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HALLIDAY
LIGHTING

Market Bosworth RFC

Rugby Pitch Floodlighting

Lighting Impact Assessment

In Accordance with ILP

***GN01 'Guidance notes for the reduction of
Obtrusive Light'***

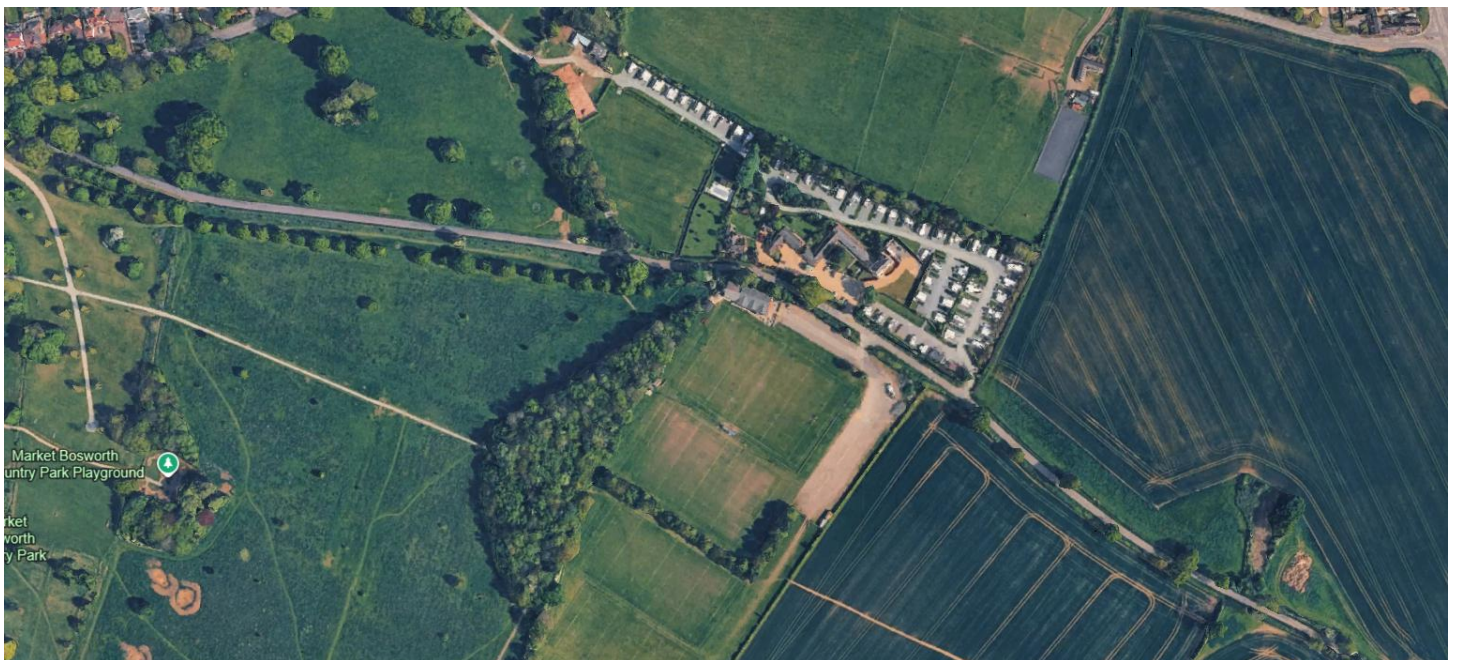
1.0 Introduction

This report has been commissioned by Market Bosworth Rugby Club to examine the effects on the environment of the floodlighting associated with the proposed rugby pitch development at the Cadeby Ln sports field site. The facility will include an grass surface and the installation of 15m lighting masts and floodlights suitable for high quality training and match play.

The aim of the report is to ensure that the proposed floodlight system will comply with current standards for large ball sports such as rugby. The lighting must also comply with nationally recognized obtrusive light limitations to maintain the amenity of nearby residents.

