



TESTING TECHNOLOGY FOR SPORT

# TestbedNordic Report

22<sup>nd</sup> November 2022

Report Number: 40428/1  
Status: 'Final' V1.0



## HEADQUARTERS

Sports Labs Ltd  
1 Adam Square,  
Brucefield Industry Park  
Livingston EH54 9DE  
Scotland, United Kingdom

Tel: +44 (0) 1506 444 755  
Email: [info@sportslabs.co.uk](mailto:info@sportslabs.co.uk)  
Web: [www.sportslabs.co.uk](http://www.sportslabs.co.uk)

## REGIONAL LOCATIONS

- USA
- Morocco
- Turkey
- South Africa
- Netherlands
- Belgium
- Norway
- Israel

# Contents

Executive Summary .....	4
Introduction .....	6
Location.....	8
Field Construction .....	9
Player Perception APP & summary of results .....	9
Site Performance Testing .....	12
Correlation of player feedback to test results .....	17
Usage Hours .....	22
Maintenance Log .....	22
Appendix 1  Initial Test Reports (Field 1 – 4).....	24
Appendix 2   Final Test Reports (Field 1 – 4).....	25
Appendix 3   Images.....	26

# TEST BED NORDIC



TESTING TECHNOLOGY FOR SPORT

"A test site for Innovation"



## Executive Summary

‘TestbedNordic’ an innovation test bed has completed its first cycle of testing and monitoring of four small, sided football fields in Solna, Sweden. The innovation in the first cycle was new environmentally friendly performance infill.

The performance testing and player feedback collated provides both objective and subjective feedback that 75% of the football turf surfaces on the whole meet user group needs along with testing evidence of safety and performance compliance to common international standards.

The site with two five aside fields and two seven aside fields were performance tested on installation, with player feedback collated through a whole seasons usage (12-18 months), and then tested at completion of the programme to provide objective test data the fields were still compliant.

With a Pitch Rater system of ‘1 very poor’ to ‘5 very good’ similar to that used in UEFA club competitions, 3.0 would be rated as satisfactory.

A fields life expectancy can be up to 10 years in a community-based facility and thus a caveat must be added this was a research programme over only 12-18 months. It does however provide comfort to investors and encourage innovation to be embraced from short – term performance evidence.

The four varying performance infills listed below. Technical data sheets can only be shared by the manufacturers due to innovation confidentiality.

1. Field T1 - Organic 201, Amorim Sports
2. Field T2 – Olive Pits, Solna City
3. Field T3 – Flow GT, Polytan
4. Field T4 – Eliá Renufill, Sports Provision

A summary of the results is overleaf where testing results are based on performance test results against the FIFA handbook of test methods for football turf to the tolerances of FIFA Quality for Shock Absorption, Vertical Deformation, Ball Roll, Ball Rebound and Rotational Resistance. The fields are too small in dimensions for any official FIFA certification.

T1 Organic 201	T2 Olive pits
<p><b>Initial Testing: Pass</b>  <b>Final Testing: Fail - Ball Roll</b>  <b>Rating: 2.17</b></p> <p>Player Feedback: 67% normal hardness, 77% good grip, 74% normal ball roll, 87 % not slippery, 69% pitch stable, 62% no skin injury, 61% body felt ok, 73% ball bounce ok</p> <p>Notes of concern: The pitch was reported by 67% to be 'hard'. Ball roll was 11.1m on retest,</p>	<p><b>Initial Testing: Pass</b>  <b>Final Testing: Pass</b>  <b>Rating: 3.0</b></p> <p>Player Feedback: 67% normal hardness, 91% good grip, 82% normal ball roll, 88% not slippery, 97% pitch stable, 79% no skin injury, % body felt ok, 91% ball bounce ok</p>
T3 Flow GT	T4 Eliá Renufill
<p><b>Initial Testing: Pass</b>  <b>Final Testing: Pass</b>  <b>Rating: 3.58</b></p> <p>Player Feedback: 77% normal hardness, 77% good grip, 80% normal ball roll, 70% not slippery, 84% pitch stable, 74% no skin injury, 93% body felt ok.</p>	<p><b>Initial Testing: Pass</b>  <b>Final Testing: Pass</b>  <b>Rating: 3.17</b></p> <p>Player Feedback: 72% normal hardness, 87% good grip, 80% normal ball roll, 77% not slippery, 81% pitch stable, 74% no skin injury, 94% body felt ok, 66% ball bounce ok</p>

It must be noted only one field had a noncompliance on the final test 'T1' for the ball roll. After interrogation of the test results and field history it would be suggested this result is not directly related to the performance infill. This field was used and exposed to the climate for a longer period of time, 18 months, as it was the first pitch to be installed.

The next batch of innovative infills are in the process of being installed for test cycle 2.



## Introduction

In this research programme a test bed in Solna, Sweden named ‘TestbedNordic’ made up of two five aside pitches and two seven aside pitches provided new performance infills for artificial turf an opportunity to be tested and critiqued by football players.

The following contributory partners and stakeholders are listed below.

- Stockholm Football Association
- Solna City
- Swedish FA
- Sports Labs

With a new artificial football field and playing surface compliance against safety and performance standards is one key item but considering player feedback and suitability for the intended user group is also important when collected in an independent manner.

Due to legislation and the market need for more environmentally friendly solutions product innovation for artificial sports surfaces is critical point in time where we move from the traditional polymeric infill that provide elastic performance in the system, however new materials have much varied physical properties and to date over 90% of artificial turf system still use SBR rubber crumb.<sup>1</sup> The fields installed are with the same components apart from the infill.

MAINTENANCE	USAGE	TESTING	ENGAGEMENT
Tracking and detail to date of all fields. A maintenance log and equipment pictures	Usage to date and a tracking system for future usage.	Testing to date and the future testing program	Tracking engagement and encouraging future feedback

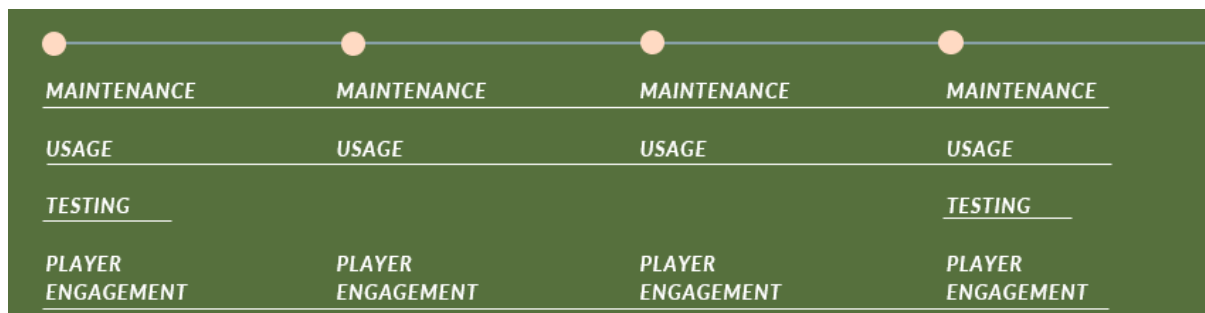
We enter a phase where new infills are being widely trialled but not in controlled environments and most importantly with verified player feedback and is this programme a proven player feedback app on mobile devices was used. In addition, usage hours and maintenance was logged by Solna City maintenance and sport departments.

Sports Labs, the leading global independent test institute, accredited by FIFA and operating an ISO 17025 quality control programme monitored and collated all objective and subjective data within the research programme and present the findings in this report for the first four products to complete a test cycle at TestbedNordic.

Prior to installation on site Sports Labs undertook a system audit for laboratory compliance. This encompassed evidence of product test reports and product data sheets and further testing where required under the Nordic and FIFA product requirements.

<sup>1</sup> Calculated from Sports Labs Ltd listed project listings

Throughout the project usage, and maintenance were recorded, as well as player engagement and testing was carried out at the beginning of the project and on completion.



