



Premier League Pitch Standards Framework

2025 Edition



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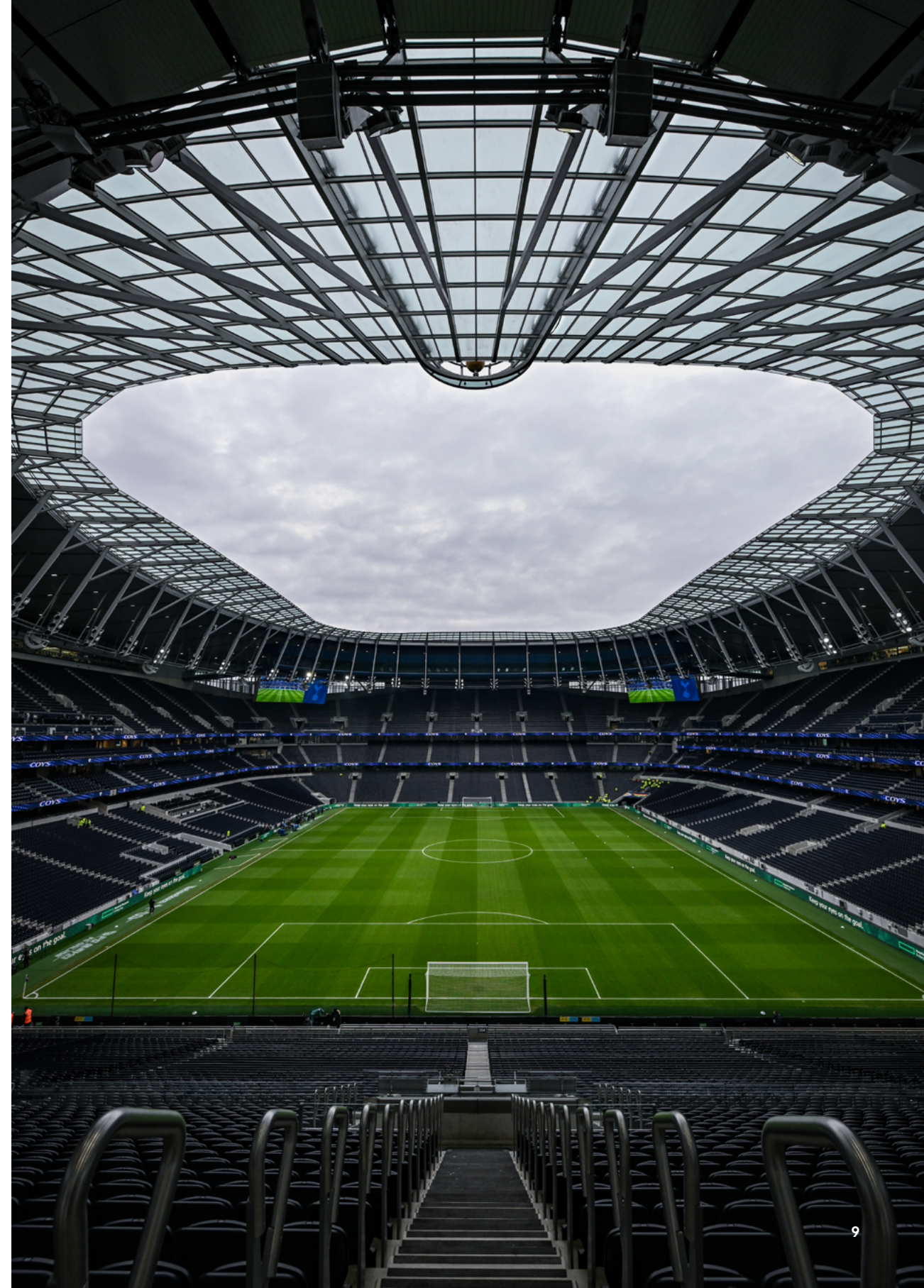
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Introduction

The Premier League strives to be the world's most competitive and compelling football competition, featuring the finest talents on and off the pitch. As the top tier of the English football league system, the Premier League places the playing surface at the heart of the action, where world-class athletes perform in front of a global audience. Over the years the quality of Premier League pitches has become the industry benchmark, driven by significant investment, outstanding pitch construction, and the expertise of dedicated grounds teams.

The Premier League Pitch Standards Framework serves as a reference for stakeholders involved in pitch management, including grounds teams, stadium management, Club management, and League organisers. It outlines the Premier League's Rules and expectations for pitches hosting Premier League matches, as well as providing best practice guidance and examples.

The Pitch Standards Framework has been produced by the Premier League and STRI Group in collaboration with the grounds teams of the Premier League Clubs, and with support from the Grounds Management Association.





01. Premier League Rules

1. Premier League Rules

The following section outlines the Premier League's Rules regarding the pitch¹. These Rules are mandatory for any pitch used to host a Premier League match.

Ref	Description	Refer to section
K. 18.	Unless otherwise permitted by the Board, in League matches the length of the pitch shall be 105 metres and its breadth 68 metres.	3.2
K.19.	The Board shall only give permission to a Club for the dimensions of its pitch to be other than as set out in Rule K.18 if it is impossible for it to comply with Rule K.18 due to the nature of the construction of its stadium.	3.2
K.20.	A Club shall register the dimensions of its pitch before the commencement of each Season by giving written notice thereof in Form 8 to the Board.	3.2
K.21.	The Board may at any time require a Club to obtain and submit to the Board a report by an independent expert certifying its pitch dimensions.	3.2
K.22.	No Club shall alter the dimensions of its pitch during the Season without the prior written consent of the Board.	3.2
K.23.	The height of the pitch grass shall not exceed 27 mm and the entire playing surface must be kept at the same height. The grass shall be cut so as to display straight, parallel lines across the entire width of the pitch, perpendicular to the touchlines. No other form of pitch presentation (such as circular or diagonal patterns) is permitted.	10.1
K.24.	Each Club shall take all reasonable steps to maintain its pitch in good condition throughout the Season and the Board may require a Club to take such steps as the Board shall specify if it is not satisfied that the pitch is being maintained to an adequate standard.	10
K.25.	Each Club shall provide and maintain at its Stadium an undersoil heating system for its pitch and shall ensure, as far as reasonably possible, that the pitch is playable on the occasion of each home League match.	3.8

¹ Refer to the Premier League Handbook, Season 2024/25. Rule numbers are accurate as at Season 2024/25. These are subject to change in subsequent Seasons.

Ref	Description	Refer to section
K.26.	In order to protect the pitch, unless otherwise mutually agreed between both participating Clubs and the League, the following procedures shall be adopted by Players and Officials in the periods immediately before and after a League match and at half-time: K.26.1. the pitch shall only be used for warming up or warming down by Players named on the team sheet plus an additional goalkeeper who, whilst not named on the team sheet, would have otherwise been eligible to participate in the League match; K.26.2. pre-match warming up by either team shall not commence until 45 minutes for outfield Players and 60 minutes for goalkeepers before the Kick-Off time at the earliest, shall not last for more than 30 minutes for outfield Players and 45 minutes for goalkeepers, and shall end no later than 10 minutes before the Kick-Off time; K.26.3. each team shall complete all warm up activities in areas of the pitch as directed by the pitch map(s) produced by the Home Club and agreed by the League; K.26.4. portable goals should be provided and shall be used by both Clubs for all goalkeeping and Outfield Player drills, other than that permitted in Rule K.23.5; K.26.5. the goal area shall be used during the warm up for one single continuous 15-minute period, comprising a 10-minute period for use solely by goalkeepers, plus an additional five minutes for use with Outfield players; K.26.6. players using the pitch at half time shall give due consideration to any other activity or entertainment taking place on the pitch at the same time; K.26.7. the Home Club may water the pitch and/or carry out any remedial or repair work to the pitch at half-time provided that it gives reasonable notice to the referee and the other Club that it intends to do so and that any such watering and/or remedial or repair work is carried out evenly over the entire length and width of the pitch; and K.26.8 any warming down after the conclusion of the League match shall last for no longer than 20 minutes, no footballs shall be permitted and shall only take place in the areas as defined by the pitch map(s) produced by the Home Club and agreed by the League, which must not include either penalty area.	10.1
K.27.	No League match shall be played on an Artificial Surface.	3.1



02. Executive Summary - Premier League expectations

02. Executive Summary - Premier League expectations



2. Executive Summary - Premier League expectations

The following section outlines the Premier League’s expectations for pitches used to host Premier League matches. This standard has been devised via detailed assessment of provisions currently in place at Premier League stadia. While these are not mandatory requirements, it is expected that they are met for any pitch used to host a Premier League match. Where expectations are not currently being met, it is strongly recommended that steps be taken to ensure that each pitch meets the Premier League standard.

Ref	Description	Refer to section
	A complete or partial pitch reconstruction should be carried out every 5 – 15 years.	3.1
	Natural grass runoff margins should be provided around the entire field of play. The transition between the natural grass and artificial surface surrounding the pitch must be seamless, with no noticeable difference in surface levels. The artificial turf surrounding the pitch should closely replicate the performance characteristics of the natural grass, including surface hardness, rotational resistance, vertical deformation, and energy restitution.	3.3
	The pitch construction profile should feature a sand-dominated rootzone. The pitch construction profile should feature an aggregate or geocellular sub-base / drainage layer.	3.4
	The pitch construction profile should feature a hybrid reinforcement system.	3.5
Pitch construction and infrastructure	The entirety of the natural grass area should be served by a fully automatic pop-up irrigation system. The irrigation system should be capable of wetting the entire pitch surface during the designated periods: prior to team warm ups, immediately before Kick-Off, and at half-time.	3.6
	A sufficient number of free-standing or gantry-style supplementary lighting rigs should be provided, in accordance with the lighting requirements of the pitch. Appropriate electrical infrastructure, including sockets, should be provided to support the use of supplementary lighting rigs. Adequate storage space should be provided for the storage of supplementary lighting rigs, with convenient and safe access and egress to and from the pitch.	3.10
	A sufficient number of free-standing pitch-side fans should be provided, in accordance with the air movement requirements of the pitch. Appropriate electrical infrastructure, including sockets, should be provided to support the use of pitch-side fans. Adequate storage space should be provided for the storage of pitch-side fans, with convenient and safe access and egress to and from the pitch.	3.11

02. Executive Summary - Premier League expectations

Ref	Description	Refer to section
	Goals should be provided in accordance with the International Football Association Board (IFAB) Laws of the Game ² . All goals used should meet the requirements of the FIFA Quality Programme for Football Goals. In addition to the main goals, a backup set of replacement goals should be available in case of breakage or other issues. Temporary portable goals should also be provided for pre-match warm ups.	3.14
	If a club is considering a turfing or re-turfing project and there is a possibility it may affect Premier League fixtures, it is expected that the Premier League be consulted during the early stages of planning.	4.1
Re-turfing	The Premier League's preferred option for turfing or re-turfing projects is the use of a proven hybrid turf that incorporates a carpet-type hybrid reinforcement system. Natural turf should only be considered if a stitched-type hybrid reinforcement system is to be installed following the re-turfing process.	4.2
	In the unlikely event that a mid-season or emergency re-turf is required, it is essential that the Premier League is notified as soon as possible.	4.3
Renovation	An annual full pitch renovation should be carried out, proportionate to the usage levels and the agronomic condition of the pitch.	5
	The renovation works should be carried out during the off-season, with the pitch fully established before the first match of the Premier League season.	5.1
Hosting other sporting events	If a club is considering hosting other sporting events that may impact Premier League fixtures, it is strongly recommended to consult with the Premier League at the early stages of planning.	6
Hosting non-sporting events	If a club is considering hosting a non-sporting event such as a concert that may impact Premier League fixtures, it is strongly recommended to consult with the Premier League at the early stages of planning.	7

² Refer to IFAB Laws of the Game in relation to the Field of Play

Ref	Description	Refer to section
	Either the club or stadium should employ an in-house grounds team.	8.1
	Adequate resources should be allocated to ensure the provision of an elite-level playing surface, including a skilled grounds team with the necessary expertise, as well as high-quality equipment and materials.	8
Resourcing	The head grounds person, or the individual responsible for pitch management, should possess the competencies outlined in the Grounds Management Association's Grounds Management Framework.	8.2
	The grounds team should have access to high-quality pitch maintenance equipment. The specific models, makes, and types of equipment will be tailored to each grounds team's needs and maintenance programme.	8.3
	Suitable facilities should be provided to allow the grounds team to carry out their roles and responsibilities professionally.	8.4
Sustainability	A sustainable approach should be adopted to the design, construction and ongoing management of the pitch to minimise environmental impact and reduce the carbon footprint.	9
	Grounds teams should develop and implement a pitch maintenance programme based on the principles of Integrated Turf Management (ITM).	9.2
Pitch maintenance and match day preparations	Pitches used to host Premier League fixture should be maintained and prepared to the highest possible standard.	10
	The pitch should be marked out in accordance with the IFAB Laws of the Game.	10.2
Winter pitch management	If any risks are associated with the pitch construction or infrastructure, suitable pitch protection covers should be provided to mitigate the risk of compromised pitch quality, postponement, or cancellation.	11.3
Turfgrass selection	Pitches used to host Premier League fixtures are established either by seeding or turfing, using cool-season turfgrass species with cultivars carefully chosen to suit the specific requirements of the stadium environment.	12
Pitch performance testing	Regular pitch performance testing should be carried out to help inform maintenance practices for optimal pitch conditions, prevent agronomic issues and reduce the risk of player injuries.	13



03. Pitch construction and infrastructure

3.1 Pitch construction general



It is expected that all pitches used for Premier League fixtures are designed and constructed to a high standard. No Premier League fixture shall be played on an artificial surface. It is expected that the pitch undergoes reconstruction approximately every 5 to 15 years to maintain optimal performance. Proper planning and design are essential, with the timing and scope of work determined by various factors, including:

- The lifespan of the pitch's components
- The extent of maintenance, including annual renovations
- Usage levels
- The frequency and intensity of other sporting and non-sporting events (e.g., concerts)
- The infiltration capacity of the rootzone

The scope of pitch reconstruction should be tailored to the specific needs of the stadium and associated environment, with the work carried out by a qualified specialist sports pitch contractor. In some cases, the project may involve partial reconstruction, where only certain elements of the pitch are replaced.

Reconstruction works should be scheduled for outside the Premier League playing season to allow adequate time for grass establishment, whether through seeding or turfing, before the first fixture of the season.

As a general guideline, a full pitch reconstruction can take approximately 5 to 6 weeks to complete, depending on the scope of the work. This timeline does not include the grass grow-in/establishment period, which can take an additional 6 to 8 weeks if the pitch is seeded.

2024 Premier League Pitch Survey

100%

All pitches in the Premier League reconstructed within the last 11 years.

75%

of respondents felt that a Premier League pitch should be reconstructed every 5-10 years.

18.75%

of respondents felt that a Premier League pitch should be reconstructed every 11-15 years.

For pitches established with turf, the establishment period can be considerably shorter, with some systems allowing for play almost immediately after installation.

Elements included within a pitch reconstruction can include:

- Replacement of the rootzone layers
- Replacement of the aggregate drainage layer or geocellular drainage layer
- Replacement of artificial turf pitch surrounds
- Replacement or installation of hybrid reinforcement system
- Replacement or installation of irrigation system
- Replacement or installation of undersoil heating system
- Replacement or installation of drainage system
- Replacement or installation of vacuum and ventilation system
- Replacement of goalpost sockets
- Replacement of corner flag sockets

Ideally, the grounds team should be consulted and involved in the pitch design process.

3.1.1 Case study:

Football pitch reconstruction (Nottingham Forest FC)

Project Timeline

Year: 2023

Duration of Construction

- The construction works, including turfgrass establishment, took approximately 12 weeks to complete and were carried out during the summer off-season period
- The construction phase, which encompassed the key elements of the pitch works, took approximately 5 weeks to complete
- Following this, the grass establishment period (often referred to as the “grow-in” phase) lasted 7 weeks, during which contractors continued to work on finishing touches around the pitch perimeter

First Football Use

- The pitch was seeded at the beginning of the grow-in phase, and it took 7.5 weeks from seeding until the pitch was ready for its first match

Key Components of the Pitch Reconstruction

The reconstruction process involved major works aimed at improving the quality of the playing surface. This included:

Rootzone Replacement

Both the upper and lower rootzone layers were replaced to ensure optimal conditions for drainage performance and turf growth

Aggregate/Geocellular Layer Replacement

A new aggregate drainage layer was installed

Hybrid Reinforcement System

A stitched-type hybrid reinforcement system was installed to improve wear tolerance

Drainage System Installation

The entire drainage system was replaced including all underlying pipework and chambers

Irrigation System Installation

A fully automatic pop-up irrigation system was installed

Undersoil Heating System

A hot water-based undersoil heating system was incorporated to protect the pitch from frost, snow and ice accumulation

Pitch Perimeter Replacement

The artificial surface surrounding the pitch was also replaced as part of the overall project to maintain uniformity and safety

Roles and Responsibilities

In-House Grounds Team

The in-house grounds team was primarily responsible for ongoing pitch maintenance activities including the maintenance of the pitch throughout the grow-in phase.

Contractor

A specialist sports pitch contractor was responsible for all major reconstruction works, including:

- Removal of the old pitch
- Construction of the new pitch
- Installation of all new systems (undersoil heating, drainage, irrigation, etc.)



Grow-in phase

The pitch was established by seeding to ensure a high-quality playing surface. The grow-in was undertaken by the grounds team whilst contractors continued work on finishing elements such as the pitch perimeter and final adjustments to the infrastructure.

Planning and Pre-Construction Phase

The project was part of a long-term planning initiative that had been discussed over several years. Advance planning allowed for careful consideration of the project’s scope, cost, and timing, ensuring that the pitch would be ready for use by the start of the Premier League season.

Contractor Engagement

The contractor was engaged well in advance to ensure they were available during the ideal window for construction. The early involvement allowed for detailed planning and a structured timeline for the works.

Input from Grounds Team

The in-house grounds team was involved in the design process to ensure the pitch met the specific needs of the Football Club. They provided valuable insights into:

- Desired turf characteristics
- Maintenance requirements
- Playing surface quality expectations

Conclusion

The 2023 football pitch reconstruction project was a significant undertaking that resulted in a state-of-the-art pitch. The project took 12 weeks from start to finish, including a 7.5-week grow-in phase before the pitch was ready for its first game. While there were some challenges, the overall outcome was successful. The collaboration between the in-house grounds team and specialist sports pitch contractor ensured that the pitch met the high standards required for the Premier League, while also providing a sustainable and manageable playing surface for years to come.

03. Pitch construction and infrastructure

3.2 Pitch dimensions

For pitches used to host Premier League fixtures, it is a Premier League Rule unless otherwise permitted by the Board, that the pitch shall be 105 metres long and 68 metres wide. The pitch should be marked out in accordance with the IFAB Laws of the Game³.



The club should register the dimensions of its pitch before the commencement of each season by giving written notice to the Board.

The Board may at any time require a club to obtain and submit to the Board a report by an independent expert certifying its pitch dimensions.

No club shall alter the dimensions of its pitch during the season without the prior written consent of the Board.

3.3 Pitch runoff margins

For pitches hosting Premier League fixtures, it is expected that natural/hybrid grass runoff margins are provided around the entire field of play. These runoff areas should have the same construction profile and performance characteristics as the field of play, and be equipped with appropriate irrigation, drainage, and undersoil heating systems.



While there are no specific requirements regarding the exact configuration or size of the natural grass runoff margins, including their distance from the white lines, it is considered best practice to ensure the natural grass runoff margins extend at least 200 mm beyond the white lines to ensure the interface between the natural grass and the artificial turf does not impact ball roll when the ball is in play.

Beyond the natural grass runoff margins, an artificial grass surface should be installed to extend the total runoff margin to a minimum of 3 meters around all sides of the field, or up to the advertising boards. The transition between the natural grass and artificial surface must be seamless, with no noticeable difference in surface levels. The artificial turf should be tested and approved as a FIFA Quality Pro product, and should closely replicate the performance characteristics of the natural grass, including surface hardness, rotational resistance, vertical deformation, and energy restitution.

2024 Premier League Pitch Survey

Distance from white lines varied from 100 mm to 6 m.

