

Natural turf pitch



Natural turf pitch

The following datasheet for natural grass pitches has been compiled to assist with planning new grass pitches and upgrade works at existing grass or redundant blaes/ash sports pitches. This datasheet should not be used as a construction specification.

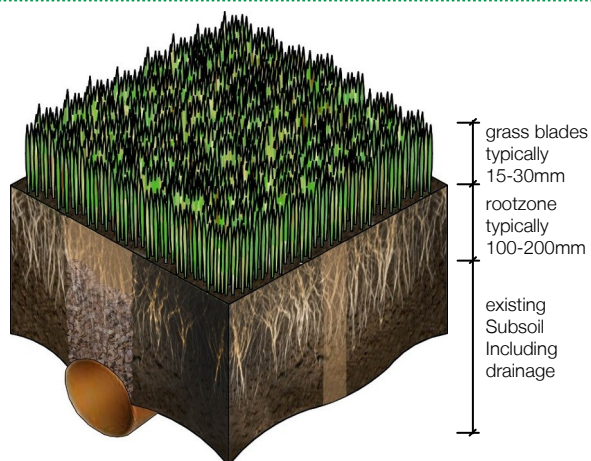
The datasheet will summarise best practice for pitch construction and maintenance of natural grass pitches for club and community use. The information provided may not be suitable for stadium pitches for professional sport.

For all projects sportscotland would recommend seeking expert advice from experienced, qualified and independent sports turf consultants to ensure that the finished soil profile meets the requirements for the pitch use. A consultant will be able to advise on contractor selection, tendering and specifications appropriate to each project.

It should be noted that in all cases the local authority should be consulted on the requirement for planning permission and building warrant for any pitch and floodlighting proposal. The pitch consultant will be able to advise in greater detail on the specifics of each site.

Construction profile

A typical construction profile may look like the diagram below.



Typical usage

Typical expected usage for a well constructed and well maintained grass pitch is 6 - 8 hours per week.

Typical cost

£80,000—£140,000

Based on a 100m x 60m natural grass pitch with primary and secondary drainage, including contractor establishment of turf. Cost will be dependant on ground conditions and location.

Relevant Standards

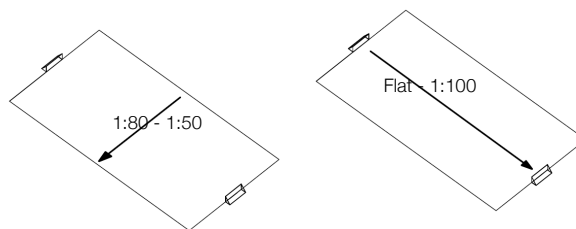
- BS 3882:2015 Specification for topsoil and requirements for use
- BS 8601:2013 Specification for subsoil
- The Sports and Play Construction Association Code of Practice for Design, Construction and Improvement of Natural Turf

Pitch surface

Gradients

Achieving a satisfactory gradient and evenness of a pitch is fundamental to the provision of a good playing surface. A slight gradient is desirable across the pitch, in one direction only, to assist in shedding surface water following heavy rainfall.

| Ideal gradient | Acceptable gradient |
|--|---|
| Along the length: flat Across the width: 1:80 | Along the length: flat -1:100 Across the width: 1:80 - 1:50 Slope only in one direction |



To achieve an even surface at these gradients it may require some minor grading (levelling) within the topsoil. On steeper slopes more extensive earthworks may be required. This involves stripping off the topsoil, re-grading the subsoil and replacing the topsoil.



Subsoil

When re-grading or importing subsoil for the construction of grass pitches, they should be predominantly granular and coarse in composition. Ideally subsoil will be a sand and gravel mix with a high volume of cobbles and boulders. The large particle spacing allows moisture to naturally drain through the soils.

If the subsoil has a high clay or silt content which have finer particles, over time, when compacted it will bind together forming an impermeable surface that will trap moisture between the sub and topsoil layer. This will lead to a pitch saturated with standing water.

Subsoil requires compaction to ensure the stability of the pitch and avoid future settlement. The subsoil should be graded and compacted in sensible and manageable layers using appropriate construction plant which may include a vibrating roller, a bulldozer or an excavator.

