GUIDANCE NOTES FOR THE PROVISION AND INSTALLATION OF NON-TURF CRICKET PITCHES AND NET CAGE FACILITIES

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01 Introduction

1.1 What is a Non-Turf Cricket Pitch (NTP) or Facility?

A Non-Turf Cricket Pitch or Facility is a pitch or facility that does not support vegetation and is designed to function without vegetation. It could be used in any situation in which a natural turf pitch or facility may be considered.

It would include a synthetic turf, rubberised or synthetic pad or carpet-like material laid on a prepared base of either bonded (concrete, tarmac, etc) or unbound mineral (hard porous interlocking or water bound material), soil or turf.

All play an important role in the “suitability for the purpose”, however, with a non-turf pitch or facility, it is the manager who plays the most critical role. The maintenance is “a key factor” as to how long the non-turf pitch or facility lasts and is “suitable for the purpose”.

There are three essential people to take into consideration in the provision of a non-turf pitch or facility - the Designer of the system, the Installer of the system (contractor), and the Maintainer (who maintains the system once installed). No non-turf pitch or facility is maintenance free.

Experience and practical research indicates all non-turf pitches should last a minimum of 20 years and during this time they may require a new surface and perhaps an underlay but, with good maintenance, the base formation should be suitable for the purpose (See Section 3.4 - Selecting a Pitch or Facility System).

01 Introduction

1.2 Background

The bulk of the research on the current range of non-turf pitch systems (NTPs) was undertaken between 1975 and 1985, and, although some research has continued since, it has not been on the scale of the formative years. Supported by the National Cricket Association (NCA), the majority of the work was undertaken by Nottinghamshire County Council, in conjunction with Nottinghamshire County Cricket Club, who developed, amongst others, the first portable pitch which enabled Floodlit cricket matches to be played in football stadia in the 1980s.

The NCA first introduced the NTP Pitches Approval Scheme in the early 1990s. Six pitch systems were originally approved but one was taken off the market. Since 1995, an additional four pitch systems have been approved, making a total of nine approved systems, some of which are seeking re-approval. Pitch approvals last for five years after which the companies must reapply. It is important to bear in mind that it is the pitch system that is approved and not the company supplying the pitch.

The first Performance Specification for Artificial Cricket Pitches was introduced by the Sports Council in 1984, having been developed by a consortium comprising of RAPRA Technology, suppliers of cricket surfaces, many individual experts and the NCA. The work started in 1977 and was completed in 1980.

The NCA updated the specification in 1987 and introduced the NCA Performance Specification in 1990. Since then it has been updated a number of times, taking into account the research projects carried out at Lilleshall National Sports Centre and the NCA match pitch programme for the installation of pitches in the 1990s. An updated version of the specification, 'The Standard', was introduced in 2000. The latest version, entitled ECB Performance Standards for Non-Turf Cricket Pitches Intended for Outdoor Use (TS6) was produced in Nov 2007.

In addition to the many systems sold in the UK, pitches have been exported to New Zealand, West Indies, Sri Lanka, India, Pakistan, South Africa, Holland, France, Spain, Canada, United States, Ireland and others.

1.3 The ECB Approvals System

The ECB Approvals System has been constantly updated and is now used to ensure that pitches which have been shown to meet the requirements of "The Standard" are installed. This is important where financial grants are involved. The supplier of an approved pitch system must provide evidence of:

(a) The quality of the facility to be installed having achieved the requirements of "The Standard".

(b) The quality of the company supplying and installing the facility, which would include management practice, quality control, organisation, innovation, planning and logistics etc, plus the 'added value' provided by the company. A voluntary Code of Practice will be introduced in 2008 which companies can sign up to provided they meet the requirements set by the ECB.

The Community Club Development Fund (CCDF) programme (2004 to 2006) made a start by introducing quality control measures. In addition, the introduction of the 'ECB Employer's Requirements' provided a framework for the procedures involved in installing a pitch or facility.

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2.1 Orientation

Where possible the facility should be sited in a north south direction to avoid batting or bowling into the setting sun.

2.2 Location

The siting of pitches in close proximity to trees should be avoided as trees create shadows which in sunny conditions make the ball more difficult to see.

Buildings also create shadows and influence wind currents which may have an effect on the playability of the facility.

Sloping land and the terrain can have an effect on the quality of a facility.

