SYNTHETIC TURF
Response to applicant's memo and review of materials
Applicant's memo, July 21, 2011

The applicant and planning staff met on July 22, 2011 to discuss the proposed text amendment regarding the use of synthetic turf as a landscape material. The applicant provided a memo along with research materials. This document is a response to the issues raised in the memo and a review of the materials. The wording from the memo is noted below in bold print, with staff's comments following:

"Many other localities encourage the use of artificial turf in landscaped areas and offer rebates for installing it and reducing water usage" (paragraph 1, memo)
Some states which are experiencing severe water shortages, such as California and Arizona, have adopted strong water conservation measures which require their communities to reduce water usage per capita. From the State of California, Division 6 of the Water Code:

> "b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible."
>
> "g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020."

California adopted a Model Water Efficient Landscape Ordinance, which many California communities have also adopted. The ordinance recommends the use of native plants. Many communities are permitting synthetic turf as a means to reduce the water consumption per capita while other communities prohibit the use of synthetic turf.

The Arizona Division of Water Resources has also established a set of conservation regulations. Plant lists have been developed to encourage the use of low-water usage plants. In 2008, Tucson became the first municipality in the county to require developers of commercial properties to harvest rainwater for landscaping. The city requires that new developments must meet 50% of their landscaping requirements by capturing rainwater. While many communities permit the use of synthetic turf, others do not.

The Kansas Water Plan notes that most communities in Kansas have adequate water at this time, but water conservation is important to insure water supplies in the future. (page 1, Kansas Water Plan, Water Conservation Policy and Institutional Framework, January 2009; http://www.kwo.org/Kansas_Water_Plan/KWP_Docs/VolumeII/Rpt_KWP_2009_Water_Conservation.pdf) On page 5, the plan suggests that water needs could be reduced through the installation of low flow plumbing, low water need landscaping and reduction of runoff from watering and car washing and on page 9, the plan recommends water 'reuse' as a potentially significant conservation action.

Staff agrees that many communities, primarily those in states with mandated water conservation measures and set attainment measures, permit the use of artificial turf as a landscaping material. The Kansas Water Plan does not include a reduction of landscaped areas in the recommended conservation measures but does suggest the reuse of water.

"Horizon 2020 encourages sustainable landscaping and a sustainable physical environment. Such goals include the use of artificial turf in many other circumstances."

"It (artificial turf) can support Lawrence's goal of sustainability through decreased water consumption, pesticide and herbicide runoff, emissions from mowers, and grass clipping waste."

"The natural grass lawn is not sustainable"
As discussed in the Staff Report and Follow-up Memo, traditional grass lawns do require watering and the use of chemicals; however, low-maintenance landscaping, landscaping which utilizes native or adapted plants, or Xeriscape require much less or none. With the proper selection of species natural landscaping, including grass, is sustainable.

"Artificial turf reduces allergens such as pollen in the environment."
While artificial plants do not produce pollen, a significant portion of the city's landscaping would need to consist of artificial plants for the reduction in allergens to be noticeable.

The memo and supporting information speak to the issue of infections, latex allergies and chemical exposure associated with artificial turf.
The staff report did not raise these points, but stated on page 5 that the NY Health Dept report found that turf surfaces are no more likely to harbor infectious agents than other surfaces, that tests did not find any relation between the crumb rubber used in synthetic turf and latex allergies. The NY study did report that some types of synthetic turf fibers contain elevated levels of lead which can form a dust posing a potential source of lead exposure. The CDC issued a health advisory in June 2008.

The memo states on page 4 that **"Zinc is not very toxic to humans so the danger is mostly to aquatic and plant life".**
This danger justifies the best management practices for stormwater management as noted in the staff report.

Page 6 of the memo states that **"Artificial turf reduces water use, pesticides, herbicides, emissions, grass clipping waste."**
Staff does not argue that artificial turf does not require as much water, pesticide, mowing or create as much grass clippings as a traditional lawn. Artificial turf is very similar to permeable pavement in these regards. Low maintenance landscaping utilizes native or adapted plants which are suited to the climate and characteristics of the area. This type of landscaping also requires less water, and requires pesticide only while being established. Depending on the species used, the amount of mowing could be reduced or eliminated. Xeriscape is a specific form of landscaping which uses drought tolerant plants and greatly reduces the water requirements. These types of landscaping are more suitable than the use of the artificial turf material in that they serve as a part of the green infrastructure, provide habitat, are part of the oxygen/carbon dioxide cycle, and maintain the natural character of the community.

REVIEW OF APPLICANT MATERIALS

"Synthetic Turf: Health Debate Takes Root—March 2008"
Many of the arguments in this article are related to the use of artificial turf for recreational fields. The article states that artificial turf is more suited for these areas of high activity. These points are not discussed in this report, as the text amendment is proposing the use of artificial turf as a landscaping material, not as a surfacing material for athletic or recreational fields.

