

Synthetic Turf Sports Fields and the Environment By John Amato, P.E.

I have been following the bantering back in forth regarding the proposed synthetic turf sports fields for Westford Youth Sports and find that there are a large portion of interested citizens that, although a first glance appear excellent at collecting data from internet sources, are having difficult time reading between the lines. To determine if infill synthetic turf sports fields are beneficial and if they should be funded using Community Preservation Funds you really need to dig past the negative marketing that is growing like a vine on the web.

First of all I feel it necessary to provide you with a little information about myself. I am a licensed civil engineer and have a sports facility design and consulting firm located here in Westford. In addition I am a committee member of the Sports Surface Committees on Natural Grass Fields, Tennis Courts and Running and Tracks and Synthetic Turf with the American Society of Testing Methods where we develop test methods and standards for the development and installation and safety of these venues. Beyond that I'm also on the Board of Directors of the Synthetic Turf Council. In these industry groups I spend equal time between natural and synthetic systems. We have developed standards for construction of running tracks, sand based sports fields, skinned infields and warning tracks, golf, tennis courts, synthetic turf. We have also developed test methods for the testing and evaluation of these venues with safety and performance as the primary goal.

Between my professional work and my industry related activities I have gained a solid knowledge base regarding these systems. I do not sell turf. I am not a carpet salesman. I have a natural lawn and not a synthetic one.

Both natural turf and synthetic turf have their places in the world of outdoor sports and recreation fields. Each situation needs to be evaluated to determine which surface type will best meet your needs. Natural turf, my preferred surface, is only suitable in cases where the projected hours of use per week can be limited and where you can spend the appropriate level of maintenance funds. For example, using a natural turf sports field more than 20 to 24 hours per week will compact the soil and damage the turf. This equates to between 680 and 816 hours per year over a three season window. Basically, grass is a living thing and can only handle limited use without destroying it. Unfortunately when using a natural turf sports field at these rates it needs to rest for a season and the recommended hours per year would be reduced. We do not have enough fields to rest any of them for a full season. Natural turf should not be used during the rain or when wet. This damages the turf. In most cases games and events are canceled and require rescheduling. Most times due to lack of available fields rescheduling is not possible. Overuse of natural turf fields almost always creates hard non-uniform unsafe surfaces and a reduction in the overall quality of programs offered on that surface.

Synthetic turf on the other hand can be used around 3,000 hour per year. Read the warranty. Because it s designed to be rapidly draining, play can take place in the rain and after the rain without damage to the turf. Synthetic fields are far more uniform and consistent than most natural turf fields and therefore a safer surface to practice and compete on. In addition they are made of resilient materials, much like a children's playground should be, and provide a level of impact attenuation that is difficult to obtain on hard over used natural turf fields.

The sports fields that are proposed for our Town are what are considered third generation infill synthetic turf. This is very different from the traditional plastic and nylon carpets most of us old folks played on. These third generation, and with the new monofilament technology forth

generation turf systems consist of a tall pile fiber simulating grass that is infilled with a mixture of resilient materials such as SBR rubber and sand. Basically the safety surface is located in simulated grass and not below the turf as in traditional systems. This creates a natural turf like texture that behaves much like natural turf grown in a soil. In fact based on testing by International Soccer organizations these surfaces are typically approved for all but the highest end competitions. Yes professional soccer players prefer natural grass but we will see our local Revolution playing on synthetic this season.

From a use standpoint these infill synthetic surfaces can survive easily three to four times the use of a natural grass field. So what does that mean for us? Well to develop a natural grass complex that provides the use benefit of one synthetic turf field we would need to develop at least three natural turf sports fields. Given that one field and the surrounding grading, safe zones, team areas and spectator areas takes up approximately three acres, we would need to build least nine acres of natural grass fields for the same net use as three acres for one synthetic field. By the way, the three acre space per field is not all field.

If you're a community with a need for six fields, I believe we actually need more, you need to obtain a site large enough to construct the six fields plus parking and any support program that you may need. That would require development of approximately 18 acres of buildable upland. Now if you could develop a complex that provides that same amount of use time using two synthetic turf sports fields in six acres and area able to "preserve" 12 acres does that constitute "preservation"? I believe that is serious preservation.

For those of you that follow the "Inconvenient Truth" philosophy, trees and shrubs tend to have at least twice the biomass as grasses. In grasses that are mowed you could expect even a larger difference. Therefore an acre of trees consumes at least twice the CO₂ as grass not to mention the other environmental benefits. Cutting an 18 acre forest to build 18 acres of grass fields cuts the potential CO₂ consumption in half. Clearing only six acres of the same 18 acre forest to build synthetic turf results in only a one-third decrease in CO₂ consumption potential. Basically two synthetic turf fields has a smaller CO₂ footprint than six natural grass fields. Again we "preserve" by using synthetic turf. Al Gore eat your heart out.

If you're still not convinced and decided to build the six natural turf sports fields you would need to consider that each field needs approximately 70,000 gallons of irrigation water each week. With six fields that is 420,000 gallons of water each week. That's just water. To maintain fields we need to fertilize them. A typical total yearly rate is approximately 15 to 20 pounds per 1,000 square feet of turf. This does not sound like much, however, with each of the six fields having 90,000 square feet of turf we need approximately four to five tons of fertilizer each year. The equipment, mowing, aeration, overseeding, turf repair, watering, application of fertilizer not to mention any herbicides and pesticides that could be required all add up to a substantial investment in man hours and materials. Reducing discharges into the environment is considered a method of "preserving" our natural resources and synthetic turf does just that.

