



· LIGHTING DESIGN · ELECTRICAL · SMART CITIES ·
ENERGY REDUCTION · LIGHTING IMPACT

BROWS FARM

LIGHTING STRATEGY

DFL-UK

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1. INTRODUCTION

1.1. Executive Summary

- 1.1.1. This Lighting Strategy has been written by DFL (Designs for Lighting Ltd¹), a lighting design consultancy specialising in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.
- 1.1.2. The Lighting Strategy proposes good practice and outlines a suitable approach for the proposed lighting at Brows Farm Driving Range, for the purpose of safety and amenity. The lighting strategy is intended to set out a minimally obtrusive approach to the lighting, whilst ensuring it is necessary and considers the sensitivity of nearby human, environmental and ecological receptors.
- 1.1.3. Lighting associated with the Proposed Development will comply with relevant British Standards and Institution of Lighting Professionals (ILP) guidance to ensure obtrusive light is minimised in accordance with best practice.
- 1.1.4. This report outlines the following:
- › Relevant obtrusive light policies in direct relation to the Proposed Development;
 - › Relevant National and Local Policies;
 - › Why the Proposed Development requires artificial lighting; and
 - › Details as to how lighting will be implemented for the Proposed Development.
- 1.1.5. It has been identified that the Application Site is set within a Sparsely inhabited rural area (E2).
- 1.1.6. Through careful design and mitigation, this Lighting Strategy ensures the lighting installation at the proposed development will be in accordance with British Standards, Guidance and Local Policy.
- 1.1.7. Due to the positioning, location, viewing angle and operating hours of the lighting applied to the Proposed Development, local human amenity receptors will not be affected by the sensitive application of lighting.

¹ <https://www.dfl-uk.com/about/>

2. LEGISLATIVE FRAMEWORKS AND NATIONAL POLICIES

2.1. Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

2.1.1. Since 2005, artificial light has been incorporated as a potential statutory nuisance. An amendment to section 79 of the Environmental Protection Act 1990, contained within the Clean Neighbourhoods and Environment Act 2005 states:

“Artificial light emitted from premises so as to be prejudicial to health and nuisance constitutes a ‘Statutory Nuisance’ and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint”

2.2. National Planning Policy Framework 2023

2.2.1. The National Planning Policy Framework (NPPF) sets out the government’s planning policies for England and how they are expected to be applied and provides a framework for local plans. With regard to light pollution, the NPPF was updated in December 2023 and states that the following elements are to be considered:

“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:

- > 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 life;*
- > 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*
- > limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

2.3. Planning Practice Guidance

2.3.1. Guidance for assessing the effects of proposed artificial lighting is outlined in the planning practice guidance (PPG). The guidance states:

“Does an existing lighting installation make the proposed location for a development unsuitable, or suitable only with appropriate mitigation? For example, this might be because:

- *the artificial light has a significant effect on the locality; and/or*
- *users of the Proposed Development (e.g., a hospital) may be particularly sensitive to light intrusion from the existing light source.*

Where necessary, development proposed in the vicinity of existing activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme, reflecting the agent of change principle. Additional guidance on applying this principle is set out in the planning practice guidance on noise.

- *Will a new development, or a proposed change to an existing site, be likely to materially alter light levels in the environment around the site and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?*
- *Will the impact of new lighting conflict with the needs of specialist facilities requiring low levels of surrounding light (such as observatories, airports and general aviation facilities)? Impacts on other activities that rely on low levels of light such as astronomy may also be a consideration but will need to be considered in terms of both their severity and alongside the wider benefits of the development.*
- *Is the development in or near a protected area of dark sky or an intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting?*
- *Would new lighting have any safety impacts, for example in creating a hazard for road users?*
- *Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed.*
- *Does the Proposed Development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies? (As it may change natural light, creating polarised light pollution that can affect wildlife behaviour.)”*

3. LOCAL POLICIES

3.1. East Hampshire District Council, Our Local Plan 2021-2040.

3.1.1. The relevant Local Planning Authority (LPA) for the Proposed Development is the East Hampshire District Council, with policies detailed within the Our Local Plan 2021-2040, Regulation 18 January 2024 applying to the lighting associated with the Proposed Development.

