Carpet-Hybrid Pitches for Community Sport

Year 4 Progress Summary – October 2020 to September 2021

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INTRODUCTION

This report summarises the findings of the **fourth year** of an ongoing research study that aims to answer the following question:

'*Can carpet-hybrid pitches support 20 to 25 hours of use per week and maintain reasonable playing quality at a reasonable cost, with good user feedback?*'

For information on what carpet-hybrid pitches are, and how they perform, please refer to earlier reports. This report is to inform funding and governing bodies as well as potential purchasers.

The report focuses on the original community-based pitch in Regent's Park (London) as this has accommodated significant use since October 2017, however the research project now encompasses the following six pitches (location and dates of first use in brackets):

1. The Regent's Park (London, 20th October 2017).
2. Bisham Abbey (Berkshire, 24th July 2017).
3. Runcorn Linnets FC (Cheshire, 7th August 2020).
4. Bootle FC (Merseyside, 11th August 2020).
5. Thatto Heath Crusaders ARLFC (Merseyside, 5th June 2021).
6. Siddal ARLFC (West Yorkshire, 5th June 2021).

The four more recent pitches comprise constructions in more northern climatic regions, and with three further carpet-hybrid grass products. These sites are enhancing the understanding of carpet-hybrid pitches from a football and rugby league specific perspective.

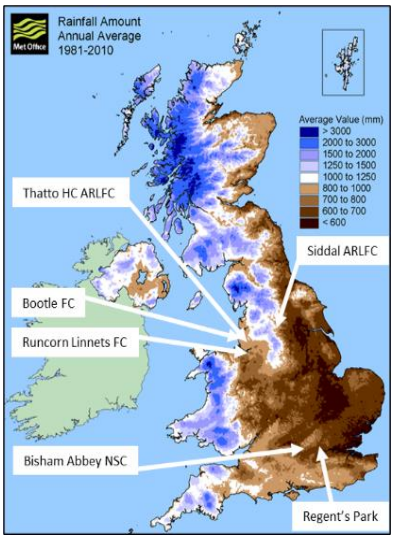

Figure 1. Site locations.

Year 4 of the research has focussed on assessing usage, performance, user feedback and maintenance inputs, with particular reference to determination of the cost per hour of use.

Figure 2. Hybrid carpet installation at Thatto.

Figure 3. Hybrid carpet installation at Siddal.

USAGE

Due to COVID-19 and government restrictions on playing sport, the Regent's Park pitch accommodated much reduced usage in November 2020 and no use at all from January to February 2021. In order to mitigate the effect of this on the research findings over the previous three years, missing data due to COVID-19 in Years 3 and 4 have been replaced with data interpolated from immediately before and after the restrictions.

The mean weekly hours of use for the Bisham Abbey and Regent's Park pitches over the first four years of the project are presented in Figure 4. The usage on the Bisham Abbey carpet hybrid pitch was 8.5 and 10.8 hours/week for the carpet-hybrid and stitched hybrid pitches respectively. Mean usage for the Regent's Park carpet-hybrid pitch over the first four years continues to be high at 23.9 hours/week (including renovation periods), which is significantly higher than that for the adjacent non-hybrid natural turf pitch (13.0 hours/week) and the anticipated typical usage of most natural grass pitches (between three and six hours per week).

