

Part B

Playing fields

Natural Turf for Sport

Updated guidance for 2025

Think of the environment. Please avoid
printing this A4 document unnecessarily.

sportengland.org

Sport England's design guidance aims to:

- Increase awareness of good design;
- Help built environment professionals, volunteers, clients, operators, user representatives and stakeholders follow best practice;
- Encourage well-designed facilities that meet the needs of sport and physical activity and are a pleasure to use.

Document accessibility

This document has been designed for comfortable reading at A4 and on a laptop screen, but can also be printed at A3 for large print versions. The pdf is accessible and has been tested to work with text readers.

The guidance is in a new format with separately downloadable Parts A to D – see page 4. They have been developed to enable the information to be digested and processed easily, with illustrations and tables for quick reference.

User guide

Before using this design guidance for any specific projects, all users should refer to the on-line user guide which explains when and how to use the guidance as well as understanding the limitations of use.

Click here for **User guide** and other
Design and cost guidance

Foreword

Natural turf for sport

Sport England believes that good facilities are fundamental to developing opportunities for sport and physical activity for everyone, from the youngest beginners to late starters and elite athletes. Sports and leisure facilities, from the smallest to largest, should be designed to be accessible and inclusive with flexibility to provide equitable sport and activity for everyone.

Good design should be based upon:

- Stakeholder engagement putting people at the heart of the whole design process;
- A sound understanding of current trends and practices within individual sports;
- Research and developments in the sport and leisure industry;
- Accounting for a diverse spectrum of user needs;
- Experience gained from previously-built schemes.

These considerations should be embraced within the earliest vision statement and enshrined in the briefing stages through to the final detailed specifications and operational arrangements.

Sport England's design guidance aims to promote a greater understanding of inclusive design principles, technical and other important considerations to arrive at appropriate solutions that meet a wide spectrum of user needs. The guidance also signposts to further information, advice and expertise as well as good practice examples.



The network of natural turf playing fields and pitches in our sporting landscape is of enduring value. With appropriate design and maintenance, natural turf can provide cost-effective, safe and sustainable playing surfaces in many different settings. Examples range from multi-functional community spaces, school playing fields, parks and local sports grounds to iconic venues for the highest levels of international competition.

Natural turf can offer multiple benefits to users in terms of feel, comfort, and safety during play. These qualities should be optimised through advances in sports turf (agronomic) and smart technologies. Mobile phone apps can help with maintenance and upgrade issues. Performance quality standards (PQS) can be specified for the design, construction types, and drainage solutions for individual sites. Hybrid solutions are also available for pitches with high levels of demand.

This guidance aims to provide sustainable natural turf pitches that support the needs of local communities to improve the health, physical and mental wellbeing of the individual. It is recommended as essential reading for all those involved in the planning and development of new or upgraded natural turf sport facilities."

Lisa Dodd-Mayne, **Executive Director of Place**

How this document relates to other guidance

The Natural turf for sport (NTS) guidance documents should be read alongside the latest version of related Sport England guidance and other key statutory and national governing body of sport (NGB) requirements, and the links highlighted below:

Sport England NTS documents

Part A Essential reading
1: Introduction
2: Project planning
3: General pitch construction

 **Part B Playing fields**
1: **Football and Rugby pitches**
2: **Cricket grounds**
3: **Playing area layouts**

Part C Equivalent quality assessment (EQA)
1: Planning policies and EQAs
2: Preparing an EQA report
3: Construction on brownfield sites

Part D Appendices
1: Project team
2: Environmental considerations
3: Performance quality standards (PQS)
4: Maintenance resource
5: Related organisations
6: Glossary of terms

To download NTS documents

[Click here](#)

Other Sport England guidance

Strategic Outcomes Planning Guidance (SOPG) [Click here](#)

Playing Fields Policy and Guidance [Click here](#)

Outdoor surfaces guidance [Click here](#)

Comparative sizes of sports pitches and courts [Click here](#)

Accessible and inclusive sports facilities (AISF) [Click here](#)

Clubhouse design guidance [Click here](#)

Other sports guidance and references

Green Space Strategies: A good practice guide [Click here](#)

Grounds Management Framework (GMA) [Click here](#)

SAPCA Codes of Practice [Click here](#)

Cricket: Club and facilities management [Click here](#)

Guidelines for Golf Green Construction in UK [Click here](#)

The European Institute of Golf Course Architects [Click here](#)

The United States Golf Association [Click here](#)

FIFA Turf and pitch design [Click here](#)

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1 Football and Rugby pitches

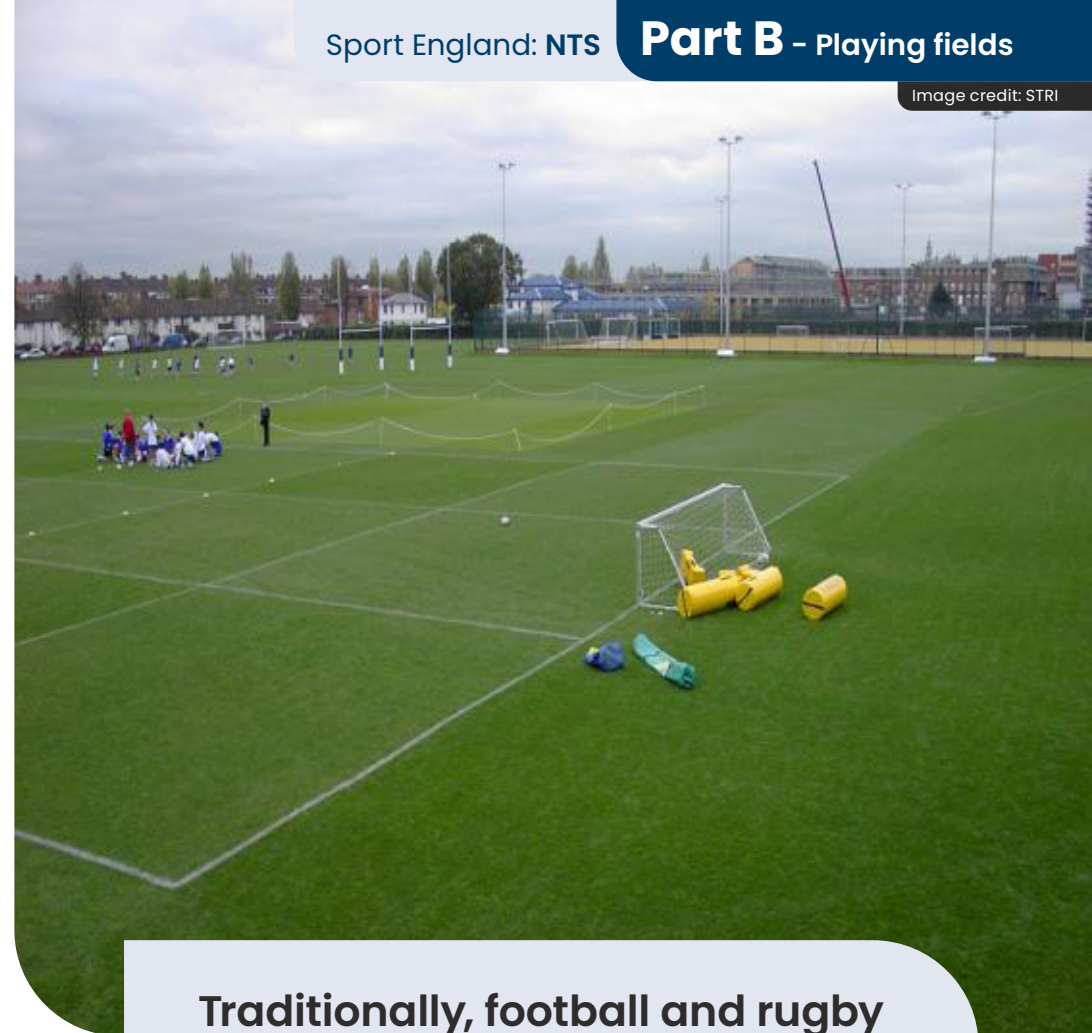
This section sets out key considerations for the design, construction, establishment and ongoing maintenance of Football and Rugby pitches.

1.1 Key considerations

The design, construction, establishment and ongoing maintenance of football and rugby pitches are discussed in more detail in this section. Various construction types are covered in sections 1.4.1 – 1.4.9. Section 1.4.10 then provides a summary Table B1 indicating anticipated hours of use per week, estimated construction and maintenance costs, associated maintenance operations, advantages and disadvantages for each construction type.

Traditionally, football and rugby union have been played on a seasonal basis when grass growth is minimal and the soil is often very wet, although rugby league is now predominantly a summer sport. For winter games, grass cover can be subject to wear at the beginning of winter and quagmire conditions can develop in high-wear areas of the pitch such as goalmouths and centre circles. As a result, players are unable to experience a satisfactory quality of game.

The pressure to get matches played means they often take place at inappropriate times, for example, during heavy rain. Frequently, maintenance routines during and after the season are unable to restore the pitch to an adequate state for quality play to take place. A vicious circle of deterioration sets in as a direct result of poor drainage and compaction of the playing surface.



Traditionally, football and rugby union have been played on a seasonal basis when grass growth is minimal and the soil is often very wet, although rugby league is now predominantly a summer sport.

1.2 Designing for likely use

Performance Quality Standards (PQS) provide a benchmark for the quality and performance of natural turf sports surfaces, as well as to assist with their management. These constitute the minimum acceptable performance criteria (e.g. drainage capacity, hardness etc.) for different levels of the game (e.g. local, regional or national) and are an essential mechanism for the effective design, construction, maintenance and long-term sustainability of the surface. Refer to Part D3 Performance quality standards for PQS relating to football, rugby and cricket.

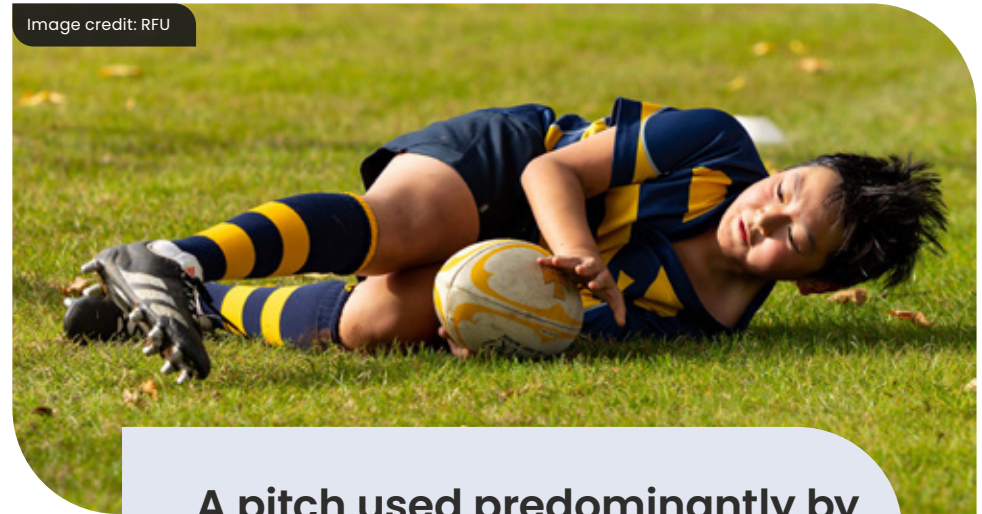
The majority of playing surfaces require a designed drainage system to provide satisfactory playing conditions throughout the playing season. Consider the frequency and intensity of use. A hard-wearing seed mixture would be suitable for pitches with winter use.

Poor construction, lack of effective maintenance and overuse of the pitch will, eventually, lead to poor drainage and unacceptable playing conditions. It is essential that pitches are designed taking into account the estimated intensity of use.

Players under the age of 16 are judged to inflict a third less damage to a pitch than their more senior counterparts. Therefore, a pitch used predominantly by juniors could accommodate approximately 50% more use than one used solely by more senior players.

The pattern of use should be considered when designing a pitch. Where use primarily takes the form of many games played during weekends with little play during the rest of the week, demand cannot be staggered to make best use of a single 'high specification' pitch. In these circumstances, general upgrading of pitches using sand grooving, sand bands or slit draining and/or sand amelioration (i.e. the incorporation of sand into the surface to improve playability – see section 1.4 Playing field and pitch construction types) would be more appropriate than the creation of a single 'premier' pitch.

Image credit: RFU



A pitch used predominantly by juniors could accommodate approximately 50% more use than one used solely by more senior players.

1.3 Pitch configuration

The layout of the pitches should be considered carefully to maximise the use of the available space and future flexibility of use. Pitch marking with safe clearances and ball stop fencing where appropriate should meet the current recommendations of the relevant sport's NGB.

The location of spectators needs to be considered to avoid interference or damage to adjacent playing surfaces. This can be a particular problem if football / rugby pitches are located too close to a cricket square.

1.4 Playing field and pitch construction types

Pitch construction falls into nine main categories according to the construction profile and system of drainage used:

- **Type 1: Undrained;**
- **Type 2: Pipe drained;**
- **Type 3: Pipe drained with mole drains;**
- **Type 4: Pipe drained with sand grooves;**
- **Type 5: Pipe drained with slit drains;**
- **Type 6: Pipe drained with sand bands;**
- **Type 7: Pipe drained with topsoil and drainage layer;**
- **Type 8: Pipe drained with a carpet-hybrid reinforcement system;**
- **Type 9: Pipe drained with suspended water table and a stitched-hybrid reinforcement system.**

These are illustrated and explained in detail in the following sections 1.4.1 – 1.4.9, and section 1.4.10 provides a summary table.

Increasingly, the Type 4 and Type 6 systems (i.e. pipe drained with sand grooves or sand bands) are seen as the most suitable for the creation of good-quality pitches. These systems are cost-effective to construct and produce pitches that, in most cases, are cost-effective in terms of maintaining the specified sports turf performance criteria.

Sand-grooving systems are more appropriate for situations where limited damage to the surface is anticipated (e.g. for football and cricket outfields), whereas sand bands are more appropriate for situations where there is a high risk of surface damage (e.g. Rugby Union).

It should be noted that undrained and even pipe drained only solutions are unsuitable for the majority of clay soils used over the winter period.

In some situations, it may be appropriate to adopt different standards of drainage for different pitches on a single site. Where some pitches are floodlit and sustain higher use in winter, a more intensive land drainage system will be required. This is also the case where key matches are played at specific times on the main pitch, to provide reliability in wet conditions. Pitches for more routine use may not be subject to the same intensity of use, and it may be possible to adopt a different approach to the development of these pitches.

A sinkage fund is recommended for secondary drainage that will require replacement within a short/medium term time period.

It is essential to take professional advice from a sports turf specialist to ensure that the quality of the pitches is not compromised, and the chosen solution is sustainable.

Increasingly, the Type 4 and Type 6 systems (i.e. pipe drained with sand grooves or sand bands) are seen as the most suitable for the creation of good-quality pitches.

1.4.1 Type 1: Undrained

There are very few situations where undrained pitches will provide sustainable, quality playing surfaces that can accommodate uninterrupted play throughout the winter period. They are likely to be of use only on naturally well-drained soils, where natural soil structure has not been destroyed by earthworks. For example, sand, well-structured topsoil over gravel, limestone or chalk, and where there is sufficient gradient to assist in shedding excess surface water off the pitch surface.

In these situations, to facilitate surface water run-off, a maximum gradient is recommended of between:

- 1.25% (1 in 80) along the pitch, and;
- 2.00% (1 in 50) across the pitch.

Poor quality playing surface in the winter period can prevent play

Image credit: Dr Richard Earl
(PSD/TGMS/Labosport)



There are very few situations where undrained pitches will provide sustainable, quality playing surfaces that can accommodate uninterrupted play throughout the winter period.

1.4.2 Type 2: Pipe drained

In the past, simple pipe drainage has been the most frequently used system – see Part A3.5 Drainage principles. However, unless the site has reasonably free-draining sandy soil or sufficient gradients to remove large quantities of water by surface shedding, pipe drainage alone is often inadequate, and the pitch can be susceptible to wet weather cancellations. The system requires:

- **Lateral drains:** Corrugated plastic pipes that are usually installed at 3–5 m centres at a depth of 450–600 mm below ground level that connect into a main drain;
- **Main drain(s):** Increasingly twin-walled pipes are being used for main drains providing a more rigid pipe with better flow characteristics;
- **All drains to be laid with a steady fall:** the pipe diameter and gradient designed should be such that the design flow rate can be achieved. Falls in the region of 1.00% to 0.67% (1 in 100 to 1 in 150) are common;
- **A positive outfall:** this can be provided in the form of an existing watercourse or surface water system or an effective soakaway system should be constructed. This will have to comply with the requirements imposed by the drainage authority or the Environment Agency.

