



# **Short guide to environmentally friendly artificial turf pitches**

– based on the joint European recommendations for Sports facilities and the results from Silkeborgbanen

# SILKEBORG BANEN

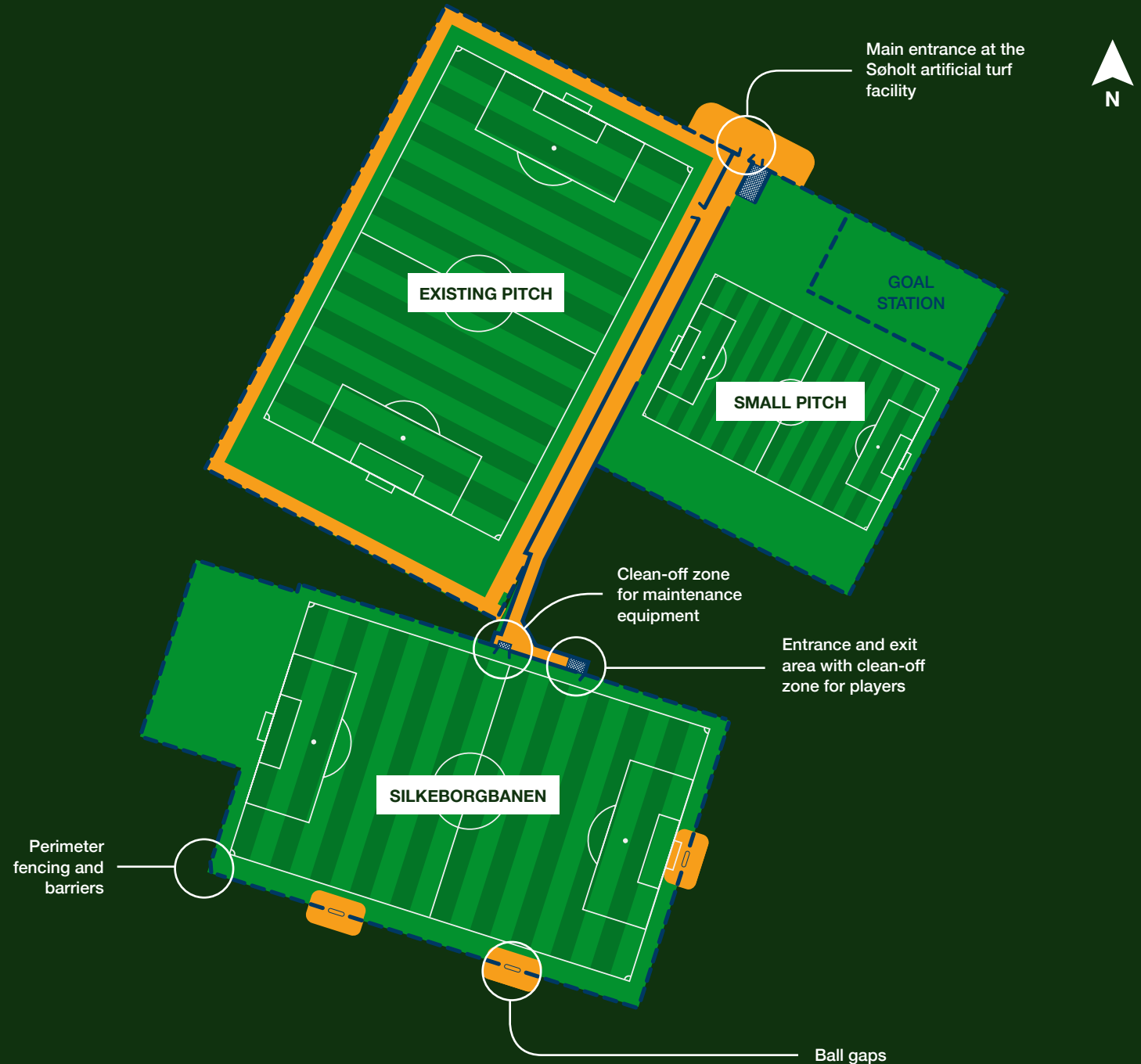
When it comes to minimising the loss of microplastics to the environment, Silkeborg Municipality, and the Danish Football Association (DBU) has launched a joint test and development project to showcase a new standard for the artificial turf pitches of the future.