The following information from the article supports staff's view on synthetic turf as a landscape material:

HEALTH ISSUES
"On the basis of limited toxicity data, some reports have concluded the health risks are minimal. Most agree, however, that far more research is needed before the question can be definitely answered. "

OTHER IMPACTS
"Natural grass does offer tangible benefits, however. According to Turfgrass Producers International, these include increased pollution control, absorption of carbon dioxide, a cooling effect, water filtration, and prevention of soil erosion. There are also perhaps intangible benefits to a field of grass. Crain presents the idea that replacing grass with synthetic turf can hinder children's creative play and affect their development. "Today's children largely grow up in synthetic, indoor environments," he says. "Now, with the growing popularity of synthetic turf fields, their experience with nature will be less than ever." *('Crain' is identified earlier in the article as William Crain of the City College of New York Psychology Department)*

HEAT
"One drawback that both fans and critics of synthetic turf agree on is that these fields can get much hotter than natural grass. Stuart Gaffin, an associate research scientist at the Center for climate systems Research at Columbia University, initially became involved with the temperature issues of synthetic turf fields while conducting studies for another project on the cooling benefits of urban trees and parks. Using thermal satellite images and geographic information systems, Gaffin noticed that a number of the hottest spots in the city turned out to be synthetic turf fields.

Direct temperature measurements conducted during site visits showed that synthetic turf fields can get up to 60º hotter than grass, with surface temperatures reaching 160º on summer days. For example, on 6 July 2007, a day in which the atmospheric temperature was 78º in the early afternoon, the temperature on a grass field that was receiving direct sunlight was 85º while an adjacent synthetic turf field had heated to 140º F. "Exposures of ten minutes or longer to surface temperatures above 122º F can cause skin injuries, so this is a real concern." said Joel Forman, medical director of the Pediatric Environmental Health Specialty Unit at Mount Sinai School of Medicine, speaking at a 6 December 2007 symposium on the issue."

"Many physical properties of synthetic turf—including its dark pigments, low-density mass, and lack of ability to vaporize water and cool the surrounding air—make it particularly efficient at

increasing its temperature when exposed to the sun. This is not only a hazard for users, but also can contribute to the 'heat island effect', in which cities become hotter than surrounding areas because of heat absorbed by dark man-made surfaces such as roofs and asphalt."

WATER QUALITY
"Moreover, because synthetic turf is unable to absorb or filter rain-water, chemicals filter directly into storm drains and into the municipal sewer system without the beneficial filtration that live vegetation provides. "

EPA: Limited EPA Study Finds Low Level of Concern in Samples of Recycled Tires from Ballfield and Playground Surfaces 12/10/2009
"The limited study, conducted in August through October 1008, found that the concentrations of materials that made up tire crumb were below levels considered harmful. However, given the limited nature of the study (limited number of constituents monitored, sample sites, and samples taken at each site) and the wide diversity of tire crumb material, it is not possible, without additional data, to extend the results beyond the four study sites to reach more comprehensive conclusions."

This study is looking at synthetic turf which uses rubber crumb infill. If synthetic turf is approved as a landscaping material, more information would be necessary before rubber crumb infill would be permitted.

NEWS FROM CPSC, US CONSUMER PRODUCE SAFETY COMMISSION
CPSC Staff Finds Synthetic Turf Fields OK to Install, OK to Play On (July 30, 2008)
"The evaluation concludes that young children are not at risk from exposure to lead in these fields. CPSC staff evaluation showed that newer fields had no lead or generally had the lowest lead levels." "Staff recognizes that some conditions such as age, weathering, exposure to sunlight, and wear and tear might change the amount of lead that could be released from the turf. As turf is used during athletics of play and exposed over time to sunlight, heat and other weather conditions, the surface of the turf may start to become work and small particles of the lead-containing synthetic grass fibers might be released."

(See staff comment with following section)

STC's Voluntary Commitment – from Synthetic Turf Council website
"The STC (Synthetic Turf Council) voluntarily agrees to comply with the revised lead restrictions currently proposed for children's produces in H.R. 4049. Specifically, the level of lead will be reduced in all pigments used to color synthetic turf to 300 ppm or less by no later than January 1, 2010, and to 100 ppm or less by no later than January 1, 2012."

The CDC Health Advisory contains recommendations for the use of turf, especially as it ages. With the reduction in the lead in the pigments, the threat of lead contamination may become lower; however, it has not been demonstrated that the threat of lead is from the pigments. The CDC Advisory indicates it is from the materials in the grass blades themselves. The CDC does state that turf made from poly-ethelene only fibers should pose no risk.

If synthetic turf is approved, standards would need to be developed regarding lead levels.