It is important to ensure that a good depth of topsoil is maintained (normally an average of 150 mm) after this work has been completed and where possible the depth of topsoil across the pitch should be constant. The make up of the subsoil and formation are also important and any material imported to assist in formation must be compatible with the existing soils and be tested to avoid any contaminants being imported.

Natural turf pitch

Topsoil

| Ideal topsoil depth | Acceptable topsoil depth |
|---------------------|--------------------------|
| 200mm | 100mm min |

The ideal topsoil profile would be a natural free draining soil profile with good quality sandy loam topsoil with a low stone content. However, the majority of pitches will be constructed using the natural topsoil on site. It is essential that this soil is properly assessed to optimise the use of the best material for pitch construction.

Topsoil should be free of any chemical contamination, glass, metal, sharp stones or other objects that would affect turf growth or which would constitute a hazard for players.

Where it is necessary to import topsoil for construction of new natural grass pitches or to supplement the existing topsoil it should as a minimum meet the requirements of Premium Grade topsoil as detailed in BS 3882:2015 as well as appropriate site specific criteria.

It may be advisable to incorporate sand into the topsoil during construction of the pitch to improve drainage and to improve surface playability.

BS 3882:2015 is the British Standard for Topsoil however this is not specific enough for sports turf applications with more particular requirements and it cannot be relied upon to deliver a quality sports pitch. Skip waste soil from site demolition and aggregate recycling facilities may comply with the standard but will not have appropriate physical or chemical properties for a natural turf playing surface.

The requirement on the number of contaminants to be tested under the British Standard has increased significantly. All tests should conform to **The Scottish Environmental Protection Agency (SEPA)** guidelines. The soil should be tested by a geo technical laboratory accredited to the **United Kingdom Accreditation Service (UKAS)**

The selection of the correct soil, sand and drainage aggregates is critical to successful pitch construction and maintenance. These materials should be tested by an approved sports turf laboratory.

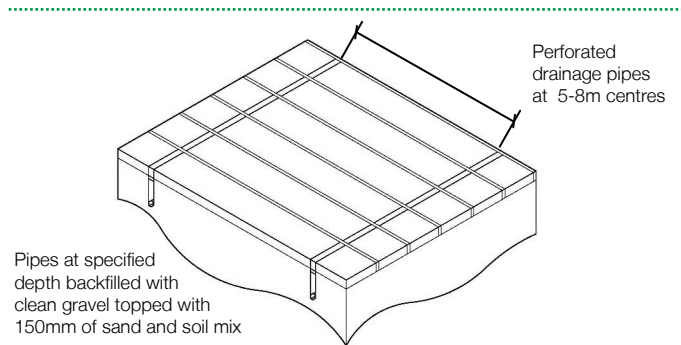
Pitch drainage

A well-drained pitch will available for use more often when weather conditions are wet. Good drainage enhances the surface strength of a root zone of the grass, improving stability and reducing damage to the turf. This allows maintenance vehicles access to the pitch more frequently without waiting for the surface to dry out.

| Primary drainage | Secondary drainage |
|-------------------------|---|
| Pipes at 5-8m centres | 50mm at 600mm-1m centres or 40mm at 500mm centres |
| Depth: minimum 600mm | Depth: to meet primary drainage |

Primary drainage

sportscotland recommend a primary piped drainage system for natural grass pitches. This should consist of perforated, lateral drainage pipes spaced at 5-8 meters and a minimum depth of 600mm. Exact specification will depend on the soil conditions and location.



The pipes trench should be backfilled with clean gravel. The top 150mm of the trench finished with a mixture of a sand and soil or compost selected according to laboratory tests. A layer of terram material may be used within the trench when there is a risk of fine soils blocking the pipe drain, this creates an impervious layer to stop fines soils.

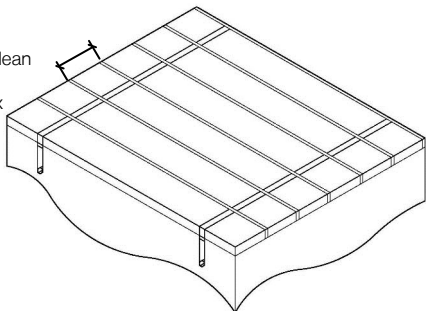


Natural turf pitch

Secondary drainage

Pitch surfaces should also have a secondary drainage system installed. This normally consists of a series of mini trenches called slit drains cut at right angles to the primary drainage pipes. These must be deep enough to connect with the permeable clean gravel filling in the pipe drain trenches.