³ Refer to IFAB Laws of the Game in relation to the Field of Play

3.4 Warm up areas

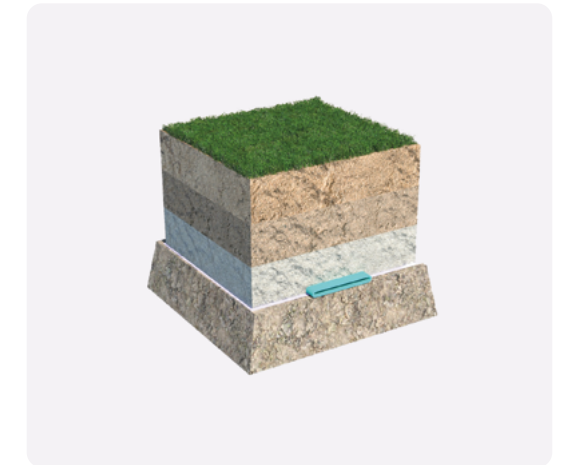
Warm up areas should be designated outside the field of play to allow substitutes to warm up during the match without interfering with the game or obstructing the assistant referee. While natural grass warm up areas offer the best replication of the playing surface, maintaining them can be challenging. These areas are particularly affected by reduced light levels, especially when located in the southern or south-western parts of the field. The combination of reduced light levels and the heavy wear caused by warm up activities can result in diminished grass cover, potentially affecting the overall appearance of the pitch and its surroundings.



If artificial turf is used in warm up areas, the surface must be tested and approved as a FIFA Quality Pro product. It should closely mimic the performance characteristics of natural grass, including surface hardness, rotational resistance, vertical deformation, and energy restitution.

3.5 Pitch construction profile

It is expected that pitches used to host Premier League fixtures are constructed with a sand-based rootzone, as is typical for elite-level stadium surfaces.



A sand-based rootzone provides stable and predictable characteristics, enabling precise control over moisture levels in the rootzone. The design of the rootzone should facilitate optimal water infiltration throughout the pitch profile while maintaining adequate water and nutrient retention to support healthy grass growth. Choosing compatible materials for the various layers within the rootzone is crucial to the success and longevity of this pitch construction method.

It is an expectation that the sand based rootzone layer(s) shall sit on top of an aggregate drainage layer, or a geocellular sub-base.

2024 Premier League Pitch Survey

All pitches in the Premier League were constructed with a sand dominated rootzone.

03. Pitch construction and infrastructure

3.6 Hybrid reinforcement systems

For pitches hosting Premier League fixtures, it is expected that a hybrid reinforcement system is integrated to reinforce the construction profile and pitch surface while also improving wear tolerance.

There are generally two types of hybrid reinforcement systems available.



Stitched type hybrid

1. Stitched type hybrid reinforcement systems

These systems consist of artificial fibres, typically made from polyethylene or other biodegradable materials, stitched vertically into the pitch construction profile using specialist machinery.

2024 Premier League Pitch Survey

All Premier League pitches have hybrid reinforcement systems.



Carpet type hybrid

2. Carpet type hybrid reinforcement systems

These systems feature artificial turf fibres woven into a backing material, which is then laid on top of the pitch rootzone.

The choice of hybrid reinforcement system should be based on several factors, including the stadium's operational schedule. Key considerations include whether the stadium will host other sporting or non-sporting events, and whether re-turfing is part of the turf management plan.

The lifespan of a hybrid pitch system can vary depending on the type of system. Stitched hybrid reinforcement systems typically last between 8 to 12 years, while carpet-style systems generally have a lifespan of 1 to 5 years depending on the system. Both lifespans are influenced by the level of ongoing maintenance and renovation.

3.7 Irrigation systems and performance

It is expected that the pitch is equipped with a fully automatic pop-up irrigation system, covering the entire field of play and natural grass runoff margins. In addition to counteracting evapotranspiration losses, the system must be capable of irrigating the surface to prepare (slick down) the pitch for play.

The irrigation system should be capable of wetting the entire pitch surface during the designated periods: prior to team warm ups, immediately before Kick-Off, and at half-time.

Additionally, there may be a need to irrigate the pitch for several other purposes, including:

- Ensuring the structural stability of the sand-dominated rootzone materials
- Ensuring grass plants have sufficient water for their biological operation and maintaining plant health

- Cooling the turf surface during high temperatures, particularly in July and August during pre-season and the early part of the Premier League season
- Adjusting surface performance characteristics
- Solubilising granular fertilisers
- Washing in surfactants, such as wetting agents
- Washing in liquid fertilisers
- Managing root depth
- Assisting in the removal of surface paint

Volumetric soil moisture content should be regularly monitored as part of the pitch testing process to help inform irrigation decisions. [Refer to Section 13.](#)



03. Pitch construction and infrastructure



Irrigation pump

It is expected that the irrigation system includes both perimeter and infield sprinklers, with the capability to isolate the perimeter sprinklers on match days when the pitch surrounds may be used for broadcast and media purposes.

Irrigation systems should be fully serviced at least once a year, with the ideal time for servicing being during the pitch renovation period, prior to any Premier League fixtures. Performing a full service as part of the annual renovation works is recommended for the following reasons:

- It allows the system to be tested when there is no immediate need for precise moisture management
- It provides an opportunity to carry out any intrusive work, such as excavations within the field of play, before grass establishment
- It ensures the system is fully operational ahead of the grow-in and grass establishment period, when the need for precise moisture management is at its highest

Irrigation systems should be regularly inspected for damage or leaks. In addition to these routine checks, the entire system should undergo a full service at least once a year. This service should include a thorough review of all system components, including but not limited to:

- Valve assemblies
- Pipes
- Backflow preventers
- Sprinkler heads, including checking and adjusting the arc (i.e., the range of degrees covered by each sprinkler from one side of its pattern to the other)
- Control systems
- Operating pressures
- Flow rates
- Water coverage across the natural grass area

2024 Premier League Pitch Survey

100%

of Premier League pitches have irrigation systems which allow the infield sprinklers to be operated separately from the perimeter sprinklers.

3.8 Pitch drainage systems and performance



Geocellular sub-base

The pitch should be served by a comprehensive drainage system designed to collect, discharge, or re-use stormwater. This system must cover the entire field of play, including both the natural grass runoff margins and artificial surrounding areas. It should either include a network of pipe drains installed beneath the aggregate drainage layer, or be integrated into the pitch sub-base, as seen in pitches with geocellular sub-bases or retractable pitch systems.

2024 Premier League Pitch Survey

100%

of Premier League pitches have dedicated drainage systems either in the form of pipe drains or geocellular layers.

3.9 Undersoil heating systems and performance



Undersoil heating system

For pitches used to host Premier League fixtures, it is a Premier League Rule that each club shall provide and maintain an undersoil heating system and shall ensure, as far as reasonably possible, that the pitch is playable on the occasion of each home League match.

An undersoil heating system is required to protect the pitch surface and construction profile from snow, frost, and ice accumulation during the winter months. This system helps minimise the risk of Premier League fixtures being cancelled or postponed due to cold temperatures or snowfall.

2024 Premier League Pitch Survey

100%

of Premier League pitches have an undersoil heating system.

03. Pitch construction and infrastructure

Conventional undersoil heating systems use a network of pipes embedded within the pitch construction profile to circulate warm water or glycol. These are known as hydronic undersoil heating systems. Alternatively, fully electric undersoil heating systems are available, which use metal wires or ribbons installed across the natural grass area to radiate heat.

2024 Premier League Pitch Survey

95%

of Premier League pitches have a hydronic undersoil heating system.

5%

of Premier League pitches have an electrical undersoil heating system.

Maintaining a consistent and precise installation depth is crucial to prevent potential damage during maintenance activities and the installation of stitched turf reinforcement systems.

Undersoil heating systems are typically set to operate when soil temperatures fall below 8°C.

It is expected that the undersoil heating system is capable of maintaining the entire natural grass area within a temperature range of at least 1°C to 8°C, effectively removing and preventing the build-up of frost, ice, or snow on the playing surface.

Properly designed undersoil heating systems are highly effective at preventing the pitch surface and rootzone materials from freezing. However, they cannot entirely eliminate the risk of snow accumulation during heavy snowfall or prevent frost from forming on the grass leaves, which can result in a slight white appearance.

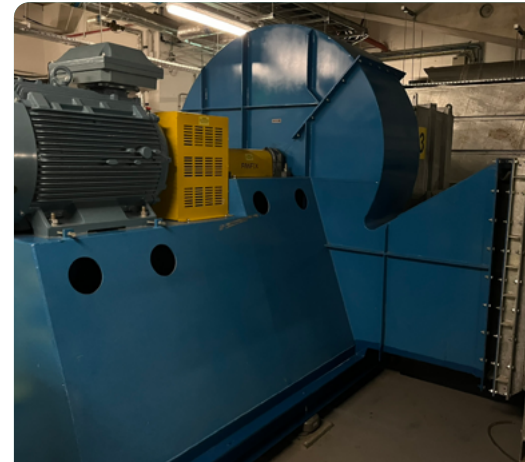


Undersoil heating boiler

Additionally, undersoil heating systems can be integrated into the turfgrass management strategy to support grass recovery during the colder winter months. [Refer to Section 11.](#)

The undersoil heating system should be fully serviced at least once a year, with the ideal time for servicing being during the pitch renovation period, prior to any Premier League fixtures.

3.10 Vacuum and ventilation systems



VV system



VV control panel

Vacuum and Ventilation (VV) systems can be beneficial in managing a stadium pitch by either drawing moisture through the construction profile (in vacuum mode) or forcing air through it (in ventilation mode). This is especially valuable in the context of climate change, as forecasts predict that England will experience higher rainfall and more frequent intense rain events. When planning and designing a new pitch construction project, it is advisable to consider integrating a VV system.

VV systems can help manage the pitch in several ways:

- Rapid water removal after storms: In vacuum mode, VV systems can quickly remove rainfall in just a few minutes, which is especially useful if a severe thunderstorm occurs just before or during a Premier League match
- Air movement and gas exchange: The system helps improve air circulation in the rootzone layers and around the plant leaves

- Uniform air distribution: It ensures even air movement across the entire pitch area
- Event management: VV systems help control moisture levels in the rootzone before and after sporting or non-sporting events (e.g., concerts), moving air through the pitch construction to maintain optimal conditions. [Refer to Sections 6 and 7](#)
- Surface temperature management: The system can assist in regulating surface temperatures

The VV system should be fully serviced at least once a year, with the ideal time for servicing being during the pitch renovation period, prior to any Premier League fixtures.

2024 Premier League Pitch Survey

15%

of Premier League pitches have Vacuum and Ventilation systems.

3.11 Supplementary lighting systems and deployment



A sufficient number of free-standing or gantry-style supplementary lighting rigs should be provided, in accordance with the lighting requirements of the pitch.

It is expected that supplementary lighting systems be available to ensure adequate light levels for promoting grass growth and recovery from wear. These lighting systems can also help increase temperatures during the winter months, supporting active grass growth and recovery. As the growth of cool-season turfgrass species used in the Premier League slows when soil temperatures drop below around 8°C, having a means of providing additional heat for the grass plant is beneficial.

2024 Premier League Pitch Survey

100%

of Premier League pitches have supplementary lighting rigs available for use on the pitch.

In a stadium environment, shade is typically cast by the stadium structure. The impact of this shade depends on several factors, including the stadium's orientation, geographic location (latitude), and the size, shape, and materials of the stadium's structures.

The need for supplementary lighting systems should be assessed quantitatively to ensure adequate light levels are provided and to inform the deployment strategy. This can be achieved through light and shade studies, such as Hemiview analysis or similar methods, which establish specific parameters or target light levels using metrics like Daily Light Integral (DLI), Photosynthetically Active Radiation (PAR), and moles per m² per day. When ambient light levels fall below the target threshold, supplementary lighting should be used.

Supplementary lighting rigs should be used to ensure the minimum target light levels are met.

Minimum typical target light levels (mol/m²/day)

Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
7.0	8.0	9.0	10.0	11.0	12.0	12.0	11.0	10.0	9.0	8.0	7.0

On average, a stadium hosting Premier League fixtures is equipped with more than nine large-format supplementary lighting rigs (over 50m²), along with additional smaller-format rigs (50m² or less).

Supplementary lighting systems can be either free-standing portable units or custom-integrated gantry-style units embedded into the stadium structure. Free-standing portable units are most commonly used in stadiums hosting Premier League fixtures, with large-format units typically covering a working area of between 120 m² and 440 m². Smaller units are also available to target specific areas of the pitch, such as goal mouths and the Assistant Referee's patrol path, with a typical working footprint ranging from 10 m² to 50 m².

Supplementary lighting units can be equipped with either LED or High-Pressure Sodium (HPS) fixtures. LED systems are typically more energy-efficient, while HPS systems provide the additional benefit of heat generation from the bulbs. LED systems can also generate heat when integrated with infrared units, though this may result in higher power consumption. The decision between LED and HPS systems should be assessed on a stadium-by-stadium basis, considering factors such as:

- Capital expenditure (CAPEX) for system procurement
- Operational expenditure (OPEX), including electricity costs

- Heat requirements
- Sustainability objectives
- Electrical power infrastructure needs

The electrical power requirements vary depending on the system. However, it is expected that appropriate electrical infrastructure, including sockets, is provided to support the use of supplementary lighting rigs. These systems typically require a 400-volt electrical supply.

Adequate storage space should be provided for the storage of supplementary lighting rigs, with convenient and safe access and egress to and from the pitch.

2024 Premier League Pitch Survey

5%

of Premier League Clubs use LED supplementary lighting rigs only. 20% of Premier League Clubs use a combination of LED and HPS supplementary lighting rigs.

75%

of Premier League Clubs use HPS supplementary lighting rigs only.

3.12 Supplementary pitch-side fans



A sufficient number of free-standing pitch-side fans should be provided, in accordance with the air movement requirements of the pitch. In cases where natural air movement across the pitch surface is limited, it is expected that supplementary pitch-side fans be provided to improve airflow, promoting turf health and reducing the risk of turfgrass diseases.

Pitch-side fans are free-standing, portable systems that can be easily transported to the pitch and used as needed. Limited air movement can negatively impact turf health and overall pitch quality, contributing to issues such as:

- Increased turfgrass disease pressure
- Higher leaf wetness
- Greater risk of surface algae growth

The requirement for pitch-side fans will vary depending on the stadium and the stadium's architecture. It is advisable to conduct specialised studies to assess natural air movement patterns across the pitch and identify the most effective fan placement.

Electrical power requirements differ by system. Appropriate electrical infrastructure, including sockets, should be provided to support the use of pitch-side fans.

Adequate storage space should be provided for the storage of pitch-side fans, with convenient and safe access and egress to and from the pitch.

3.13 Pitch protection covers



It is a Premier League expectation that if there are any risks associated with the pitch construction or infrastructure, suitable pitch protection covers should be provided to mitigate the risk of compromised pitch quality, postponement, or cancellation.

[Refer to Section 11.3](#) for further details in relation to pitch protection covers.

In most cases, the undersoil heating system will offer adequate protection against the accumulation of frost, snow, and ice. However, in certain situations, it may be beneficial to deploy a pitch protection cover in addition to the undersoil heating, particularly before heavy snowfall just prior to a match or during periods of extremely low temperatures, to help prevent frost from forming on the grass leaves.

In cases where a drainage system is ineffective, inflatable waterproof covers can be used to protect the pitch from rainfall. While not recommended for long-term use, these covers can be deployed in the short-term during emergency situations.

3.14 Pitch monitoring systems



Pitch monitoring systems provide objective data that can support the sustainable management of the pitch and help optimise maintenance practices.

These systems typically consist of sensors placed within the pitch construction profile and/or on the surface. They monitor various parameters, such as air temperature, soil temperature, PAR light, salinity, humidity, soil moisture, and electrical conductivity.

Access to real-time, objective data on these factors enables more precise management of maintenance tasks, including irrigation, supplementary lighting, and nutrient applications. This data also aids the grounds team in planning and executing a more effective maintenance programme.

Various proprietary systems and applications can be integrated with pitch monitoring systems. [Refer to Section 9](#) on sustainable pitch management.

03. Pitch construction and infrastructure

3.15 Goals

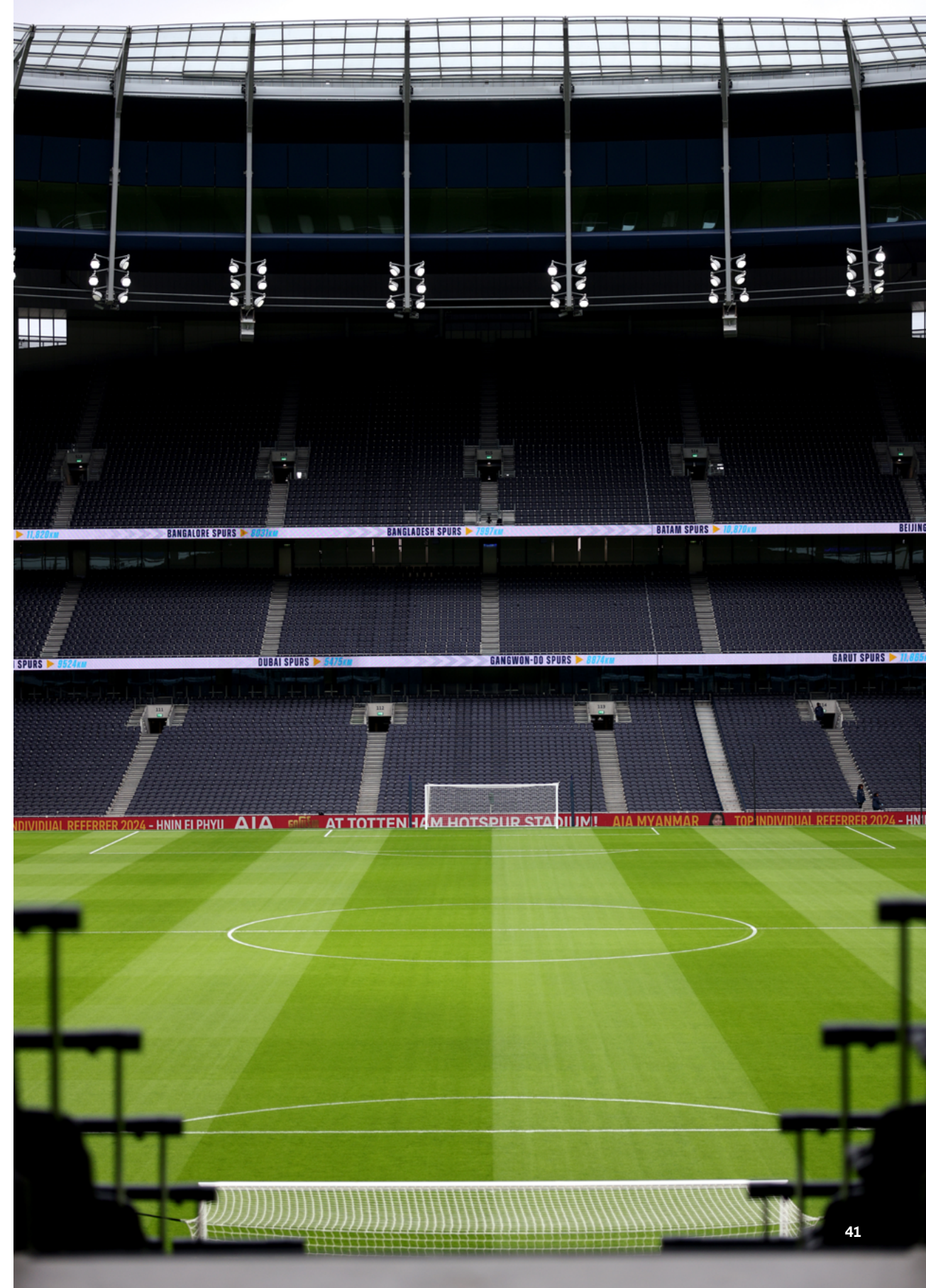
Goals should be provided in accordance with the IFAB Laws of the Game⁴.

It is a Premier League expectation that all goals used meet the requirements of the FIFA Quality Programme for Football Goals.

The distance between the inside edges of the goalposts shall be 7.32 meters, and the height from the lower edge of the crossbar to the ground shall be 2.44 meters. The goalposts and crossbar should be white, with uniform width and depth, not

exceeding 12 cm. Nets must be securely attached to both the goalposts and the ground behind the goal, properly supported, and positioned in a way that does not obstruct the goalkeeper.

The Premier League requires that, in addition to the main goals, a backup set of replacement goals be available in case of breakage or other issues. Temporary portable goals should also be provided for pre-match warm ups.



³ Refer to IFAB Laws of the Game in relation to the Field of Play



04. Pitch turfing or re-turfing

04. Pitch turfing or re-turfing

4.1 General

When establishing a pitch, it is preferred to establish from grass seed, provided sufficient time is available. This method offers greater control over the composition of the performance of the rootzone, as it does not require the importation of materials. Turfing or re-turfing is often used as an alternative to seeding for establishing a football pitch. The decision to turf or re-turf, rather than seed, is typically driven by one of the following factors:

Time constraints

When a playing surface needs to be ready within a timeframe that does not allow for the full germination and establishment of seed.

