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# RESEARCH PROJECT

# "Compare possible hours of use for different sports field construction types and maintenance inputs"

## Sports Turf Association Victoria

## Final Report Summary

## January 2019

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## COMPARE POSSIBLE HOURS OF USE FOR DIFFERENT SPORTS FIELD CONSTRUCTION TYPES AND MAINTENANCE INPUTS

## SPORTS TURF ASSOCIATION VICTORIA

## FINAL REPORT SUMMARY

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### INTRODUCTION

Over the past decade the number of sports field constructions and renovations has increased with the general aim of being able to cope with the increasing demand for playing surfaces and the increasing number of users. The challenge has been not only to construct better quality sports fields but also to be able to provide the necessary level of maintenance so as to optimise the capital investment. The problem has often been that the level of maintenance is not in line with the capital investment or expectations and unfortunately these costly projects do not deliver the required outcome.

The objective of this research project was to compare;

- Sportsfields of different construction types
- The associated maintenance practices compared to the quality of the playing surfaces
- The potential hours of use for the different construction types and maintenance programs

### METHODOLOGY

This project involved assessing four sportsfields of different construction types and standard of play over a period of 21 months. The sportsfields can be summarised as follows;

| **Sports field No.1** | |
|---|---|
| Soil type | Sand profile with subsoil drainage |
| Turf type | Santa Ana overseeded with ryegrass |
| Cricket | Turf pitch |
| Sports played | Senior football, Junior football, Auskick, Womans football, Turf Cricket |
| **Sports field No.2** | |
| Soil type | Fine sandy loam no subsoil drainage |
| Turf type | Kikuyu |
| Cricket | Synthetic pitch |
| Sports played | Junior football, Auskick, Junior cricket |
| **Sports field No.3** | |
| Soil type | Fine sandy loam no subsoil drainage |
| Turf type | Kikuyu |
| Sports played | Senior soccer |
| **Sports field No.4** | |
| Soil type | Sand profile with subsoil drainage |
| Turf type | Santa Ana |
| Cricket | Turf pitch – Premier Grade Cricket (2 XI) |
| Sports played | Senior football, Junior football, Auskick, Cricket |

The sportsfields were assessed on 8 occasions throughout 2017 and 2018. They were assessed for the following parameters;

- Soil type
- Infiltration rate
- Soil strength (compaction)
- Soil moisture
- Turf composition
- Weeds, Insects and disease
- Traction
- Surface hardness
- Turf colour/health
- Surface levels
- Thatch and root depth
- Wear and turf damage

Information was also collected on the hours of use and maintenance.

## RESULTS

The data collected for each sportsfield is summarised as follows;

**Sportsfield 1:** This field is a sand profile with a subsoil drainage system and coped best of the fields with winter rainfall. It also had the highest hours of use and while there was extensive wear there were very few sandy or unstable areas. The couch provides a very hard wearing and resilient surface.

The challenge with this field was restoring the couch cover over the spring/summer period and as a consequence of couch not completely recovering the turf damage was compounded from one winter season to the next. That is, wear from 2017 had not completely recovered by the start of the 2018 winter season and consequently by August 2018 the area of wear and turf damage was considerably greater.

In order to maximise the use of the field and to sustain an acceptable playing surface an increase in fertiliser applications and increased mite control would assist in the recovery of the couch.

Irrigation is another important factor affecting the quality and sustainability of the playing surface and attention to improving irrigation management would improve the health of the couch and repair of the surface.

**Sportsfield 2:** This field is constructed from a fine textured soil with no subsoil drainage and is highly susceptible to winter waterlogging and extensive turf damage as a result. While the weather remains reasonably dry it can sustain a moderate level of use, however, one rainfall event can saturate the soils and cause rapid deterioration of the surface.

The field has a one-way fall from wing to wing and as a result the low side of the field becomes extremely wet after a rainfall event. Once the soils are wet they remain saturated until the spring when the soils start to dry out.

Kikuyu as the predominant grass type has been quite resilient. Under wet conditions the Kikuyu deteriorates very quickly, however, in the spring there is quite rapid recovery because of the stolons and rhizomes in the soil. This field was overseeded with ryegrass along the goal to goal line and just outside the width of the point posts. The overseeding was used as a means to improve the winter turf cover. As a general premise the ryegrass provided some improvement in winter wear, however, the soil conditions were the overriding factor.

Given the poor soil conditions this field is reasonably well maintained with a strong emphasis on the spring renovation, fertilising and irrigation. While the winter wear was severe there was quick recovery of the surface in the spring/early summer.

The irrigation system had quite poor distribution and this restricted the growth of the Kikuyu in late summer with several dry areas where the turf was stressed.