The applicable policies are:

NBE13 Protection of natural resources-

“Development proposals will be permitted provided that they ensure that the Local Plan Area’s natural resources remain safe, protected, and prudently used.

Development proposals will be expected to demonstrate that they: a. Do not give rise to soil contamination or air, noise, radiation, light or water pollution where the level of discharge, emissions or contamination could cause harm to sensitive receptors (including impact on dark night skies);”

Policy DES2 Responding to local character

“Detailed proposals for the design and layout of new development will be required to: [...]

[...]. Avoid or minimise light pollution (such as glare or light spillage from buildings and the site as a whole) through the design of new light fixtures and by proposing the minimum amount of lighting necessary to achieve its purposes without compromising safety.”

Policy DM12 Dark Night Skies

“New development proposals must consider the potential impacts of new external lighting and light-spill from internal lighting on the Local Plan Area’s dark skies and the South Downs National Park International Dark Sky Reserve. Adverse impacts should be avoided through the omission of lighting or through building design (as appropriate) unless it is demonstrated that such impacts are necessary to ensure the safety of occupants or visitors and that these impacts can be mitigated in accordance with

Development proposals will be permitted where they conserve and enhance the intrinsic quality of the dark night skies by; - a. Directing lighting downwards whilst preventing upward, sideways and outward spillage; and b. Ensuring the colour and intensity of lighting is appropriate for wildlife and the wider setting; and c. Ensuring the design and quality of fenestration minimises light glow, glare and light trespass.”

4. BRITISH STANDARDS

4.1. BS EN 12193:2018 – Light and Lighting – Sports Lighting.

4.1.1. This standard specifies the required light levels for specific outdoor and indoor sporting

5. GUIDANCE

5.1. Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals GN01:2021)

5.1.1. The Lighting Strategy is informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, which is typically caused by poorly designed and installed exterior artificial lighting. The Lighting Strategy is informed by the most relevant sections of GN01/21 that has recently been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks.
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, 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 or suburban locations.
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity.

Table 1: Environmental Zone Descriptions

Environmental Zones	Sky Glow ULR ² (Max %)	Light Trespass (Into Windows) E _v (lux)		Building Luminance Average, Pre-curfew
		Pre-Curfew	Post-Curfew ³	Average L (cd/m ²)
E0	0	0	0	0
E1	0	2	0 (1*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

² ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky

³ Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off; this typically refers to 23h00 – 07h00

5.2. GN08:2023 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

5.2.1. This document is aimed at lighting professionals, lighting designers, planning officers, developers, bat workers/ecologists and anyone specifying lighting. It is intended to raise awareness of the impacts of artificial lighting on bats, and mitigation is suggested for various scenarios. However, it is not meant to replace site-specific ecological and lighting assessments, which states the following

“It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate ‘complete darkness’ or a ‘complete absence of illumination’ on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where ‘complete darkness’ on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light adverse behaviour (Stone, 2012).”

“A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component.”

*“A buffer zone subdivided to into smaller zones of increasing illuminance limit further away from the Supporting Habitat would ensure light levels (illuminance - measured in lux) do not exceed certain defined limits. This has the effect of a gradual decrease in lighting from the developed zone, rather than a distinct cut-off, which may provide useable area for the project which also limits lighting impacts on less sensitive species, or less well-used habitat.” (see **Figure 1**).”*