## Location

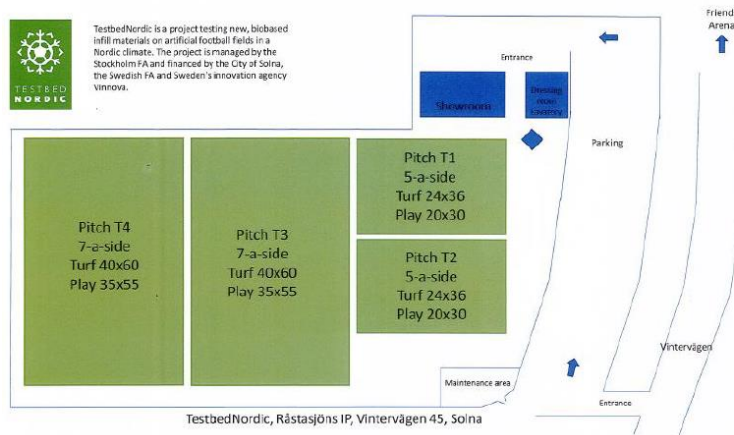
The site is located in the municipality of Solna, close to Friends Arena, the national football stadium.

Site Name	TestbedNordic 'Råstasjön'
Address	Vintervägen 45, 169 54, Solna
GPS Co-ordinates	59.369587, 17.996319

### Map View



### Site Layout





## Field Construction

All fields had the same sub-base, same shockpad, same contractor (Spentab) during installation. The only change in site material was the performance infill. Due to material availability, there was a delay in the installation of some of the pitches where T1 & T3, were installed before T2 & T4.

1. Field T1 - Organic 201 – December 2020
2. Field T2 – Olive Pits – June 2021
3. Field T3 – Flow GT – April 2021
4. Field T4 – Eliá Renufill – May 2021

## Player Perception APP & summary of results

Players were invited after playing on the pitch to provide feedback through a password encrypted app available on all smart phones provided and analysed by Sports Labs.

Feedback was received through the whole season, well balanced female to male, and enough to bring validity to the survey interpretation. Each survey had 26 questions.

In this report comparison between the start of the season and second half of the season is to monitor player feedback as time progresses. The first half of the season, up until March 2022 and the second half of the season from March until June 2022. This was defined based on feedback dates.

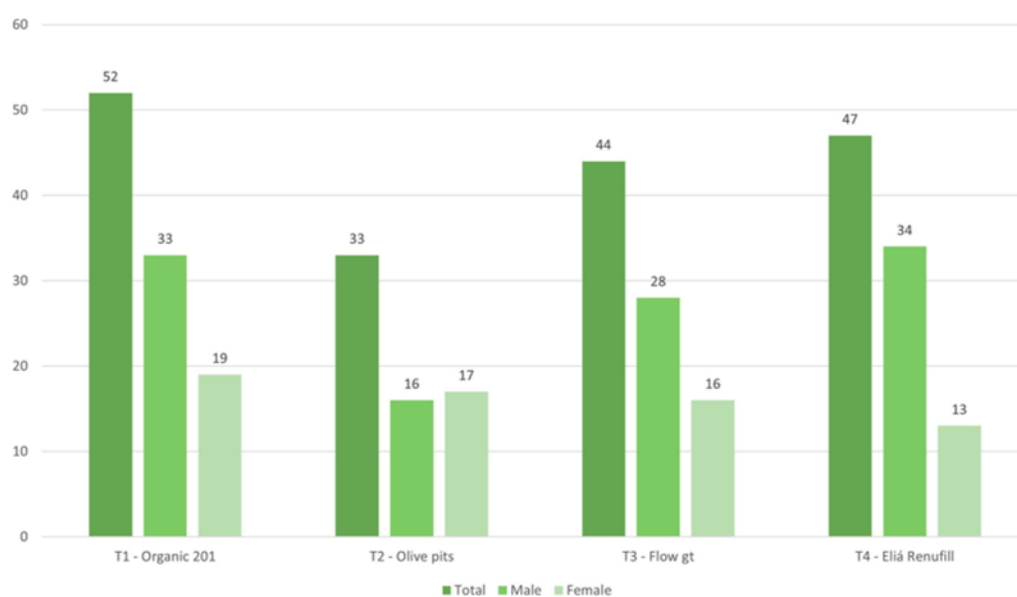
All feedback from players less than 16 years old was removed and in this report, we bring focus to female feedback as well as the accumulative response.

The player perception app was provided in Swedish to all users.

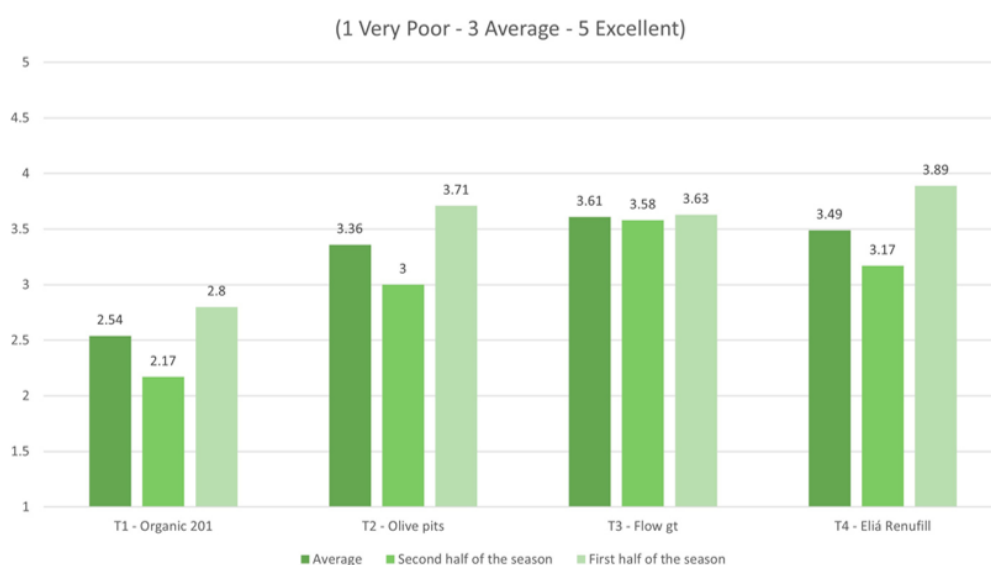
On average across all four fields the average was 3.23 above satisfactory of 3.00.



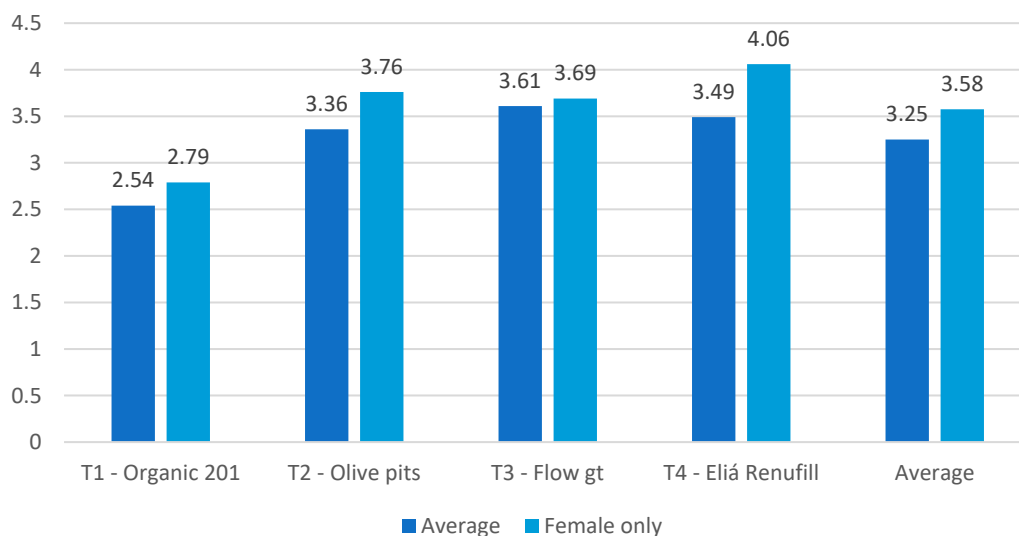
Player response rate across fields is broken down below to accumulative, male and female.



Feedback was received through the whole season, well balanced female to male, and enough to bring validity to the survey interpretation. Each survey had 26 questions.



### Accumulative v Female Pitch Ratings



3.0 is the 'average' marker for acceptability. Pitches T1, T2 and T4 all experience a decrease in their rating over the course of the season, whilst T3 retains a constant rating. Only T1 drops below 3.0 as a rating.