The condition of the land on which the facility is sited has a bearing on the design and the extent of earth works required. The following should be considered:

- Is cut and fill necessary?
- Is drainage required?
- Has hard core and foundations to be removed?

A risk survey is a helpful tool in determining what can be achieved.

2.3 Risk Survey for the Installation of Practice Facilities

There are three main areas that need consideration, as indicated in the table below:

(a) Safety of the proposed installation.
(b) Quality of the facility.
(c) Resources required and obtainable.

SAFETY	CONSIDERATIONS
Orientation	Direction of play should be north-south so as to avoid batting and bowling into the sun. This is particularly relevant in the evening and in the later stages of the season.
Trees (in close proximity to the facility)	These can create shadows across the playing surface as well as depositing leaves on the facilities.
Roads (in close proximity to the facility)	Roads create noise and the activities on the facility may create a safety hazard for drivers and pedestrians.
Buildings	Buildings create shadows, reduce light, intensify winds, reduce and increase the circulation of air, in the later creating an environment to encourage rust, rot, build up off organic matter, disease and other forms of decomposing fungi, and vegetation.
Paths	Paths in close proximity may put users at risk from balls and users may be a distraction for the facility users.
Ground Conditions (clay, sand, silt, peat water courses, slope and terrain)	The ground conditions have a major bearing on the provision of the facility as they influence the design.
Other Facilities	Facilities for all sports, play areas, gardens, woods etc may encourage people to be too close to the action for their personal safety.

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QUALITY	CONSIDERATIONS
Pitches	The quality of the materials used within the structure of the installation, the quality of the workmanship, the playing performance quality and the quality of the pitch design are all factors that must be taken into consideration in the risk assessment.
Cage	The quality of the poles, sockets, cross members and other supports influence the durability of the facility and therefore its safety to users and spectators.
Nets	The quality of the netting and skirt influence the durability of the facility and therefore its safety to users and spectators.
Fixings	The quality of the fixings, ties, laces, brackets, concrete, pegs, and other fixings influence the durability of the facility and therefore its safety to users and spectators.
Design	In addition to the component parts, the design and layout of the facility plays a major part in the safety and durability of the facility.
RESOURCES	**CONSIDERATIONS**
Purchase	Availability of funds for the installation of the facility.
Regular Maintenance	A budget is required to fund man power, specialist skills, time and any other resources needed to ensure the facility is well maintained.
Annual Maintenance	The resources available funds, man power, specialist skills, time and any resource need to ensure the facility is well maintained.
Insurance	Funds, policy exclusions and any other influencing factors.

By using the table in Appendix A, it is possible for the club to determine the level of risk they are committing themselves to in the future and to determine a plan for the ongoing development of facilities at the club.

03 Pitch Guidance

3.1 Design of Non-Turf Pitches

Non-turf pitches can be divided into two main groups - Bound and Unbound.

(a) Bound is where the surfaces are laid on a structure that is bound together with a bonding agent like Bitmac, concrete etc.

(b) Unbound is where the surfaces are laid on a structure that is not bound and is held together by the interlocking and particle size distribution of the particles.

Unbound has the ability to absorb moisture and alter the playing characteristic of a pitch more readily than a bound structure, therefore, it plays similar to a good natural turf pitch with changeable playing characteristics influenced by the moisture content in the base formation.

Soil is an unbound structure and pitches that use a clay base provide the nearest playing performance to a grass pitch, they do however require the highest maintenance inputs.

This information should be only used as a generalisation as designers may well have their own method of meeting the ECB Performance Standard and providing a pitch that plays like grass.

There are a number of designs which have been shown to meet the criteria as laid down within the ECB Standard but may not be an approved ECB system, therefore, they would not be recommended by ECB.

Research has shown designers may adjust the performance of a pitch by adjusting any one of the following:

(a) The surface

(b) The underlay or underlays

(c) The upper supporting layers

(d) The upper base formation

(e) Lower base formation (if required)

(f) The length, stiffness and formation of the synthetic turf pile.

(g) The depth, stiffness and composition of the surfacing components and underlays.

(h) The composition and depth of the supporting layers.

(i) Introducing an underlay or additional underlays between the surface and the supporting layers.

(j) Altering the length of the synthetic turf pile, making it erect and increasing the density. Earlier pitches required a pile length of no greater than 6 mm as in the earlier days the longer the pile, the more the playing characteristic were affected. This is no longer applicable with recent surface introductions as long as the pile does not flatten significantly.

