



## FIELD CONSTRUCTION GUIDE

### **Purpose**

To provide guidance to clubs seeking to construct a new playing surface and/or improve an existing playing surface. To allow for the development of playing surfaces that provide quality playing surfaces that are not only conducive to good football but are safe for players and officials.

It is not intended to limit the scope for clubs to approach this problem in other ways but to set out 'best practices' information that will assist the club to provide the accepted standard for a playing surface approved by Football Brisbane.

This information should be interpreted in relation to the existing local conditions. The experience and knowledge of local turf suppliers and maintenance practitioners should not be discounted. No attempt has been made to cost the different methods of pitch construction.

### **Scope**

To assist clubs in compliance with the standard of playing surface set out in the Football Brisbane 'Playing Facilities Standards' (page 8), Surface – General and Grass Coverage sections and the FIFA standard (page 9).

In particular the problem of ground hardness is at the centre of the desire to produce playing surfaces that limit the risk of injury. Ref: Football Brisbane 'Playing Facilities Standards' (Page 10) Shock Absorbency and Medi Sci Sports Exercise 31(5): S354.

There is a direct relationship between ground hardness, Anterior Cruciate Ligament injuries and AFL football that must be considered in relation to playing surfaces for football. This is set out in:

- Medi Sci Sports Exercise 31(5): S354. Ground Hardness using the Racetrack Penetrometer.

This guidance document is focused on the main elements that affect the playing surface performance:

- Planning considerations
- Construction of the playing surface

For new or major redevelopment the site must be analysed in the light of expected usage and potential restrictions. For all but the smallest projects a feasibility study should be commissioned from an experienced independent professional.

## **Background**

In particular the next two paragraphs outline the rationale for clubs to consider when making decisions on ground maintenance and/or ground upgrades.

Safety must be the primary concern of any club and certainly this association. A poorly constructed and/or neglected field will often be a dangerous field. Simply put, the field that is not constructed correctly and maintained can present a number of hazards to the players, which can lead to a variety of injuries. This can further detract from the attraction of the facility and open the owners up to threat of litigation.

The playing characteristics of the field will be severely impaired by poor design and/or a lack of maintenance. The ball can become faster over the surface, it will roll unevenly and the ball bounce will vary from place to place. The players will feel uncomfortable running on an uneven surface and frustrated by the inability to control an unpredictable ball.

## **Reference Acknowledgement**

In preparing this document the following documents have been used as reference material:

- Sport England (English Sports Council) [www.sportengland.org](http://www.sportengland.org) Natural Turf for Sport
- Medi Sci Sports Exercise 31(5): S354 Ground Hardness using the Racetrack Penetrometer

## **Disclaimer**

Remember this is an information guide only. Any decision to implement all or part of the methods shown here should be analysed in depth for cost effectiveness and suitability to the particular circumstances of your club and playing field.

The decision to construct a new playing surface or major upgrade of an existing surface should be a considered one. The decision **not to** implement an upgrade also has costs and serious considerations attached. Clubs have a "Duty of Care" to provide safe playing conditions for practice and competition.

# Planning

## Introduction

If quality football is to be played and developed successfully it is essential it takes place on good quality surfaces that are available most of the year. Timely consideration of the issues will result in a good quality playing surface that is:

- appropriate for the planned level, type and quantity of use
- physically and financially sustainable in the long term

It is essential to consider in detail all the implications of the proposal before deciding how to proceed. Failure to consider all aspects of the project early in the development process will result in lost opportunities. Still worse, it may not be possible to correct resultant problems without making radical alterations to established plans thus causing delay and possibly, additional costs.

Lack of appropriate planning in the early stages of the design of natural turf playing surfaces will be costly and severely affect the long-term viability of the project. A poorly considered proposal resulting in a mediocre facility will discourage users and/or increase maintenance costs to unsustainable levels. A well-designed surface, properly constructed and maintained, is enjoyable to play on and forms a major incentive for players to join your club.

This guidance does not attempt to give detailed advice on the design, construction and maintenance of playing surfaces. This must, except for the smallest projects, be sought from qualified, experienced and independent professionals. As well as giving appropriate technical advice, an experienced professional should be able to give specific guidance on the financial and contractual implications of the proposed work. This guidance discusses the key issues and should be used as a reference point in the quest to ensure the achievement of a suitable and sustainable playing surface.