## Site Performance Testing

Testing was carried out by Sports Labs using calibrated equipment under ISO 17025 and approved and accredited technicians. Each field was tested on installation for compliance against FIFA, EN and Nordic testing tolerances and then tested on completion of the season, prior to the surface being removed. Results out of tolerance are identified in red.

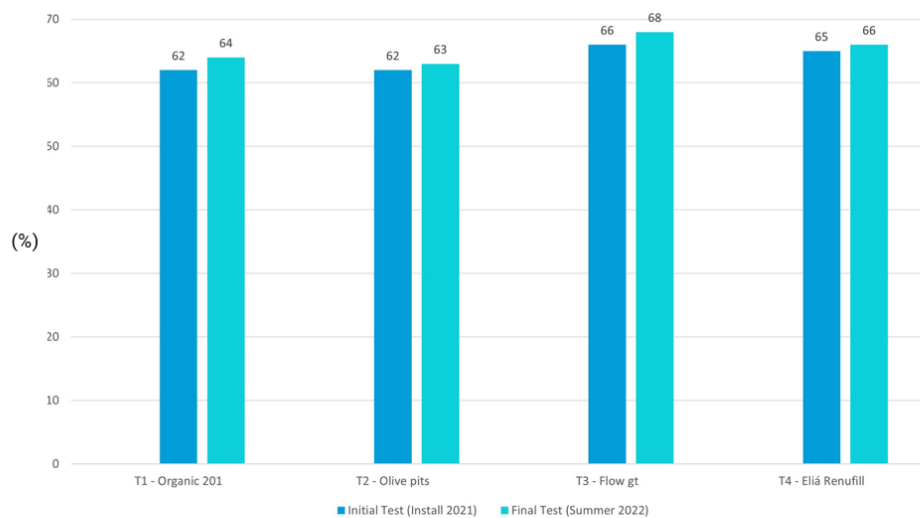
Test reports, 8 in total, are provided in an appendix bundle not attached to this report due to the size. An extract as an example is below:

TestbedNordic - T1		40428 / 23656/3		
Football Turf Condition Report		<div><div>SPORTS LABS</div><div>TESTING TECHNOLOGY FOR SPORT</div></div>		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>FIFA Quality Pro: 40% - 45% FIFA Quality: 40% - 45% (Nordic Standard: 40% - 45%)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>62</div><div>-</div><div>-</div><div>61</div><div>64</div></div>	
	Vertical Deformation (mm)	<div>FIFA Quality Pro: 44mm FIFA Quality: 44mm (Nordic Standard: 44mm)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>9.3</div><div>-</div><div>-</div><div>9.5</div><div>9.7</div></div>	
	Rotational Resistance (Nm)	<div>FIFA Quality Pro: 38 - 40Nm FIFA Quality: 38 - 40Nm (Nordic Standard: 38 - 40Nm)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>38</div><div>-</div><div>-</div><div>38</div><div>40</div></div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>FIFA Quality Pro: 0.80 - 0.85m FIFA Quality: 0.80 - 0.85m (Nordic Standard: 0.80 - 0.85m)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>0.78</div><div>-</div><div>-</div><div>0.83</div><div>0.67</div></div>	
			<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div>	
	Ball Roll (m)	<div>FIFA Quality Pro: 5.0m - 10.0m FIFA Quality: 5.0m - 10.0m (Nordic Standard: 5.0m - 10.0m)</div> <div>FIFA Quality: 5.0m - 10.0m FIFA Quality: 5.0m - 10.0m (Nordic Standard: 5.0m - 10.0m)</div> <div>(Nordic Standard: 5.0m - 10.0m)</div>	<div>Direction A</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>5.6</div><div>-</div><div>-</div><div>5.9</div><div>-</div></div>
			<div>Direction B</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>6.6</div><div>-</div><div>-</div><div>7.3</div><div>-</div></div>
			<div>Direction C</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>7.6</div><div>-</div><div>-</div><div>8.0</div><div>-</div></div>
			<div>Direction D</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>8.1</div><div>-</div><div>-</div><div>7.4</div><div>-</div></div>
			<div>Mean</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>7.0</div><div>-</div><div>-</div><div>7.2</div><div>-</div></div>
Values in <b>bold</b> indicate failure of directly specified limits				

TestbedNordic - T1		40708 / 2693s		
Football Turf Condition Report		<div><div>SPORTS LABS</div><div>TESTING TECHNOLOGY FOR SPORT</div></div>		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>FIFA Quality Pro: 40% - 45% FIFA Quality: 40% - 45% (Nordic Standard: 40% - 45%)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>66</div><div>-</div><div>-</div><div>62</div><div>65</div></div>	
	Vertical Deformation (mm)	<div>FIFA Quality Pro: 44mm FIFA Quality: 44mm (Nordic Standard: 44mm)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>10.1</div><div>-</div><div>-</div><div>9.3</div><div>9.3</div></div>	
	Rotational Resistance (Nm)	<div>FIFA Quality Pro: 38 - 40Nm FIFA Quality: 38 - 40Nm (Nordic Standard: 38 - 40Nm)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>38</div><div>-</div><div>-</div><div>43</div><div>43</div></div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>FIFA Quality Pro: 0.80 - 0.85m FIFA Quality: 0.80 - 0.85m (Nordic Standard: 0.80 - 0.85m)</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div colspan="5">Not recorded due to pitch being water-logged</div></div>	
			<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div>	
	Ball Roll (m)	<div>FIFA Quality Pro: 5.0m - 10.0m FIFA Quality: 5.0m - 10.0m (Nordic Standard: 5.0m - 10.0m)</div> <div>FIFA Quality: 5.0m - 10.0m FIFA Quality: 5.0m - 10.0m (Nordic Standard: 5.0m - 10.0m)</div> <div>(Nordic Standard: 5.0m - 10.0m)</div>	<div>Direction A</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>8.7</div><div>-</div><div>-</div><div>9.4</div><div>9.0</div></div>
			<div>Direction B</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>7.0</div><div>-</div><div>-</div><div>8.4</div><div>8.5</div></div>
			<div>Direction C</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>11.3</div><div>-</div><div>-</div><div>14.5</div><div>12.9</div></div>
			<div>Direction D</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>9.5</div><div>-</div><div>-</div><div>15.3</div><div>18.2</div></div>
			<div>Mean</div>	<div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div> <div><div>9.1</div><div>-</div><div>-</div><div>11.9</div><div>12.1</div></div>
Values in <b>bold</b> indicate failure of directly specified limits				

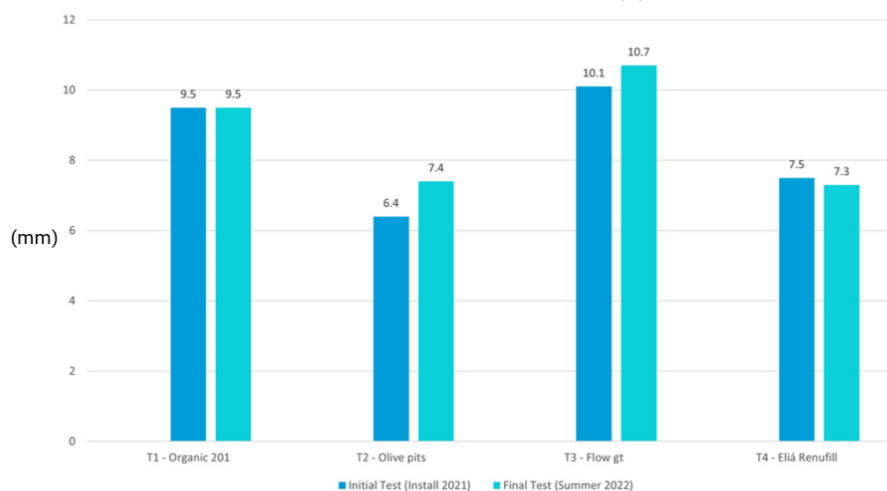
Initial Test Report Number		Final Test Report Number	
40428		40708	
40491		40709	
40429		40710	
40492		40711	

TestbedNordic

SHOCK  
ABSORPTION

**Summary:** All pitches remain compliant within an optimal range for shock absorption, meeting all performance standards for football turf. On initial test this is to be expected as the surfaces are designed accordingly, however after one full season they are still compliant, due to the shockpad.