2024 Premier League Pitch Survey

15%

of Premier League pitches have been established from turf.

Existing surface issues

If there are problems with the current surface, such as insufficient grass density, poor surface levels, or instability, requiring a quick replacement of all or part of the pitch, often in emergency situations.

The Premier League's preferred option for turfing or re-turfing projects is the use of a proven hybrid turf that incorporates a carpet-type hybrid reinforcement system. Natural turf should only be considered if a stitched-type hybrid reinforcement system is to be installed following the re-turfing process.

In some cases, within the Premier League, a minimum grow-in period of six weeks may not be feasible, making re-turfing an increasingly common option, particularly in multi-use stadiums. While this approach can offer full grass coverage and good playability in a shorter timeframe, there are inherent risks associated with the re-turfing process.



Effective communication and detailed planning are crucial for the success of any turfing or re-turfing project. If a Club is considering such a project and there is a possibility it may affect Premier League fixtures, it is expected that the Premier League be consulted during the early stages of planning.

When planning a turfing operation, several key considerations must be taken into account, including:

Time

Determine when the surface needs to be playable

Weather

Account for all potential weather conditions, both during the grow-in phase and at the time of harvest and installation

Access

Assess pitch access and its suitability for larger machinery and trucks

Turf farm location

Consider the proximity of the turf farm or the site where the turf is grown to the stadium

Delivery

Travel time for turf delivery and unloading will influence whether the transport needs to be refrigerated or not

Contractors

Ensure the availability of experienced contractors with the necessary labour and equipment for turf installation

Once the requirements are clearly established, ensuring that the works are carried out correctly and to a high standard are essential to the success of the project.

Turf for football pitches is typically grown at specialised turf farms experienced in producing high-quality turf for elite sports use. Coordination between the grounds team and turf supplier is advisable in relation to the management and maintenance of turf prior to harvest and installation at the stadium. This approach helps mitigate some of the risks associated with turfing, as the grounds team is fully informed about the turf's condition and the maintenance practices that have been applied before it arrives. It also allows the ground staff to customise the maintenance plan, ensuring the turf arrives at the stadium in the desired condition.

Similar to a pitch renovation, plans for turfing or re-turfing should be finalised approximately 6-12 months in advance. This timeline ensures adequate time for thorough planning, as well as sufficient time for the turf to grow, establish, and reach optimal condition before harvest and installation at the stadium.

The age of the turf being harvested is an essential consideration. If the turf is too old, it may require additional maintenance to perform effectively due to the buildup of natural organic matter. For turf with a carpet-type hybrid reinforcement system, the optimal age at harvest is approximately 10-16 weeks. In contrast, turf without this reinforcement system relies on the strength of its rooting and organic matter layer, typically requiring 10-14 months to mature before it can be harvested.

4.2 Typical re-turfing scope of works

A re-turfing project following a sporting or non-sporting event, typically involves certain key elements. This section serves as a general example and is not intended as a specification of works. The exact scope of work should be tailored to meet the specific requirements of the event. Refer to Sections 6 and 7 for hosting other sporting and non-sporting events

Prior to the event

- The existing surface area to be removed should be surveyed to determine the current pitch levels, as well as the locations of kerb edging, manholes, inspection covers, junction boxes, rodding eyes, drainage outfalls, stop cocks, valves, sprinkler heads, and cable markers

- Surface removal can occur either before or after the event. The existing levels, the depth of the organic material, and the thickness of the turf to be installed typically determine the amount of existing material that should be removed. Turf is generally harvested at a depth of 35-50 mm. Note: If the pitch is to be used for play within a few days after turf installation, the turf should be cut to a minimum thickness of 40 mm
- Any discrepancies identified in the existing survey should be addressed at this stage by correcting them with an approved clean sand or rootzone mix that is compatible with the existing pitch profile materials
- The surface should be consolidated to ensure uniform compaction
- A geotextile should be placed over the surface prior to the installation of event flooring

Post event works

- Following the removal of the event flooring, the geotextile should be removed from the surface
- The surface should be lightly power harrowed, graded, raked, and consolidated to ensure the surface levels are consistent with the overall pitch grade (if applicable)
- Minor level discrepancies should be corrected with an approved sand or rootzone material
- The surface should be kept suitably moist during this process using the pitch irrigation system
- Prior to laying the turf, a pre seed fertiliser should be applied
- Turf should be harvested and imported as 'big roll turf,' with widths ranging from 1.2 m to 2.5 m and an appropriate length. The typical turf thickness ranges from 35 mm to 50 mm. Note: If the pitch is to be used for play within a few days after turf installation, the turf should be cut to a minimum thickness of 40 mm
- Turf is typically transported using refrigerated trucks, depending on the distance from the turf farm to the stadium and the duration for which the turf will be rolled up. If proper precautions are not taken, there is a risk of the turf overheating during transport
- Turf should be laid with overlapping joints in a brickwork pattern to maximise strength. The rolls should be tightly positioned together using approved machinery designed for this purpose. Any defects should be identified promptly and corrected before rolling

- It is essential that the laid turf rolls are aligned correctly so that the leading edge is straight to ensure a clean finish and that the turf fits exactly into the designated area without further cutting
- The final surface should be rolled with an approved roller
- The irrigation system should be fully operational at the time of turf installation, with moisture levels carefully managed

4.3 Reactive re-turf

In the unlikely event that a mid-season or emergency re-turf is required, it is essential that the Premier League is notified as soon as possible. An emergency re-turf is typically prompted by issues with the existing pitch surface, such as low grass density, poor surface levels, compromised stability, adverse weather conditions, turfgrass disease outbreaks, or excessive usage, all of which can cause the pitch condition to deteriorate rapidly.

It is critical that the underlying causes leading to the need for an emergency re-turf are addressed during the immediate off-season.

4.4 Case study:

Pitch re-turfing project (Tottenham Hotspur FC)

General Information

Club: Tottenham Hotspur FC

Year: 2023

Project Overview

In 2024, Tottenham Hotspur FC underwent a complete re-turfing of the playing surface at the Tottenham Hotspur Stadium to ensure a high-quality, durable pitch ready for the new season. This case study details the key elements of the re-turfing works, from the initial planning stages through to the completion of the installation.

Key Project Details

Year of re-turfing: 2024

Time from Turf Installation to First Use: 10 days

Project Duration: 6 days

Main Elements of the Re-Turfing Works

April – Laying, Filling, Seeding, and Grow-In

- Turf establishment began at the turf farm in April with the laying of the carpet-type hybrid reinforcement system and filling of the rootzone
- Seeding and grow-in efforts were carefully managed to ensure a strong foundation for the turf

May – Removal of Existing Surface

In May, at the end of the Premier League season, the old pitch surface within Tottenham Hotspur Stadium was carefully removed to prepare for the new turf installation.

July – Grading of Rootzone

Following removal of the existing surface, the existing rootzone was graded and levelled to ensure an even and stable foundation for the new turf.

July/August – Harvest and Laying of Turf

In late July and early August, turf was harvested from the turf farm, ready for laying at the stadium. This process was carried out within 6-8 hours of harvest to maintain turf quality.

Project Timeline

Removal of Existing Surface: 1 Day

Grading and Levelling of Rootzone: 1 Day

Turf Harvesting and Laying: 3 Days

Snagging and Final Adjustments: 1 Day

Overall, the re-turfing process took 6 days from the removal of the existing surface to the final adjustments. The new pitch was ready for use just 10 days after installation.



Collaboration with the Grounds Team and Contractors

The re-turfing works were carried out in close collaboration between the stadium's in-house grounds team, the turf farm, and a specialist sports pitch contractor. Key elements of the re-turfing process were shared between the teams.

In-House Grounds Team Responsibilities

- Assisted with the filling of the carpet, grow-in, and laying of the turf
- Regular visits to the turf farm throughout the grow-in period for monitoring and adjustments
- Post-installation maintenance to ensure optimal performance

Contractor Responsibilities

The contractor handled the majority of the turf harvesting, grading, and laying activities.

Turf Harvesting and Transport

Time Between Turf Harvest and Installation: 6-8 hours

Transport Time from Turf Farm to Stadium: 3-4 hours

Refrigeration

No refrigerated trucks were used during the transport, as the turf was handled within the optimal timeframe

Planning and Preparation

- Order Placement: The turf was ordered in December, with an 8-week lead time, and planning began in January/February. By March/April, all details, including the harvest date, were confirmed, depending on summer events

- Grow-In and Maintenance Program: The Club's grounds team worked closely with the turf farm to set up a comprehensive maintenance and nutrition programme. Weekly visits were made to the turf farm throughout the grow-in period, and the grounds team also spent 2-3 days a week working directly at the farm during the off-season

Performance Testing and Quality Control

- Performance Testing: While no performance testing was carried out at the turf farm before harvest, the grounds team conducted tests post-installation to ensure the pitch met the required standards, addressing any visible issues promptly

Best Practice Guidelines for Re-Turfing

- Optimal Turf Age: The grounds team recommends that younger turf (10-12 weeks old) performs better post-installation
- Full Renovation of Older Pitches: If older turf is used, it is critical to carry out a full renovation, removing all vegetation and preparing the rootzone to sand level to prevent poor performance

Conclusion

The 2024 pitch re-turfing project at the Tottenham Hotspur Stadium was a collaborative effort between the in-house grounds team, a specialist sports pitch contractor, and the turf supplier. By adhering to best practices, meticulous planning, and efficient execution, the new pitch was ready for play within 10 days of installation, ensuring the Stadium was fully prepared for the new Premier League season.

4.5 Case study:

Pitch re-turfing project (London Stadium)

General Information

Stadium: London Stadium
(West Ham United FC)

Year: 2024



Project Overview

In 2024, London Stadium undertook a major re-turfing project to ensure a high-quality playing surface. The project was carefully planned and executed to meet the demands of various summer events and the new Premier League season. This case study outlines the key stages of the re-turfing works, from preparation to installation and testing, as well as the collaboration between the in-house grounds team and contractors.

Key Project Details

Stadium: London Stadium

Year of re-turfing: 2024

Time from Turf Installation to First Use:

1 day

Main Elements of the Re-Turfing Works

Preparation and Removal of Existing Surface

The first step in the re-turfing process involved removing organic matter and the existing sand profile, as well as the artificial carpet that had previously covered the pitch surrounds.

Due to the stadium hosting multiple summer events such as baseball games, concerts, and monster truck shows, the surface was protected by pitch protection flooring.

Once the events concluded, the pitch protection flooring was removed, and preparations began, including topdressing, levelling, and verti-draining to create the ideal foundation for the new turf.

Turf Installation and Snagging

Following the preparation of the base, the new carpet-type hybrid reinforcement system was installed over a period of four days. This included 16-hour working days to ensure all aspects of the installation were completed efficiently.

The seams and joins of the turf were carefully snagged to ensure smooth transitions and durability, preventing any issues that could arise during use.

Post-Installation

The next day after turf installation, the pitch hosted athletics events, including activities like shot put and discus throwing, as well as heavy foot traffic, which added additional stress to the surface shortly after installation.

Timeline of the Re-Turf Works

Turf Harvest to Installation: 3-5 hours
transport time between the turf farm and the Stadium.

Removal of Existing Surface: 16 hours

Installation of carpet type hybrid reinforcement system: 4 days (16-hour working days)

Collaboration with the Grounds Team and Contractors

In-House Grounds Team

The grounds team, led by the head grounds manager, played a critical role in the planning and execution of the re-turfing works. All products and methods used at the turf farm were selected by the in-house team, ensuring that the specific needs of the pitch were met.

The grounds team worked alongside the contractors during the installation phase, assisting with tasks such as turf laying, filling, and snagging.

Contractors

The turf supplier handled the harvesting of the turf, and a specialist sport pitch contractor undertook the installation of the new hybrid system.

Logistics and Transportation

Ordering and Preparation

All turf products and methods used at the farm were carefully selected by the grounds team, with regular site visits to monitor progress.

The turf supplier was responsible for purchasing the products according to the grounds team's programme, ensuring full coordination between all parties involved.

Grow-In and Maintenance at Turf Farm

The grounds team worked closely with the turf supplier to oversee the grow-in process.

Regular visits (every 7-10 days) were made by the grounds team, and staff also worked at the farm for a three-day spell over the 14-week grow-in period to assist in monitoring and adjustments.

Performance testing was carried out at the turf farm prior to harvest to ensure the turf met the required standards.

Best Practice Guidelines and Considerations

Hybrid Turf System as a "Blank Canvas"

The grounds team emphasised treating the new carpet-type hybrid pitch as a blank canvas, acknowledging that carpet-type pitches behave differently from stitched-type pitches. Grounds teams must be flexible and adapt to the specific needs of the pitch to ensure optimal performance.

Adaptability to Turf Requirements

The ability to quickly adapt to the surface's needs, whether in terms of nutrition, irrigation, or maintenance practices, was highlighted as essential for maximising performance.

Conclusion

The 2024 re-turfing project at London Stadium was a significant undertaking, balancing the demands of multiple events with the need for a high-quality playing surface. Through meticulous planning, efficient execution, and close collaboration between the in-house grounds team, turf supplier and contractor, the project was successfully completed within the required timeframe. The pitch was ready for use just one day after installation, ensuring minimal disruption to both athletic events and the new Premier League season. The project highlights the importance of adaptability, thorough planning, and effective communication in maintaining world-class stadium surfaces.



05. Pitch renovations

5. Pitch renovations



For pitches hosting Premier League fixtures, it is expected that an annual full pitch renovation is carried out, proportionate to the level of usage and the agronomic condition of the pitch. The renovation works should be carried out during the off-season, with the pitch fully re-established before the first match of the following Premier League season.

Time is the most critical factor when it comes to pitch renovations. If adequate time is not allocated for annual renovations, the quality of the pitch will suffer at the start of the Premier League season. When establishing from seed, a full pitch renovation typically requires 6 to 10 weeks, not including the approximately 7 days needed to complete the work.

The success of a pitch grow-in is influenced by several factors, including weather and growing conditions, the specific growing environment within the stadium, supplementary infrastructure and equipment, and turfgrass disease pressure.

As a result, it is challenging to prescribe an exact grow-in period which covers all Premier League stadiums. However, the general guidelines below can be followed.

Grow-In Period Greater Than Six Weeks

A grow-in period of more than six weeks typically allows for the development of a dense grass canopy and a strong root structure, which helps to stabilise the pitch surface. This is dependent on optimum growing conditions during the grow-in period following the renovation works.

- With a grow-in period of 6-10 weeks, it would be expected that the grass sward would be fully established, ensuring optimal surface stability and traction when combined with a pitch reinforcement system
- This 6-10 week period helps ensure the pitch is in peak condition for the new Premier League season, with traction and stability within the desired range for safe and high-performance player interactions

Risks of Shorter Grow-In Periods

When the grow-in period is less than six weeks, there is an increased risk of pitch quality being sub-standard or compromised. This may include some or all the following:

- Reduced grass coverage
- Reduced surface stability and traction
- Increased grass loss (kicking out), resulting in more divots and surface debris
- A higher likelihood of players slipping, increasing the risk of injury
- Playability being negatively impacted, with both ball to surface and player to surface interactions inhibited
- Increase in pitch recovery time

Risks of Less Than Four Weeks

When the grow-in period is less than four weeks, the risk of sub-standard or compromised pitch quality becomes even more significant:

- The grass sward remains immature and underdeveloped, with patchy and inconsistent coverage
- The pitch will rely heavily on the hybrid reinforcement system for stability, as the natural grass sward will not have matured sufficiently in terms of rooting
- Further grass loss (kicking out), with more divots and surface debris due to immaturity of grass sward
- The likelihood of players slipping increases further, posing a serious safety hazard
- Playability being severely impacted, with both ball to surface and player to surface interactions inhibited further
- Increased damage to the pitch which may also impact future fixtures
- Increased maintenance costs to try to recover the pitch

The lifespan of a carpet-type hybrid pitch depends on the stadium's operational model, particularly the timing of matches and other sporting or non-sporting events, and the frequency of its renovations. When the operational schedule does not allow for an appropriate renovation window, it may be necessary to replace the system by reurfing after an event. However, if more time is available, these pitches can be renovated using methods similar to those outlined in this section, allowing sufficient time for the grass to re-establish before the next Premier League match.

2024 Premier League Pitch Survey

100%

of Premier League Clubs undertook an annual renovation which involved re-establishing the surface from seed or turf.

5.1 Renovation planning

A full pitch renovation typically involves a combination of work carried out by a specialist sports pitch contractor and the in-house grounds team. Depending on the available equipment and expertise, the in-house team may take on some of the renovation tasks. If a specialist sports pitch contractor is employed, it is essential to have a clearly defined scope of work for each party, to ensure that all responsibilities are understood and allocated accordingly.

The grounds team is expected to maintain ongoing communication with their chosen contractor. Renovation dates should be agreed upon with the contractor approximately six months in advance of the planned works.

5. Pitch renovations

5.2 Typical renovation works

A full pitch renovation typically includes a range of key tasks. Note that each grounds team may have different methods for carrying out their renovations. The scope of work should be tailored to the level of usage and the agronomic condition of the pitch.

- Killing off the existing grass surface by spraying with a non-residual total herbicide
- Removal of all vegetation from the grassed area through fraise mowing using specialist equipment
- The decision on how much rootzone material to remove during each renovation is usually made on a yearly basis and will vary depending on several factors
- Topdressing with fresh, clean sand of the same grade used during the original construction, typically a medium or medium-fine sand
- Deep tine aeration to de-compact the pitch profile, followed by brushing the newly topdressed material into the tine holes. This may be followed by shallow aeration to mix the material and ensure suitable hydraulic conductivity through the rootzone layers
- Brushing to help maintain the upright position of the hybrid reinforcement system fibres, ideally around 18–22 mm in height. As the pitch ages, some areas may require hand stitching or the addition of fibres where they have become buried
- Carpet-type hybrid reinforcement systems may have slightly different cleaning and renovation requirements depending on the backing density
- The irrigation system sprinkler heads may need to be dug out and re-levelled with fresh, clean sand
- Seeding in 3–5 directions at approximately 45–65 g/m². Refer to Section 12 for further details of turfgrass selection
- Pre-seed fertilisers can be applied at this stage or a week into the grow-in period to maximise efficiency, particularly given the sandy rootzone and high infiltration rates. Traditional pre-seed fertilisers, which contain high levels of phosphorus (P), are essential for energy production and cell division, promoting healthy rooting. A conventional granular fertiliser is typically used at this stage
- Additional bio-stimulants or mycorrhizal products are often applied to replicate the natural symbiotic relationship between plant roots and beneficial fungi. If soil testing has identified any issues, such as the need for nematode treatments, these can also be applied at this stage
- The entire playing area should then be covered with germination sheets to retain moisture and warmth. Depending on initial establishment, these sheets should be removed in approximately 7–10 days or when the grass height reaches 10–15 mm
- As many stadiums seek additional revenue streams, events are often held during the summer months, therefore coinciding with planned renovation works. Certain renovation activities can be completed before events, such as spraying the surface with non-residual total herbicide, fraise mowing the existing vegetation, and importing fresh, clean sand. This approach ensures that these tasks do not need to be performed after the event if timescale are limited.

5.3 Mini in-season renovations

Typically, the grounds team aims to carry out several mini renovations throughout the season, aligning these with gaps in fixtures, such as international breaks. These smaller renovations play a vital role in ongoing maintenance and long-term pitch quality. A mini renovation generally involves non-intrusive tasks that will improve the pitch over the course of the season.

Mini in-season renovations typically include the following activities:

- Light scarification/Verti-cutting
- Surface grooming/brushing
- Light sand topdressing (approximately 10 tonnes)
- Overseeding
- Aeration
- Extended use of artificial lighting rigs

5.4 Case study:

Pitch renovation (Arsenal FC)

General Information

Club: Arsenal FC

Year: 2024

Background

In preparation for the new Premier League season, a comprehensive pitch renovation was undertaken to ensure the surface met the required standards. The renovation was completed with a tight schedule, with only 7 weeks between seeding and the first use of the pitch, and 8 weeks between seeding and the first Premier League match. This case study provides a detailed overview of the renovation process, the key factors that led to its success, and the lessons learned.

Key Elements

Year of re-turfing: 2024

Time from Turf Installation to First Use:
10 days

Project Duration: 6 days

Main Elements of the Re-Turfing Works

Surface Removal and Preparation

The first step of the renovation involved the removal of all existing vegetation. This was achieved by a combination of Koro and scratch-out techniques, which completely stripped the grassed areas. This was followed by deep tine aeration to decompact the surface and to open up holes in the pitch profile. New rootzone material, in this case, straight sand, was applied to the surface and brushed into the holes.

