City of Minneapolis:
Sustainability Office
Health Department

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Memorandum *DRAFT

To: City Council Health Environment Community Engagement Committee

From: PHAC/CEAC

Date: November 8, 2016

Subject: Recycled tires as ground cover Recommendations

This memo is in response to City Council Health Environment and Community Engagement June 20, 2016 direction:

- Requesting that the Public Health Advisory Committee(PHAC) and the Community Environmental Advisory Commission (CEAC) study and make recommendations regarding the use of waste tires as ground cover in Minneapolis and report back to the Health, Environment and Community Engagement Committee in February of 2017.

- Directing staff from the Health Department and City Coordinator's Office of Sustainability to work with the Public Health Advisory Committee and the Community Environmental Advisory Commission to support their efforts to study and make recommendations regarding the use of waste tires as ground cover in Minneapolis

Appreciation of the problem

Outdoor playgrounds, sports and athletic fields are critical assets to promote physical activity. The choice of surface materials can affect the safety, usability, and cost of maintaining the play area. Surfacing is one of the most important factors in reducing the likelihood of life-threatening head injury although some injuries from falls may occur no matter what surfacing material is used. Additionally, factors to consider when making decisions about surfacing materials include: length of season, concentration of use, increasing play time, durability, minimum required depths, fall height, initial installation and ongoing costs, maintenance, and replacement. It is important to note that all surfacing materials have benefits and challenges when taking into account the multiple factors for determining the best product for use in particular situations.

Sports and athletic fields most often consist of dirt, grass or natural turf, artificial turf, or turf plus infill (such as crumb rubber).

Options available for surfacing around children's play areas and under playground equipment include loose fill materials and unitary surfacing materials.

1) Examples of loose fill materials: organic infill composed of coconut fiber, cork and rice husk blend; wood products such as engineered wood fiber, pea gravel, sand, shredded/recycled rubber mulch, wood mulch (not CCA treated*) and traditional wood chips. *CCA = chromated copper arsenate
2) Examples of unitary surfacing materials include: "poured-in-place" rubber surfacing or any combination of energy-absorbing materials held in place by a binding agent and cured to create a unitary shock absorbing surface.

Product definitions

Crumb rubber is granulated rubber made from recycled tires to form small, uniform pellets. Tires are broken up by grinding or freezing; steel and other fibers are almost entirely removed in the manufacturing process. One common use for crumb rubber is as filler in synthetic turf fields.

Tire mulch is shredded rubber made from recycled tires and is similar in size to traditional wood chips. One common use for tire mulch is as surface covering around children's play areas and under playground equipment.

Organic infill composed of coconut fiber, cork and rice husk blend that is recyclable,……NEEDS MORE WORK

Engineered wood fiber (EWF) made from 100% virgin wood fiber which is not chemically treated. EWF products are designed specifically for use as a playground safety surface.

Grass and dirt are not considered protective surfacing especially in playground construction because wear and environmental factors reduce their shock absorbing effectiveness. Athletic / sports fields using dirt and grass have additional challenges with regard to weather, durability, and maintenance.

Wood mulch (not CCA-treated*) and wood chips compress at least 25% over time due to use and weathering, require greater depth for safety, frequent maintenance to ensure surface levels never drop below the minimum depth, and are subject to standing water and freezing in winter. *CCA = chromated copper arsenate

Pea gravel and sand do not provide the required fall protection when considering fall height. These products are more typically used in sand boxes, activity walls at ground level, around play houses, or any other equipment children use at ground level.

Unitary surfacing materials such as "poured in place" rubber surfacing consists of rubber mats and tiles or combination of energy-absorbing materials held in place by a binder that may be pour in place at the playground site and then cured to form a unitary shock absorbing surface. Unitary materials are available from a number of different manufacturers, many of whom have a range of materials with differing shock absorbing properties.

PHAC and CEAC Recommendations from 2008

Both groups were asked to make recommendations in 2008 related to recycled tires; see attachments A and B.

Formation of Joint Recycled Tire Committee

The following members volunteered to form a Joint Recycled Tire Committee and report/update their respective organizations:

- **CEAC:** Anna Abruzzese (CEAC chair), Andrew Murray (CEAC vice chair), Jenna Grove (Clean Water Action), Meleah Houseknecht, Jon Duesman / Adam Arvidson (Minneapolis Park and Recreation Board)

- **PHAC:** Karen Soderberg, PHAC co-chair & Ward 7 rep; Joey Colianni, member at large; Craig Hedberg, University of Minnesota – School of Public Health; and sitting in for the PHAC MPS representative - Lee Setter, Manager - Minneapolis Public Schools Environmental Health & Safety

Related Meetings by Joint Recycled Tire Committee

- August 23, 2016: Presentation by Play It Safe Minnesota, a non-profit organization that is seeking a ban on recycled tires in playgrounds and fields. This group made a presentation to HECE in June, which resulted in City Council direction for the joint committee study and request to develop a set of recommendations.

- September 8, 2016: Presentations by Minneapolis Public Schools (MPS) and Minneapolis Park and Recreation Board (MPRB). Key points of each presentation are summarized below.

- October 25, 2016: Presentations by William Toscano, PhD, Professor-Environmental Health Sciences, University of Minnesota-School of Public Health (UMN-SPH); Matt Simcik, PhD, Associate Professor-Environmental Health Sciences, UMN-SPH; and Michael Peterson, M.E.M, DABT, Sr. Toxicologist with Gradient. Professor Toscano is a toxicologist who studies endocrine disruption; Professor Simcik is an environmental chemist who has advised several school districts on this issue; and, Mr. Peterson is an industry representative specializing in human health risk assessment.