When the drains have been laid, trenches should be backfilled with porous material to ensure that the high percolation rates necessary for effective drainage are achieved:

- Predominantly, hard, angular gravel or crushed stone within the range 2–10 mm should be used as backfill. This should be brought to within 150–200 mm of the surface.
- Coarser trench backfill can be ‘capped’ with a 50 mm ‘blinding layer’ in the form of coarse sand or fine grit, to prevent ingress of fine material above. The trench is backfilled to ground level with preserved topsoil or an imported, permeable sandy rootzone material.

Installing pipe drainage in a new pitch

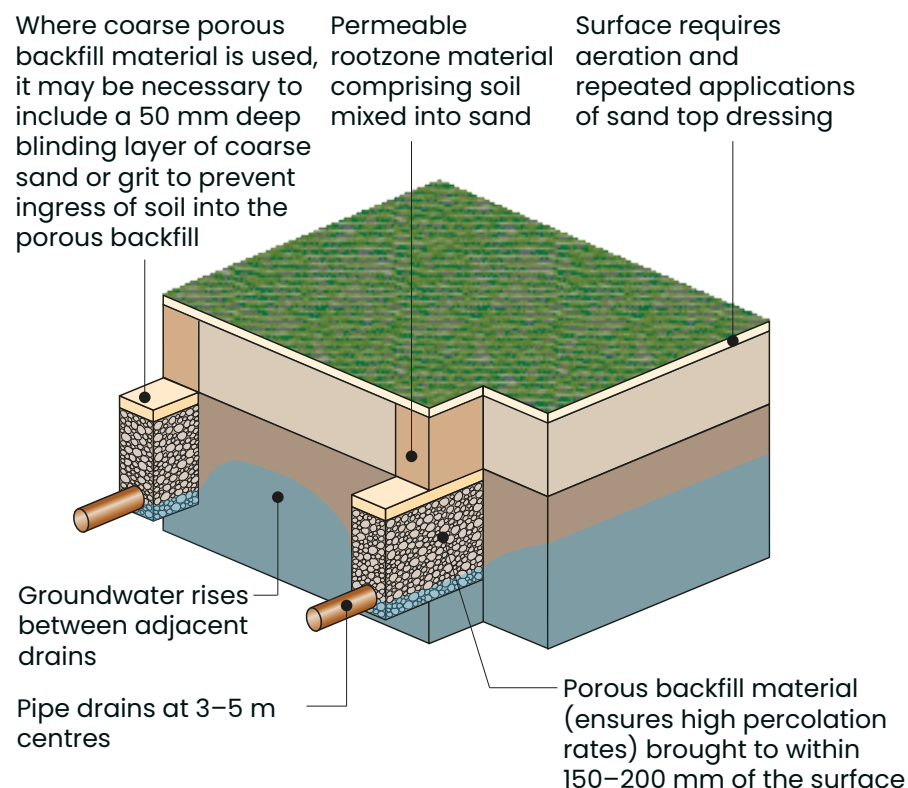
Image credit: Cranfield University



The system requires all drains to be laid with a steady fall: the pipe diameter and gradient designed such that the design flow rate can be achieved.

When the drains have been laid, trenches should be backfilled with porous material to ensure that the high percolation rates necessary for effective drainage are achieved.

Figure B1 Type 2: Pipe drainage construction on cultivated topsoil



A variation of the above (i.e. using angular gravel or crushed stone within the range 2–10 mm) would be:

- To use a slightly finer gravel within the range 2–6 mm for the backfill, this being brought to within 150 mm of the surface.
- This would then be covered to ground level with a coarse sand, the upper portion of which would be ameliorated with topsoil during the subsequent cultivations.

Where pitches are being fully redeveloped in order to increase playing performance over the longer term, sand can be ameliorated into the surface of the topsoil. The depth (typically up to 50–75 mm) and construction of this needs to be fully specified based on the soil type and likely pitch management.

Pipe drained systems alone are generally only suitable for free-draining sandy soil conditions affected by shallow groundwater. Given reasonably permeable soils and good management, fairly good playing surfaces can result. However, in many areas of the UK this method is not suitable, given the slowly permeable nature of the indigenous soil.

This system is therefore generally only suitable for situations where the indigenous soil is permeable but is affected by shallow groundwater levels. The lateral drains serve to ‘pin down’ the water table. It is therefore essential that a competent consultant is commissioned to establish the optimal drain depth and spacing to ensure that wet strips do not occur between adjacent drain runs.

Pipe drained systems alone are generally only suitable for free-draining sandy soil conditions affected by shallow groundwater.

1.4.3 Type 3: Pipe drained with mole drains

Mole drainage potentially offers a very cost-effective solution to surface water drainage. The system typically comprises pipe drains installed at 5–10 m centres in combination with mole drains installed at approximately 1 m centres. Alternatively, for pitches that slope down towards a ditch or watercourse, mole drains can be installed such that they outfall directly into the ditch or watercourse without the need for costly piped drainage infrastructure. The mole drains are formed by a tractor-mounted mole plough which creates stable channels within the clay subsoil that are connected to the surface through fine fissures and by the plough leg slot, and that also connect with the permeable backfill over the pipe drains.

For this approach to work, the clay content should be sufficiently high (> 30%) and the clay should be of the correct mineralogy such that it does not disperse when saturated. Soil samples should be tested to confirm the suitability of this approach. However, the following should be noted:

- Mole channels have a finite operational lifespan and typically, re-moling will be required every three to five years;
- Some clay soils suffer significant shrinkage on drying and there is a risk of surface cracks developing along the path of the mole plough leg slot which may make the pitch too dangerous to play on. This is most likely during the first summer after installation. For this reason, mole drainage is not recommended for cricket outfield;
- The risk of large surface cracks developing can be mitigated to some degree by installing closely spaced linear slits (typically at 260 mm spacing), parallel to the mole drains so that numerous small, but safe, cracks develop;
- Successful mole drainage is dependent upon several interacting factors (e.g. clay stability, clay plasticity, mole channel depth, mole plough size and mole plough set-up). It is therefore strongly recommended that advice is sought from a sports turf consultant experienced in mole drainage.

Tractor and mole plough

Image credit: Dr Richard Earl
(PSD/TGMS/Labosport)



Mole drains are only suitable for soils with more than a 30% clay content. In addition, it is essential that the soil comprises stable clay mineralogy otherwise rapid failure will occur.

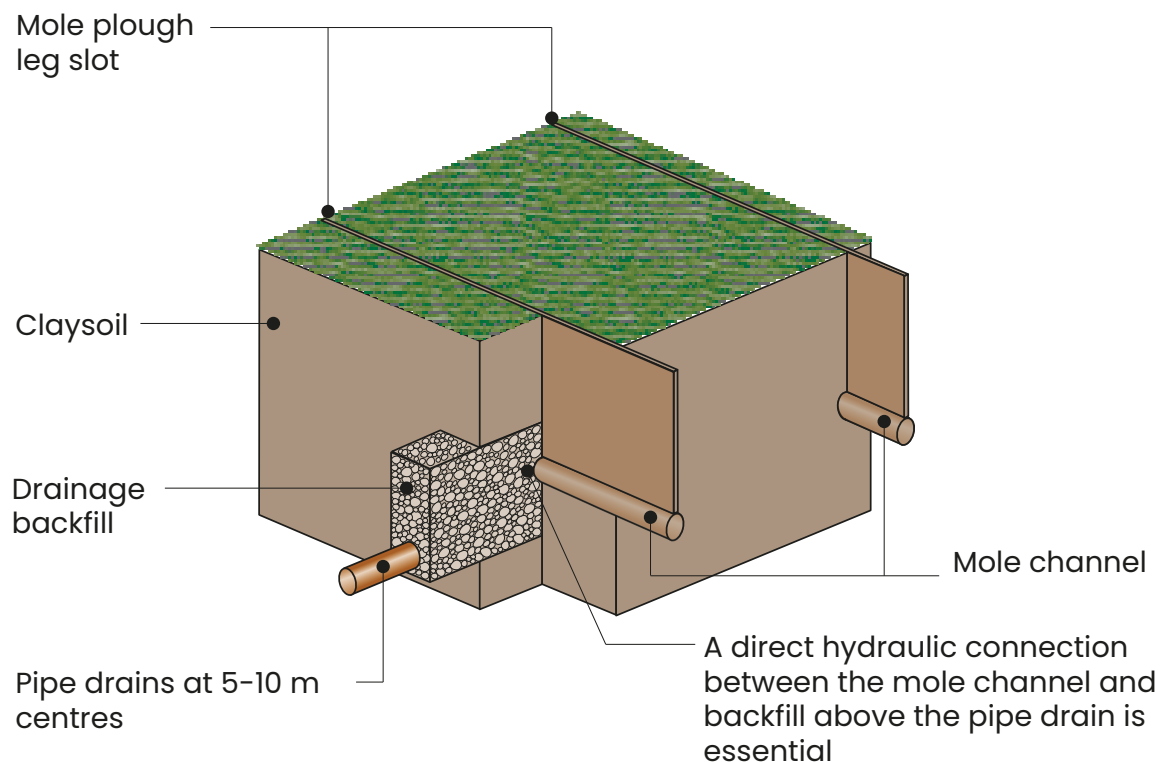
Mole channels have a finite operational lifespan and typically, re-moling will be required every three to five years.

Cross-section through pitch showing a mole channel and leg slot

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



Figure B2 Type 3: Pipe drainage with mole drains on cultivated topsoil



Mole plough leg and channel maker

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)

1.4.4 Type 4: Pipe drained with sand grooves

This type of construction is appropriate for situations where significant damage to the surface is not anticipated (e.g. cricket outfield and football pitches). It is cost-effective to construct and maintain as well as reducing the potentially serious problems of shrinkage associated with the slit drainage, or sand banding, form of construction.

The pitch construction is similar to that of a Type 2 pipe drained pitch described in section 1.4.2, with the addition of the following:

- A series of sand grooves, approximately 150 mm deep and 20 mm wide, introduced by a machine at a spacing of 260 mm. These grooves are forced into the soil with a tine rather than being created by excavating a narrow trench, and can be filled with sand or fine grit;
- It is essential that the sand grooves connect efficiently with the permeable backfill of the pipe drainage system below;
- Heavy top dressings of suitable sand are essential for the successful construction and management of pipe drainage and sand grooved pitches;
 - A dressing of sand of approximately 8 mm in depth should be applied immediately after installation of the sand grooves;
 - Two further sand dressing applications 8 mm in depth each should follow at sufficient intervals such that the grass is not smothered (typically six weeks apart in the growing season) so that a total of 24 mm is applied;
 - In subsequent years, a light annual sand dressing of approximately 5 mm is recommended;
 - Each application of sand dressing should be in the region of 60–100 tonnes, depending on the size of pitch.

Sand grooves installed at 260 mm centres

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



Pipe drainage with a secondary drainage system is considered to be the most cost-effective type of construction for the creation of good-quality pitches that can meet the necessary PQS.

For this system to be effective, it is essential that:

- The grooves are installed at sufficient depth to achieve an efficient hydraulic connection with the permeable backfill in the primary drainage trenches below;
- The spacing of the primary lateral drains is sufficiently narrow (no more than 4 m) as the distance of lateral movement of water achievable along a sand groove is limited, and;

Figure B3 Type 4: Pipe drainage with supplementary sand grooving on cultivated topsoil

Where coarse porous backfill material is used, it may be necessary to include a 50 mm deep blinding layer of coarse sand or grit to prevent ingress of rootzone into the porous backfill

Sand dressing or rootzone layer

Topsoil

Subsoil

Drainage backfill

Pipe drains at 3–4 m centres

Sand or rootzone backfill

Sand-filled groove

Sand grooves at approximately 260 mm centres

A direct hydraulic connection between the sand grooves and backfill above the pipe drain is essential

- Sand grooves will need redoing every 3–5 yrs in high-use adult football pitches, especially where worm casting is prevalent.

Moreover, the tops of the grooves are quite narrow (~20 mm) and therefore susceptible to being smeared over with soil during play, which renders them ineffective. It is for this reason that sand grooves are not recommended for rugby.

This type of construction is appropriate for situations where significant damage to the surface is not anticipated (e.g. cricket outfields and football pitches).

1.4.5 Type 5: Pipe drained with slit drains

Supplementary slit drains (also often called “sand slits”) will significantly improve the efficiency of removal of surface water into the piped drains below. Basically, the construction mirrors that of a pipe drained system with the addition of:

- A series of narrow, commonly 50 mm wide, sand and gravel filled trenches excavated across, and into the porous backfill of the lateral drains. Slit drains are typically 250–350 mm deep and installed at 0.5–2.0 m spacing;
- Heavy top dressings of suitable sand are essential for the successful construction and management of pipe drainage and slit drained pitches:
 - A dressing of sand of approximately 8 mm in depth should be applied immediately after installation of the slit drains, and immediately prior to overseeding to re-establish grass cover;
 - Two further sand dressing applications 8 mm in depth each should follow at sufficient intervals such that the grass is not smothered (typically six weeks apart in the growing season) so that a total of 24 mm is applied;
 - In subsequent years, a light annual sand dressing of approximately 5 mm is recommended;
 - Each application of sand dressing should be in the region of 60–100 tonnes, depending on the size of pitch.

A drawback of slit drains is that they can become capped and sealed over with topsoil, which renders them ineffective. Also, slit drains installed in clay soil can be prone to settlement in dry weather due to the surrounding clay shrinking on drying. They therefore require frequent topping up, particularly during the first year following installation, to prevent an uneven and possibly dangerous surface developing. It is for this reason that the ‘Type 4’ construction, comprising narrowly-spaced sand grooves, is often selected for football or cricket over the Type 5 or the Type 6.

Installation of slit drains in progress

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



Slit drains are typically 250–350 mm deep and installed at 0.5–2.0 m spacing.

Adequate maintenance is essential in order to produce and maintain a vigorous, dense sward, particularly over the top of the slit drains.

It should be noted that pipe drained surfaces with slit drains might:

- Be uneven during the first season;
- Settle in the summer months due to shrinkage in clay soils. These should be monitored and topped up with sand to maintain the safety and quality of the surface and the effectiveness of the drainage system. Where available, irrigation will help to reduce this problem.

Figure B4 Type 5: Pipe drainage and slit drainage construction on cultivated topsoil

Where coarse porous backfill material is used, it may be necessary to include a 50 mm deep blinding layer of coarse sand or grit to prevent ingress of rootzone into the porous backfill

Sand dressing or rootzone layer

Topsoil

Subsoil

Drainage backfill

Pipe drains at 5–10 m centres

Sand or rootzone backfill

Coarse sand

Gravel backfill

Slit drains at approximately 1 m centres

A direct hydraulic connection between the slit drain and backfill above the pipe drain is essential

Combined pipe and slit drainage will significantly improve the drainage of most pitches

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



Adequate maintenance is essential in order to produce and maintain a vigorous, dense sward, particularly over the top of the slit drains.

1.4.6 Type 6: Pipe drained with sand bands

A now more common method of installing a secondary drainage scheme for applications such as rugby is to install sand bands using a Koro Topdrain, GKB Drainmaster or similar machine. Sand bands significantly improve the removal of water into a pipe drainage system. The construction mirrors that of a pipe drained system with the addition of:

- A series of narrow, commonly 40 mm-wide, sand-filled trenches excavated across and into the porous backfill of the lateral drains. The sand bands are typically 225 mm deep and installed at 0.5 m spacing;
- Heavy top dressings of suitable sand, or placement of a layer of rootzone (a mixture of sand and soil or organic matter), are essential for the successful construction and management of sand band pitches.

Under suitable conditions, it is possible to install sand bands at the time of construction, rather than the more usual installation through an established grass sward. This allows for the sand bands to be seeded at the same time as the remainder of the pitch, therefore providing a more uniform grass sward.

Immediately after installation of the sand bands, either:

- A sand dressing should be applied and subsequently reapplied as part of routine maintenance works in the close season. This process will be necessary for at least three to five years following installation. Each application of dressing should be in the region of 60–100 tonnes, depending on the size of the pitch. Or alternatively;
- A 50 mm-deep layer of rootzone (a mixture of soil or organic matter and sand) can be placed and graded over the pitch surface. This is particularly helpful for stony sites where there is a risk of upward migration of stones. It also provides temporary storage capacity during periods of heavy rain

which may take time to drain down through the system. Moreover, it allows grass roots to grow through the rootzone layer and anchor into the topsoil below, thereby increasing surface stability.