A shallow aeration treatment followed, ensuring an even distribution of the new material. The surface was then brushed and drag-matted to level the pitch, while also standing up the artificial fibres to ensure a finish as close as possible to the original construction (20 mm exposed fibres).

Re-levelling and Seeding

The in-field sprinklers were removed, dug out, and re-levelled with clean rootzone material. Hand-stitching was carried out in areas where the surface had loosened over time. Seed was then applied in five different directions using a dimple seeder at a total rate of 50g per m².

The chosen seed mix was specifically selected for its wear tolerance, recovery potential, and disease resistance, ensuring that the pitch would be able to withstand the rigours of a Premier League season.

In addition to seeding, pre-seeder fertilisers, Mycorrhizal products, nematode treatments, and soil amendments were applied. These products were chosen based on soil test results taken prior to the renovation and were incorporated into the soil by the dimple seeder. To accelerate germination, the pitch was then covered with grow covers.



In-House Versus Contractor

In-House Grounds Team

The in-house team handled all aspects of the renovation, including stripping the outer areas, applying topdressing, seeding, product applications, and aeration.

Contractor Support

Contractors were used to strip the main pitch area as the necessary equipment was not available on-site. The contractor's expertise in handling this process helped streamline the renovation.

Timeline and Planning

Renovation Duration

From the initial surface removal to seeding, the renovation took a total of 6 days, with 7 days allocated for full completion. This was a slight reduction in time compared to previous years, but the renovation still met the Club's requirements.

Pre-Renovation Planning

Renovation scheduling was carried out in close coordination with the contractor and events team. The team planned the renovation well in advance, before Christmas, to ensure that dates for events such as summer concerts are taken into account. The plans and scope of work were discussed and agreed upon by the grounds team and the contractor.

Why the Renovation was Successful

Adequate Grow-In Time

One of the main factors that contributed to the success of this renovation was the 7-week grow-in period. In the past, the team had only been given 5 weeks, which often left the surface lacking stability at the start of the season. The extra time allowed for a more natural and less forced grow-in, leading to a more consistent and healthy surface.



Weather Conditions

Good weather also played a role in the success of the renovation, allowing for optimal growing conditions. While weather is always a variable, having the extra grow-in time gave the pitch the best chance for success.

Effective Communication and Planning

Continuous communication between the grounds team, the contractor, and the events team ensured that the renovation was carried out efficiently and within the required time frame. The pre-renovation planning process allowed for adjustments if necessary and helped avoid any potential disruptions.

Challenges and Recommendations

While the renovation was ultimately successful, the case highlights some key challenges and areas for improvement:

Renovation Frequency

The grounds team suggested that a full renovation should be carried out every year to maintain top-quality pitch conditions. However, getting buy-in from senior management and decision-makers on the importance of yearly renovations can be difficult. The team stressed that a minimum grow-in period of 6 weeks should be part of the Premier League framework to ensure proper establishment when starting from seed.

Equipment Availability

While the in-house team had the necessary equipment for most of the work, there was still a reliance on contractors for larger tasks such as surface stripping. It would be beneficial for the Club to invest in additional machinery to reduce reliance on external contractors.

Conclusion

This renovation was considered a success due to the additional time allowed for the grow-in period, effective planning, and coordination between all parties involved. The extra week for the pitch's establishment made a significant difference, resulting in a more stable and consistent surface for the start of the Premier League season. However, the team recommended that yearly renovations and a minimum grow-in period of 6 weeks be incorporated into best practice guidelines for all Premier League Clubs to ensure long-term pitch health and high-quality playing surfaces.



06. Hosting other sporting events

6. Hosting other sporting events

6. Hosting other sporting events

Stadiums that host Premier League fixtures are occasionally used for other sporting events, including rugby union, rugby league, boxing, athletics, American football, baseball, and non-Premier League football. The following section outlines key considerations when hosting other

sporting events on a grass or reinforced turf pitch surface.

Refer to Section 7 for events requiring a surface different from grass or reinforced turf e.g. boxing, motocross and monster trucks.

6.1 Planning and communication



If a Club is considering hosting other sporting events that may impact Premier League fixtures, it is strongly recommended to consult with the Premier League at the early stages of planning. The preferred time for hosting a non-football event is when there is an adequate window to successfully transition to the event, and allowing sufficient time to return the pitch to its optimal condition before the next Premier League match.

The success of any sports event depends on careful planning and effective communication among all stakeholders throughout the planning process, event execution, and post-event activities. It is essential that all parties are involved in the early stages of planning to minimise and manage risks as effectively as possible.

Stakeholders typically involved in hosting a sports event include:

- Event promoters and organisers, such as sports clubs, sports organisations, or international sports bodies
- Ground staff/pitch managers
- Stadium events team
- Stadium management
- Pitch consultant (if appointed)

Any changes to the event programme should be communicated to all parties as early as possible to allow for review and comment.

Communication and consultation among all parties should ensure that any pitch infrastructure vulnerable to damage—such as irrigation system sprinklers, pitch perimeter, valve boxes, or pitch reinforcement systems—are identified and addressed. Additionally, any infrastructure that may need to be modified or installed before the event should also be considered (e.g., goal posts).

If there is an expectation that a logo will be applied to the pitch, the logo applicator or event organiser should provide all parties with a comprehensive proposal. This should include details on the logo design and its positioning, the method of application and removal, and a work schedule outlining the dates and times for the application.

If the logo applicator is contracted by the event organiser, rather than being handled by the grounds team, it is essential for the event organiser to ensure clear communication between the logo applicator, grounds team, and stadium managers. Without effective communication, it may be difficult to recover the costs associated with repairing any damage caused by the logo application.

6.2 Non-Premier League football matches

In addition to Premier League matches, stadiums commonly host a variety of other football matches, which can include:

- Women's team fixtures
- European fixtures (e.g., UEFA Champions League, Europa League, and Europa Conference League)
- FA Cup fixtures
- EFL Cup fixtures
- Reserve team fixtures
- Youth team fixtures (e.g., U18s, U21s, and U23s)
- International fixtures
- Friendly fixtures

It is essential that the grounds team is adequately staffed in proportion to the number of football matches scheduled at the stadium. As the number of matches increases, additional personnel will be needed to ensure the pitch is properly prepared and maintained.



WSL in action at the Emirates Stadium

6. Hosting other sporting events

6.3 Alternative line marking and branding

Logos and alternative pitch markings applied for non-football events can pose challenges both in terms of turf health, pitch management and aesthetics. If these markings are not properly removed before the next Premier League match, they could negatively affect the pitch's presentation as well as the Premier League brand. The following section outlines the main turf management issues that may arise.

6.3.1 Application of logos

Logos related to other sporting events should not be applied to a natural grass surface unless it is guaranteed that the logo can be removed prior to the next Premier League match. IFAB Laws of the Game do not permit the reproduction of logos or emblems on the field of play and its surround area.

6.3.2 Alternative line marking

Where alternative line marking is required as part of hosting a non-Premier League sports event, it is important that the paint materials used are suitable for turf use. Additionally, where the line markings are not being applied by the grounds team, the applicator should provide full technical details of the material proposed for use well in advance of the event to allow for review and localised tests/samples of the product to be trialled. Line markings should be applied using proprietary sports turf paints that do not seal the rootzone surface, smother the turf or negatively affect grass health. Although some turf paints are marketed as 'removable' or 'erasable', this usually means it can be washed off or removed from the blades of grass on the surface; however, often the paint solution also works its way into the pitch profile,

where it cannot be removed and may reduce the infiltration capacity of the rootzone beneath the marking. There are various methods for applying line marking paint, including airless spraying, brushing, and rolling. Brushing and rolling are recommended for alternative line marking, as they use less paint and apply it primarily to the surface of the grass, particularly when using thicker paint. These methods also facilitate easier removal by mowing after the event. In contrast, spraying pushes the paint deeper into the grass canopy and is generally used with thinner paints.

6.3.3 Removal and turf recovery

The most effective method for line removal is to let them grow out naturally, with the logos or lines gradually removed during regular mowing operations. Other techniques include masking the logo or lines with green paint (although this may not always produce ideal results) or using small lighting rigs to stimulate growth and accelerate recovery. The longer photosynthetic tissues on grass plants are covered in paint, the greater the risk of plant stress occurring.

In some cases, aerating the turf (using a shallow aerator or similar equipment) along with pressure washing or water jetting can be used to remove logos before the next Premier League fixture. However, if this method is employed, care must be taken to avoid causing excessive damage to the turf or the underlying rootzone materials. This is best done with biodegradable pigments or paints.

It is considered best practice to conduct a small test using the turf paint on a limited area before trialling the most suitable removal method for the specific turf.

6.4 Goalposts

Depending on the non-football sporting event being hosted, there may be a need to install goalposts specific to the requirements of that sport. It is crucial that all staff involved in the installation and removal of the goal posts are properly trained. In some cases, and depending on the sport, the use

of specialist post erectors may be necessary. These specialists can ensure that the installation and removal process is carried out safely and efficiently and to a high standard, whilst reducing the risk of injury for those involved in the operation.



6.5 Case study:

Dual-purpose pitch maintenance (Brentford FC)

Adapting the Height of Cut Between Rugby and Football Matches

To accommodate the different requirements for rugby and football, the grounds team adjusts the height of the grass. For rugby matches, the target is 30 mm, and for football, it is 23 mm. However, this adjustment is dependent on the available time between matches. When time is limited, a compromise is made by adding a few millimetres to the grass height for rugby, without reaching the full 30 mm. This flexibility allows the team to manage tight timeframes without compromising the integrity of the playing surface.

Line Marking Process and Paint Removal

Line marking is an essential part of preparing the pitch for both sports. The team uses a washable paint applied using a wheel-to-wheel machine, focusing on painting only the leaf of the grass. This approach ensures that the paint is easily removable after matches, helping to transition the pitch between football and rugby without leaving unwanted marks or damaging the turf.

Pitch Maintenance for Optimal Conditions

The maintenance team employs several strategies to ensure the pitch is in optimal condition for both rugby and football. One key method is firming the pitch to minimise damage, particularly prior to rugby matches, which are more physically demanding on the surface due to the nature of the sport. If time permits, this step is crucial in maintaining a durable and even playing field.



Installing Rugby Goal Posts

The installation of rugby goal posts is managed efficiently using a specialist post erector attached to the back of a tractor. This mechanised approach enables the team to swiftly and safely install the posts, reducing manual labour and the time required for setup.

Pitch Maintenance for Double-Headers (Rugby and Football on Consecutive Days)

When rugby and football matches are scheduled on consecutive days, the pitch turnaround process is highly weather-dependent and requires a significant increase in staff resource. If rugby is played first, more than 20 staff members are involved in restoring the pitch for the next day's football match.

The process includes:

- 4 staff operating rotary mowers: These individuals handle initial mowing and debris clearance
- 2-3 people washing lines: They work to remove rugby markings and prepare for football line markings
- A divot repair crew: A dedicated team follows the washing crew to repair any divots or damage caused by the rugby match
- Transition to cylinder mowing: After completing initial repairs and line washing, the rotary mower operators switch to cylinder mowing to reduce the grass height back down to 23 mm for football

Best Practice Guidance for Dual-Sport Pitch Maintenance

The key to successfully hosting both rugby and football matches, especially on Premier League-standard pitches, lies in staffing. Having extra match day staff is crucial when transitioning between different sports, as it ensures the pitch meets the high standards expected for both rugby and football. Adequate staff resource is essential for delivering the expected quality, particularly when quick turnarounds are required.

Conclusion

The case study highlights the complexity and coordination required for maintaining a dual-purpose pitch for rugby and football. Efficient processes for grass height adjustment, line marking, post installation, and damage repair, coupled with sufficient staffing, ensure that the pitch remains in optimal condition for both sports.

07. Hosting non-sporting events



7. Hosting non-sporting events

7.1 Introduction

Stadiums that host Premier League fixtures are occasionally used for non-sporting events, such as concerts. The following section highlights key considerations when hosting a non-sporting event on a grass or reinforced turf pitch surface.

When a Club begins considering the hosting of a non-sporting event, it is essential to

first assess the nature of the event and the potential implications it may have on the pitch. While some events may not directly affect the pitch, most large-scale events will have some impact on the surface. This section focuses on events held directly on the pitch area, which are likely to affect the condition and integrity of the playing surface.



7.2 Event classification

Classifying events enables all stakeholders to better understand the potential implications, consequences, and associated costs, thereby facilitating more effective planning well in advance of the event.

The following classification system is widely used by sporting organisations globally. Each category is designed to assess the type of event based on its potential impact on the pitch, including the risk of damage to the surface.

Category 1

All event staging is positioned off the pitch, typically in the surrounding stands, with only a light-duty, translucent turf protection system used to cover the pitch. This type of event usually results in minimal damage, depending on how long the pitch is covered by the protection system.

Category 2

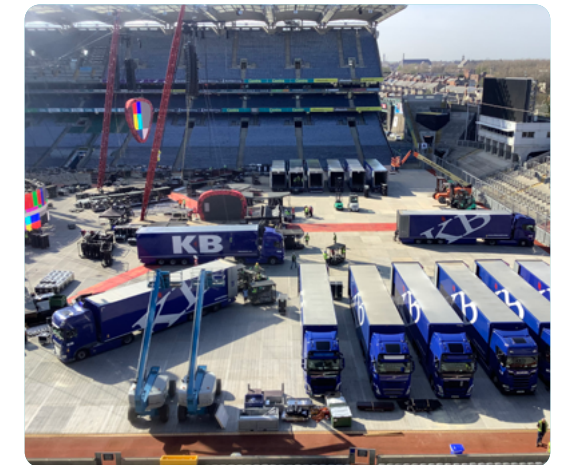
The stage is partially located on the pitch, with a secondary stage (or 'B' stage) placed on the playing surface. The pitch will require coverage with a mix of materials, potentially including steel trackway and a translucent turf protection system. The use of steel trackway depends on whether heavy-duty access is necessary. This type of event carries a higher risk of significant pitch damage.

Category 3

A stage is erected in the centre of the pitch, with spectators surrounding it. If a lightweight stage structure (such as scaffolding) is used and pitch protection is carefully managed, the risk of damage to the pitch can be minimised.

Category 4

Large structures, including or in addition to the stage, are constructed on the pitch, typical of major events or a large-scale concert. This type of event usually results in substantial pitch damage.



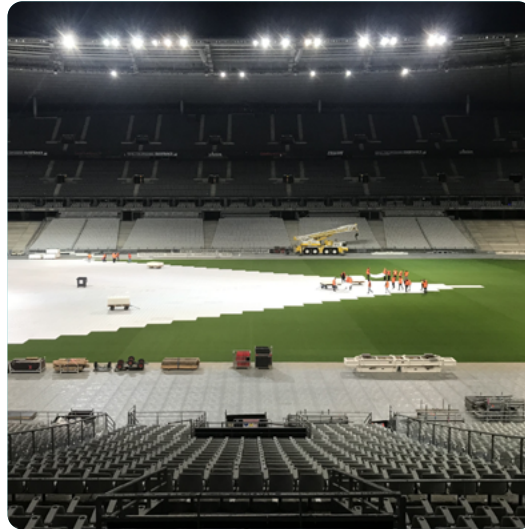
7. Hosting non-sporting events

7.3 Turf/pitch protection systems

Turf/pitch protection systems are generally categorised based on the material grade, ranging from lightweight to heavy-duty options. When selecting the appropriate protection system, it is crucial to determine the specific requirements. For instance, does the system need to support heavy loads, such as a stage, or is a lightweight system preferred for faster installation? Understanding the characteristics of each product and following the manufacturer's guidelines are essential steps in choosing the right system. Additionally, the time available for pitch recovery after the event may influence the decision on which protection system to use.

7.3.1 Lightweight systems

Light-duty pitch/turf protection systems typically consist of white or translucent panels with ventilation holes for drainage and air circulation. These systems can be easily installed and removed by hand. They are designed to withstand the weight and traffic of golf buggies and loaded trailers but are not suitable for forklift or truck access. These panels are also capable of supporting lightweight structures such as delay towers and staging. For cool-season grasses like those used in the Premier League, this type of system can generally remain in place for 5 to 7 days without causing significant damage, though some discolouration, such as yellowing, may occur due to weather conditions or the time of year.



Examples of lightweight pitch/turf protection systems include:

- Ultradeck 1
- ArmorDeck 1
- Terraplas range
- Matrax LD composite mats

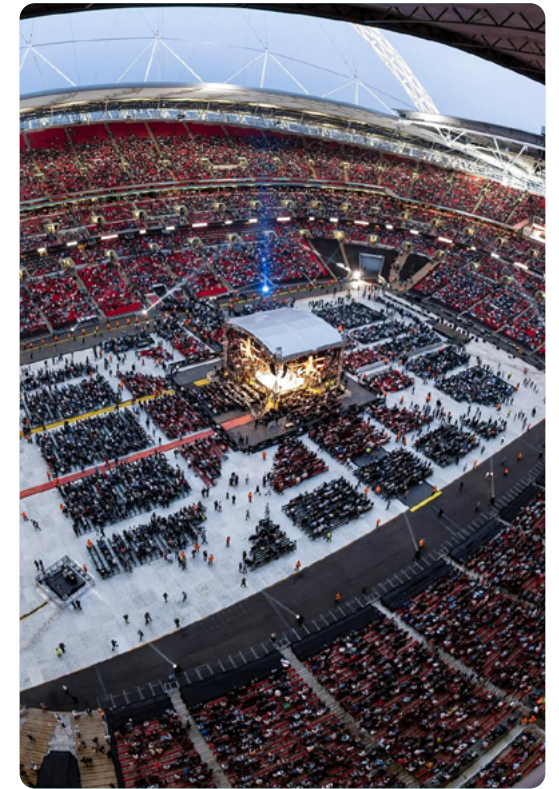
After the removal of the lightweight protection system, cool-season grass typically requires around 7 to 10 days to recover, provided the turf has been covered for a maximum of 5 to 7 days. This recovery period is dependent on optimal growing conditions and strict adherence to specific turf protection guidelines and management practices both before and after the event.

7.3.2 Heavy-duty systems

Heavy-duty pitch/turf protection systems are designed to support the weight of larger, heavier vehicles, such as cranes, which may be positioned on or near the pitch. These systems typically feature robust plastic panels, which can be either translucent or opaque, and are designed for quick installation and removal either by hand or with aluminium steel trackway. However, aluminium steel trackway panels can cause significant damage to the turf, even when left in place for a short period, and may also burn the turf under hot, sunny conditions.

Examples of heavy-duty pitch/turf protection systems include:

- I-Track
- Terratrak Plus
- Armor Deck 3
- Matrax 4x4 HD
- Aluminium steel trackway



7.4 Event planning and communication

If a Club is considering hosting an event that may impact Premier League fixtures, it is strongly recommended to consult with the Premier League at the early stages of planning.

The success of any sports event depends on careful planning and effective communication among all stakeholders throughout the planning process, event execution, and post-event activities. It is essential that all parties are involved in the early stages of planning to minimise and manage risks as effectively as possible.

Stakeholders typically involved in hosting a non-sporting event include:

- Event promoters and organisers
- Ground staff/pitch managers
- Stadium events team
- Stadium management
- Pitch consultant (if appointed)

7. Hosting non-sporting events

The event organiser or promoter should submit a comprehensive proposal to all relevant parties, outlining the stage structure(s), proposed pitch/turf protection system(s), and a detailed schedule of works. This schedule should include proposed dates and times for each phase of construction, installation, and dismantling, as well as vehicle movements (particularly for larger vehicles), staffing, materials, and equipment.

The proposal should also include information on any activities that could impact the pitch and surrounding areas, along with method statements for specific tasks, such as crane operations. This information should be provided at the earliest stages of planning to ensure all parties have adequate time to review, provide feedback, make necessary adjustments, and grant approval before any work begins.

Any changes to the event schedule or programme of works should be communicated to all parties as soon as possible to allow for adequate review and feedback. A detailed dismantling/de-rig schedule should be developed, similar to the construction/installation plan, specifying exact timings for each phase, method statements, and a final deadline for the removal of all protective coverings from the pitch.

Ongoing communication and consultation between all parties should also identify and address any potential risks to pitch infrastructure, such as irrigation heads, pitch perimeter, valve boxes, and the pitch reinforcement system, to prevent damage during the event.

7.5 Installation of pitch/turf protection system

The event organiser should ensure that all pitch/turf protection systems are thoroughly cleaned and dried before being delivered to the site for installation. Upon arrival, the grounds team should inspect the protection system to verify that all panels have been properly washed and dried before being laid on the pitch.