Silkeborgbanen has been designed according to the recommendations described in the joint European guide for the construction of artificial turf pitches, CEN report (DS/CEN/TR 17519).

The purpose of the test and development project in Silkeborg is to verify if it is possible to keep the loss of microplastics from the artificial turf pitches to a low and acceptable level – with simple means. Apart from the new insights, the ambition is to share the knowledge and experience gained throughout the project to national and European user community.

The main driver is lack of all year pitch capacity. This conditions a dependency of 100% functional pitches in the winter season where the capacity for 360.000 players goes approx. 4.500 in the summer season to around 400 artificial pitches.

This document is a booklet guide on infill containment, based on the joint European recommendations and experience from Silkeborgbanen so far.



Planning



# SYNTHETIC TURF INFILL CONTROL

HELP PROTECT THE ENVIRONMENT BY IMPLEMENTING THE RECOMMENDATIONS OF EUROPEAN STANDARDS COMMITTEE TECHNICAL REPORT 17519



## FIELD DESIGN

**1** **SPLASH**  
Select a synthetic turf system that has low infill splash characteristics

**2** **BARRIERS**  
Fit containment barriers on all boundaries of the field to ensure infill cannot leave the control zone

**3** **GRATES**  
Fit decontamination grates/mats to all field entrances



**4** **BRUSHES**  
Place boot cleaning brushes at main player access gates

**5** **DRAINS**  
Ensure all storm water drains within the control zone have suitable micro-filters to capture any infill in rain water run-off

**6** **SNOW**  
Ensure any snow removed from the field is always stored within the control zone

BOUNDARY FENCE

FIELD PERIMETER FENCING

FIELD GATE

ENTRANCE GATE

## FIELD MAINTENANCE

**7** **BRUSHING**  
Have a dedicated maintenance brush that never leaves the control zone

**8** **CLEANING**  
Thoroughly clean all maintenance tractors and plant before they leave the control zone

## FIELD CONSTRUCTION

**9** **INFILL STORAGE**  
During installation ensure infill is only stockpiled within the control zone

**10** **FIELD REMOVAL**  
At the end of the synthetic turf's life, lift and dispose of it responsibly

Inspired by the ESTC – EMEA Synthetic Turf Council – and based on the CEN report DS/CEN/TR 17519, the Danish Football Association (DBU) has prepared a "red-yellow-green" zone model with 10 recommendations for environmentally friendly measures around artificial turf stadiums

1



**Fencing**  
The pitch is fenced around the perimeter in two different heights:  
■ 4,0 m  
■ 1,2 m  
Three ball gaps have been strategically placed in the perimeter fencing (marked with yellow)

