

## The *real* differences between **natural turf** and synthetic grass



*To provide shock absorbency, rubber granules are commonly used in synthetic grass, as seen here at an artificial sports field in Northbridge, NSW.*

Whether you've just built your dream home and are about to develop a new garden or, you are improving an already established garden, one of your questions could be:

### **"Should I choose natural turf or synthetic grass?"**

It's a big decision, so it's a good idea to think carefully about the answer.

Similarly, there are significant differences between playing sport, such as football, on natural turf compared to artificial surfaces. Concerns over the likelihood of injury and long term exposure to the components of artificial grass are not new, but what does current research tell us?

Natural turf has many "natural" advantages over synthetic grass, and some of these may surprise you.

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# Choosing between natural turf or synthetic grass?

## The facts...

### What is synthetic grass made of?

Synthetic grass is made up of two main constituents that are closely related, polypropylene and polyethylene.

Polypropylene is a hard wearing plastic polymer and is found in many plastic items such as dishwasher-safe food containers. Polyethylene is synthesised from ethylene, a compound that's usually made from petroleum or natural gas. Items such as bottles and other containers used in food, medical and other consumer industries are made from polyethylene.

To provide shock absorbency, synthetic grass is usually installed with a layer of polypropylene or rubber granules (usually made from recycled car tyres) and sand as an "infill". It is often recommended that this infill be replenished and/or redistributed on a regular basis.

In comparison, natural turf is completely organic, "powered" by sunlight, nutrients and water and is naturally safe.

### What are the health benefits of natural turf compared with synthetic grass?

Research has shown that natural turf has lots of health benefits. Because it is a living organism, natural turf transpires to keep cool, which is why it is great to walk on even on the hottest days. Synthetic grass doesn't transpire, rather it absorbs heat, so that on some Summer days you may not be able to walk or play on it at all.

A 2002 study by Brigham Young University in the United States, compared the air temperature of natural turf and synthetic grass at the surface of football a field and found that the maximum for the natural turf portion was 31.5°C, while synthetic grass had reached 68.5°C. An Australian study by Geoff Connellan, University of Melbourne, has shown that areas of green space can modify the local microclimate by reducing temperatures not only on the grass itself but also in the surrounding air.

Artificial turf has been used for the US' National Football League (NFL) for more than a decade. A study by the NFL Injury and Safety Panel, conducted between 2002 and 2008, recorded injuries on its nine artificial turf stadiums compared to its natural turf stadiums. The study found the rate of anterior cruciate ligament injuries was 88 per cent higher in artificial turf games compared to those held on natural grass, and the rate for ankle sprains was 32 per cent higher.

Anyone who has played hockey or football on synthetic grass knows the pain from a "burn" when you fall over and graze yourself. In addition, synthetic grass is associated with a high incidence of strain sports injuries and a phenomenon known as "turf toe" due to its lack of give.

As synthetic grass degrades with use and age, its components can break down into smaller and smaller pieces. These tiny microfibers can be easily inhaled, especially when a player falls and/or slides across the synthetic surface.

In addition, recycled rubber contains many heavy metals such as cadmium, chromium, lead, molybdenum, selenium and sulphur that have been absorbed into the rubber while in use as a vehicle tyre.

According to Dr Linda Chalker-Scott from Washington State University: "There is no question that toxic substances leach from



While natural turf keeps cool on summer days, synthetic grass can heat up to over three times the local air temperature.

Natural Turf	Synthetic Grass
Stays cooler on hot days	Can heat up to over 3 times the local air temperature
Provides a natural fire barrier	Is flammable & poses a fire risk
Produces oxygen & helps reduce pollution	Does not produce oxygen & usually ends up as landfill
Self-replenishing & usually cheaper	Expensive & eventually requires replacement
Natural, calming & self-sanitising	Fake, artificial & can require sanitising
Safer sporting surface	Increased risk of sporting injury
Increases home values	Not shown to increase home values

rubber as it degrades, contaminating the soil, flora & fauna and aquatic systems."

Doctor Joseph Sullivan from Massachusetts in the US carried-out a scientific review of published literature in relation to artificial turf and found that tyre rubber used for infill can have damaging effects on the human body. Dr Sullivan found that "inhalation of components of tyre rubber or actual particles of tyre rubber can be irritating to the respiratory system and can exacerbate asthma". He also observed the potential for mutagenic or cancer causing effects when people are exposed to used rubber tyre particles.

In contrast to synthetic grass, parks and gardens utilising natural turf surfaces have been proven to improve mood and mental health by providing a cool, calm and relaxing environment.

### Is there a difference in the cost of installing natural turf verses synthetic grass?

Yes – a big difference. Synthetic grass can cost up to three times as much to purchase and install as natural turf. Installing synthetic grass may be as much as \$90 per m<sup>2</sup> compared with as little as \$20/m<sup>2</sup> for site preparation, buying and laying of natural turf. If irrigation is required, this could add a further \$10/m<sup>2</sup>, installed.

Synthetic grass is laid down on a hard, road base surface, which means that the soil surface has to be compacted. Soil microbes and life such as worms, which help keep your soil healthy and in good physical shape, can't survive in heavily compacted soil.

In contrast, turf is installed on the surface of the soil, which is prepared, usually by levelling, not compacting. Natural turf is a living organism and after it's installed, it soon develops a relationship with the soil and its microorganisms as the roots establish themselves.

### Is there a difference in maintenance costs?

Natural turf needs to be mowed, fertilised occasionally, pests and diseases may need to be controlled and, depending on your location and the weather, watered. So these are ongoing costs for natural turf.