The installation of the turf protection system should begin at one edge of the pitch and progress inward. Any lightweight buggies or vehicles used to transport the panels should always drive on previously laid panels, never directly on the pitch/turf surface. The same approach should be followed during the removal of the system. Vehicles operating on the turf protection system must be driven cautiously, avoiding abrupt turns, sudden stops, and overloading. To minimise wear and prevent concentrated damage, entry points onto the pitch should be varied along its length, and all available pitch tunnels or access routes should be used equally.

When covering the pitch surrounds, allowance should be made for groundstaff to be able to access hose points so that localised irrigation can be carried out if required.

Excess equipment, including scaffolding poles, large cable coils, and sound or lighting transport boxes, should be properly stored and not left on top of the pitch/turf protection system (e.g., beneath the stage or delay towers). Storing such items in this way can block light and air from reaching the grass through the ventilation holes. If large quantities of cable or coils are needed, they should be neatly secured or suspended from the underside of the stage or delay tower to avoid obstructing airflow.

7.6 Staffing and protocols

The event organiser/promoter must ensure that there are sufficient and suitably trained personnel to facilitate the proper installation and removal of the pitch/turf protection system panels according to the agreed schedule. Foot traffic should be carefully managed and supervised to prevent unnecessary walking directly on the pitch surface. Any foot traffic on the pitch must be approved by the ground staff in advance.

All staff involved in set-up and removal should ensure their footwear is clean and free of any contaminants, such as soil, concrete dust, oils, or grease, which could potentially damage the turf.

Heavy vehicles should not be allowed into the stadium bowl unless the appropriate level of turf protection is in place. Ideally, vehicle access should be limited to forklifts, cherry pickers, golf buggies, and trolleys, with their movements restricted to what is absolutely necessary and always on the designated turf protection system. Under no circumstances should vehicles be allowed to travel directly on the turf.

The event organiser should ensure that all staff involved in set-up or dismantling are fully briefed on these requirements and made aware that they should not be on the pitch unless prior approval has been given by stadium management, ground staff, and the turf consultant, as applicable. Strict supervision and enforcement are essential to prevent any unnecessary activity on the pitch.

No materials, including food, pegs, nuts, bolts, hydraulic fluids, or fuel, should be placed directly on the turf, even temporarily. Additionally, strict controls should be in place for what substances are brought onto the pitch, especially after the protective

panelling has been laid—this includes during installation, dismantling, and the event itself, where possible. Alcohol, soft drinks, coffee, tea, and cigarettes should be strictly prohibited due to the potential damage they can cause to the turf. For example, alcohol may cause visible damage after a few days.

Cleaners should be tasked with removing all rubbish from the surface of the turf protection system before it is removed from the pitch surface and taken off site. This should take precedence over cleaning the stands and should ensure that dismantling proceeds on schedule with minimal debris on the pitch. Additionally, it is recommended that a towable magnet be kept on-site to sweep the pitch both before and after the removal of the turf protection system following any event.

7.7 Event timing

Given the Premier League fixture schedule, it is typically best to schedule events to coincide with major pitch renovation or redevelopment works at the end of the playing season, unless a retractable pitch system is in place. This allows the pitch to be covered for an extended period before being reestablished in time for the next season. It is crucial to keep in mind that adequate time will still be needed after the event to restore the pitch surface for the new Premier League season.

If the pitch needs to be reestablished from seed, a recovery period of six to ten weeks is required. However, if turf (such as a carpet-type hybrid reinforcement system) is used for reestablishment, this time frame can be shortened to one to two weeks.

The timing of the event will often play a key role in determining the appropriate pitch/turf protection system to be used.

7. Hosting non-sporting events

7.8 Typical steps for hosting a non-sporting event

The following outlines a typical programme for pitch works surrounding an event. Two options are presented: Option 1 involves the removal of the pitch surface. Option 2 retains the existing pitch surface.

Option 1 – pitch surface removal/renovation

Pre-event

- Conduct a thorough condition assessment of all pitch infrastructure, including, but not limited to, the irrigation system, undersoil heating, pitch reinforcement system, surface levels, etc
- Remove the pitch surface by fraise mowing. If time is limited, mow the pitch as closely (low) as possible
- Protect sprinkler heads as necessary
- Lay geotextile over the entire pitch area. This should be done before installing the pitch/turf protection system
- Install the pitch/turf protection system across the entire pitch area. Ensure all panels are thoroughly washed and dried before installation. The protection system should be appropriate for planned loads and meet all necessary pitch protection standards

Post-event

- Clean and remove all rubbish and debris from the surface of the pitch protection system
- Carefully remove the pitch protection system, ensuring no damage occurs to the pitch surface
- Remove the geotextile, ensuring all debris is collected and prevent it from coming into contact with the pitch surface
- Use a magnet to sweep the entire pitch and surrounding areas, removing any metal objects such as nuts and bolts. Multiple passes may be required
- If necessary, fraise mow the pitch surface
- Continue with the planned pitch renovation. [Refer to Section 5](#)
- Allow for grow-in or turfing phase. Only required if the pitch surface was removed prior to the event

Option 2 – pitch surface retained

If the pitch surface is to be retained after the event, it is crucial that pitch management and maintenance leading up to the event are carefully planned to ensure the pitch is in optimal condition before the installation of the pitch/turf protection system.

Timing is even more critical when the pitch surface is to be retained, as every additional minute the pitch is covered increases the risk of added stress and potential damage.

Pre-event

- Conduct a thorough condition assessment of all pitch infrastructure, including but not limited to the irrigation system, undersoil heating, pitch reinforcement system, surface levels, etc
- Protect sprinkler heads and other pitch infrastructure as needed
- Perform a final mow of the pitch before installing the pitch/turf protection system
- Apply necessary plant protection products, such as contact fungicide, wetting agents, or plant growth regulators
- Install the pitch/turf protection system across the entire pitch area. Ensure all panels are thoroughly washed and dried prior to installation. The protection system must be suitable for the required loadings and meet the necessary pitch protection standards

Post-event

- Clean and remove all rubbish and debris from the surface of the pitch protection system
- Carefully remove the pitch protection system, ensuring no damage is done to the pitch surface
- Use a magnet to sweep the entire pitch and surrounding areas, removing any metal objects such as nuts and bolts. Multiple passes may be necessary

Utilise all available pitch maintenance resources to restore the pitch as quickly as possible and return it to optimum condition.

7.9 Case study:

Hosting a Non-Sporting Event (Newcastle United FC)

Club: Newcastle United FC

Event: Sam Fender concert at St James' Park

Dates: 9th and 10th June 2023

Event Overview

Newcastle United FC hosted two Sam Fender concerts on consecutive nights at St James' Park, attracting over 100,000 fans in total. This would be categorised as a Category 4 event held during the off-season prior to the start of the Premier League Season. Given Sam Fender's local roots, the event was a significant occasion requiring detailed planning and coordination with the Club's grounds team.

Planning and Coordination

The grounds team were involved in the planning stages to coordinate pitch maintenance and renovation activities related to the event. Details for the concert were officially confirmed between December 2022 and January 2023, allowing the team to plan the necessary preparations beforehand and the required renovation work afterward.



Pitch Preparations Before Setup

- The last home Premier League match of the Season took place on the 22nd May
- This was followed by the Rugby League Magic Weekend on 3rd and 4th June
- Concert set-up works commenced immediately after the Magic Weekend, on the 4th June
- Prior to the Magic Weekend, the pitch was treated with glyphosate
- Immediately after the Magic Weekend, the grounds team worked alongside the concert setup crew to remove the rugby goalposts and LED advertising boards, facilitating pitch protection installation

Pitch Protection Measures

- A heavy-duty plastic pitch protection system was laid across the entirety of the pitch
- Metal trackway sections were installed in high-load areas, such as under the stage and delay (sound) towers
- The pitch was covered by the pitch protection system for approximately one and a half weeks. Works to remove the pitch protection system commenced approximately two days after the concert, when the stage and key infrastructure had been dismantled

Concert Setup

- A large stage was erected at the southern end of the pitch
- Delay (sound) towers and screens were installed on the pitch
- It took approximately five days for the full concert setup to be completed
- Two members of the grounds team supervised the installation of the pitch protection system and general concert setup to prevent any damage to the pitch or pitch infrastructure
- No water ballasts were used for the staging of this concert, unlike previous events where the irrigation system was used to fill ballast tanks requiring assistance from the grounds team

Post-Concert Pitch Condition

Once the pitch protection was removed following the concert, the grass was found to be dead, with a significant amount of rotting material.

The surface was extremely hard due to prolonged covering and loading from the concert infrastructure, spectators and vehicle movements. Concert goers were present both on the pitch and in the stands.

Renovation Work

Immediately after the pitch protection system was removed, the surface was verti-drained to relieve compaction.

- A full renovation was conducted, including:
 - Surface removal using a Koro Field Top Maker
 - Raking and application of 120 tonnes of sand
 - Seedbed preparations, seeding and fertiliser application
- Germination sheets were used in the more shaded southern end of the pitch to speed up germination times

Post-Concert Football Usage

A friendly tournament, including four men's games and a women's match, took place six weeks after the pitch renovation works. The pitch was playable but not optimal for this tournament with grass coverage weaker than would be considered optimal.

By the first home Premier League fixture on 12th August, the pitch was in excellent condition, benefiting from an additional two weeks of growing time after the friendly tournament.

Conclusion

This case study highlights the importance of early proactive planning and pitch protection in successfully hosting large-scale non-sporting events at football stadiums. Newcastle United FC's experience with the Sam Fender concert demonstrates how effective coordination can minimise disruption and ensure the playing surface is restored to high standards in time for the Premier League Season.





08. Resourcing

8. Resourcing

8. Resourcing

To ensure that pitches used for Premier League fixtures meet the highest standards, it is expected that sufficient resources are allocated. This includes a skilled grounds

team with the necessary expertise, high-quality pitch maintenance equipment and materials, and suitable facilities.

8.1 Grounds team

It is expected that either the Club or stadium employs an in-house grounds team who are responsible for various tasks, including but not limited to:

- Developing and implementing a comprehensive pitch maintenance programme to achieve an elite level playing surface
- Preparing the pitch for matches and training sessions
- Organising and supporting other sporting and non-sporting events
- Planning and overseeing pitch renovation work
- Managing and coordinating pitch construction projects

The size and composition of the grounds team should be customised to meet the specific needs of the stadium, ensuring the provision of an elite-level playing surface. Key factors to consider when determining the size of the team include:

- Additional responsibilities, like managing training ground pitches
- The proposed usage schedule, including the number of fixtures and events. As the number of fixtures increases, additional personnel will be needed to ensure the pitch is adequately prepared and maintained
- The need for specialist expertise (e.g., in managing specific pitch systems and related infrastructure)

As a general guideline, a grounds team responsible for a Premier League pitch should consist of at least four staff members, including a head grounds person. Staffing levels should be increased on match days to ensure all match day tasks are effectively completed to achieve the required quality ([Refer to Section 10](#)). This may include the provision of external matchday support. In the case of additional football fixtures or other sporting and non-sporting events, the size of the grounds team should be adjusted accordingly to accommodate the increased workload.

8.2 Staff management

The demands placed on the grounds team can be substantial, making it crucial to manage staff effectively in order to protect their wellbeing and maintain the elite level standards required for pitches hosting Premier League fixtures. This involves ensuring that staffing levels are adequate to meet the demands of both the number of fixtures and the condition of the pitch. Equally important is managing working hours to prevent fatigue and promote a healthy work-life balance. UK legislation states that employees cannot work more than 48 hours a week on average. This law is sometimes called the 'working time directive' or 'working time regulations'. Employees can choose to work more by opting out of the 48-hour week.

Effective scheduling, regular breaks, and adequate rest periods are crucial for maintaining staff focus, efficiency, and motivation. Equally important is promoting a supportive work environment that offers opportunities for continuous professional development, training, linked to a well-structured appraisal process. These initiatives enable staff to enhance their skills, expand their expertise, and feel adequately supported.

Ensuring the availability of appropriate assistance and wellbeing support structures is essential to supporting the members of the grounds team effectively.



8. Resourcing

8.3 Grounds management framework - skills and knowledge matrix

The Grounds Management Association (GMA) provides a skills and knowledge matrix as part of its Grounds Management Framework, which outlines the competencies required to maintain pitch surfaces at various quality levels. Within this framework, a Premier League pitch is classified as “elite”, demanding the highest standards of skills and expertise.

The following is a summary of the competencies for a head grounds person. It is expected that the head grounds person, or the individual responsible for pitch management, should either possess these competencies or be supported to develop them.



Elite

A pitch/surface that is of outstanding quality and meets the standards for play for elite sport in the UK. It meets the playing needs and expectations of professional athletes, both nationwide and globally.

Subject	Deputy/Assistant Head Grounds Person	Head Grounds Person
Personal		
	Be capable of working in a junior management, or technical role	Be able to fulfil a senior management role
	Be able to control budgets	Be able to interact with Board members
	Be able to manage staff at an advanced level	Be able to communicate at an advanced level
	Be able to develop working procedures and protocols	Be able to provide a high level of work expertise and competence in managing and training others
	Be able to create and manage business plans	Be able to manage programmes and portfolios
	Be able to provide guidance and support to others	Be able to negotiate
	Be able to manage projects	Be able to respond to complex situations and work demands
	Be able to analyse and evaluate work	Be able to price and plan projects
	Be able to lead	
	Be able to manage a team	
	Be able to manage contractors	

Subject	Deputy/Assistant Head Grounds Person	Head Grounds Person
Operations		
Machinery and materials	Have a detailed knowledge and understanding of all machinery and materials available across the industry	Have an awareness of innovations and changes to materials and machinery across the industry
Pitch preparation	Have a detailed knowledge and understanding of all turfcare operations	Have an awareness of changes to best practice operations and innovations across the industry
Management		
Grounds Management	Have a high level understanding of sports turf agronomy	Have an advanced up to date practical, theoretical and technological knowledge and understanding of sports turf management
	Be able to produce a proactive pest management- Integrated Pest Management (IPM) programme	Be able to understand the extent of green space and how it can be managed effectively
	Have the understanding and ability to sustainably manage turfgrass surfaces	Have an understanding of warm season grass management
	Have a good understanding of soil science	Be able to understand the management of different non-turf surfaces.
Assessment	Be able to show detailed and specialist knowledge level, of sports turf management.	Be able to explore and understand how current and future developments and innovations can impact on the turf care industry.
	Be able to show an understanding of the purpose and benefits of waste minimisation	
Construction	Be able to evaluate and understand a full Performance Quality Standards (PQS) result and implement turfcare practices/processes to produce optimum results	Be able to adapt and use appropriate practical skills to address more complex problems. Carry out basic and evaluate actions, methods and results
	Have basic design skills and competence for small scale works only	Understand how to make effective turf management decisions based on environmental conditions.
		Be able to produce a design brief for the construction of non turf, natural and hybrid turfgrass surfaces

8. Resourcing

Subject	Deputy/Assistant Head Grounds Person	Head Grounds Person
Outsourcing / contractors	Have the ability to project manage from concept to completion	Be able to report and present findings to senior management
	Be able to manage procurement of equipment and services	Are capable of directing, advising, and assisting external specialist designers and consultants
	Have the ability to understand contract specifications for regular maintenance work such as end of season renovation, spraying, basic drainage/irrigation	Have an understanding of and competence to undertake effective contract management.
	Be capable of assisting external specialist designers	
Health and Safety	Are able to oversee health and safety management	Are able to understand the principles and applications of managing risk, write H&S policy and the benefits of a positive health and safety culture.

8.4 Pitch maintenance equipment

It is expected that the grounds team has access to high-quality and appropriate pitch maintenance equipment. The specific models, makes, and types of equipment will be tailored to each grounds team's needs and maintenance programme.

It is recommended that the Club should be in possession of, or have access to, the certain items of pitch maintenance equipment as a minimum. The numbers of each individual item of equipment may need to be adjusted based on the number of staff members. This equipment list outlines the recommended minimum requirement machinery required for day-to-day maintenance activities. Additional equipment will be necessary for tasks such as annual renovations, should they be carried out by the grounds team.



Type of equipment	Minimum Nr.
Tractors	1
Pedestrian cylinder mowers	4
Pedestrian rotary mowers	4
Pedestrian aerators	1
Tractor mounted aerators	1
Pedestrian sprayer	1
Tractor mounted or ride on spraying units	1
Topdresser	1
Overseeder	1
Pedestrian fertiliser spreader	2
Line marker	1
Tractor mounted brushes	1
Tractor mounted rake	1
Brushes for artificial turf	1
Tine rake for artificial turf	1

8. Resourcing

8.5 Facilities for the grounds team

Providing adequate facilities for the grounds team is essential for staff welfare and for maintaining the highest quality playing surface. The Workplace (Health, Safety and Welfare) Regulations 1992 require employers to provide welfare facilities for their employees.

General welfare facilities required by the grounds team include:

- Kitchen/ food preparation area and access to drinking water
- Relaxation/seating area
- Clothes drying room
- Changing room
- Workstations (desk and computer)
- Shower
- Toilet and welfare facilities
- Meeting room

2024 Premier League Pitch Survey

93.75%

of Premier League grounds teams have access to a kitchen/food preparation area.

93.75%

of Premier League grounds teams have access to a relaxation/seating area.

62.50%

of Premier League grounds teams have access to a clothes drying room.

75%

of Premier League grounds teams have access to work stations (i.e. a desk and computer).

37.50%

of Premier League grounds teams have access to a meeting room.

68.75%

of Premier League grounds teams have access to a shower.

8.5.1. Spatial considerations

8.5.1.1. Equipment storage

Equipment Storage

The stadium or Club should provide a secure, covered storage area for pitch maintenance equipment. The space should be well organised with shelving, racks and other accessories. Equipment should be stored to allow easy access for cleaning and ongoing maintenance. The equipment storage area should be located close to the pitch with easy and safe access from the storage area to the pitch.



Workshops

A dedicated workshop space is important for equipment maintenance and repairs. The workshop should be equipped with workbenches, power outlets, tool storage, and safety features like ventilation and lighting. Having an on-site workshop reduces downtime by allowing quick repairs, ensuring the equipment is always operational and ready for use.



Washdown area

A suitable area for washing down maintenance equipment following use. This should be equipped with both cold and hot water and have sufficient drainage to allow for washing of multiple pieces of equipment at the same time in accordance with the Groundwater Act 2009. The use of a self-contained cleaning system is becoming more common, and these can also allow for reductions in water usage.



8. Resourcing

8.5.1.2. Materials and infrastructure storage

Consumable materials (e.g. fertilisers, plant protection products, grass seed and topdressing material etc)

A secure well-ventilated room with relevant temperature controls is needed to store fertiliser and chemicals (Chemical vault). Storage of fertilisers and chemicals should be in line with the relevant regulation outlined by HSE (Health and Safety Executive) and as part of COSHH (Control of Substances Hazardous to Health). It is optimal to have an area to store a large quantity of sand topdressing with good access to the pitch.

Infrastructure Storage

Adequate space should be designated for the storage of irrigation infrastructure (including water storage tanks, control systems, and pump sets), vacuum and ventilation systems (plant and control systems), undersoil heating infrastructure, supplementary lighting rigs, fan storage, pitch equipment (such as spare goals, portable goals, corner flags, pitch testing tools, etc.), pitch drainage infrastructure (if applicable), pitch protection systems, and weather monitoring and data systems.



Chemical store

8.5.1.3. Staff welfare facilities

Break room and rest areas

Premier League grounds teams often work long, physically demanding hours, particularly during busy periods or extreme weather conditions. A comfortable break room with seating, kitchen amenities, climate control (heating and air conditioning), and access to high-speed internet/Wi-Fi provides a space for the team to rest, eat, and recharge.

