

Commonwealth Games

Hockey field specifications & technical
requirements

May 2019 edition

1 General

This document has been prepared to enable the Local Organising Committee to provide hockey fields to the standards required for the Commonwealth Games. This document forms part of the FIH's Event's Manual and should be read in conjunction with the other FIH documentation.

The FIH reserve the right to amend, delete or add to these requirements at any time.

For clarification or further information on the FIH's field, lighting and sports equipment requirements please visit www.fih.ch/hockeyturf or contact facilities@fih.ch.

2 Sustainability principles

The FIH is keen to ensure the hockey facilities constructed for the Games are as environmentally sustainable as possible. With this in mind the Local Organising Committee is encouraged to use a Hockey Turf surface that:

- Utilises bio-based polyethylene yarns as far as possible
- Is designed to only require irrigating at 1l/m² or less
- Incorporates the sustainable reuse of water used to irrigate the fields
- Incorporates a sub-field irrigation system
- Is not bonded to the underlying shockpad, allowing the more straightforward resurfacing /relocation of the Hockey Turfs in the future
- Is manufactured from a range of materials that allow the full recycling of the Hockey Turf and shockpad (cradle to cradle) when it reaches the end of its life as a hockey playing surface.

The design and construction of the fields should be based on the principals of the IOC's *Guide to Sport, Environment and Sustainable Development* ISO 14001 and ISO 20121.

The FIH is aware that temporary pitch systems are being developed that allow existing sports fields to be temporarily overlaid and converted into hockey fields. The FIH supports and endorses this approach and sees the potential benefits it offers events like the Commonwealth Games. Therefore, the FIH is willing to consider the use of Global Category Temporary Overlay Fields for some or all of the Commonwealth Games hockey venues, subject to them complying with the relevant requirements of the *FIH Hockey Turf and Field Standards* and this document.

3 Definitions

Competition field – a field used for competitive games during the Event.

Event - the FIH tournament.

FIH Hockey Turf and Field Standards – all parts of the *FIH Hockey Turf and Field Standards*. Unless otherwise specified by the FIH, this shall be the edition current 24 months in advance of the Games.

FIH TV Lighting Guide - *FIH Facilities Guide - Sports Lighting for Broadcasting 11 a-side Hockey, Outdoors*. Unless otherwise specified by the FIH, this shall be the edition current 24 months in advance of the Games.

FIH Lighting Guide - *FIH Facilities Guide - Sports Lighting for Non-televised Outdoor Hockey*. Unless otherwise specified by the FIH, this shall be the edition current 24 months in advance of the Games.

Field - the full Hockey Turf area comprising the Field of Play and Run-Offs. May also be described as the Pitch.

Field of Play - the playing area contained within the side lines and goal lines.

Hockey Turf - a synthetic turf surface specifically designed for the game of hockey and complying with the FIH Quality Programme.

LOC - Local Organising Committee.

Operational margin – a margin outside the run-offs that is used by event management for TV camera positions, advertising boards, etc.

Run-Offs - margins around the perimeter of the Field of Play that form deceleration and safety margins for players.

Temporary Overlay (TO) – an FIH approved method of base and hockey turf surfacing that allows a hockey field to be temporarily built above an existing structure (e.g. overlaying a natural grass or synthetic turf sports field) and/or FIH approved method of base and hockey turf surfacing that can be removed and relocated elsewhere, at the end of an event.

Training Field – a supplementary field provided to allow teams to train prior to and during competition.

Summary of field requirements

Field designation		Competition fields		Competition fields / Warm-up fields		Training fields		See guidance note
Number of fields required		1		1 (see also Note 4.4)		1		5 & 17
Field dimensions & minimum run-offs	Length	Length	Width	Length	Width	Length	Width	
	Field of play	91.40m	55.00m	91.40m	55.00m	91.40m	55.00m	6.1
	Inner run-off	3.0m	3.0m	3.0m	3.0m	2.0m	2.0m	6.2
	Outer run-off	2.0m	1.0m	2.0m	1.0m	1.0m	1.0m	6.2
	Operational margin	1.0m	1.0m	-	-	-	-	6.3
	Total size	103.40m	65.0m	101.40m	63.0m	97.40m	61.00m	
Field orientation		North / South		North / South		North / South		7
FIH Product Approval Hockey Turf category		Global / Global TO		Global / Global TO		Global / Global TO		10.1
Same Hockey Turf as Competition Field		-		Yes		Yes		
Age of Hockey Turf at time of the Games		Less than 18 months		Less than 18 months		Less than 18 months		5.5
Colour of field of play		Blue		Blue		Blue		10.2
Run-off colours		Blue		Blue		As agreed with FIH		10.2