Adequate maintenance is essential in order to produce and maintain a vigorous, dense sward.

Installation of sand bands at 0.5 m spacings using a Koro Topdrain machine

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



A now more common method of installing a secondary drainage scheme for applications such as rugby is to install sand bands using a Koro Topdrain, GKB Drainmaster, or similar machine.

Under suitable conditions, it is possible to install sand bands at the time of construction.

Figure B5 Type 6: Pipe drainage and secondary drains in the form of sand bands

Where coarse porous backfill material is used, it may be necessary to include a 50 mm deep blinding layer of coarse sand or grit to prevent ingress of topsoil into the porous backfill

Sand dressing or rootzone layer

Topsoil

Subsoil

Drainage backfill

Pipe drains at 5 m centres

Sand or rootzone backfil

Coarse sand

Sand bands at 500 mm centres

A direct hydraulic connection between the sand bands and backfill above the pipe drain is essential

Grass roots can grow through the sand-dressed / rootzone layer and anchor into the topsoil below to provide a seamless pitch surface

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)

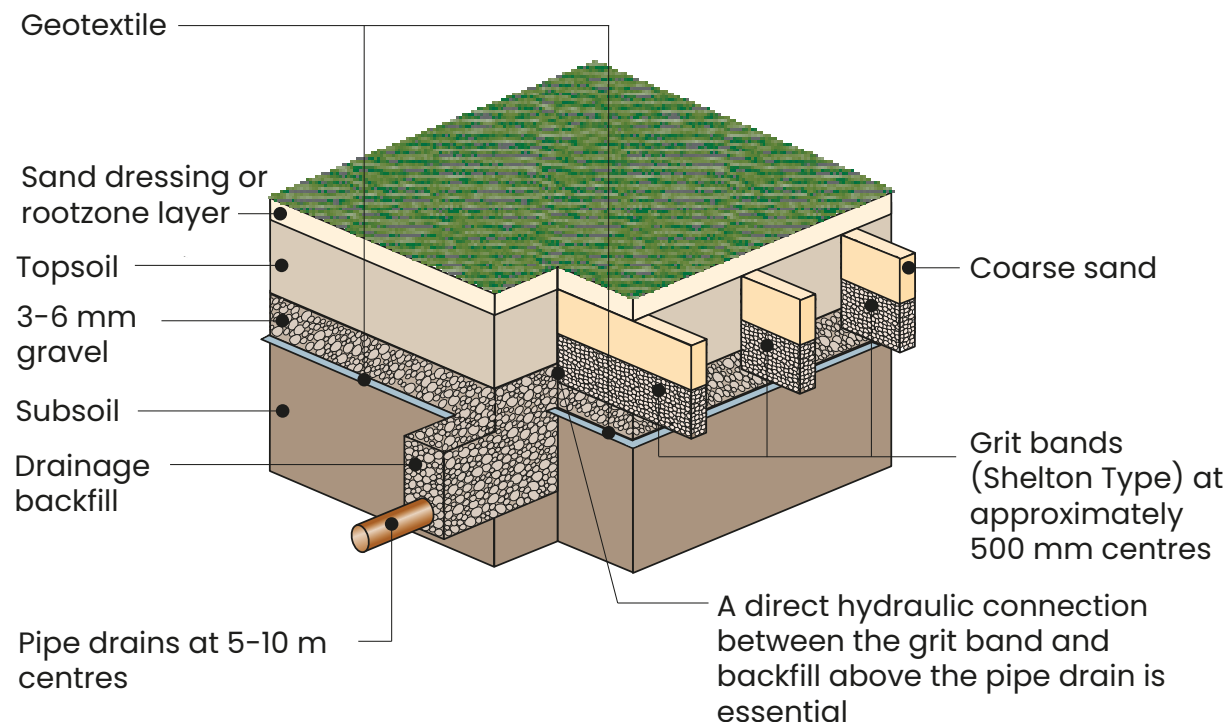
Adequate maintenance is essential in order to produce and maintain a vigorous, dense sward.

1.4.7 Type 7: Pipe drained with topsoil and drainage layer

In some cases, particularly on reclaimed land such as former school buildings, it may be appropriate to develop pitches on a drainage layer, or grit raft, combined with a soil growing medium (i.e. Type 7 below) rather than a sand-based rootzone material as used in the suspended water table construction (see Type 9).

This approach can produce a higher standard of playing surface but with less reliance on high rates of fertiliser or irrigation compared with a sand-based pitch profile (e.g. Type 9). The method can be used effectively where the underlying subsoil materials are unsuitable for a conventional pipe and slit system.

Figure B6 Type 7: Pipe drainage and slit drainage construction on grit raft



It is essential to include a secondary system to connect effectively through the soil to the grit layer.

The design of the profile and the materials used are critical to the successful development of the pitch and depend on the available soil.

As with all pitches, the need for good maintenance is essential and irrigation should be included.

See also Part C3 Construction on brownfield sites for a variation of the Type 7 construction over a sub-formation.

In some cases, particularly on reclaimed land such as former school buildings, it may be appropriate to develop pitches on a drainage layer, or grit raft, combined with a soil growing medium.

1.4.8 Type 8: Pipe drained with carpet-hybrid reinforcement system

Carpet-hybrid pitches are constructed by creating a flat, drained surface and then covering this with a specially-manufactured artificial grass carpet that has a backing fabric designed to allow grass roots to pass through. Once installed, the carpet is infilled with a manufactured sand rootzone and seeded with standard natural turfgrass so that a hybrid of natural and artificial grass is used to play sports such as rugby and football.

Figure B7 Installation of a carpet-hybrid pitch system for Type 8 construction

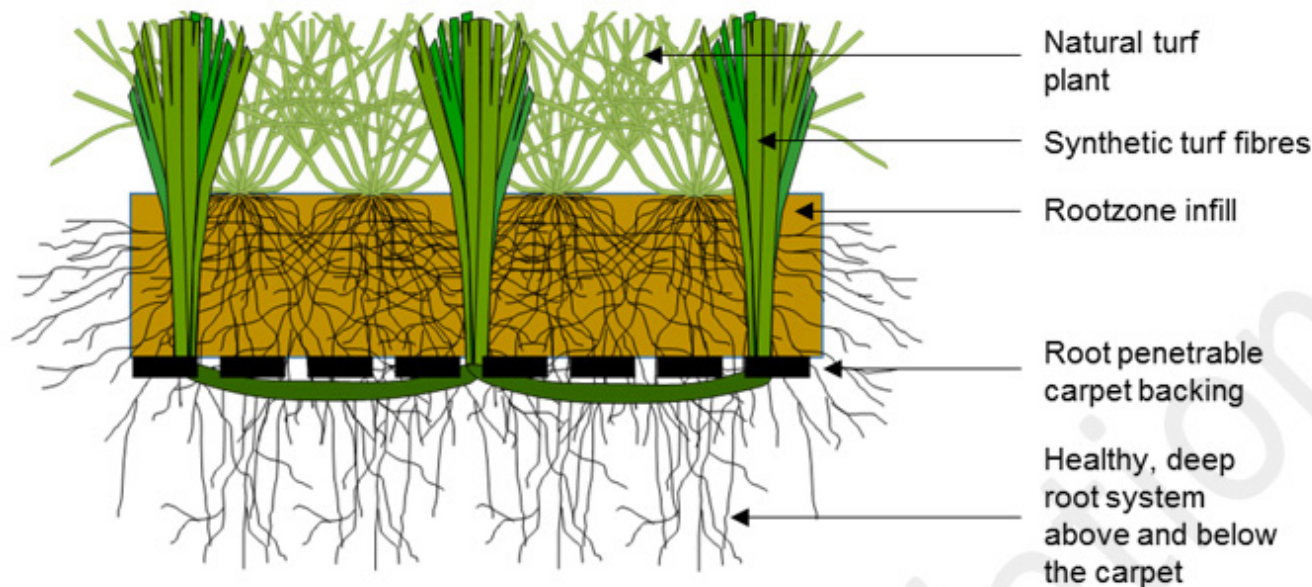


Image credit: from James IT (2011) Proc IMechE Vol. 225, Part P: 115. Sage Publications

The purpose of the artificial grass fibres is to help increase the wear resistance and strength of the natural grass so that pitches can accommodate more than 15 hours of use per week.

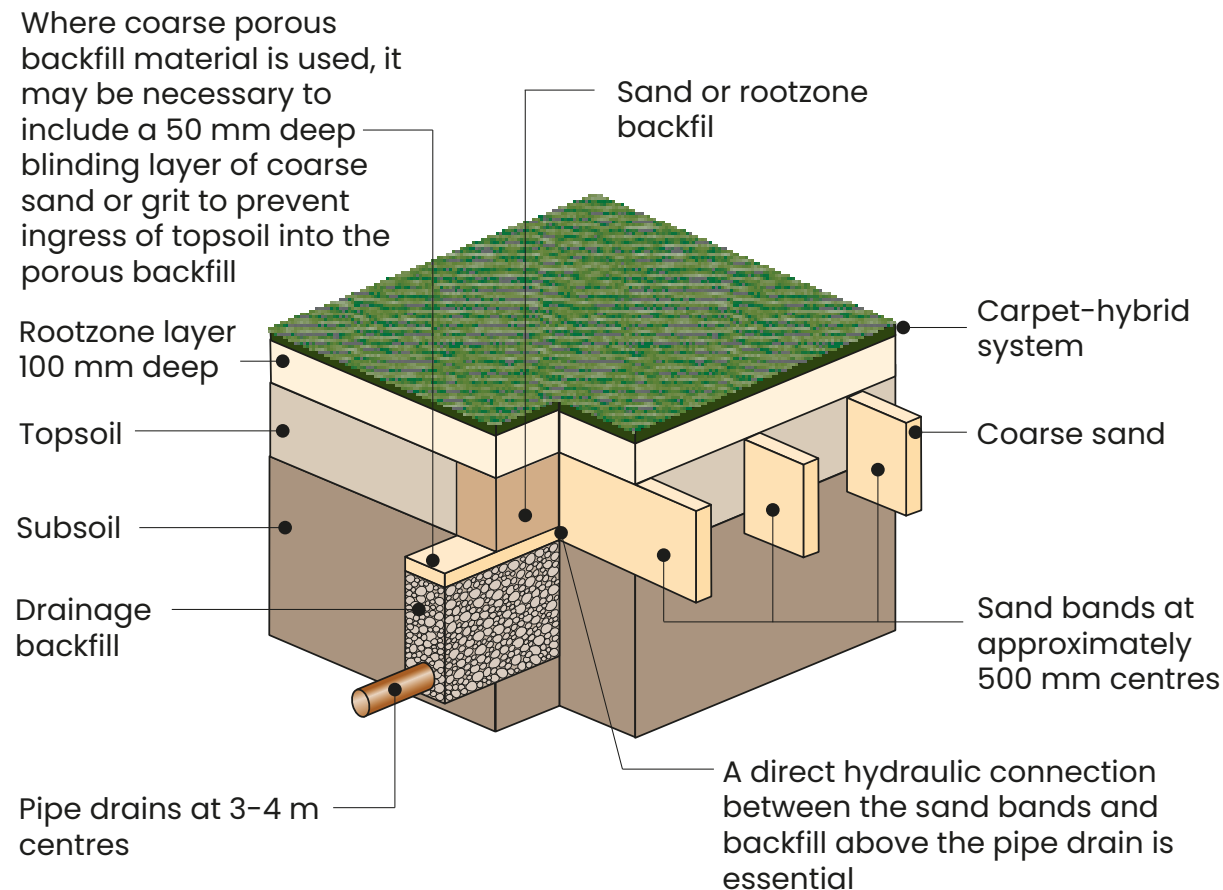
Carpet-hybrid pitch systems are typically constructed by placing a 100 mm-deep layer of rootzone (a blend of sand and soil) above a Type 5 or Type 6 pitch construction prior to laying, infilling and seeding the carpet.

Hybrid carpets can last more than ten years before replacement may be required. The carpet-hybrid system provides natural protection to the underlying pitch construction, including the land drainage scheme. Replacement involves disposal of the old carpet and infill at a specialist recycling depot, and installation of a new carpet and infill, followed by grass establishment.

The purpose of the artificial grass fibres is to help increase the wear resistance and strength of the natural grass so that pitches can accommodate more than 15 hours of use per week.

Adequate maintenance is essential in order to produce and maintain a healthy grass sward, particularly with regard to fertiliser and irrigation requirements. There is also a need to manage the natural accumulation of organic matter in the surface layer in order to maintain drainage efficiency. These pitch systems require a robust annual renovation operation involving raking out excess organic matter, application of sand dressing, decompaction, application of fertiliser and overseeding. This needs to be factored into the overall operating business model.

Figure B8 Type 8: Pipe drainage with a carpet-hybrid reinforcement system



These pitch systems require a robust annual renovation operation involving raking out excess organic matter, application of sand dressing, decompaction, application of fertiliser and overseeding. This needs to be factored into the overall operating business model.

1.4.9 Type 9: Pipe drained with suspended water table and stitched-hybrid reinforcement system

This type of construction forms the basis for very high standard pitches and is very demanding in terms of management, particularly with regard to fertiliser and irrigation requirements. Stitched-hybrid pitches are constructed by stitching artificial fibres on a 20 mm grid to a depth of 180 mm into a suspended water table pitch construction profile.

Figure B9 Installation of a stitched-hybrid reinforcement system for Type 9 construction

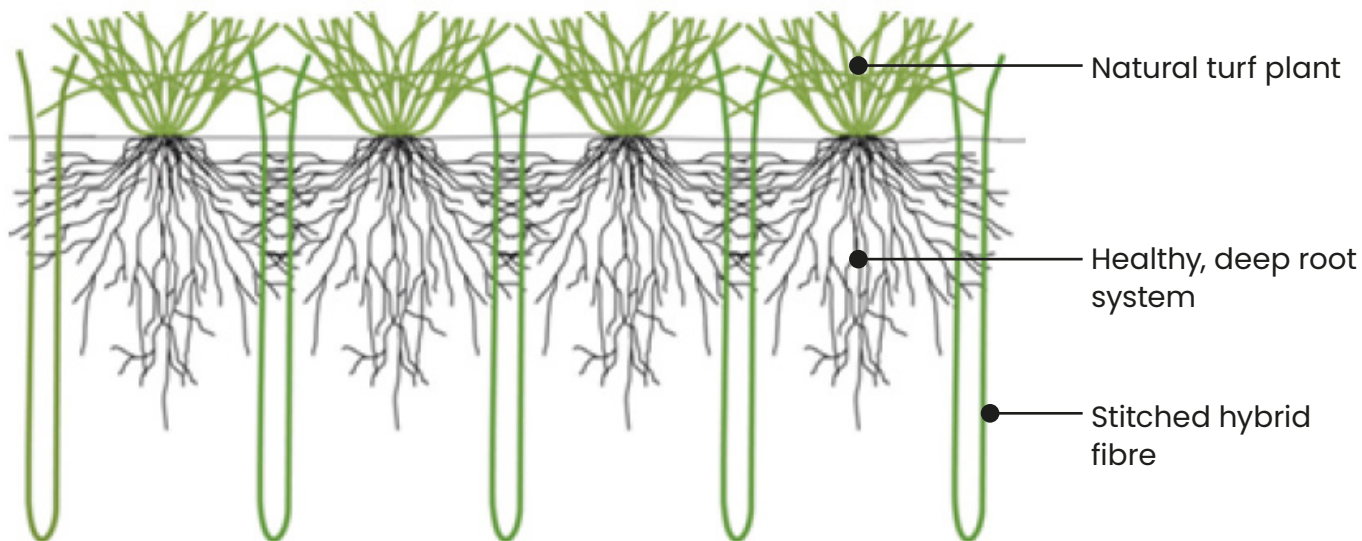


Image credit: from James IT (2011) Proc IMechE Vol. 225, Part P: 115. Sage Publications

Installation of a stitched-hybrid pitch system

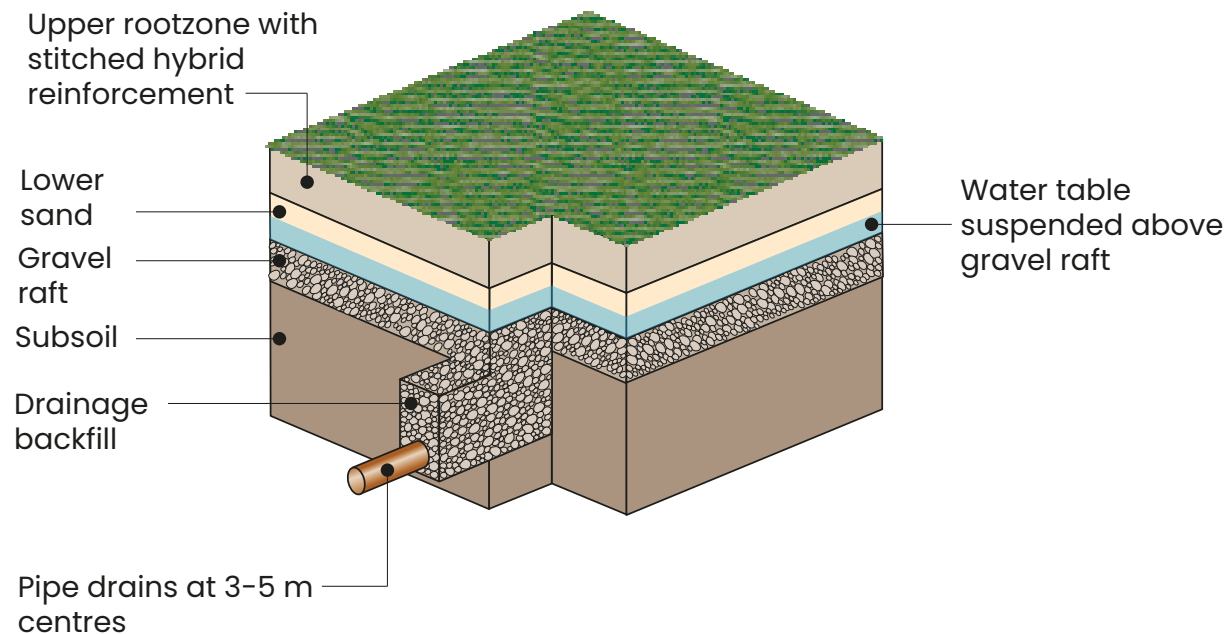
Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



This type of construction forms the basis for very high standard pitches and is very demanding in terms of management.