(k) Altering the depth of the supporting layers, i.e. reducing the depth of concrete from 100 mm to 70 mm. A similar situation is applicable to Bitmac.

3.2 Classification

Practical research during the past 25 years has shown the top 100 mm of a non-turf pitch influence the playing performance. The ability of this zone to absorb moisture is a major factor in determining how a pitch plays.

The number and depth of moisture absorbing components in the zone affect the extent to which a pitch performs, thereby providing the nearest comparison to a grass pitch. It is the combination of components and the extent to which they are affected by moisture that determine “the changeability” in a pitch in the same way as a grass pitch is affected.

Based on the ability of the structure to absorb or be affected by moisture the playing performance of a pitch is classified as either totally dynamic, semi dynamic, totally static or semi static.

3.3 Types of System

TYPE OF SYSTEM	PLAYING PERFORMANCE & MAINTENANCE IMPLICATIONS
1. Double Performance Pad System	
Synthetic turf laid on two performance pads over soil, especially clay loam, angular interlocking sand or closely mown turf on a cricket square.	Plays like a good grass pitch, the nearest to natural turf of the systems, however, few companies are willing to supply because of the levels of maintenance required.
2. Double Performance Pad System	
Synthetic turf laid on two performance pads over unbound mineral material.	Plays like a good grass pitch but requires maintenance from time to time. (APPROVED SYSTEM)
3. Single Performance Pad System	
Synthetic turf laid on a performance pad over unbound mineral material.	Plays like grass but requires maintenance on a regular basis. (APPROVED SYSTEM)
4. Single Performance Pad System	
Synthetic turf laid on a performance pad over unbound mineral over a stone base formation.	Plays like grass but requires less maintenance. (APPROVED SYSTEM)
5. Single Performance Pad System	
Synthetic turf laid on a performance pad over a bound base (Bitmac) over a stone base formation.	Plays within the parameters found on a good grass pitch and does not require the same maintenance inputs as pitch systems 3 and 4. (APPROVED SYSTEM)
6. Unbound Mineral System	
Synthetic turf laid on unbound mineral over a stone base formation.	Plays similar to a grass pitch but requires the highest input of maintenance other than system 1. (APPROVED SYSTEM)

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The highest maintenance input system is a synthetic turf laid directly onto unbound mineral, followed by synthetic turf laid on a single pad over unbound mineral.

The lowest maintenance system is a synthetic turf laid on a pad over a bound layer (Bitmac) laid on stone, followed by a synthetic turf on a double pad (one of which is impervious0 system over unbound mineral.

There are ten pitch systems currently approved by ECB.

- Two companies market a double pad system over unbound material.
- Four companies market a single pad system over unbound mineral.
- Three companies market an unbound mineral system.
- One company markets a single pad system over bound base.

From the information provided by the companies, Clubs and organisations should decide which type of system meets their requirements and specify the names of the approved systems (not the company) when obtaining estimates or quotations, which must include all works.

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3.4 Selecting a Pitch or Facility System

When deciding on a pitch or facility system, the process should be divided into two:

(a) What is the condition of the ground on which the pitch or facility is to be installed?

This includes: the levels (slope, undulations, etc), what is in and on top of the ground at the present time (trees, undergrowth, buildings, foundations, rubbish, brickbats, industrial waste, saturated soil, vegetable topsoil, sand, limestone and many more). What the facility is built on can affect the quality of the playing performance. Drainage of the site plus the surrounding land, location of trees, hedges, bushes, their type and potential root span, age of trees etc, have a bearing on the success of the facility.

(b) What system design is suitable for the application, bearing in mind the following?

Who will be using the facility? What the facility will be used for - match play, practice, mini games, fitness, coaching, etc? All have a bearing on the systems under consideration. Does the playing performance mimic the performance of a good grass pitch and to what extent?

Selection of the base formation is an important issue in the practical application of a system, e.g. for match play, a concrete base has to be installed on a relatively flat site, otherwise considerable expense may be incurred in marrying the outfield and surrounds with the pitch surface.

The difference in hardness between a concrete slab and natural turf can also be dangerous on a match pitch, especially if the concrete does not have a cushion layer laid over it. Timber edgings can also be dangerous unless lower than the pitch surface and preferably surfaced with soil.

Bitmac and concrete based pitches normally require less maintenance than unbound mineral based pitches, but if the base moves, it is more difficult to repair and may need removing altogether, whereas the unbound mineral can be easily repaired with the minimum of expense and such pitches usually mimic the playing performance of a clay based grass pitch.