**Sportsfield 3:** This field is constructed from a fine textured soil with no subsoil drainage and is highly susceptible to winter waterlogging and potentially extensive turf damage as a result. While the weather remains reasonably dry it can sustain a moderate level of use, however, one rainfall event can saturate the soils and cause rapid deterioration of the surface. Because of the level of sport played on the field there is little or no training and all efforts are made to preserve the surface for games.

Kikuyu as the predominant grass type has been quite resilient. Under wet conditions the Kikuyu will deteriorate quite quickly. In the winter of 2017 there had been considerable turf damage in the goal squares and the centre of the field. The damage was sufficiently severe to necessitate returfing these areas. In 2018 the level of damage was considerably less and reflects the low hours of use.

This field is partially overseeded with ryegrass as a means of improving the winter turf cover. As a general premise the ryegrass provided some improvement in winter wear and presentation, however, the soil conditions and hours of use are the overriding factor.

Given the poor soil conditions this field is reasonably well maintained with a strong emphasis on the spring renovation, fertilising and irrigation and careful management of the use throughout the winter months.

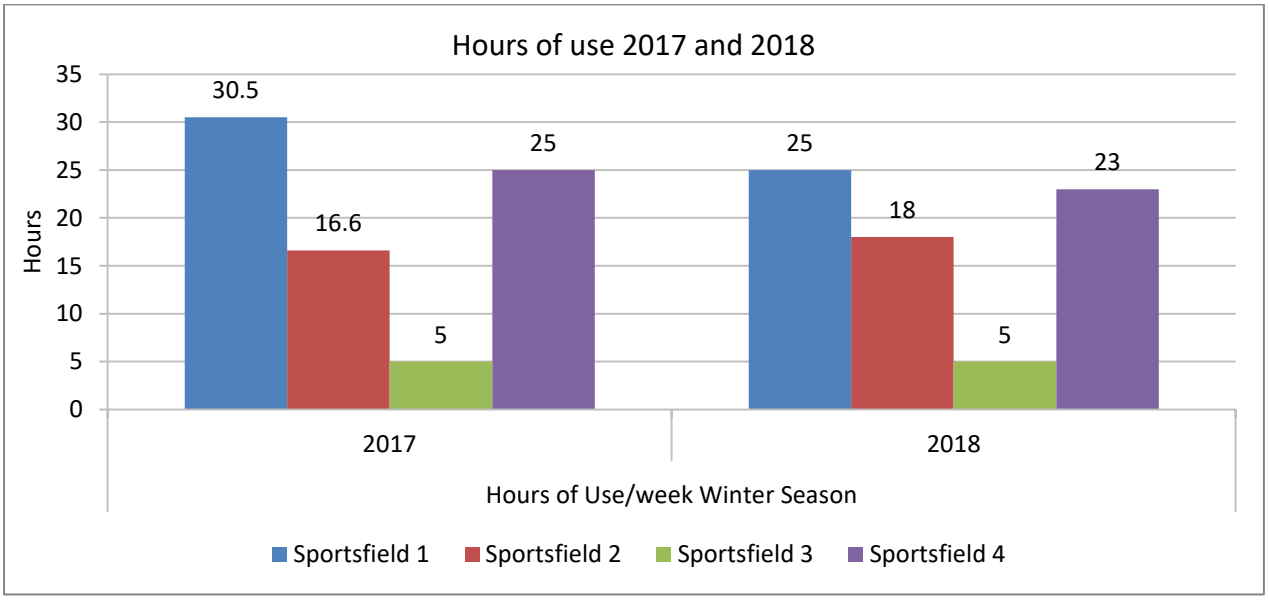
The irrigation system had quite poor distribution and this restricted the growth of the Kikuyu in late summer with several dry areas where the turf was stressed.

**Sportsfield 4:** This field is a sandy profile with some subsoil drainage and copes reasonably well with winter rainfall. There are some localised depressions in the surface that hold water and the accumulation of organic matter

increases the moisture retention in the upper part of the profile. As the soil moisture content increases, combined with the high use of the field, the couch thins out considerably.

This field has a high hours of use and while there was extensive surface wear and turf thinning there were no sandy or unstable areas. There is an intensive post-winter fertilising program that allows the couch to recover quite quickly in the spring. The couch going into the winter sports season is vigorous and of high density which allows the surface to cope with the use.

**Hours of Use:** The hours of use are summarised in the chart below. The hours of use that can be tolerated before there is significant turf damage is influenced by the construction type, weather and maintenance of the surface. There is little doubt that the investment in a well-drained field with couch provides the highest hours of use. This presumes a level of maintenance that ensures there is a 100% grass cover of high density at the end of summer, leading into the winter sports. If these conditions are met at least 25 – 30 hours of use/week over the winter months can be expected.