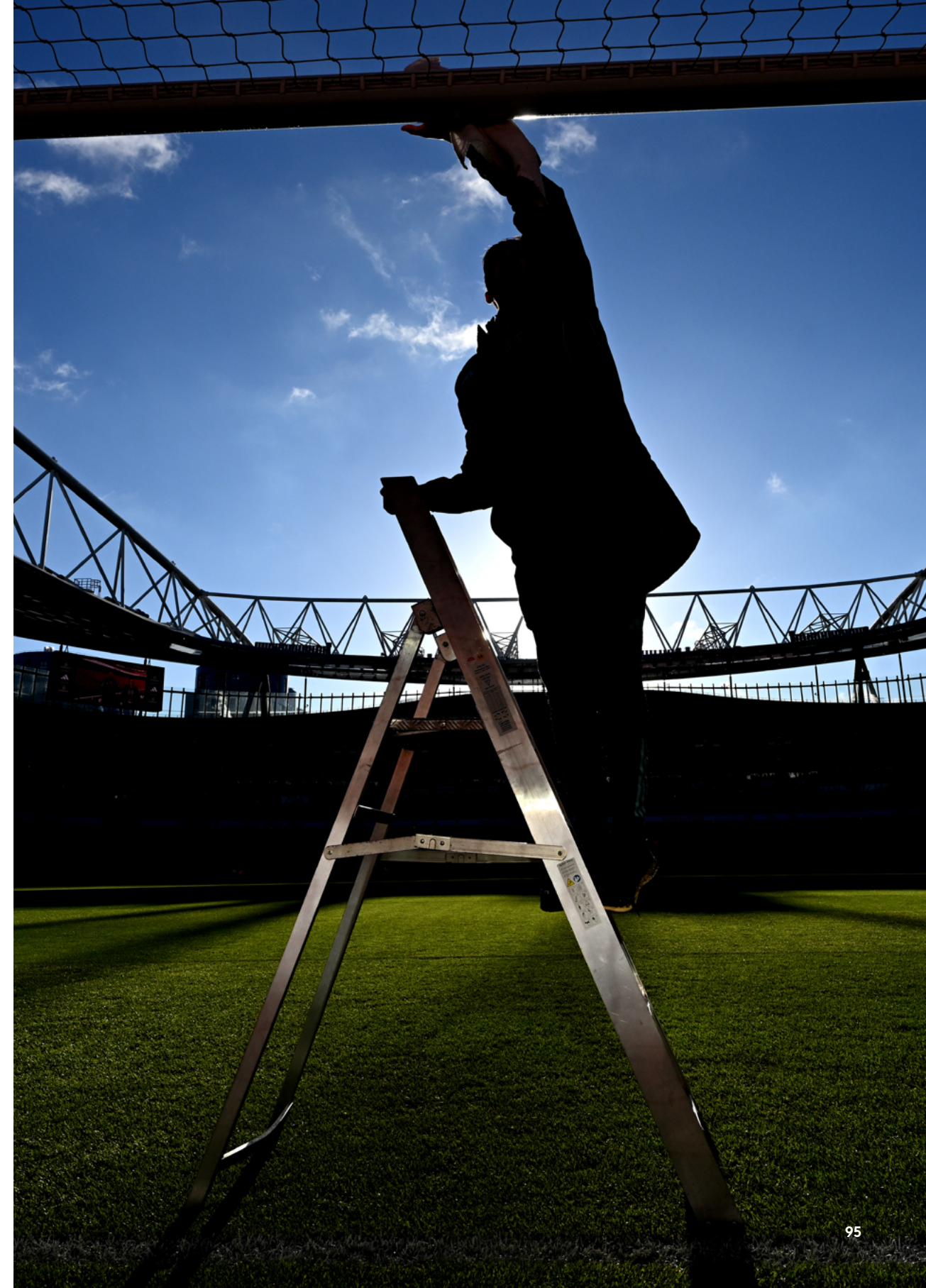
Changing, shower, and drying facilities

Since the grounds team works primarily outdoors and is often exposed to the elements, it is essential to provide clean, private changing rooms and shower facilities to ensure they can maintain personal hygiene and comfort throughout the day. Showers are particularly important for health and safety, especially when handling chemicals, in line with HSE guidelines. Drying facilities are also crucial, particularly during the winter months, allowing staff to hang wet gear and change into dry, warm clothing.

8.5.1.4. Meeting room facilities

Meeting room and operations office

A meeting area provides space for team briefings, strategy sessions, and debriefs after games. It is also useful for coordinating with stadium management to discuss specific pitch preparation needs or logistics. The grounds team requires an administrative office for planning and coordinating their work. This space should be equipped with computers, monitors for viewing weather forecasts, turf health data, and other monitoring systems, as well as storage for pitch maintenance logs and schedules. Access to high-speed internet/Wi-Fi is essential for these monitoring systems to operate efficiently.





09. Sustainable pitch management

9. Sustainable pitch management

9. Sustainable pitch management

It is an expectation that a sustainable approach is adopted to the design, construction and ongoing management of pitches used to host Premier League fixtures to minimise environmental impact and reduce the carbon footprint.

For elite-level stadium pitches, sustainable pitch management involves a range of factors, requiring a holistic approach.

This includes, but is not limited to, the use of innovative technologies and materials, efficient management of power and water resources, waste reduction, and the implementation of a sustainable pitch maintenance programme based on the principles of Integrated Turf Management (ITM).

9.1 The use of innovative technologies and materials

A variety of innovative technologies and materials are available to maintain pitches to the highest possible standards while ensuring sustainability. These include:

Electric Pitch Maintenance Equipment

The use of electric-powered mowers and tractors helps reduce reliance on petrol-powered machinery, which is more harmful to the environment. These electric alternatives are also quieter, reducing noise pollution.

Pitch Management Applications and Monitoring Systems

A range of proprietary applications are available to support grounds teams in achieving sustainable pitch management. These tools typically assist with managing critical aspects, including:

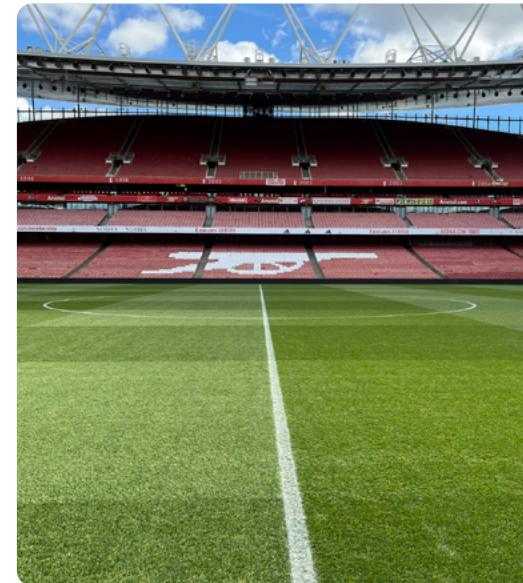
- Staff Management – Scheduling, assignments, and resource allocation
- Task Management – Planning, tracking, and completing daily operations
- Machinery and Equipment Management – Maintenance schedules, usage tracking, and asset management
- Inventory Management – Monitoring stock levels, reordering, and storage

- Product Application Planning & Record Keeping – Tracking the application of fertilisers, plant protection products, and other treatments
- Financial Management & Budgeting – Cost control, expense tracking, and budget planning
- Reporting – Generating detailed reports on pitch performance and maintenance activities
- Pitch Performance Testing – Collecting and reporting data on key pitch performance indicators



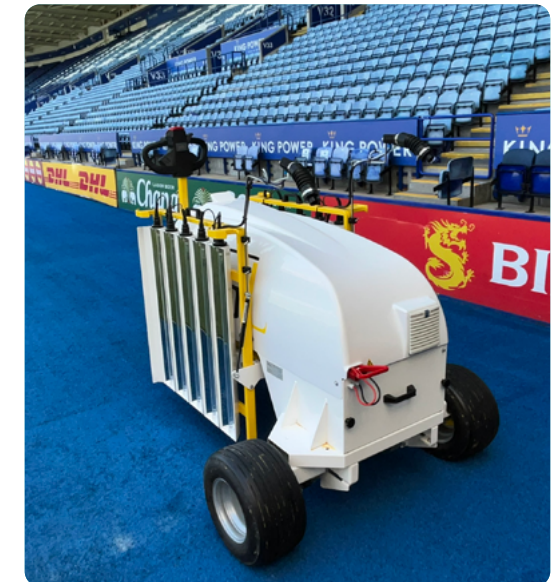
Environmentally Friendly Materials

Choosing sustainable materials during both pitch construction and ongoing management can significantly reduce the carbon footprint and minimise environmental impact. As an example, many pitch marking paints are formulated to be water-based, which reduces the environmental impact of the chemicals used. These water-based paints can be applied without harmful solvents, and many are designed to be biodegradable.



Innovative Machinery

Innovative machinery, used as part of an Integrated Turf Management (ITM) approach, helps maintain turf health sustainably. An example is a UVC machine that emits ultraviolet light to kill fungi and reduce turfgrass disease pressure, promoting a healthier pitch with less chemical intervention.



9.2 Integrated turf management (ITM)



9.2.1 General principles

It is expected that Clubs and their grounds teams apply the principles of Integrated Turf Management (ITM) when maintaining pitches for Premier League fixtures.

The core focus of Integrated Turf Management (ITM) is to foster a healthy grass plant through sustainable turf management practices that take into account environmental factors and maintenance techniques. When ITM is properly implemented, issues can be addressed early, preventing them from escalating into larger, more difficult-to-manage problems later.

Integrated Turf Management (ITM) involves understanding the root causes of pests, weeds, and diseases and other threats to turf health, allowing for targeted curative treatments and prevention of future occurrences.

ITM requires a deep understanding of the specific pests, weeds, or diseases, enabling the grounds team to identify when conditions are most favourable for their development. By recognising these environmental factors, the team can implement proactive maintenance practices to mitigate the risks and prevent issues from arising. The final step in an ITM approach involves the use of plant protection products (PPPs). However, these products should only be applied when necessary to address an urgent pest, weed, or disease outbreak.

9.2.2 Health versus growth

When managing an elite level football pitch, it is easy to assume that vigorous growth equates to a healthy grass plant. While this is true in some cases, uncontrolled or excessive growth can be undesirable. Growth is essential for recovery from wear, allowing the grass plants to mature and the turf canopy to thicken. However, it is crucial to balance growth with the overall health of the plant, as a healthy plant is stronger and more resilient.

An ITM-based programme for football pitches aims to balance the need for biomass replacement and turf recovery with the promotion of a healthy, resilient plant. The goal is simple: a healthy plant, growing at an optimal rate, will provide the best playing surface — one that can withstand both the stresses of play and pressures from pests, weeds, and diseases.

9.2.3 Water availability

A major challenge for Premier League Clubs in the future will be the growing limitations on water availability as resources become more constrained. Developing a long-term water management strategy will be critical to ensuring a sustainable water supply for Clubs. Key components of this strategy include:

Water Harvesting

Collecting alternative water sources, such as rainwater, can provide a valuable irrigation resource. This method not only conserves water but also offers potential cost savings by recycling water for use on the pitch

Alternative Water Sources

Using greywater or treated sewage effluent (TSE) for irrigation can help reduce reliance on potable water, easing the strain on local water supplies and providing an eco-friendly alternative

9. Sustainable pitch management

9.3 Power and water resources

Effective management of power and water resources is essential for the sustainable upkeep of a pitch. Here are several sustainable approaches that can be implemented:

LED Supplementary Lighting Systems

LED lighting systems typically require less power, especially when used without infrared heating elements, making them a more energy-efficient choice for supplementary pitch lighting.

Energy-Efficient Undersoil Heating Systems

The design and installation of energy-efficient undersoil heating systems can significantly reduce both gas and electricity consumption, helping to lower the carbon footprint of pitch maintenance.

Sustainable Drainage Systems

Installing drainage systems that either collect and reuse stormwater or discharge it sustainably according to SuDS (Sustainable Drainage Systems) principles can

reduce water usage, minimise flood risk downstream, and prevent the discharge of nitrates from pitch fertilisers into watercourses and sewer systems.

Smart Irrigation Systems

Smart irrigation systems work in conjunction with monitoring and sensor technology to ensure that only the necessary amount of water is applied, preventing over-irrigation and optimising water usage.

Sub-Surface Irrigation Systems

These systems deliver water directly to the rootzone from below the construction profile. Sub-surface irrigation improves water use efficiency by reducing evapotranspiration losses and lowering reliance on overhead irrigation systems.

Rainwater Harvesting

Stormwater collected from the pitch or stadium roof can be captured and reused for irrigation or other stadium facilities, helping to conserve potable water and reduce overall water consumption.



9.4 Waste reduction



Waste generated during pitch maintenance activities should be managed in a way that minimises waste and supports sustainability objectives. The following guidelines should be followed:

Grass Clippings

If grass clippings are not being repurposed for sustainable initiatives within the stadium, they should be collected by a commercial waste service and transported to a green waste facility for recycling or composting.

Chemical Containers Disposal

For containers that have held chemicals (e.g., plant protection products), they must be thoroughly rinsed according to the manufacturer's instructions (usually triple rinsed). The rinse water should be returned to the sprayer for its intended use and not disposed of down a drain or on the ground.

Labels should be removed, and the containers should either be returned through specialised collection programmes or recycled if they are clean and free of chemical residue.

Disposal of Waste Materials

Other waste materials such as fertiliser bags, cardboard packaging, and containers should be recycled in accordance with local recycling guidelines.

Recyclable Equipment and Materials

Wherever possible, recyclable materials and equipment should be incorporated into both the pitch construction and ongoing maintenance. For example, certain types of PVC pipes used in pitch drainage systems can be recycled at the end of their lifecycle.

Disposal of waste oils

Do not dispose of waste oils from pitch maintenance equipment down drains. Ideally, these oils should be recycled through a company that specialises in oil recycling and offers waste collection services.

For large quantities of waste oil, engage a licensed hazardous waste disposal company to ensure the oil is either properly disposed of or recycled in an environmentally responsible way.

Disposal and Recycling of Hybrid Reinforcement System Materials

Whenever possible, fully recyclable or biodegradable materials should be used in place of plastic-based options.

If plastic-based materials, such as fibres or backing materials are used, extra care should be taken to prevent their contamination with organic materials. This is particularly important during surface renovations or pitch reconstructions.

If plastic materials become mixed with the organic material removed from the pitch, every effort should be made to separate them, using methods like sieving or a trundle wheel.

Once the plastic materials are separated, all efforts should be made to recycle or repurpose them. If this is not feasible, the plastic should be disposed of through a specialist licensed waste company.

9.5 Case study:

Sustainable pitch management (Aston Villa FC)

Club Overview

Name of Club: Aston Villa FC

Name of Stadium: Villa Park

Sustainability Initiatives in Pitch Management

Transition to Battery-Operated Equipment

A significant milestone in the grounds team's sustainability journey was the shift from petrol and diesel-powered machinery to battery-operated equipment. This transition primarily focused on mowers and sprayers, which were key targets. By adopting electric-powered machines, the team has greatly reduced carbon emissions and noise pollution, while also decreasing reliance on fossil fuels.

Adjusted Use of Supplementary Lighting Units

The grounds team have made significant adjustments to how they use supplementary lighting units, aiming to make them more effective and efficient. For instance, they now use the lights more during daylight hours and ensure they are turned off at night. This mimics a natural diurnal cycle, in other words where there is a distinct day and night, while reducing the amount of electricity consumed. By strategically using the lighting units, the grounds team are able to cover the surface more frequently, resulting in more effective results in helping the grass recover, particularly during periods of intense use or adverse weather conditions.

Use of UV Machine for Fungicide Reduction

To reduce chemical use, the grounds team has introduced a UVC machine, which has proven highly effective in cutting down the need for fungicides. This technology has enabled a more natural approach to turf management, fostering a healthier surface with fewer chemicals and supporting their sustainability goals.

Reduction of Fertiliser Usage

Another key sustainability improvement has been the reduction in fertiliser use, especially during the grow-in period. By significantly cutting back on fertiliser application, the grounds team has not only lowered their environmental impact but also reduced reliance on fungicides, as the reduced fertiliser load can naturally reduce disease pressure for certain turfgrass diseases common on football pitches. This initiative is part of the grounds team's commitment to maintaining a healthy and sustainable pitch without heavy dependence on chemical treatments.

Water Management and Wetting Agents

Water management has been a key focus area for the grounds team, who have experimented with both granular and liquid wetting agents to enhance moisture retention in the rootzone. During the grow-in phase, their goal has been to maintain moisture as low as possible, reducing the need for excessive irrigation while still supporting turf health. By managing moisture more effectively, they can retain nutrients for longer and minimise leaching, ensuring the pitch remains sustainable over the long term.

Water management is an area where Premier League Clubs could benefit from greater attention. Reducing excessive irrigation not only conserves water but also improves nutrient retention in the rootzone. By using wetting agents and moisture management techniques, Clubs can maintain optimal moisture levels without over-irrigating, preventing nutrient loss.

Conclusion

The grounds team at Aston Villa FC has made impressive progress in adopting sustainable practices that have enhanced pitch quality and reduced their environmental footprint. Initiatives like improved water management and reduced chemical use not only support the Club's environmental goals but also ensure the maintenance of a world-class playing surface.



9.6 Case study:

Sustainable pitch management (Southampton FC)

Club Overview

Name of Club: Southampton FC

Name of Stadium: St Mary's Stadium

Sustainability Initiatives in Pitch Management

Southampton FC has embraced a range of sustainable practices in the management and maintenance of the pitch at St Mary's Stadium. These initiatives aim to reduce the environmental impact of operations while maintaining a high-quality playing surface. The Club's efforts to integrate green technology and reduce reliance on chemicals represent a forward-thinking approach to sustainability in sports turf management.

LED Grow Lights

To promote healthy grass growth, especially during periods of low natural sunlight, Southampton FC uses LED grow lights. These lights are energy-efficient compared to traditional supplementary lighting systems and allow for targeted, controlled light exposure that stimulates grass growth without the excessive energy consumption associated with conventional methods. The use of LED technology contributes to reducing the Club's carbon footprint while maintaining the pitch in optimal condition.

Battery-Powered Mowers

In line with their commitment to sustainability, Southampton FC employs battery-powered mowers for pitch maintenance. These mowers produce

zero direct emissions, unlike traditional petrol-powered alternatives, thus reducing the Stadium's overall greenhouse gas emissions. Additionally, battery-powered equipment tends to be quieter, contributing to reduced noise pollution and better working conditions for the grounds team. This initiative is an important step toward lowering the environmental impact of routine pitch care.

UVC 180 Non-Chemical Disease Prevention

Another key innovation at St Mary's Stadium is the use of a UVC 180 system for non-chemical disease prevention. This ultraviolet (UV) treatment technology helps to prevent turf diseases by disrupting the DNA of harmful pathogens, such as fungi, without the need for chemical fungicides. By reducing or eliminating the use of chemical treatments, this initiative contributes to healthy turf growth and decreases the reliance on synthetic products and supports the long-term sustainability of the pitch.

Conclusion

Southampton FC's sustainability initiatives demonstrate a commitment to environmentally responsible pitch management. By incorporating LED grow lights, battery-powered mowers, and UVC technology for disease prevention, the Club not only reduces its environmental footprint but also sets a strong example of how sports stadiums can adopt sustainable practices without compromising the quality of the playing surface.





10. Match day pitch preparation

10. Match day pitch preparation

10.1 Timings



The pitch should be prepared to the highest possible standard for Premier League matches. Each grounds team participating in a Premier League match must comply with the relevant timings within the Countdown to Kick-Off included in the Match Day Information Sheet produced by the Premier League. All pitch preparation and maintenance activities must be completed in good time before each League match. This includes mowing, line marking, the installation of pitch equipment such as goals and corner flags, and any other maintenance tasks necessary to ensure the pitch is fully prepared for play.

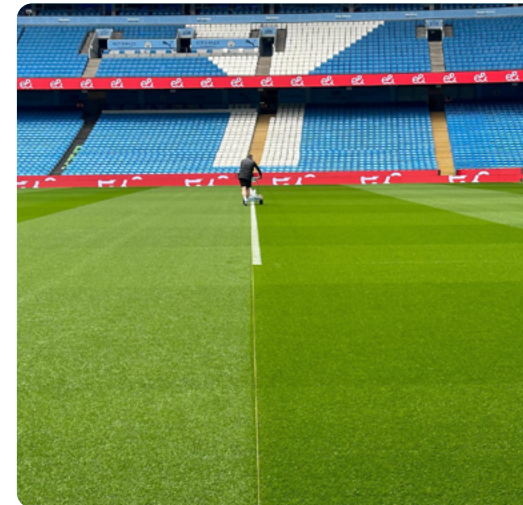
Before match day, ground staff must ensure that all fertiliser applications comply with relevant health and safety regulations, especially concerning the timing of the final application. Likewise, if Plant Protection Products (PPPs) are required for weed, pest, or disease control, the necessary health and safety procedures must be strictly followed to protect players, officials, and anyone present around the pitch.

10.2 Line markings

Clubs should use all reasonable endeavours to ensure pitch lines are painted in accordance with the following timings:

- for Kick Offs before 15:00, by 09:00 that day; or
- for Kick Offs at or after 15:00, five hours prior to Kick Off.

Clubs are advised to maintain communication with their regional Hawk-Eye representatives to discuss any changes to the schedule for pre-match camera and equipment tests.