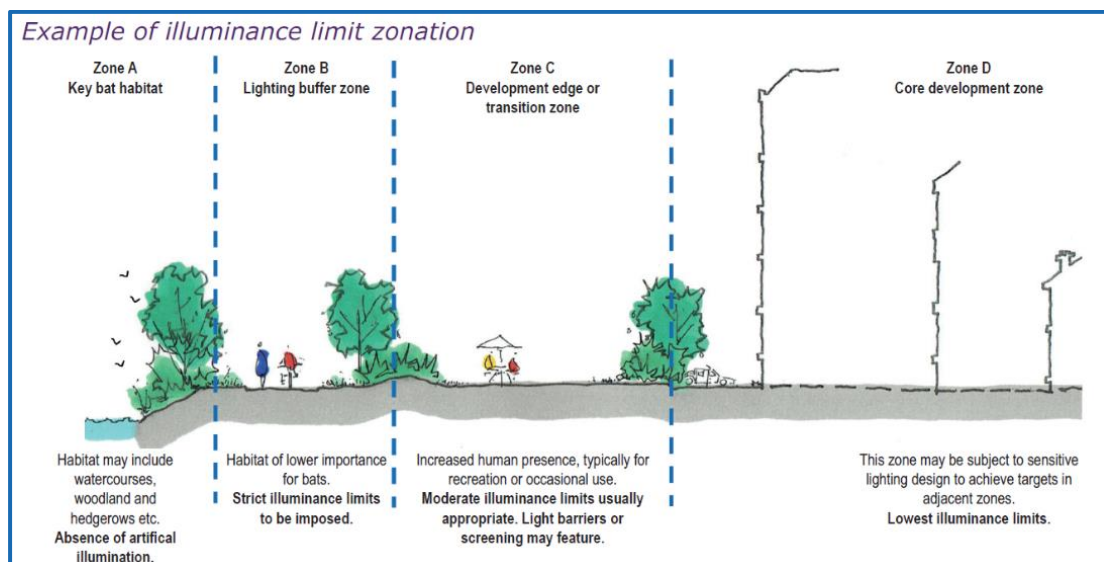


Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

6. DESKTOP STUDY

6.1. Site Description and Context

- 6.1.1. The Application Site is Brows Farm Golf Centre. Brows Farm Golf Centre is a driving range and practise golf course to the rear of Farnham Road. An indicative boundary of the site and proposed layout can be seen in **Figure 2**.
- 6.1.2. The Proposed Development comprises a multi-storey enclosed driving range expansion to the existing single story enclosed driving range. The Site Layout Plan is shown in **Figure 3**.
- 6.1.3. A desktop assessment was completed to understand its position within the current lit environment.



Figure 2: The Application Site location and boundary



Figure 3: Proposed Development Site layout plan

6.2. Designations

6.2.1. Whilst in proximity to the South Downs National Park, this designated site is greater than 1Km from the Application Site, lighting applied to the site would not affect this designation. No other SAC, SSSI or AONB's are near the Application Site.

6.3. Baseline lighting

6.3.1. Whilst the road adjacent to the Application Site is unlit, the residential properties to the southwest of the Application Site are reasonably well lit by car park lanterns and amenity lighting. The properties to the north and east of the Application Site also exhibit amenity lighting typically associated with the identified environmental zone.

6.4. CPRE Night Blight Mapping⁴

6.4.1. To inform our understanding of the nighttime environment, we look to use the CPRE Nightblight map to better appreciate the current baseline light levels. The CPRE Night Blight Mapping confirms the skyward radiance within the vicinity of the Application Site is between 1 - 2 Nano Watts/cm²/sr. As shown in **Figure 4**, the likely levels of skyglow within the vicinity of the Application Site are similar to those expected within an E2 zone.