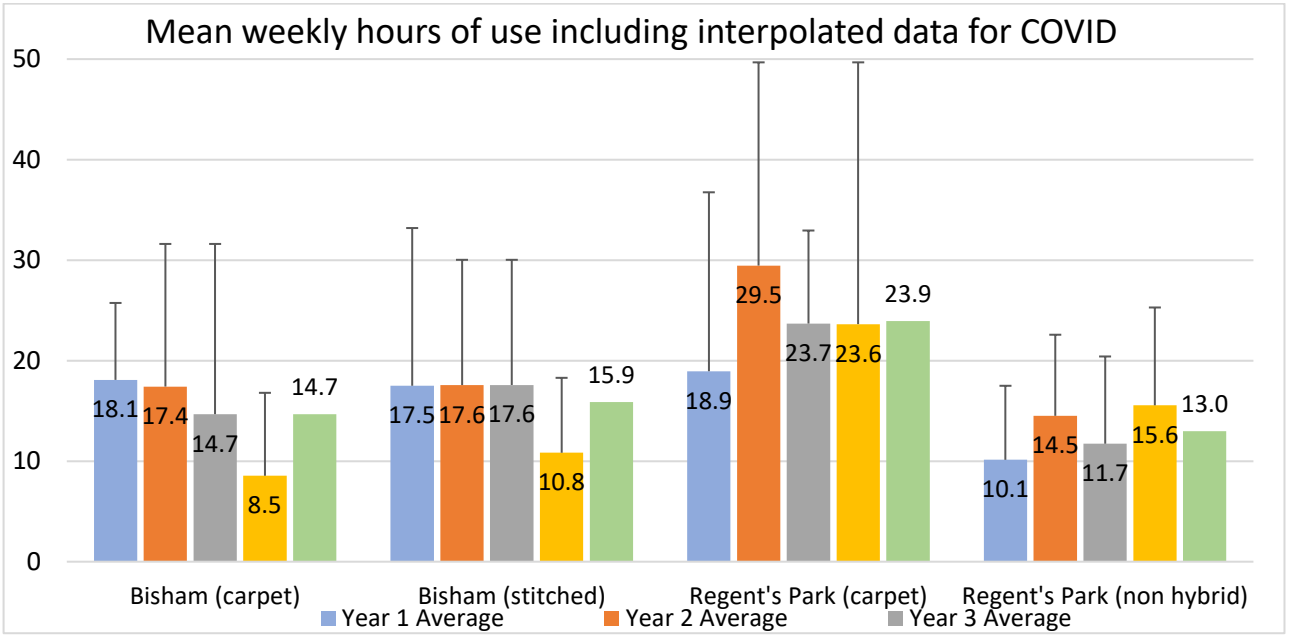

Figure 4. Average weekly usage for the Bisham Abbey and Regent's Park pitches over the first four years.

The whiskers in Figure 4 show the peak weekly usage during each of the first four years.

The peak usage of the carpet-hybrid pitch at Regents Park in Year 4 was 49.7 hours/week (similar to that during Year 2) compared with 25.3 hours/week on the non-hybrid natural turf pitch. Between 24 April 2021 and 5 June 2021, mean usage on the Regent's Park carpet-hybrid pitch was 48.1 hours/week, which is comparable to the usage levels achieved at some 3G floodlit pitches. To note, the usage hours at Regents Park have been achieved without the benefit of sports lighting to extend potential hours of use.

The mean weekly hours of use for the northern sites are presented in Figure 5, although the two rugby league pitches were only in use for three months of Year 4 due to their construction timetable. The Runcorn pitch accommodated 25.8 hours/week, which is comparable with the Regent's Park carpet-hybrid pitch. Usage at Bootle was less at 17.5 hours/week, but still significantly higher than that for a typical natural turf pitch.