10.3 Match day irrigation



Unless clearly detrimental to the playing surface or otherwise affected by adverse precipitation, the pitch shall be watered in the period between 10 minutes and 5 minutes prior to kick-off, and at half-time. All pitch watering must be carried out evenly over the length and width of the pitch.

This should be done using the pitch irrigation system, unless adequate rainfall has already occurred, making irrigation unnecessary.

Changes to the pitch-watering schedule should be communicated to the Match Delegate pre-match. Changes to pitch watering may be requested by the Match Referee.

10. Match day pitch preparation

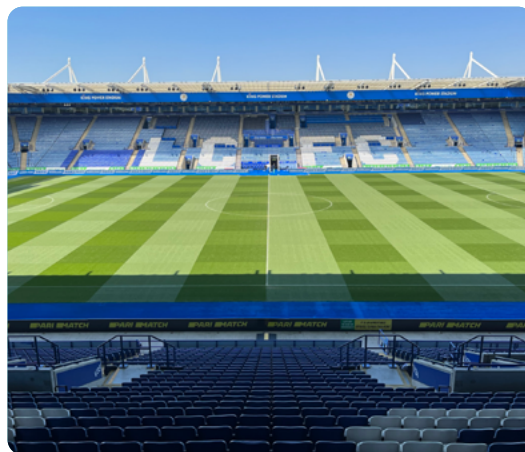
10.4 Grass height



Premier League Rules specify that height of pitch grass shall not exceed 27mm and the entire playing surface must be cut to the same height. Each Club should be in possession of the grass measurement instrument (prism), supplied by the League. The Match Delegate or Referee may carry out spot checks over the course of the Season to ensure that the grass height is no more than 27mm and is consistent across the whole pitch. It is suggested that the prism is kept securely at the Stadium. If the Visiting Club has concerns over the length of the grass or any other aspect of the playing surface they should raise their concerns with the Referee or the Match Delegate.

Mowing pattern

Premier League Rules specify that the grass shall be cut so as to display straight, parallel lines across the entire width of the pitch, perpendicular to the touchlines. No other form of pitch presentation (such as circular or diagonal patterns) is permitted.



10.5 Pre-match maintenance activities

The grounds team should perform the following maintenance operations on match day. However, it is important to note that this is only a guideline, and each team will adjust its match day activities to meet the specific needs and conditions of their stadium, as well as their own established protocols.

- Pedestrian brushing
- Pedestrian cylinder mowing
- Line marking
- Installation of goalposts
- Installation and removal of portable goals for goalkeeper warm ups at an agreed location, as per the pitch protection map
- Installation of corner poles/flags
- Erection and removal of crowd protection netting (if applicable)
- Divot repairs– after warm ups and prior to Kick-Off
- Isolation of the pitch irrigation system after pre-match watering



10. Match day pitch preparation

10.6 Half-time maintenance activities

The grounds team should carry out the following maintenance operations during the 15-minute half-time interval, after the players and Match Officials have exited the pitch.

- Divot repairs and surface repairs
- Checking goal posts, nets and corner flags



10.7 Post-match maintenance activities

The grounds team should perform the following maintenance operations after the match, once the players and Match Officials have left the pitch. This is a general guideline, and grounds teams may have their own protocols for post-match maintenance activities.

- Divot repairs and surface repairs
- Removal of goalposts and nets
- Removal of corner poles/flags
- Surface cleanup – using pedestrian rotary mowers, along with brushing, raking, or light Verti-cutting



10.8 Pitch protection

Each Club is required to produce and agree with the Premier League both pre- and post-match Pitch Maps that illustrate the permitted locations for warm-up and warm-down activities. A standardised template to produce Pitch Maps will be provided to the Grounds Team of each Club prior to the start of the Season (see example below).

Clubs must ensure that the Pitch Protection Rules poster and Pitch Maps are prominently displayed in both teams' dressing rooms and the Match Officials' dressing room.

Within the template icons for each activity can be repositioned as needed, but Clubs should avoid adding or removing icons if possible. Colours and labels must be kept intact to ensure consistency across all Clubs.

Club crests can be added on a match-by-match basis to personalise the map if desired. If the layout remains the same across multiple matches, Club crests can be omitted and labelled as "Home" and "Away."

Any changes to the Pitch Maps for individual matches must be communicated to the Premier League.

Match Officials' warm up area

The Home Club will designate a suitable exclusive area of the pitch for use by the Match Officials to carry out their pre-match warm-up exercises.

The ideal area has been identified as being the area between the centre circle and the touch line furthest away from the players' tunnel, as indicated in the diagram.

Where, for whatever reason, it is not suitable to designate this area for the exclusive use of Match Officials, the Home Club is requested to identify an alternative area of the pitch for use by Match Officials and to display this clearly on the Pitch Map.

If an alternative area is to be used, it should cover an area no less than 30m x 15m and should not interfere with the Visiting Team's pre-match preparations.





11. Winter pitch management

11. Winter pitch management

11.1 Introduction



The winter weather conditions in England pose a considerable challenge to maintaining pitch quality at stadiums hosting Premier League matches.

The English winter generally occurs from December to March. However, in terms of weather, winter conditions (cold temperatures, frost, and sometimes snow) can begin earlier, typically in November,

and sometimes extend into April. Effective pitch management during this period is essential to maintain optimal pitch quality and minimise the risk of cancellations or postponements.

The following section outlines best practice guidelines for managing pitches during the winter months.

11.2 Undersoil heating system usage

The use of the undersoil heating system may be necessary to keep the pitch free of frost, ice, and snow, depending on the weather conditions leading up to and during matches. [Refer to Section 3.8.](#)

The grounds team should closely monitor weather forecasts ahead of match days to determine whether the system is needed. To minimise manual decision-making by the grounds team, undersoil heating systems are typically programmed with a specific activation temperature (usually when soil temperatures are around 8°C). At this threshold the system automatically activates.

Undersoil heating systems can also be utilised to promote grass growth and recovery during the winter months, working in conjunction with supplementary lighting systems.

The frost covers must be capable of covering the entire pitch including surrounds and can come in single, double, or triple layers, depending on the level of protection required. These covers are typically made from geotextile material with reinforced hems and eyelets along the perimeter, allowing them to be securely fastened to the ground.

To ensure ease of use and minimise labour, the chosen frost covers should be manageable for the grounds team. Inflatable roller systems are often preferred, as they are less labour-intensive.

Frost protection systems that use heaters and fan units to blow hot air beneath the cover are also available to safeguard the pitch during extreme weather conditions.

It is important to note that frost covers should not be used as rain covers. The appropriate type of cover must be used in the correct scenario, based on the permeability of the material.

11.3.2 Rain protection covers

Rain covers are not typically used at Premier League stadiums if the pitch has been suitably designed and constructed to cope with rainfall. However, if there are known issues with the drainage performance of a pitch, rain covers should be made available. These waterproof membranes prevent water from saturating the pitch, which could result in unplayable conditions.

As with frost covers, rain covers should cover the entire pitch and surrounds to prevent surface water ingress. However, the pitch gradient must be considered to ensure adequate runoff towards functional drainage outlets. Inflatable rain covers are another option, as they allow for extended coverage without smothering the surface.

11.3 Pitch covers

If any risks are associated with the pitch construction or infrastructure, suitable pitch protection covers should be provided to mitigate the risk of compromised pitch quality, postponement, or cancellation.

11.3.1 Frost protection covers

All Clubs should have adequate frost protection to prevent fixture postponements due to freezing conditions. Frost covers help reduce the risk of matches being postponed and are recommended as a backup option, even if an undersoil heating system is present, in case of system failures.

11. Winter pitch management

11.4 Vacuum and ventilation systems

If a pitch is equipped with a vacuum and ventilation system, the grounds team should closely monitor the weather forecast and activate the system in vacuum mode during and after heavy rainfall events to help accelerate water removal through the construction profile. [Refer to Section 3.9.](#)

11.5 Overseeding

As temperatures drop during the winter months, overseeding may be necessary, particularly in high-traffic areas such as the central corridor, goalmouths and Assistant Referees' patrol path. However, since cooler temperatures are not ideal for seed germination, additional measures may be required to support growth.

The use of germination sheets, supplementary lighting rigs and the undersoil heating system can help in this process. Germination sheets create a warmer micro-climate that encourages seed germination which can be supplemented by the undersoil heating system; supplementary lighting rigs provide supplemental light, compensating for the reduced natural daylight during winter. Overseeding should be timed and supported with these methods to ensure successful turf recovery and growth.

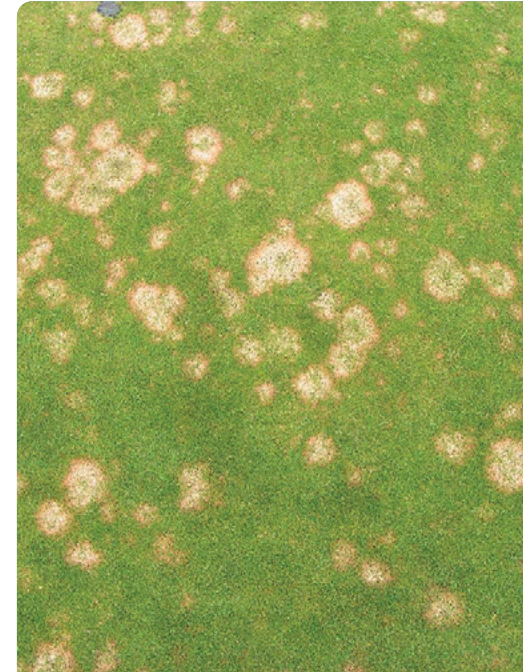
11.6 Winter turfgrass disease management

During the autumn and winter months, turfgrass diseases can be prevalent due to cool temperatures and conditions that result in prolonged periods of leaf wetness. Snowfall can also pose a challenge, but it is expected that snow accumulation will not be allowed to persist for extended periods on Premier League pitches.

Turfgrass diseases commonly encountered on Premier League pitches during the autumn and winter months may include the following:

- Microdochium Patch (*Microdochium nivale*)
- Red Thread (*Laetisaria fuciformis*)
- Snow Mold
- Leaf Spot (*Drechslera* and *Bipolaris* spp).

The recommended best practice for grounds teams is to manage diseases and pests using an Integrated Turf Management (ITM) approach, which takes a holistic view of pest and disease control as part of turf maintenance programmes. This strategy focuses on prevention rather than treatment during periods of high disease and pest pressure, emphasising sustainable practices. [Refer to Section 9.2.](#)



Microdochium Patch (*Microdochium nivale*)



Red Thread (*Laetisaria fuciformis*)



Snow Mold



Leaf Spot (*Drechslera* and *Bipolaris* spp)



12. Pitch procedures for matches in winter weather conditions

12. Pitch procedures for matches in winter weather conditions

12 Pitch procedures for matches in winter weather conditions

During the winter months, it is the Home Club's responsibility to monitor the weather in advance of match day and advise if adverse conditions are expected.

Clubs should contact the Premier League Football Operations team and the appointed Referee at least 48 hours prior to kick off to make all parties aware and ascertain the Referee's travel arrangements, in case a pitch inspection is required.

Clubs should contact Premier League Match Centre - matchcentre@premierleague.com - with any concerns or further information regarding current or expected adverse weather conditions and/or pitch inspections. The Premier League will ensure that, via the Match Manager, broadcasters are kept informed of matches which may be affected by the weather.

12.1 Pitch Inspection Procedure

The responsibility to initiate a pitch inspection lies with the Home Club. However, it is not permissible for a Club to make a decision to postpone a match. Premier League Rule L.13-L.15 states who has such power to postpone or abandon a match and the subsequent steps required should this decision be made.

Where there is doubt about the condition of the pitch, the Home Club is asked to carry out, where appropriate, the following procedures:

1. Contact the Visiting Club to ascertain the travel arrangements of their team and supporters. This is essential when considering the timing of pitch inspections.

2. Should the appointed Referee not be available for the pitch inspection, an Official (other than the Match Referee) can be appointed to carry out a pitch inspection who should then provide feedback directly to the Premier League.

NB. A Match Official will not be appointed to perform a pitch inspection at any Club with which they have a known affiliation.

3. In the event of the Match Referee making the decision to postpone a match they should immediately inform the Premier League Football Operations team. If this decision is taken on the day of the match, then Premier League Match Centre should be informed immediately.

12.2 Snow Balls

In addition to the Winter Hi-Vis Match Ball that will be in use throughout the winter months Clubs will also receive a supply of 'Snow Balls'.

The Snow Balls should be made available by each Home Club at every match day in the event there is significant snowfall on-pitch. In this instance, the Referee can make an assessment whether it would be more

suitable to use the Snow Ball for increased visibility, subject to approval from Premier League Match Centre.

The Snow Balls have been certified by Hawk-Eye. However, Clubs should be aware that Hawk-Eye may request additional match-specific testing to be carried out with this ball on the day of the fixture.

12.3 Snow Clearance Procedure

If snow is forecast during the match, all pitch lines should continue to be marked with white paint as usual. Do not use blue or red paint as this can adversely affect match technology (e.g VAR and GLT).

If there is heavy snowfall that settles on the pitch, as a priority, the area around the lines should be cleared first. The optimum is a 1.5m gap each side of the line to aid the calibration system, to be cleared before kick-off and during half-time.

If there is heavy snowfall during a match and it settles on the pitch, the match can be stopped periodically to allow the grounds team to clear the lines. On these occasions the 'Snow Ball' should be used.

Club grounds teams are advised to have a line-clearing procedure in place so that snow can be cleared as quickly and effectively as possible and minimise the delay to restarting the game.



13. Turfgrass selection

13. Turfgrass selection

13.1 General

It is an expectation that pitches used to host Premier League fixtures are established either by seeding or turfing, using cool-season turfgrass species with cultivars carefully chosen to suit the specific requirements of the stadium environment.

Currently, the two cool-season turfgrass species used throughout England and Wales are Perennial ryegrass (*Lolium perenne*) and Smooth-stalked meadow-grass (*Poa pratensis*).

Turfgrass/ species selection often comes down to the following parameters:

- Wear tolerance and recovery potential
- Shoot density
- Fineness of leaf
- Resistance to disease(s)
- Winter greenness
- Summer greenness
- Live ground cover
- Visual merit
- Overall performance

Grounds teams can either choose a pre-mixed seed blend from trusted suppliers or create their own custom mixture. This process typically involves reviewing the STRI/BSBP (British Society of Plant Breeders) turfgrass list that covers winter sports pitches mown at 25 mm.



13.2 Turfgrass disease tolerance

Disease tolerance is becoming an increasingly important factor in turfgrass breeding and selection for the UK market. Climate change is significantly affecting the incidence and severity of turfgrass diseases, particularly in shaded Premier League stadiums. At the same time, the use of chemical treatments to prevent disease outbreaks is becoming more challenging due to evolving legislation.

Seed companies are investing heavily in research and development to identify new Perennial ryegrass cultivars that offer improved disease tolerance without compromising the surface performance needed in Premier League stadiums. Two emerging disease risks for the UK climate are

- Grey Leaf Spot (*Pyricularia grisea*)
- Brown Patch (*Rhizoctonia*)

13.2.1 Grey leaf spot (*Pyricularia grisea*)

Symptoms

Appears first as tiny, brown leaf and stem lesions, which enlarge rapidly into round to oblong spots. Spots will extend across the entire leaf and become a bluish-grey colour causing dieback and leave weaker patches of turf, impacting the aesthetic value and playability of the surface

- Mature lesions are tan to grey colour with purple to brown borders
- A halo or general chlorosis may occur around/near spots
- Spots may be covered with grey mycelium during periods of warm, humid weather
- Affected leaves can twist and curl giving a hook like appearance
- The sward may look thin, or drought stressed



Conditions the disease favours

- Warm, humid weather – between 25°C and 30°C
- Stressed environments such as drought, compaction and excessive nitrogen/high fertility
- Cutting heights lower than is recommended for grass species
- Excessive thatch

Management

- Avoid excessive nitrogen application in summer months/hottest period of the year
- Deep and Infrequent irrigation to avoid water stress
- Dew removal and correct irrigation times (limit leaf wetness)
- Increase height of cut
- Reduce thatch levels and prevent soil compaction
- Preventative applications of Plant Protection Products (PPPs) provide optimal control
- Use fungicides that have label recommendations for grey leafspot control

A recent example of this is the emergence of Grey Leaf Spot (GLS; *Pyricularia grisea*) in stadiums in the south of England. This marks the first time the disease has been observed across the English Channel, as it had previously only appeared in France until a few years ago. The spread is likely linked to rising temperatures and increased humidity, and it is expected to continue affecting Premier League pitches for the foreseeable future.

13. Turfgrass selection

13.2.2 Brown patch (*Rhizoctonia*)



Symptoms

- Brown patch is less common, patches become light brown
- In a Perennial ryegrass sward, individual leaves may have lesions that are tan in the centre and bordered with a brown edge
- Mycelium growth

Conditions the disease favours

- Temperatures over 20°C
- Leaf wetness or high humidity
- Poor surface drainage
- Excessive fertility

Management

- Ensure the turf surface is kept dry through dew removal, improved airflow and deep and infrequent irrigation
- Reduce thatch levels and aeration operations
- Avoid excessive nitrogen application in summer months/hottest period of the year

13.2.3 Diploid and tetraploid grasses

The table below summarises the key differences between diploid and tetraploid grasses, both of which are commonly used by Premier League grounds teams.

Diploid	Tetraploid
<ul style="list-style-type: none">• Two sets of chromosomes• Tend to have a finer leaf and denser growth habit• Diploid grasses often offer improved turf quality, however slightly less tolerant to extreme weather conditions• Offers good wear tolerance, but recovery is slightly slower under stressful conditions	<ul style="list-style-type: none">• Four sets of chromosomes• Exhibit coarser/broader leaf, although less dense than diploid, their increased vigour often makes them more wear tolerant• The extra set of chromosomes often leads to greater resistance to environmental stressors; however, turf quality is often deemed less• Less wear tolerance but recovers faster through vigorous growth



14. Pitch performance testing

14. Pitch performance testing

14. Pitch performance testing



Regular pitch performance testing is expected for all pitches hosting Premier League matches. This process involves collecting, recording, and analysing quantitative data using specialised pitch testing equipment and tools.

Pitch performance testing serves as a vital resource for grounds teams, guiding day-to-day maintenance practices to ensure optimal pitch conditions. Beyond routine maintenance, analysing performance data helps track trends and monitor key parameters over time, allowing for proactive pitch management.

In addition to supporting grounds teams, pitch performance data is valuable to other stakeholders, including sports scientists and football management teams. It provides insights on critical factors such as injury prevention, footwear selection, and overall playing quality, contributing to player safety and performance.

2024 Premier League Pitch Survey

100%

of Premier League grounds teams undertake some form of pitch performance testing.

14.1 Parameters

A variety of parameters can be assessed either by the in-house grounds team or by an external pitch performance testing company or consultant.

The scope of pitch performance testing is typically determined by the grounds team based on their specific needs or guided by a specialist testing or consultancy company, often using proprietary systems, pitch testing equipment and software applications.

FIFA has established a standardised approach for natural and hybrid turf pitch testing through the FIFA Quality Programme for Natural Playing Surfaces, which outlines a series of performance tests, protocols, and test methodologies.

2024 Premier League Pitch Survey

56.25%

of Premier League Clubs undertake their own pitch performance testing (i.e. by the grounds team).

43.75%

of Premier League Clubs use a combination of pitch testing carried out by both the grounds team and an external pitch consultancy/testing company.



14. Pitch performance testing

This comprehensive programme covers a wide range of pitch performance parameters including:

- Vertical ball rebound
- Ball roll
- Shock absorption
- Vertical deformation
- Rotational resistance
- Evenness
- Surface hardness
- Infiltration rate
- Normalised difference vegetation index (NDVI)
- Visual inspection (divots, footmarks etc)
- Sward height (grass height)
- Root depth
- Thatch depth
- Uniformity of sward colour
- Ground coverage
- Weed content
- Insect pests
- Turfgrass diseases
- Volumetric soil moisture content
- pH
- Soil health analysis

When conducting pitch performance testing in accordance with the FIFA Quality Programme for Natural Playing Surfaces, Premier League stadiums should aim to ensure that all test parameters fall within the 'Excellent Quality' category. See Table.

