DFL

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

THE PADEL CLUB, Q LEISURE, LONDON ROAD, ALBOURNE, HASSOCKS

TECHNICAL REPORT

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Version – LI&P
V3.5 AUG2024

PROJECT NUMBER: 3930		DOCUMENT REF: 3930-DFL-ELG-XX-RP-EO-13001			
P01	First issue	JP	AMS	AMS	17/10/2025
P02	Second Issue	JP	AMS	AMS	28/10/2025
P03	Third Issue	JP	AMS	AMS	11/11/2025
P04	Fourth Issue	JP	AMS	AMS	20/11/2025
P05	Final	JP	AMS	AMS	25/11/2025
Revision	**Purpose Description**	**Originated**	**Checked**	**Approved**	**Date**

Designs for Lighting (DFL) is a business built on successfully collaborating with our clients. We have over 20 years proven experience in our industry, listening to the challenges our clients face, developing the best solutions and being innovators in our specialism. Our role is to find the most effective and sustainable outcome to enhance and support your projects. We proudly work with recognised industry bodies to promote and shape the future of the industry and ensure our staff are trained to exceed the required competency levels of our industries. Above all, we ensure each project delivers against our values.

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1. INTRODUCTION

1.1. Executive Summary

1.1.1. This technical report has been written by DFL (Designs for Lighting Ltd[1]), a lighting design consultancy specialising in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.

1.1.2. The technical report outlines the lighting approach to apply to the installation of the proposed lighting. The aim of the technical report is to outline the levels to which lighting will be provided and where lighting will be provided, which is functional to ensure safety and sensitivity to both the environment and nearby ecological receptors (for example, bats).

1.1.3. The technical report concerns land at Q Leisure, London Road, Albourne, Hassocks (hereafter referred to as the Application Site). The Proposed Development is for the construction of six new Padel courts which will require illumination for during the evenings after dark.

1.1.4. 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.

1.1.5. 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.
- The likely effects of applying artificial lighting

1.1.6. It has been identified that the Application Site is set within a sparsely inhabited rural area which is assessed to be an E2 Environmental Zone for the purpose of a lighting assessment.

1.1.7. 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] 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:

"The following matters constitute "statutory nuisances" for the purposes of this Part, that is to say— [....]

[....] artificial light emitted from premises so as to be prejudicial to health or a 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 2024

2.2.1. The National Planning Policy Framework (NPPF) 2024 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 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. Mid Sussex district plan 2014-2031.

3.1.1. The relevant Local Planning Authority (LPA) for the Proposed Development is the Mid Sussex District Council with policies detailed in the Mid Sussex Local Plan (Adopted March 2018) applying to the lighting associated with the Proposed Development.

The applicable policies are:

DP29: Noise, Air and Light Pollution

"The environment, including nationally designated environmental sites, nationally protected landscapes, areas of nature conservation or geological interest, wildlife habitats, and the quality of people's life will be protected from unacceptable levels of noise, light and air pollution by only permitting development where:...

Light pollution: • The impact on local amenity, intrinsically dark landscapes and nature conservation areas of artificial lighting proposals (including floodlighting) is minimised, in terms of intensity and number of fittings; • The applicant can demonstrate good design including fittings to restrict emissions from proposed lighting schemes;...

The degree of the impact of noise and light pollution from new development or change of use is likely to be greater in rural locations, especially where it is in or close to specially designated areas and sites.

4. BRITISH STANDARDS

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

4.1.1. This British and European standard specifies lighting for indoor and outdoor sports events; the document covers most sports events practised within Europe. The document considers the application of artificial lighting, control methodology, uniformity, glare restrictions, illuminance and colour properties for optimal performance.

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 GN01/2021 that has 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 that the lighting installation should be switched off; this is 23h00 – 06h00

