

**ATTACHMENT C**  
**ALTERNATIVE ARTIFICIAL TURF IN-FILL OPTIONS**

## ALTERNATIVE ARTIFICIAL TURF IN-FILL

Crumb Rubber (SBR) is the most common type of artificial turf infill, often mixed with sand to provide ballast. It is derived predominantly from used tires which are recycled by shredding or cryogenic (freezing) process.

As a recycled product, crumb rubber is readily available (often locally) and offers the advantage of reducing the volume of used tires sent to landfills. It also has a smaller carbon footprint than producing virgin products for the same use. A key disadvantages of crumb rubber is its effect on field surface temperature. Artificial turf fields with crumb rubber infill produce higher surface temperatures than natural grass or organic infills. Another often cited disadvantage is the initial odour produced as the material off-gasses. These odours as well as reports in the media that crumb rubber may pose health concerns have fueled negative public perceptions of the product and artificial turf systems in general. While clinical research conducted to date does not link crumb rubber with elevated risk to human health or environmental safety<sup>1</sup>, some field owners and operators have opted to utilize alternative infill products in their artificial turf field options.



The following table provides the cost premium over and above standard crumb rubber as well as some of the pros and cons for each of the available alternate infill options.

Infill	Description	*Price Increase	Advantages	Disadvantages
Crumb Rubber (SBR)	Ground-up car and truck tires.	\$0	<ul style="list-style-type: none"> <li>• Sports Performance - Highly resilient with excellent shock absorption</li> <li>• Low cost</li> <li>• Post-consumer recycled product removes tires from waste stream</li> </ul>	<ul style="list-style-type: none"> <li>• Post-consumer recycled product—material sources are variable</li> <li>• Contributes to hotter surface temperatures.</li> <li>• Negative public perception</li> <li>• Has new tire odor</li> </ul>
Coated Crumb Rubber (SBR coated)	Ground-up car and truck tires encapsulated with a cross linkable, UV resistant coating	70/30 Coated SBR / Sand +\$147,200 \$11.50 sq./m	<ul style="list-style-type: none"> <li>• Sports Performance - Highly resilient with excellent shock absorption</li> <li>• Low cost</li> <li>• Post-consumer recycled product removes tires from waste stream</li> <li>• Light colour selections absorbs less visible light to reduce surface temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Post-consumer recycled product—material sources are variable</li> <li>• Negative public perception</li> <li>• Has new tire odor</li> </ul>
TPE (Thermoplastic Elastomer)	A group of rubber type block copolymers having	70/30 TPE / Sand +\$486,400	<ul style="list-style-type: none"> <li>• Sports Performance - Can have high resiliency– good shock absorption</li> </ul>	<ul style="list-style-type: none"> <li>• High cost; limited availability results in high transportation costs</li> </ul>

<sup>1</sup> Synthetic Turf Council News Release titled. "Synthetic Turf Council Releases Guidelines for Testing Infill in Synthetic Turf Fields", August 17, 2015.