To create an open process of sharing information, representatives of Minneapolis Public Schools, Minneapolis Park and Recreation Board, Play It Safe Minnesota, and Field Turf were invited to present to the joint sub-committee. Other interested guests were informed of and invited to the joint committee meetings as well. All meeting information including agendas, presentations, and meeting notes / minutes were posted on the Public Health Advisory Committee webpage.

Minneapolis Context

- **MPS** currently has 47 playground areas (of 66 total) with rubber mulch, 8 have engineered wood mulch, 10 playground areas (tot lots) use sand, one pour-in-place at new Dowling Adaptive playground, and one synthetic turf field with crumb rubber infill at Washburn High School.
    - Previous complaints about wood mulch concerned mold, safety, freezing, and drainage.
    - Rubber tire mulch used because at the time, it was promoted by the EPA and Consumer Product Safety Commission for safety, durability, and the product does not degrade.
    - MPS is temporarily on hold with the conversion of the last 8 engineered wood mulch playgrounds to engineered rubber mulch. This temporary hold allows time for government studies on the use of engineered rubber mulch and conclusive links to health hazards. They do not have any immediate plans to add more artificial turf fields at this time.
    - MPS is performing routine maintenance on existing engineered rubber mulch playgrounds.
    - See Attachment C for more detailed information. (handout from September 8, 2016 meeting)

- **MPRB** uses artificial turf with crumb rubber infill in 8 locations. No crumb rubber or synthetic turf is used on playgrounds, rather MPRB playgrounds use pour-in-place combined with sand or engineered wood fiber.
    - Artificial turf with crumb rubber infill withstands the wear-and-tear of lengthy seasonal use and heavy demand.
    - MPRB has started allocating rehabilitation funds in its capital plan in 2019-2020 for older artificial turf fields.
    - See Attachment D for more detailed information. (handout from September 8, 2016 meeting)

- **Both MPS and MPRB** rely on the US Consumer Product Safety Commission's "Public Playground Safety Handbook" for guidance which identifies shredded/recycled rubber mulch as an "Appropriate Surfacing" product, given that this product can meet the impact attenuation requirements of ASTM F1292, as long as minimum depths of the material are maintained. They point out that "this notation is solely focused on the impact attenuation to minimize serious head injuries, and not on other aspects that may pose other risks, such as chemical exposure or ingestion." (See Attachment E, pages 8-10)

- It is unknown how many playground areas and artificial fields are in the City from other sources such as places of worship, private schools, day care centers, etc.

Federal and State Activities

- **Federal:** On February 12, 2016 the U.S. Environmental Protection Agency (EPA), the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry (ATSDR), and the U.S. Consumer Product Safety Commission (CPSC) launched a multi-agency action plan to study key environmental human health questions. By late 2016, the agencies will release a draft status report that describes the findings and

conclusions of the research through that point in time. The report will also outline any additional research needs and next steps. The full report will be released at a later date.

- **State of Minnesota:**
  1) The Minnesota Department of Health (MDH) put out fact sheet on crumb rubber in April 2016. Their fact sheet references two major studies that are currently underway: the EPA study referenced above and a study by the California Office of Health Hazard Assessment which will run through 2018. (See Attachment F)
    - MDH is tracking these studies and will consider their results in any future recommendations regarding the use of crumb rubber in synthetic turf fields.

  2) Hennepin County and Bloomington-Richfield-Edina public health departments are currently not studying the public health effects of crumb rubber – tire mulch.
    - In April 2016, the Edina school board approved conversion of four grass fields to artificial turf and a fifth synthetic field is being replaced with new crumb rubber.
    - On May 12, the Edina Energy and Environment Commission voted to condemn the use of crumb rubber in Edina.

  3) In June 2016, the Duluth School Board voted to move forward with plans to replace the rubber mulch used on most district elementary school playgrounds. The board voted unanimously on the measure with plans to have the rubber mulch removed by the start of the 2017-2018 schoolyear.

  4) During the 2015 legislative session, two bills were introduced: House File 3496 (HF3496) and Senate File 3108 (SF3108). The proposed legislation would have established a moratorium on the use of recycled tire mulch and crumb rubber on any new construction of public parks and school playgrounds until 2019. Public parks and school playgrounds already utilizing the material would have been required to post signs to educate users on ways to reduce exposure. HF3496 was referred to the Committee on Government Operations and Elections Policy and given an informational hearing; SF 3108 was referred to the Committee on Environment and Energy and received no hearing.

Joint Committee Key Findings

1) The chemical composition of tire rubber is designed to enhance the functionality of tires on automobiles and trucks. Tire rubber contains a variety of chemicals that are known to be toxic; however, it remains to be determined whether the extent of exposure to these chemicals on play surfaces covered by recycled tire materials poses an actual health risk.
2) Concerns have been raised about toxic effects of recycled tires, including off-gas, ingestion, and surface overheating.
3) Surface material selection and proper installation play a crucial role in creating safer playground areas and minimize injuries associated with playground equipment.
4) It is a difficult balance between competing concerns which include: increasing play time outside (given Minnesota's shorter playing seasons), safety and injury management, cost of installations and ongoing maintenance, and field/playground durability.
5) Crumb rubber infill and / or rubber tire mulch in existing playgrounds and athletic fields is costly to replace. **(See handouts C & D from MPS and MPRB)**
6) The City does not operate any fields / parks but has political power and influence.
7) **MDH** is tracking two important studies currently underway examining potential health effects from crumb rubber and synthetic turf. One is being led by the federal Environmental Protection Agency. The second is by the California Office of Health Hazard Assessment and will run through mid-2019.
   a. **The EPA study** may not present findings that are dramatically different from what is currently known, but a draft report will not be available until late 2016.
   b. **The California study** is including biological measures over time and may provide more information on long-term health effects, but is not due to be completed until mid-2019.