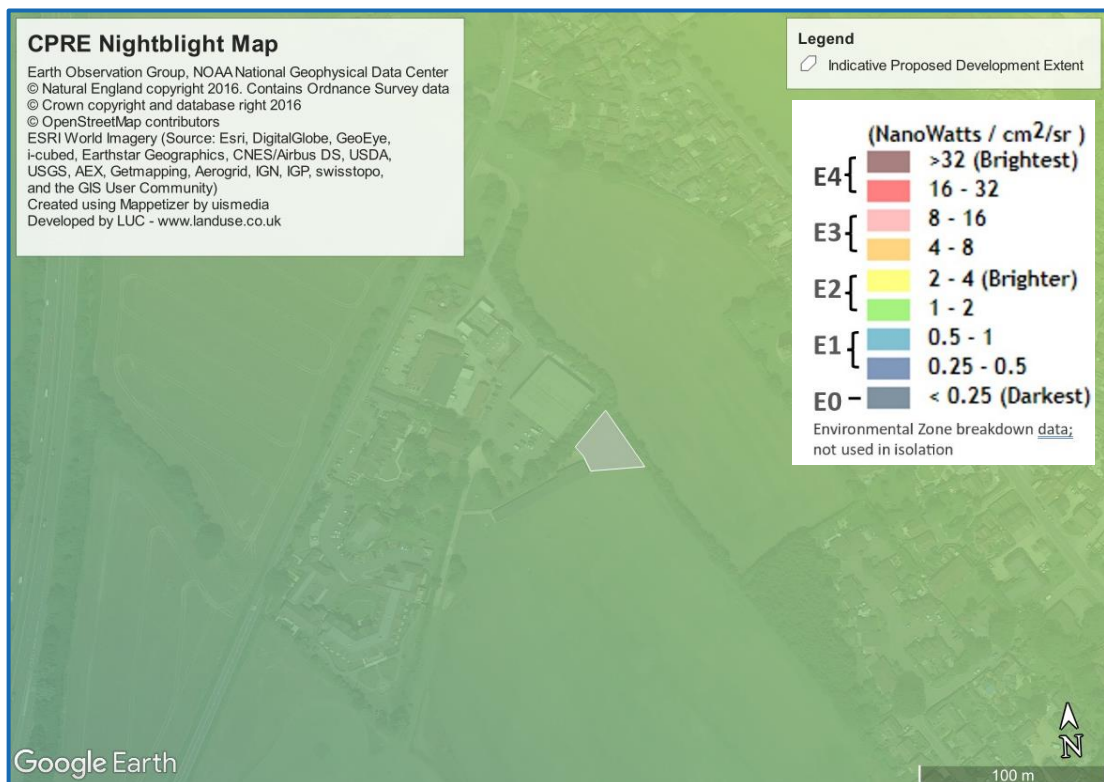


Figure 4: Surrounding areas/roads

⁴ NightBlight Map is a visual representation of light pollution as a view from above the earth's atmosphere and indicates upward light spill based on sky glow.

6.5. Environmental Zone Classification

6.5.1. The Environmental Zone criteria detailed within **Table 1** and **Table 2** informs the basis of the Lighting Strategy. The Application Site is considered to be located within an E2 Environmental Zone, due to its location and proximity to residential developments to the north, east and southwest as well as the further suburban environment to the east.

Zone	Surrounding	Examples	Limitations (Lux)		Sky Glow ULR (Max)
			Pre-curfew	Post-curfew	
E2	Rural	Sparsely inhabited rural areas, Village or relatively dark outer suburban locations	5	1	2.5%

Table 3: Limitations of identified environmental zone

7. IDENTIFIED RECEPTORS

7.1. Ecological

7.1.1. No ecologically sensitive areas have been identified, due to the closing time of the Application Site (8.30 hours) artificial lighting is unlikely to impact light sensitive ecology should this be identified at a later stage.

7.2. Human Amenity

7.2.1. To the north, east and southwest- of the site, Potentially Sensitive Human Receptors have been identified as shown in **Appendix 3**. Therefore, this lighting strategy has been written in accordance with GN01, **Table 2** - Obtrusive Light Criteria.

Receptor Type	Receptor No. (Appendix 3)	Description	Sensitivity
Human Amenity	PHAR 001	Residential properties off of station road and Bishearne Gardens north and northeast of the Application Site.	Low
Human Amenity	PHAR 002	Residential properties off of Balfour Drive east of the Application Site.	Low
Human Amenity	PHAR 003	Residential properties off of Riverside Close southeast of the Application Site.	Low
Human Amenity	PHAR 004	Residential Properties and Blenheim Court Care home located of Fareham Road in close proximity of the Application Site to the southwest.	Medium

Table 4: Potential Human Amenity Receptors (PHAR)

