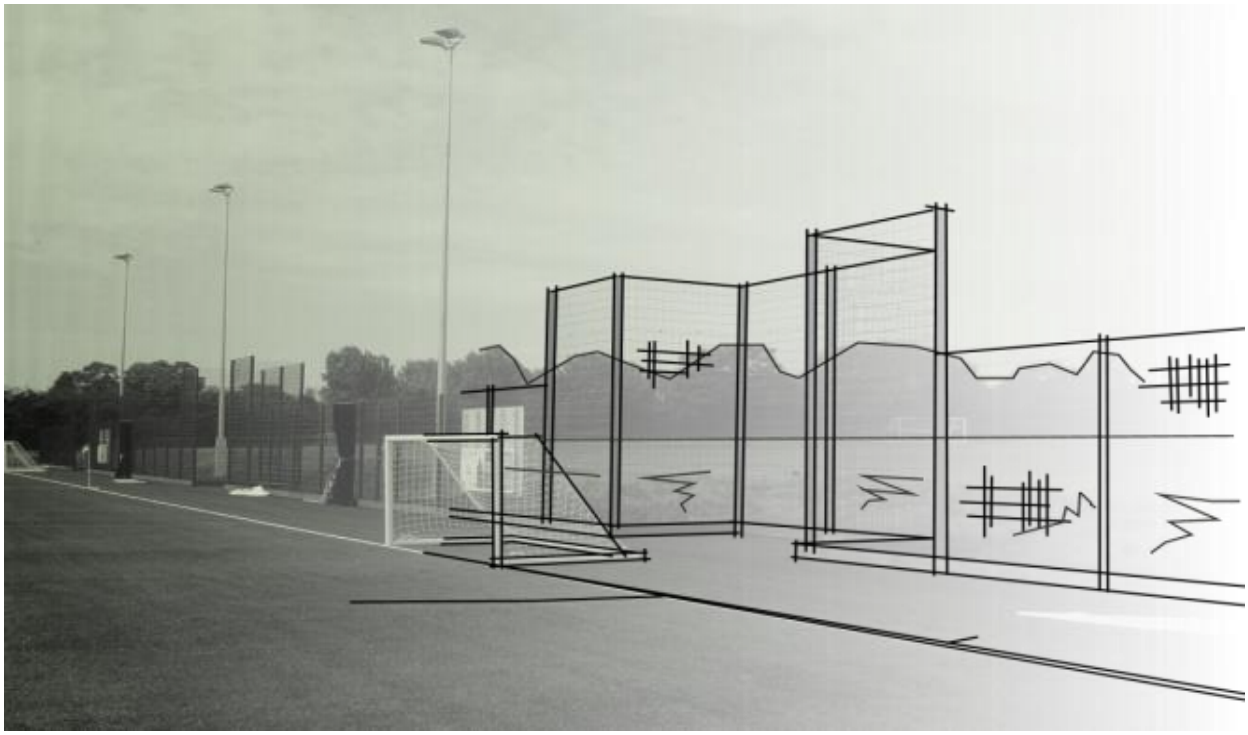
Queen Elizabeth High School

Refurbishment of existing sports courts to become a 3G synthetic turf training facility including replacement perimeter fence and new directional LED sports lighting system

Appendix F - Sports Lighting Statement



Site	Queen Elizabeth High School Ashfields Bromyard Herefordshire HR7 4QS		
Project	Refurbishment of existing sports courts to become a 3G synthetic turf training facility including replacement perimeter fence and new directional LED sports lighting system		
SSL project code	SSL2805		
Document title	Sports Lighting Impact Statement		
Document control	**Revision**	**By**	**Date**
	1st issue	ME	5th July 2022

Surfacing Standards Limited,
Office 2 Empingham House, Uppingham Gate, Ayston Road, Uppingham, Rutland, LE15 9NY

T. 01536 400012
E. info@surfacingstandards.co.uk

www.surfacingstandards.co.uk

Associated Documents

Drawings SSL2805 05- Proposed Floodlighting
Appendices Appendix A - Floodlight Performance Report Appendix B - LED Data Sheet Appendix C - ILP Guidance Notes