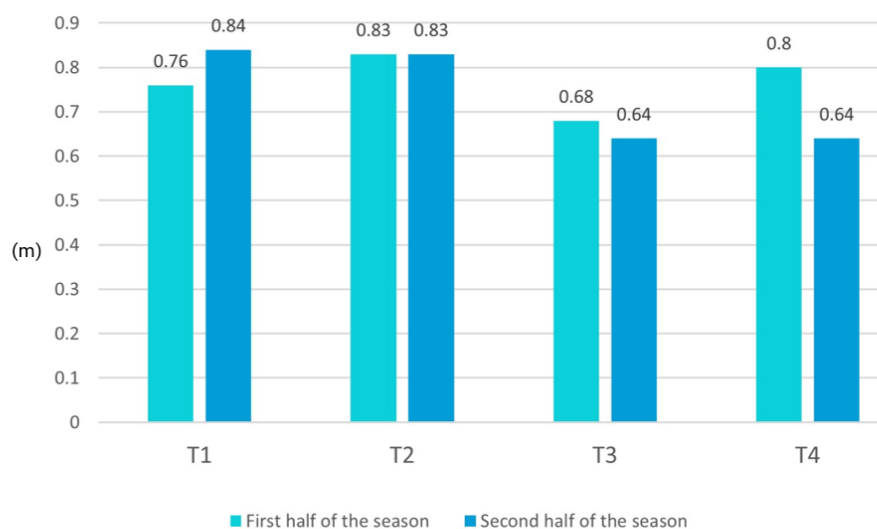
TestbedNordic

VERTICAL  
DEFORMATION

**Summary:** T1, T2, T3 and T4 are all compliant to FIFA Quality, Nordic and EN standards. T3 is notably higher. Again, these systems on initial test this is to be expected as the surfaces are designed accordingly, however after one full season they are still compliant, due to the shockpad.



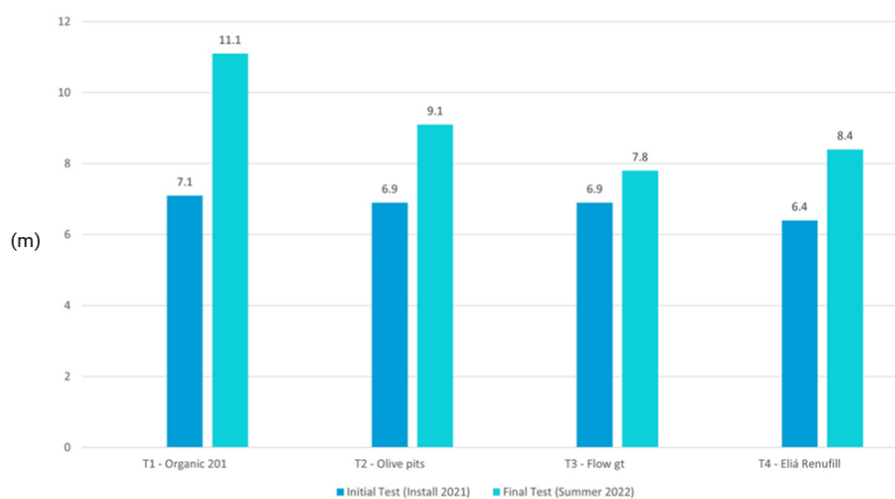
TestbedNordic

BALL  
REBOUND

**Summary:** All pitches test well and are passing tolerances for Ball Rebound.

TestbedNordic

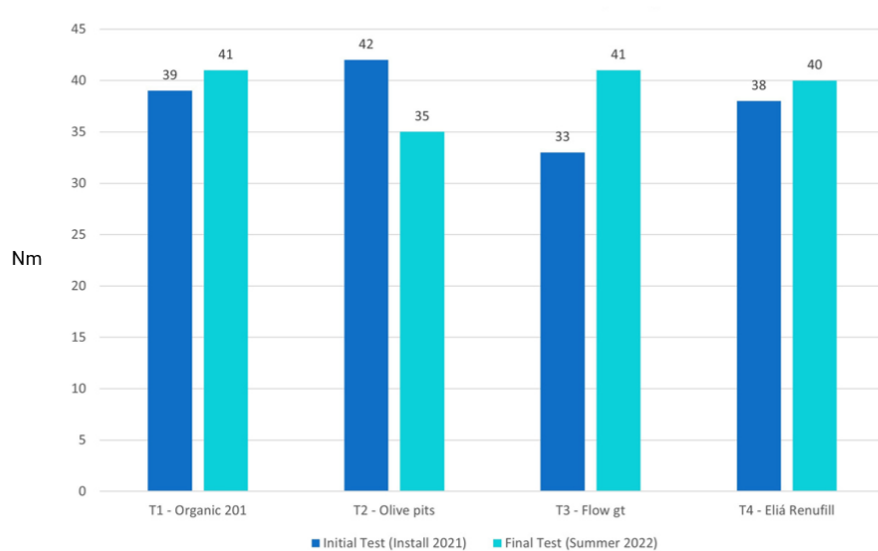
## BALL ROLL



**Summary:** Each pitch experiences an increase in Ball Roll. Most notably on pitch T1 - Organic 201. T3, T2 and T4 are compliant for FIFA Quality. T1 shows a very big increase and would need additional managed maintenance to continue to pass the tests.

TestbedNordic

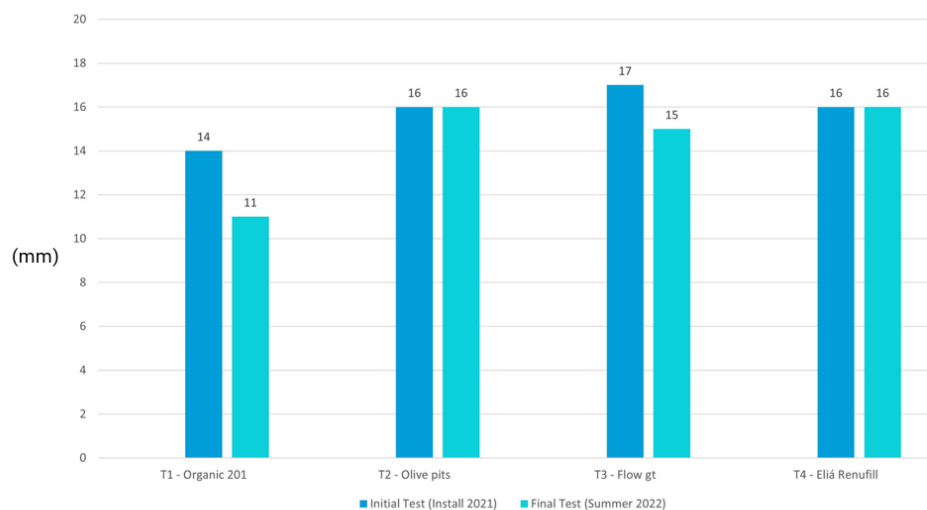
## ROTATIONAL RESISTANCE



**Summary:** All traction results are within tolerances, and as expected all pitches increase after 1 season apart from T2 which drops by 7 Nm however it still remains within the tolerances.

TestbedNordic

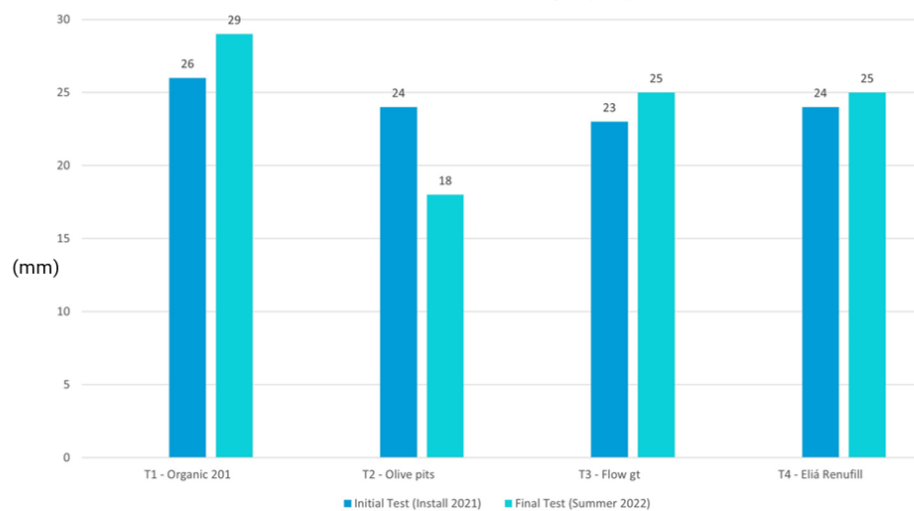
## FREE PILE



**Summary:** Information only, the main drop is T1 which aligns with the increase in ball roll results. The infill looks to not be supporting the artificial fibre like the other infills. All fields have similar usage hours.