2



**Barriers**  
Perimeter barriers of different height are tested  
■ 20 cm  
■ 40 cm  
■ 60 cm

3

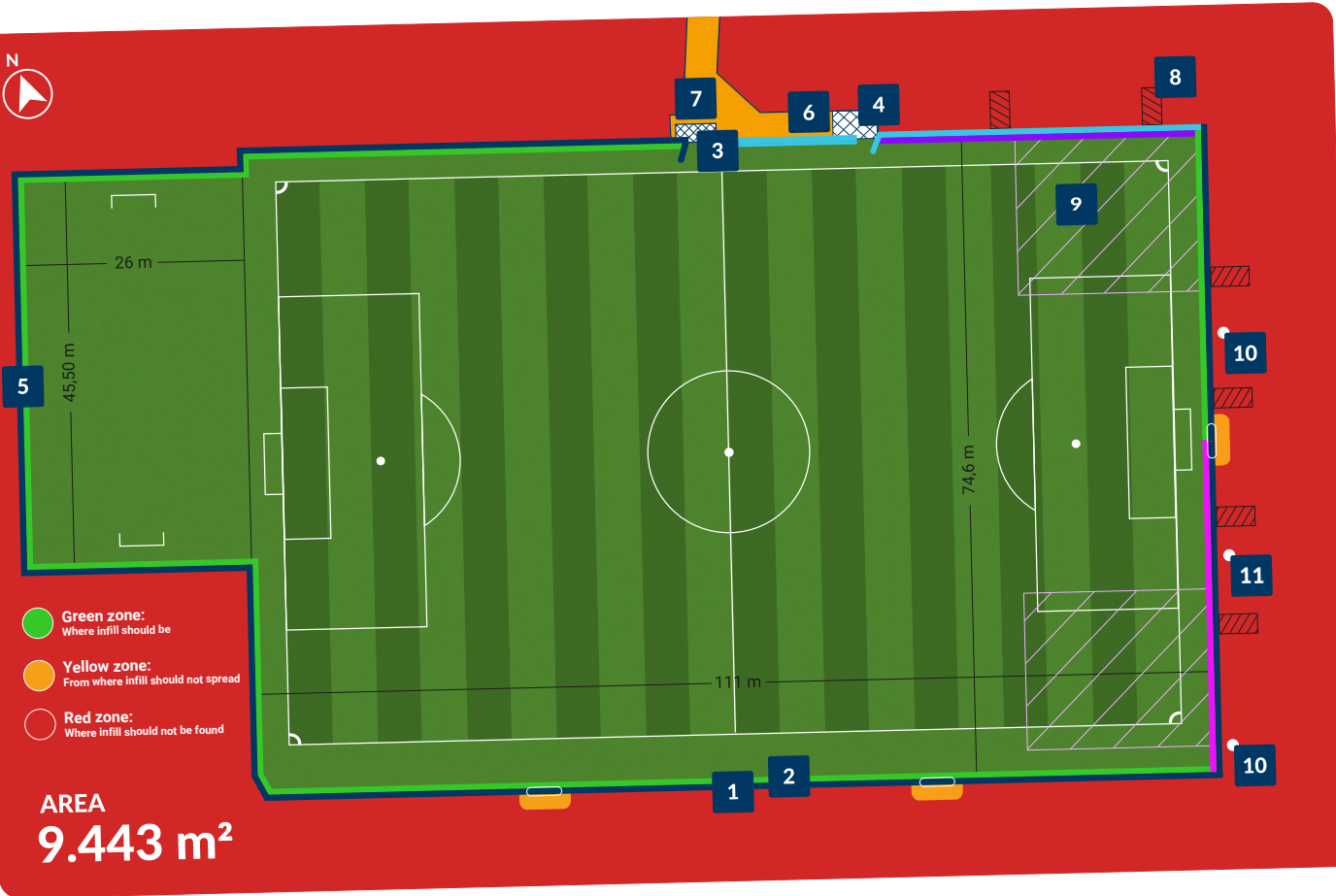


**Gate for maintenance equipment**  
An entrance/exit gate for maintenance equipment and personnel has been installed. Players and coaches are not allowed to use this gate. Equipment is being cleaned with an air compressor before leaving the pitch. After leaving the pitch, the tractor will pass mesh grates measuring 3 m x 1,5 m.

4



**Gate for users**  
Users (players, coaches, etc.) can only enter and leave the pitch through a specially designed entrance/exit gate with a floor consisting of mesh grates measuring:  
Width: 1,5 m  
Length: 4,5 m



9



**Membrane fields**  
2 membrane fields – both 400 m<sup>2</sup> – are installed to separate drainage water from the containment zone from other drainage sources.

10



**Wells – drainage water**  
A specific well with drainage water from each membrane field have been installed.

11



**Other well**  
A well with drainage water from the rest of the pitch (not membrane fields) have been installed.

In connection with project planning for Silkeborgbanen, Silkeborg Municipality cooperated with engineering consultants WSP, using the "red-yellow-green" model to plan where granulate should be, where it is acceptable – and where no granulate should found

5



**Digital monitoring**  
The utilization rate is monitored with a HallMonitor.

6



**Infill discharge via users**  
Measurements of discharge of granulate via users (players, coaches and equipment) are carried out right after the exit gate. We measure: Infill material inside shoes in fill material outside shoes and on clothes

7



**Infill discharge via maintenance equipment**  
Measurements of discharge of granulate via maintenance equipment are carried out after a standard procedure cleaning on the pitch and after passing the maintenance equipment exit gate. Only the tractor is being measured. The other equipment does not leave the facility.