The rationale for considering all of the above is to present the contractor with as much information as possible so that the most appropriate design can be achieved.

In assessing quotations and design recommendations, you should expect to receive from each contractor a statement on:

- Levels.
- The most compliant design and product (including all additional enabling work).
- The extent of the management and time involved in maintaining the chosen product.
- A site investigation report with recommendations.
- An indication of any sub contracted elements (security fencing etc).

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Once you have agreed a design you should seek to enter into an agreement that is based on the ECB Employer's Requirements or other similar arrangement. This type of document offers the club a clear undertaking as to responsibilities and liability throughout the contract work phase and the warranties and management beyond. This agreement should be signed prior to any work being undertaken or any money being paid to the contractor.

ECB strongly advises Clubs, Local Authorities and other organisations to EMPLOY either a competent expert on the subject or a company with an ECB Approved Pitch System to assist in the design and build process.

3.5 Installation

The temptation is to either attempt to install pitches on a self help basis or to employ a local builder to install the base formation and/or the supporting layers with the club or owner fitting the underlays and surfacing.

This is not encouraged by ECB as the skills required and the quality of the product has shown that only skilled, experienced personnel should install pitches under the control of the designer or the supplier of the system.

If a club wishes to install a pitch they should only do so if they employ the designer or the supplier of the system to supervise and check the installation is installed correctly.
The ECB prefer clubs to purchase from the designer or supplier of the system.

3.6 Quality

The quality levels to which a facility should be installed can be found in the ECB Code of Practice and the ECB Performance Standards for Non-Turf Cricket Pitches intended for Outdoor Use (Nov 2007).

These indicate the limits within which a facility should be installed, the quality of the materials used and the checks the installer should carry out during the construction.

3.7 Unacceptable Features on Pitches

A match pitch marrying in to the surrounding ground. However, in places the outfield should have been lifted.

Unsatisfactory joining of surfaces.

The stump holes are outside the limits specified.

Match pitch contours unaccepable.

Bowlers run up not married into the surrounding ground.

04 Net and Cage Guidance

All systems should conform to the ECB Performance and Technical Standards for cricket practice nets, cages, and supports and security fencing, as they appear from time to time.

4.1 Performance of the System

The system should prevent balls from going under, over, round or through the structure of the netting and cage / supports.

4.2 Fixing of Nets

The nets should be fixed to the posts and horizontal cross members or cables with an appropriate means either with ties, flexible clips, line wires, ropes, laces and any other flexible means.

Stiff plastic ties used for gardening, DIY and fastening things in a permanent manner should be avoided because they can soon cut through the individual sections of the netting. Only where there is no strain on the netting should they be used.

4.3 Billowing of Nets

Perhaps one of the biggest failings of clubs and organisations selecting a net and cage system is a lack of understanding as to the extent of billowing that occurs when a ball impacts on a net. Billowing can range from as little as 300 mm to 1.8 metres, depending on the system selected, which is governed by the extent of the slack in the system (the amount of netting greater than the length required which is surplus to requirements and lays on the ground).

In some systems a rope is used to keep the net in position, whilst with other systems weighted poles, tight lines, surface fixings like pegs, particularly outdoors, are considered to be the solution.

Billowing can occur when the ball hits the net, players run into the net and strong winds blow the nets out of position. The amount of billowing must be controlled in the interests of safety and the functionality of the system.

4.4 Damage Caused by Rabbits, Foxes and other Animals

A skirt is a way of protecting the bottom of the net from damage and it can also help to reduce billowing.

4.5 Tensioning

Tensioning also helps in reducing billowing but needs very careful consideration if the club are to maximise the use of the facility. By ensuring the net is controlled at an optimum position, greater use can be made of the facility at all times despite the variation in weather conditions. If the net is taught it can act as a sling with the ball being quicker off the net than when it impacted on the net. When select a

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net system detailed discussions should be held with the Suppliers who should take the Club's user requirements in to consideration and demonstrate how their system is the most appropriate for the Club's needs.

4.6 Roof Netting

The netting used for the roof should be fastened to the vertical nets in such a manner that balls do not pass between them.