The more efficient the drainage system, the greater the need for effective irrigation and nutrition. This method is appropriate for a high standard of pitch where the timing of matches is critical or for training at a high level on a surface with similar characteristics to those of the match pitch, e.g. for a professional football or rugby club.

Figure B10 Type 9: Pipe drainage with a suspended water table and stitched-hybrid reinforcement system



This method is appropriate for a high standard of pitch where the timing of matches is critical or for training at a high level on a surface with similar characteristics to those of the match pitch.

1.4.10 Types 1–9 summary

Table B1 below provides a summary of types 1–9 pitch constructions. Indicative information is also provided on hours of use, capital and maintenance costs based on a natural turf area of one adult football pitch, likely maintenance requirements, plus advantages and disadvantages for each type respectively. The following notes apply:

- **Note 1:** The adult weekly use (hours) figures only give a general guide. The actual playability of pitches will depend upon a combination of factors including the prevailing weather conditions, physical characteristics of the soil profile, and the standard of management provided. The usage levels are also a factor and the rule of thumb figures shown can increase by approximately 50% for players under 15 years of age;
- **Note 2:** Construction and/or improvement works costs are estimated at 2025 rates for an adult football pitch. They include an allowance for professional fees, contingency, and initial 12-months maintenance. They exclude associated external works and site abnormalities which are site specific and subject to site survey;
- **Note 3:** Ongoing annual maintenance costs are estimated at 2025 rates for an adult football pitch for situations ranging from where volunteer help is available (e.g. for mowing, fertiliser application, spiking and line marking) to all maintenance operations being contracted out;
- **Note 4:** Type 7 is the preferred option for school development projects where new buildings are constructed on existing playing fields, and new pitches are constructed where buildings have been demolished.

Table B1 Summary of pitch construction types

Pitch type	Adult weekly use (hours)	Comparative costs (£) excl. VAT		Maintenance	Advantages	Disadvantages
		Construction and/or improvement works capital costs	Ongoing annual maintenance costs			
Type 1 Undrained	Typically under 2	£15,000 up to £57,500 (re-grading)	£5,000 – £15,600	Aeration and sand dressing when conditions allow.	Low capital cost.	Likely to be suitable only in naturally well-drained soils.
Type 2 Pipe drained	2–3	£64,200 (drainage) up to £101,400 (drainage + re-grading)	£6,000 – £13,500	Aeration when conditions allow. Sand dressing not essential, but beneficial.	Low capital and ongoing maintenance cost.	In dry weather, surface cracks can render pitches unplayable.

Cont/d

Table B1 cont/d...

Pitch type	Adult weekly use (hours)	Comparative costs (£) excl. VAT		Maintenance	Advantages	Disadvantages
		Construction and/or improvement works capital costs	Ongoing annual maintenance costs			
Type 3 Pipe drained with mole drains	2-4	£57,000 (drainage + mole drains) up to £94,200 (drainage + mole drains + re-grading)	£6,000 – £13,500	Aeration when conditions allow. Sand dressing not essential, but beneficial. Re-moling every 3-5 years.	Low capital and ongoing maintenance cost.	In dry weather, surface cracks can render pitches unplayable.
Type 4 Pipe drained with sand grooves	3-5	£64,200 (drainage) up to £101,400 (drainage + re-grading)	£7,500 – £15,600	Aeration and regular sand top dressing (@ 60-80 tonnes per annum). Higher drainage rates mean that some irrigation may be necessary during dry periods. Re-sand grooving required every 3-5 years under high wear (or high worm casting).	Cost-effective way of improving drainage thereby allowing increased use without damage to the playing surface. Can be used to reinstate slit systems capped with topsoil. Lower cost and less susceptible to soil shrinkage problems.	The top of the sand grooves may be capped with topsoil more easily. Depth of bands limited and may not connect with drain trench backfill.

Cont/d ...

Table B1 cont/d...

Pitch type	Adult weekly use (hours)	Comparative costs (£) excl. VAT		Maintenance	Advantages	Disadvantages
		Construction and/or improvement works capital costs	Ongoing annual maintenance costs			
Type 5 Pipe drained with slit drains	3-6	£91,100 (drainage + slit drains) up to £128,300 (drainage + slit drains + re-grading)	£7,500 – £15,600	Aeration and regular sand top dressing (@ 60-80 tonnes per annum). Higher drainage rates mean that some irrigation may be necessary during dry periods. Normally only installed into the established sward.	Cost-effective way of improving drainage thereby allowing increased use without damage to the playing surface.	Slits can be capped and sealed with topsoil significantly reducing drainage rates. Surface may be uneven in the first season. Slits may open up during the summer due to soil shrinkage.
Type 6 Pipe drained with sand bands	3-6	£94,100 (drainage + sand bands) up to £131,200 (drainage + sand bands + regrading)	£7,500 – £15,600	Aeration and regular sand top dressing (approx. 60-80 tonnes per annum). Higher drainage rates mean that some irrigation may be necessary during dry periods. Re-sand banding required every 8-10 years under high wear (or high worm casting).	Cost-effective way of improving drainage thereby allowing increased use without damage to the playing surface. Can be installed at construction stage.	Sand bands can be capped and sealed with topsoil significantly reducing drainage rates. Surface may be uneven in the first season. The sand bands may open up during the summer due to soil shrinkage.

Cont/d ...

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Table B1 cont/d...

Pitch type	Adult weekly use (hours)	Comparative costs (£) excl. VAT		Maintenance	Advantages	Disadvantages
		Construction and/or improvement works capital costs	Ongoing annual maintenance costs			
Type 7 Pipe drained with topsoil and drainage layer	3-6	£180,000 (drainage + reuse of topsoil from site) up to £300,000 (drainage + importation of topsoil)	£7,500 – £15,600	Some increase in maintenance required. Aeration and sand dressing essential. Increased requirement for irrigation.	Increased drainage rates and wear tolerance. Can be constructed over poor subsoil material. With proper maintenance a hard-wearing surface can be achieved.	Grit bands can be capped and sealed with topsoil significantly reducing drainage rates. Surfaces may be uneven in the first season, the grit bands may open up during the summer due to soil shrinkage.
Type 8 Pipe drained with carpet-hybrid system	10-20	£364,000 – £410,200	£14,500 – £25,000	Higher levels of fertiliser and irrigation to maintain hard-wearing turf. Top dressing with rootzone-compliant material. Surface aeration work.	Increased wear tolerance and the performance of play. Very high drainage rates achievable. With proper maintenance a very high standard of playing surface can be achieved and maintained.	Regular high level of maintenance required. Pop-up irrigation system essential.

Cont/d ...

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Table B1 cont/d...

Pitch type	Adult weekly use (hours)	Comparative costs (£) excl. VAT		Maintenance	Advantages	Disadvantages
		Construction and/or improvement works capital costs	Ongoing annual maintenance costs			
Type 9 Pipe drained with suspended water table and stitched-hybrid system	10-20	£700,000 – £860,000	£14,500 – £25,000	Higher levels of fertiliser and irrigation to maintain hard-wearing turf. Top dressing with rootzone-compliant material. Surface aeration work.	Increased wear tolerance and the performance of play. Very high drainage rates achievable. With proper maintenance a very high standard of playing surface can result.	Regular high level of maintenance required. Pop-up irrigation system essential.

See also Part D3 for minimum Performance Quality Standards guidance for playing fields.

1.5 Cultivation

Cultivation is the physical manipulation of soil using soil engaging implements and is an essential part of seedbed preparation. Cultivation at a deeper level (e.g. with a 'subsoiler') may be necessary on sites levelled by major grading in order to alleviate compaction.

It is important that the works are correctly timed and that soils are only worked in appropriate conditions (i.e. in the Spring or Summer when the soil is dry and friable). To achieve the desired tilth, it is essential that the appropriate equipment is used.

For stony topsoil, allowance should be made for the removal, and/or burial of stones or other debris using appropriate equipment.

The final seedbed should comprise a smooth surface that is uniformly firm but not over-compacted. An appropriate fertiliser dressing should be applied prior to seeding or turfing.

1.6 Grass cover

The lowest cost and preferred means of establishing grass cover is by seeding. It is essential that seeding is uniform over the working area.

For rugby and football pitches, the seed mixture should comprise predominantly, if not entirely, hard-wearing and fine-leaved cultivars (varieties) of perennial ryegrass.

Where time is limited, pitches can also be established using purpose-grown imported turf, although this is a more expensive option. The turf should contain hard-wearing grass cultivars suitable for winter games and be predominantly weed-free. The turf should be grown on light sandy topsoil and should not be excessively fibrous.



Image credit: Dr Richard Earl
(PSD/TGMS/Labosport)

Seeding a well-prepared, smooth and level tilth using a tractor-mounted seed drill

For specialist constructions, a washed turf may be considered. This is where the entire topsoil base within the turf has been washed off the roots before laying. Turfed pitches often require intensive hollow tine aeration in order to assist surface drainage and encourage root penetration and development during the early years of establishment.

In some instances a custom grown turf may be used which has been established on a specially-prepared rootzone material, rather than the indigenous topsoil.

1.7 Upgrading pipe drained pitches

Properly constructed pipe drained pitches can be upgraded by adding further pipe-drains to achieve a more intensive system. These systems can be supplemented further by installing a secondary drainage system in the form of sand grooves, slit drains or sand bands to improve the surface drainage performance. However, for this approach to be fully effective, a good drainage connection should be achieved between the secondary drainage system and the primary drains.

1.8 Sand amelioration

The drainage characteristics and surface playability of topsoil can be improved by applying and stirring in suitable sand. It should be noted, however, that a high proportion of sand is required to achieve a significant improvement in drainage performance.

Where a high standard pitch is required, the quantity of sand should be determined by laboratory analysis to determine the particle size distribution of the soil and sand. In some cases, the sand will be mixed with topsoil off-site, with the final rootzone material then being spread over the prepared base.

For the majority of pitches, it is more cost effective to spread a layer of sand on the pitch (typically 25 mm deep) and lightly work this into the surface of the topsoil to improve infiltration and reduce surface damage from wear. This sand layer is particularly effective when combined with a secondary drainage system.

1.9 Irrigation

Watering facilities are desirable for pitch management, not only for initial grass establishment, but to assist with renovation of the playing surface. Due to high percolation rates, well-drained pitches will require intensive irrigation to combat problems caused by drying out during periods of low rainfall.



A basic irrigation system comprises conveniently-located hydrant points where a hose or mobile sprinkler can be connected. For free-draining rooting mediums over drainage rafts, an automatic pop-up irrigation system is essential.

The irrigation system should comply with local water company regulations, and this will involve the installation of a system incorporating facilities to prevent reverse siphoning into the water main.

Irrigation may also be required to offset potential problems with soil shrinkage on drain lines where the indigenous soil has a high clay content.

The design of an irrigation system will normally require advice from a specialist irrigation consultant on issues such as:

- Irrigation demand;
- Capacity and location of water storage;
- The potential for use of greywater;
- The source and cost of water;
- Potential for abstracting groundwater (up to 20 cubic metres per day may be abstracted without a licence);
- Pumps, power supplies, pipework, hydrants and sprinklers;
- Irrigation scheduling.

1.10 Maintenance

Maintenance is key to the success of all pitches and playing fields and is an essential requirement to provide pitches that meet relevant PQS over a long period. There are too many examples of well-constructed pitches that fail after a short period of time due to inadequate maintenance, and then require further significant investment to make them effective again.

Periodic sand topdressing applications maintain playability of the pitch surface

Image credit: STRI



Image credit: Daniel Ratling

Specialist equipment such as a solid-tine aerator can be hired to maintain pitch quality

Typically, a maintenance programme will include:

- Mowing, aeration, nutrient application, overseeding/turfing, sand topdressing, and pest, weed and disease control, and irrigation;
- Depending on the sport/surface, post-match work may involve replacing divots, repair of damage through topdressing application, overseeding, or irrigation;
- To restore a sports surface back to standard for the following season, a number of operations may need to be performed at the end of the playing season (often termed “an end-of-season renovation”).

However, the content of the maintenance programme will depend on the pitch construction and sport use.



At the end of the season, over seeding reinstates worn turf

It is essential to bear in mind that the maintenance requirements of a newly-established pitch may be considerably higher than that for a mature playing surface.

For the implementation of an effective maintenance programme, it is important for all staff and volunteers to be formally trained on use of any equipment and on the principles of grounds management.

Further guidance is available from the GMA at: <https://resources.thegma.org.uk/core-modules>

Further information on maintenance resources that may be required is presented in Part D4.

The following equipment is fundamental to implementing a successful maintenance programme:

- **Mower:** various models fulfill different requirements. Cylinder mowers produce a better-quality finish than rotary mowers, but capital and ongoing maintenance costs are higher;
- **Aerator:** tractor-mounted or pedestrian. This can be hired in when required;
- **Sprayer:** for application of liquid fertiliser and pesticides;
- **Spreader:** Pedestrian rotary fertiliser spreader with spinning disc action for application of granular materials including fertiliser and grass seed;
- **Chain harrow/roller:** to break up clumps and re-level the surface. Heavy rolling should be avoided due to adverse effects on the soil or rootzone;
- **Combination grooming tool;**
- **Hand tools:** a spade, fork, half-moon turf edger, dragbrush, edging shears, wheelbarrow, measuring and line marking equipment should be included;
- **Health and Safety:** appropriate Personal Protective Equipment (PPE) should be used.

There is a wide range of equipment available that can be used for aeration or for renovating the pitch surface when a more thorough operation is necessary to restore good surface drainage or to remove excessive fibre or thatch. It is expensive to hire equipment but, in some areas of the UK, the NGBs have equipment banks where maintenance equipment can be hired at competitive rates to complete these specialist tasks.

