

Floodlighting

Guidance notes on the installation and
maintenance of floodlights



Facility Development Unit



The Department of
Arts, Sport and Tourism
An Roinn
Ealaíon, Spóirt agus Turasóireachta



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A word from John Delaney, Chief Executive Officer

“ One of the most enjoyable aspects of my position as CEO of the Football Association of Ireland is the opportunity it gives me to visit local communities and to witness the remarkable achievements in providing quality football facilities. I know that many years of planning and hard work have gone into these ventures.



The pathway to develop these facilities can be long and arduous but there is assistance available through the Department of Arts, Sport and Tourism and from the Football Association of Ireland's Facility Development Unit. Therefore, I am delighted to support the development and distribution of this, the latest in the FAI's series of guidance notes for clubs, leagues and facility operators.

I would like to take this opportunity to thank you for the work undertaken or about to be undertaken by you and hope that you find that these guidance notes assist you in maximising the quality of your facility as well as delivering value for money.

John Delaney



1.0

Introduction

Floodlighting is a costly and technical investment and floodlighting schemes are not for the amateur. They must be designed and installed by qualified lighting engineers to professional standards. The purpose of this Document is to equip football clubs to define their floodlighting needs and to understand what is involved in engaging a professional lighting engineer.

2.0

Preparing a scheme

The upgrading of floodlights and particularly the installation of lighting where it does not currently exist is a major step for a football club and should follow broadly the stages outlined in the 'Guidance notes on managing the development of facilities'.

When planning the floodlighting scheme for your club it is important to consider the future and consequently the possible need for higher lighting levels if the club has ambitions to compete at a higher level. It is important therefore to allow for this in whatever layout/ scheme the club opts for.

Lighting schemes must have the services of an electrical or lighting engineer, who can help you to define your needs, to prepare a specification, and analyse tenders received from potential contractors. They can also, if appropriate, handle a planning application on your behalf.



3.0

Planning consent

Planning permission for floodlights is often refused and advice on this topic should be sought from a lighting specialist, FAI or your local authority.

The local planning authority will have existing policies to which it will refer but it will also be influenced by the practical details of each individual scheme as each site location and surroundings will bring different challenges.

There are some factors which you yourself can influence to improve your chances of receiving planning permission:

- **Visibility from a distance**, including both sky glow* and the height of columns;
 - typically, columns will be 15m to 18m high. However the lower the column the more floodlights have to be angled or aimed on to the playing area and surface
 - * The light emitted upwards from each floodlight
- **Glare;**
 - this can be minimised by floodlights mounted at the correct height and by correctly angled lighting units or, in some cases, by a secondary reflector lighting scheme.
- **Spillage (or light trespass);**
 - this is the amount of 'wasted' light, which can affect surrounding properties and residents. This can also be minimised by lighting shields or 'hoods'
- **The activity on the pitch itself;**
 - local people may not object to the lighting but they may object to games being played in the evenings and especially to abnormal traffic movements and noise. It is not uncommon for planning authorities to impose time restrictions or curfews.

Good landscaping design can help to reduce visibility, glare and spillage and on sensitive sites it is recommended that you take the advice of a professional landscape designer.

Floodlights which are properly designed and installed by recognised companies are unlikely to result in any adverse impacts on the surrounding areas.

4.0

Electricity Supply

There is a number of key considerations that must be taken into account when planning your installation;

- Increased or new electricity supplies will require a Capital Contribution.
- Current charge for a 50 kva Contracted Supply Level or Maximum Import Capacity (MIC) is €3,380.
- Application Form can be downloaded from ESB Networks website. Ref. Form NC 3.

5.0

Energy Contracts

- Clients are at liberty to purchase energy from licensed Suppliers of whom there are approximately eight operating in the All Ireland Market.
- Rates quoted below are from ESB Supply .Better deals may be negotiated with alternative Suppliers such as Bord Gais ,Viridian, ESBI ,etc.

6.0

Safety Legislation

- As a Client you will need to establish if any planned project will be Notifiable to HSA under SHAWW Act 2005.
- Criterion is if workers will be on site for 30 days or if in excess of 500 man days of work involved.
- If so Client will need to appoint competent Project Supervisor Planning Stage (PSDP) and Project Supervisor Construction Stage (PSCS) and ensure Safety &Health Plans are completed.

7.0

Lighting levels

The term lighting level refers to the amount of light falling on the playing surface.

Whilst there is no need for you to become a technical expert, some knowledge of the terms used by lighting engineers will be helpful to you in your role as client.

