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Steyping Grammar School

External Lighting Strategy Report

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1 Introduction

This report describes the proposed lighting design for the external areas of Steyping Grammar School. This includes the lighting levels and uniformity as well as technical details for the proposed luminaires used in the modelling of the site.

This report should be read in conjunction with

- External Lighting Lux Levels drawings - Showing quantity of luminaires and lux levels
- Luminaire Schedule – which show the type of proposed luminaires

The drawings and this report demonstrate that the proposed lighting design will provide safety and security lighting for the external areas of the school to allow the site to be used effectively and safely, whilst limiting excessive light pollution and obtrusive light.

The proposed design complies with *ILP Guidance Note 01/21 The Reduction of Obtrusive Light*.

2 Design Parameters

2.1 Light pollution

The installation is designed to comply with the *ILP Guidance Note 01/21 The Reduction of Obtrusive Light (GN01/21)*.

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

Figure 1 - ILP Guidance Note 01/21, Table 2

Using GN01/21 Table 2, the site is assessed to be in environmental zone E3 (Suburban) meaning, the maximum allowable Upward Light Output Ratio (ULOR) should be below 5%.

Therefore, all luminaires specified for use at the site have an ULOR of <5% and meet the criteria in table 2 and subsequently reduce the sky glow of the site.

In addition, the design has been assessed against the ILP GN01/21 limits for obtrusive light, specifically the maximum permissible vertical illuminance at nearby residential properties.

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

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

Figure 2 - ILP Guidance Note 01/21, Table 3

For Environmental Zone E3, GN01/21 outlines the maximum permitted vertical illuminance as 10 lux pre-curfew and 2 lux post-curfew.

A full obtrusive light assessment has been undertaken for the proposed all weather pitch and MUGA floodlighting. The calculated vertical illuminance remains within the limits set out in GN01/21 (E3) as shown in section 4. This ensures that light spill to neighbouring properties is appropriately controlled.

2.2 British Standards Criteria

The British Standards set out guidance for minimum maintained average illuminances ($\bar{E}_m$) of areas with external lighting, with criteria summarised in *BS EN 12464-2-2014 Light and lighting - Lighting of work places Part 2: Outdoor work places*.

The main design parameters set out by the standard are in table 5.1 below:

5.4 Lighting requirements for areas, tasks and activities

Table 5.1 — General requirements for areas and for cleaning at outdoor work places

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	U_o —	R_{GL} —	R_a —	Specific requirements
5.1.1	Walkways exclusively for pedestrians	5	0,25	50	20	
5.1.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0,40	50	20	
5.1.3	Regular vehicle traffic (max. 40 km/h)	20	0,40	45	20	At shipyards and in docks, R_{GL} may be 50
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0,40	50	20	
5.1.5	Cleaning and servicing	50	0,25	50	20	All relevant surfaces

Figure 3 - BS EN 12464 Table 5.1

The parameters for parking areas are set out in table 5.9 below:

Table 5.9 — Parking areas

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx	U_o —	R_{GL} —	R_a —	Specific requirements
5.9.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0,25	55	20	
5.9.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0,25	50	20	
5.9.3	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	0,25	50	20	

Figure 4 - BS EN 12464 Table 5.9

3 Proposed Design

As set out in the *BS EN 12464-2-2014 Light and lighting - Lighting of work places Part 2: Outdoor work places*, the following strategy for each area is proposed:

3.1 Walkways and pedestrian areas

As outlined in BS EN 12464 table 5.1, the pedestrian walkways are designed to achieve an average horizontal illuminance of 5 lux with a minimum uniformity of 0.25.

The luminaires selected generally consist of LED wall-mounted luminaires at a height of 3m on the buildings. Pedestrian walkways between buildings are illuminated using 3m column mounted LED luminaires, providing uniform lighting for safe circulation.

All the proposed luminaires have minimum upward light component.

3.2 Car park lighting

As set out in BS EN 12464 table 5.9, vehicle areas require a higher level of illumination for safety with:

- Table 5.9 light traffic, e.g. parking areas; cycle parks achieving a minimum of 5 lux (with a uniformity of 0.25)

This applies to all parking at Steyning Grammar School, and the luminaires are mounted at 6m.

