmed the previous findings that ***there is no evidence of link between contracting cancer and playing on artificial turf with SBR infill.*** A large number of studies have further confirmed that the effect of SBR rubber are as negligible as the effect of ingesting grilled foods or exposure to tyre wear on roads in everyday life."
  - <https://aptwebassets1.s3.amazonaws.com/wp-content/uploads/sites/3/2017/06/20170330-statement-on-sbr-infill-v1.0.pdf>

Lastly, renowned toxicologist Michael K. Peterson, recently published the attached manuscript: "*Comprehensive Multipathway Risk Assessment of Chemicals Associated with Recycled Crumb Rubber in Synthetic Turf Fields*".

A few key points from this report:

- Estimated non-cancer hazards and cancer risks for all the evaluated scenarios were within US EPA guidelines. In addition, cancer risk levels for users of synthetic turf field were **comparable to or lower** than those associated with **natural soil** fields.
- For most scenarios, **cancer risks were higher for natural soil** fields.
- The use of synthetic turf fields containing recycled rubber infill **would not result in unacceptable risks** or hazards to adults or children under US EPA's risk assessment guidelines.
- <https://www.recycledrubberfacts.org/wp-content/uploads/2017/10/Environmental-Research-January-2018.pdf>

**Regarding concerns related to exposure to Heavy metals:**

Heavy metals in artificial turf are regulated by a federal ASTM standard.

- **The ASTM Specification for Total Lead Content in Synthetic Turf Fibers (F 2765-09)**

- This specification applies to the maximum content of lead in fibers used in synthetic turf.
  - Reduce lead content to 100 mg/kg (ppm).
- **The ASTM Specification for Extractable Hazardous Metals in Synthetic Turf Infill Materials (ASTM F3188-16).**
  - This specification covers all extractable hazardous metals (man-made or natural) that are intended for use as infill materials for synthetic turf sports surfaces. It specifies the amount of certain metals that have the potential to be extracted from synthetic turf infill materials if ingested. The time, temperature, and pH of the extraction fluid approximate the conditions the infill material would experience in the stomach during the digestive process. The levels of extractable metals are compared to maximum levels allowed in children's toys.

### **Regarding concerns related to increased concussions**

Of the available studies, two of the more thorough investigations have been provided for by Dr. Michael Meyers, a professor at Idaho State University. These publications include *"Incidence, Mechanisms, and Severity of Game-Related College Football Injuries on FieldTurf Versus Natural Grass, 3-Year"* by the Department of Health and Human Development, Montana State University, and the 5-year study published by the Human Performance Research Center, West Texas A&M University. In an ongoing annual study tracking the number of concussions high school football players suffered on natural and synthetic surfaces over 12 years, Dr. Michael Meyers indicates that:

[https://fieldturf.com/workspace/uploads/files/fieldturf\\_college\\_safety\\_study.pdf](https://fieldturf.com/workspace/uploads/files/fieldturf_college_safety_study.pdf)  
<https://fieldturf.com/workspace/uploads/files/study-high-school-football-5-year-dr-meyers-2004-fieldturf.pdf>

- 11.6 % of all concussions are the result of player-to-surface contact. 88.4 % of the remaining concussions occurred during player-to-player contact. Interestingly, when comparing surfaces, 11.8 % of player-to-surface concussions occurred on natural grass, while 11.4 % were sustained on synthetic turf. Even more overwhelming: only 1 % of total injuries were player-to-surface concussions — meaning that 99 % of all high school football injuries, including concussions, are not player-to-surface concussions. "The turf is not the problem that people think it is," Meyers says. "I can't even say this is a natural grass problem. I'm going to be fair to both sides of the issue."
- The percentages are even smaller when it comes to the NCAA level. Meyers' research indicates that 5.9 percent of all concussions at the college level are the result of player-to-turf contact (with a slightly higher percentage occurring on natural grass compared to artificial turf).
- Even more revealing is the fact that less than one-half of one percent — .43 percent, to be exact — of all college football injuries, including concussions, are player-to-turf concussions.

“I’m not downplaying the seriousness of concussions,” Meyers says. “Any type of head injury can be life-threatening and is not to be taken lightly.”

Another recent study, this one conducted by researchers at the **University of Toronto** and involving game-day injuries to players in the National Football League, supports Meyers’ work. The study collected injury reports from regular-season games played during the 2012 and 2013 seasons and indicates no difference in concussion rates between natural grass or artificial turf. Researchers concluded that “risk of concussion was not associated with ... playing surface,” adding that “there is limited evidence linking surface type to upper extremity injuries. New synthetic surfaces have improved shock-absorbing properties and may be more forgiving.”