2.0 Site Location

The sports field will be located to the South of Cadeby Lane. The site is bounded by residential properties to the south. The nearest residential properties are on Cadeby Lane which are approximately 35m away from the proposed pitch location to the North.



Aerial View

3.0 Design Standards

The floodlighting proposals have been assessed using the guidance outlined by the following publications: -

BS EN 12193 Light and Lighting - Sports Lighting (2018)

BS EN 12193 sets the minimum lighting levels for sports within Europe, it classifies sports into three standards.

Class III – Training and recreational use

Class II – High quality coaching and low level competition

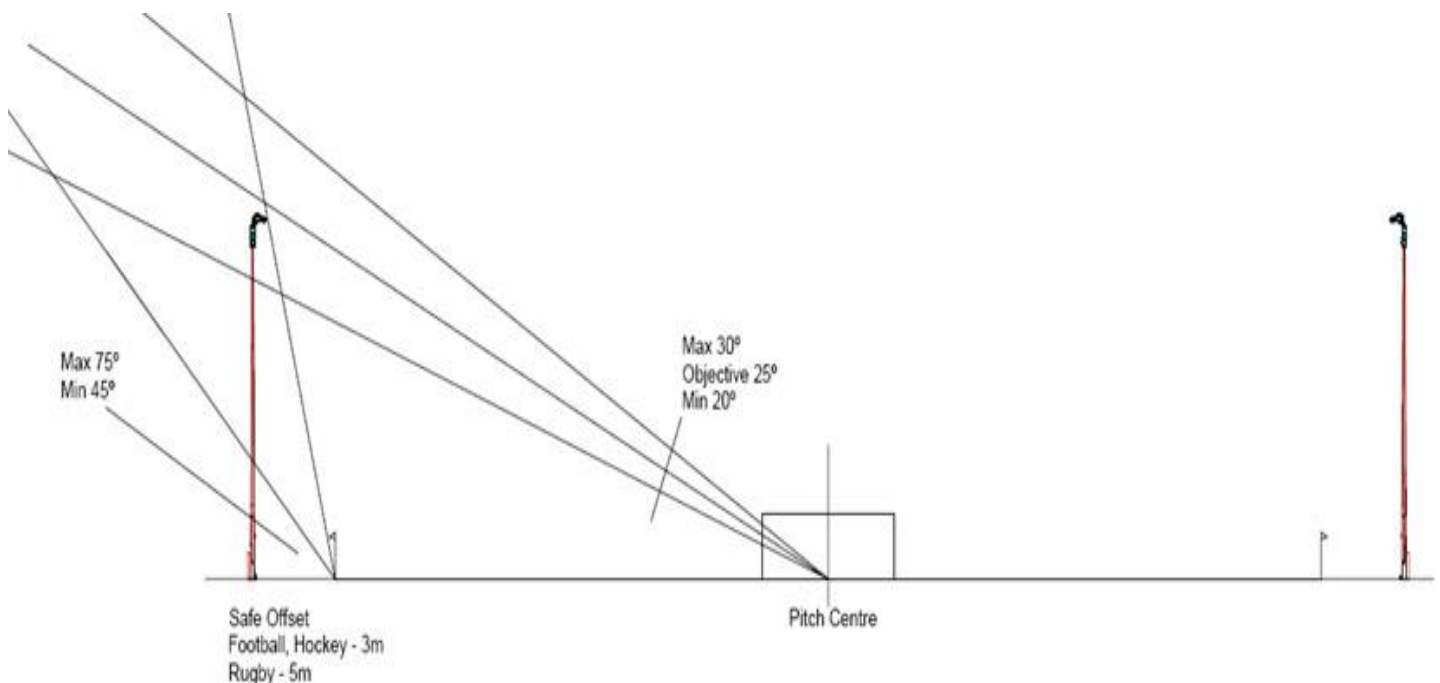
Class I – National standard coaching and high level competition

ILP Guidance notes for the reduction of obtrusive light (2020)

Sets the guidelines for maximum values of light spill and glare dependent on the environmental zone category of the site.