Field designation		Competition fields	Warm-up fields	Training fields	See guidance note
Recommended hockey turf manufacturer		FIH Preferred Supplier			
Recommended field builder		FIH Preferred Supplier or FIH Certified Field Builder			
Line markings & logos	5m dashed circle lines	Required	Required	Required	10.3
	Additional line markings	No additional line markings	No additional line markings	No additional line markings	
	FIH Quality Programme logo	Required	Required	Optional	10.3
Field watering		As required by installed Hockey Turf system	As required by installed Hockey Turf system	As required by installed Hockey Turf system	11
Category of FIH Field certification required		Global Elite Global Elite (TO)	Global Global (TO)	Global Global (TO)	4 & 15
Sports equipment per field	Goals	Three (one set and one spare)	Three (one set and one spare)	Two (one set)	12.1
	Nets	Three (one set and one spare)	Three (one set and one spare)	Two (one set)	12.1
	Corner flags	Six (one set and two spare)	Six (one set and two spare)	Four (one set)	12.2
Perimeter fencing	Side Line boundaries	Minimum 1.0m high	Minimum 1.0m high	Minimum 1.0m high	13
	Back Line boundaries	Minimum 7.0m high	Minimum 7.0m high	Minimum 3.0m high	13
Sports Lighting requirements		TV1	Non-televised Class II	Non-televised Class II	16

4 Information to be provided

4.1 No less than 24 months before the Event:

The LOC shall provide the following information to the FIH:

Table 1 – information required	Tick list
A detailed plan (full CAD drawings including vertical elevation drawings) of the existing or proposed field(s) to include:	
1. Field orientation	
2. Overall field dimensions (Field of Play, Run-Offs and operational margin), including details of any Run-Off not surfaced with Hockey Turf	
3. Position of rain guns or irrigation sprinklers	
4. Position of auxiliary water supply points (hose points)	
5. Height and positions of perimeter fencing, including any temporary ball stop netting	
6. Proposed location of team benches	
7. Maintenance and emergency vehicle access to the field	

4.2 No less than 18 months prior to the Event:

The LOC shall seek FIH approval of the proposed (installed) Hockey Turf product and colours (Field of Play and run-offs) no later than 18 months prior to start of the Event. On approval, these details will be announced on the FIH website. They will also be reconfirmed to Competing Teams in the Team Briefing as detailed in the FIH Events Manual.

4.3 Field certification

4.3.1 Competition fields

The Competition Fields shall be certified to the FIH Global Elite category no less than one month in advance of the Official Hockey Test Event.

If a temporary pitch overlay is to be used, the field shall be certified to the FIH Global Elite (Temporary Overall) category

Note – as of May 2019 currently under development by the FIH.

The certification shall remain valid throughout the period of the Games.

4.3.2 Training fields

The training fields (and any separate warm-up areas) shall be certified to the FIH Global category no less than three months in advance of the Games. The certification shall remain valid throughout the period of the Games.

If a temporary pitch overlay is to be used, the field shall be certified to the FIH Global (Temporary Overall) category.

Note – as of May 2019 currently under development by the FIH.

The certification shall remain valid throughout the period of the Games.

5 Number and types of field

5.1 Competition fields

The LOC shall provide the number of competition fields detailed in the *Summary of Field Requirements* of this Specification.

5.2 Warm-up fields

The LOC shall provide the number of warm-up fields detailed in the *Summary of Field Requirements* of this Specification. They shall be located at the tournament venue, as close to the competition fields as possible.

5.3 Training fields

The LOC shall provide the number of training fields detailed in the *Summary of Field Requirements* of this Specification. They shall be located at the tournament venue or as close as possible, as agreed with the FIH.