Infill	Description	*Price Increase	Advantages	Disadvantages
	physical cross-links between soft and hard segments. <i>(used at BC Place Stadium)</i>	\$38.00 sq./m	<ul style="list-style-type: none"> <li>• Virgin material–raw materials can be controlled – contains no PAH’s or heavy metals</li> <li>• Less fine particles = less “spray” <i>(particles dislodged from turf fibers)</i></li> <li>• No odour</li> <li>• Can be melted so they can be recycled after use</li> <li>• Can be re-used</li> <li>• Can be colored: <ul style="list-style-type: none"> <li>▪ Match to turf application</li> <li>▪ Potential reduction in turf surface temperature</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Extruded particles: <ul style="list-style-type: none"> <li>▪ All particles are the same size, so they remain loose and more mobile</li> <li>▪ Round particles can create slipping problems on sidewalks or tracks</li> <li>▪ Improper formulation can lead to premature aging issues – Important to select proven proprietary products.</li> </ul> </li> </ul>
EPDM (Ethylene Propylene Diene Monomer)	A copolymer of ethylene and propylene having diene linkages that can be crosslinked with peroxides or sulfur.	70/30 EPDM / Sand + <b>\$492,800</b> \$38.50 sq./m	<ul style="list-style-type: none"> <li>• Sports Performance - High to medium resiliency depending on filler level</li> <li>• Virgin material–control of raw materials</li> <li>• No odour</li> <li>• Crumb form (angular granules)–settles like crumb rubber. <i>(more likely to stay in place)</i></li> <li>• Less fine particles = less “spray” <i>(particles dislodged from turf fibers)</i></li> <li>• Can be colored</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Limited availability results in high transportation costs</li> <li>• High filler level results in chalking, degradation of materials</li> <li>• Improper crosslinking can lead to premature aging</li> <li>• Cannot be re-used</li> </ul>
Rounded Silica Sand	Large particle-sized, highly rounded sand can provide a synthetic turf infill that does not compact in the way the smaller, more angular sand tends to compact.	100% EnviroSand + <b>\$428,800</b> \$33.50 sq./m	<ul style="list-style-type: none"> <li>• Relatively low cost (per lbs.)</li> <li>• Inorganic material–can be cleaned to have low impurities</li> <li>• Can be coated to give it color</li> </ul>	<ul style="list-style-type: none"> <li>• No resiliency–low shock absorption</li> <li>• Requires a pad</li> <li>• High transportation costs due to weight</li> <li>• High number of pounds required to infill the system (high cost)</li> </ul>
Organic (Coconut Husks)	Primarily coconut husk and coconut peat. <i>(Bowen Island has a coconut fiber/ cork infill field.)</i>	83/17 Organic/Sand + <b>\$326,400</b> \$25.50 sq./m	<ul style="list-style-type: none"> <li>• Natural product–not chemically produced</li> <li>• Provides playing characteristics similar to natural turf</li> <li>• Light color absorbs less visible light to reduce surface temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Higher costs than SBR crumb rubber</li> <li>• Requires more maintenance and refreshing than crumb rubber fields</li> <li>• Limited Sports Performance - requires a pad for adequate elasticity</li> </ul>



Infill	Description	*Price Increase	Advantages	Disadvantages
			<ul style="list-style-type: none"> <li>Retains water for evaporative cooling</li> </ul>	<ul style="list-style-type: none"> <li>Requires a watering system to prevent infill from "caking". (<i>hardening when dry</i>) during summer months.</li> <li>Susceptible to freezing due to low water permeability – limits cold weather use.</li> </ul>
Organic (Cork)	Ground-up bark from the cork tree. ( <i>Port Coquitlam has a Cork infill field</i> )	83/17 Organic/Sand + <b>\$224,000</b> \$17.50 sq./m	<ul style="list-style-type: none"> <li>Natural product–not chemically produced</li> <li>Light color absorbs less visible light to reduce surface temperature</li> <li>Low density decreases the weight needed to fill the turf</li> <li>UV resistant</li> </ul>	<ul style="list-style-type: none"> <li>Limited Sports Performance - requires a pad for adequate elasticity</li> <li>Low density allows material to float, cling to fibers with static charge</li> <li>May require watering system to remove static charges</li> <li>Susceptible to freezing due to low water permeability– limits cold weather use.</li> <li>Limited availability</li> </ul>
Organic (Walnut Shells)	Ground-up walnut shells.	83/17 Organic/Sand + <b>N/A</b>	<ul style="list-style-type: none"> <li>Cool infill during summer</li> <li>No concern with floating/ice</li> <li>Used in New York</li> <li>Very slow to bio-degrade</li> </ul>	<ul style="list-style-type: none"> <li>Brand new 2017 technology</li> <li>Limited Sports Performance - requires a pad for adequate elasticity</li> <li>Slightly more abrasive</li> <li>Limited availability</li> </ul>
Nike Grind	Ground-up soles from athletic shoes.	70/30 Nike Grind / Sand + <b>\$217,600</b> Unknown control over source of supply \$17.00 sq./m	<ul style="list-style-type: none"> <li>Sports Performance - Has good resilience and shock absorption</li> <li>Has improved public perception vs crumb rubber (SBR)</li> <li>Post-consumer recycled material</li> </ul>	<ul style="list-style-type: none"> <li>Limited supply</li> <li>Non-natural color</li> <li>Unknown control over source of supply</li> </ul>

Table is adapted from an alternative Infill Comparison by Shaw Sport Turf.

\*Costs are based on estimates and will vary by geographic region. Costs shown are the estimated increase over standard crumb rubber infill for a 12,800 m<sup>2</sup> field (*as per Topaz Park Phase 1 recommended Concept*) consisting of a turf system of 50mm fiber with a 70/30 rubber sand mix.