CIBSE Lighting Guide LG4 - Sports Lighting (2006)

Many of the lighting guides available offer little design guidance, however, CIBSE Guide LG4 provides the designer with a wealth of information, including how to use floodlight beams, the control of glare and spill light containment. There is also a method of calculating the optimum mounting height for floodlights using maximum and minimum angles projected from the centre of the pitch or court. This method effectively limits the aiming angle of the floodlight in order to produce the most efficient lighting design with limited overspill or waste light.



Calculation method for floodlight mounting height for CIBSE LG4

4.0 Obtrusive Light Limitations

The Institution of Lighting Professionals has produced a guidance document to be used by lighting professionals, planning authorities and people with an interest in reducing the environmental impact of lighting installations. The *ILP GN01 'Guidance note for the reduction of obtrusive light' 2021* categorises the environment into five zones. The categorisation is according to the amount of urbanisation, the existing background illumination and the degree of protection required to maintain the current environmental zone.

The environmental zone categories are shown in Table 2 and the obtrusive light limitations in Tables 3, 4 and 6.

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Table 4 (CIE 150 table 3): Limits for the luminous intensity of bright luminaires⁴

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
	Post-curfew	0	0	0	0	0	0
	E2						
	Pre-curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
	E3						
	Pre-curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000
	E4						
	Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500

Table 6 (CIE 150 table 5): Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

The guidance notes also recommend the maximum beam elevations for floodlights and the most effective reflector design required to minimise spill light and glare. By following this advice effective light control can be assured.

The site at Market Bosworth Rugby Club is located within a residential area of Market Bosworth. The existing background illuminance is relatively low and consists of low-level street lighting and domestic luminaires. The rugby floodlighting will be used for match play, small area games, and training purposes.

As the current backdrop for residential properties is of a medium illuminance the sports pitch lighting should be designed to comply with an environmental zone E2 in order to protect the amenity of existing residents.

6.0 Proposed Lighting System

The proposed floodlighting system has been designed by Halliday Lighting using the Siteco FL11 LED floodlight system. The floodlights will be mounted on the 15m high raising and lowering masts.

The floodlights proposed are FL11 Maxi Pro PL33T with back cowls and FL11 Maxi PL33T with back cowls sports floodlights which feature flat style optics designed to reduce upward waste light and overspill. See photographs below:-



Siteco FL11

The floodlight uses the latest LED technology and features an external optical system to shield the LED Optics. The internal optical system maintains a flat floodlight profile producing uniform illuminance over the pitch whilst cutting off obtrusive light towards properties and upwards into the sky. The optics also feature Back Light Control which cuts off stray light at extremely acute angles to stop stray light when located in close proximity to residential properties.

The floodlight also features a variable dimming facility to allow the end user to tailor the illuminance levels to suit the standard of play. The system can therefore be used at a lower illuminance level for training when the visual task is less taxing resulting in lower energy costs and reduced visual impact. In addition, a programmable curfew timing system can be incorporated to automatically switch the floodlighting system off after designated hours, preventing unnecessary operation and further reducing energy consumption and potential disturbance to the surrounding environment.

The pitch lighting has been designed to comply with the requirements of the RFU Guidance for Floodlighting which requires an average illuminance level of 200Lux. The system has been designed to

provide lighting conditions suitable for grassroots rugby with the facility to be dimmed for high quality training and coaching.

The proposed mounting height of 15m has been calculated in line with the CIBSE LG4 design method to ensure that the floodlights are mounted at the optimum height. By using this mounting height the floodlight aperture will remain horizontal.