1.10.1 Maintenance programmes

Figure B11 Summer Rugby League pitch maintenance programme summary

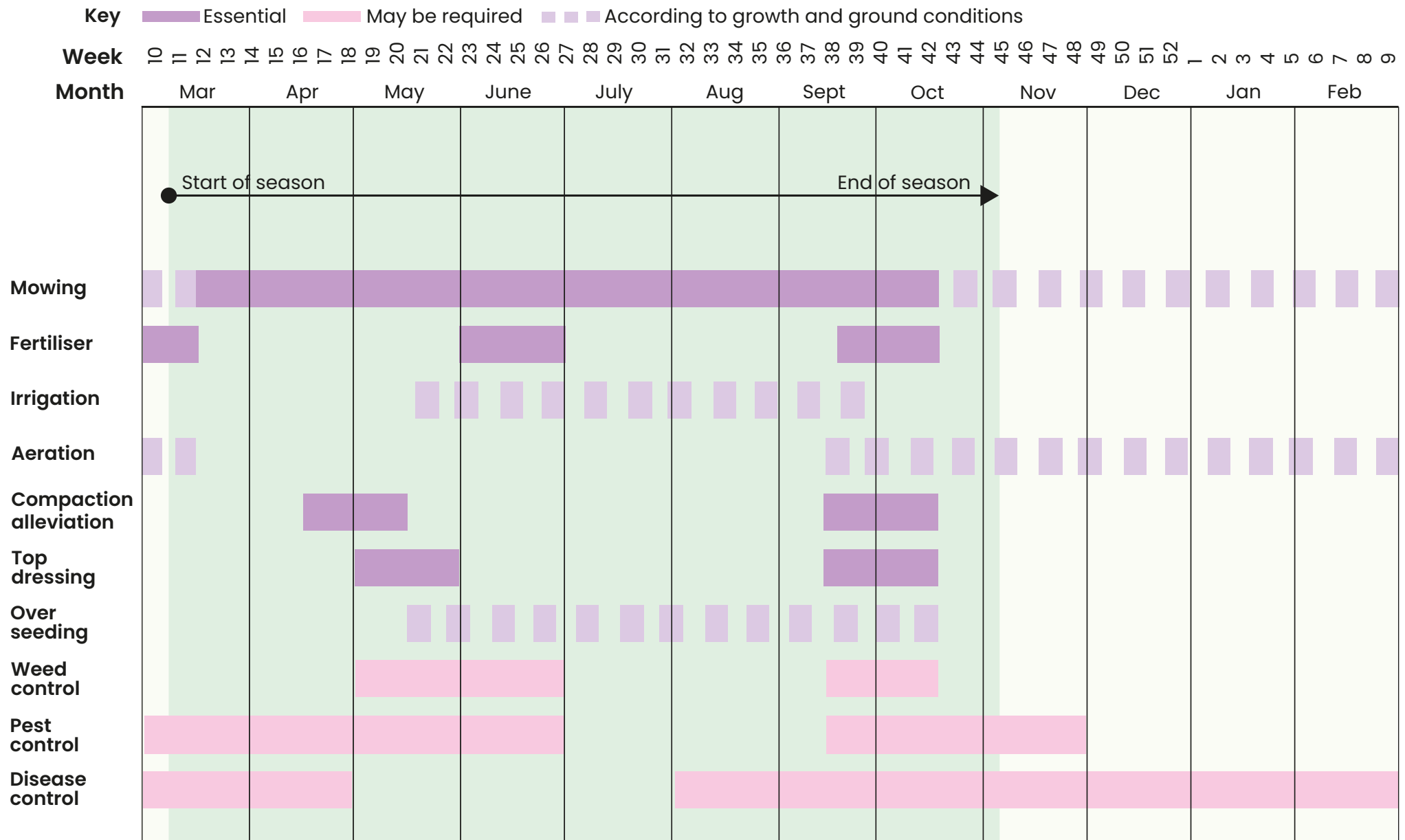
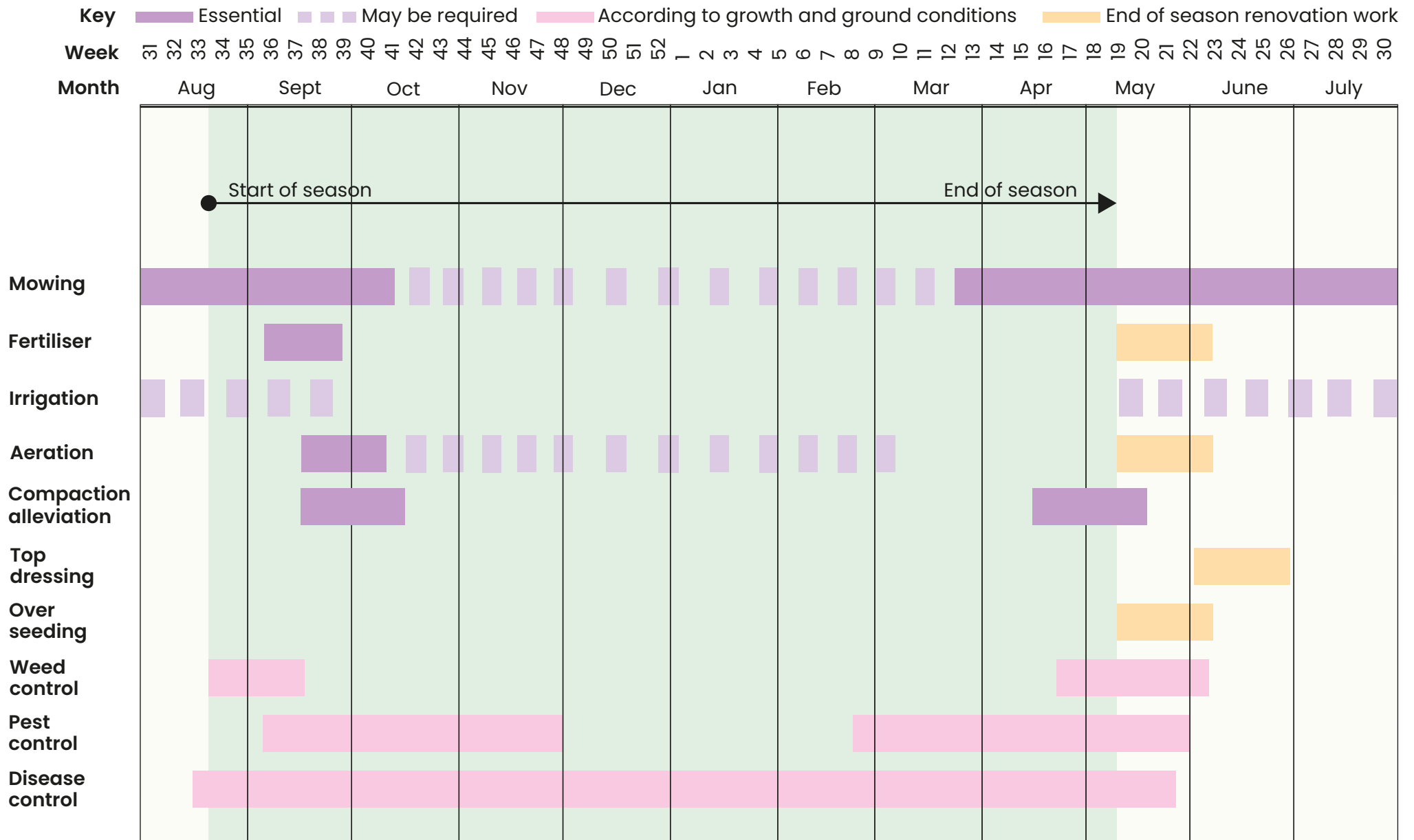


Figure B12 Winter Football and Rugby pitch maintenance programme summary



2 Cricket grounds

This section sets out key considerations for the design, construction, establishment, and ongoing maintenance of cricket grounds.

2.1 Key considerations

The following guidance will assist clubs and schools during the early stages of planning a new cricket square or pitch. The guidance does not, however, go into great detail in terms of design, construction and maintenance issues. Therefore, these should be considered in relation to the guidelines available from the England and Wales Cricket Board (ECB).

In particular, the ECB publish their own guidance on the construction, preparation and maintenance for the relevant standard of play¹³.

Additionally, for all but the smallest projects, expert independent advice should be sought.

The ECB publish their own guidance on the construction, preparation and maintenance for the relevant standard of play¹³.



¹³ See ECB document available at: <https://www.ecb.co.uk/play/club-support/facility-management>.

2.2 Initial planning

Firstly, identify the level of cricket to be played and the associated PQS required. Plan the square to have a lifespan of 25 years and factor in realistic maintenance costs to achieve this.

Field of play boundary and safety margin criteria is as follows:

- For 'seniors', the boundary should be a minimum of 45.72 m from the middle stumps of the pitch in current use – see section 3.6.1 Pitch examples;
- For 'juniors', recommended pitch lengths and maximum boundary sizes for junior cricket vary depending on age as set out in the ECB guidance: 'ECB-Recommended-Junior-Formats-U9-U17-FINAL-Issued-December-2018'. See Table B2 below for a summary;
- In all cases there should be an additional 3.00 m safety margin between the maximum boundary and any hard or injurious object or change in slope.

Table B2 Cricket pitch and boundary sizes for juniors (based on ECB recommendations)

Indicative ages	U9	U11	U13	U15	U17
Pitch length (yards)	15	17	19	20 (girls) 22 (boys)	22
Maximum boundary (metres)	30	35 (soft ball) 40 (hard ball)	45 (girls) 50 (boys)	50 (girls) 55 (boys)	55 (girls) 60 (boys)

Pitches should run approximately north / south to minimise the risk of batters or bowlers facing a low sun projection. The pitch axis should point in a direction between 305 degrees and 55 degrees on a compass – see Part A Figure A2.

Single pitch area criteria is as follows:

- For 'seniors', a single pitch area is 20.12 m (22 yards) long x 3.05 m (10 feet) wide, but in reality are constructed to a 25 m minimum length to allow for high wear in the bowlers landing areas;
- For 'juniors', the pitch length is reduced to 20 yards (U15 girls), 19 yards (U13), 17 yards (U11), and 15 yards (U9) respectively.

The size of the cricket square is determined by the number of pitch areas required in a season. To calculate this:

- Assess the total number of matches to be played during the season;
- Assess the number of times each strip can be used during the playing season. This is variable but could be between two and five times dependent on the type of cricket, the standard of maintenance and the time available to the grounds manager to maintain and prepare the pitches;
- Calculate the number of pitches required and hence the total width of the square: the number of matches to be played divided by the assessed number of games per pitch gives the total number of pitches required.

2.3 Site investigation

Before making decisions about the construction of the cricket ground it is important to identify the characteristics of the indigenous soil. This is achieved by analysis of the topsoil and the subsoil from a number of locations across the site. The soil analysis should be conducted by an experienced consultant using an approved, independent soil laboratory.

The initial investigation should identify the site's natural run-off and the location of existing drainage. Where available, obtain copies of drainage plans.

Ensure there will be reasonable access for construction vehicles and take steps to protect the outfield from damage by heavily laden traffic.

Following initial planning and site investigation and before proceeding further, the following information should be available:

- Required size of the square;
- Depth of dig for construction of the square;
- Drainage requirements for the proposed square and outfield including any anticipated future expansion.

2.4 Cricket square

2.4.1 Falls

Ideally, the square should be completely level along the line of play, although a fall of up to 1 % (1 in 100) might be acceptable.

A slight cross-fall of between 1.25% (1 in 80) and 1.60% (1 in 63) is desirable to assist surface run-off.

In all cases, the square should blend smoothly into the outfield and be finished proud of the surrounds by 25 mm (1 inch) to allow for water run-off and prevent standing winter rainfall to the detriment of grass health and build-up of associated algae.

The maximum gradient of the outfield should be 2% (1 in 50).

2.4.2 Materials

Cricket demands a firm, level surface that provides consistent bounce and pace. The selected cricket loam for the square will have a major influence on the physical characteristics of the playing surface and will also affect the selection of grass cover.

The nature of the existing topsoil will determine the extent of the construction works required to develop the square. For different standards of pitch, the clay content should be:

- 28 – 35 % for first class, county, and high-level club cricket, or;
- 25 – 30 % for club-level cricket.

Note that marl (lime-rich mudstone) should not be used.

The clay content of the topsoil will be determined by a soil analysis carried out at the initial planning stage. Where existing topsoil is unsuitable, make allowance at the planning stage for importing an appropriate cricket loam from a specialist supplier.

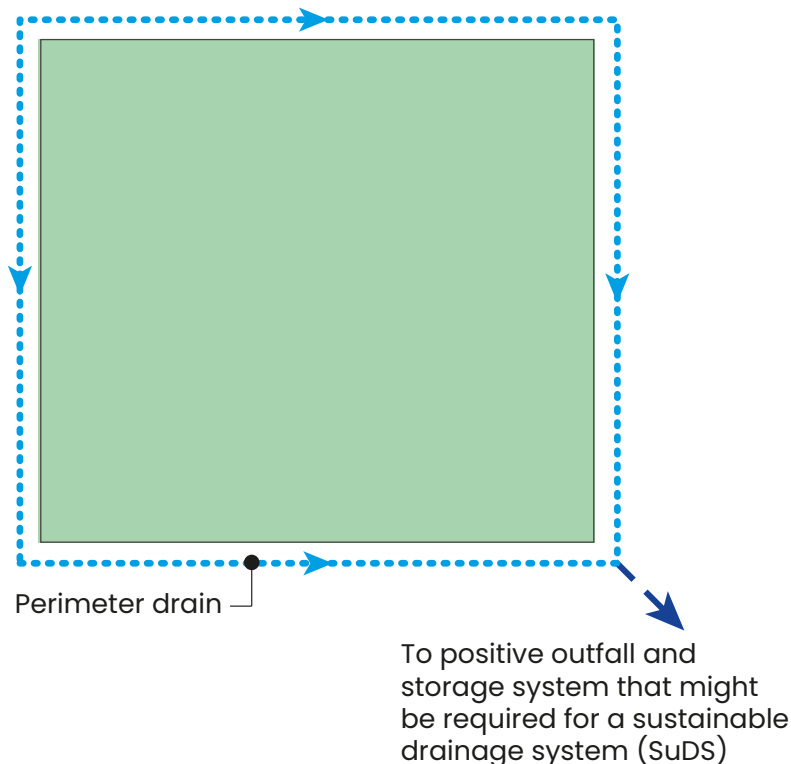
To accommodate the imported loam, an equivalent depth of existing material should be removed from the footprint of the square, but accounting for the finished square surface to be 25 mm higher than the surrounds.

2.4.3 Drainage

The drainage system should be designed by a specialist to meet the demands of the location and planned pitch use. In its simplest form, the drainage system will comprise a single perimeter drain around the outer edge of the square.

Except when designed with a drainage raft, never install a pipe-drainage system under the square as this will result in differential drying out, shrinkage and cracking at the surface. 'Drainage rafts' are required only in exceptional circumstances, such as in situations where shallow ground water results in very wet soils or for very high-standard construction.

Figure B13 Cricket square with a perimeter ring drain



2.4.4 Construction

Excavate topsoil to the required depth, invariably 100–150 mm. Install the drainage system. If excavation exceeds 100 mm introduce appropriate loam in layers no deeper than 50 mm.

The loam should be consolidated every 50 mm by tracking in with excavator tracks, wheels or other form of rough or cleated track or tyre. While time-consuming, consolidation is the most important element of the construction process and should be carefully supervised.

All layers should be keyed in, and air pockets removed. Failure to carry out this process diligently will curtail the expected lifespan of the pitch or square and lead to disruption and additional costs.

Levelling and construction can be achieved with levelling pegs or laser levelling equipment and, if correctly carried out, there should be no need for overlapping. The success of this procedure relies on exact marrying up with the outfield.

A roller should not be used for the final levelling as this may leave isolated pockets that can only be eradicated by 'walking and heeling' or mechanical tracking-in.

Precise placement and consolidation of cricket loam is crucial to the success of cricket square construction

Image credit: Dr Richard Earl (PSD/TGMS/Labosport)



2.4.5 Seeding

Note that pitches and squares should not be turfed. Grass cover is established by seeding using appropriate cultivars of suitable grass species sown at a rate of 50–75 g/m². The selection of a suitable seed mixture will depend on the proposed intensity of use and levels of management and maintenance available. The seed mixture should be selected in consultation with a specialist and take account of advice available from the ECB. Successful seedbed preparation relies on the following steps:

- Ensure all stones are removed;
- Rake the surface and, where necessary, apply a pre-seeding fertiliser;
- Spread the seed uniformly then lightly rake into the surface and roll with a hand-roller;
- Water the seedbed;
- Provide protective fencing around the perimeter to prevent encroachment onto the new surface;
- The use of germination sheets should be considered to accelerate grass emergence and to afford temporary protection from intensive rainfall which can mobilise the seed and cause erosion of the cricket loam.

The square will be ready for use 9–18 months after seeding.