Surfacing Standards Limited,
Office 2 Empingham House, Uppingham Gate, Ayston Road, Uppingham, Rutland, LE15 9NY

T. 01536 400012
E. info@surfacingstandards.co.uk

www.surfacingstandards.co.uk

1 Sports Lighting Proposal

The proposed Artificial Grass Pitch (AGP) requires a sports lighting system to satisfy the necessary and planned community usage. The lighting system is vital to ensure the local community are able to make use of the facility during the evening and during the darker winter months, so that training sessions and matches can be safely accommodated.

The proposed sports lighting system will be operated during evenings of permitted use, after dusk and up to the approved curfew hour.

The following hours are proposed for usage of the new AGP:

Monday to Friday: 08:00 to 21:00 hrs*
Saturday & Sunday: 09:00 to 17:00 hrs*

*Amenity lighting would be provided to ensure safe egress from the AGP for a 15 minute period following switch-off time.

The sports lighting hours of usage would be required during these times, but only at the times of the year when daylight is fading or it has gone dark.

The permitted hours of use will be determined through the planning application process and the applicant wishes to accommodate hours of use in order to maximise developmental outcomes; both during the day and during evenings and at weekends via pre-arranged and structured community access.

The sports lighting proposal includes the following details:

Requirement	Detail provided
The precise location of the pitch, which should take account of the light spill given its proximity to, for example, any highway and any nearby residential properties.	Please refer to drawing SSL2805 05 - Proposed Floodlighting and Appendix A - Floodlighting Performance Report. Light spillage to the surrounding areas does not impact on any local residential properties or highways due to the separation distances from the closest public highway and the closest residential properties. Key Point of Note – Any light spill is reduced to less than 1 LUX by the time light reaches the edge of the playing field boundary at the west end of the AGP (this is the closest point to the boundary of the site). To put this into context, twilight is typically around 1 LUX and a clear full moon can provide up to 1 LUX luminance. Refer to Appendix A - Floodlighting Performance Report.
The types of sport to be played on the pitch and the standard of play - both of which will have an influence on the amount of illumination required.	The standard of football activities includes FA affiliated junior / youth football (highest level of competition).
Details of columns – number, height and finish.	The proposed floodlight system comprises 4no. 10m high steel masts, hinged, finished galvanised (Z275) self-coloured.
Details of luminaires – number, types, dimensions, finish and output of lamps fitted, to include manufacturer's technical information.	Philips Optivision LED GEN 3.5. The luminaires, manfuactured by Philips Lighting, have been selected as they provide a complete lighting system even for the most complex of areas. They are a high efficiency luminaire with low energy consumption and meet the highest performance standards providing outstanding uniformity. They enable highly precise light distribution with minimum spill light, which is even important given this site location. They are also dimmable which provides reduced level lighting options when the pitch is only be used for training purposes. The design of the luminaire allows for a slimine fitting, much less obtrusive than other fittings. Refer to 'Appendix B – LED Data Sheet' for technical information and images
Details of any cowls/hoods/shades/baffles that maybe needed to control light spill and glare – number, dimensions and finish.	The specific type of luminaire proposed includes internal louvres to provide increased control of light spillage. The luminaire also has a zero upward light ratio. The spill limiting technology provided will ensure that the controlled spillage levels indicated on the lighting scheme design are achieved. The lighting system design will comply with recommendations published within ILP Guidance Notes for the Reduction of Obtrusive Light 2021 (Appendix C). On completion of the installation, the system will be tested and commissioned to ensure the LUX levels submitted as part of this application are achieved and not

	exceeded, both to the pitch playing area but also importantly to the surrounding areas.
Plan showing pitch with the location/position of lighting columns and luminaires.	Refer to drawing SSL2805 05 – Proposed Floodlighting and Appendix A - Floodlighting Performance Report, showing results of horizontal and vertical illuminance over the performance areas and spillage exceeding the facility perimeters.
Details of lighting set up – horizontal (rotation) and vertical (tilt) alignment of the luminaires	Refer to Appendix A - Floodlighting Performance Report
Details of lighting output, including levels of surface luminance on the pitch and overspill, i.e. off the pitch (manufacturers/supplier's calculations and diagrams should be provided separately and also to be overlaid on an OS base so that the impact on the surrounding area can be assessed).	Refer to drawing SSL2805 05 – Proposed Floodlighting and Appendix A - Floodlighting Performance Report