8. LIGHTING STRATEGY

8.1. Summary

- 8.1.1. The Proposed Development will require lighting for safety and amenity at limited times during the hours of darkness. Lighting will be fit for purpose and sensitive to nearby human and ecological receptors.
- 8.1.2. Lighting will be of an appropriate specification and designed in accordance with British Standards.
- 8.1.3. Amenity lighting for the Proposed Development will be applied sensitively to account for the receptors identified bounding the Application Site and within the Proposed Development.
- 8.1.4. Luminaires will be used with integral LEDs and only where the luminaire photometry is available from the manufacturer. This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are minimised or mitigated.
- 8.1.5. The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the Application Site is located, is sensitive to the area, and provides a recognised standard level of lighting for all adoptable areas requiring illumination. Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.
- 8.1.6. All lighting unless otherwise stated is to emit a cool white colour temperature light (4000 Kelvin or less) will be used as opposed to the 5700K recommended in BS EN 12193. This is to reduce the potential for adverse effects onto potentially sensitive receptors.
- 8.1.7. Lighting is only to be applied to the driving range bays, no additional lighting is to be applied to the external structure or exterior fields of the proposed development.
- 8.1.8. The client has chosen to add no further additional lighting to the fairway to reduce the potential impact of the lighting applied to the Proposed Development.

8.2. Driving Range

8.2.1. The driving range bays will be illuminated in accordance with BS EN 12193-2018 for amenity and safety purposes. The lowest possible lighting levels are proposed within this Lighting Strategy.

8.2.2. Performance requirements for the Driving range are outlined in **Figure 5**

Outdoor							Reference area		Number of grid points	
							Length	Width	Length	Width
Golf (including driving range)							—	—	—	—
Class	Horizontal illuminance on tee		Horizontal illuminance on fairway		Horizontal illuminance on green		Vertical illuminance over the fairway and green (at 1 m height) ^a	R_G	R_a	
	$E_{hor Ave lx}$	$U2_{hor}$	$E_{hor Ave lx}$	$U2_{hor}$	$E_{hor Ave lx}$	$U2_{hor}$				$E_{vert Ave lx}$
I	—	—	—	—	—	—	—	—	—	
II	—	—	—	—	—	—	—	—	—	
III	100	0,50	20	0,30	50	0,50	50	55	60	

^a For Golf Driving ranges the vertical illuminance only applies at the distance marker.

Figure 5: Performance requirements

8.2.3. Luminaire performance requirements are outlined in **Appendix 4**.

9. SUMMARY OF RESULTS

9.1. Overview

- 9.1.1. The Light Spill Diagram shown in **Appendix 1** and **2** demonstrates that the Light Spill Levels associated with the proposed lighting would comply with the obtrusive light guidance set out in ILP GN01, at sensitive receptors.
- 9.1.2. To ensure the worst-case scenario has been modelled, the highest potential light levels have been modelled / presented in the light spill diagram, with the project maintenance factors set at MF = 1.0⁵. This demonstrates the light levels at their highest (initial light levels at the start of luminaire life).

9.2. Summary of Results

- 9.2.1. The proposed lighting within the task area(s) is compliant to the relevant policies, standards and guidance. This will be achieved by sensitive applying the lighting to the proposed development in a fashion that shields the environment from upward light spill and switches the lighting off before post-curfew hours.
- 9.2.2. The luminaires will be switched off at 20:30 hours the post-curfew restrictions will not need to be met as the application site will not be contributing artificial lighting from the Proposed Development during post-curfew hours.
- 9.2.3. Where human receptors are potentially sensitive to vertical light spill, a vertical illumination grid has been modelled, as shown in **Appendix 2**. The light levels based on the modelling do not exceed 5 Lux, keeping the light levels within the guidance given within GN01:2021 for an area identified as an E2 environment.