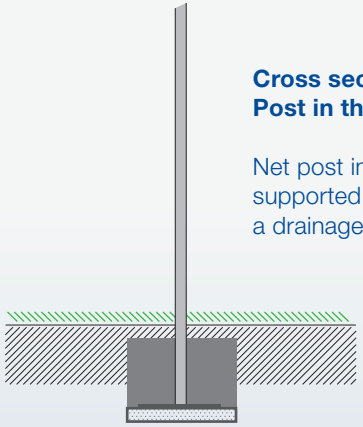
4.7 Steelwork and Supports

All steel work should be robust enough for the job including players and equipment running into the frame. All posts should be typically, a minimum diameter of 42.3 mm with a 3 mm wall thickness set in concrete to a depth of no less than 475 mm in the ground on a 100 mm stone drainage layer. The designer should be aware of the strain the structure must be capable of sustaining and design accordingly taking into consideration ground and climatic condition, type and levels of use which should form part of the site investigation before submitting a scheme.

A net/cage system shall be no less than 3.6 metres wide by 18.3 metres long and 3.6 metres high and the roof netting shall cover the entire cage with no gaps where a ball can pass through. Within the net, in the interests of safety, the stumps should be positioned 1.5 metres from the back netting.

4.8 Durability

The steel work and the netting on all types of systems must be to the correct strength and installed to a suitable design for the "purpose intended", bearing in mind prevailing winds, strength and stability of soil on the site concerned, the maintenance required to maintain the structure and the life expectance it has been designed for.



Cross section of a Net Post in the ground.

Net post in the ground supported by concrete on a drainage raft

The cross member should be fixed securely to the uprights by a fixing which will not part in service. Cross member has come out of its socket due to poor design, installation, pressure on the structure (winds, vibrations, players leaning on the cage, vandalism or other means) poor maintenance or neglect on behalf of the facility owner. There are a host of reasons and it is essential the owner is fully conversant with the upkeep of the structure once installed. All companies should provide management and maintenance instructions and as appropriate training if requested by the owner.

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4.9 Key Items to Consider When Selecting Net Cage Systems

A cross member that has become detached.

Tension wire ready for fastening to the net to reduce billowing.

A rodent protection skirt on the outside of the net.

Fixing holding the tension wire for reducing billowing.

Intermediate fixing for holding the tension wire to avoid drilling which may weaken the post.

05 Other Considerations

5.1 Warranties

It is important to obtain warranties for the entire system and the individual component especially the netting and the extent to which the netting remains under warranty especially the maintenance implications.

5.2 Risk Survey

When considering systems it is a good idea to carry out a risk survey, as indicated in the Appendix.

5.3 Training

It is advisable for at least two people from an organisation or club to attend courses on the installation, management and maintenance of non-turf cricket facilities. Further details of courses can be obtained through the Institute of Groundsmanship (www.iog.org).

5.4 Management and Maintenance

The installer and the supplier should make the owner and the appointed representative fully aware of how to maintain and manage the facility. This includes training and providing a detailed Code of Practice for the facility.

5.5 Evaluation

When selecting a system it is important to evaluate what is available and how long the facility will last. Numerous methods of evaluation have been used over the years. The most simplistic has been to take the total costs of installation, plus the management cost, divided by the potential usage (See Example 1):

Example 1:
Period of time the facilities will be used before a new top structure is required 10 years.

Cost and Usage Per Annum
(One net facility)

Installation cost:	£6,500
Management cost:	£1,500 per annum
Usage (adult) per annum:	1600 user hours

Total Cost over Ten Years

Installation cost:	£6,500
Maintenance cost:	£15,000
Total Cost:	**£21,500.00**
Usage:	1600 user hours x 10 = 16000

£21,500.00 divided by 16,000 user hours = £1.34 per user hour.
Note: A user hour is one person for one hour. (Figures based on work carried out for Sport England).

Further details on the information contained in this document can be obtained from the ECB Funding & Facilities Unit at facilities@ecb.co.uk

APPENDIX A - Level of Risk Survey

Requirement	1 Very Low	2 Low	3 Medium	4 High	5 Very High
Safety					
Orientation					
Trees					
Roads					
Buildings					
Paths					
Ground Conditions					
Other Facilities					
Quality					
Pitches					
Cage					
Nets					
Fixings					
Design					
Resources					
Purchase					
Regular Maintenance					
Annual maintenance					
Insurance					

Possible Sources of Information:
Safety: Club members, club officials, ECB officials and expert advisers.
Quality: The designer, supplier and ECB officials and expert advisers.
Resources: Club members, club officials, the designer, supplier and expert advisers.