About Synthetic Turf—From Synthetic Turf Council website

This article mentions the basic benefits of using synthetic turf as water conservation, elimination of pesticides and fertilizers, and reduction in emissions from gas-powered maintenance equipment. Staff's response is in the staff report and follow-up memo.

Synthetic Turf Becomes Latest Celebrity Trend—From Synthetic Turf Council website
"Synthetic turf for landscape and recreation is one of the fastest growing segments of the market. Able to be installed in places where grass can't grow or be effectively maintained, its numerous applications include residential, commercial and municipal landscape; airport grounds; pet parks; playgrounds and rooftops."

"The Southern Nevada Water Authority estimates that every square foot of natural grass replaced saves 55 gallons of water per year."

Case Studies and Testimonials—from Synthetic Turf Council website

1. Used in Hawaii for an area for people with wheelchairs to work with their assistance dogs. "Our new artificial lawn helps keep the dogs and the facility clean and the yard will be better for people to use when practicing with their dogs."

2. In New York, used to surface a 38th floor terrace yoga deck.

3. Twentynine Palms Marine Corps Base—Mojave Desert Region. "Located in the desert region of the Mojave Desert, conserving water at Twentynine Palms is a must." "It (synthetic turf) is softer and more inviting than hard surfaces and is non-allergenic, creating a safe area for children and pets.

Synthetic Turf Installed in North America Conserves More than Three Billion Gallons of Water, Eliminates Nearly a Billion Pounds—from Tiger Turf website
"As of 2011, the estimated total of synthetic turf installed in North America annually conserves more than three billion gallons of water, significantly reduces smog emissions and eliminates close to a billion pounds of harmful fertilizers and pesticides. The industry has also recycled more than 105 million used tires."

"An average lawn of 1,800 square feet will save 99,000 gallons of water a year if landscaped with synthetic turf – about 70% of a homeowner's water bill, or up to $500."

"Synthetic turf eliminates the need for nearly a billion pounds of harmful pesticides, fertilizers, fungicides and herbicides which are used to maintain grass."

"BASF Corporation performed an Eco-Efficiency Analysis measuring environmental and economical impacts of synthetic turf athletic fields with professionally installed and maintained grass alternatives. Released in November 2010, the life cycle assessment found that with typical field usage, synthetic turf had a lower consumption of energy, raw materials and solid waste generation than natural grass fields."

Capitol*Alert*—The Sacramento BEE website
"Gov. Jerry Brown has vetoed legislation that would have required homeowners associations to let people replace their lawns with artificial turf, the governor's office announced today."

Should you fake the lawn? –from Sunset website
Example of a couple installing artificial turf in their Los Angeles yard.

Going the Extra yard—from Audubon website

"They (lawns) have proven to be a very expensive ecologic and economic symbol," points out Bret Rappaport, the director of Wild Ones, a nonprofit organization that encourages landscaping with native plants as an alternative to the vast swaths of monoculture widespread today." The article points out that a typical US lawn requires 10 pounds of pesticide, 29 pounds of fertilizer and 170,000 gallons of water annually. "Natural landscaping, on the other hand, harmonizes a yard's plant life with the greater ecological community—the species already adapted to the local climate—while eliminating the need for costly maintenance. Whereas nitrogen and phosphorous fertilizers, along with chemical herbicides and pesticides, easily run off conventional lawns and into water sources, the varying root lengths of native plants actually reduce this 'non-point-source pollution" by anchoring soil and absorbing water. Natives also attract a variety of local wildlife and provide respite for millions of migrating birds."

"The Southwest Florida Water Management District now encourages area residents to replace grass with native vegetation."

The Limpkin, Newsletter of the Space Coast Audubon Society of Brevard County, Florida

This article provided the history of the traditional lawn and concluded: now we're beginning to recognize the need to reduce or eliminate lawns".

Chemicals and particulates in the air above the new generation of artificial turf playing fields, and artificial turf as a risk factor for infection by methicillin-resistant Staphylococcus aureus (MRSA)California Environmental Protection Agency—July 2009

This article reviewed studies that looked into whether the artificial turf playing fields emit levels of chemicals or particulates into the air that cause illness when inhaled and whether these fields infect athletes with the dangerous bacterium called methicillin-resistant *Staphylococcus aureus.* The report concluded that "While these estimated risks are low compared to many common human activities, they are higher than the negligible risk level of one cancer in a population of one million people. Data gaps exist that could lead to overestimates or underestimates of these risks."

"OEHHA, (Office of Environmental Health Hazard Assessment, California Environmental Protection Agency) is currently working to fill the above data gaps." "OEHHA will determine whether the new generation of artificial turf playing fields releases chemicals or particulates into the air that pose an inhalation risk to persons using the fields. OEHHA will also determine whether artificial turf fields increase the risk of infection by dangerous bacteria such as MRSA." (page 7)

No definitive answer on the questions were provided.