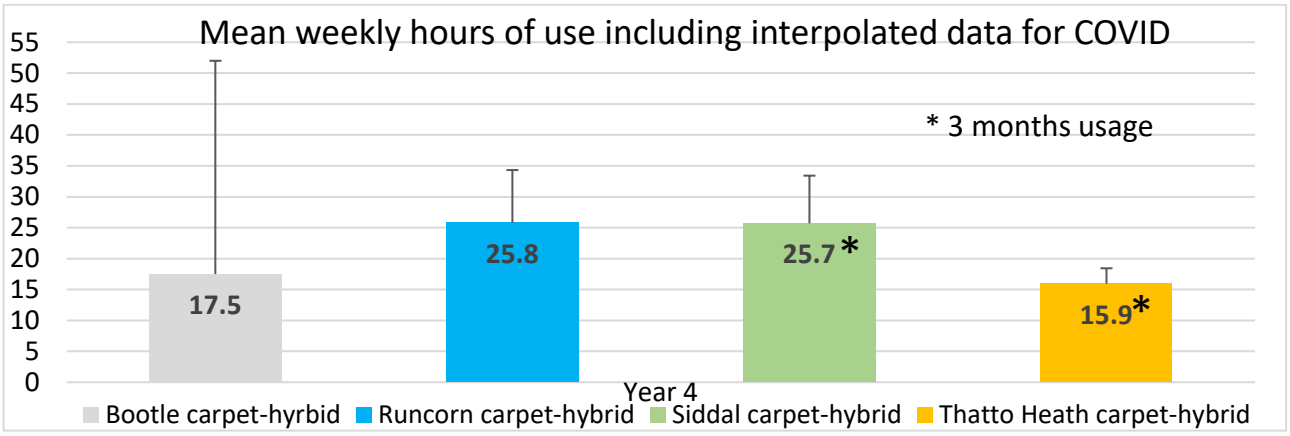

Figure 5. Average weekly usage for the northern carpet-hybrid pitches.

The whiskers in Figure 5 show the peak weekly usage during Year 4. Peak usage at Runcorn was 34.3 hours/week however Bootle accommodated 53 hours/week in May 2021 one week before the annual renovation.

Minimising cancellations is essential for operational/business planning, fixture scheduling and maintaining participation. It is therefore notable that over the first four years of the study, there have been no cancellations due to rain on the carpet-hybrid pitch in Regent's Park. In Year 5 (December 2021), the Regent's Park carpet-hybrid pitch had its first cancellation due to rain as there was standing water on pitch. There was good grass coverage but 87 mm of rain fell over the weekend. A decision was taken to cancel a match due to potential increase in wear and tear. All other grass pitches were cancelled for a longer period than the carpet-hybrid pitch which was back in use that same afternoon. Usage of the Runcorn pitch was cancelled for two hours following heavy rain; however, the pitch was back in use an hour later.

USER FEEDBACK

The overall user feedback rating scores for the Regent's Park carpet-hybrid pitch continue to be significantly higher than those for the adjacent non-hybrid natural turf pitch, with mean scores out of ten of 8.9 and 6.5 for the carpet-hybrid and non-hybrid natural turf pitches respectively. These scores for a carpet-hybrid pitch in a community setting are extremely positive and have only declined very marginally since the pitch was first installed in 2017.

The maintenance of consistently high user pitch satisfaction scores for the carpet-hybrid pitch is interesting considering the lack of grass cover at times at Regent's Park. A small number of respondents (4/82, 4.9%) raised concerns over sandiness and abrasions, and 2/82 (2.4%) commented on hardness, however the vast majority of comments were very positive e.g., "The pitch has a positive impact on the game" (32/82, 39.0%), and "The pitch has a high quality, better than natural turf" (25/82, 30.5%).

Community sport users at Regent's Park surveyed following use of the carpet-hybrid pitch commented:

- *'This pitch adds significant enjoyment to our matches!*
- *'The pitch allows us to play football in our passing style, making for a much better style of play for spectators to watch.*
- *'We like to play the ball on the floor and our players can trust the quality of the surface.*
- *'More pitches are needed like this, especially as the weather gets bad.*

Both Bootle and Runcorn received high user feedback scores during the end of Year 3 and throughout Year 4, with mean scores not dropping below 8.5/10.

The Performance Quality Standards (PQS) system used in this project for assessing the performance of carpet-hybrid pitches was originally developed to assess non-hybrid natural turf pitches. As such, there is strong emphasis on maintaining grass cover, however an emerging significant advantage of carpet-hybrid systems is that pitch performance for the majority of the parameters assessed can be maintained with diminishing grass

cover, as the presence of the artificial fibres compensates for this grass-loss. This explains a recurring observation over the first four years of the project of divergence in measured PQS scores for grass cover-related parameters versus player-perception of overall pitch quality.