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**)."*

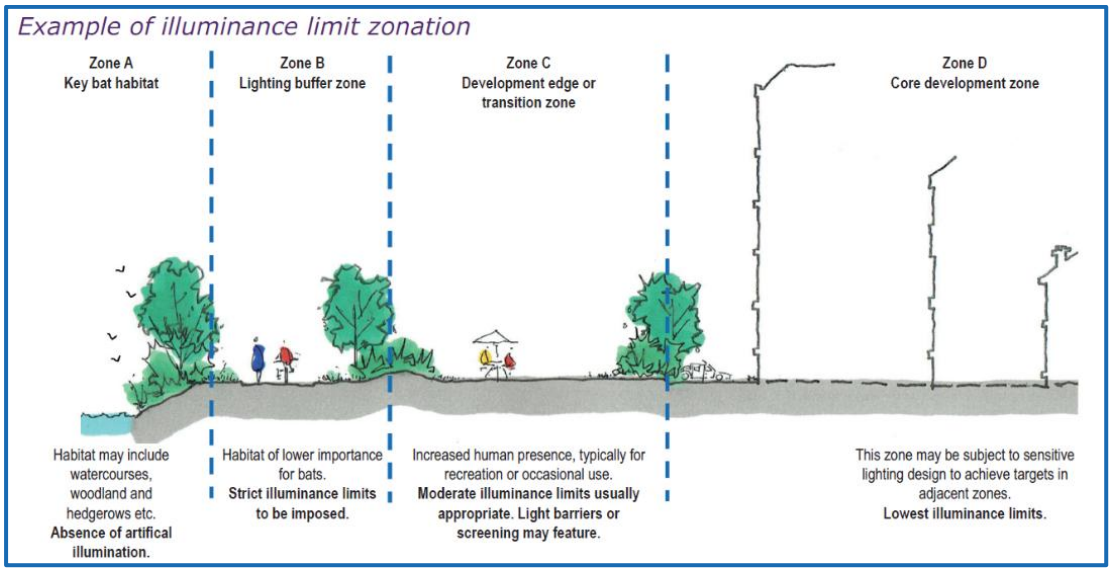

Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

6. DESKTOP STUDY

6.1. Site Description and Context

6.1.1. A desktop assessment was completed to understand its position within the current lit environment.

6.1.2. The Application Site is Q Leisure, London Road, Albourne which is near Hassocks and north of Brighton. An indicative boundary of the Application Site can be seen in **Figure 2**.