**Maintenance:** The maintenance programs for each of the fields is summarised in the table below.

| Activity | Sportsfield 1 | Sportsfield 2 | Sportsfield 3 | Sportsfield 4 |
|---|---|---|---|---|
| **Category*** | A | C/D | B | A – A+ |
| **Mowing (cuts/year)** | 39 | 48 | 48 | 90 – 100 (with rolling in winter as a substitute for mowing) |
| **Overseeding with ryegrass** | Overseeded in year 1 of the project but not in year 2 | Not overseeded in year 1 of the project but goal to goal line was overseeded in year 2 | Nil | Centre bounce square and goal squares |
| **Topdressing ($m^3$)** | $60m^3$ | $60m^3$ | Nil | As required |
| **Compaction relief** | 1 solid tine | 1 – 2 solid tine | 1 solid tine | 2 – 3 solid tine (vertidrain) |
| **Hollow coring** | 1 hollow core | Nil | Nil | 1 hollow core |
| **Scarifying** | Nil | 1 over 2 years | 1 over 2 years | Depends on thatch levels |
| **Insect control** | 2 | Nil | Nil | 1 over 2 years (as required) |
| **Disease control** | Nil | Nil | Nil | Nil |
| **Wetting agent** | Nil | Nil | Nil | Nil |
| **Pre-emergent herbicide** | 1 | Nil | Nil | 4 |

| | | | | |
|---|---|---|---|---|
| **Post-emergent herbicide** | 2 for *Poa annua* control | Nil | Nil | 2 for *Poa annua* control |
| **Broadleaf herbicide** | Nil | Nil | Nil | 1 |
| **Nitrogen Fertility (kg/100m$^2$/yr)** | 1.9 | 0.99 – 1.5 | 0.99 | 1.9 |
| **Fertiliser applications** | 3 | 2 - 3 | 2 | 4 |

*The category is arbitrary and varies between municipalities but provides some level of hierarchy. The category often reflects the standard of facilities rather than just the standard of the playing surface. For this project the fields have been provided with a ranking based around the condition of the field, standard of competition and quality of the winter playing surface.

## CONCLUSIONS

After 21 months of monitoring and assessing the fields there are several conclusions;

i. The dry winter of 2017 had assisted in the fields coping with the traffic and this was again reflected during the winter of 2018 which was even drier.
ii. The oval constructed on a heavy soil type deteriorated very quickly when there was rain. While the field was in satisfactory condition for a certain period of the year, the field would not cope with a year of average winter rainfall under the current level of use. The precarious nature of soil based fields further highlights the importance of a well-drained profile.
iii. The thatch depth continues to have a significant influence on surface moisture retention and infiltration rate even on a sand profile.
iv. A sand profile that has some drainage substantially improves the ability of the surface to cope with high traffic loads.
v. A strong couch base going into the autumn/winter season provides a high wear resistant surface even when there is very little leaf due to the high traffic. The stolons and rhizomes are the key to providing this resilience. Attention should be given to late summer fertilising to ensure high turf density leading to winter use.
vi. Oversowing with ryegrass has little if any influence on wear resistance when the ryegrass establishment has not been managed adequately to allow the ryegrass to become well established before being subjected to traffic. Overseeding while the field is in use results in a poor strike rate and low plant density.
vii. The spring transition is most important to restoring the warm-season grass base and is dependent on soil aeration, high fertility and mite control.
viii. Any soil decompaction program needs to be monitored as to its effectiveness. This includes identifying the depth of the compacted layer and assessing the effectiveness of the aeration practice undertaken (e.g. by measuring soil strength and infiltration rate).
ix. *Poa annua* was the most prominent weed species during the winter and all fields had a relatively high *Poa annua* content. Where there was poor recovery of the warm-season turf this provided areas for the *Poa annua* to germinate.
x. Summergrass (*Digitaria* sp.), Crowsfoot grass (*Eleusine indica*) and Wireweed (*Polygonum* sp.) were present in several of the fields during the spring/summer months and were associated with the high traffic areas. Where there were no control measures undertaken, the infested area increased across the 21 month assessment period.
xi. The hours of use data indicate that on a well-drained couch field, with a moderate level of maintenance, 30 hours of use per week over a 26-week autumn/winter period is sustainable. With a moderate increase in fertiliser and soil aeration it is expected that this could be increased. The timing of maintenance practices is also an essential element in improving the hours of use.
xii. The spring recovery of the warm-season grass cover is important in maintaining the integrity of the warm season grass cover and density. Where there is poor spring/summer recovery there is a gradual deterioration of the warm-season grass that can require replacement.
xiii. Hot summers are highly beneficial in developing a strong warm-season turf irrespective of the soil type providing there is adequate water.
xiv. The poor water distribution at some sites was affecting the overall turf health, turf recovery, turf density and root growth.