Over the first four years, the mean PQS score for the Regent's Park carpet-hybrid pitch equates to:

"*Mid-season elite training facilities with intensive use, very good community facilities, with well-resourced maintenance budget and employed, trained ground staff*".

MAINTENANCE AND RENOVATION COSTS

The Regent's Park carpet-hybrid pitch continued to receive a low-input maintenance strategy during Year 4 with a drop in cost compared to previous years due to COVID-19 restrictions. For Regent's Park, routine maintenance costs for the carpet-hybrid and non-hybrid natural turf pitches are broadly similar with a four-year mean of £4,277 and £4,183 respectively. Annual renovation costs for both Regent's Park pitches reduced in Year 4 because of less use due to COVID-19 (£5,670 and £4,675 for the carpet-hybrid pitch and the non-hybrid natural turf pitch respectively). Only one renovation was carried out within the year, compared to two renovations in previous years. The non-hybrid natural turf pitch in Regent's Park continues to receive a low-input routine maintenance strategy with a correspondingly low mean annual renovation cost over the first four years, priced using typical industry rates, of £7,544, which is £4,599 lower than that for the carpet-hybrid pitch at £12,143.

In summary, over the first four years of the project, the mean combined maintenance and renovation cost for the carpet-hybrid pitch in the community setting of Regent's Park was, at typical industry rates, £16,419 compared to £11,726 and £12,551 for the adjacent non-hybrid natural turf and a typical 3G pitch respectively.

The cost data for Bootle in Year 4 is in stark contrast to those for the Regent's Park pitch, with routine, annual and total combined maintenance costs of £19,588, £20,249 and £39,837 respectively. The combined routine and annual maintenance cost for Bootle is ~2.4 times higher than that for the Regent's Park carpet-hybrid pitch.

COST PER HOUR OF USE

An indication of the cost per hour of use can be developed based on construction, routine maintenance and annual renovation costs, and then modelled against the average annual usage hours for each year (Figure 6).

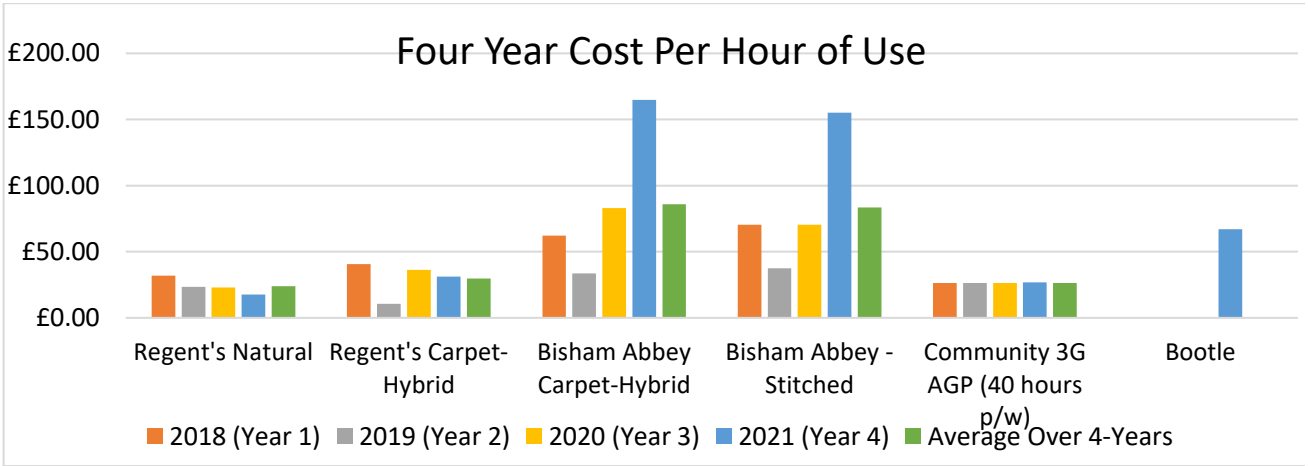

Figure 6. Cost per hour of use at Regent's Park, Bisham Abbey and Bootle.