In designing a suitable lighting solution for the proposed development, several key specification issues had to be considered. These included the illuminance (Lux) level required, the environmental zone category for the site, the minimum mast height, the number and type of floodlights.

The task of designing the optimum external lighting design was undertaken using specialist design software (CalcuLuX Area 7.9.0.0) provided by Philips Lighting.

The details of how site issues were resolved are as follows:

2 Design Principal

A new lighting system should provide the following lighting standards, in accordance The Football Association (FA) (FIFA Class II) lighting requirements for varying types of play, which is as follows:

Use	Maintained average illuminance	Uniformity (Min / Ave)
Competition	>200Lux	>0.6
Training	>120Lux	No requirement

(Lux level is the intensity of light as measured on a given surface taking into account the area over which the luminous flux is spread. For example, 1000 lumens which is the output of a given light source concentrated into an area of one square metre, would illuminate that square metre to 1000 Lux. If spread over an area of ten square metres, the same 1000 lumens light source would produce a dimmer illuminance of only 100Lux.)

In addition, the lighting system design seeks to comply with complimentary recommendations published within BS EN 12193:2007 Light and lighting. Sports lighting.

BS EN 12193:2007 is the European standard that deals with sports lighting to ensure good visual conditions for players, athletes, referees, spectators and CTV transmission. Its objective is to provide recommendations and specify requirements for good quality sports lighting by:

- Optimising the perception of visual information used during sports events
- Maintaining the level of visual performance
- Providing acceptable visual comfort
- Restricting obtrusive light

BS EN 12193:2007 specifies lighting for indoor and outdoor sports events most practiced in Europe. It provides lighting values for the design and control of sports lighting installations in terms of illuminances, uniformity, glare restriction and colour properties of the light sources.

All the above requirements are meant to be as minimum requirements. It also gives methods by which these values are measured. For the limitation of glare, it also points out restrictions on the location of the luminaires for specific sporting activities.

3 Environmental Status

The environmental category was established by referring to The Institution of Lighting Professionals (ILP): Guidance Notes for The Reduction of Obtrusive Light 2021 (as included in Appendix C). This document categorises the environment into five zones ranging from E0 (Protected) to E4 (Urban).

The proposed site/surroundings would fall into Zone E3, which is deemed as 'Suburban' surroundings.

The ILP design guidance for environmental zone E3 is as follows:

Obtrusive Light Limitations for Exterior Lighting Installations – Maximum value of vertical illuminance on properties				
Upward Light Ratio/ Sky Glow [Max %]	Maximum value of vertical illuminance on properties		Luminaire Intensity I [candelas]	
	Pre curfew	Post curfew	Pre curfew	Post curfew
5%	10 LUX	<2 LUX	10,000	1,000

4 Floodlight Design

In order to meet the requirements of The Institution of Lighting Professionals: Guidance Notes for The Reduction of Obtrusive Light 2021, the lighting system selected for this project uses a flat glass technology.

The solution has been designed to provide lighting specifically for the external sports facility, which may be controlled accordingly to endeavour to reduce energy consumption and also potential impact on the surrounding environment.

The Optivision LED gen3.5 luminaire, manufactured by Philips Lighting, has been selected to provide a complete lighting system even for the most complex of areas. This is a high efficiency luminaire with low energy consumption and meet the highest performance standards providing outstanding uniformity. The luminaire enables highly precise light distribution with minimum spill light, and important consideration for this site. They are also dimmable which provides reduced level lighting options when the pitch is only be used for training purposes. The design of the luminaire allows for a slimine fitting, much less obtrusive than other fittings.