2.4.6 Irrigation

Provide at least one hydrant point at a location convenient to the square such that it is possible to water each of the pitches. A hose or sprinkler can be attached for general watering of the square and / or preparation of pitches. The irrigation system must comply with local water company regulations, and this will include the installation of a system incorporating facilities to prevent reverse siphoning into the water main.

Automatic pop-up irrigation systems can be used to water the whole square or parts of the square, depending upon design. Manual watering points will still be required for watering individual pitches because during the season, there are times when areas of the square need to be kept dry for play. Pop-up sprinklers can be useful for end of season renovations and during dry periods.

2.4.7 Non-turf pitches

Artificial surfaces that replicate the look and feel of natural turf cricket wickets can be integrated into a natural turf playing area. These are referred to as non-turf cricket pitches (NTCPs) – see Figure B14 below showing an example layout for one NTCP adjacent to a standard 8-wicket natural turf cricket square.

They can offer benefits in terms of durability and maintenance and be suitable for practice and occasionally for matches. The ECB has set performance standards for these pitches which are implemented through suppliers approved and regulated by the Board. See the ECB's TS6 document available at:

<https://www.ecb.co.uk/play/club-support/facility-management>.

Figure B14 Cricket square with adjacent non-turf cricket pitch (NTCP)

Notes: See Part A Figure A2 for pitch orientation criteria. All dimensions are in metres.

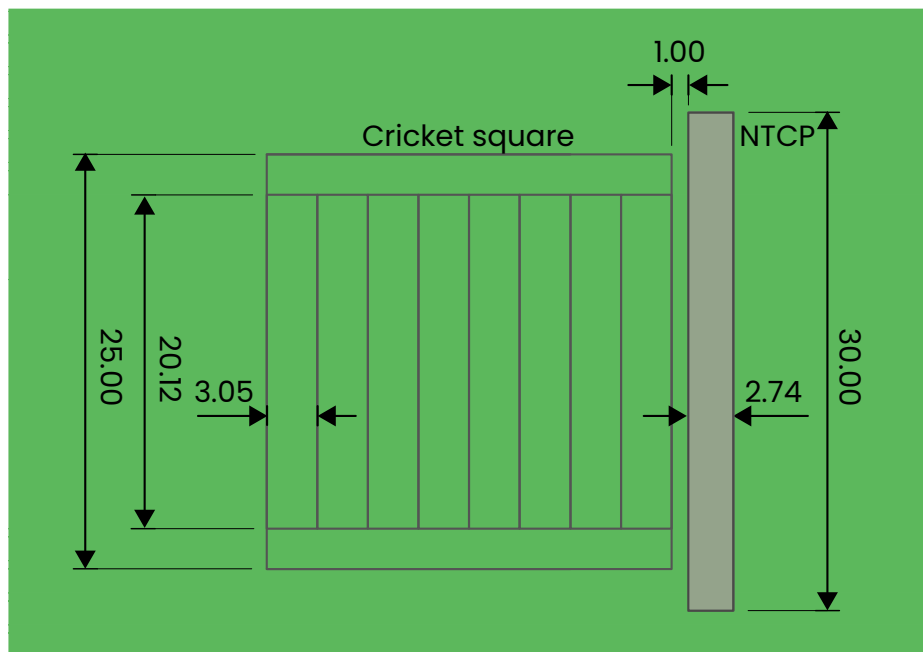


Image credit: ECB

2.5 Outfield

The outfield should comprise smooth and even levels that permit balls to roll freely across the surface. If the outfield is to be cut from grassland, the site should be checked for:

- Uneven surfaces;
- Inadequate drainage;
- Inappropriate grasses.

The following approaches can be considered depending on site conditions:

- Where the quality of turf is satisfactory and site undulations are isolated, it should be sufficient to strip away portions of turf and, where necessary, adjust the underlying ground level. The turf is then replaced to form a level and firm surface;
- Where site undulations are more severe but there is a good depth of topsoil, it may be enough simply to regrade the site to a uniform surface;
- Where existing gradients are too steep, more significant level adjustment may be necessary involving the removal of topsoil and grading of exposed subsoil, followed by topsoil replacement.

The outfield need not be completely level and a slight gradient of up to 1:50 may assist shedding of surface water.



Image credit: ECB

2.5.1 Drainage

Where rainfall levels are low and topsoil is naturally free draining, there should be no need for artificial drainage, particularly if the outfield is to be used for summer cricket only.

If the ground is relatively impervious, some form of land drainage scheme may be required – see Figure B15 adjacent.

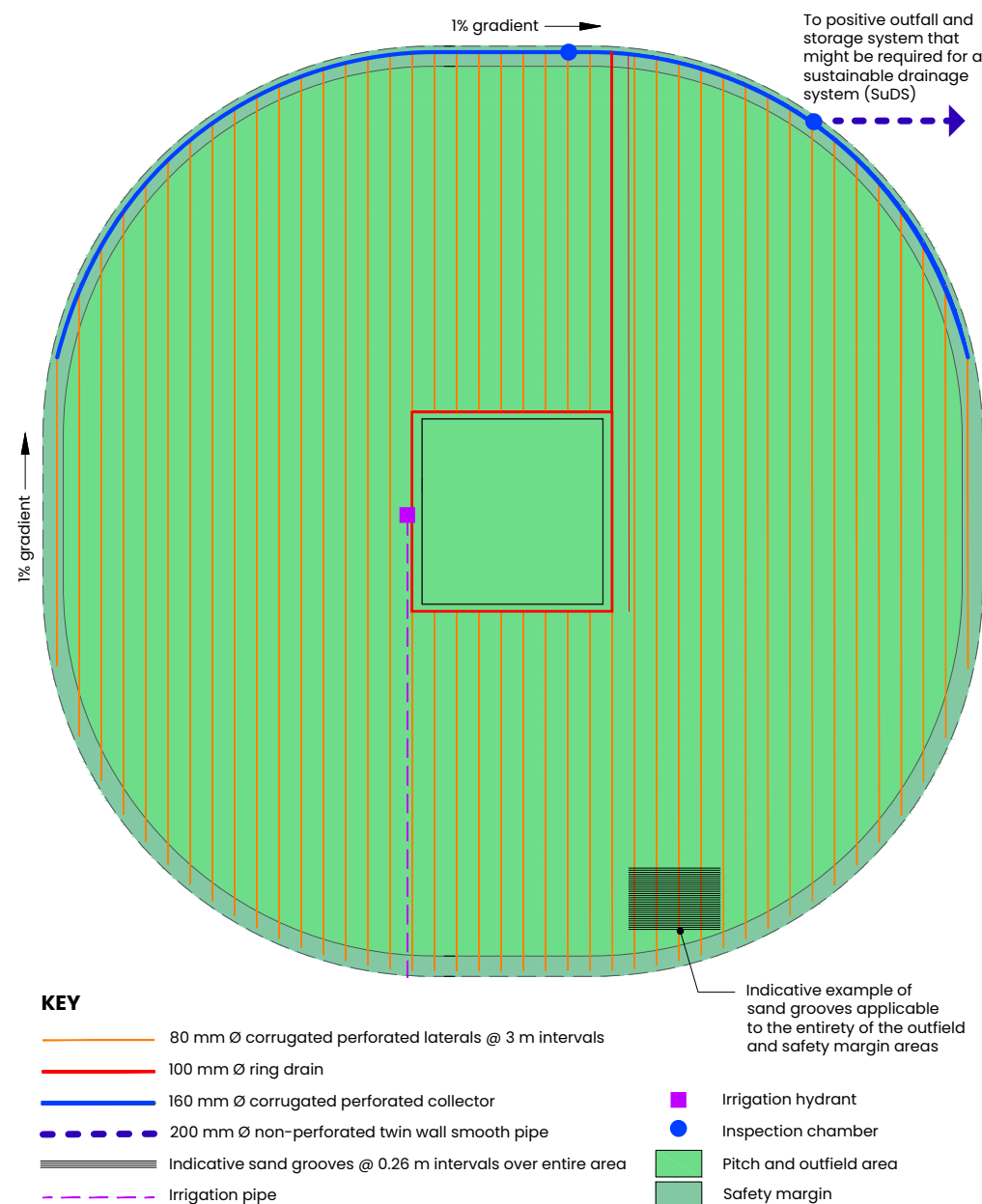
Where the outfield will be used as a playing surface for other sports such as football or rugby, construction should follow recommendations for those sports. While supplementary secondary land drainage may be used on cricket outfields, caution is advised owing to the possibility of settlement of backfilling material during dry weather. This could result in an uneven playing surface which is potentially dangerous for fielders. Make allowance for topping up the secondary drainage with suitable sand when settlement occurs.

2.5.2 Grass cover

For the finest quality outfields, seed mixtures containing cultivars of dwarf ryegrass are most appropriate.

Where winter games are to be played on the outfield, the establishment of a perennial ryegrass sward is essential to maintain the hard-wearing quality of the surface in anticipated wet winter playing conditions. The cultivars chosen should have a high tolerance to close mowing.

Figure B15 Cricket outfield drainage layout example with optional sand groove secondary drainage system



2.6 Maintenance

Maintenance requirements will depend upon site conditions and prevailing growth. Proper management will be vital to the achievement of the best possible playing surface and top dressing the cricket square with cricket loam will be crucial in achieving this. Other maintenance requirements should be discussed and agreed with the cricket design specialist who should provide a detailed maintenance schedule with the original design. Consideration of these requirements should not be left until the works have been completed. It is essential to bear in mind that the maintenance requirements of a newly-established cricket square may be considerably higher than those for a mature playing surface.

Typically, a maintenance programme will be split between the cricket square and the outfield. Cricket square maintenance will include mowing, aeration, thatch control, scarifying, verticutting, rolling, nutrient application, overseeding, topdressing, pest and disease control and irrigation. Cricket outfield maintenance will mainly include mowing, aeration, thatch control, nutrient application, overseeding and pest and disease control.

For the implementation of an effective maintenance programme it is important for all staff and volunteers to be formally trained on use of any equipment and the principles of grounds management and cricket pitch preparation. Further guidance is available at <https://resources.thegma.org.uk/core-modules>.

Typically, a maintenance programme will be split between the cricket square and the outfield.

The following equipment is fundamental to implement a successful maintenance programme:

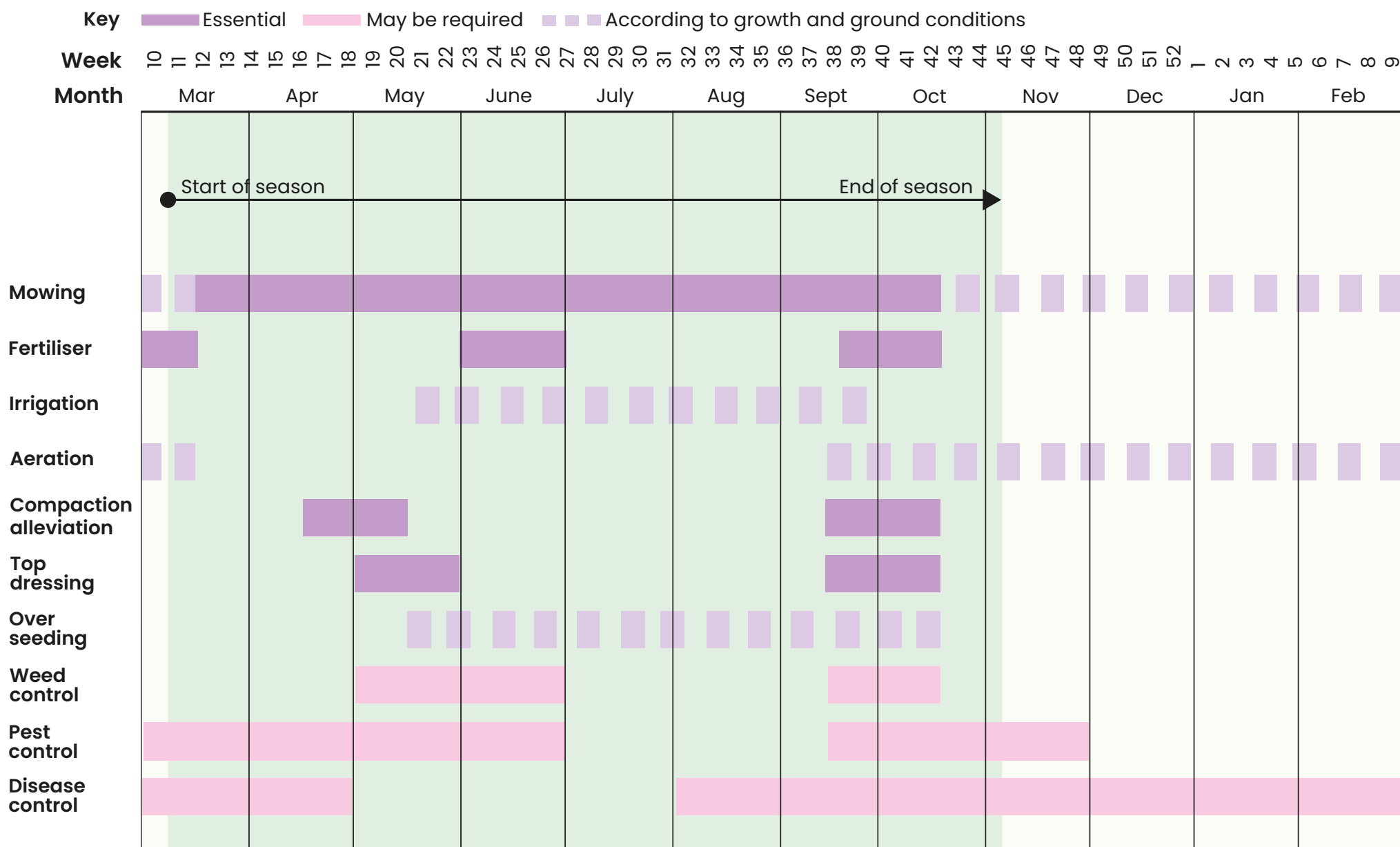
- **Mowers:** a high-quality professional 7-10 blade cylinder mower (pitch and cricket square);
- **Groomer:** specialist cricket pedestrian brush-rake combination tool;
- **Scarifier:** the most efficient are powered, pedestrian models;
- **Sprayer:** for pest and disease control;
- **Spreader:** Pedestrian rotary fertiliser spreader with spinning disc action for application of granular materials including fertiliser and grass seed;
- **Irrigation:** Automatic pop-up irrigation systems can be used to water the whole square or parts of the square, depending upon design. Manual watering points will still be required for watering individual pitches because during the season, there are times when areas of the square need to be kept dry for play. Pop-up sprinklers can be useful for end of season renovations and during dry periods;
- **Roller:** ride-on twin drum type used for pitch preparation.

It is essential that a robust end-of-season renovation is carried out on the square in September / October comprising removal of organic matter, restoration of surface levels, dressing with compatible cricket loam, fertilisation and overseeding.

Further information on maintenance of the cricket square and outfield can be found in the GMA Toolkit for Cricket available at: <https://resources.thegma.org.uk/cricket/cricket-home> and the ECB's website at: <https://www.ecb.co.uk/play/club-support/facility-management>.

2.6.2 Outfield maintenance programme

Figure B17 Cricket outfield maintenance programme summary



3 Playing area layouts

This section sets out key considerations, references and typical layouts and markings for a range of sports played on natural turf. For indicative drainage layouts, see the weblink on page 52 for separate downloadable pdf drawings.

Ensure that consideration is given to the essential support facilities such as:

- Site accessibility, cycle and car parking;
- Changing and social facilities;
- Dugouts and spectator areas;
- Secure storage for maintenance machinery and sports equipment;
- Storage for agrochemicals;
- Machinery washdown areas;
- Fertiliser storage.

See the following separate design guidance downloads available from the Sport England website:

- **Clubhouse:**
<https://www.sportengland.org/guidance-and-support/facilities-and-planning/design-and-cost-guidance/clubhouses>
- **Accessible and inclusive sports facilities (AISF):**
<https://www.sportengland.org/guidance-and-support/facilities-and-planning/design-and-cost-guidance/accessible-inclusive>
- **Comparative Sizes of Sports Pitches and Courts (OUTDOOR):**
<https://www.sportengland.org/guidance-and-support/facilities-and-planning/design-and-cost-guidance/outdoor-surfaces>

Guidance should be sought from NGBs on layouts including for multi-sport locations, spectator zones, and technical areas. The standard layouts in sections 3.1 – 3.6 assume a single pitch location for the following:

- Mini soccer;
- Youth football;
- Senior football;
- Rugby Union;
- Rugby League;
- Cricket:
 - Pitch examples;
 - Pitch markings.
- Combined winter games and cricket pitches.