Artificial Turf Study, Leachate and Stormwater Characteristics, Connecticut Department of Environmental Protection July 2010 (information was provided with June PC packet, 'Artificial Turf Field Investigation in Connecticut Final Report, dated July 27, 2010)

"The DEP concludes that there is a potential risk to surface waters and aquatic organisms associated with whole effluent and zinc toxicity of stormwater runoff from artificial turf fields. Zinc concentrations in the stormwater may cause exceedences of the acute aquatic toxicity criteria for receiving surface waters, especially smaller watercourses." The DEP recommends the

use of stormwater treatment measures that may reduce the concentrations of zinc below the acute aquatic toxicity levels. Page 22

Evaluation of the Environmental Effects of synthetic Turf Athletic Fields. Milone & MacBroom December, 2008

This article agreed that the surface of the artificial turf gets much hotter than natural grass, but found that the air temperature above the surface was less than 5 degrees higher than surrounding area. The Missouri University study found air temperature at head level to be 138º Given the discrepancy in the two studies regarding the change in air temperature at a point above the artificial turf, it can be assumed that the amount of heat that dissipates to one specific area varies. The nature of heat is that if a hot surface is located next to the air, heat will dissipate into the air. The heat of the turf contributes to the 'heat island' effect, but due to the nature of heat transfer, it is not possible to locate the areas where the heat occurs; rather it is a contribution to the overall heat level.

The article also reviewed volatile chemicals and synthetic turf; however, it is typically agreed that Volatile chemicals are not an issue with outdoor artificial turf.

The article included a study on stormwater from synthetic turf which found that the amount of zinc is below the EPA standard for fresh water. If the use of synthetic turf is approved, further research into zinc and stormwater runoff would be necessary when developing standards.

Synthetic Turf 360º a Guide for Today's Synthetic Turf—Synthetic Turf Council

"In its report, "Municipal Solid Waste in the United States, 2009 Facts and Figures," the EPA estimates that 33.2 million tons of yard trimmings were generated in 2009, the third largest component of the Municipal Solid Waste in Landfills."

The City of Lawrence has a yard trimming pick up day and yard trimmings are recycled into compost. It is also recommended that grass clippings be left on the lawn to decompose and serve as natural fertilizer and organic matter.

Synthetic turf is more accessible for people with disabilities. "The surfaces that are universally accessible and go beyond ADA to be actually usable for children with disabilities include artificial grass with rubber underneath." "Wheelchairs roll easily and crutches won't sink into park and landscape surfaces like those used by the Miracle League nationwide to help youth with physical disabilities play baseball. Many retirement communities use extensive amounts of synthetic turf for landscaping to assist residents with mobility challenges."

The article states that the City of Lakeland, Florida installed over 25,000 sq ft of synthetic turf in play zones. The Lakeland Florida website states that: "On July 1, 2010, the City of Lakeland returned to the Year Round Water Conservation Measures set forth by the Southwest Florida Water Management District Rule 40D-22."

(The Florida Water Management Districts have established a year round set of conservation measures which include limitations on watering and irrigation.)

What do the Experts Say, a bibliography prepared by the Synthetic Turf Council, 2011.

Review of the Impacts of Crumb Rubber in Artificial Turf Applications; Rachel Simon, University of California, Berkeley, February, 2010. The study concluded, on page 48, that synthetic turf has greater all-weather availability than natural grass, increased playing hours, reduced maintenance, is a cost-effective investment, crumb rubber is generally considered safe use of tire rubber, synthetic turf fields had fewer injuries than natural grass fields, and that they are environmentally friendly.

Articles which were not discussed as they focus on the use of artificial turf as a sports or playground area surfacing material

Lawrence High School Sports Venues—Landplan Engineering, PA website

Lawrence Unified School District Selects Gameday Grass 3D from Astroturf for Eight New Atheltic Fields—from Astroturf website

Grass without limits---Foreverlawn website

SUMMARY

Staff's opinion, after reviewing the applicant's materials and memo, remains that synthetic turf is not an appropriate landscaping material and staff recommends that the use be prohibited outright in the Development Code.

Other means are available to attain many of the environmental benefits associated with synthetic turf. These include

1. WATER CONSERVATION:
    - Water reuse (use of gray water for irrigation, plant watering)
    - use of captured rainwater for gardening,
    - Xeriscape,
    - use of native or adapted plants.

2. REDUCED OR ELIMINATED PESTICIDE AND/OR FERTILIZER USE:
    - Use of native or adapted plants.

3. REDUCED EMISSIONS DUE TO REDUCED MOWING
    - Use of short grass species, or ground covers that don't require mowing.
    - Use of higher quality lawnmowers with better emissions ratings
    - Less frequent mowing