While these costs do not exist with synthetic grass, it does require several maintenance procedures, such as:

- Disinfection (animal fluids, faeces and bird droppings tend not to break down due to the lack of microorganisms and, if left, can affect human health).
- Cleaning and sweeping of leaves and debris'.
- Checking and topping-up of infill levels (where applicable).
- Grooming to maintain texture and uniformity.
- Damage repair and replacement, including joint and seam maintenance.
- Stain removal.
- Weed removal (yes, weeds can, and do grow on and through some synthetic grass surfaces).
- Moss and algae prevention (in certain situations, applications of moss killer and/or algacide are required).

In addition, some synthetic grass manufacturers recommend regularly applying water to counteract the high temperatures reached on hot days by synthetic turf surfaces.

### What is the long term cost difference?

While synthetic grass is more expensive to install, you might think its lower maintenance cost will result in lower overall costs over time. Well, in a detailed report from the Department of Sport and Recreation, Government of Western Australia, the cost of various synthetic sports fields were compared over a 25 and 50 year lifecycle. In all cases except tennis, natural turf fields were estimated to be less expensive (see Table 1).

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THE NATURAL LAWN AREA OF A GARDEN PROVIDES A GREAT SPOT FOR OUTDOOR ENTERTAINING AND A COOL RESTFUL OASIS.



Rubber infill is commonly applied to synthetic grass.

**Table 1: Total cost of natural turf and synthetic grass sports fields over a 25 and 50 year period**

Sports field	Natural Turf		Synthetic Grass	
	25 Years	50 Years	25 Years	50 Years
AFL/Cricket	\$1,622,167	\$2,886,333	\$4,090,000	\$7,725,000
Hockey	\$787,167	\$1,387,583	\$1,013,300	\$1,753,575
Lawn Bowls	\$619,111	\$1,105,222	\$784,125	\$1,369,750
Rugby	\$1,185,333	\$2,126,167	\$2,847,500	\$5,397,500
Soccer	\$1,004,917	\$1,797,833	\$2,517,500	\$4,330,000
Tennis	\$266,000	\$552,500	\$246,500	\$424,000

(Source: Department of Sport and Recreation, Government of Western Australia, 2011)

## Choosing between natural turf or synthetic grass?

### The facts...

#### Is natural turf less durable than synthetic grass?

No. In fact, once you have installed natural turf it self-replenishes and can last a lifetime. Synthetic grass doesn't replace itself like natural turf so eventually it will show signs of wear and need to be replaced, usually when it is around eight to 10 years old (although some brands may last more than 20 years).

#### What are the environmental aspects of natural turf and synthetic grass?

While natural turf has been proven to significantly reduce erosion and enhance infiltration of water, nutrients and chemicals, synthetic grass inhibits infiltration and has the potential to leach heavy metals and other residues from the materials used in its construction.

Because natural turf carries out photosynthesis, it produces oxygen while removing carbon dioxide from the atmosphere and storing it as organic carbon in the soil, making it an important carbon sink. In comparison, synthetic turf does not have the ability to remove carbon dioxide from the atmosphere and significant carbon emissions come from the production and eventual disposal of synthetic turf.

You might think that natural turf needs a lot of water to become established and remain healthy. However, varieties are now available that don't need a lot of water to keep them in tiptop shape, for example, soft leaf buffalo or zoysia. Depending on your location and time of year, most natural turf lawns will initially need watering to ensure establishment. Also, if you are in a dry climatic zone, you may need to regularly water your natural lawn, particularly during summer, to keep it looking lush and green.

This isn't to say that synthetic grass is completely water free. Many synthetic grass manufacturers recommend applying water to the surface to stop soil underneath from cracking, and to cool the surface. A large amount of water is also used to make synthetic grass.

Synthetic grass is flammable while natural turf acts as a fire retardant. The South Australian Country Fire Service recommends that: "Mown lawn or grazed green grass is most appropriate immediately surrounding buildings."

If you decide to remove or replace your natural lawn, it's a matter of simply digging it up, mulching it or going over the top of it with your new surface covering. With synthetic grass, it is a very different story. Unlike natural turf, synthetic grass is not recycled or reused for other purposes, it takes an extremely long time to break down and eventually, it usually ends up as landfill.

And finally, natural turf absorbs more noise and reflects less light, reducing glare, compared to synthetic grass. Natural turf also enhances the organic biodiversity in the soil whereas the compacted base under synthetic surfaces has very little or no organic biodiversity.

**A NATIONAL SURVEY INVOLVING 114 AUSTRALIAN REAL ESTATE AGENTS IN 2012 REVEALED A NATURAL LAWN CAN ADD 18 PER CENT (OR UP TO \$75,000) TO THE SELLING PRICE OF HOMES NATIONWIDE.**

#### To sum up, Natural Turf:

- **has a cooling effect.**  
The temperature on a green lawn in midsummer can be 10°C less than bare soil, 20°C less than asphalt, concrete or pebbles and almost 40°C less than synthetic grass!
- **is environmentally friendly.**  
Turf improves water quality by filtering runoff and reducing erosion. Turf also reduces greenhouse gases by absorbing carbon dioxide and producing oxygen.
- **promotes wellbeing.**  
Open natural greenspace promotes physical exercise and improves mental health.
- **uses less water than you think.**  
With 5 main turf types and many different varieties to choose from, drought tolerant and water efficient options are available. Turf also grows well using recycled water and water saving crystals.
- **is a natural product.**  
Turf self-replenishes, provides a natural fire barrier, reduces noise and can increase home values by up to 18 per cent!

In comparison, **Synthetic Grass** is more expensive to install and maintain, requires regular disinfection to control bacteria and germs, is artificial with an unnatural feel and smell, has been proven to result in more injuries, is flammable, on hot days can heat up to three times the air temperature and is not environmentally friendly.

#### For more information

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