Recommendations: (This is a draft list of recommendations developed at the last CEAC-PHAC meeting)

1) Given the City's political power and influence, we recommend leveraging partnerships which have the same goals in mind, those of: safety, injury management, healthy active living, and outdoor recreation. Specifically, we recommend that:
    a. Representatives from the City Council, MPS, MPRB and other stakeholders follow this issue closely and collaborate to plan out thoughtful proactive approaches and identify resources.
    b. City Council support its' partners' investment in finding alternatives by asking stakeholders to begin to develop contingency plans, timelines, and budgets for change from rubber mulch, crumb rubber to potentially less toxic options without sacrificing safety. The contingency plans may vary by partner depending on patterns of use, options for replacement, type of installation, and budgetary considerations.
    c. Future City Council action should align with state level action; in particular the actions advised by MDH and other state agencies.
    d. An inventory of all fields and playgrounds in the City including those located at places of worship, private schools, day care centers, etc. in Minneapolis. This inventory would provide scope and scale if future action is desired or required. The City should partner with existing organizations that are undertaking this work. The inventory should include location, approximate square footage, and estimated usage.
    e. The City engage in raising awareness with users and property owners of the use of crumb rubber infill and recycled tire mulch about the simple precautions that can be taken as recommended by MDH. (See Attachment F, page 2)

2) Given that two significant studies from the EPA and the California Office of Environmental Health Hazard are underway and that MDH is also awaiting results of these studies before moving forward with recommendations / guidelines, we recommend a moratorium for the use of city funding on all new development of fields / playgrounds using crumb rubber infill or for fields / playgrounds converting current wood fiber to rubber mulch.
    a. A moratorium would be dated to end 12/31/2019. A time-dated moratorium provides the City and its' partner / stakeholders opportunities to engage in dialogue, collaboration, and problem-solving given that planning processes take several years. One park renovation that would likely be impacted by this moratorium is Curry Field. Special considerations related to this moratorium include:
        i. Rubber mulch used in playgrounds and crumb rubber infill <u>currently in use</u> would need to be maintained to the proper safety depth.
        ii. It is costly to replace crumb rubber infill and / or rubber tire mulch in existing playgrounds and athletic fields. (See Attachments C and D) City-partner-stakeholder conversations need to include a mechanism for addressing timing and cost.
        iii. MPRB has plans to convert Curry field to crumb rubber in 2019. This project has high community engagement and a delay is expected to be unwelcome. MPRB and the City should collaborate to ensure that options to crumb rubber can be considered within the project budget and timeframe.
    b. A moratorium would provide time for the City to convene a partner / stakeholder group to discuss collaborative efforts on what to do, for the development of contingency plans, and to complete an inventory of all fields impacted by potential future decisions / actions.
    c. A moratorium also provides opportunities to educate users and property owners on crumb rubber infill and recycled tire mulch about the simple precautions that can be taken.

In order to help support these recommendations, PHAC and CEAC will continue to monitor the issue and may be called on to provide insight and perspectives throughout the time period of the moratorium and after more substantial scientific studies have been completed.

Note: NEXT page contains summaries of the EPA & California studies, which could be included or not. It might be a good resource, especially for the presentation to Council (if they ask questions about it). I cut it to shorten the document.

EPA study

- Led and chiefly implemented by the US Environmental Protection Agency (EPA) and the Centers for Disease Control and Prevention's National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (CDC-NCEH/ATSDR), in cooperation with the US Consumer Product Safety Commission (CPSC) and other agencies. Other agencies such as National Institute of Environmental Health Sciences, the U.S. Department of Defense and California's Office of Environmental Health Hazard Assessment will provide expertise, facilities and/or sharing of information.
- Research is currently underway and the plan is to release a status report with the summary of findings by the end of 2016. While this effort won't provide all the answers, the information will help answer some of the key questions that have been raised about tire crumb used in artificial turf fields and will provide a better understanding of potential exposures that people may experience by using these fields.
- Tire crumb sample collection and field sampling is underway. Tire crumb samples will be collected from up to 40 different locations within the four US census regions. These locations include both outdoor and indoor playing fields as well as recycled tire crumb manufacturing plants. To protect privacy, the names of the specific locations sampled will not be released publicly.
- By the end of 2016, the agencies anticipate releasing a draft status report that describes the preliminary findings and conclusions of the research through that point in time. The draft status report will summarize the agencies' progress in: (1) Identifying key constituents of concern in recycled tire crumb used in artificial turf fields; (2) Assessing potential exposures to potentially harmful constituents; (3) Conducting an initial evaluation of potential cancer and non-cancer toxicity of key chemical constituents; and (4) Identifying follow-up activities that could be conducted to provide additional insights about potential risks. The results of the preliminary work on recycled tire-derived playground surface materials will also be described. The report will also outline any additional research needs and next steps.

California Office of Environmental Health Hazard Assessment

- A comprehensive study which will include a review of current knowledge, public input, exposure assessment, and estimated health outcomes, scheduled for completion in mid-2019. A draft report describing the preliminary data and results of the study will be released in mid-2018.
- The study is assessing the potential health impacts associated with playing on synthetic turf fields and playground mats. It is examining athletic fields and playground mats made from crumb rubber derived from recycled tires. Major parts of the study include:
    1. Identifying and measuring chemicals released from crumb rubber and artificial grass blades in indoor and outdoor fields and playground mats throughout California.
    2. Evaluating exposures to chemicals released from crumb rubber and synthetic grass blades through inhalation, swallowing, and skin contact.
    3. Evaluating the hazards and toxicological activities of chemicals released from turf. This includes examining the ways that sensitive populations, such as children, may be more vulnerable to chemicals released from synthetic turf fields.
    4. Developing a study protocol for measuring chemicals from synthetic turf in urine or other bodily fluids of athletes, or using personal monitors worn by athletes.
    5. Conducting an assessment of potential health impacts associated with exposures to chemicals released from synthetic turf and playground mats, taking into account the finding of the above activities.

