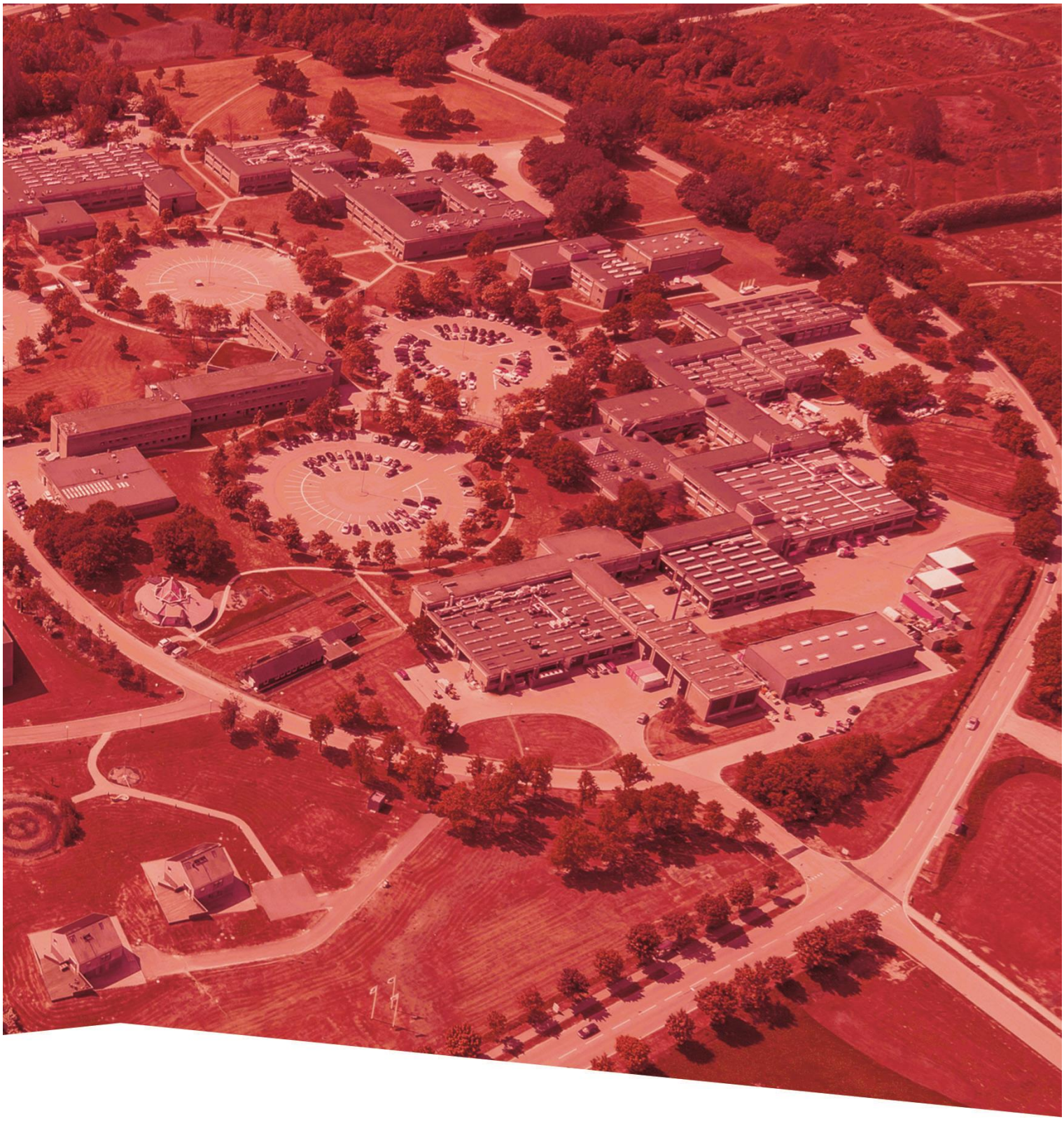

Concept paper
Recommendations for monitoring and documentation of RMM measures on artificial turf pitches

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Recommendations for monitoring and documentation of RMM measures on artificial turf pitches

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1. Preface

Danish Technological Institute has been involved in documentation of the effects of installed RMM measures on an artificial turf pitch in Silkeborg.[1] The recommendations contained in this concept paper are based partly on the experience obtained in this project, and partly on the long track record for documentation of environmental effects of artificial turf fields. It is supplementary to the CEN standard TR 17519.

2. Mass balance on artificial turf fields

A breakdown of the mass balance for rubber granulate discharge from artificial turf pitches without risk management measures, based on German, Dutch, Norwegian, Swedish and Danish studies are shown in Figure 1 below.