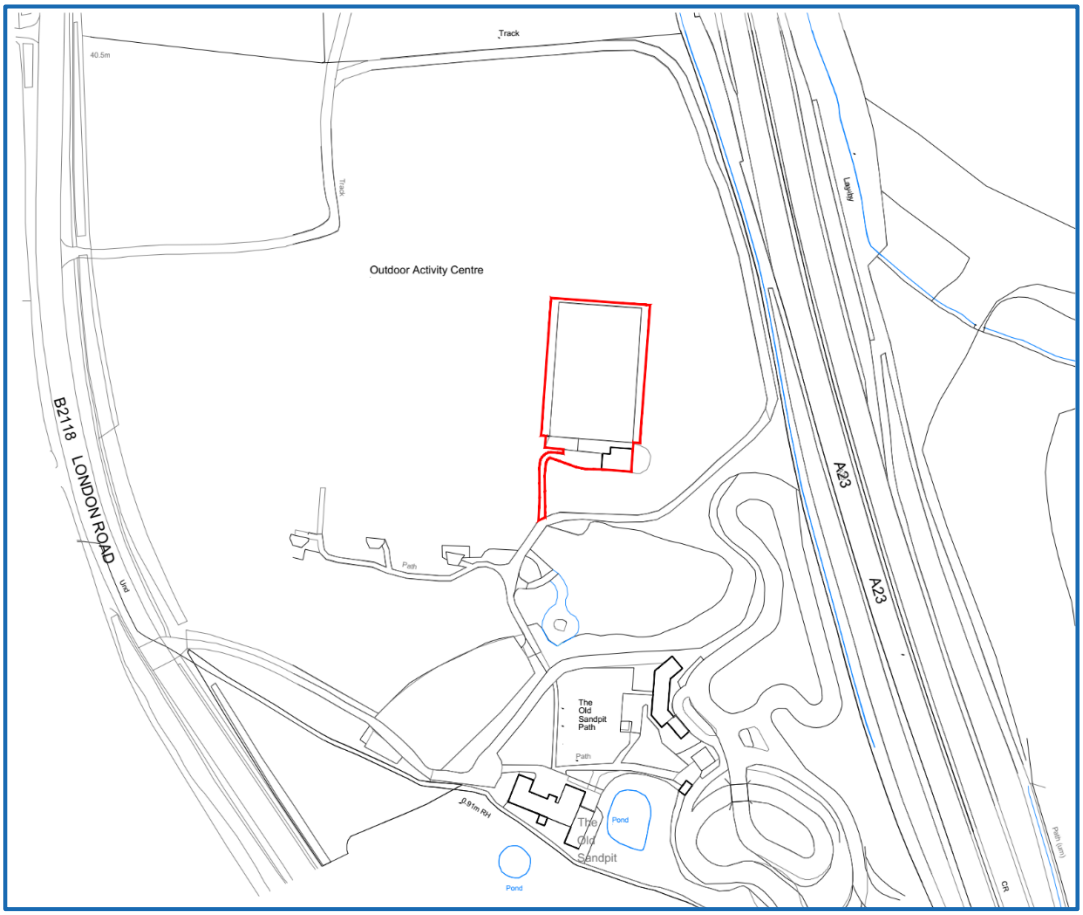

Figure 2: The Application Site location and boundary

6.1.3. The Proposed Development is for 6 Padel courts. The Proposed Development Plan is shown in **Figure 3.**

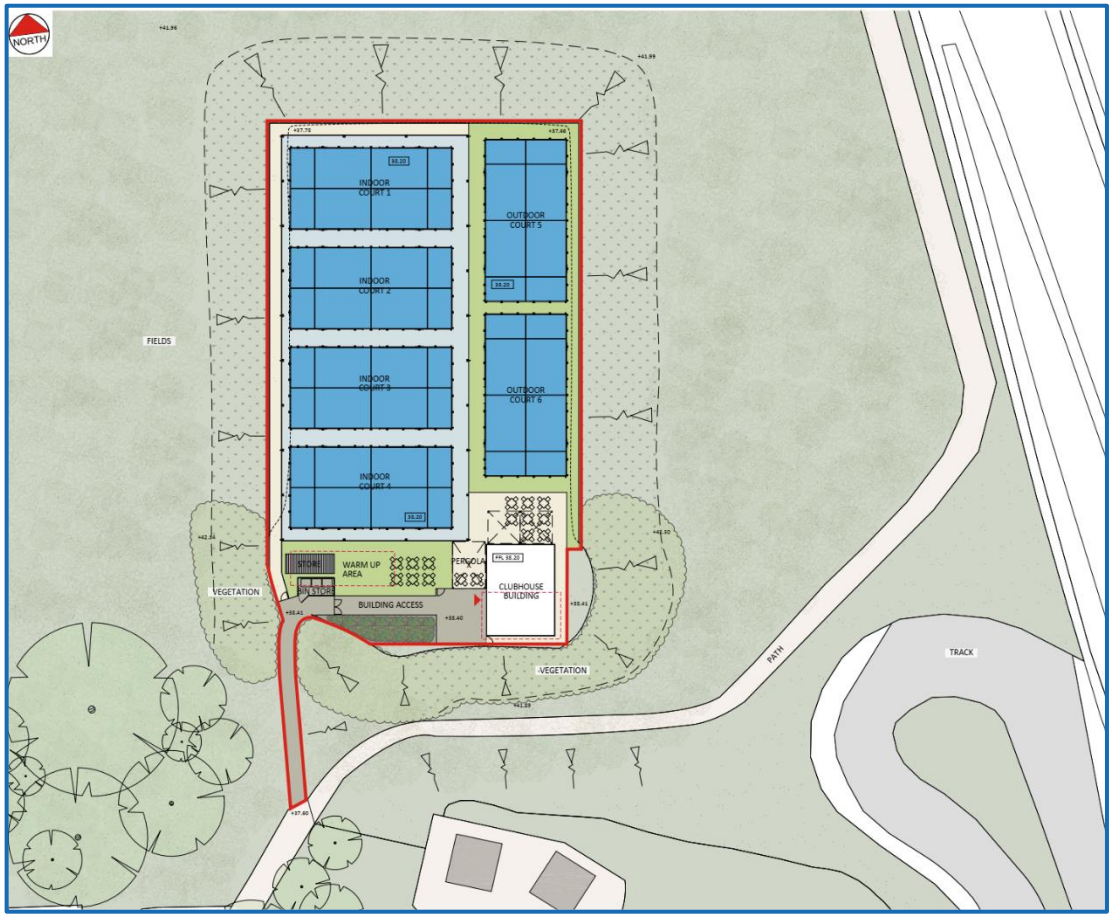

Figure 3: Proposed Development Site layout plan (from Saunders Architects drg. 10150/P101)

6.2. Designated Sensitive Site

6.2.1. -The area is within 2 km[4] proximity of a designated Sites of Special Scientific Interest Site(SSSI) and National Landscape (Formally AONBs) these are shown in **Figure 4** and referenced to as.

- South Downs National Park – 300m from Application Site
- Wolstonbury Hill SSSI – 1.3km from Application Site

[4] Based on empirical thresholds from visual impact studies, tall slender structures in open landscapes are typically prominent up to about 2 km, still relatively prominent between 2 and 5 km, and beyond this distance their prominence declines significantly, based on statements within *Wind Turbine Visibility and Visual Impact Threshold Distances in Western Landscapes* study (U.S.BLM-sponsored)

Figure 4: Site designation

6.3. Baseline lighting

6.3.1. The surrounding area is a rural area in which the site comprises of a lit go-kart track to the southeast along with lighting for wayfinding in the car park and customer barn conversion, the area to the north is very dark, with no lighting around the application site. Lighting around the site is purely limited to the southern and southeast areas.