8



**Infill discharge over the barriers**  
6 measuring points – samplingpads made from artificial turf – have been installed. They measure: Width: 0,6 m Length: 2,0 m

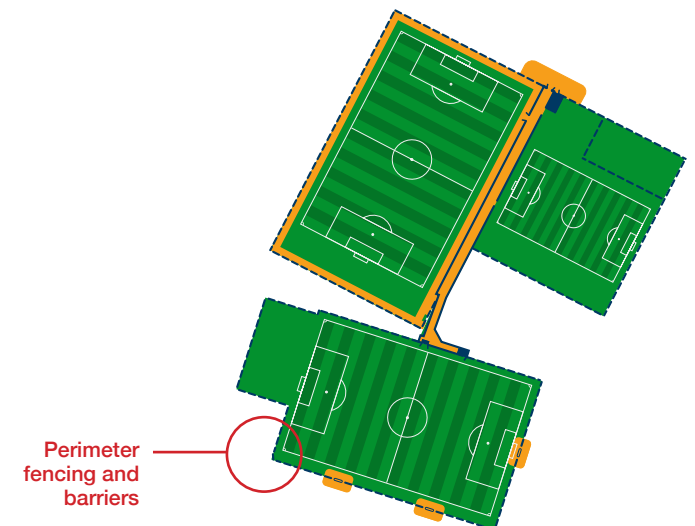
Perimeter fences and barriers



## PERIMETER FENCING AND BARRIERS

To ensure that granules stay on the pitch, an impenetrable barrier approx. 50 cm in height should be installed along the perimeter of the pitch. The barrier should fit tightly to the turf carpet. Especially if the pitch is in a residential area, barrier material which will minimise noise.

At Silkeborgbanen, barriers of different height are tested – 20 cm, 40 cm and 60 cm – to provide documentation that barriers minimise spreading of rubber granulate – and to determine the significance of barrier height. Initial analyses indicate that the loss of rubber granulate will be less than 10 kg annually, if 50 cm barriers are installed along the perimeter of the pitch.



Entrance and exit area

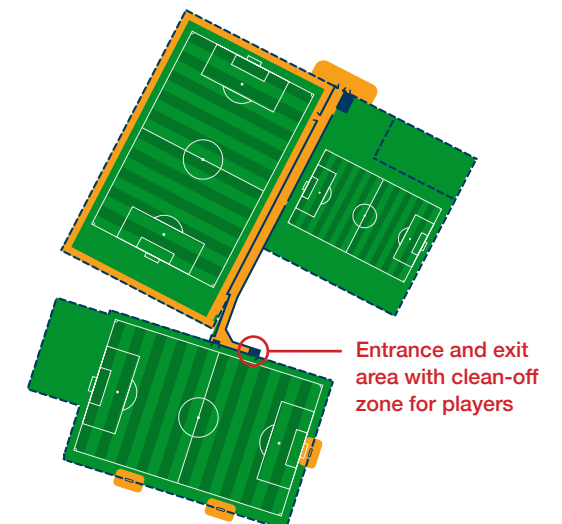




## ENTRANCE AND EXIT AREA WITH CLEAN-OFF ZONE FOR PLAYERS

A mandatory clean-off zone where players MUST pass to access or exit the pitch area of the pitch itself. This clean-off area should be constructed with mesh grates as "flooring", so players are forced to walk across at least 1.5 m of grating.

At Silkeborgbanen, players walk across 4.5 m of mesh grating, when they pass through the clean-off zone. Experience gathered so far indicates that players and coaches including equipment will carry less than 5 kg of rubber granulate off the pitch annually when exiting through the clean-off zone built at the Silkeborgbanen.



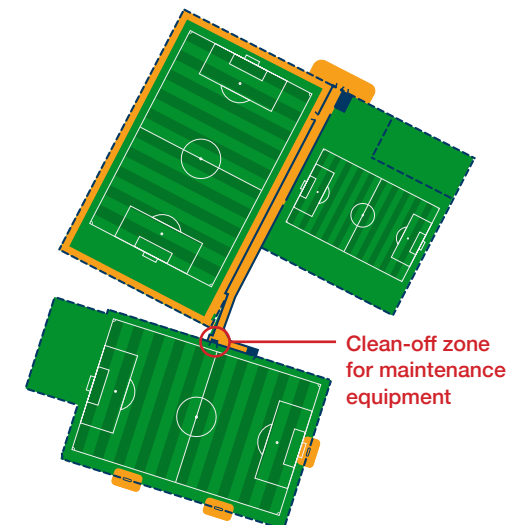


## CLEAN-OFF ZONE FOR MAINTENANCE EQUIPMENT

A clean-off zone for maintenance equipment – e.g. tractors – must be installed. Players, coaches, and spectators should not be able to use this exit point.