Date: October 29, 2008

Attachment A

To: Honorable Minneapolis City Council Member Scott Benson
From: Public Health Advisory Committee (PHAC)
RE: Recommendation on Use of Crumb Rubber Applications

With the assistance of local environmental health and landscape architect professionals, PHAC members reviewed four applications of rubber products utilized within Minneapolis parks and playgrounds. It is important to note that these products do not have the same origin, same formulation (i.e. solid form, chipped, painted, etc.), nor exposure to hazards.

They include:

- Rubber chips
- Poured in place recycled crumb rubber
- Rubber molded tiles/rubber mats
- Crumb rubber/Field Turf product

Potential health and safety considerations to consider/explore specific to each product include:

- heat stress
- injury
- infection
- latex allergy
- chemical exposure (indoor vs. outdoor use)

After a series of discussions, PHAC members have developed three key recommendations regarding future use of these rubber products in Minneapolis:

1) PHAC recommends monitoring related research and studies as they become available.
2) PHAC recommends application of the **precautionary principle**[1] before utilizing additional rubber product in Minneapolis parks and playgrounds.

    - The precautionary principle is a tool for policy- and decision-making designed to ensure that people or entities bear political responsibility for taking action to prevent damage to health and ecosystems in the face of uncertain scientific information about health and ecosystem risks.

    - Application of the precautionary principle is especially appropriate for the protection of children's health because:
        - the science underlying the impacts of environmental stressors on children (from the stage of the fetus to the age of 18) is more complex, less researched and less understood than that of such impacts on adults;
        - the likelihood of serious harm to children from such impacts can be greater than for adults because of their different and changing stages of biological development, their behavior and their greater exposure in relation to body weight;
        - children are involuntarily exposed to a greater proportion of the risks caused by society's activities than adults, yet they have less power to avoid them;
        - the risks and the benefits of avoided risks have more time to impact on children and society than on adults;

3) PHAC recommends entities considering the use of rubber products in parks and playgrounds seek/investigate alternative products which may be safer for children (i.e. flexsand, corn husk, cork, etc.)

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[1] Dealing with uncertainty – how can the precautionary principle help protect the future of our children? World Health Organization Europe. Fourth Ministerial Conference on Environment and Health. Budapest, Hungary, June 2004.

Attachment B

Date: December 11, 2008

To: Honorable Minneapolis City Council Member Scott Benson

From: Citizen's Environmental Advisory Committee (CEAC)

RE: Recommendation on Use of Crumb Rubber Applications

Based on the information provided in this memo, members of CEAC recommend:

1) The City Council support 2008 Kahn/Wagenius legislation studying the potential health risks of crumb rubber use as infill for turf and on playgrounds and urges such legislation include a comparative analysis of alternatives,

2) Before the City Council approves use of crumb rubber or other artificial turf applications, an applicant must demonstrate its environmental and health safety as compared to the alternatives,

3) The City Council consider developing an ordinance addressing appropriate applications citywide once the studies have been completed and the Public Health Advisory Committee has reviewed them, and

4) The City should evaluate existing applications of crumb rubber with in the City, including children's exposure.

At your request, we reviewed concerns raised by state agencies, public health officials and environmental groups about potential adverse health and environmental effects that may result from the use of crumb rubber in synthetic turf, used on high school athletic fields, and as crumb rubber on playgrounds. We reviewed readily available literature and determined there is adequate support for concerns raised about health risks to children exposed to recycled tire crumb. However, much of the literature also concluded that there is insufficient data to establish if those concerns can be validated.

The concerns raised relate to use of a loose, crumbled product made from used tires and incorporated in synthetic turf as well as crumb rubber placed in playgrounds. Synthetic turf is made in layers of synthetic materials including green plastic blades that are attached to a backing and small particles called fill, often referred to as crumb rubber, that secure the blades. Children playing on tire crumb in play grounds under outdoor play structures as an alternative to sand or wood chips could potentially be exposed to toxic substances.

Health concerns are generally focused on crumb rubber because it is made from recycled tires containing chemicals that can cause cancer and other health problems if exposure occurs. There are three possible ways that children might be exposed: Accidentally ingesting small amounts of material from residue left on hands after playing on the fields,

breathing in dust and/or direct skin contact with the crumb rubber. Stormwater runoff is also a concern. As runoff from the now impervious surface is directed towards storm water systems, these chemicals could end up in surface water resources and cause adverse potential effects to aquatic wildlife.

Other issues of concern raised by the Sierra Club and others include additional health concerns: the need to water the synthetic turf because it gets so hot in the summer, enough to cause burns, water quality: potential environmental impacts of artificial turf located near rivers, lakes and aquifers from storm water systems or as ground water seepage and global warming: replacing living surfaces with non-living surfaces makes cities warmer than rural areas. Synthetic turf has been well documented to become significantly hotter than natural grass and even asphalt.

Thank you for taking the time to carefully consider the issues associated with the potential health and environmental effects related to the use of crumb rubber. Some available literature is informative about potential dangers and other literature suggested that the risk associated with the use of crumb rubber was very low; therefore, we believe the previously stated recommendations are appropriate.

