

ARTIFICIAL TURF IN TORONTO

1. POSITION STATEMENT

Natural surfaces are important features of an urban landscape. They provide valuable environmental services by helping to cool our air, absorb rain water and remove carbon dioxide from our atmosphere. Based upon a review of the available evidence, artificial turf can be associated with urban heat island effects and surface water management issues that may require some limits to be placed on its use in Toronto.

Overall the main concerns relating to the use of artificial turf are linked to climate change mitigation and adaptation. Widespread use of artificial turf would make Toronto less resilient to extreme weather events and increase adverse health impacts associated with these events. The 2014 Provincial Policy Statement directs municipalities to address climate change mitigation and adaption, including maximizing the use of vegetation and pervious surfaces. Toronto addresses this through the Toronto Green Standard and zoning bylaw, which limit the use of hard surfaces, including artificial turf, on properties in the city and encourage natural landscaping to reduce the urban heat island impacts of development.

Artificial Turf and Sports Fields

In certain cases artificial turf can sustain higher levels of use than natural surfaces and could be appropriate in areas which would otherwise not be available as an active space for a community. The use of third generation artificial turf is not expected to result in exposure to contaminants at levels that pose a significant risk to human health provided it is properly installed and maintained and users follow good hygienic practices. Under such conditions, and in the cases where use of natural turf is not possible or practical, the benefits from increased physical activity on fields are expected to outweigh the risks. In addition, available evidence indicates that, while playing on artificial fields results in a different pattern of injuries, it does not result in an overall increase in injuries when compared to natural turf surfaces. However, outdoor artificial turf surfaces can become hot during the summer months so it is important to take steps to prevent heat stress and surface burns to skin.

Artificial turf field users need to be aware of the potential for heat-related injuries and of the importance of good hygienic practices that minimise any exposure to substances found in artificial turf. Field users should:

- a) Ensure access to drinking water, opportunities for breaks and access to shade;
- b) Be able to recognize symptoms and apply first aid for heat-related illness;
- c) Wash hands after playing on artificial turf;
- d) Supervise small children and ensure they do not eat the infill material;
- e) Avoid eating on the artificial turf;
- f) Avoid tracking infill material into the school or home (shaking visible rubber pellets off, or providing shoe/equipment cleaning areas before exiting the field);
- g) Protect exposed skin from direct contact with the turf during hot weather events; and,
- h) Clean and disinfect abrasions and cover them as soon as possible.

Facility operators contemplating the installation of artificial turf as a replacement for a natural or hardscape surface should:

- a) Consider the installation of artificial turf only in situations where the conditions on the site and the high use of the space would prevent the maintenance of a healthy natural turf;
- b) Incorporate landscape design strategies that minimize urban heat island and climate change related effects, which can include increasing natural vegetation, decreasing the use of impervious surfaces and reducing the amount of other surfaces with high heat retention properties on the site and in surrounding areas;
- c) Include mitigation strategies that address water quality issues such as water capture and drainage, and maintenance and sanitation procedures;
- d) Prevent heat-related health impacts by providing shade and drinking water; prohibit the use of the field when artificial turf surfaces become very hot such as during heat alert and extreme heat alert days;
- e) Post messages on outdoor artificial fields to remind users of the potential for heat-related injuries on hot days and of the use of good hygienic practices;
- f) Ensure proper ventilation in indoor artificial turf facilities;
- g) Adopt protocols for selecting and purchasing artificial turf systems that address concerns regarding chemical content, heat absorption, and other environmental and health and safety factors;
- h) Prevent toddlers' direct exposure to artificial turf that does not meet limits for children's products as outlined in Health Canada's Consumer Products Containing Lead Regulation;
- i) When available, use alternative infill materials and/or less solar absorbing materials in new installations, rather than crumb rubber infill made from recycled tires; and
- j) Ensure that maintenance protocols are followed and procedure in place to inspect, test, and replace any existing synthetic turf that may age or deteriorate.