7.0 Light Spill Calculations

The lighting design details are shown on Halliday Lighting drawing HLS12295 REV 1. The drawing shows the proposed mast locations, pitch lighting levels and overspill predictions. The design calculations have been reviewed to carry out a detailed interrogation of the Halliday design proposals. This included assessing spill and source intensity values at residential properties, upward light calculations and disability glare calculations.





The direct upward light output ratio for the lighting system has been calculated as 0%. This confirms that the proposed lighting installation will not have a negative effect on existing night sky.

The proposals fully comply with the recommendations of the *ILP 'Guidance notes for the reduction of obtrusive light'* for an environmental zone E2 and would be suitable for installing in a Rural Landscape with a Low background illuminance.

8.0 Conclusion.

The proposed lighting system for the proposed pitch has been designed to meet the specific lighting requirements for large ball sports such as rugby. The proposed system is suitable for grassroots standards of play as well as high quality coaching and match play, whilst ensuring that nationally recognised environmental standards are adhered to.

The design takes account of site location and the close proximity of existing residential properties. The designer has chosen a luminaire with excellent spill control systems ensuring that it is fully E2 compliant and has been oriented to avoid the disturbance of observers located within nearby properties. Light calculations have been produced taking account of the local terrain but have not included the shading effect of existing mature trees. As a result, the calculations represent the worst-case scenario and spill values will be further reduced in reality.

For and on behalf of Halliday Lighting



Standards and Guidance

The following lighting guides and documents have been used for reference.

ILP Guidance Note No 1 'Guidance notes for the Reduction of Obtrusive Light' 2020

ILP Guidance Note No 8 - Bats and Artificial Lighting Report (2018)

The Society of Light and Lighting(CIBSE), Lighting Guide 4 "Sports Lighting" 2006

FA Guide to floodlighting

BS EN 12193 Light and Lighting - Sports Lighting (2018)

Clean Neighbourhoods and Environment Act 2005

Glossary

Lumen

The standard unit of light (luminous flux) used in describing light emitted by a source or received by a surface.

Illuminance and Maintained Illuminance(lumens/m2 or lux)

Illuminance is the term used to describe the level of light on a surface in lumens/square metre or lux. Maintained illuminance is the term used to describe the average illuminance on a reference surface e.g. desktop, at the time maintenance has to be carried out.

Horizontal Illuminance

The level of light falling on to a horizontal plane(ie The Ground).

Vertical Illuminance

The level of light falling on to a vertical plane(ie The walls of a house).

Light Output Ratio (LOR)

This is the ratio of the total light output of a luminaire, relative to the total light output of the lamp/s under reference conditions. Total LOR can be divided into downward(DLOR) and upward(ULOR) light output ratios if appropriate.

Light Intrusion (Light trespass, Overspill, Light into windows).

The flow of light spilling outside the location boundary. With inadequate control Intrusive light may be sufficiently great as to provide a serious nuisance and disturbance to adjacent areas.

Glare.

Glare may be divided into 2 types known as disability and discomfort glare. In a Sports Lighting context it relates primarily to direct viewing of the floodlights. Only in severe situations would disability glare be experienced. In most instances it is discomfort glare that may result, causing annoyance to the viewer if inadequate screening of floodlights is not provided.

Sky Glow

The general term for the Halo-effect caused by upwardly directed light, forming a glow in the night sky. It can cause diminished contrast of stars against their dark background making astronomical observations difficult and often impossible. The upwardly directed light can be caused by direct waste light from floodlights or indirect redirected light from the sports surface.

ILP

The Institution of Lighting Professionals.

ILP 'Guidance notes for the reduction of obtrusive light

A booklet produced by the ILP providing advice on reducing the impact of exterior lighting installations on the environment. The degree of permissible overspill & ULOR varies depending on the environmental zone as categorized in the guidance notes. Due to the higher ambient lighting levels in built up areas the restrictions are not as stringent in city centres, where as dark landscapes & rural areas require tighter control