To conclude, all proposed luminaires have <5% upward light component and meet the criteria from GN01/21, Table 2.

3.3 Canopy Mounted Luminaires

The luminaires selected consist of surface mounted circular downlights on the underside of the canopies, minimising upwards light spill.

The canopies are illuminated to achieve an average of 5 lux at 0.25 uniformity.

3.4 All Weather Pitch

The all-weather pitch is illuminated using column-mounted LED floodlights. The luminaires have been modelled to minimise light spill to neighbouring residential properties and to ensure compliance with ILP (GN01/21) limits for Environmental Zone E3.

The lighting design has been developed in accordance with Sport England, the International Hockey Federation (FIH) and England Hockey guidance for outdoor artificial sport lighting. For club-level hockey, the recommended performance criteria are summarised below, based on guidance presented by Sports England (Figure 5) and the FIH (Figure 6, Class II):

- 350 lux average maintained illuminance
- Minimum uniformity of 0.7

Artificial Sports Lighting

Design Guidance Note

Sport	Class	Horizontal illuminance		Vertical illuminance		Ra	Reference / Sport England updates
		Eave (lux)	Emin/Eave	Eave (lux)	Emin/Eave		
Handball							
	I	500	0.7			60	Table A.21 BS EN 12193:2007
	II	200	0.6			60	
	III	75	0.5			20	
Hockey							
							Table A.22 BS EN 12193:2007
							England Hockey recommends a minimum of 350 lux for competition and the following levels for particular pitches
							Class 1 = 750 lux
							Class 2 = 500 lux
							Class 3 = 300 lux
							See 'Guide to the Artificial Lighting of Hockey Pitches' download at: www.englishockey.co.uk
	I	500	0.7			60	
	II	200	0.7			60	
	III	200	0.7			20	
Horse racing							
							Table A.24 BS EN 12193:2007
Ice Hockey							
							Table A.19 BS EN 12193:2007
	I	750	0.7				
	II	500	0.7				
	III	200	0.5				

Figure 5 - Sports England Guidance Note

Class of play ¹	Eh maintain lux	Horizontal uniformity ratio		UG	GR-Max	CRI (Ra)	Colour temp. (Tk)*
		U1	U2				
Class I	≥ 500	≥ 0.50	≥ 0.70	0.65	<50	>65	>4000
Class II	≥ 350	≥ 0.50	≥ 0.70	0.65	<50	>65	>4000
Development & community level training	≥ 200	≥ 0.40	≥ 0.60	0.60	<50	>65	>4000
Eh maintain	Minimum horizontal maintained illumination, measured in lux						
U1	Minimum/Maximum illuminance						
U2	Minimum/Average illuminance						
UG	Uniformity Gradient – the rate of change of illuminance between adjacent (grid) values						
GR-Max	Glare rating						
CRI	Colour Rendering Index						
Colour temperature	A way to describe the light appearance provided by a lighting. * The same colour temperature lamps should be used for a venue						

Figure 6 - FIH Recommendation for Outdoor Hockey

3.5 Multi-Use Games Area (MUGA)

The southern MUGA is illuminated using column-mounted LED floodlights. These luminaires have also been modelled to minimise obtrusive light and ensure compliance with ILP GN01/21 limits for Environmental Zone E3.

The lighting design follows Sport England guidance for club and community level tennis (see Table below), with the following recommended performance criteria:

- 400lux average horizontal illuminance, 0.6 uniformity (Total Play Area)
- 500lux average horizontal illuminance, 0.7 uniformity (Principle Play Area)

Club and Community lighting for tennis, netball, 5-a-side, basketball, rush hockey					
Club			Community		
		Horizontal Illuminance (Lux)	Uniformity (Emin / Eave)	Horizontal Illuminance (Lux)	Uniformity (Emin / Eave)
Netball		400	0.7	400	0.7
Tennis (recommended)	PPA	500	0.7	500	0.7
	TPA	400	0.6	400	0.6
5-a-side football		120	0.6	120	0.6
Basketball		200	0.6	75	0.5
Rush hockey		350	0.7	200	0.7

Figure 7 - Sports England Guidance Note for Tennis

The completed lighting model in section 4 demonstrates that the proposed floodlights achieve these requirements while maintaining compliance with ILP *GN01/21* vertical illuminance limits at the nearest residential properties.