Pitches can be used on a flexible multi-sports basis. For example, for training or playing other sports such as American Football on a rugby pitch.

The National Governing Bodies (NGB) of sport provide details of pitch sizes. See current list of recognised bodies at:

https://www.sportengland.org/guidance-and-support/national-governing-bodies?section=recognised_ngbs .

Indicative drainage layouts for the pitch layouts included in this section are available as separate downloadable pdf drawings at:

<https://www.sportengland.org/guidance-and-support/facilities-and-planning/design-and-cost-guidance/outdoor-surfaces> .

3.1 Mini soccer

Figure B18 Playing area for Mini Soccer U7 – U8 (37 x 27 m) – standard layout

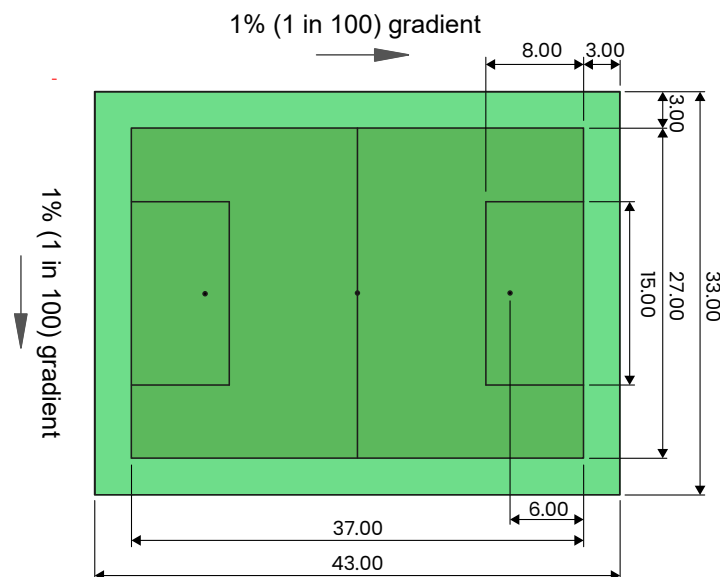
Notes: See Part A Figure A2 for pitch orientation criteria. All dimensions are in metres.

Key:  Pitch area  Safety margin 3.00 m wide

Further reference:

For further layout and pitch size options, refer to 'The FA Guide to Pitch and Goalpost Safety' document available at:

<https://www.thefa.com/get-involved/goalpost-safety>.



3.2 Youth football

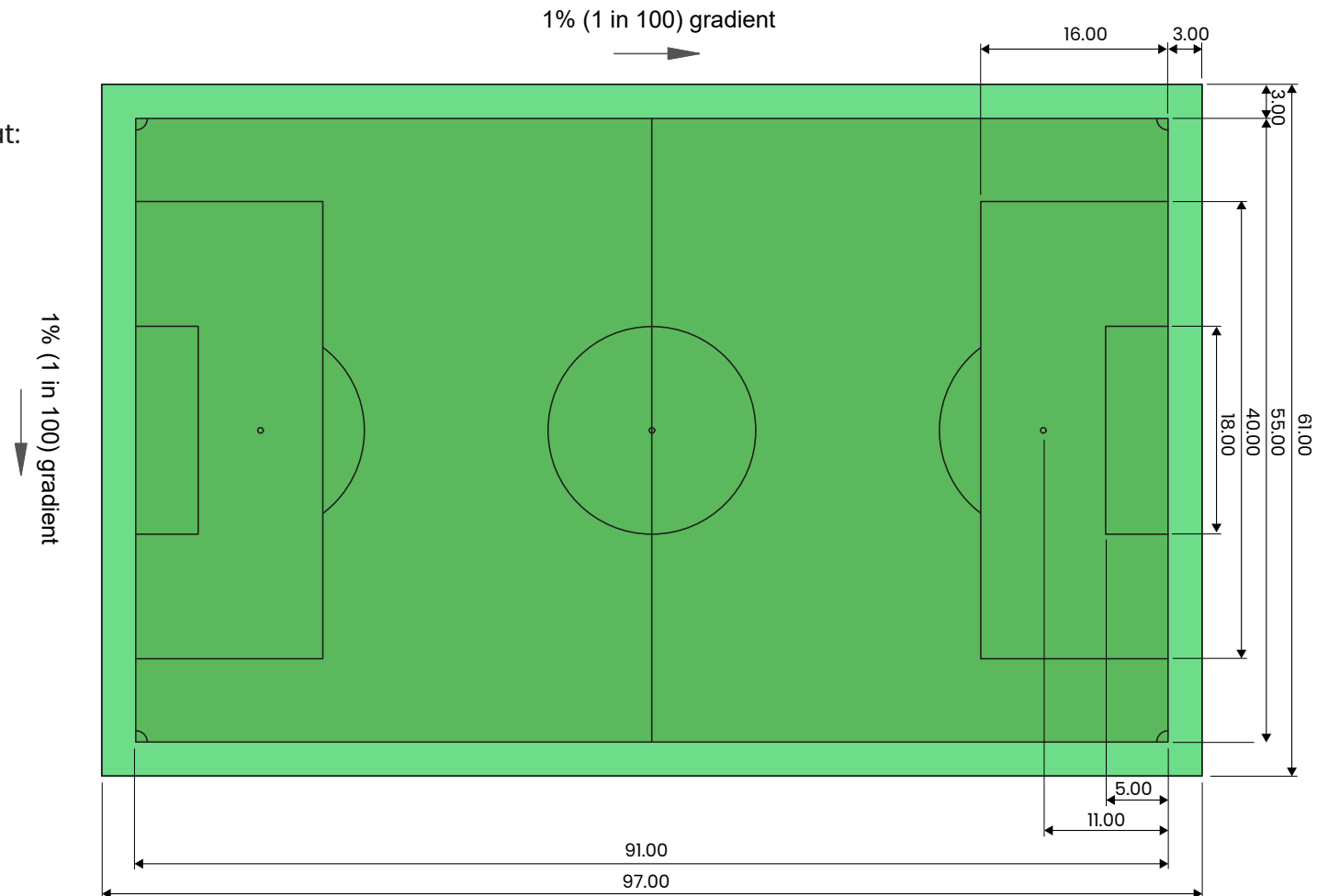
Figure B19 Playing area for Youth U15 – U16 Football (91 x 55 m) – standard layout

Notes: See Part A Figure A2 for pitch orientation criteria. All dimensions are in metres.

Key: Pitch area Safety margin 3.00 m wide

Further reference:

For further layout and pitch size options, refer to 'The FA Guide to Pitch and Goalpost Safety' document available at: <https://www.thefa.com/get-involved/goalpost-safety>.



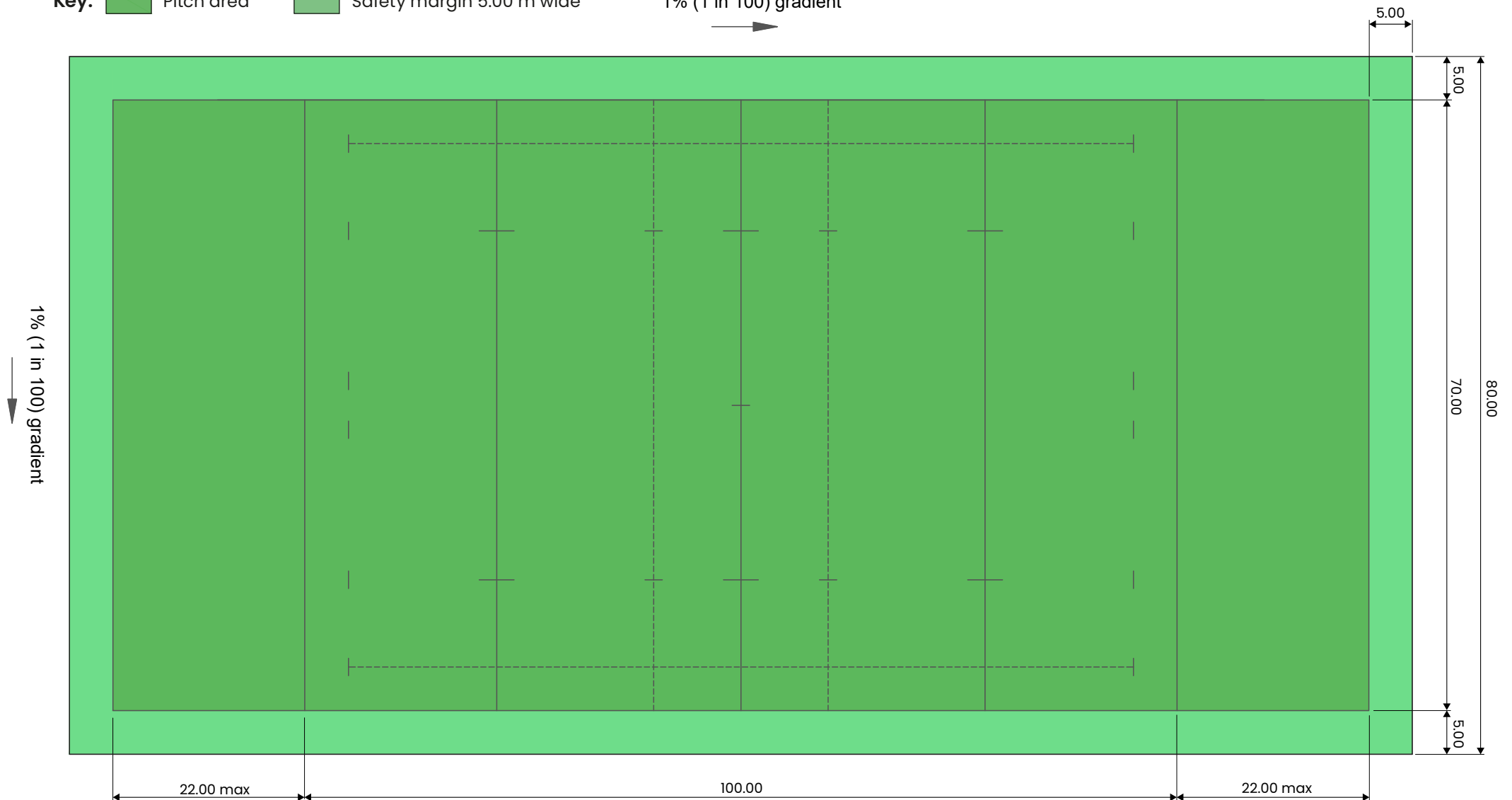
3.4 Rugby Union

Figure B21 Playing area for Senior Rugby Union (100 x 70 m) – standard layout

Notes: See Part A Figure A2 for pitch orientation criteria. All dimensions are in metres.

Key: Pitch area Safety margin 5.00 m wide

1% (1 in 100) gradient

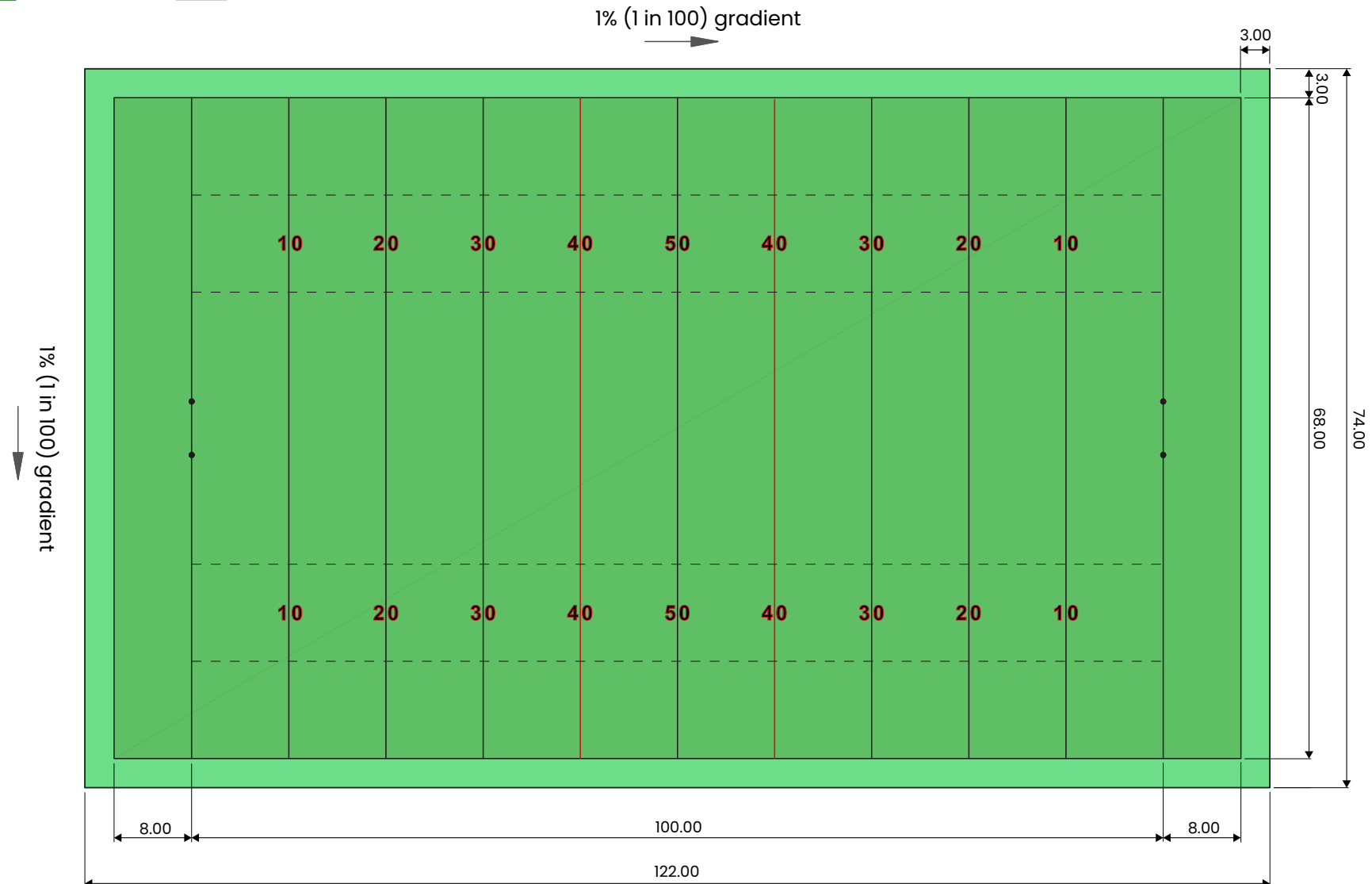


3.5 Rugby League

Figure B22 Playing area for Senior Rugby League (100 x 68 m) – standard layout

Notes: See Part A Figure A2 for pitch orientation criteria. All dimensions are in metres.