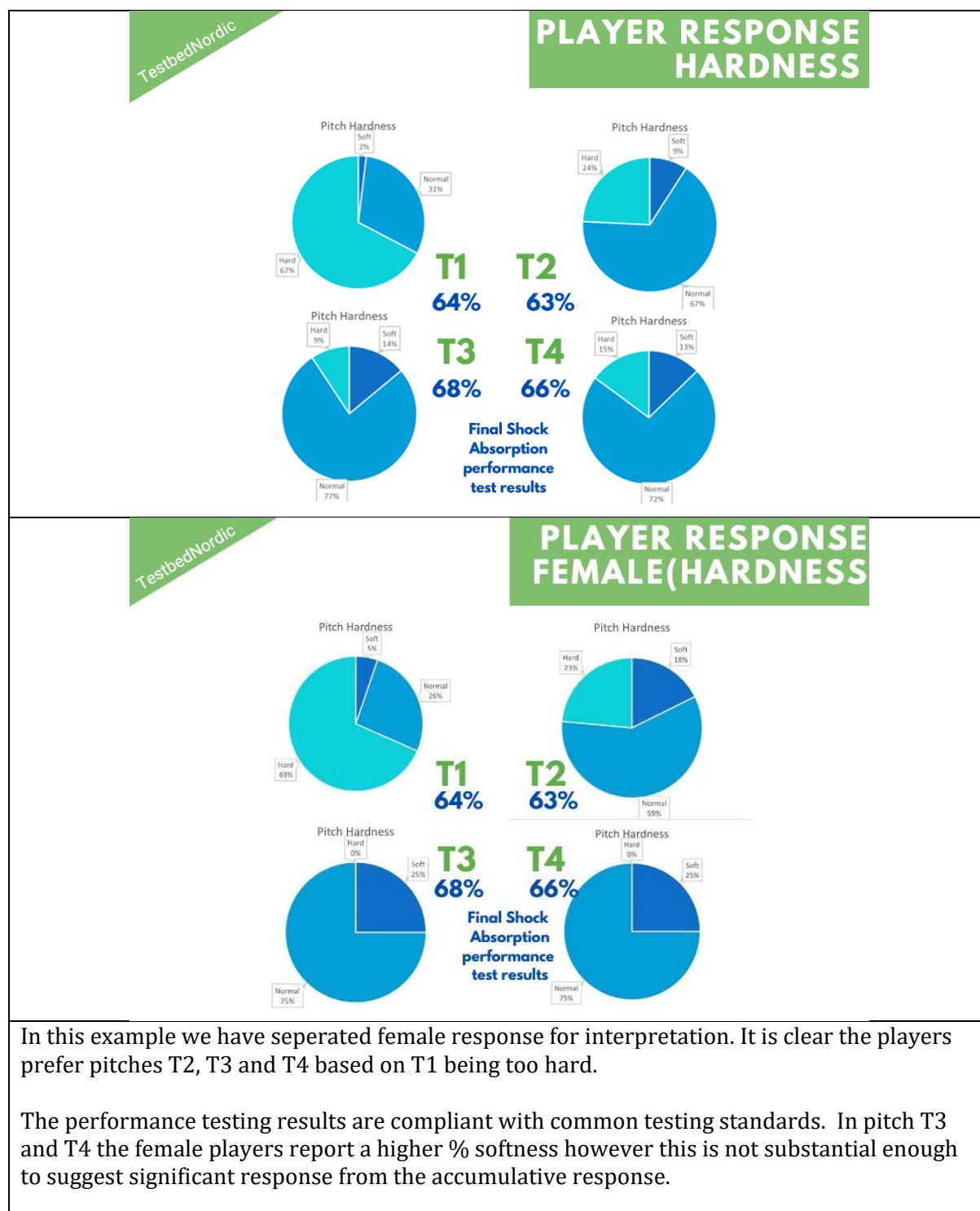
TestbedNordic

## INFILL DEPTH



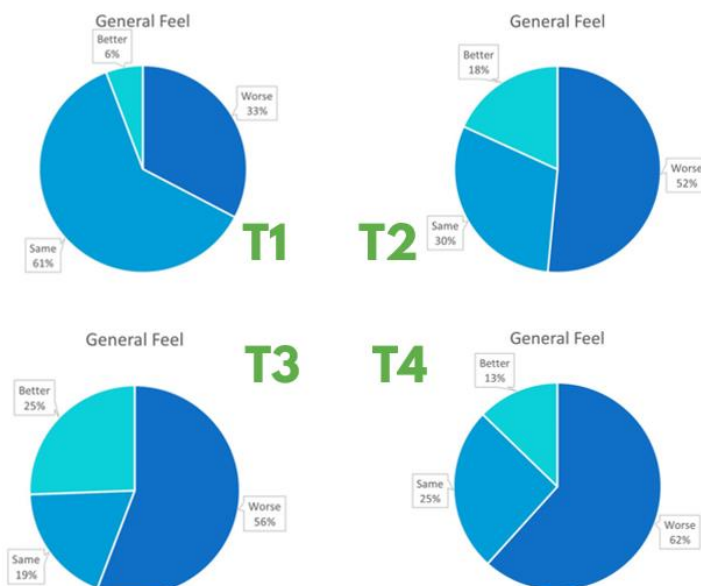
**Summary:** Information only, however infill depth looks to increase marginally which could be related to maintenance timings pre-test. The only drop is T2, the olive pits.

## Correlation of player feedback to test results



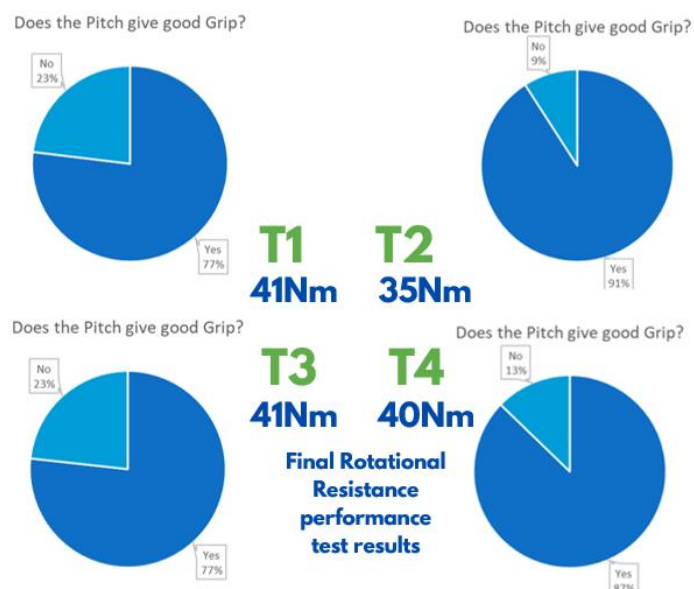
TestbedNordic

## PLAYER RESPONSE FATIGUE



TestbedNordic

## PLAYER RESPONSE GRIP



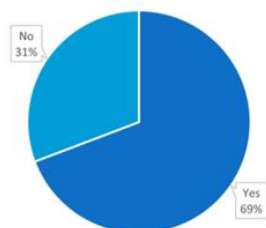
**Summary:** All pitches noted a higher rate of positive response for grip. Pitches T1 and T3 both accumulated more negative responses for poor grip.