4 Light Scenes

The pre-curfew period extends from 7:00am to 10:00pm. During pre-curfew hours, all external lighting required for use of the site remains operational. This includes the floodlighting to the all-weather pitch and the southern MUGA to support ongoing sports activities.

After 10:00pm (post curfew), the lighting strategy reduces to essential lighting on site. Floodlights serving the all-weather pitch and the southern MUGA are switched off, ensuring full compliance with ILP *GN01/21* requirements.

4.1 Lux levels – General lighting (Pre Curfew)

The calculated lux levels for the pre curfew period are below.

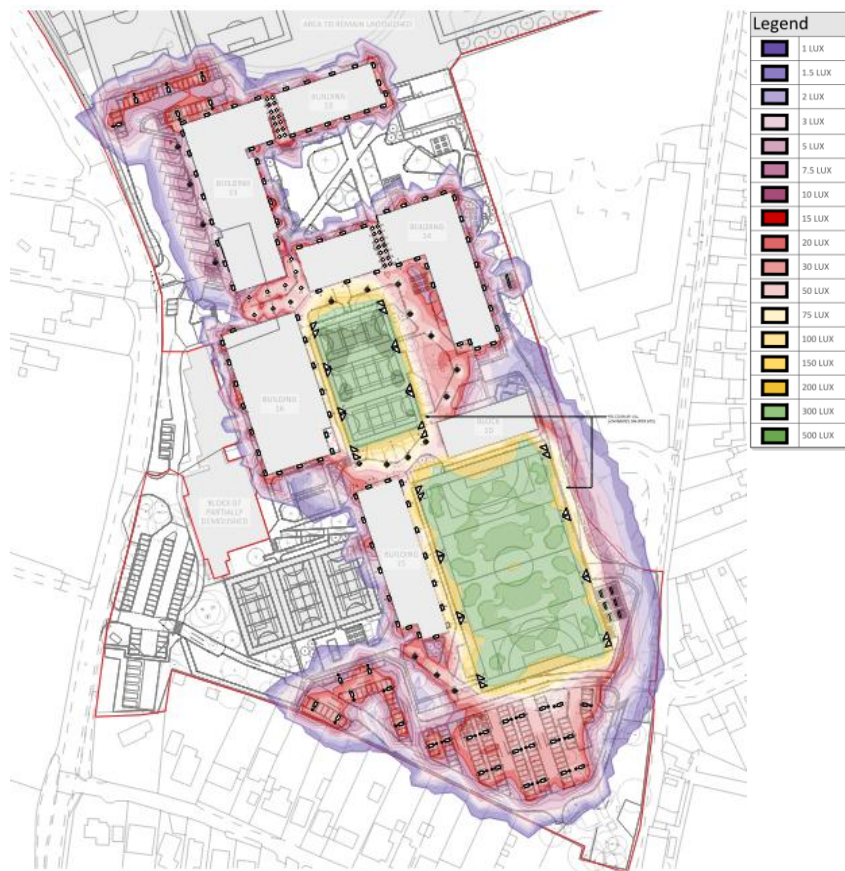


Figure 8 - Lux levels and light spill during a typical (pre curfew) period

Steyning Grammar School has requirements for elevated lux levels in the sports areas of the site, namely the MUGA and the all-weather pitch. Despite this, the plot demonstrates that light spill to neighbouring properties is minimal, with section 4.3 providing a detailed assessment of light distribution at 45 Shooting fields, the property closest to the all-weather pitch.

4.2 Lux levels – General Lighting (Post Curfew)

Figure 9 shows the calculated site lux levels for the post curfew period.

