New LED Floodlight Installation
Lighting Impact Assessment
In Accordance with ILP
GN01 ‘Guidance notes for the reduction of Obtrusive Light’

HALLIDAY LIGHTING

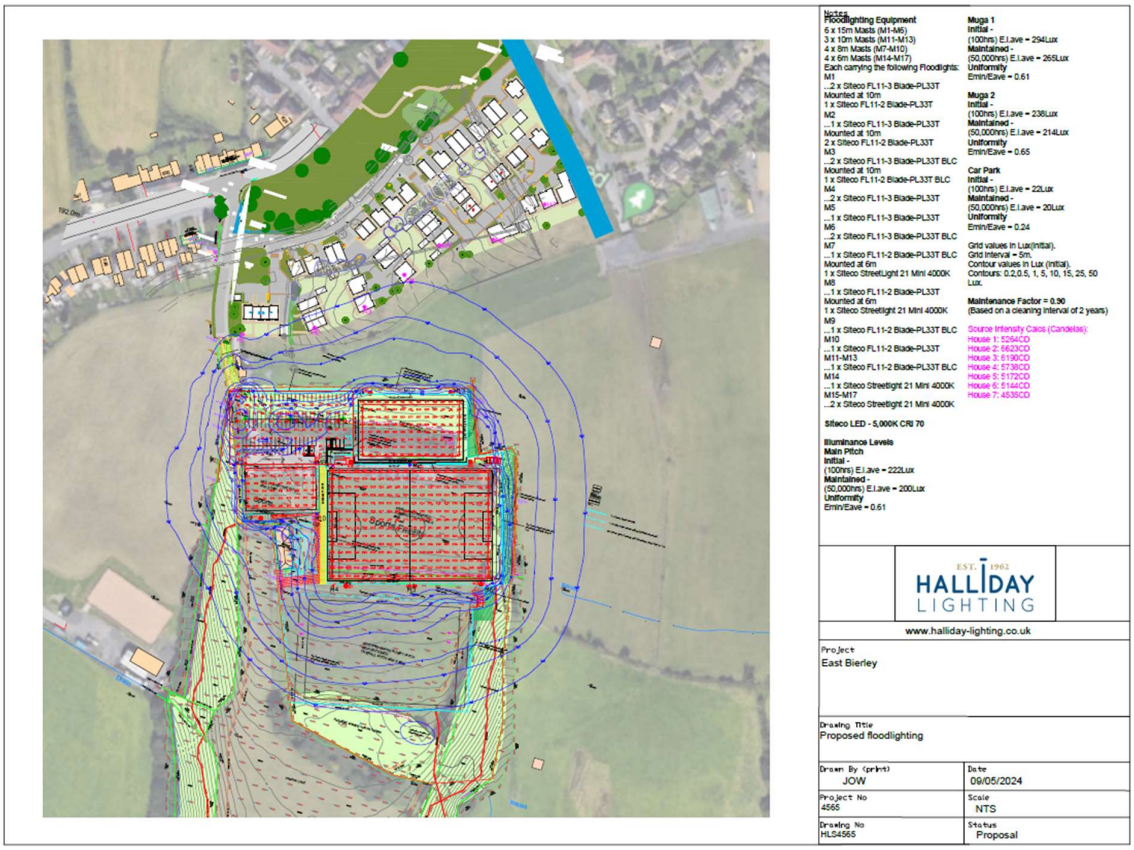
1.0 Introduction

This report has been commissioned by Halliday Lighting to examine the effects on the environment of the proposed floodlighting on the new sports development. The proposals include the installation of new LED luminaires that comply with the FA requirements – 200 lux.

The report has been produced by Halliday Lighting, a specialist Sports Lighting Contractor with over 60 years of experience within the industry. The aim of the report is to ensure that the proposed floodlight system will comply with current standards for football with nationally recognized obtrusive light limitations and complies with the ILP guidance.

2.0 Site Location

The site is located just off Hunsworth Lane, Bradford.



Proposed Layout - Ariel view

3.0 Design Standards

The floodlighting proposals have been assessed using the guidance outlined the following publications:
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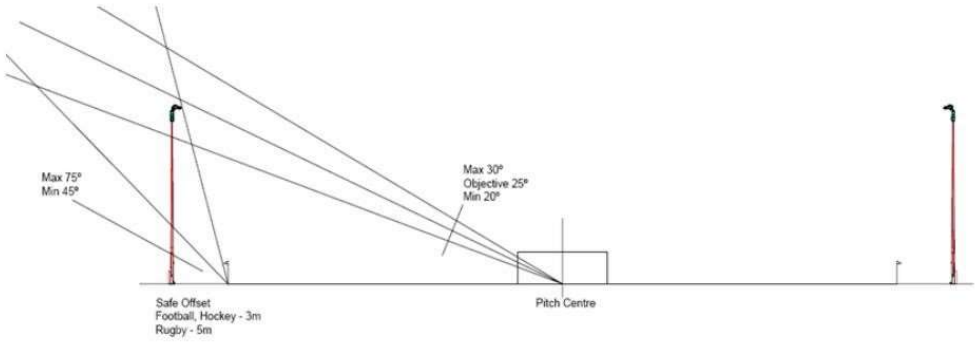
BS EN 12193 Light and Lighting - Sports Lighting (2018)
BS EN 12193 sets the minimum lighting levels for sports within Europe, it classifies sports into three standards.
Class III – Training and recreational use
Class II – High quality coaching and low-level competition
Class I – National standard coaching 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 to produce the most efficient lighting design with limited overspill or waste light.