Please refer to 'Appendix B – LED Data Sheet' for further details.

5 Mast Design & Height

The mast height was calculated using CalcuLuX Area to light the pitch to conform to the FA requirement of football lighting.

The optimum mast height was calculated to be between 8m and 12m.

This masts height will result in very low vertical overspill and good uniformity on the playing surface to ensure that the artificial lighting:

- Is directed fully downwards towards the playing pitch surface;
- Avoids sky glow;
- Achieves full cut-off as recommended by The British Astronomical Association's Campaign for Dark Skies.

By contrast, lower column heights would result in a higher aiming angle for every luminaire, resulting in increased overspill and glare and higher columns would require more intensive lighting needed to provide adequate results at ground level and

On this basis, 10m high mounting heights provide the most efficient solution and the proposed masts will offer a slim-line profile, which will minimise daytime impact.

6 Lighting Performance

The lighting proposal is detailed within 'Appendix A - Floodlighting Performance Report', which shows the mast locations, floodlight orientations, luminance levels on the pitch and projected overspill values.

The design for the Artificial Grass Pitch (AGP) achieves values which meets the requirements of BS EN 12193 as follows:

Period	Property	Result
Artificial Grass Pitch (maintained usage incorporating 0.95 maintenance factor)	Average illuminance Uniformity	>200 Lux >0.60 Min / Ave

All design calculations have been undertaken using an open, unobstructed site.

The maintained luminance values for the floodlights are calculated using a maintenance factor of 0.90 to account for environmental conditions and depreciation of light output between cyclical maintenance, including bulk lamp change.

7 Obtrusive Light Calculation

Refer to 'Appendix A - Floodlighting Performance Report', in order to establish obtrusive light calculations.

The tilt of the lights (i.e. the luminaire aiming angles) are at 68 degrees. This complies to ILP guidance (see Figure 3 below) which states that tilt should be less than 70 degrees, removing unwanted upward light spillage.

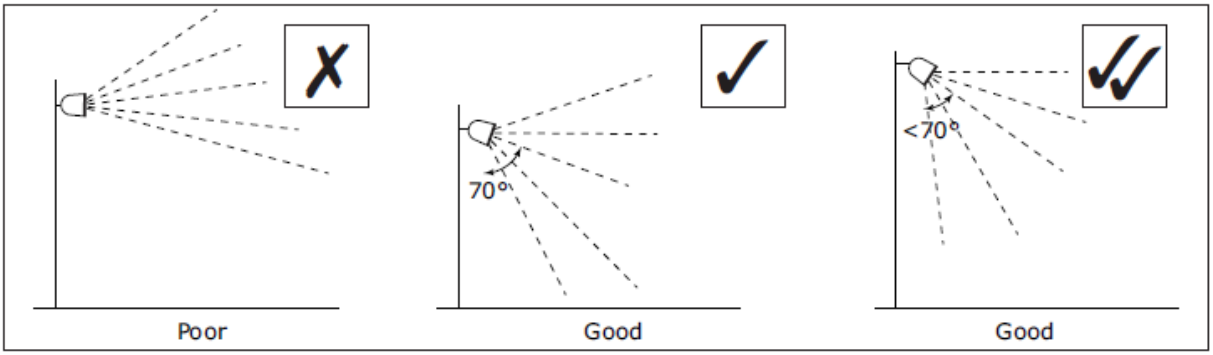


Figure 3 Luminaire aiming angles

All floodlights will be extinguished at the permitted curfew time and therefore, light intrusion will be 0 Lux which is comfortably below the post-curfew 2 Lux threshold for a development within environmental zone E3.

All floodlights will be extinguished at the permitted curfew time and therefore, luminaire intensity will be 0 candela which is comfortably below post-curfew 1000 candela threshold for the environmental zone E3.

8 Planning Policy Context

Central Government guidance on lighting and planning is contained in the National Planning Policy Framework (NPPF) (2021).

The NPPF defines Sustainable Development, which is the core principle of planning, setting out that there are three dimensions to sustainable development: economic, social and environmental.