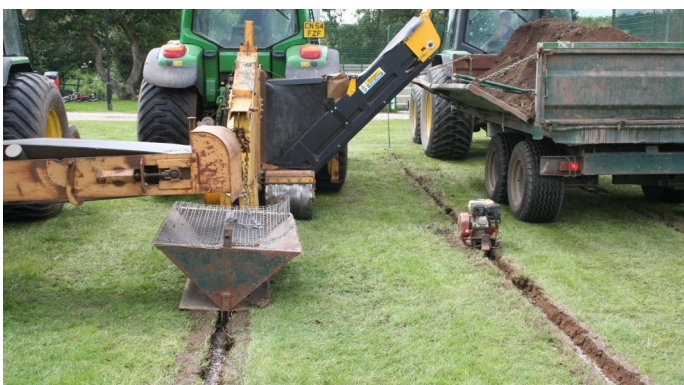
50mm wide sand slits at 600 – 1000mm centres backfilled with 8-10mm clean and gravel topped with 150mm sand and soil mix



The slit drains should be back filled with clean gravel, with the top 150mm of the slit trench finished with sand selected according to laboratory tests.



There are other forms of secondary drainage where the levels of the excavations will be different from those described. In all cases the secondary drainage must form an effective connection with the gravel back fill material in primary pipe drain trench.



Drainage aggregates

Aggregates used in the pitch sub base or in pipe and slit drainage channels should be the correct size and free from fine particles to allow for free movement of water. These aggregates must be resistant to chemical or physical breakdown to ensure that good drainage performance is maintained over a long life span.

Seeding and establishment

Sports pitches should be sown with a high quality sports turf seed mixture containing a high proportion of wear tolerant ryegrass. **Sports Turf Research Institute (STRI)** in conjunction with **The British Society of Plant Breeders (BSPB)** produce a booklet setting out the performance properties of grass seed which can help to identify the best species for situations and use.

Seeding should be carried out in suitable weather conditions with a base fertiliser applied during the final seedbed preparation. Seeding should be carried out at the optimum rate for the soil type to promote good sward density.



Allowing time for the full establishment of the turf is vital for the quality of the playing surface. The period required will depend on the timing of seeding and the weather conditions as well as the intensity of maintenance during the initial grow-in period.

A natural turf pitch will normally take 20 weeks or more to establish to be ready for match play. Only with intensive maintenance and the optimum weather conditions a pitch may be ready in 12 weeks.

Mowing is a fundamental requirement for the development of a strong and robust turf. The timing and frequency of mowing can determine how quickly this can be achieved, again this is weather dependant.

Turf which is still establishing has a higher nutrient requirement and requires frequent applications of fertiliser during the establishment period. It may be necessary to apply fungicide to deal with turf disease or selective herbicide to control weed growth. Top dressing, soil loosening or aeration work are also essential to healthy turf establishment.

Natural turf pitch





Maintenance

Regular maintenance is required to ensure a good quality playing surface. This should be planned & implemented throughout the playing season to ensure the surface is in good condition for as much of the season as possible. It is impossible guarantee that a natural pitch will be available for an entire season in our Scottish climate. Annual pitch renovation should be planned & implemented to ensure the pitch has a period of rest to allow the sward to gain strength and repair any areas that have been heavily trafficked.



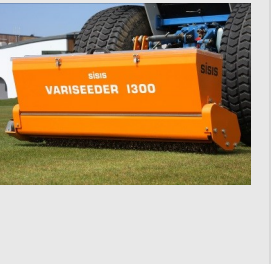
If a sports pitch is not maintained appropriately, gradual deterioration will begin to affect the quality of the playing surface. One issue that is common to sports pitches, is where drains are allowed to be capped with a layer of soil and vegetation if top dressing of sand is not applied regularly as part of the planned annual maintenance. This will have a gradual effect on the surface as this soil cap increases in depth leading to an ineffective drainage system that requires major work to re-structure the topsoil and reconnect the playing surface with the main drainage lines.