Attachment C

Facilities Department
Division of Environmental Health and Safety
Plant Maintenance and Operations Building
1225 N 7th St.
Minneapolis, Minnesota 55414-2398
Phone: 612.668.0310 / Fax: 612.668.0275

Minneapolis Public Schools
Playground Mulch Summary and Projected Cost

- 66 separate playground areas
- 47 currently have engineered rubber mulch covering 204,170 Square Feet
- 8 currently have engineered wood mulch covering 33,145 Square Feet
- 10 currently have sand covering 20,678 Square Feet (Tot-Lots)
- 1 currently has Poured In Place (Dowling new Adaptive playground in courtyard)
- Cost estimate to convert all 47 rubber mulch play areas to engineered wood fibar: $1,143,352 (cost likely to increase with needed border changes & improved drainage).
- Annual maintenance cost to replenish engineered wood mulch/sand at 65 play areas: $194,245 (This is based on the need to replenish every 1 to 2 years)
- Annual maintenance cost to replenish rubber mulch at 66 play areas: $35,000 (This is based on the need to replenish every 5 to 7 years)
- One synthetic turf field with crumb rubber at Washburn High School. All other ball fields are grass. We do not have any immediate plans to add more.

MPS is temporarily on hold with the conversion of the last 8 engineered wood mulch playgrounds to engineered rubber mulch. MPS is doing this to allow time for government studies on the use of engineered rubber mulch so that we can make an informed decision. We are continuing to perform maintenance on existing engineered rubber mulch playgrounds i.e. adding material as needed to maintain required depth.

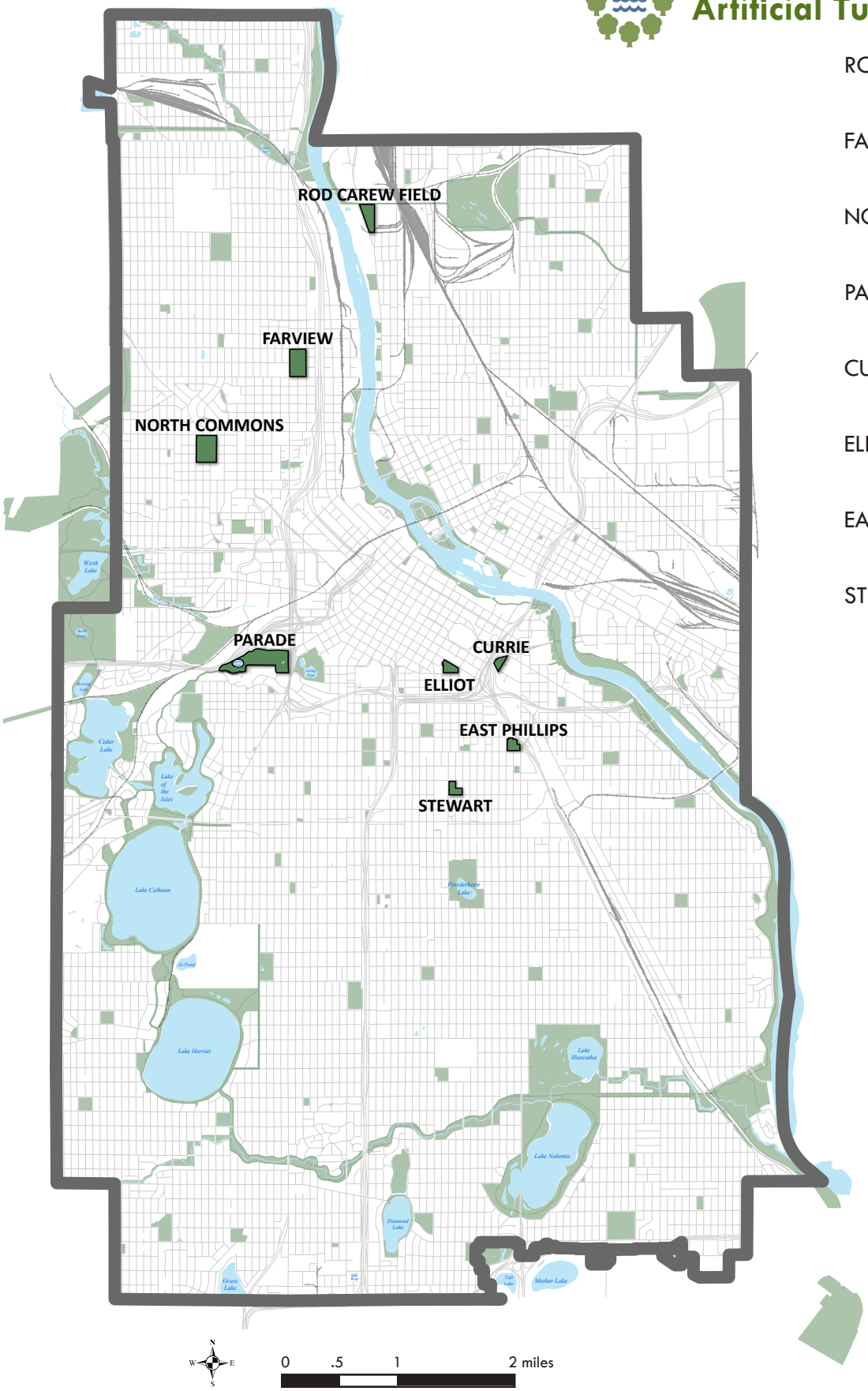
Thank you!