A synthetic turf on the other hand does not need the amount of man hours and equipment needed for a natural turf sports field. A synthetic turf field needs to be groomed once every four to six weeks, dragged once a week and cleaned up at the same rate as a natural turf field. When it's hot outside these fields do heat up. Many use water as a means to cool the fields. Most do not. This water use is far less than that needed for irrigation of natural turf sports fields. Based on available data that I have reviewed, one can conclude dry areas with high elevation tend to the up more than low elevations. Comparing heat build up at Brigham Young, Penn State and New York City

one sees a heat build-up of as much as 100, 40 and 20 degrees Fahrenheit. These locations are all at the same latitude but differ in elevation and air moisture content.

Typical comparison of natural turf as compared to synthetic turf maintenance yields an investment of two or three to one on a per field basis. When you extrapolate this while considering that one synthetic turf field does the duty of three natural turf fields this becomes four to nine times the maintenance cost per hour of field use for a natural turf field over that of a synthetic turf. Data you may have seen on-line indicating \$20,000 to \$40,000 per year to maintain a synthetic turf field is for high-end Division I College and Professional fields not recreation fields located in Towns similar to our Town. Again, as with the savings on the amount of land indicates, the reduction in maintenance costs shows a large advantage. Clearly this is “preservation” of maintenance funds and manpower.

So why is there tons of data that says the opposite? This is big business. There have been approximately 4,000 synthetic turf sports fields constructed in the USA. This year there we will construct nearly 800 new synthetic turf sports fields in this country. In total that represents 4,800 fields that do not need sod, 4,800 fields that do not need fertilizer and 4,800 fields that do not need mowers, herbicides and other natural turf services. The natural turf business is losing serious ground and they are fighting to maintain their ground, no pun intended. This is an industry loss in the order of hundreds of millions of dollars. This negative marketing is about money. Every owner they convince to keep it natural is money in their pocket. Check out the sources of most of the negative data. They are turf managers, turf scientists and others in the industry hurt most by the growth of synthetic turf. This is about money.

What about all of the data indicating that the rubber used is bad for the environment? Again, recent studies in Europe prompted by market competition put the scare into buyers to shift market trends. Most infill synthetic turf fields use recycled tire SBR crumb rubber as the resilient material. These recycled tires are not from stockpiles but from shops that replace tires. They take your old tires and send them to be granulated. Alternative material producers, far more expensive than the recycled tire rubber, would like to get into this huge market so a little miss information or partial information goes a long way and can create a lot of damage to an industry.

So here is some truthful information. The US EPA states that “scrap tires are not a hazardous waste.” Scrap tires become a generator of hazardous materials when they are burned or exposed to temperatures over 400 degrees Fahrenheit. This information comes from the EPA and from Material Safety Data Sheets required by OSHA to ensure safety in the work place. Check out the following; <http://www.epa.gov/garbage/tires/index.htm>. The EPA, in fact, recommends using the crumb material from granulated tires for “playgrounds, running tracks and sports fields.” These fields are a method to recycle tires. As we know recycling is a means to “preserve” our environment. As a country we generate approximately 350,000,000 tires each year. Recycling these is a good thing for the environment. The EPA would not tell us to use recycled tire rubber in playgrounds where our youngest children play if they were not sure it was safe. In fact, if you go beyond the many studies done over the past 30 years you will find consistently that the use of recycled tire SBR rubber in playgrounds and sports fields does not represent a risk. There is far more information that supports this EPA position than that presented by the negative marketers.

Now how does this fit into the use of infilled synthetic turf and funding by Community Preservation Committee Funds. First of all, Massachusetts General Law CHAPTER 44B. COMMUNITY PRESERVATION, Chapter 44B: Section 2. Definitions indicates:

"Recreational use", active or passive recreational use including, but not limited to, the use of land for community gardens, trails, *and noncommercial youth and adult sports, and the use of land as a park, playground or athletic field.* "Recreational use" shall not include horse or dog racing or the use of land for a stadium, gymnasium or similar structure.

In chapter 44B: Section 5 of this same law states;

(2) The community preservation committee shall make recommendations to the legislative body for the acquisition, creation and preservation of open space; for the acquisition, preservation, rehabilitation and restoration of historic resources; *for the acquisition, creation and preservation of land for recreational use*; for the acquisition, creation, preservation and support of community housing; *and for the rehabilitation or restoration of open space, land for recreational use* and community housing that is acquired or created as provided in this section. With respect to community housing, the community preservation committee shall recommend, wherever possible, the reuse of existing buildings or construction of new buildings on previously developed sites.

The law clearly states that Towns can use Community Preservation funds of active recreation. In fact they state "*creation and preservation*". They include "*and the use of land as a park, playground or athletic field*" in their definition as well. Other Towns including Tyngsborough, Concord and Sandwich to mention a few have approved funding for synthetics. The installation of a crumb rubber infill synthetic turf sports field is an EPA recommended method to recycle scrap tires. It provides a substantial decrease in water demand for irrigation. It reduces discharge of pollutants into our natural resources and decreases man hours necessary to maintain a field. It results in a net decrease in land required to provide matching hours of use. It is safer than most natural turf fields due to its resilient surface and uniformity. In essence, it reduces the environmental impact of project that meets similar hours of demand, it reduces water demand, it eliminates the need for fertilizer, it decreases the amount of canceled games and practices, it can extend the months of play, and it is safer. It preserves the environment and preserves the health of our children. If that is not community preservation then nothing is.