- The most common measure of light levels for sport is 'lux' (lumens per square metre) which is a measure of horizontal illumination. (E_H)
- Vertical Illuminance (E_V) refers to the light in the direction of a TV camera. This is measured 1.5m above the pitch surface. This will have a lower reading than Horizontal illumination.
- 'Uniformity' (the ratio of the minimum to the average illumination) is the measure of the evenness of your lighting on the pitch surface. This is measured at 88 points on a football pitch, using a grid with 11 points lengthways and 8 across.
- Another similar expression is 'minimum diversity', and general quotations and tenders employ both average lux and diversity in their documentation.
- Lighting will not remain as bright throughout its life as on the day when you first switched on. 'Maintained illuminance' refers to the lighting level throughout the life of the lamp. It will be affected by voltage reductions, by the lamp itself and by the cleaning regime. Typically, a lamp could lose up to 20% of its effectiveness after 2 years or 4,000 hours use.
- The lighting levels recommended for football depend, as they do for most sports, on the nature and standard of football being played and the respective league and Competition guidelines.
- A principal source of advice on sports lighting is the Institution of Building Services Engineers (CIBSE), who use a threefold system of lighting classification.
 - In general it reflects the same recommendations. Recommended levels for spectator events vary roughly according to the average number of spectator places, as spectators are further from the 'action' than are players, and in larger grounds the lighting columns may be further back from the pitch.
 - Televised events will demand higher levels of lighting. The International Commission on Illumination publishes a "Guide for the Lighting of Sports Events for Colour."

The following are the lighting levels (in Lux) recommended by the Football Association of Ireland for the various levels of play from local domestic football up to preliminary rounds of UEFA competitions.

Table 1: Note: the below figures are for minimum 'maintained' levels.

Competition and training Lighting Recommendations				
Televised Events		Non Televised Events		
UEFA (Preliminary Rounds)	Eircom League & Competitive non- senior Internationals	Regional Development & non-senior international friendlies	Senior, intermediate, junior and schoolboy Football	Training
1200 – 1400 (E_H)	800 (E_H)	500(E_H)	250 (E_H)	150 (E_H)

8.0

Column Arrangements*

- Side-lighting is the preferred system for football, with 3 or 4 columns along each side of the ground, but this can lead to some fall-off in illuminance towards the goal lines which should be restricted as much as possible. This is usually done by reducing the floodlight spacing towards the end of the touch lines rather than placing additional masts behind the goal lines. The latter layout will direct light along the main axis of play, resulting in excessive glare for the players.
- Six and eight column systems can be used to minimize the effects of spill light, while reduced column height keeps the installation in scale with urban development & rural landscapes.
- A lighting system should be designed so as not to adversely affect the performance of players, referees, officials and the comfort of spectators.
- A small ground can be lit by a 4-corner tower system, which has the advantage of providing an unobstructed view of the pitch. It is however a more expensive system to install as it requires higher more substantial masts which use large banks of floodlights in order to achieve uniformity of light distribution, and because of this it may also raise planning issues.
- Corner columns should be positioned a minimum of '10 degrees' behind the goal line, giving the goalkeeper an unobstructed view to the corner flag and 5 degrees outside of the touchline.

* Please see Appendix A for an analysis of column arrangements

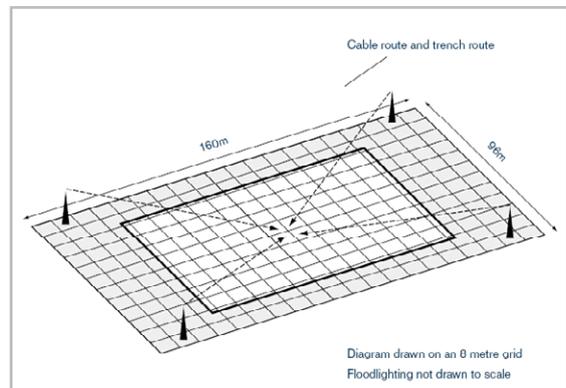


Diagram 1.0 4 column pitch lighting layout

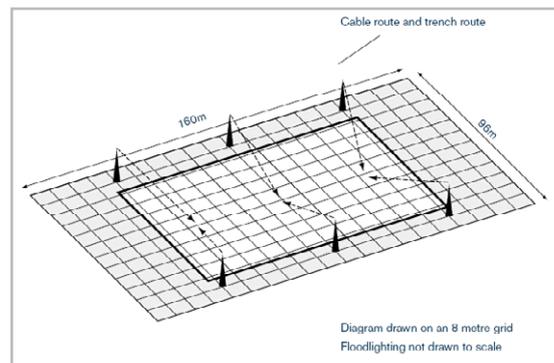


Diagram 2.0 6 column pitch lighting layout

9.0

Maintenance

Regular maintenance of floodlighting is crucial in maintaining the required light levels. Lamps can be cleaned and/or changed, either by climbing the lighting masts, by using hydraulic platforms, or by installing masts that can be lowered. The system adopted should also consider if this will conflict with long-term developments.