5.4 Age of Hockey Turf surface

To reduce any detrimental effects of use on the performance and consistency of a field, the maximum age of the Hockey Turf surface at the time of the Games shall be as specified in the *Summary of Field Requirements* of this Specification. All fields should be subjected to similar levels of use and maintenance prior to the Games.

5.5 Field design and construction

All fields shall have been designed and constructed to ensure they can be certified to the specified requirements of the *FIH Hockey Turf and Field Standards*. The construction shall typically comprise a stabilised formation, sub-field drainage system (vertical or horizontal) compacted aggregate sub-base, engineered (asphalt) base, shockpad and Hockey Turf playing surface, all designed and constructed in accordance with sports field engineering best practice.

6 Field dimensions

6.1 Field of Play

The dimensions of the Field of Play shall be as per the Rules of Hockey.

6.2 Run-offs

Beyond the Field of Play are the run-offs. These are provided to ensure player welfare and form part of the total playing area. The run-offs shall be kept clear of all permanent or temporary fixtures, (including advertising boards, TV cameras, etc) at all times.

The full run-off shall be surfaced with the same quality of Hockey Turf as the Field of Play.

Run-off dimensions are minimums. Larger run-offs are acceptable.

6.3 Operational margin

An operational margin is required outside the run-offs on the Competition Pitch. The margin may be surfaced with Hockey Turf or an alternative surface such as asphalt, concrete pavers, etc. The transition from the run-off to the operational margin shall be smooth and not form a potential trip point.

7 Field orientation

Unless otherwise agreed with the FIH the Field shall be aligned North / South, with a maximum deviation from north of no more than $\pm 15^\circ$.

8 Field drainage

Unless otherwise agreed with the FIH the fields shall be designed to incorporate a sub-surface drainage system (vertical or horizontal) that is designed to cater for a rain-fall event of at least 150mm/hr or a one in ten year's rain-fall event, whichever is greater.

The hockey turf surface shall be designed to ensure water is able to drain vertically into the underlying sub-surface drainage system.

9 Field profile

A number of different field profiles may be used including single planes (end-to-end, side-to-side and diagonal falls), envelope and ridge profile. Irrespective of which is chosen the profile should be symmetrical around the central axis of the field and it should not cause the hockey turf to dry inconsistently across the field.

If an envelope or ridge profiles are used, the change in grade shall not adversely affect the consistency of the ball roll or exceed the specified requirements for surface regularity.

Each field provided for the Games shall have the same profile.

Unless agreed in advance with FIH the maximum gradients shall be as detailed in Table 2.

Table 2 – field gradients	
Longitudinal gradients along the length of the field	$\leq 0.2\%$
Lateral gradients across the width of the field	$\leq 0.4\%$

10 Playing Surface

10.1 Category of surface

The fields shall be surfaced with the Global category of FIH Approved Product.

10.2 Play surface colours

The FoP and run-offs of the Competition and Warm-up Field shall be preferably be Signal Blue (RAL Colour 5005). Other acceptable shades of blue are:

- Ultramarine Blue (RAL Colour 5002)

- Gentian Blue (RAL Colour 5010)
- Traffic Blue (RAL Colour 5017)
- Capri Blue (RAL Colour 5019)

The FoP of the Training Field shall be the same colour as the Competition Field. Ideally the run-offs will be the same colour as the FoP, although alternative colours can be used, as agreed with the FIH.

10.3 Line markings

The fields shall be marked in accordance with the current *Rules of Hockey* applicable at the time of the Event.

Line markings shall be 75mm wide, white in colour and preferably in-laid or tufted into the hockey turf carpet. All In-laid markings shall be manufactured to the same specification as the main playing surface.

Field markings shall include the dashed lines marked 5 metres from the outer edge of each circle-line. These shall be marked in accordance with Clause 1.4 (d) of the Field and Equipment specifications detailed in the *Rules of Hockey*.

No other marking (lines or advertising) shall be placed on the competition field without the FIH's prior approval.

Suitably sized *FIH Quality Programme for Hockey Turf Certified Field* logos shall be located on a suitable position on the run-off of each field. These shall be in-laid hockey turf logos.