Part of the environmental dimension of sustainable development is clearly stated to include contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to minimise pollution.

Paragraph 185 of the NPPF 2021 sets out that:
Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:
a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life65;
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;
and
c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Obtrusive light was made a Statutory Nuisance under the Clean Neighbourhoods and Environment Act 2005. The Council can take action against sources of intrusive light where these are shown to be causing a nuisance, for example a domestic floodlight shining into window in a neighbouring dwelling. In addition, conditions imposed on any planning consent for lighting must ensure that adequate control can be enforced. It is acknowledged that many lighting installations which may cause obtrusive light do not require planning permission or do not fall under the Act as a statutory nuisance.

9 Impact on Development

The sports lighting proposals are detailed proposal drawings and appendices, showing mast locations, light orientations, illuminance levels on the pitch and projected overspill values.

The Artificial Grass Pitch (AGP) design achieves a maintained average illuminance value of >200 Lux with >0.60 min/ave uniformity. This is in accordance with the minimum standards required by The Football Association (FA) (FIFA Class II) for varying types of play.

10 Monitoring Programme

On completion of the lighting installation, the system will be tested and commissioned to ensure the agreed design levels are achieved and not exceeded. During the operational life cycle of the system, periodic lighting checks and assessments will be undertaken to ensure the installation continues to satisfy the requirements set out in the lighting design.

These assessments include:

- Lighting Levels to each individual area
- Overspill levels

11 Lighting Assessment Conclusion

1. The proposed sports lighting system is specifically designed to fulfil sports lighting requirements and is particularly suited to applications where low light pollution is essential.

2. Performance of the proposed artificial lighting (floodlighting) systems satisfies the intended sporting applications and standards of play.

3. A 10m high mounting height to the Artificial Grass Pitch (AGP) provides the most efficient solution and the proposed masts will offer a slim-line profile, which will minimise daytime impact.

4. The proposed Philips OptiVision LED gen3.5 is an asymmetric down lighting luminaire will provide the optimum sports lighting solution, ensuring that light reaches the sports surface and not into the sky or polluting the environment.

5. Performance of the proposed artificial lighting (floodlighting) system complies with an Environmental Zone E3 (ILP) which is a suburban location.

6. Light intrusion to the closest tree canopies does not create an unacceptable impact by way of artificial lighting.

7. Luminaire intensity created whilst floodlights are operated is below the threshold for the environmental zone E3 location and as such; does not create an unacceptable impact by way of artificial lighting.

8. All luminaires have a zero upward light ration to limit overspill and the proposed vertical alignment of luminaires is 2° maximum above the horizontal plane

9. Upward waste light will also be minimized, achieving full cut-off with 0% projected into the atmosphere. This satisfies the recommendations by The British Astronomical Association's Campaign for Dark Skies, an organisation who lobby for low light pollution lighting systems.

10. Use of the lighting system within permitted times will be controlled by a photocell detector and timer switch.

11. Control switches and time clocks shall be installed to the lights to ensure they cannot remain on any later than the permitted curfew hour and therefore mitigate impact to the surrounding environment.

12. Time clocks will be set to operate within a pre-programmed time including a seasonal changeover facility for BST and GMT.

The lighting scheme has been designed to minimise the impacts on surrounding areas outside of the Artificial Grass Pitch (AGP) and given the proposed location of the AGP within the site footprint, we do not consider that the proposed lighting would result an unacceptable impact by way of artificial lighting on the surrounding landscape.

End of document

Published by	Michael Eastman, Consultant
Signature	M.Eastman
Issued	26th July 2022

Surfacing Standards Limited,
Office 2 Empingham House, Uppingham Gate, Ayston Road, Uppingham, Rutland, LE15 9NY

T. 01536 400012
E. info@surfacingstandards.co.uk

www.surfacingstandards.co.uk

International Organization for Standardization (ISO) Quality Management System (QMS) ISO 9001:2015.
Member of Sports and Play Construction Association Professional Services Group
Registered in England and Wales under registration number 05154061
VAT number GB 687834179