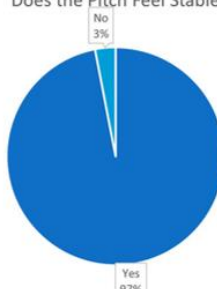
TestbedNordic

## PLAYER RESPONSE STABILITY

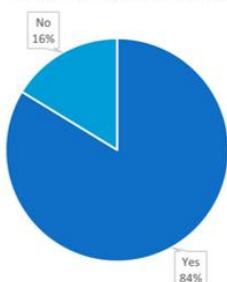
Does the Pitch Feel Stable

**T1****9.5mm**

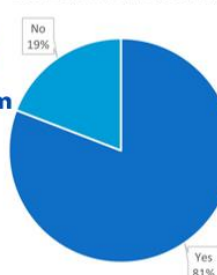
Does the Pitch Feel Stable

**T2****7.4mm**

Does the Pitch Feel Stable

**T3****10.7mm**

Does the Pitch Feel Stable

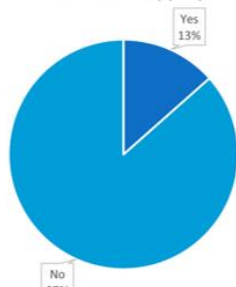
**T4****7.3mm**

**Final Vertical  
Deformation  
performance  
test results**

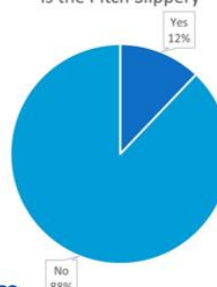
TestbedNordic

## PLAYER RESPONSE SLIPPY

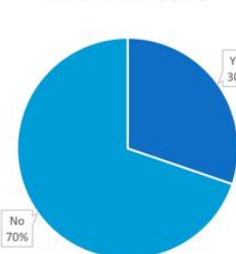
Is the Pitch Slippery

**T1****41Nm**

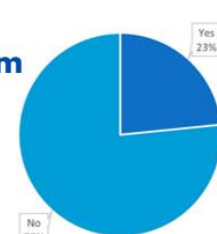
Is the Pitch Slippery

**T2****35Nm**

Is the Pitch Slippery

**T3****41Nm**

Is the Pitch Slippery

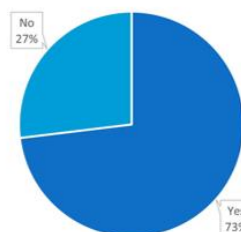
**T4****40Nm**

**Final Rotational  
Resistance  
performance  
test results**

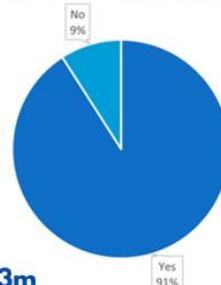
TestbedNordic

## PLAYER RESPONSE BALL BOUNCE

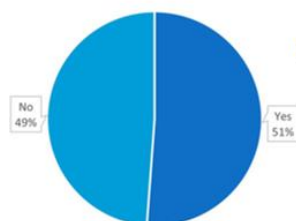
Was the ball bounce normal?

**T1****0.76m\***

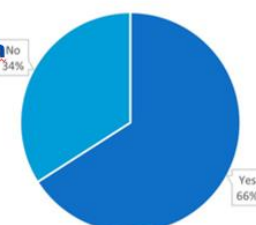
Was the ball bounce normal?

**T2****0.83m**

Was the ball bounce normal?

**T3****0.64m****T4****0.64m**

Was the ball bounce normal?

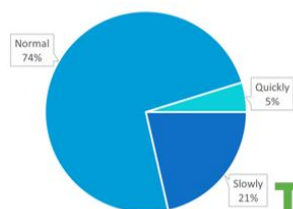


**Final Ball  
Rebound  
performance  
test results**

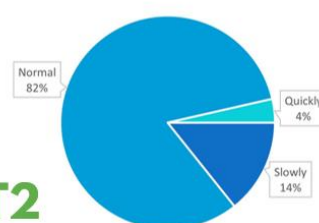
TestbedNordic

## PLAYER RESPONSE BALL ROLL

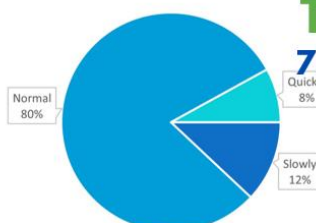
How did the ball roll?

**T1****11.1m**

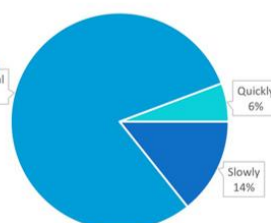
How did the ball roll?

**T2****9.1m**

How did the ball roll?

**T3****7.8m****T4****8.4m**

How did the ball roll?

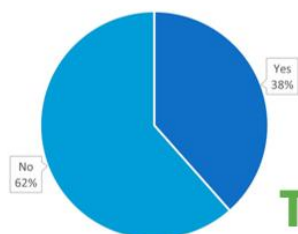


**Final Ball Roll  
performance  
test results**

TestbedNordic

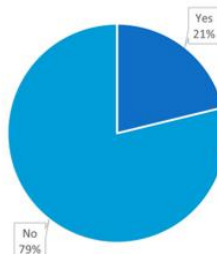
## PLAYER RESPONSE SKIN INJURY

Any burns from the Surface?



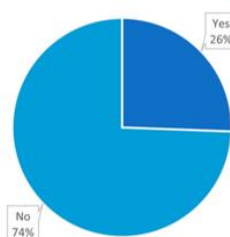
T1

Any burns from the Surface?



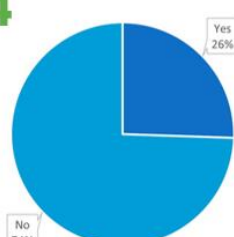
T2

Any burns from the Surface?



T3

Any burns from the Surface?

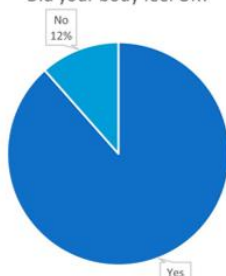


T4

TestbedNordic

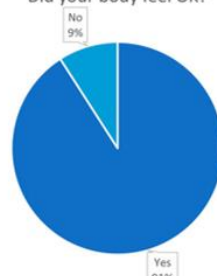
## PLAYER RESPONSE BODY FEELING

Did your body feel OK?



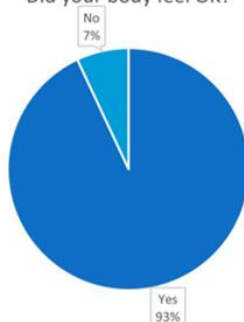
T1

Did your body feel OK?



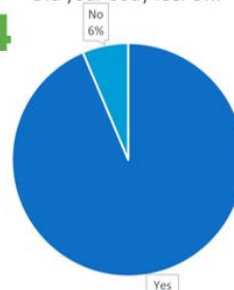
T2

Did your body feel OK?



T3

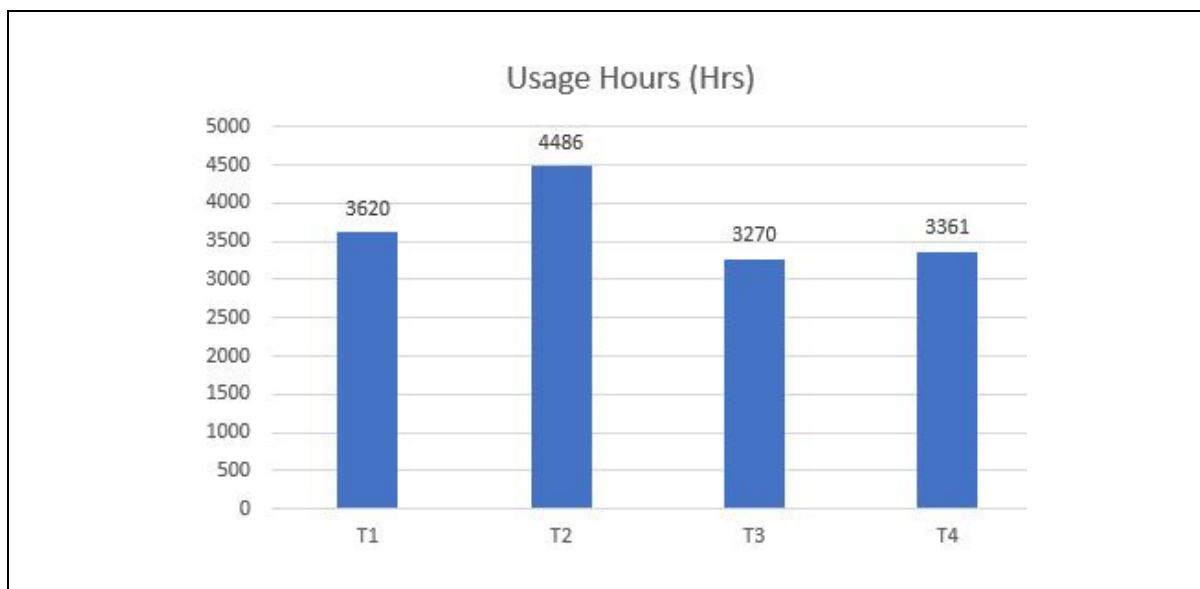
Did your body feel OK?