Receptor No	GN01 requirements		Maximum vertical Illuminance (Lux)	Pass/fail
	Pre-curfew	Post Curfew		
PHAR 001	5 Lux	1 Lux	0.11 Lux	Pass
PHAR 002	5 Lux	1 Lux	0.04 Lux	Pass
PHAR 003	5 Lux	1 Lux	0.01 Lux	Pass
PHAR 004	5 Lux	1 Lux	0.26 Lux	Pass

Table 9: PHAR results table, maximum illuminance

⁵ <https://www.dfl-uk.com/knowledge-hub/faqs/>

9.3. Mitigation

- 9.3.1. Careful design ensures the lighting has been minimised onto sensitive receptors in accordance with standards and guidance.
- 9.3.2. Where applicable, shields are proposed in particularly sensitive areas to further minimise spill.
- 9.3.3. Through the use of the control methods detailed in **Appendix 4-**, it limits the amount of light in the affected Application Area to minimum amount of time for amenity and safety purposes.
- 9.3.4. The detailed design is to be completed by a competent person or persons in accordance with the details within this Lighting strategy.
- 9.3.5. To reduce the impact of lighting to the Proposed Development additional lighting will only be applied to the driving range bays.
- 9.3.6. The artificial lighting will be switched off at 20:30 hours.

10. CONCLUSION

10.1. General

- 10.1.1. Lighting associated with the Proposed Development shall be designed in accordance with the Lighting Strategy for the Application Site outlined in **Section 8**.
- 10.1.2. This lighting strategy has been written in accordance with the relevant British Standards, industry guidance and local policies to ensure it is unlikely to give rise to obtrusive light with the potential to affect human, environmental and ecological receptors.
- 10.1.3. Through the application of this lighting strategy sensitive receptors will not be adversely affected by obtrusive light, as shown in **Appendix 1 & 2**.
- 10.1.4. Upward light spill will be mitigated by the placement of the luminaires under the driving range canopies.
- 10.1.5. Through careful design and mitigation, this Lighting Strategy ensures the lighting installation at the proposed development will be in accordance with British Standards, Guidance and Local Policy.
- 10.1.6. Due to the positioning, location, viewing angle and operating hours of the lighting applied to the Proposed Development, local human amenity receptors will not be affected by the sensitive application of lighting.

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document XXXX-DFL-ELG-XX-LD-EO-13001-S3

APPENDIX 2 – VERTICAL LIGHT SPILL DIAGRAM

See accompanying document XXXX-DFL-ELG-XX-LD-EO-13002-S3

APPENDIX 3 – SENSITIVE RECEPTORS



Figure 6: Sensitive receptors

APPENDIX 4 – EQUIPMENT SPECIFICATION

1.1. Luminaire and control specification

1.1.1. Performance requirements are outlined in **Table 1.1**


Equipment Specification	
Application Area	Driving Range
Correlated Colour Temperature (Kelvin)	≤ 4000K
Luminaire Manufacturer	Cree
Luminaire Model	Triproof ITP (Or Similar Approved)
Light Source	LED ≤ 4700
Height	N/A
Mounting Arrangement	Ceiling mounted or suspended
Luminaire Tilt	0%
Upward Light Output Ratio E2 < 2.5%	N/A
Example Luminaire Image	
Controls	Manual on off switch

Table 1.1: Luminaire performance requirements

This isn't the end...

We don't just have the solution for what you need today. We also have the solutions you might need for the future. We have dedicated teams that deliver.

- **Lighting Impact and Planning** teams that focus on delivering the most effective and sensitive lighting solutions to support planning.
- **Residential** teams that cover all aspects of new development and redevelopment spanning private, section 38 and section 278 design packages.
- **Public Realm** teams that are experts in enhancing night-time public spaces to create inviting spaces and opportunity for local economies to thrive during the hours of darkness.
- **Electrical** teams – we don't just put a light in the ground, we can help you get power to it as well! Additionally, we also offer design services for EV charging. As this market rapidly expands, make sure you have the experts managing the load, otherwise your EV charging solutions might not live up to expectations.
- **Strategic Infrastructure** teams that offer Lighting and Electrical expertise for complex transport networks and interchanges.
- **Consultancy Services** teams that help when you know what you want but you need someone to help you turn the idea into a project.

Finally, as innovators, you might be facing something bespoke or niche. Don't worry – we might have the answer you need. Feel free to get in touch!

THE POWER TO MAKE LIGHT WORK



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