Minneapolis
Park & Recreation Board

2016 Artificial Turf Fields

Attachment D

Artificial Turf Field Locations



ROD CAREW FIELD
Full Size Softball Field

FARVIEW PARK
Football/Baseball Field

NORTH COMMONS PARK
Full Size Softball Field

PARADE STADIUM
Full Size Soccer Field

CURRIE PARK
Half Size Soccer Field

ELLIOT PARK
Full Size Soccer Field

EAST PHILLIPS PARK
(2) Half Size Soccer Fields

STEWART PARK
Half Size Soccer Field

Revision date:
3-29-2016

Conversion of Existing Fields to Natural Turf

Summary of Existing Artificial Turfed Fields

Park	Year	Infill	Size (SF)	Type	MPRB	Grants	Donations	Total Construction	Projected Annual Revenue
Parade Athletic Field	2005	Crumb Rubber	99,600	Full Size Soccer	$ 1,300,000	$ 200,000	$ -	$ 1,500,000	$ 129,795
Stewart Park	2009	Crumb Rubber	27,440	1/2 Soccer field	$ 50,000	$ 225,000	$ -	$ 275,000	$ 28,575
Currie Park	2009	Crumb Rubber	25,480	1/2 Soccer field	$ 50,000	$ 250,000	$ -	$ 300,000	$ 28,575
East Phillips Park	2012	Crumb Rubber	54,635	Two - 1/2 size	$ 575,000	$ 150,000	$ -	$ 725,000	$ 57,150
North Commons	2013	Crumb Rubber	42,392	Full Size Softball Field	$ -	$ -	$ 600,000	$ 600,000	$ 47,625
Farview Park	2013	Crumb Rubber	114,322	Football/Baseball Field	$ 100,000	$ -	$ 1,200,000	$ 1,300,000	$ 129,795
Rod Carew Field	2014	Crumb Rubber	60,109	Full Size Softball Field	$ 120,000	$ 67,000	$ 600,000	$ 787,000	$ 47,625
Elliot Park	2014	Crumb Rubber	81,958	Full Size Soccer	$ 300,000	$ 175,000	$ 600,000	$ 1,075,000	$ 107,950
				Totals	**$ 2,495,000**	**$ 1,067,000**	**$ 3,000,000**	**$ 6,562,000**	**$ 577,090**

Summary of Table 1:

Projected Annual Revenue is based off of total number of hours fields are available between March 21 - November 11.
It is assumed that a natural turf field will only be available 50% of the time that a synthetic turf field would be.
If fields are converted to natural turf, revenue will be at least cut in half.

Estimated Cost to Convert Artificial Turfed Fields to Natural Turf While Maintaining Field Capacity

Park	Year	Size (SF)	Type	Conversion	Land Acquisition	Replacement	Grant/Donation Reimbursement	Totals
Parade Athletic Field	2005	99,600	Full Size Soccer	$ 398,400	$ 6,972,000	$ 697,200	$ 200,000	$ 8,267,600
Stewart Park	2009	27,440	1/2 Soccer field	$ 109,760	$ 1,920,800	$ 192,080	$ 225,000	$ 2,447,640
Currie Park	2009	25,480	1/2 Soccer field	$ 101,920	$ 1,783,600	$ 178,360	$ 250,000	$ 2,313,880
East Phillips Park	2012	54,635	Two - 1/2 size	$ 218,540	$ 3,824,450	$ 382,445	$ 150,000	$ 4,575,435
North Commons	2013	42,392	Full Size Softball Field	$ 169,568	$ 2,967,440	$ 296,744	$ 600,000	$ 4,033,752
Farview Park	2013	114,322	Football/Baseball Field	$ 457,288	$ 8,002,540	$ 800,254	$ 1,200,000	$ 10,460,082
Rod Carew Field	2014	60,109	Full Size Softball Field	$ 240,436	$ 4,207,630	$ 420,763	$ 667,000	$ 5,535,829
Elliot Park	2014	81,958	Full Size Soccer	$ 327,832	$ 5,737,060	$ 573,706	$ 775,000	$ 7,413,598
			Totals	**$ 2,023,744**	**$ 35,415,520**	**$ 3,541,552**	**$ 4,067,000**	**$ 45,047,816**

Summary of Table 2:

To remove artificial turf, remove gravel and rock, import topsoil, irrigate and seed it is estimated to cost $4 per SF.
Additionally, to make up for lost field use, more land needs to be acquired to construct more fields.
Based on real estate values at this time, the cost to acquire new land is estimated at $70 per SF.

Revision date:
3-29-2016

Attachment E

Public Playground Safety Handbook

U.S. Consumer Product Safety Commission

Saving Lives and Keeping Families Safe

- Watching and stopping dangerous horseplay, such as children throwing protective surfacing materials, jumping from heights, etc.
- Watching for and stopping children from wandering away from the play area.

2.3 Selecting Equipment

When selecting playground equipment, it is important to know the age range of the children who will be using the playground. Children at different ages and stages of development have different needs and abilities. Playgrounds should be designed to stimulate children and encourage them to develop new skills, but should be in scale with their sizes, abilities, and developmental levels. Consideration should also be given to providing play equipment that is accessible to children with disabilities and encourages integration within the playground.

Table 1 shows the appropriate age range for various pieces of playground equipment. This is not an all-comprehensive list and, therefore, should not limit inclusion of current or newly designed equipment that is not specifically mentioned. For equipment listed in more than one group, there may be some modifications or restrictions based on age, so consult the specific recommendations in §5.3.