T4

## Usage Hours

Throughout the project pitch usage hours were recorded and supplied on completion by Solna City. The usage was recorded from the installation through to the completion of the project, in the case of T1 up to 18 months.



## Maintenance Log

Maintenance was carried out as per the operations and maintenance manual and logged where possible on the online portal by the maintenance team from Solna City. The staff were trained, with maintenance equipment stored on site and readily available to be carried out in line with the operation and maintenance manuals.

An example of the platform and feedback questionnaire is provided below.

Submission Date	Source App	Namn - Name	Datum - Date	Fotbollsplan - Pitch
Jul 22, 2022	<a href="#">View</a>	Rickard Jonsson	Jul 21, 2022	T1
Jun 7, 2022		Håkan Linnander	Jun 7, 2022	T4
Jun 7, 2022		Håkan Linnander	Jun 7, 2022	T3
May 23, 2022		Rickard Jonsson	May 18, 2022	T4
May 23, 2022		Rickard Jonsson	May 18, 2022	T3
May 23, 2022		Rickard Jonsson	May 17, 2022	T2
May 23, 2022		Rickard Jonsson	May 18, 2022	T1



**SPORTS LABS**  
SOLNA FOTBOLLFÖRBUND

**'Solna' Arbete som gjorts - Maintenance Form**

Name - Name \*  
Please Select

Date - Date \*  
MM-DD-YYYY

Size

Football pitch - Pitch \*

☐ T1  
☐ T2  
☐ T3  
☐ T4

Water - Weather \*

☐ Sunny - Sunny  
☐ Mist - Overcast  
☐ Rainy - Rainy  
☐ Wind - Windy



**Infilltjocklek - Infill Depth (mm)**  
(Average of 3 test locations)

ex: 23



**Arbete som gjorts - Maintenance Carried Out \***



## Appendix 1| Initial Test Reports (Field 1 – 4)

These are provided in full body as an appendix bundle.

TestbedNordic - T1		40428 / 2365/s3	
Football Turf Condition Report		SPORTS LABS TESTING TECHNOLOGY FOR SPORT	
Test Results			
Player/Surface Interaction	Shock Absorption (%)	(FIFA Quality Pro) ≥50 - <55% (FIFA Quality) ≥55 - <57% (Nordic Standard) ≥55 - <57%	1 2 3 4 5 62 - - - 61 64
	Vertical Deformation (mm)	(FIFA Quality Pro - AAA) ≤4.0 - ≤10.0mm (FIFA Quality - AAA) ≤4.0 - ≤11.0mm (Nordic Standard = FIFA Quality)	1 2 3 4 5 9.3 - - - 9.5 9.7
	Rotational Resistance (Nm)	(FIFA Quality Pro) ≥30 - <40Nm (FIFA Quality) ≥35 - <50Nm (Nordic Standard) ≥35 - <50Nm	1 2 3 4 5 38 - - - 38 40
Ball/Surface Interaction	Vertical Ball Rebound (%)	(FIFA Quality Pro) 0.60 - 0.80mm (FIFA Quality) 0.60 - 1.00mm (Nordic Standard) 0.60 - 1.00mm	1 2 3 4 5 0.78 - - - 0.83 0.67
	Ball Roll (m)	(FIFA Quality Pro) Initial ≥4.0 - ≤8.0m No test ≥4.0 - ≤8.0m (FIFA Quality) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m (Nordic) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m	1 2 3 4 5 Direction A 5.6 - - - 5.9 - Direction B 6.6 - - - 7.3 - Direction C 7.6 - - - 8.0 - Direction D 8.1 - - - 7.4 - Mean 7.0 - - - 7.2 -
Values in RED denote failure of client's specified limits			

TestbedNordic - T2		40491 / 2365/s3	
Football Turf Condition Report		SPORTS LABS TESTING TECHNOLOGY FOR SPORT	
Test Results			
Player/Surface Interaction	Shock Absorption (%)	(FIFA Quality Pro) ≥50 - <57% (FIFA Quality) ≥55 - <57% (Nordic Standard) ≥55 - <57%	1 2 3 4 5 - 62 62 - 62
	Vertical Deformation (mm)	(FIFA Quality Pro - AAA) ≤4.0 - ≤10.0mm (FIFA Quality - AAA) ≤4.0 - ≤11.0mm (Nordic Standard = FIFA Quality)	1 2 3 4 5 - 6.8 6.1 - 6.5
	Rotational Resistance (Nm)	(FIFA Quality Pro) ≥30 - <40Nm (FIFA Quality) ≥35 - <50Nm (Nordic Standard) ≥35 - <50Nm	1 2 3 4 5 - 43 44 - 40
Ball/Surface Interaction	Vertical Ball Rebound (%)	(FIFA Quality Pro) 0.60 - 0.80mm (FIFA Quality) 0.60 - 1.00mm (Nordic Standard) 0.60 - 1.00mm	1 2 3 4 5 - 0.76 0.85 - 0.88
	Ball Roll (m)	(FIFA Quality Pro) Initial ≥4.0 - ≤8.0m No test ≥4.0 - ≤8.0m (FIFA Quality) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m (Nordic) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m	1 2 3 4 5 Direction A - 8.6 6.1 - 6.1 Direction B - 6.2 6.6 - 6.9 Direction C - 6.6 6.3 - 5.8 Direction D - 7.3 8.6 - 7.9 Mean - 7.2 6.9 - 6.7
Values in RED denote failure of client's specified limits			

TestbedNordic - T3		40429 / 2366/s2	
Football Turf Condition Report		SPORTS LABS TESTING TECHNOLOGY FOR SPORT	
Test Results			
Player/Surface Interaction	Shock Absorption (%)	(FIFA Quality Pro) ≥50 - <55% (FIFA Quality) ≥55 - <57% (Nordic Standard) ≥55 - <57%	1 2 3 4 5 67 - - - 67 64
	Vertical Deformation (mm)	(FIFA Quality Pro - AAA) ≤4.0 - ≤10.0mm (FIFA Quality - AAA) ≤4.0 - ≤11.0mm (Nordic Standard = FIFA Quality)	1 2 3 4 5 10.5 - - - 9.9 10.0
	Rotational Resistance (Nm)	(FIFA Quality Pro) ≥30 - <40Nm (FIFA Quality) ≥35 - <50Nm (Nordic Standard) ≥35 - <50Nm	1 2 3 4 5 32 - - - 34 35
Ball/Surface Interaction	Vertical Ball Rebound (%)	(FIFA Quality Pro) 0.60 - 0.80mm (FIFA Quality) 0.60 - 1.00mm (Nordic Standard) 0.60 - 1.00mm	1 2 3 4 5 0.62 - - - 0.70 0.73
	Ball Roll (m)	(FIFA Quality Pro) Initial ≥4.0 - ≤8.0m No test ≥4.0 - ≤8.0m (FIFA Quality) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m (Nordic) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m	1 2 3 4 5 Direction A 6.7 - - - 6.3 6.2 Direction B 7.1 - - - 7.2 7.0 Direction C 7.6 - - - 6.3 6.4 Direction D 7.5 - - - 7.2 7.6 Mean 7.2 - - - 6.8 6.8
Values in RED denote failure of client's specified limits			

TestbedNordic - T4		40492 / 2443/s	
Football Turf Condition Report		SPORTS LABS TESTING TECHNOLOGY FOR SPORT	
Test Results			
Player/Surface Interaction	Shock Absorption (%)	(FIFA Quality Pro) ≥50 - <57% (FIFA Quality) ≥55 - <57% (Nordic Standard) ≥55 - <57%	1 2 3 4 5 67 64 64 64 65
	Vertical Deformation (mm)	(FIFA Quality Pro - AAA) ≤4.0 - ≤10.0mm (FIFA Quality - AAA) ≤4.0 - ≤11.0mm (Nordic Standard = FIFA Quality)	1 2 3 4 5 7.7 6.8 7.6 7.3 8.0
	Rotational Resistance (Nm)	(FIFA Quality Pro) ≥30 - <40Nm (FIFA Quality) ≥35 - <50Nm (Nordic Standard) ≥35 - <50Nm	1 2 3 4 5 40 41 38 38 34
Ball/Surface Interaction	Vertical Ball Rebound (%)	(FIFA Quality Pro) 0.60 - 0.80mm (FIFA Quality) 0.60 - 1.00mm (Nordic Standard) 0.60 - 1.00mm	1 2 3 4 5 0.80 0.81 0.80 0.80 0.79
	Ball Roll (m)	(FIFA Quality Pro) Initial ≥4.0 - ≤8.0m No test ≥4.0 - ≤8.0m (FIFA Quality) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m (Nordic) Initial ≥4.0 - ≤10.0m No test ≥4.0 - ≤12.0m	1 2 3 4 5 Direction A 5.6 6.0 5.2 5.4 6.1 Direction B 6.7 7.2 6.9 6.3 7.2 Direction C 7.4 6.9 6.6 6.3 7.2 Direction D 6.5 7.4 5.8 5.4 5.9 Mean 6.5 6.9 6.1 5.8 6.6
Values in RED denote failure of client's specified limits			

## Appendix 2 | Final Test Reports (Field 1 – 4)

These are provided in full body as an appendix bundle.