Calculation method for floodlight mounting height for CIBSE LG4

The following table provides details about the minimum football floodlights requirements for nontelevised outdoor football as set out by the FA:

Governing Body	Category	Eave
THE FA	Step 1 (Conference)	250 lux
	Steps 2-6	180 – 200 lux

In addition to the standards set by the FA, European standard BS EN 12193:2018 also presents recommendations and requirements for sports lighting. For Football, it specifies floodlight values for three categories as below:

Standard	Category	Eave
BS EN 12193:2018	I	500 lux
	II	200 lux
	III	75 lux*

**Note: The FA recommend a minimum of 120 lux for football so clubs should aim to meet that minimum instead of the lower European standard.*

4.0 Obtrusive Light Limitation

The Institute 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 *'Guidance notes for the reduction of obtrusive light 2020'* 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 and 4.

Table 2: Environmental zones			
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

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on properties.						
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

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 Hunsworth Lane is located within a rural area. The existing background illuminance is relatively low.

Table 4 (CIE 150 table 3 (amended)): Limits for the luminous intensity of bright luminaires[4].

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)	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
Aid to gauging A_p		2 to 5cm	5 to 10cm	10 to 20cm	20 to 40cm	40 to 80cm	>80cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding A_p representative area (m^2)		0.0008	0.004	0.016	0.063	0.251	>0.5

Notes:

1. d is the distance between the observer and the glare source in metres;
2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions;
3. A_p is the apparent surface of the light source seen from the observer position
4. For further information refer to Annex C of CIE 150
5. Upper limits for each zone shall be taken as those with column $A_p>0.5$

The site at Hunsworth Lane is located within a rural area. The impact on the residents and surrounding area is a key design criteria for the new proposed installation. Due to the sites location and residential properties the lighting should be designed to comply with an environmental zone E2 in order to maintain the relatively controlled backlight and protect the amenity and existing residents. During our design process we have ensured our proposals meet the requirements outlined for an environmental zone E2.

5.0 Proposed Lighting System

The proposed floodlighting system has been designed by Halliday Lighting using a SITECO FL11 LED floodlight system. The floodlights will be mounted on 15m masts to illuminate the rugby pitch.

The floodlights proposed are SITECO FL11 sports floodlights which feature flat style optics designed to reduce upward waste light and overspill. See photograph below:

Siteco FL11 2 Brick

Siteco FL11 3 Brick

The floodlight uses the latest LED technology and features an internal louvre system to shield the LED Optics. The internal louvre system maintains a flat optical system providing uniform illuminance over the pitch whilst cutting off obtrusive light towards properties and upwards into the sky.

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.

The pitch lighting has been designed to comply with the requirements of the European standard BS EN 12193:2018 Class II which requires an average illuminance of 200 lux.

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. As a result system ULOR is less than 1% and fully Dark Skies Compliant.

The proposed lighting system will provide the end user with a flexible system which will illuminate the Football pitch and MUGA. LED lighting can also allow the facility to be dimmed to lower illuminance levels for training and lower level coaching, should the end user require this feature. This flexible approach will reduce running costs and the impact on the surrounding area.