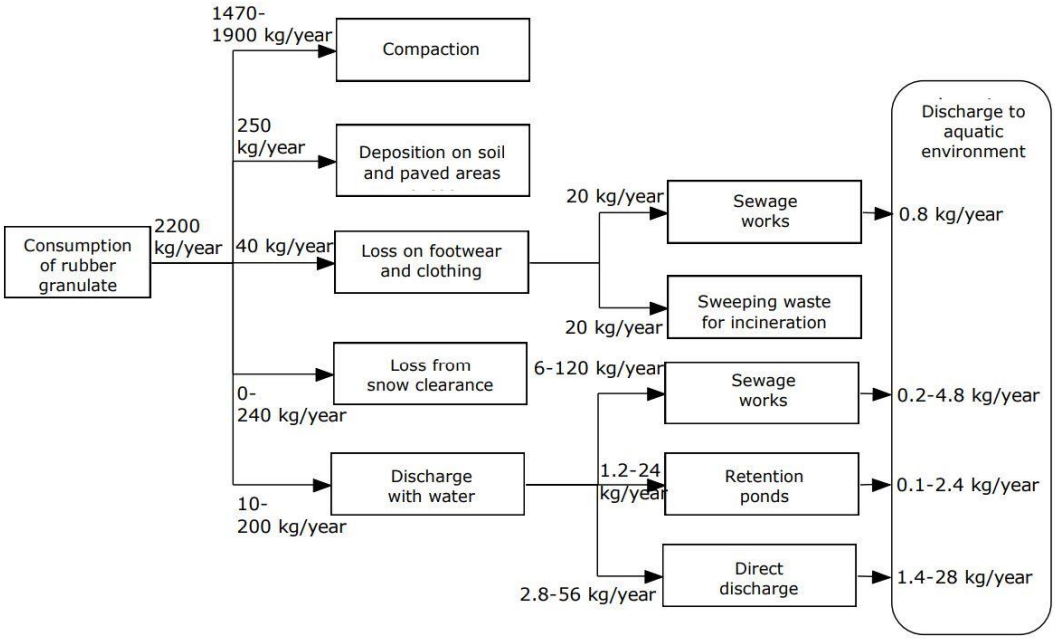

Figure 1: Mass balance for rubber granulates on pitches without RMM

Here, it is seen that the majority of the consumption of rubber granulate is due to compaction. However, this mass balance also illustrates the need for documentation of the effects of RMM measures, as these aim for a discharge of less than 50kg/year.

[1] https://silkeborgbanen.dk/

This mass balance also underlines that on an artificial turf pitch with granulate infill, the main pathways of emissions are:

- Over fences and barriers
- At player entry and exit points
- Transport with maintenance equipment
- Drainage water

To assess the total emissions from the pitches, monitoring of these pathways are essential. Following are our recommendations for methodologies for this.

3. Recommendation for documentation of emissions from artificial turf pitches

3.1. Fences and barriers

As most artificial turf pitches are symmetrical with barriers on the side and ends of the pitches, it will typically be representative to measure the discharge of rubber granulates over the sides of the field on one quarter of the field as illustrated in Figure 2. To ensure a sufficient reliability of the measured discharge, the following is recommended:

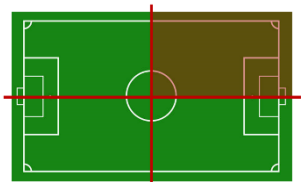

Figure 2: Typical football pitch

- Installation of 2-3 measuring fields on the side of the pitch (between centre and corner). One of these measurement points should be near the corner flag, where a higher discharge is often observed
- Installation of 2-3 measuring fields at the end of the pitch (between centre and corner). One of these measurement points should be behind the goal, where a higher discharge is often observed.

Sampling on a measuring point should be done on fields at least 60 cm wide and 200 cm long perpendicular to the fence. Measurements should be made every 3 to 6 months for at least one year.

Different materials can be used for sampling areas e.g. geotextile or sampling pads made from artificial turf (see Figure 3). The latter ensures capture of the discharged particles and limits removal of particles from the sampling area caused by fx wind. It is important to ensure that the sampling areas are fixed by using proper fixation and that vegetation do not grow up and move the sampling fields. Different methods have been developed by DTI to avoid this.

Figure 3: Sampling pads for granulate discharge over fences and barriers

3.2. Player entry and exit points

It is recommended that measurement of discharge of granulate via players are done 3 times per season. These measurements should be done in such a way, that they are representative for the use of the pitch area e.g. in dry, wet, summer and winter weather and representative of typical use of the pitch (see details in CEN TR 17519 5.2). In Silkeborg, it was decided to simplify the test, by focusing on measuring on:

1. Infill material inside the shoes of the players
2. The sum of infill material outside shoes and on clothes.

Equipment used on the pitch, such as balls and cones also contain some material which should be measured as required in the standard. When performing measurements of discharge of granulate via players, it is important not to instruct the players to behave differently than a normal training/game session, as extra instruction can affect the way the players behave when exiting the pitch area.

The measurements performed on granulates from players should to be correlated with the actual use of the pitch, meaning the number of players using the field during a year and the weather conditions (wet/dry/snow) over the year.

3.3. Transport with maintenance equipment

Measurement on maintenance equipment should be performed at least 3 times per season in such a way that they are representative for the use of the pitch area e.g. in dry, wet, summer and winter weather and representative of typical use.

After the equipment is cleaned as the normal procedure by the operating personnel (eg using brushes or pressured air cleaning), the equipment is transferred on to a sampling material such as a geotextile or plastic film, where remaining granulates are brushed off and collected for. Sampling should be representative for normal use and weather conditions (wet conditions were rubber sticks to surfaces, winter where rubber may be present in snow and dry conditions).

The measurements performed on discharge from maintenance equipment should to be correlated with the actual use of the pitch, meaning the number maintenance operations during a year and the weather conditions (wet/dry/snow) over the year.

3.4. Drainage water

Sampling from drainage water from the pitch should be done 1-2 times per season under different temperature conditions (summer, winter). The samples should be collected from freely running water from the drains. These water samples should as a minimum be analysed for microrubber, microplastics and Zink.

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