For the community setting at Regent's Park, the mean cost per hour of use of the carpet-hybrid pitch over the first four years of the project (£29.65) is somewhat higher than that for the non-hybrid natural turf pitch (£23.96) but with user satisfaction scores of 8.9/10 and 6.5/10 respectively. The difference of £5.69 could be bridged or reduced by applying a slightly higher hire charge for the carpet-hybrid pitch and/or reducing maintenance costs. The cost per hour of use of the carpet-hybrid pitch (£29.65) is marginally higher than the modelled cost per hour of use for a typical 3G AGP (£26.41).

There was a marked spike in the cost per hour of use for both of the Bisham pitches (circa. £160) due to a reduction in usage hours compared to previous years whilst sustaining relatively high maintenance costs. The cost per hour of use for Bootle (£66.93) is lower than the 4-year mean for the Bisham carpet-hybrid pitch (£85.96), but just over double that of the Regent's carpet-hybrid pitch (£29.65).

The relationship between pitch construction costs for a standard 100 m x 64 m pitch and mean hours of use over the first four years of the project is presented in Figure 7.

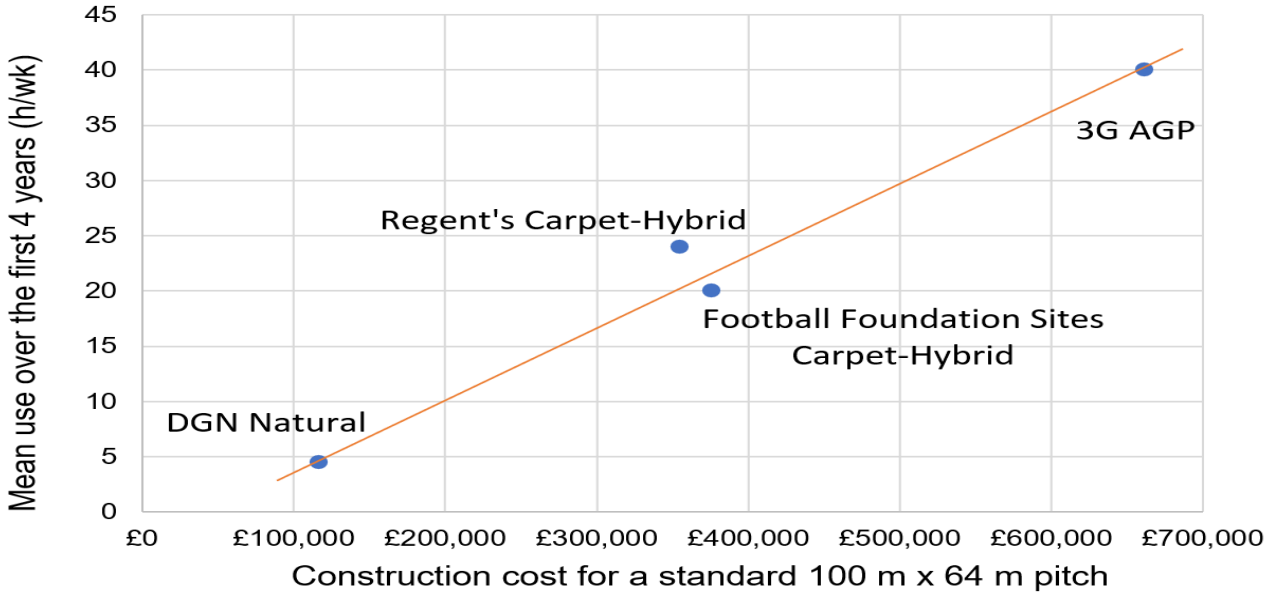

Figure 7. Mean hours of use and pitch construction costs.