If an artificial turf field is causing concussions, Meyers says, it is the result of either uneven infill caused by poor maintenance or a low infill weight. Research presented at the 2014 annual meeting of the American Orthopedic Society for Sports Medicine focused on game-related high school football injuries across artificial turf systems of various infill weights. As the artificial infill surface weight decreased, the incidence of game-related high school football trauma significantly increased.

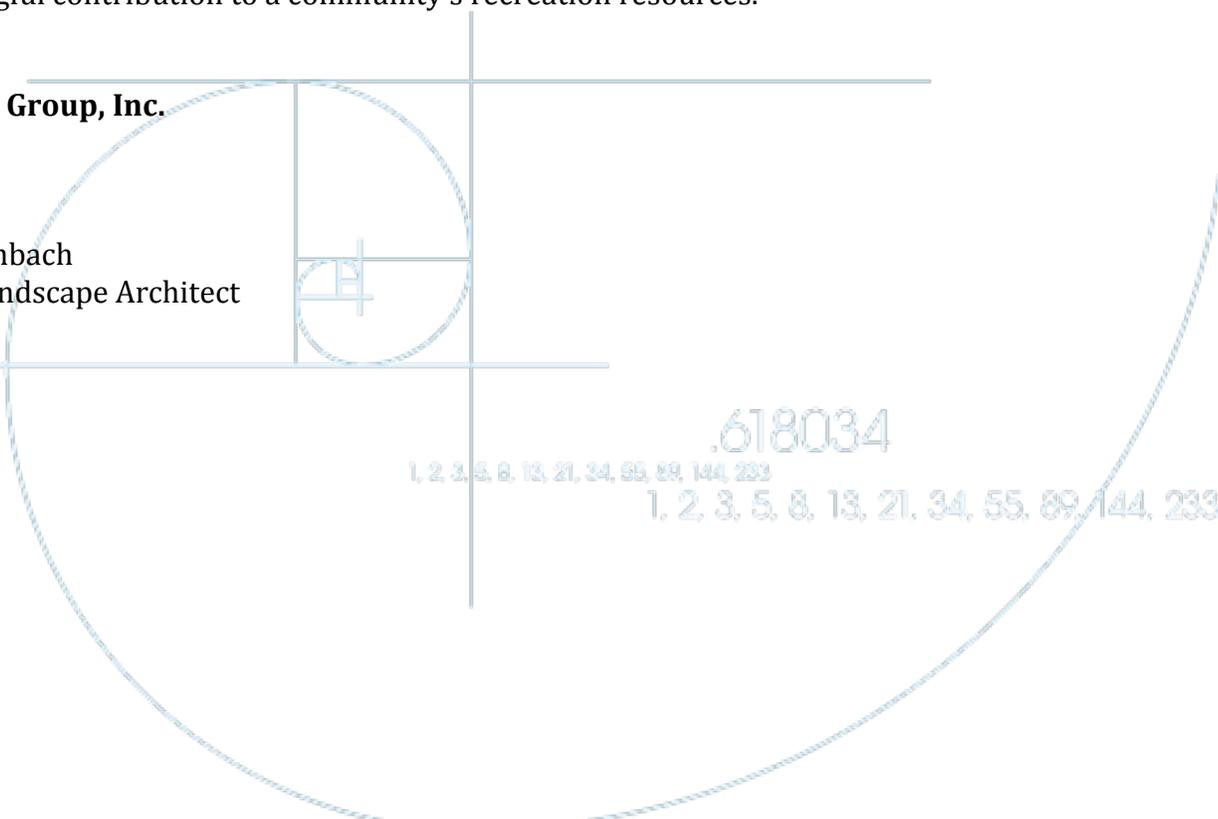
<https://www.ncbi.nlm.nih.gov/pubmed/27088102>

Kathryne, we hope this information is helpful.

As I’d mentioned, there’s a great deal of information available to review and become familiar with regarding these concerns. As our evaluation and assessment will continue, in our travels to date, we’ve found the surface to be well within the realm of reason and a helpful and meaningful contribution to a community’s recreation resources.

Sincerely,  
**RJM Design Group, Inc.**

Craig Sensenbach  
Principal Landscape Architect



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