11 Field irrigation

For wet fields the method of irrigation shall provide a uniformly wet playing surfaces in accordance with FIH requirements across the whole of the Field of Play and run-offs. Irrigation may be provided by above-field sprinklers, rain-guns or other means agreed with the FIH or by sub-field irrigation.

The minimum quantity of water applied to the playing surface shall be in accordance with the wetting procedure used when the Hockey Turf system was tested and Product Approved.

11.1 Above-field irrigation

If above-field irrigation is to be used there shall be no sprinklers located within the Field of Play or within 2m of a goal or side line. Rain-guns shall not be located within the run-offs.

The design of the irrigation system shall take into account prevailing wind directions and minimise water spray drift onto spectators.

The irrigation control system shall allow varying cycles and individual programs to ensure the entire playing area and surrounds can be watered. It shall allow the following cycles:

- 12-15 minutes
- 8 minutes
- 3-4 minutes
- Single station activation

Adequate water storage shall be provided to ensure the field(s) can be fully watered as required for the projected schedules of play during the Event.

The sprinklers or rain guns shall be capable of sectoring to 90° or 180°. The discharge rate shall be such that an irrigation cycle of all six emitters (operating in matched arc pairs) shall achieve an even precipitation over the Field of Play as specified in the FIH Field Handbook.

For locations where any of the conditions listed below could occur the irrigation system shall be designed to ensure the risk of water borne bacterial infection of players or spectators from diseases such as Legionnaires Disease is eliminated:

- the water temperature in all or some parts of the system is between 20 °C and 45 °C
- water is stored in an open loop system
- water is re-circulated
- there are sources of nutrients such as rust, sludge, scale, organic matter or biofilms within the irrigation or storage system
- local climatic conditions are likely to encourage bacteria to multiply

Field watering shall be undertaken in accordance with the Hockey Turf manufacturer's instructions, taking into account the specific wetting requirements of the installed hockey turf, as detailed in the FIH Product Approval Test Report.

11.2 Sub-field irrigation

The irrigation control system shall ensure water levels are uniformly maintained throughout a game with the ability to top-up during breaks in play as required.

The control mechanism shall ensure that optimum playing conditions are retained at all times and that ponding of water within the Hockey Turf surface does not occur. The system shall be sufficiently responsive so that it can self-adjust to any rain-fall event occurring during a game, so there is no adverse effect on play.

11.3 Ancillary watering

Back-up large bore hoses with a suitable supply shall be provided for additional manual watering of the field as necessary. These should be stored close to the field (not on the Run-Offs) to enable rapid deployment, and should be stored safely to avoid tripping hazards.

12 Sports equipment

At least one month prior to the start of the competition, the LOC shall install the specified sports equipment. All equipment shall be free of any commercial branding unless specified in the FIH Events Manual or otherwise agreed by the FIH.

12.1 Goals

Goals shall be aluminium goals with an integral weight system that conform to the *Rules of Hockey* and European Standard EN 750. The front wall on the uprights and cross bar shall be reinforced to prevent ball impact damage. The backboard panels shall be reinforced and fitted with impact and noise absorbing panels on all inside faces to a height of 460mm. The posts and cross-bar shall be white (or another colour subject to FIH approval).

Nets shall be hung from the back bar in a way that allows them to hang freely to eliminate ball rebounds. They shall be held firmly in place with an integral net retaining system (not net hooks).

The nets shall be the same colour as the Field of Play. They shall be fixed so that the ball does not pass between the goal-posts and the net or between the cross-bar and the net. The nets shall be fixed at the back of the side-boards and back-boards so that the ball cannot pass beyond the net

12.2 Corner Flags

Corner flags shall be mounted on flexible (22mm diameter) posts and be fitted into ground sockets or be mounted onto surface base plates.

13 Field fencing

The field shall be fully enclosed by perimeter fencing. The fencing mesh (normally 50mm) shall not allow hockey balls to pass through it, but it shall allow spectator visibility.

On side boundaries fencing shall be a minimum of 1.0m high. Low level fencing shall incorporate an upper hand rail.

Behind the goals the fencing height shall be as specified in the *Summary of Field Requirements* for the full width of the boundary. Fencing may be ball catch netting suspended from tensions cables providing such netting is fully attached to prevent it billowing in the wind.