2. DEFINITIONS AND ACRONYMS

Artificial Turf: A surface of synthetic fibres made to look like natural grass. It is used on sports fields, play areas, residential/commercial landscaping, roadway medians, bases of street trees, rooftop decks, and patios, balconies around swimming pools, pet areas and airports.

Generations of Artificial Turf: The first generation turf systems were made up of short-pile fibres without "infill" (see definition below). The second generation turf systems featured sand infill, medium-pile and less-densely spaced fibres. The third generation systems most widely used today use long-pile fibres made from polyethylene and infill that is a mixture of sand and recycled rubber. Artificial turf products using nylon fibres, which may contain higher levels of some contaminants, may still be available on the market.

Crumb Rubber: material derived by reducing scrap tires or other rubber into uniform granules with reinforcing materials such as steel and fibre, and other type of inert contaminants such as dust, glass, or rock removed.

Hardscape: Paved or other surface areas in the built environment such as streets, sidewalks, and other structures, where the upper soil profile is no longer exposed to the air and is covered with durable materials.

Health Equity: The absence of systematic and potentially remediable differences in one or more aspects of health across socially, demographically, or geographically defined populations or population subgroups.

Infill Material: One or more granular materials that are worked in between the artificial turf fibres during the installation process. Commonly used base materials are granulated crumb rubber (usually made from recycled tires), flexible plastic pellets, sand, and rubber- or acrylic-coated sand.

Provincial Policy Statement: Provides policy direction on matters of provincial interest related to land use planning and development. Under the Planning Act, decisions affecting planning matters shall be consistent with policy statements issued under the Act. The 2014 statement directs municipalities to address climate change mitigation and adaptation, including maximizing the use of vegetation and pervious surfaces.

SBRr: Styrene-butadiene recycled rubber, a synthetic material derived from styrene and butadiene. It is a commodity that competes with natural rubber and is a component of some of the newer generation artificial turf.

Toronto Green Standard: A set of performance measures for sustainable site and building design. The standard integrates environmental performance requirements to improve air and water quality, reduce green house gas emissions, enhance urban ecology and reduce solid waste to landfill.

3. BACKGROUND

- Artificial turf is already in use in Toronto and concerns have been raised about health impacts, especially to vulnerable user groups such as young children in schools and child-care facilities.
- The industry promotes artificial turf as a cost-efficient, environmentally and user-friendly product. It is becoming increasingly common on sports fields. In Toronto, the use is spreading to schools, child-care facilities, parks, streets, home lawns and commercial areas.
- First and second generation artificial turf made of nylon or nylon/polyethylene blend fibres may still be available for purchase. These may contain levels of lead that pose a potential public health concern.
- Artificial turf has evolved since the first generation rolled out in the 1960s. A third generation product is widely available, with improvements made to the design and composition of the turf to address earlier concerns raised with respect to health, safety, and environmental impacts.
- However, Toronto residents continue to express concern about the use of artificial turf including the use of recycled tire in the infill material, urban heat island effect, potential for physical injuries and issues related to design and maintenance.
- Health and environmental agencies that have reviewed the available evidence have concluded that adverse risks to health are unlikely to occur from the use of artificial turf. Some agencies have advocated the adoption of precautionary measures to address potential concerns. Some examples are found in Table 1.

- In the fall of 2013, City Planning asked Toronto Public Health to provide an opinion about the health and safety of artificial turf in response to current proposals to replace the natural fields on Toronto school properties with artificial turf fields.

4. HEALTH IMPACT ASSESSMENT (HIA)

- TPH has conducted a health impact assessment on the use of artificial turf. While the HIA focussed on the use of artificial turf on sports fields and children's play spaces, its findings are also relevant to home lawns and commercial and other landscaping applications. The HIA reviewed a range of potential impacts and identified strategies to safeguard health and the environment while concurrently maximising opportunities to promote health and health equity.
- A large number of studies have been conducted to assess the risks from potential exposure to contaminants related to artificial turf materials. Many other studies have examined injuries, heat-related concerns, storm water management and ecosystem health. Highlights of the findings of the HIA are provided in Table 2