Clubs will have to consider (on the advice of their lighting specialist) whether their ground staff can carry out this operation or whether it should be the subject of a maintenance contract. It is essential that maintenance is budgeted for. It will cost money, but will save money in the long term.

10.0

Technical Issues

A number of technical factors must be taken into account when planning an installation:

- electrical systems are based upon a three phase supply, with cables buried at least 450mm below the surface
- lighting masts for 11-a-side pitches will usually be at least 15m high and at least 6m back from the touch lines
- there is a variety of lamp types and lighting systems but the choice nowadays really rests between metal halide (MBI) – giving good colour quality, medium lamp life and slightly higher energy costs, and high pressure sodium (SON), which has poorer colour but longer lamp life; tungsten halogen and high pressure mercury vapour are no longer used.

11.0

Compliance and Certification

The entire system must comply with statutory requirements and when it is completed the electrical contractor will have to provide you, the client, with an inspection and testing certificate, followed by a completion certificate. These record the relevant tests and also the name of the contractor and the work carried out.

- Conformity of Electrical Installation to ETCI Wiring Regulations will be certified by Electrical Contractor who will normally be registered with RECI or ECCSA.
- Emergency Lighting where it exists will be certified by qualified Certifier.
- Lighting Installation should be certified by a Lighting Engineer qualified to full membership level of Institution of Lighting Engineers (MILE).
- Manufacturers will supply designs(often free of charge) but will not indemnify Clubs against any claims which may arise from the manner in which the equipment is installed or subsequently performs.
- Clients need to be cautious about indemnity if any offered by a directly hired Contractor against for example personal injury claims arising from accidents sustained while playing in the lit facility.

12.0

Health and Safety

- In order to promote player safety, no lighting structures shall be placed within 5 m of the pitch side lines or goal lines.
- In the installation itself, all ducting work should be at least 450mm below ground level and tape signaling where cabling is 150mm above all cabling/wiring along their entire length in service trenches
- Cables in the soft ground shall be buried in trenches to a minimum depth of 500mm. Where applicable (as detailed in the IEE Wiring Regulations) cables shall be laid on a bed and surround of sand 150mm thick.

13.0

Ducting

Cable ducting should be installed so, in conjunction with draw pits, it provides an underground containment system in all hard landscaping to allow the future re-cabling of the lighting system.

Unless otherwise specified ducting should comprise 100mm diameter minimum rigid plastic ducting pipe, with flexible ducting where necessary.

Service ducting and draw pits for electric cables should include the provision and installation of draw ropes.

For the ongoing management of the floodlighting installation the following should be considered in the design process;

- Different settings for lighting levels to satisfy training, competition or television purposes and energy conservation
- A master time clock with battery back-up should be provided to cut-out the floodlights at the programmed time. The clock should allow for the seasonal changeover from GMT to BST.
- An hour counter is also an item to be considered to monitor overall usage.
- A key switch for manual override should also be provided.
- To allow safe egress at the cut-off time, at least one luminaire on each operational portion of the pitch shall remain in operation for a five minutes period following cut-off.
- The management system should include a system of visual warning to warn users the cut-off time is approaching. This can be achieved by switching a flashing beacon(s). The beacon shall operate five minutes before the cut-off time. It should only operate if any element of the floodlighting is in use.
- Sockets should be placed on at least two columns as a temporary means of power supply for PA systems etc.

Recommended publications

IFA Philips Guide to Floodlighting.

CIBSE. Lighting Guide 4: Sports Lighting.

BS EN 12193:1999 Light and lighting – Sports lighting.