Player and match officials' access gates to the field(s) shall be at least 1.2m wide.

At least one set of double gates shall be provided to allow maintenance and emergency vehicle access to the field(s).

14 Maintenance equipment

The LOC shall ensure that all necessary maintenance equipment, as recommended by the hockey turf manufacturer, is available to enable the Hockey Turf on each field to be fully maintained in accordance with the manufacturer's instructions. They shall also ensure an adequate number of trained maintenance staff are available throughout the Event.

If intensive rainfall (thunder storms, etc.) may be anticipated during the Event suitable squeegees to remove any excess water ponding on the hockey turf shall be provided.

If painted lines are to be used the LOC shall ensure that suitable maintenance equipment and paint is available throughout the Event to allow the remarking of lines as required.

15 FIH Field Certification

New fields should be used prior to test to ensure the hockey turf reaches its optimum condition prior to test. This may require several week's play and an adequate allowance should be made in the commissioning programme for this.

FIH field certification includes an assessment of the effectiveness of the field's irrigation system and this needs to be fully compliant and operational at the time of the field test.

The tests shall be undertaken by an FIH accredited test institute appointed by the LOC (see www.fih.ch/hockeyturf for details of FIH Accredited Test Institutes). To ensure impartiality the test institute should not have been involved in the design or procurement of the field.

If help is required to organise a field and or lighting tests, please contact facilities@fih.ch.

16 Sports lighting

The fields shall be illuminated to satisfy the relevant performance requirements as specified in the *Summary of Field Requirements* and defined in the current FIH Lighting Guide.

The lighting system shall be tested after at least 10 hours initial use (to ensure consistency). The tests shall be undertaken by an independent lighting engineer, as agreed with the FIH or an FIH accredited test institute appointed by the LOC. The test institute/lighting engineer should not have been involved in the design or procurement of the lighting system.

If the lighting system is a permanent installation the lighting test shall be undertaken no more than six and no less than two months in advance of the Event.

If a temporary lighting system is to be used to fully light or augment an existing lighting system, the lighting tests shall be undertaken and the results submitted to the FIH for approval no more than five days in advance of the Event.

17 Warm-up & training fields

17.1 General

Separate warm-up and training fields shall be located at the venue or remotely as agreed with the FIH. They shall be FIH certified to the required category in accordance with the *Summary of Field Requirements* and of this Specification.

The fields must display similar playing characteristics to competition fields meaning all fields should be of a similar age, have been subjected to the same levels of use and be maintained to the same standards.

17.2 Sports Equipment

Warm-up and training fields shall be equipped with goals and corner flags.

For wet fields the irrigation system shall have adequate capacity for repeat use throughout the day.

Appendix A - Construction guideline criteria

The following information is provided to assist in the design and construction of the hockey fields. It is based on industry best practice. As every hockey field construction has site specific considerations it is very important that a thorough geographical site investigation is undertaken prior to the field design being prepared and that this guidance is tailored to reflect the site conditions found.

1 Formation or subgrade

The formation should be free of all vegetation. Chemical treatment should be used as appropriate, ensuring conformity to the relevant environmental standards.

If the formation is trimmed and levelled using cut and fill techniques, any filling should be carried out in layers that are compacted before the next is spread and the maximum layer depth should be 600mm.

Formation levels should not deviate from the design levels by more than +20/-30mm. Levels should be measured on at least a 10 x 10m grid.

A geo-synthetic separation layer should be laid over the formation to separate it from the overlying sub-base. The membrane (either non-woven or woven) should have a minimum tensile strength of 8kN/m when tested in accordance with BS EN ISO 10319 and a static puncture strength of at least 1.5kN when tested in accordance with BS EN ISO 12236. The membrane should be laid with joints that overlap by at least 300mm or by the manufacturer's recommendations.

The load-bearing capacity of the prepared formation should be measured using one of the test procedures specified in Table 1 and the compaction values should be achieved in all test locations.