Times of use of external lighting

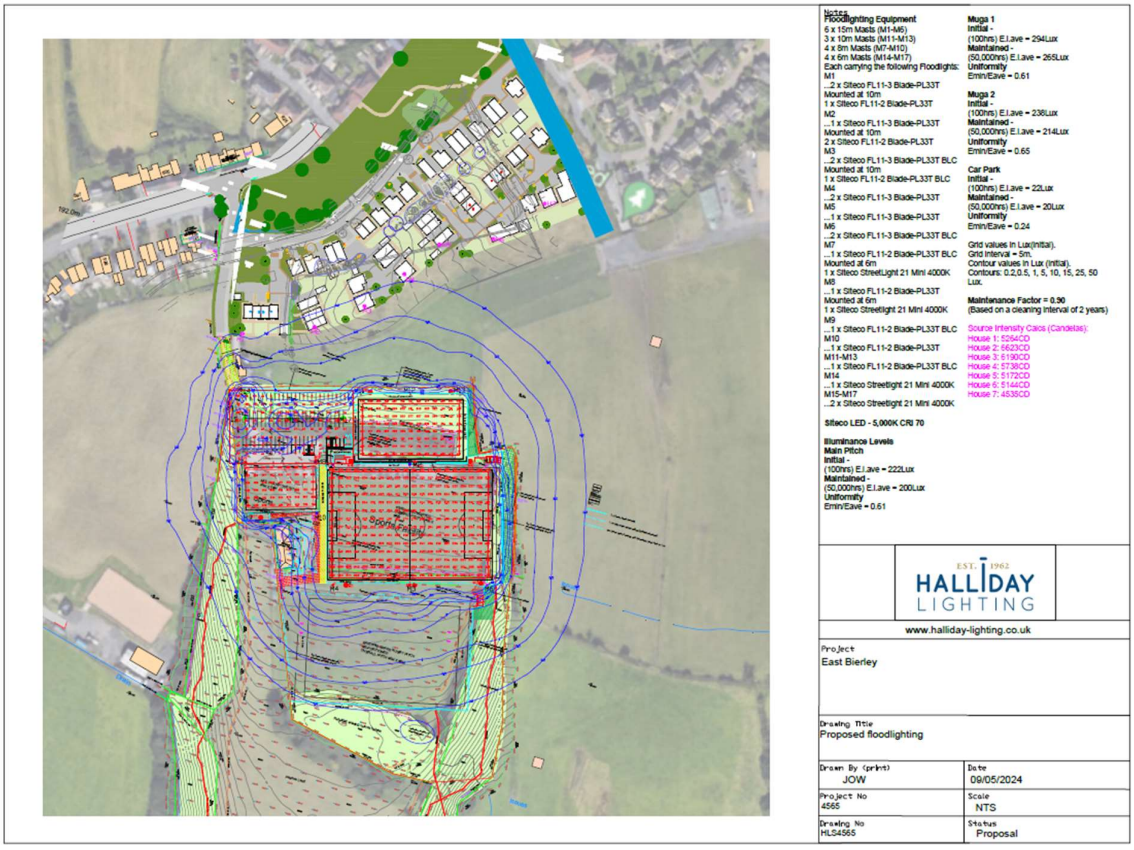
09:00 to 21:00 Monday to Friday; and
09:00 to 16:00 Saturday, Sundays and Bank Holidays
Pitch floodlighting shall only be operated when the pitches hereby approved are in use and shall be turned off no later than 15 minutes after the use of the pitch has ended."

Lighting controls:

Pitch side & pavilion switching locations
Dali dimming system
Timeclock
KWHR / Hours run meter
Manual Override

6.0 Light Spill Calculations

The lighting design details are shown on Halliday Lighting drawings HLS4565. The drawings show the proposed mast locations, pitch lighting levels and overspill predictions.



Proposed lighting for the Football pitch and MUGA.

Light containment is excellent with spill light being cut off sharply as it reaches the site boundary. 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 well inhabited rural and urban location with medium background illuminance. The design has also taken into consideration any future housing development.

7.0 Ecology

By installing the lighting system proposed the development will adopt the recommendations detailed in ILP GN08 'Bats and Artificial Lighting' 2018. This encourages designers to limit upward spill light from installations and to aim floodlights away from bat roosts and foraging routes as well as using light sources with low UV(Ultra Violet) content to reduce the attraction of insects.

The proposed lighting system incorporates the following features which are aimed at protecting the existing habitat of bats and other wildlife:-

- The floodlights are not aimed towards any bat roost or foraging route.
- The floodlights have little elevation with the front glass oriented horizontally.
- The light source used is LED which is white in colour appearance and would produce as near to zero UV as is possible. This will reduce the likelihood of bats being diverted from their natural foraging routes.
- The column height has been calculated to minimise height whilst using the minimum number of lighting units.
- The proposed floodlighting will have reduced use during the spring, summer and early autumn when bat activity is highest as there is sufficient natural light for sport to be played into the evening without the use of artificial light. During winter/early spring and late autumn/winter when the floodlight use will be most frequent there will be little or no bat activity due to there being few or no insects for bats to forage on.

8.0 Conclusion

The proposed lighting system for the East Bierley Sports Association has been designed to meet the specific lighting requirements for football and is suitable for high quality coaching and match play, whist ensuring that nationally recognised environmental standards are adhered to.

The design takes into account the site of location. The designer has chosen a luminaire with excellent spill control systems ensuring that it is fully Dark Skies compliant and has been oriented to avoid the

disturbance of bats and other wildlife. 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.

This document coupled with the lighting design proposals provided by Halliday Lighting Limited can therefore be used as the benchmark lighting strategy for the proposed sports pitch at the East Bierley.