Before such maintenance machines and equipment is driven off the artificial pitch stadium, it must be possible to clean it – using e.g. compressed air or simple brushes to remove rubber granules for the surfaces.

At Silkeborgbanen, equipment is blown clean with compressed air before it leaves the pitch. Afterwards, the equipment is driven across 1.5 m of mesh grating. So far, experience indicates that less than 0.5 kg of rubber granulate annually will be removed from Silkeborgbanen by maintenance machines.



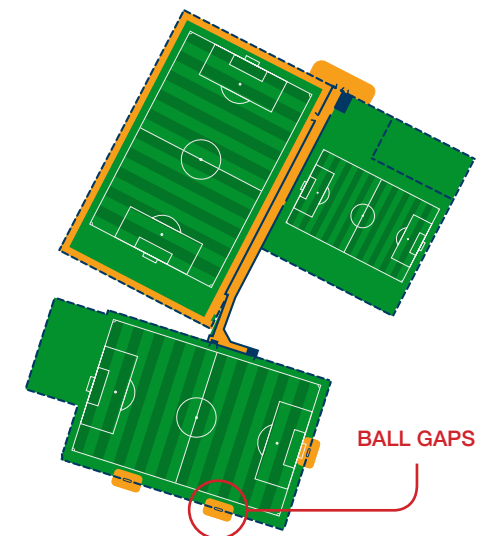


## BALL GAPS

It is a good idea to install strategically placed ball gaps in the perimeter barriers, so players can fetch stray footballs outside the stadium.

Right outside these ball gaps – outside the stadium – mesh grates, e.g. 1 m x 1 m in size, should be installed, so granules on football boots, if any, can fall off when players temporarily leave the pitch through gaps.

At Silkeborgbanen, it has not yet been analysed how much granulate may potentially be dispersed through the use of ball gaps. However, initial observations do not indicate that this is a significant, potential granulate dispersal route.



Maintenance



## MAINTENANCE

Recommended is always to follow the maintenance plan included when an artificial turf system is installed.

If the level of granulate is low in some parts of the pitch, it is not the same as to say that granulate has spread to nature. Compaction in the underlying, stabilising sand layer and compaction of rubber granules are often the reasons.

Another common reason is that granules have naturally, through pitch use, been moved from the areas with the most activity (most used areas) towards the edge of the stadium, and that maintenance personnel has not managed to reposition granules to the most used areas in the middle of the pitch. A 1 mm layer of rubber granulate on an 11-a-side pitch corresponds to 3 tonnes of rubber granulate, so if granules are not repositioned to high-activity areas, it will soon look as if large amounts of granulate are missing; and this may result in unnecessary refill of rubber granulate.

Furthermore, the following is important:

### DURING SUMMER

- Avoid the use of herbicides on the pitch.
- Rake/brush the pitch regularly to prevent compaction of the infill material.
- As a rule of thumb, 1 hour should be spent on maintenance for each 10 hours of use.
- Prevent excess consumption of granulate refill by optimising regular maintenance.

### DURING WINTER

- In so far as possible, choose mechanical and manual snow removal instead of using road salt and/or other de-icing chemicals.
- If de-icing products are used, make sure to request documentation from the supplier or the manufacturer, proving compliance with current regulations for xenobiotics.
- Avoid the use of snowblowers for snow removal, as this will increase the risk that rubber granulate is spread.
- Snow removed from the pitch should always be deposited at a designated area, which may be an artificial turf area or an area with a paved / tiled surface or where crop protection fleece is laid out at the bottom. Once the snow has melted, the remaining granulate must be collected for the purpose of being put back on the pitch.

# Would you like to know more?

For further information about Silkeborgbanen and our ongoing analyses, follow us on [Silkeborgbanen.eu](https://www.silkeborgbanen.eu).