TestbedNordic - T1		40708 / 2693s		
Football Turf Condition Report		<div>SPORTS LABS</div> TESTING TECHNOLOGY FOR SPORT		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥60 - &lt;70% (FIFA Quality) ≥55 - &lt;65% (Nordic Standard) ≥55 - &lt;65%</div>	<div>Positions</div> <div>12345</div> <div>66-6263</div>	
	Vertical Deformation (mm)	<div>Specified Limits</div> <div>(FIFA Quality Pro - AAA) ≥4.0 - &lt;10.0mm (FIFA Quality - AAA) ≥4.0 - &lt;11.0mm (Nordic Standard = FIFA Quality)</div>	<div>12345</div> <div>10.1-9.39.3</div>	
	Rotational Resistance (Nm)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥200 - &lt;400Nm (FIFA Quality) ≥225 - &lt;500Nm (Nordic Standard) ≥225 - &lt;500Nm</div>	<div>12345</div> <div>38-4343</div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) 6.00 - 8.00mm (FIFA Quality) 6.00 - 8.00mm (Nordic Standard) 6.00 - 8.00mm</div>	<div>12345</div> <div>1-11</div>	
	Ball Roll (m)	<div>Specified Limits</div> <div>(FIFA Quality Pro) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (FIFA Quality) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (Nordic) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m</div>	<div>12345</div> <div>8.7-9.49.0</div>	
			Direction B	<div>7.0-8.48.5</div>
			Direction C	<div>11.3-14.512.9</div>
			Direction D	<div>9.5-12.918.2</div>
			Mean	<div>9.1-11.912.1</div>
Values in RED denote failure of client's specified limits		Go to setting		

TestbedNordic - T2		40709 / 2694s		
Football Turf Condition Report		<div>SPORTS LABS</div> TESTING TECHNOLOGY FOR SPORT		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥60 - &lt;70% (FIFA Quality) ≥55 - &lt;65% (Nordic Standard) ≥55 - &lt;65%</div>	<div>Positions</div> <div>12345</div> <div>-6363-63</div>	
	Vertical Deformation (mm)	<div>Specified Limits</div> <div>(FIFA Quality Pro - AAA) ≥4.0 - &lt;10.0mm (FIFA Quality - AAA) ≥4.0 - &lt;11.0mm (Nordic Standard = FIFA Quality)</div>	<div>12345</div> <div>-7.77.2-7.5</div>	
	Rotational Resistance (Nm)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥200 - &lt;400Nm (FIFA Quality) ≥225 - &lt;500Nm (Nordic Standard) ≥225 - &lt;500Nm</div>	<div>12345</div> <div>-3835-32</div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) 6.00 - 8.00mm (FIFA Quality) 6.00 - 8.00mm (Nordic Standard) 6.00 - 8.00mm</div>	<div>12345</div> <div>-0.760.85-0.88</div>	
	Ball Roll (m)	<div>Specified Limits</div> <div>(FIFA Quality Pro) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (FIFA Quality) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (Nordic) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m</div>	<div>12345</div> <div>-9.69.6-9.4</div>	
			Direction B	<div>-8.69.0-10.0</div>
			Direction C	<div>-6.57.4-7.3</div>
			Direction D	<div>-8.414.0-10.0</div>
			Mean	<div>-8.310.0-9.2</div>
Values in RED denote failure of client's specified limits		Go to setting		

TestbedNordic - T3		40710 / 2695s		
Football Turf Condition Report		<div>SPORTS LABS</div> TESTING TECHNOLOGY FOR SPORT		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥60 - &lt;70% (FIFA Quality) ≥55 - &lt;65% (Nordic Standard) ≥55 - &lt;65%</div>	<div>Positions</div> <div>1345</div> <div>66-6869</div>	
	Vertical Deformation (mm)	<div>Specified Limits</div> <div>(FIFA Quality Pro - AAA) ≥4.0 - &lt;10.0mm (FIFA Quality - AAA) ≥4.0 - &lt;11.0mm (Nordic Standard = FIFA Quality)</div>	<div>12345</div> <div>10.0-10.911.2</div>	
	Rotational Resistance (Nm)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥200 - &lt;400Nm (FIFA Quality) ≥225 - &lt;500Nm (Nordic Standard) ≥225 - &lt;500Nm</div>	<div>12345</div> <div>42-3844</div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) 6.00 - 8.00mm (FIFA Quality) 6.00 - 8.00mm (Nordic Standard) 6.00 - 8.00mm</div>	<div>12345</div> <div>0.63-0.650.63</div>	
	Ball Roll (m)	<div>Specified Limits</div> <div>(FIFA Quality Pro) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (FIFA Quality) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (Nordic) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m</div>	<div>12345</div> <div>6.6-7.16.9</div>	
			Direction B	<div>9.8-8.36.7</div>
			Direction C	<div>8.8-8.49.0</div>
			Direction D	<div>7.5-7.27.0</div>
			Mean	<div>8.2-7.87.4</div>
Values in RED denote failure of client's specified limits		Go to setting		

TestbedNordic - T4		40711 / 2696s		
Football Turf Condition Report		<div>SPORTS LABS</div> TESTING TECHNOLOGY FOR SPORT		
Test Results				
Player/Surface Interaction	Shock Absorption (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥60 - &lt;70% (FIFA Quality) ≥55 - &lt;65% (Nordic Standard) ≥55 - &lt;65%</div>	<div>Positions</div> <div>12345</div> <div>68-6566</div>	
	Vertical Deformation (mm)	<div>Specified Limits</div> <div>(FIFA Quality Pro - AAA) ≥4.0 - &lt;10.0mm (FIFA Quality - AAA) ≥4.0 - &lt;11.0mm (Nordic Standard = FIFA Quality)</div>	<div>12345</div> <div>9.6-10.210.5</div>	
	Rotational Resistance (Nm)	<div>Specified Limits</div> <div>(FIFA Quality Pro) ≥200 - &lt;400Nm (FIFA Quality) ≥225 - &lt;500Nm (Nordic Standard) ≥225 - &lt;500Nm</div>	<div>12345</div> <div>40-3840</div>	
Ball/Surface Interaction	Vertical Ball Rebound (%)	<div>Specified Limits</div> <div>(FIFA Quality Pro) 6.00 - 8.00mm (FIFA Quality) 6.00 - 8.00mm (Nordic Standard) 6.00 - 8.00mm</div>	<div>12345</div> <div>0.67-0.600.65</div>	
	Ball Roll (m)	<div>Specified Limits</div> <div>(FIFA Quality Pro) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (FIFA Quality) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m (Nordic) Initial ≥4.0 - &lt;10.0m Re-test ≥4.0 - &lt;10.0m</div>	<div>12345</div> <div>6.9-6.37.2</div>	
			Direction B	<div>9.4-8.510.7</div>
			Direction C	<div>10.3-9.010.3</div>
			Direction D	<div>7.6-6.97.5</div>
			Mean	<div>8.6-7.78.9</div>
Values in RED denote failure of client's specified limits		Go to setting		

## Appendix 3 | Images

Image 1 | T1



Image 2 | T2



Image 3 | T3



Image 4 | T4



*End of Report*