## Strategic Planning

The following basic information regarding types of use and user needs should be compiled before appointing consultants or initiating any development of a natural turf playing surface:

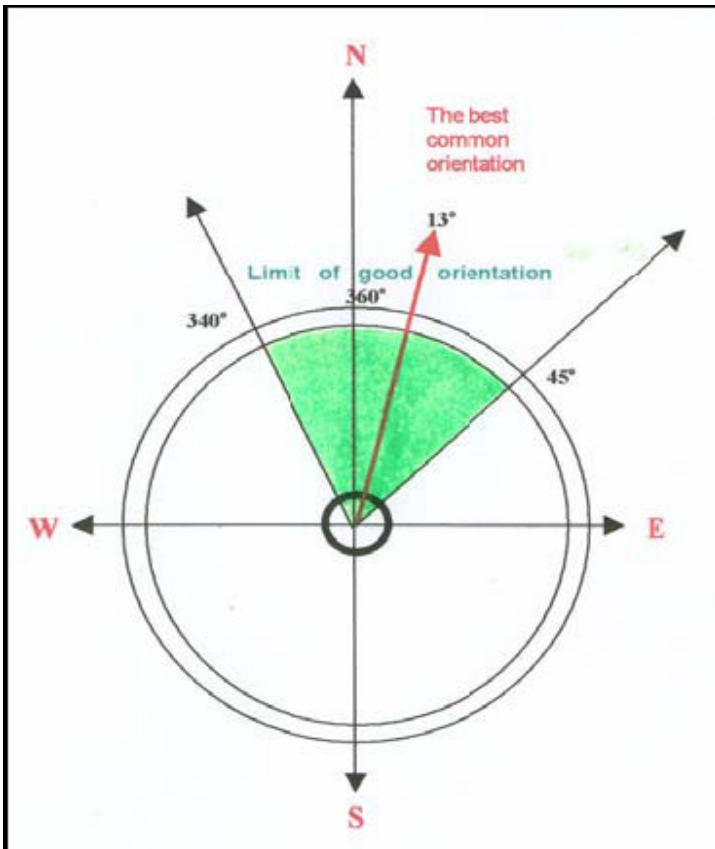
- expected level of user performance, for example local league, regional or state competition
- likelihood that the facility will be used for training
- number of times per week for each activity, duration and whether for junior or senior use
- will floodlighting of the playing or training surface be required?
- is there a requirement for phased development?
- will there be any non-sport use during the year, for example as temporary car parking or a venue for a local gala?
- realistically, what long-term resources will be available to maintain the playing surface?
- how much money is available to carry out the necessary work?

Careful consideration must be given to the specific requirements of the playing surfaces and supporting ancillary facilities. It should not be assumed that because an existing facility or pitch, for example, is located in a certain position that it should stay there. Careful re-planning will be rewarded by efficient layouts that are often easier and more economic to construct and maintain.

For most projects a detailed survey, with levels, will be required to establish the key features of the site. The topography of the site will determine the need for any level adjustment. Sites with significant slopes will need to be re-graded in order to produce playing surfaces with acceptable gradients. Where drainage improvements are required a positive out-fall should be identified into which water from the site can be discharged.

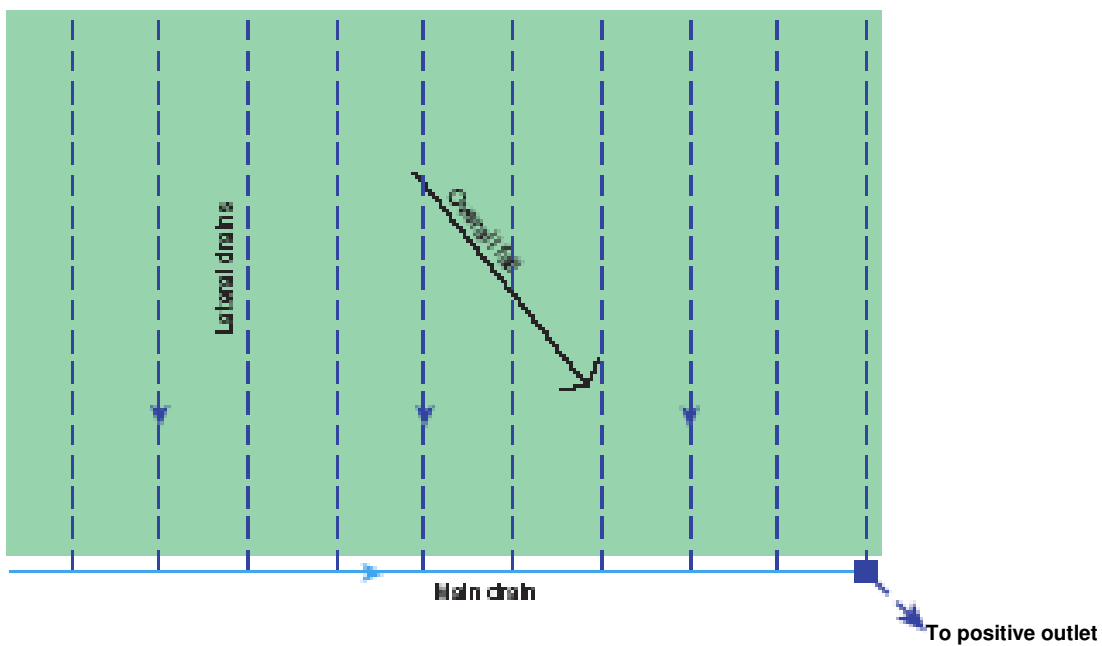
### Requirements for planned activities

Facilities and viewing positions should be oriented to avoid low sun angles.