Table 1 – recommended load bear capacity for field subgrade

Dynamic Cone Penetrometer (DCP) to a depth of 0.5m below formation	BS 5930	Inferred CBR \geq 5 %
California Bearing Ratio test	BS 1377-9	CBR \geq 5 %

2 DRAINAGE

The hockey fields should incorporate a drainage system designed to remove rainfall from the playing surface at enough rate to ensure that excess water is not allowed to build-up and restrict the use of the facility. The drainage system should be based on vertical drainage in which the hockey turf, shockpad and bound base is permeable allowing water to flow down through it and the under lying sub-base. Depending on the type of sub-soil on the site some water may then percolate into the sub-soil, but as most soils are unlikely to have adequate capacity a sub-surface water drainage system shall be constructed to augment any natural drainage. This will typically consist of a series of lateral drains laid within the formation to collect the water and take it to perimeter collector drains that carry the water to the discharge point.

The spacing between lateral drains will be dependent drainage system's design but should be no more than 10m for drains with an external diameter of 80mm or greater and no more than 7m for drains with an external diameter of less than 80mm. Lateral drains should be laid to a minimum slope of 0.5 %. Perimeter drainpipes with a minimum external diameter of at least 100 mm should be laid when

the drainage slope is at least 0.5%. For shallower slopes pipes with a diameter of at least 125 mm should be laid. The minimum drainage slope should be 0.3%.

The minimum depth of drain trenches should be the diameter of the drain plus 150mm. The minimum width of the drain trench should be at least three times the diameter of the drainage pipe which should be centrally located in the trench.

Pipe bedding materials should be clean, durable pea gravel or similar. Flexible pipes should be laid on a bed of 75mm minimum depth and the drainage trench back-filled with similar granular materials to a minimum depth of 150mm above the crown of the pipe.

Rodding eyes or catch-pits, with covers, should be installed to allow inspection and maintenance of the main elements of the drainage system.

3 SUB-BASE

The sub-base should:

- Provide adequate internal stability and load-bearing capacity in conjunction with the formation-during both construction and in the long-term to support surface applied loads without excessive deformation or permanent damage. This should include protection of the (weaker) formation soils beneath.
- Provide adequate stability to resist the effects of swelling, shrinkage or freezing in the formation soils.
- If the formation soils are frost susceptible limit the likelihood of frost penetrating to them.
- Provide adequate storage of infiltrating surface water when required as part of the drainage and attenuation system.

The depth of the sub-base should be determined in accordance with civil engineering good practice, taking into account ground and local climatic conditions. Typically, the minimum depth will be 300mm.

At no point should the sub-base depth be less than 90% of the design depth and the total area on which the depth is below the design depth should not exceed 10% of the total surface area.

The aggregates used to form the sub-base should comply with the relevant requirements of BS EN 13285.

When tested using a *Prima Light Weight Deflectometer* (LWD) in accordance with BS 1924 Clause 9.2 the surface modulus of the prepared sub-base should be greater than or equal to 40 MPa. These values should be achieved in all test locations.

Construction levels should not deviate from design levels by more than +10mm/-20mm.

4 Perimeter edgings

The base of the field should be contained within concrete edgings which should be laid to a true line and level with adequate up-stand for the subsequent fitting of the hockey turf surfacing system. If required by the hockey turf surface, the edge detail should incorporate a carpet clamping system.

5 Bound Base

The bound base layer should be formed from an open grade asphalt mix complying with BS EN 13108-7. The bitumen used in the asphalt mix should be Class 60-70 or Class 80-100; depending on local conditions and the bitumen content should be between 3.4 and 4 %, all in accordance with BS EN 12591.

If a single layer bound base construction is used the asphalt course should be 0/10mm or 0/14mm grade asphalt laid to an average consolidated minimum thickness of 50 mm with no area being less than 35mm thick at any location.

If a two-layer bound base construction is used the binder course layer should either be a 0/10mm, 0/14mm or 0/20mm grade asphalt, laid to an average minimum consolidated thickness of 40 mm with no area being less than 30mm thick. The surfacing course layer should comprise 0/6 mm or 0/10mm grade asphalt, aid to an average minimum consolidated thickness of 25 mm with no area being less than 20mm.

The bound base should have the same slope as the final playing surface and construction levels should not deviate from Design Levels by more than ± 15 mm.