2.3.1 Equipment not recommended

Some playground equipment is not recommended for use on public playgrounds, including:

- Trampolines
- Swinging gates
- Giant strides
- Climbing ropes that are not secured at both ends.
- Heavy metal swings (e.g., animal figures) – These are not recommended because their heavy rigid metal framework presents a risk of impact injury.
- Multiple occupancy swings – With the exception of tire swings, swings that are intended for more than one user are not recommended because their greater mass, as compared to single occupancy swings, presents a risk of impact injury.
- Rope swings – Free-swinging ropes that may fray or otherwise form a loop are not recommended because they present a potential strangulation hazard.
- Swinging dual exercise rings and trapeze bars – These are rings and trapeze bars on long chains that are generally considered to be items of athletic equipment and are not recommended for public playgrounds. *NOTE: The recommendation against the use of exercise rings does not apply to overhead hanging rings such as those used in a ring trek or ring ladder (see Figure 7).*

2.4 Surfacing

The surfacing under and around playground equipment is one of the most important factors in reducing the likelihood of life-threatening head injuries. A fall onto a shock absorbing surface is less likely to cause a serious head injury than a fall onto a hard surface. However, some injuries from falls, including broken limbs, may occur no matter what playground surfacing material is used.

The most widely used test method for evaluating the shock absorbing properties of a playground surfacing material is to drop an instrumented metal headform onto a sample of the material and record the acceleration/time pulse during the impact. Field and laboratory test methods are described in ASTM F1292 *Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.*

Testing using the methods described in ASTM F1292 will provide a "critical height" rating of the surface. This height can be considered as an approximation of the fall height below which a life-threatening head injury would not be expected to occur. Manufacturers and installers of playground protective surfacing should provide the critical height rating of their materials. This rating should be greater than or equal to the fall height of the highest piece of equipment on the playground. The fall height of a piece of equipment is the distance between the highest designated play surface on a piece of equipment and the protective surface beneath it. Details for determining the highest designated play surface and fall height on some types of equipment are included in §5 Parts of the Playground.

2.4.1 Equipment not covered by protective surfacing recommendations

The recommendations for protective surfacing do not apply to equipment that requires a child to be standing or sitting *at ground level.* Examples of such equipment are:

Appropriate Surfacing

- Any material tested to ASTM F1292, including unitary surfaces, engineered wood fiber, etc.
- Pea gravel
- Sand
- Shredded/recycled rubber mulch
- Wood mulch (not CCA-treated)
- Wood chips

Inappropriate Surfacing

- Asphalt
- Carpet not tested to ASTM F1292
- Concrete
- Dirt
- Grass
- CCA treated wood mulch

- Sand boxes
- Activity walls at ground level
- Play houses
- Any other equipment that children use when their feet remain in contact with the ground surface

2.4.2 Selecting a surfacing material

There are two options available for surfacing public playgrounds: unitary and loose-fill materials. A playground should never be installed without protective surfacing of some type. Concrete, asphalt, or other hard surfaces should never be directly under playground equipment. Grass and dirt are not considered protective surfacing because wear and environmental factors can reduce their shock absorbing effectiveness. Carpeting and mats are also not appropriate unless they are tested to and comply with ASTM F1292. Loose-fill should be avoided for playgrounds intended for toddlers.

2.4.2.1 Unitary surfacing materials

Unitary materials are generally rubber mats and tiles or a combination of energy-absorbing materials held in place by a binder that may be poured in place at the playground site and then cured to form a unitary shock absorbing surface. Unitary materials are available from a number of different manufacturers, many of whom have a range of materials with differing shock absorbing properties. New surfacing materials, such as bonded wood fiber and combinations of loose-fill and unitary, are being developed that may also be tested to ASTM F1292 and fall into the unitary materials category. When deciding on the best surfacing materials keep in mind that some dark colored surfacing materials exposed to the intense sun have caused blistering on bare feet. Check with the manufacturer if light colored materials are available or provide shading to reduce direct sun exposure.

Persons wishing to install a unitary material as a playground surface should request ASTM F1292 test data from the manufacturer identifying the critical height rating of the desired surface. In addition, site requirements should be obtained from the manufacturer because some unitary materials require installation over a hard surface while others do not. Manufacturer's instructions should be followed closely, as some unitary systems require professional installation. Testing should be conducted in accordance with the ASTM F1292 standard.

2.4.2.2 Loose-fill surfacing materials

Engineered wood fiber (EWF) is a wood product that may look similar in appearance to landscaping mulch, but EWF products are designed specifically for use as a playground safety surface under and around playground equipment. EWF products should meet the specifications in ASTM F2075: *Standard Specification for Engineered Wood Fiber* and be tested to and comply with ASTM F1292.

There are also rubber mulch products that are designed specifically for use as playground surfacing. Make sure they have been tested to and comply with ASTM F1292.

When installing these products, tips 1-9 listed below should be followed. Each manufacturer of engineered wood fiber and rubber mulch should provide maintenance requirements for and test data on:

- Critical height based on ASTM F1292 impact attenuation testing.
- Minimum fill-depth data.
- Toxicity.
- ADA/ABA accessibility guidelines for firmness and stability based on ASTM F1951.

Other loose-fill materials are generally landscaping-type materials that can be layered to a certain depth and resist compacting. Some examples include wood mulch, wood chips, sand, pea gravel, and shredded/recycled rubber mulch.