APPENDIX A

Explanations for Soccer Clubs on Electricity Costs for New Floodlighting

Maximum Lit Area : 118m x 83m

Please see FAI recommended minimum lux levels in Table 1.0. Maintained Average Illuminance after 4,000 hrs. with annual cleaning) is;

Columns	Height Metres	Location	Floodlights	Wattage kW	Eav, (Lux)	Total kW
4	20	Corners	16	2	135	32
6	16	Sidelines	12	2 Kw	157	24

Considerations:

- Higher columns are more expensive to purchase.
- Also because they have to project the light further more wattage is needed (33% more) .
- Hence sideline mounted units cheaper from Whole Life Cost viewpoint.
- The kva rating of 24 kw = $24 / 0.80 = 30$ kva.
- Precinct & Indoor Lights: = 2kva.
- Electric Heater = 3kva.
- 2No. Instantaneous Showers = 18kva.
- Total Load = 53kva

Electricity Tariffs

If the Demand or Maximum Import Capacity (MIC) applied for exceeds 50 kva ESB Networks will specify the Maximum Demand Low Voltage Low Load Factor Tariff. In the case above if the water is heated by gas or by immersion heaters (with the immersion heaters interlocked so that they are not operating at the same time as the floodlighting) then the demand can be held well below the critical 50 kva level. Now it is possible to avail of the General Purposes Tariff.

Tariff Comparison

Tariff	Annual Standing charge	€ MIC Annual Charge	Day Units €
General Purposes	149.65	nil	0.1610
LVLFF*	1,102.30	1,392.84	0.1689

*Low Voltage Low Load Factor

- Comparing the two alternatives it is clear that on every count the LVLFF Tariff is very unfavourable compared to the General Purposes Tariff
- Before a unit of electricity is used there is already a difference in Annual Standing

Charges of $€1,102.30 + €1,392.84 - €149.65 = €2,345.49$

Thereafter there is a difference of $€0.1689 - 0.1610 = 0.0079$ or 0.79c in every unit consumed. Hence if a Club had a load of 50kw running for 3 hrs per night the additional cost = €1.185/ night.

If we take 100 nights use per. annum the additional cost of LVLFF versus General Purposes is of order of **€2,500 per.annum.**

For updated information on tariffs and prices please visit www.esb.ie/business

APPENDIX B

List of FAI Guidance Documents

1. Facility Development;

Guidance notes on managing the development of facilities

2. Natural Turf;

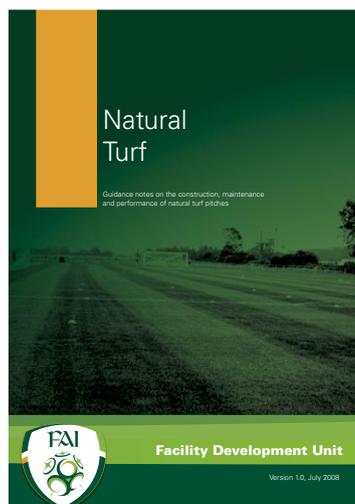
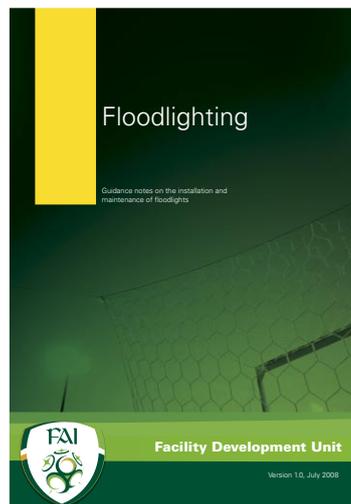
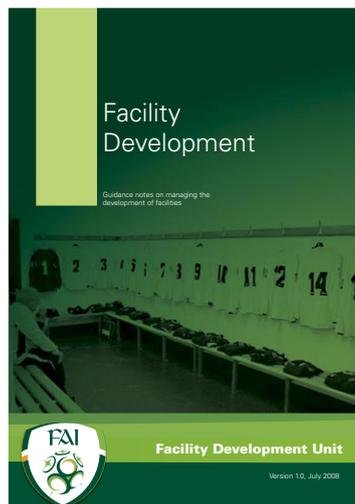
Guidance notes on the construction, maintenance and performance of natural turf pitches

3. Artificial Turf;

Guidance notes on the construction, maintenance and performance of artificial turf pitches

4. Floodlighting;

Guidance notes on the installation and maintenance of floodlights





Notes

The background of the page is a green-tinted image of a soccer goal net. The net is made of a hexagonal mesh and is attached to a dark frame. The perspective is from a low angle, looking up at the net, which creates a sense of depth and texture. The lighting is soft, highlighting the individual hexagons of the mesh.

Acknowledgement

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