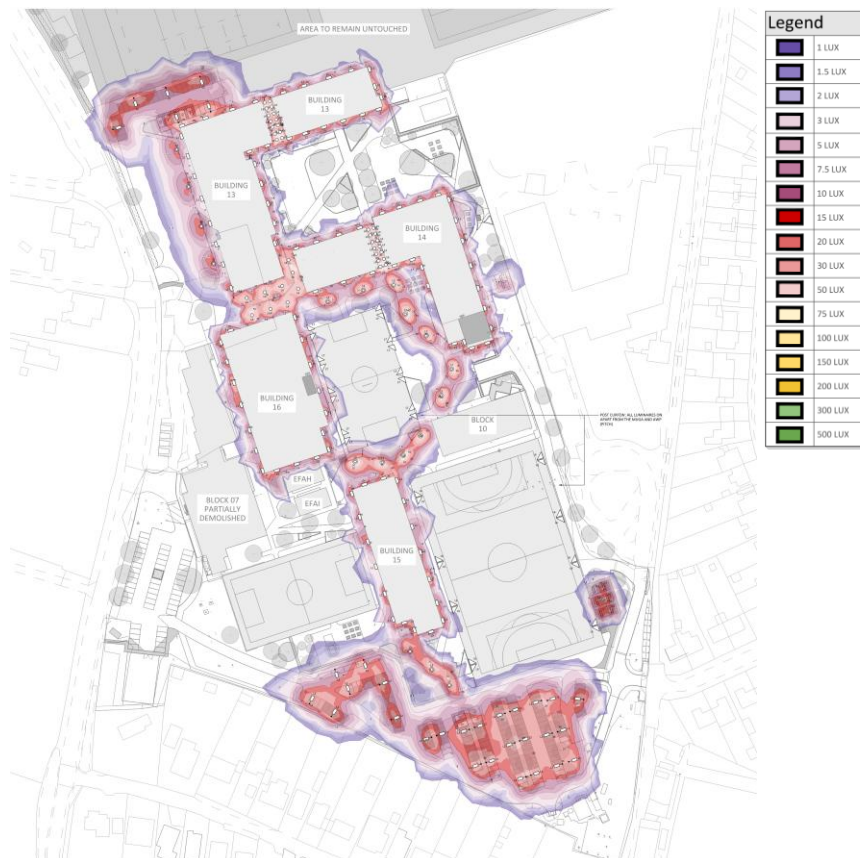


Figure 9 - Lux levels and light spill during the post curfew period.

The plot shows that there is little light spill to the adjacent residential areas.

4.3 Compliance with ILP GN01/21

Figure 10 shows the lighting levels for the closest property to the all-weather pitch. Combining this with the whole site lighting plots there is minimal light spill, with values <2.8lux during typical pre curfew periods and <0.1lux for post curfew periods.

Location	Application Condition	Max Vertical Illuminance (Lux)	Uniformity
Shooting Fields Property (in close proximity to Sports Pitch)	Pre-Curfew	2.8	-
	Post-Curfew	0.1	-

Figure 10 - Lux levels and light spill to neighbouring properties.

This surpasses the criteria of ILP GN01 Table 3 which states limits of 10lux pre curfew and 2lux post curfew for illuminance in the vertical plane.

4.4 Lighting controls

General external lighting will be controlled by a multi-channel controller with a photocell and timeclock in series. This means that the lighting will automatically turn on at dusk and off at dawn and provides the minimal amount of lighting for security.

The system for the all-weather pitch and the MUGA shall include a pitch specific controls system which allows dimming of the light to pre-set levels for different sports. In addition, the MUGA and the all-weather pitch will be manually switched on and off for pre and post curfew compliance with ILP GN01/21.

4.5 Luminaire colour temperatures

All external luminaires are specified to be 2700K as per ILP Guidance Note 08 which states a warm colour temperature is found to be less impactful to bats.

4.6 Light spill visors

The column-mounted floodlights (for the MUGA and all-weather pitch) will be fitted with external visor accessories to control and reduce light spill. This measure helps limit obtrusive light to neighbouring properties. A typical external visor is shown below.



Figure 11 - Typical light spill visor

5 Conclusion

The proposed lighting scheme meets the design parameters required to limit light pollution as recommended by ILP Guidance Note GN01/21.



Oxford
One St Aldate's
Oxford
OX1 1DE

Swindon
3 Newbridge Square
Swindon
SN1 1BY

Bristol
22-24 Queen Square
Bristol
BS1 4ND

Cardiff
Brunel House, Clockwise
2 Fitzalan Road, Cardiff
CF24 0EB

Exeter
Clockwise Exeter
Broadwalk House, Exeter
EX1 1TS

Cornwall
Deck 2, Pentire House
5-9 Beach Road, Newquay
TR9 1ES