Pitch maintenance should be advised by your specialist pitch consultant.

Regular and Bi-annual maintenance tasks may include:

| Grass cutting | Brushing/ Levelling | Aeration | De-compaction |
|--|---|--|--|
|  |  |  |  |
| <p>This will be a regular feature of the pitch maintenance and the level of cut will be determined by the sport, the time of year and most importantly the level of use.</p> | <p>A continuous programme of levelling the low spots of an existing pitch by locally adding thin layers of quality top dressing sand.</p> | <p>Small solid tines (spikes) are pushed into the turf surface to allow air permeate the root zone and help drain standing water. Aeration equipment should not cause any surface disruption and should not be carried out in bad weather.</p> | <p>Also know as Verti-draining. Larger hollow tines are pushed into the turf surface and then gently lifted to de-compact the topsoil. The surface should be in a suitable condition to allow for the depth of penetration required.</p> |

Annual and seasonal maintenance tasks may include:

| Scarifying | Top dressing | Over seeding | Fertilizing | Weed & pest control |
|--|---|---|--|--|
|  |  |  | | |
| <p>This exposes the topsoil, removing a build up of dead and rotting vegetation that can block air and nutrients from reaching the soil and root zone.</p> | <p>This helps maintain the connection with the surface drains by spreading a sand layer over the pitch surface which incorporates into the topsoil. The selection of sand should be done with recognition of the existing soil profile.</p> | <p>Application of more seed to the pitch surface. Should be done in the off season with an appropriate seed mix for the soil type and pitch location.</p> | <p>This ensures that soil contains appropriate nutrients to maintain turf growth and balance the soil Ph levels. This will be subject to the soil type and pitch location.</p> | <p>The level of weed and pest control should be periodically assessed on each individual site to determine the correct course of action.</p> |

Natural turf pitch

Reinforced turf systems

There are various systems for reinforcing the natural grass of a pitch. Typically they involve the introduction of a man made element to the rootzone which may be a fibre sand, loose or bound artificial fibres.

These systems act to reinforce the rootzone and may also provide additional synthetic grass fibres mixed with the natural grass to support the pitch surface.

Whilst these do improve the stability of the surface of a pitch and increase hours of play they will be significantly more costly than a natural grass pitch.



Summary of key design criteria

| Ideal gradient | Acceptable gradient |
|--|--|
| Along the length: flat Across the width: 1:80 | Along the length: flat - 1:100 Across the width: 1:80 - 1:50 Slope only in one direction |

| Primary drainage | Secondary drainage |
|--|---|
| Pipes at 5-8m centres Depth: minimum 600mm | 50mm at 600mm-1m centres or 40mm at 500mm centres Depth: to meet primary drainage |

| Ideal topsoil depth | Acceptable topsoil depth |
|---------------------|--------------------------|
| 200mm | 100mm min |

Floodlighting

sportscotland would not recommend floodlighting a natural grass main match pitch, as this would encourage overuse and increase maintenance requirements. Please refer to the governing body guidelines for individual sports for stadium lighting requirements.

Football Stadium Pitches

This datasheet does not cover requirements for stadium pitches. **Scottish Football Association** have joined the **FIFA** (International Football Association) Pitch Improvement Programme. Pitches within the club licensing scheme are subject to the **FIFA** criteria.

Sports turf contractors

When choosing a contractor it is important that they have the specialist knowledge, expertise and equipment appropriate to the construction of sports pitches.

Pitch dimensions & markings

The following sportscotland datasheets are also available:

- 001 Pitch & Court markings - Football
- 002 Pitch & Court markings - Rugby Union
- 003 Pitch & Court markings - Shinty
- 005 Pitch & Court markings - Rugby League

Further resources

sportscotland can recommend the following resources for the construction and maintenance of natural turf sports pitches:

The Sports and Play Construction Association (SAPCA)
www.sapca.org.uk

Institute of Groundsmanship (IOG)
www.iog.org

Sports Turf Research Institute (STRI)
www.stri.co.uk

The following book may also be of interest to designers:

Rootzones, Sands and Top Dressing Materials for Sportsturf
By Dr Stephen Baker (2006), Sports Turf Research Institute
ISBN-10: 1873431600