Parameter	Excellent Quality ⁵
Vertical ball rebound	0.60 – 1.00 m
Ball roll	4.0 – 10.0 m
Shock absorption	55.0 – 70.0 %FR
Vertical deformation	4.0 – 11.0 mm
Rotational resistance	25.0 – 50.0 Nm
Evenness (10 mm)	No deformation > 10 mm
Surface hardness	70.0 – 85.0 CIV
Infiltration rate	> 150 mm/hr
Normalised difference vegetation index (NDVI)	> 0.80 NDVI
Visual inspection (divots, footmarks etc)	Very occasional
Visual inspection (divots, footmarks etc) - size	Very small
Sward height (grass height)	22.0 – 28.0 mm
Root depth	> 50.0 mm ⁶
Thatch depth	< 1.0 mm
Uniformity of sward colour	Very consistent
Ground coverage	95.0 – 100.0 %
Weed content	0.00 – 0.10 %
Insect pests	0.00 – 0.10 %
Turfgrass diseases	0.00 – 0.10 %
Volumetric soil moisture content	25.0 – 30.0 %
pH	6.5 – 7.0
Soil health analysis	Excellent quality

14.2 Frequency and timing

The frequency and timing of pitch performance testing are typically determined by the grounds team, considering various factors. As a minimum, it is recommended that key components of performance testing be carried out weekly, with more comprehensive assessments conducted less frequently.

⁵ Based on the FIFA Quality Programme for Natural Playing Surfaces – Pith Rating System

⁶ Root depth based on a hybrid reinforcement system (carpet or stitched type hybrid reinforcement system)

14.3 Case study:

Pitch Performance Testing at Etihad Stadium (Manchester City FC)

Club: Manchester City FC

Introduction

Manchester City FC employs a comprehensive pitch performance testing strategy to maintain world-class playing conditions at the Etihad Stadium.

Through a partnership with an external pitch testing company, the Club ensures consistent data collection and analysis, optimising pitch quality and player safety.

Pitch Performance Testing Approach

Testing Framework

The Club has established a five-year partnership with an external pitch testing company, ensuring a dedicated pitch tester is stationed full-time at the Club.

This specialist serves as the bridge between the grounds team and the Club's performance team, facilitating data integration and maintenance decision-making.

Key responsibilities of the pitch performance tester include

- Undertaking regular pitch performance testing across the training pitches and the Etihad Stadium pitch
- Attending weekly grounds team supervisor meetings to provide data insights
- Evaluating the impact of maintenance activities on pitch performance
- Testing Frequency and Parameters
- Testing is conducted regularly at the Etihad Stadium and typically includes:

- Routine weekly tests: Three basic tests per week to assess:
 - Energy restitution
 - Vertical deformation
 - Shock absorption
 - Rotational resistance (traction)
 - Moisture levels (as required)
- Match day testing: An additional full suite of pitch performance tests is conducted before each match. A detailed report is generated and provided to the Club's performance team with insights into factors such as:
 - Footwear recommendations
 - Player safety and physiological impact
 - Player warm-up areas
 - The report includes grass height measurements with photos taken of the grass height prism
- Agronomic assessments: These tests are carried out less frequently but are intended to address key agronomic metrics such as:
 - Grass cover
 - Root depth
 - Water infiltration rates

Data Storage and Integration

Pitch performance data is securely stored on the external pitch testing company's software platform, accessible via a paid software licence. The system also includes:

- A diary feature to document pitch maintenance activities



- The ability to overlay maintenance data with pitch performance metrics for trend analysis

Pitch Performance Testing Benefits

Pitch performance testing at Manchester City FC delivers significant advantages:

1. Grounds team decision making: Empirical data validates maintenance strategies and helps optimise pitch maintenance.
2. Improved player performance and safety: Data-driven insights support the Club's performance team to make informed decisions on footwear and injury prevention.

3. Project justification investment: Long-term data supports funding requests for pitch-related projects and improvements.

4. Communication with Club leadership: Pitch performance data is presented in a structured format for board-level discussions, facilitating informed investment decisions.

Conclusion

Manchester City FC employs a proactive approach to pitch performance testing. By integrating data-driven insights into pitch maintenance and player welfare, the Club ensures optimal playing conditions and enhanced decision-making at multiple levels.



15. Appendix

15. Appendix

Pitch maintenance

It is an expectation that pitches used to host Premier League matches are maintained and prepared to an elite level standard. Each Club shall take all reasonable steps to maintain its pitch in good condition throughout the season. The Board may require a Club to take such steps as it specifies, if it is not satisfied that such standards are being met.

Pitch maintenance needs will differ depending on location and are influenced by usage levels, local weather conditions, and the unique microclimate of each stadium. Each grounds team will manage their pitch based on specific site conditions and its professional expertise. As a result, the following section is not prescriptive but highlights key maintenance operations typically performed, acknowledging that the number and type of tasks may vary depending on the specific circumstances. To promote a sustainable approach, the principles of Integrated Turf Management (ITM) should guide the daily maintenance operations carried out by grounds teams in the Premier League.

Mowing and pitch presentation

A Premier League pitch should be mown frequently to create a playing surface of the highest quality. Premier League Rules specify that the grass height must not exceed 27 mm for matches. However, there may be instances where the grass height is allowed to exceed this limit between matches to support the health of the grass plant.

Pedestrian cylinder mowers are typically used for routine and match day mowing operations. Rotary mowers may also be employed as part of regular pitch maintenance, as well as for removing debris after matches or maintenance activities, such as scarification that generate surface debris.

Premier League Rules also stipulate that the grass shall be cut to display straight, parallel lines across the entire width of the pitch, perpendicular to the touchlines. No other form of pitch presentation (such as circular or diagonal patterns) is permitted.

When carrying out mowing operations it is common for Premier League grounds teams to:

- Brush the surface prior to mowing to reduce leaf wetness and stand the grass up to achieve optimal quality of cut
- Ensure blades are well sharpened and mowers are set-up correctly
- Check mowers for oil and leaks prior to entering the grassed surface
- Use string lines to mark the mowing pattern and ensure straight lines
- Mow at a comfortable walking pace to ensure quality of cut
- Mow the pitch multiple times in preparation for a match. This ensures the grass is at the optimal height, the mowing pattern is clearly defined, and the surface's performance characteristics, such as hardness, are fine-tuned
- Empty the grass boxes regularly

- Use turning boards where mowers are manoeuvred or turned on an area of natural grass
- Attach wheels to mowers for transporting across non-grassed surfaces
- Thoroughly clean mowing equipment before storing

When mowing, no more than a third of the grass plant should be removed at a time. If there is excessive growth or if mowing frequency has been reduced for agronomic reasons, the height of cut should be gradually lowered to the desired level for match day.

Removing too much grass in one go can lead to increased stress on the turf and, ultimately, higher disease pressure.

All mower blades should be sharp before cutting. Dull blades or those that fail to make a clean cut can cause damage to the grass plant, creating wounds that provide a direct entry point for fungal spores or mycelia. To ensure a clean cut, the grass should be dry, as leaf wetness can lead to poor cutting quality. Practices like dew removal should be implemented to eliminate excess moisture from the grass before mowing.

Line marking and pitch dimensions

Line marking must adhere to the IFAB's Laws of the Game. It is essential that the white lines are straight (or uniformly curved), bold, and durable. The most commonly used line markers are wheel-to-wheel and spray-type. While new technologies, such as robotic line markers, are available, they are generally not used for marking pitches that host Premier League matches.

When carrying out line marking it is common for Premier League grounds teams to:

- Measure lines and mark out using string lines for accuracy
- Ensure lines are a uniform width. This should be 120 mm (12 cm) and match the width of the goalposts
- Use paint brushes to paint intricate markings by hand
- Fill the line marker with paint off the natural grass area and check the equipment for leaks prior to starting
- Paint lines at a slow walking pace. A metronome can be used to ensure a consistent walking speed
- Apply two applications of paint for optimal brightness
- Use warm water and a soft brush/sponges to remove any paint spills or paint that have transferred accidentally when marking out lines
- Thoroughly clean the line marker after each use before storing

Fertiliser application

A fertiliser can be defined as any mineral, organic or organic based material of natural or synthetic origin which is added to the soil/rootzone to supply select elements essential for plant growth. Fertilisers are defined by the number of nutrients contained, the method of manufacture, and the percentage of nutrient and materials used. The formulations can be split into three categories:

- 1. Straight:** One primary nutrient (e.g. ammonium nitrate)
- 2. Intermediates:** Two primary nutrients from one material (e.g. potassium nitrate)
- 3. Compounds:** Two or more primary different materials (e.g. potassium nitrate plus superphosphate) straights and intermediates (blended compound) or by a formation of homogenous compound by granulation (complex compound)

A conventional release fertiliser can be described as a type of fertiliser that releases its nutrients rapidly after application. This type of fertiliser tends to be water soluble, hence the fast release nature. Conventional release fertilisers often last for a shorter duration as they are taken up by the plant or leached out. Conventional release fertilisers are a type commonly used by Premier League grounds teams due to the desire for accuracy of nutrient uptake during periods of growth.

Controlled/slow-release fertilisers refer to a type of fertiliser that gradually releases nutrients over an extended period, providing a more consistent and long-term supply of nutrients to the turfgrass. These fertilisers are designed to prevent the rapid nutrient release typical of conventional fertilisers, reducing the frequency of applications and minimising nutrient losses through leaching or

volatilisation. Since nutrients are released gradually, there is less risk of runoff or leaching into groundwater, making them more environmentally friendly. These types of fertilisers were designed for high leaching risk situations, such as on sand rootzones, and when used, are often included to provide a base feed to promote continued plant health, and when additional growth is needed, conventional fertilisers are used to top up.

Each grounds team uses different programmes, products and treatments as such the below section focuses on application only.

Granular fertiliser application

Granular fertilisers are typically applied using hand-operated pedestrian spreaders. Uniform application is required to prevent streaks, burns or light and dark lines, which can cause issues with aesthetics and surface playability.

When applying granular fertiliser, it is common for Premier League grounds teams to:

- Undertake regular laboratory chemical analysis to understand the nutrient requirements of the rootzone
- Apply granular fertiliser in accordance with plant requirements
- Calibrate the spreader off the pitch and to a rate directed by the fertiliser manufacturer/supplier
- Fill the spreader outside of the grassed area
- Divide the total rate of fertiliser to be applied in half and apply in two directions (lengthways and widthways) to ensure even coverage and consistent application across the entire surface

- Use cones or markers to define the width of the application area
- Maintain records using either documents/spreadsheets created by the grounds team or proprietary software/apps
- Wash in granular fertiliser using the irrigation system if rain is not forecast
- Apply regular, small doses of fertiliser (known as spoon-feeding) to avoid rapid growth spurts that could have a detrimental effect on the health of the turf and to help prevent nutrient leaching

Liquid fertilisers and plant health products

Liquid fertilisers are typically applied using hand-operated pedestrian sprayers or vehicle mounted equipment. It is recommended to use two separate sprayers: one for applying liquid fertilisers and surfactants, and another for plant protection products, to minimise the risk of cross-contamination.

Liquid feeding is often used as part of a balanced fertiliser programme which also contains granular fertiliser applications, often alternating between liquid and granular applications to meet the needs of the turf and to avoid peaks and troughs of nutrient availability to the plant. This tends to offer enhanced control over grass growth.

Plant health products are designed to support the health and functioning of

grass plants. They often include classes of products such as biostimulants. Their role is often not to provide direct nutrition to the turf, but to provide other compounds that the plant or soil ecosystem can use to help promote plant health and assist the turf to cope with various stresses, such as turfgrass diseases or drought.

When applying liquid fertiliser or plant health products such as biostimulants, it is common for Premier League grounds teams to:

- Apply liquid fertiliser in accordance with plant requirements
- Be extra vigilant when tank mixing and follow product labelling
- Check water volume requirements
- Calibrate the sprayer off the pitch ensuring correct nozzles are used for the product and rate being applied, correct pressures, no leaks etc
- Fill the sprayer outside of the grassed area
- Use cones or markers to define the width of the application area
- Maintain records using either documents/spreadsheets created by the grounds team or proprietary software/apps
- Allow for approximately 4 hours drying time (depending on the product being applied) and avoid applying in direct sunlight and evening applications

15. Appendix

Aeration

Generally, there are two kinds of aeration works carried out on Premier League pitches:

- Deep tine aeration
- Shallow aeration

Deep tine aeration

The primary purpose of tractor-mounted deep tine aeration equipment is to relieve compaction deep in the pitch profile, reduce surface hardness, improve water infiltration, promote root development, break up fine material and organic matter buildup, and enhance air exchange within the rootzone.

Deep tine aeration can be combined with sand topdressing to introduce clean sand into the rootzone. Heave can be added to the machine to help increase decompaction and level any undulations or surface unevenness, but care should be taken to avoid excessive disruption to the pitch surface, especially when hybrid reinforcement systems are in place. It is recommended to perform deep tine aeration at least two to three days before a match, without the use of heave.

Shallow aeration

A shallow pedestrian aerator creates a network of holes in the pitch surface to enhance water infiltration and air exchange. It can also help achieve a controlled reduction in surface hardness before a match, without affecting the appearance of the pitch. The machine's working depth can be adjusted, and various tine sizes and thicknesses can be used to tailor the application. The effect of aeration on surface firmness should be assessed before proceeding with treatment. This operation is typically performed on MD-1 or in anticipation of forecasted rainfall to improve infiltration.

When carrying out aeration treatments, it is common for Premier League grounds teams to:

- Measure surface hardness and other pitch performance parameters before and after treatments
- Place cones on the pitch to highlight and protect infrastructure, such as sprinkler heads and other services, from potential damage
- Ensure tines are of suitable diameter and depth, tight and correctly fitted
- Assign a second operator to walk behind the machine to monitor for any turf damage, check aeration depth (depths of tine holes) and ensure no tines are lost in the pitch
- Alternate the depth of treatment regularly

Sand topdressing

Sand topdressing is a key aspect of regular pitch maintenance. This process can be carried out during the playing season, with approximately 10 tonnes applied in a single application. It may also be part of a mini renovation, where 10 to 20 tonnes are applied, or as part of end-of-season renovations, with 60 to 120 tonnes used depending on the amount of material removed.

Sand top dressing helps to:

- Reduces algae build up
- Ensure hydraulic conductivity between surface and rootzone layers by diluting fine material and organic matter
- Improves surface levels and firmness
- Improves drainage capabilities

It is recommended to have a soil particle size distribution analysis carried out to check that any new material that is added is compatible with the existing rootzone, it

is also recommended to record the amount of sand is being applied. Over application or burying of reinforcement system fibres should be avoided.

Sand topdressing is usually carried out with a specialist tractor mounted spinning disc type spreader.

Overseeding

Given the introduction of undersoil heating systems and new grass cultivars, it is common for Premier League grounds teams to overseed the pitch continuously throughout the playing season at low rates to encourage continued grass establishment and new growth, particularly in high wear areas.

Overseeding rates can be as low as 10 g/m², with mid-season renovation rates ranging from 10 to 40 g/m², depending on the cultivar. End of season renovation rates can be as high as 50 g/m². For details on specific grass species and cultivars. [Refer to Section 12](#) on turfgrass selection.

Thatch management

Thatch management refers to the process of controlling the accumulation of organic matter commonly known as thatch - a layer of dead and living organic matter (such as grass stems, roots, and leaves) that builds up between the soil surface and the green vegetation. Thatch can become problematic if it accumulates excessively, leading to issues with turf health, playability, and surface quality.

Effective thatch management of a Premier League pitch is crucial for maintaining a high-performance surface, and it typically involves the following elements:

- Improved water and nutrient penetration
- Enhanced water infiltration
- Increased surface stability/traction
- Pest and disease prevention

Methods of thatch management include turf grooming, scarification, verti-cutting, aeration and sand topdressing.

Managing fertiliser and water inputs so that excessive growth is not promoted also helps to reduce organic matter build up.

Weeds, diseases and pests

It is a Premier League expectation that weeds, pests, and turfgrass diseases are effectively managed in a sustainable way to prevent any negative impact on the quality of the playing surface.

Weeds

Weeds are plants growing in undesirable locations and include weed grass species such as annual meadow grass (*Poa annua*) as well as broad leaf weeds such as dandelions (*Taraxacum officinale*).

When managing weeds, it is common for Premier League grounds teams to:

- Regularly monitor weed content
- Remove weeds by hand or with specialised equipment to prevent them from establishing and outcompeting grass cultivars
- Use selective herbicides as a last resort if weeds cannot be removed through hand-picking or other cultural practices, such as verti-cutting and scarification. Herbicides should always be applied according to the manufacturer's guidelines. First, identify the broadleaf weed, then select the appropriate product for control

15. Appendix

Turfgrass diseases

The risk of turfgrass disease is high for Premier League pitches, primarily due to the microclimate in enclosed stadiums, the intensity of usage and the maintenance inputs required.

The grounds team should be adept at recognising and managing the primary turfgrass diseases that commonly affect playing surfaces.

Turfgrass diseases common to pitches used to host Premier League matches include:

- Microdochium patch (*Microdochium nivale*)
- Pythium blight (*Pythium*)
- Grey leaf spot (*Pyricularia grisea*)
- Leaf spot (*Dreschlera* spp.)
- Rust (*Puccinia* spp.)
- Brown patch (*Rhizoctonia* spp.)
- Dollar spot (*Clariireedia homoeocarpa*)

An Integrated Turf Management (ITM) strategy should be employed to limit the use of pesticides and promote cultural methods of control.

Early detection and preventive measures can reduce disease outbreaks, ultimately saving time and resources. If chemicals are required, they should be used responsibly, ensuring they are legally permitted and minimising their environmental impact.

To manage and reduce the risk of turfgrass disease, Premier League grounds teams commonly:

- Remove dew routinely
- If airflow is limited, use pitch side fans to reduce leaf humidity
- Avoid mowing wet surfaces
- Ensure mowing equipment is set up correctly and blades are sharp to prevent tearing of the turf leaf
- Manage irrigation to minimise prolonged leaf wetness
- Apply nitrogen judiciously
- Apply plant growth regulators to improve turf health, reduce mowing needs, and stimulate root growth
- Monitor and control thatch levels
- Reduce turf stress through application of plant health products or appropriate use of supplemental lighting
- Undertake vigilant monitoring of turf in periods of high potential disease pressure to ensure that, if disease does develop, it is treated at a very early stage

Pests

The following insect pests can occur on pitches used to host Premier League matches.

- Nematodes – principal pest found on Premier League pitches
- Crane fly (*Tipula paludosa*)
- Leatherjacket larvae (Crane fly larvae)
- Chafer larvae
- Frit fly larvae

Nematodes can be particularly problematic, with symptoms including weak, patchy turf that may appear discoloured (ranging from pale to brown). These patches are likely to spread, as the nematodes move from dead areas to healthy plants. Stress caused by nematode damage can make plants more vulnerable to secondary diseases, such as Microdochium patch. In sand-dominated rootzones, plants tend to decline more quickly, especially in warm conditions. Free-living nematode populations are not evenly distributed across the turf but typically form “hot spots” of high populations, and their distribution can vary significantly with depth in the rootzone.

Reducing the risk of parasitic nematodes typically involves implementing effective management practices to prevent contamination, such as:

- Using clean seed, clean sand topdressing, clean maintenance equipment if moving between sites
- If returfing, assessing nematode populations before importation

When managing nematodes, Premier League grounds teams often:

- Raise the height of cut slightly to reduce turf stress
- Water frequently (due to shorter roots)
- Fertilise in small and frequent amounts (liquid foliar fertiliser can help if root system is damaged by nematode activity)
- Apply authorised garlic extract based products

Nematode populations can be tested by plant pathologists through the process of sending rootzone samples to a laboratory for analysis.

15. Appendix

Plant protection product (PPP) application

The final step in an ITM approach involves the targeted use of plant protection products (PPPs). It is a legal requirement that the member of staff applying the product has the relevant spraying qualifications - PA01 or PA06.

When applying PPP's, it is common for Premier League grounds teams to:

- Read the product label carefully and follow all the instructions
- Check water volume requirements
- Calibrate the sprayer off the pitch ensuring correct nozzles are used for the product and rate being applied, correct pressures, no leaks etc
- Fill the sprayer outside of the grassed area
- Use cones or markers to define the width of the application area
- Maintain records using either documents/spreadsheets created by the grounds team or proprietary software/apps
- Ensure compliance with relevant HSE and COSHH requirements and complete a LERAP
- Ensure staff wear PPE at all times
- Ensure access to pitch is forbidden for anyone not wearing appropriate PPE
- Allow for approximately 4 hours drying time or as label directs

As part of the Plant Protection Products (Sustainable Use) Regulations 2012, pesticide application equipment (PAE) testing became a legal requirement from 26 November 2016. Any machine applying a professional pesticide must be tested by the specified dates and intervals thereafter.

- For all new PAE, the first test is due before the machine is 5 years old. Boom sprayers over 3 metres must be tested at least every 3 years
- Boom sprayers 3 metres and under, micro-granular and slug pellet applicators, weed wipers, seed treatment and other specialist application equipment are due a re-test every 6 years



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