Important tips when considering loose-fill materials:

1. Loose-fill materials will compress at least 25% over time due to use and weathering. This must be considered when planning the playground. For example, if the playground will require 9 inches of wood chips, then the initial fill level should be 12 inches. See Table 2 below.
2. Loose-fill surfacing requires frequent maintenance to ensure surfacing levels never drop below the minimum depth. Areas under swings and at slide exits are more susceptible to displacement; special attention must be paid to maintenance in these areas. Additionally, wear mats can be installed in these areas to reduce displacement.
3. The perimeter of the playground should provide a method of containing the loose-fill materials.
4. Consider marking equipment supports with a minimum fill level to aid in maintaining the original depth of material.
5. Good drainage is essential to maintaining loose-fill surfacing. Standing water with surfacing material reduces effectiveness and leads to material compaction and decomposition.
6. Critical height may be reduced during winter in areas where the ground freezes.
7. Never use less than 9 inches of loose-fill material except for shredded/recycled rubber (6 inches recommended). Shallower depths are too easily displaced and compacted
8. Some loose-fill materials may not meet ADA/ABA accessibility guidelines. For more information, contact the Access Board (see §1.6) or refer to ASTM F1951.
9. Wood mulch containing chromated copper arsenate (CCA)-treated wood products should not be used; mulch where the CCA-content is unknown should be avoided (see §2.5.5.1).

Table 2 shows the minimum required depths of loose-fill material needed based on material type and fall height. The depths shown assume the materials have been compressed due to use and weathering and are properly maintained to the given level.

2.4.2.3 Installing loose-fill over hard surface

CPSC staff strongly recommends against installing playgrounds over hard surfaces, such as asphalt, concrete, or hard packed earth, unless the installation adds the following layers of protection. Immediately over the hard surface there should be a 3- to 6-inch base layer of loose-fill (e.g., gravel for drainage). The next layer should be a Geotextile cloth. On top of that should be a loose-fill layer meeting the specifications addressed in §2.4.2.2 and Table 2. Embedded in the loose-fill layer should be impact attenuating mats under high traffic areas, such as under swings, at slide exits, and other places where displacement is likely. Figure 1 provides a visual representation of this information. Older playgrounds that still exist on hard surfacing should be modified to provide appropriate surfacing.

2.5 Equipment Materials

2.5.1 Durability and finish

- Use equipment that is manufactured and constructed only of materials that have a demonstrated record of durability in a playground or similar setting.

Minnesota Department of Health
ENVIRONMENTAL HEALTH DIVISION

Attachment F

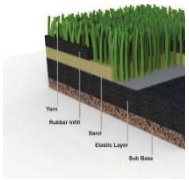
Crumb Rubber in Athletic Fields

QUESTIONS REGARDING POTENTIAL HEALTH EFFECTS FROM THE USE OF CRUMB RUBBER IN ATHLETIC FIELDS.

What is Crumb Rubber?

Crumb rubber is created by reducing scrap tires or other rubber into small, uniform pellets. Tires are broken up by either grinding or by freezing and then breaking. The steel and other fibers in scrap tires are almost entirely removed in the manufacturing process.[1] Using scrap tires can provide a community and environmental benefit by removing mosquito breeding grounds and reducing fire hazards.

How is it used?



Because crumb rubber is used in a wide variety of products, it comes in a range of sizes. One common use for crumb rubber is as a filler in synthetic turf fields. The crumb rubber helps support the artificial blades of "grass" to give the field a more natural texture and feel. It is also used in floor mats, carpet padding, as foundation for roads and railroads, and as filler in packaging.[2]

Are there health concerns?

Tires contain a number of materials that can be harmful to health if significant exposure (swallowing, breathing, or through the skin) occurs, including metals (zinc, lead), volatile organic compounds (methyl isobutyl ketone), semi-volatile organic compounds (benzothiazole, PAHs), and particulates (carbon black).[3] Studies done by states (CA, NY) have shown that exposure to chemicals in crumb rubber is likely to be small and unlikely to increase the risk for any health effect. However, recent news reports and comments from the public continue to raise questions about exposure to crumb rubber. A study from Connecticut urged caution until additional information is gathered.

What is being done?

Two major studies are currently underway examining potential health effects from crumb rubber and synthetic turf. One is being led by the federal Environmental Protection Agency; a draft status report is expected in late 2016. Additional federal research may result from these findings.[4] The second is by the California Office of Health Hazard Assessment and will run through 2018. The California study will be very comprehensive and include a review of current knowledge, public input, exposure assessment, and estimated health outcomes.[5] The Minnesota Department of Health is tracking each of these studies and will consider their results in any future recommendations regarding the use of crumb rubber in synthetic turf fields.

Are there other considerations?

In addition to concerns about chemical exposures, synthetic turf can become extremely warm during summer days, causing heat-related stress. Because the surface is different than natural grass, sports equipment may need to be adjusted (e.g. shorter cleats on shoes) to avoid injury.

There have been reports of skin infections from scrapes suffered on indoor surfaces especially.

Are there health benefits?

Regular physical activity reduces the risk of many chronic diseases, including cardiovascular disease, diabetes and some cancers, can improve your mental health and mood, and increase your chances of living longer.[6] Synthetic turf is also able to be used more often and longer than traditional grass fields, increasing opportunities for physical activity for both students and community residents.

Are there other benefits?

There can be environmental advantages to using synthetic turf. Depending on the region of the country, a typical grass sports field requires 500,000 to one million gallons of water per year in addition to significant amounts of pesticides and fertilizers.[7] Synthetic turf fields require neither watering nor application of chemicals.

The availability of community sports facilities can also help reduce health disparities in underserved areas by helping to create environmental, economic, and social conditions that promote health.[8]

Now What?

Given the extensive use of synthetic turf in Minnesota and the lack of reported health issues associated with their use, it is unlikely that they pose a significant, acute public health concern. However, more information is needed to assess possible long-term issues. MDH will continue to gather information and track ongoing studies to assess possible health risks. In the meantime, users of these fields can take some simple precautions such as:

- Washing with soap and water after use, especially any scrapes or cuts
- Shaking out clothes/shoes to limit take home of rubber crumbs
- Cover food/beverages to prevent contamination with rubber material

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