Table 1: Conclusions On Third Generation Artificial Turf Summarized From Assessments Done By Selected Government Agencies	
Montreal Health and Social Services Agency, Public Health Branch (Beausoleil et al., 2009)	Concluded that in light of all the information gleaned from the scientific literature, it appears that the health risks for players who use artificial turf are not significant and that it is safe to engage in sports activities on this type of outdoor field.
Connecticut Department of Public Health (CDPH) (2007)	Based on the data available, CDPH concludes that the public health risks associated with chemicals in artificial turf materials to be low. Sources of exposure not related to artificial turf materials are more significant than those associated with artificial turf.
The New York City Department of Health and Mental Hygiene (Denly et al., 2008)	Considers it to be unlikely that low levels of exposure to the various chemicals measured in artificial turf have an effect on the health of players. Tested nylon fibres from a number of artificial turfs, measuring the levels of lead in dust by surface area. Since the values found fell within the allowable limits for residential surfaces set by the U.S. EPA, it considered that fields could continue to be used in spite of the relatively high concentration of lead measured in the fibres themselves.
The New York City (NYC) Department of Parks & Recreation (2014)	Based on elevated measurements of lead found in some city parks, indicates that it: <ol style="list-style-type: none"> 1) will use carpet-style or alternative infill materials on all new fields, rather than crumb rubber infill; 2) implements NYC Health Department protocols to inspect, test, and replace any existing synthetic turf fields that may age or deteriorate; and 3) implements the Health Department's recommendations on signage, procurement protocols and assessment of new technologies.
Norwegian Institute of Public Health and Radium Hospital (2006)	Concluded that the use of artificial turf (indoors in gymnasiums) with recycled rubber aggregates did not pose a major health risk. However, it recommends that SBRr aggregates not be used in new indoor gymnasiums.
KemI (Swedish Chemicals Agency) (KemI, 2006)	Recommends that aggregates from recycled tires not be used in the construction of new artificial turf fields. However, given the low health and environmental risks associated with these materials considered that SBRr aggregates in existing fields need not be replaced as long as the artificial turf remained in good condition.

Table 2: Summary Of Health Impacts Associated With Third Generation Artificial Turf Compared To Natural Surfaces	
Determinants of Health	Environmental and Health Impacts
Environmental Factors	
Urban heat island	Has the potential to increase air temperature in nearby neighbourhoods, which could increase the risk of heat-related illnesses during hot weather.
Heat-related illness and injuries	Significantly increases temperature of surface and above surface, which increases the risk of heat-related illnesses and injuries among field users, especially children, during hot weather.
Contaminants in air, dust and water	Adverse health effects unlikely although good hygienic practices and supervision of young children are required to reduce user exposure to contaminants in dust associated with rubber infill. Potentially adverse impact on aquatic ecosystems from contaminants in leachate over the long-term.
Historically contaminated sites	Can act as a barrier to underlying contaminated soil on a contaminated site and allow the installation of a playing field that can increase opportunities for physical activity.
Storm water runoff	Increases the risk of localized flooding during extreme weather events which are expected to become more common with climate change.
Carbon sink	Reduces carbon sinks, which increases net releases of greenhouse gases that contribute to climate change.
Built Environment and Lifestyle Factors	
Physical activity	Increases the number of hours during which fields are available and is expected to favour structured recreational activity; the impact on overall activity level in the community is not known, however.
Injuries	Artificial turf and natural grass have comparable rates of injury, although there are some differences in injury patterns.
Access to natural green space	Artificial turf can displace natural green space which is also important to health and the development of children.
Neighbourhood impacts	Increased field time for structured recreation can increase traffic, lighting, parking and noise concerns for nearby residents.
Equity and Access Factors	
Public access to recreation	Has the potential to enhance access to outdoor recreation facilities among low-income, high-density neighbourhoods that are currently under-served. Installation of artificial turf surfaces is often accompanied by a change in use patterns, which may negatively impact certain groups; measures can be put in place to reduce negative impacts on community access and disadvantaged communities.
Access for people with disabilities	Has the potential to enhance access to recreation facilities for people using mobility aids such as wheelchairs.

5. REFERENCES

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6. FOR MORE INFORMATION

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