### Drainage

Good drainage is a key requirement and a naturally well-drained site will form a sound basis for a playing surface. On land where the soil tends to be impervious, adequate provision for supplementary drainage must be provided to meet the needs of the intended use.



**Level adjustment**

Many sites require major re-grading of levels. The first stage is to scrape off the existing topsoil cover and retain for eventual re-spreading.

Levels are adjusted in the subsoil, using the surplus 'cut' from high parts to fill lower areas. In some situations imported fill material may be required to build up low areas. Filling must be done in consecutive layers not exceeding 250mm. Each layer must be adequately consolidated to avoid subsequent settlement. The final formation must be trimmed smooth to the required level before replacing the topsoil.

**Design Issues**

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 directly related to poor drainage and compaction of the playing surface.

The majority of playing surfaces require a designed drainage system to provide satisfactory playing conditions throughout the playing season. Upgrading a poorly drained pitch or constructing a new one does not necessarily solve the drainage and usage problem. 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 be designed taking account of the estimated intensity of use.

Players under the age of 15 are judged to inflict about half the damage to a pitch than their more senior counterparts. Therefore, a pitch used predominantly by juniors can accommodate approximately twice the capacity of one used solely by more senior players.

The pattern of use must be taken into account when designing a pitch. Where use primarily takes the form of a large number of 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 slit-drainage and sand amelioration (see later sections) would be more appropriate than the creation of a single 'premier' pitch.

## Pitch Construction

### Reference

Sport England (English Sports Council) Natural Turf for Sport [www.sportengland.org/naturalturf.pdf](http://www.sportengland.org/naturalturf.pdf)

### Pitch Standard

Generally, depending on the standard of facility required, the playing surface should be no steeper than 1:100 along the line of play and 1:50 across the line of play. A well-constructed pitch could be in the order of 1:200 along the line of play and 1:100 across the line of play.

Pitch construction falls into four main categories according to the system of drainage used. They are:

- Undrained pitches
- Pipe-drained pitches
- Pipe- and slit-drained pitches
- Suspended water table pitches

This document shows the two methods selected as suitable for Australian conditions based on on-going cost of maintenance.

### Undrained pitch

There are few situations when pitches of this type will provide a sustainable, quality-playing surface.

### Pipe-drained pitch

Currently this is the most frequently used pitch drainage system. 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.

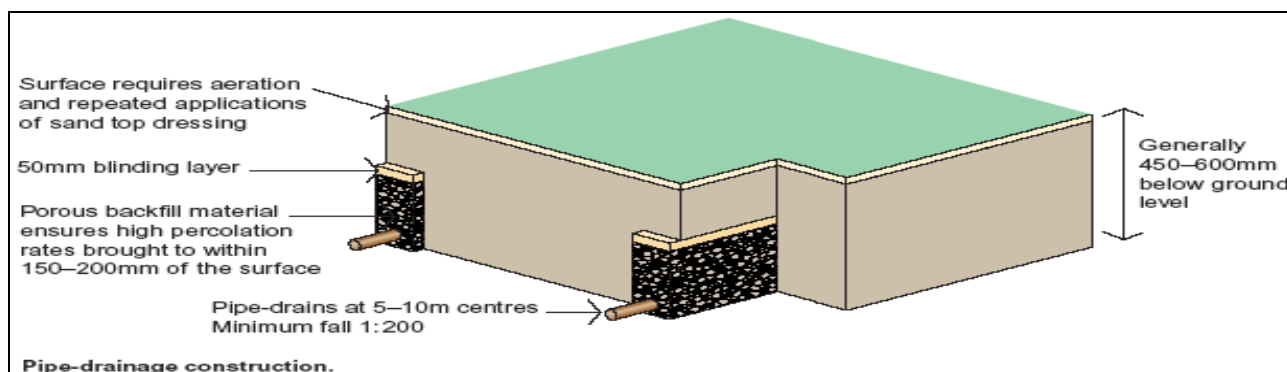
Dependent on drainage design plastic pipe drains are commonly installed with laterals at spacing between 5 and 10m centres at a depth between 450 and 600mm below ground level.