The natural turf pitch data is based on Sport England standard costs with 3 to 6 hours of use as per the Sport England Design Guidance Note: Natural Turf for Sport. Hours of use for the 3G AGP are modelled at 40 per week. With reference to Figure 7, the relationship is broadly linear with carpet-hybrid pitches lying between non-hybrid natural turf pitches at the lower end of the scale, and 3G AGP pitches at the upper end.

ISSUE AT BOOTLE FOOTBALL CLUB (YEAR 5)

During Year 5 of the project in late January 2022, surface water ponding began to occur on the Bootle carpet-hybrid pitch, which reduced usage from 16 hours/week in January to only 5 hours/week in February. The cause was found to be the development of a thin, dark, organic-rich layer near the surface (Figure 8).

Following decompaction/aeration operations, usage increased to 12 hours/week in March 2022, and 15 hours/week in April 2022. It is concluded that the issue was not related to the particular carpet-hybrid product at Bootle as the same system is in use at Thatto Heath Crusaders ARLFC, but with no similar observations there.

It is currently surmised that it is possible to have too much lush, green grass going into winter period when grass becomes dormant, as excess grass matter can be forced into the surface during play which subsequently breaks down into colloids (fine organic particles) which then act like a sponge and impede surface water infiltration. It is therefore likely that an optimum compromise between aesthetics and performance needs to be struck in late autumn. This issue at Bottle was addressed more fully during an annual renovation in May 2022 (Figure 9) but will be closely monitored as the project progresses.

Figure 8. Dark, organic-rich surface layer.

Figure 9. 9th June 2022 – 29 days after renovation overseed.

LESSONS LEARNT FOR COMMUNITY SPORT

1. There have been no cancellations for the carpet-hybrid pitch (aside from snow cover) during the first four years of the project. The non-hybrid natural turf pitch has averaged 33.5 cancelled sessions per year.
2. Community users are more tolerant of lower / no grass cover when compared with feedback relating to the non-hybrid natural turf pitch. The carpet-hybrid pitch continues to receive high user feedback scores (circa 9/10) whilst sustaining high usage due to its popularity for bookings.
3. 39% (32/82) of respondents commented in Year 4 that this community-based carpet-hybrid pitch was having a positive impact on their game. Almost 83% of the comments received were of a positive nature.
4. Although the low maintenance regime employed in Regent's Park has resulted in a lack of natural grass cover following periods of intensive use, this has had a positive knock-on effect of reduced organic matter accumulation. As a consequence, only one, less aggressive, renovation is required per year, which may increase the longevity of the pitch whilst reducing maintenance costs.
5. The 4-year mean combined maintenance and renovation cost for the carpet-hybrid pitch at Regent's Park is, at typical industry rates, £16,419 compared to £11,726 and £12,551 for the non-hybrid natural turf pitch and a typical 3G pitch respectively (circa £4k greater).

SUMMARY

Over the first four years of the trial, the Regent's Park carpet-hybrid pitch has accommodated average weekly usage of 23.9 hours (including renovation periods) compared to 13.0 hours on the non-hybrid natural turf pitch. Nearly twice the weekly usage has been achieved on the carpet-hybrid pitch whilst maintaining user feedback scores of 8.9/10. This ongoing research study aims to answer the following question:

'*Can carpet-hybrid pitches support 20 to 25 hours of use per week and maintain reasonable playing quality at a reasonable cost, with good user feedback?*'.

On completion of Year 4, it is currently concluded that the answer is:

- Over the first four years – yes.
- In the medium term – very likely.
- In the long term – to be confirmed

NEXT STEPS

The project will continue to monitor usage, maintenance costs, performance and user feedback at all six venues.

Footnote: *This report can be provided in large format upon request*.