Key:  Pitch area  Safety margin 3.00 m wide



3.6 Cricket

3.6.1 Pitch examples

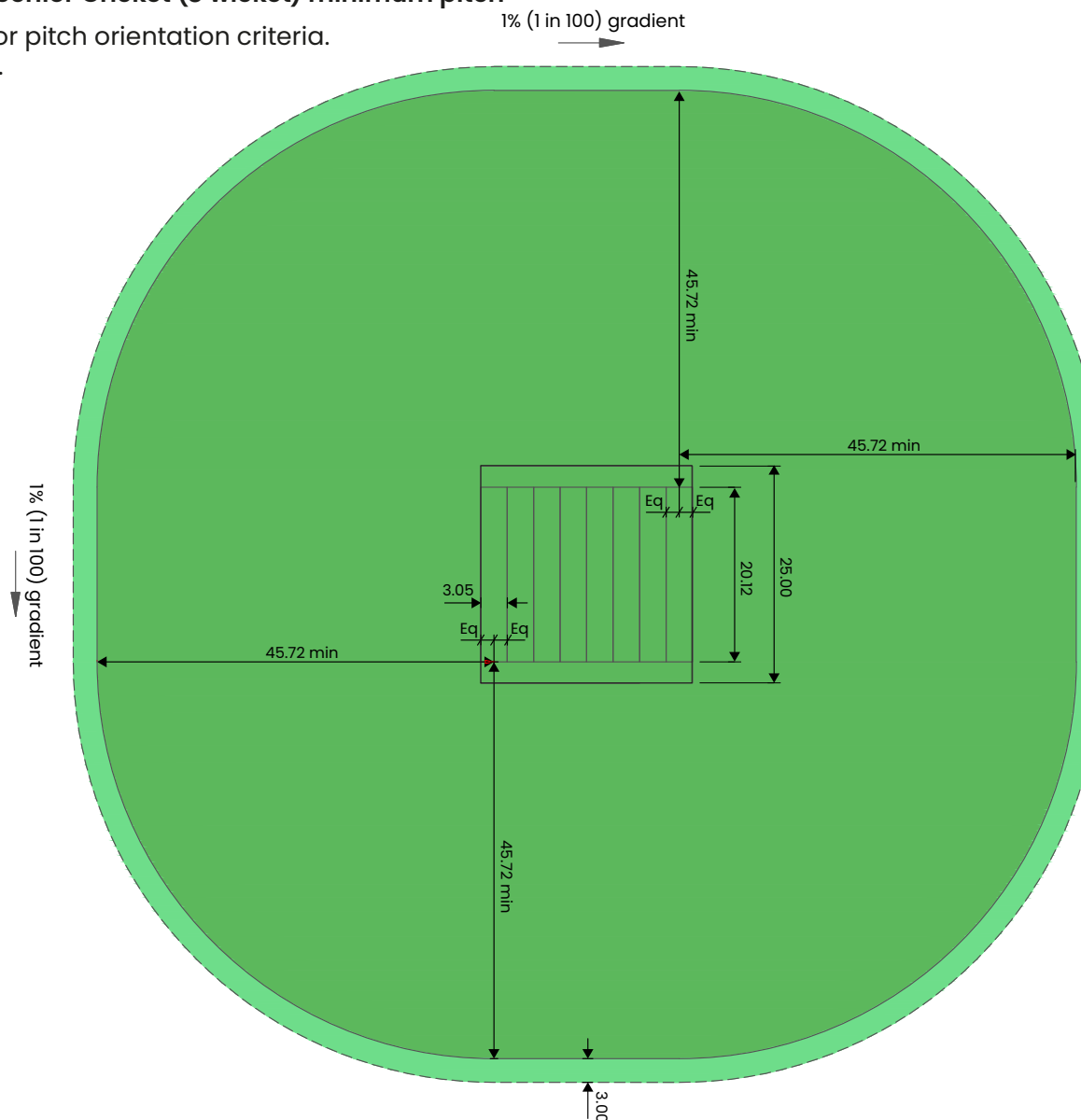
Figure B23 Playing area for Senior Cricket (8 wicket) minimum pitch

Notes: See Part A Figure A2 for pitch orientation criteria.

All dimensions are in metres.

Key:

- Pitch area
- Safety margin
3.00 m wide



3.6.2 Pitch markings

Figure B25 Cricket pitch details

Notes: See Part A Figure A2 for pitch orientation criteria.
All dimensions are in metres (and imperial).

This figure is based on extracts from Appendix B: Laws 7 and 9 of The MCC Laws of Cricket, Pitch Markings & ICC/ECB Playing Conditions – drawing is taken from ECB document 'TS4 Recommended Guidelines for the construction, preparation and maintenance of cricket pitches and outfields at all levels of the game.'

Further guidance is available at: <https://resources.thegma.org.uk/your-sport/cricket/maintaining-your-cricket-ground/cricket-season/preparing-pitches-play/phase-3-1>

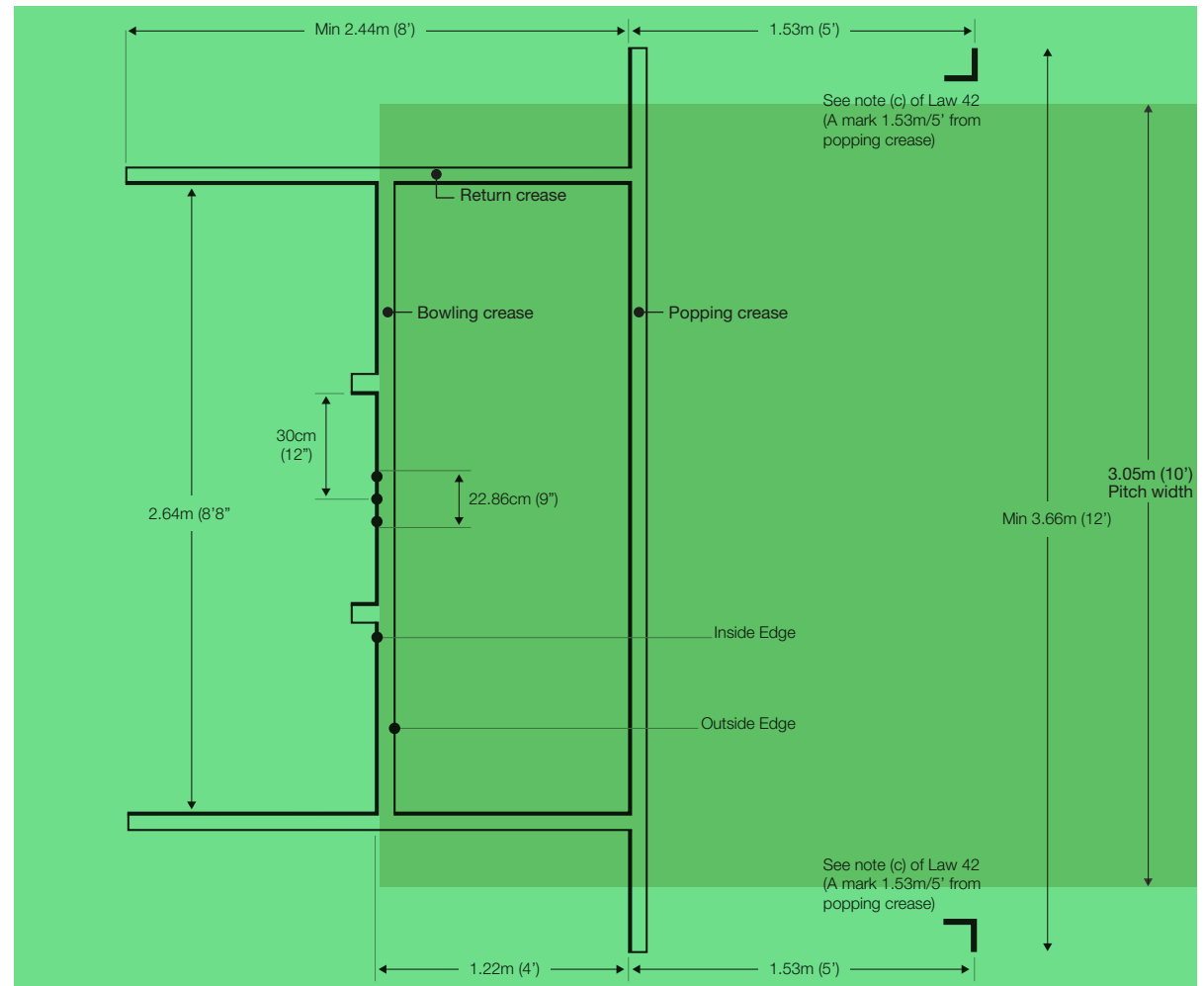
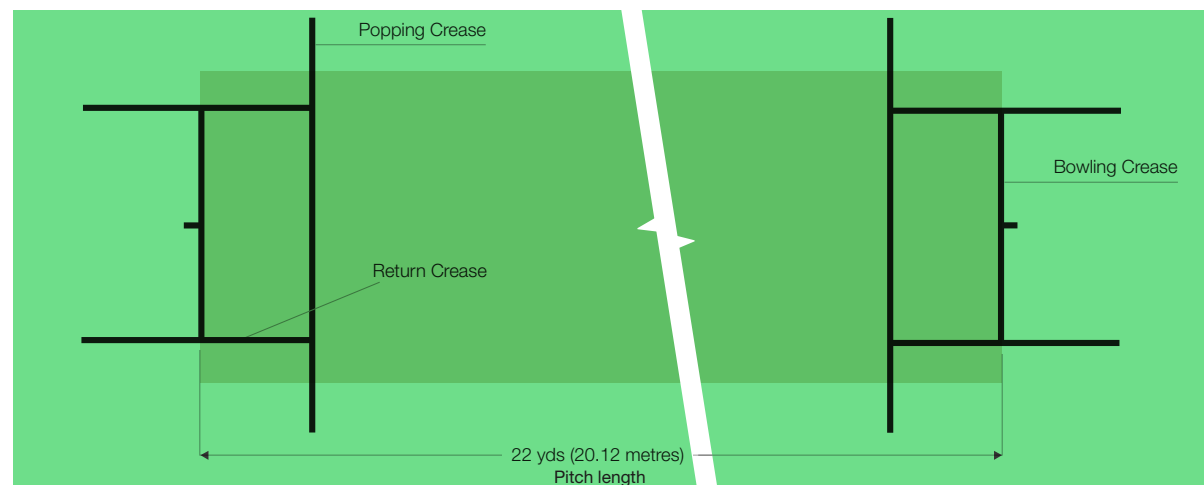


Figure B26 Cricket bowling, popping and return crease details

Notes: See Part A Figure A2 for pitch orientation criteria.
All dimensions are in metres (and imperial).

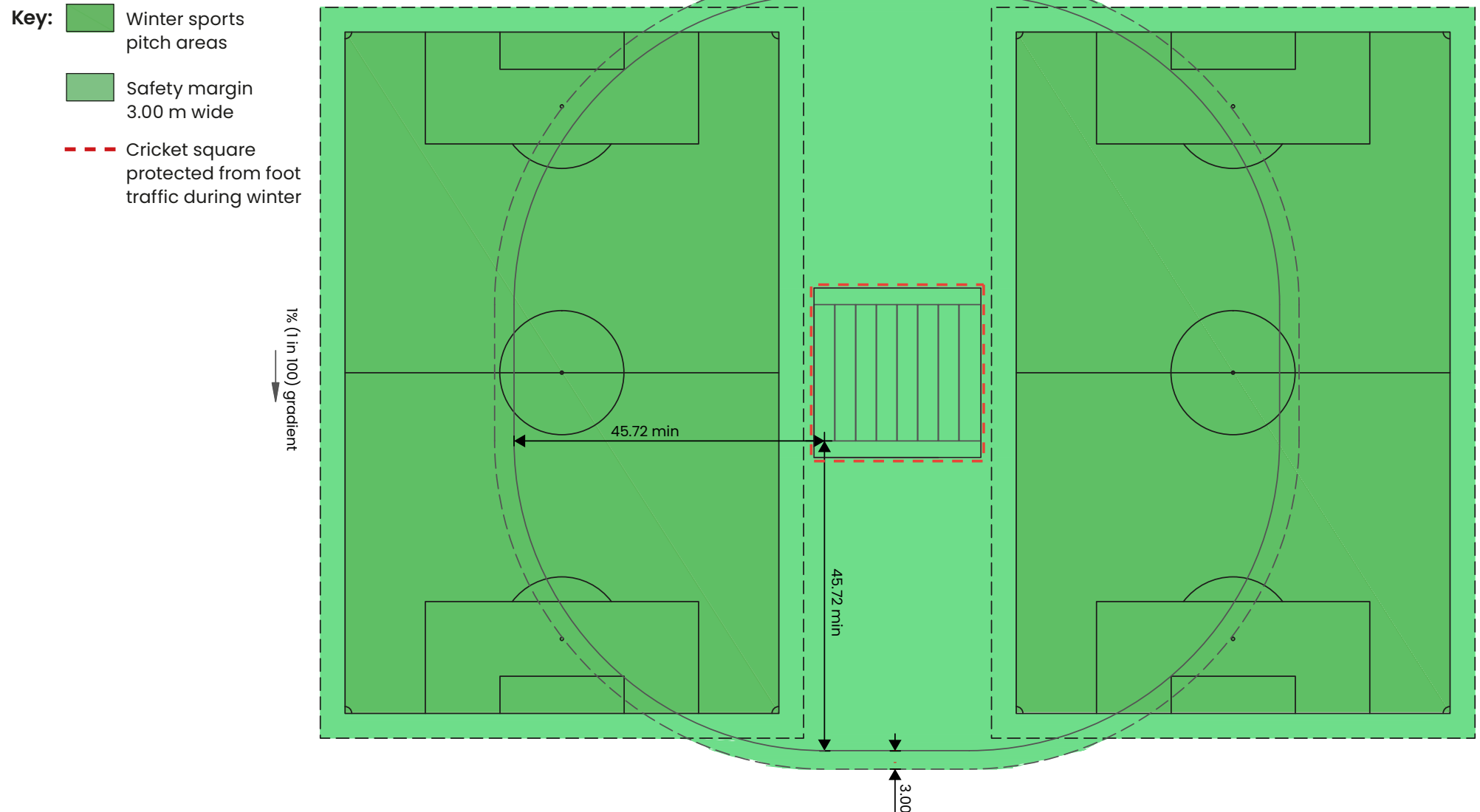
This figure is based on extracts from Appendix B: Laws 7 and 9 of The MCC Laws of Cricket, Pitch Marklings & ICC/ECB Playing Conditions - Drawing taken from ECB document 'TS4 Recommended Guidelines for the construction, preparation and maintenance of cricket pitches and outfield at all levels of the game.'



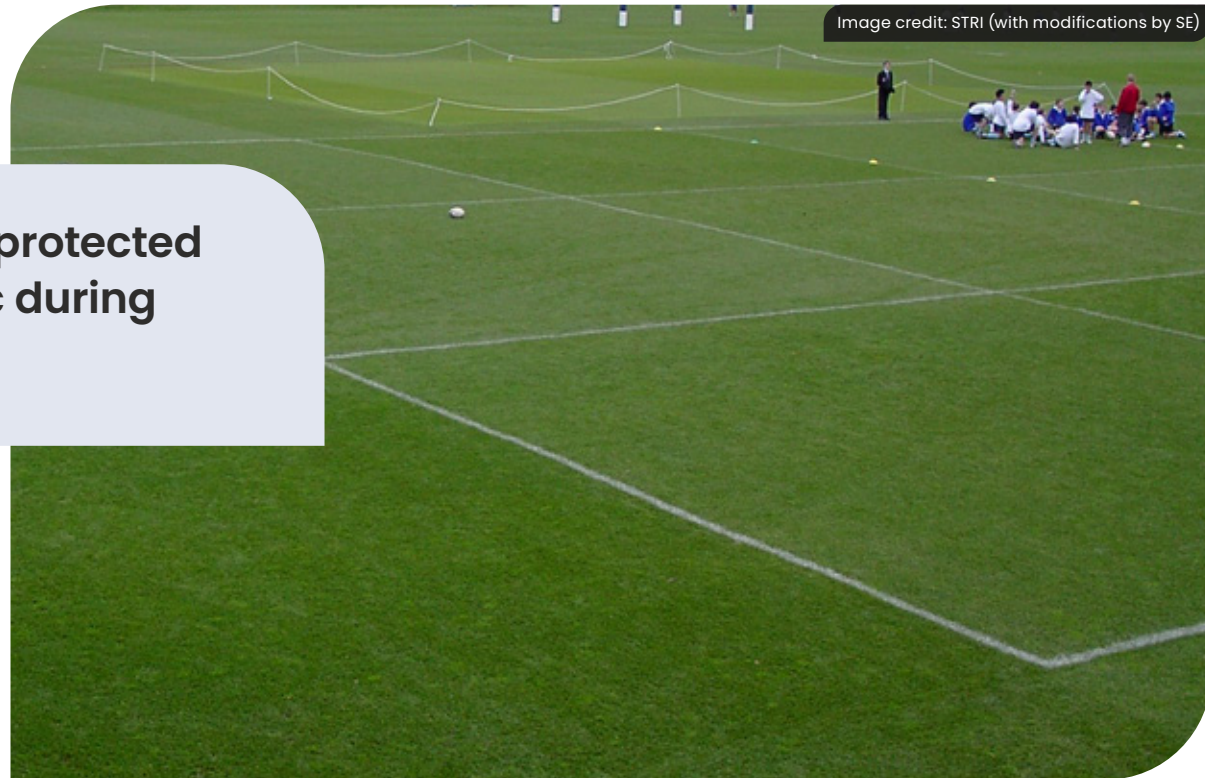
3.7 Combined winter games and cricket pitches – standard layout

Figure B27 Playing area for Combined Winter Games and Cricket (8 wicket) pitches – standard layout

Notes: See Part A Figure A2 for pitch orientation criteria.
All dimensions are in metres.



Cricket square protected from foot traffic during winter.



Document accessibility

This document has been designed for comfortable reading at A4 and on a laptop screen, but can also be printed at A3 for large print versions. The pdf is accessible and has been tested to work with text readers.

Contributors

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