All drains must be laid with a steady fall, no less than 1: 200. A positive outfall must be provided in the form of an existing watercourse or surface water system.

When the drains have been laid trenches must be backfilled with porous material to ensure the high percolation rates necessary for effective drainage.

Predominantly single-sized, hard, angular gravel or broken stone within the range 6–10mm must be used as backfill. This should be brought to within 150–200mm of the surface. The trench backfill is then 'capped' with a 50mm 'blinding layer' in the form of coarse sand or fine grit to prevent infiltration of the topsoil. The trench is backfilled to ground level with preserved or imported topsoil.

Given reasonably permeable soils and good management, fairly good playing surfaces can result. However, in many areas this method is not suitable in very wet weather and will require aeration and dressing with appropriate sand to ensure maximum use of the pitch. Surface requires aeration and repeated applications of sand top dressing.



### Pipe and slit-drained pitch

Supplementary slit-drains will significantly improve the removal of water into pipe-drains. Basically the construction mirrors that of a pipe-drained system with the addition of a series of narrow, commonly 50mm, trenches cut across and into the porous backfill of the drains.

A drawback of slit-drains is that they can become capped and sealed over with topsoil, which can render them useless. Sand dressing must be designed to ensure that capping does not occur. This method was not selected as the additional drainage performance was unbalanced by the additional cost of maintaining the system.

### Suspended water table

The term 'suspended water table' refers to water held in the lower part of the root zone and above the blinding or drainage layer. This moisture reserve helps sustain the grass sward during dry weather. This solution is the preferred option where:

- a very high standard of pitch performance is required
- the pitch is required to accommodate high levels of play during the season
- the required drainage rate is high, for example at professional football clubs
- a high level of reliable maintenance is available
- a fully automatic irrigation system is available

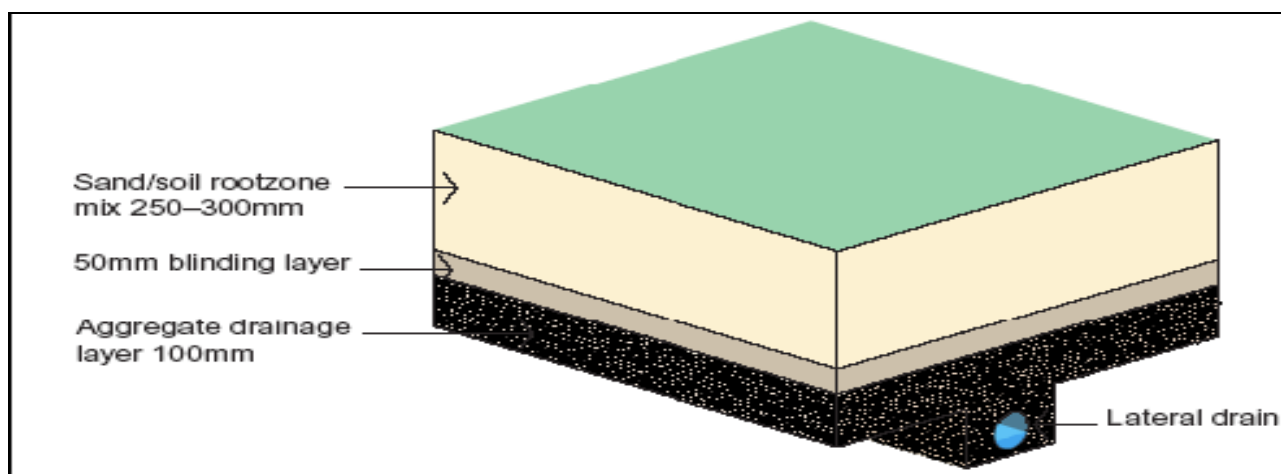
This is **essential** as the grass sward is likely to dry out due to the high sand content of the construction.

This type of construction comprises:

- a graded base drained by a series of drains, normally spaced between 5–10m.
- suitable gravel laid to a minimum depth of 100mm with a 50mm blinding layer of suitable coarse sand or fine grit.
- 250–300mm depth of specially prepared sand/soil root zone mix.

If properly maintained this construction provides a very high standard of playing surface. These very sandy constructions often benefit from some form of reinforcement to help stabilise the upper part of the profile. Various materials have been developed in recent years for stabilising sandy root zones and these include polypropylene fibres, shredded mesh element sand artificial grass fibres. This type of pitch construction is more demanding in terms of management, particularly with regard to fertiliser and irrigation requirements.

The more efficient the drainage system the greater the need for effective irrigation.



**Suspended water table construction. High standards of pitch performance require high levels of reliable maintenance.**