6.4. CPRE Night Blight Mapping[5]

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 0.5 - 1 Nano Watts/cm²/sr. as shown in Figure 5.

[5] 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.

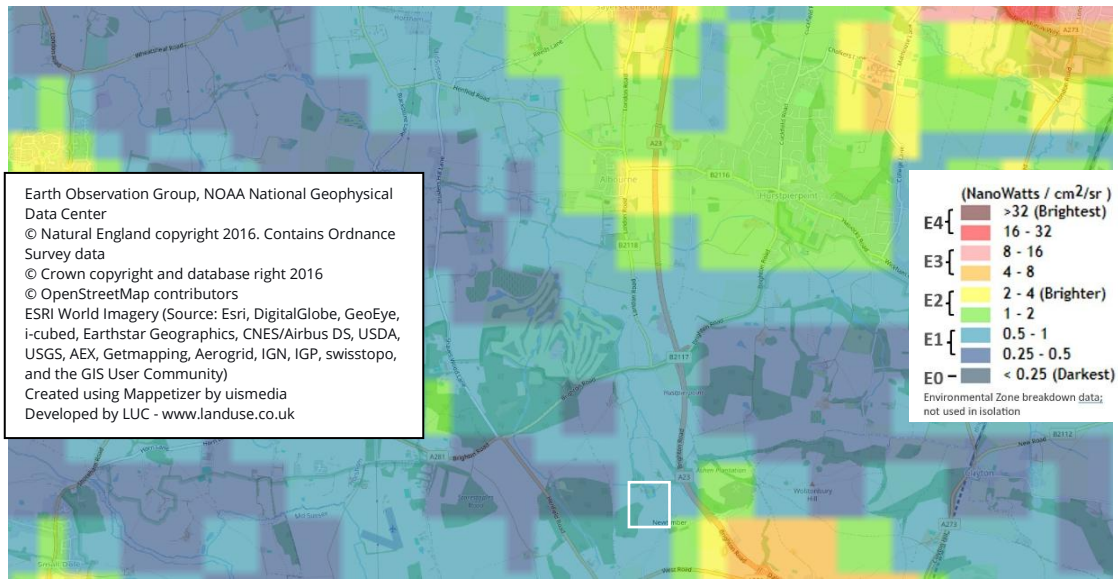

Figure 5: CPRE Map

6.5. Environmental Zone Classification

6.5.1. The environmental zone has been assessed as an E2 environmental zone. This is due to the location of the site being in a very rural area with lots of unlit roads, there is a lit go-kart track, but this contributes very little to the ambient lighting in the area with very little skyglow seen coming from the site.

Zone	Surrounding	Examples	Limitations		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. With the application site being housed within a very steep embankment with black walls and enclosed in a roof the surrounding area is unlikely to feel any kind of change in the light levels from the application site.

7.2. Human Amenity

7.2.1. Potential Human Amenity Receptors can be seen within proximity to the west of the Application Site; however, these receptors are approximately 0.2Km away behind natural blocking elements (a well-established tree line and landscape).

6.4.2. A description of the potential human receptors can be seen in **Table 4,** and locations in **Appendix 2.**

Receptor Type	Receptor No. (Appendix 3)	Description
Human Amenity	PHAR 001	Breechlands farm
Human Amenity	PHAR 002	Sandpit Cottage
Human Amenity	PHAR 003	2 Alders Cottages etc

Table 4: Potential Human Amenity Receptors (PHAR)

8. LIGHTING STRATEGY

8.1. Summary

8.1.1. The Proposed Development will require lighting for safe use of the courts 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. Where it is proposed to use a similar or approved luminaire, full evidence via calculations should be provided in terms of its performance and ensuring that obtrusive light is within the guidelines detailed in this document.

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 is to emit a cool white colour temperature light (4000 Kelvin or less) as opposed to the colour temperature proposed within BS EN 12193 (5500K), this is to further reduce the potential for adverse effects on the surrounding environment.

8.1.7. Lighting will be required in the following task areas:

- 6 Padel Courts
- Clubhouse ingress and egress
- Bollard wayfinding

8.2. Padel courts

8.2.1. Padel courts will be illuminated in accordance with BS EN 12193:2018 for safety purposes during the use of the task area. The lowest practicable lighting levels are proposed within this Lighting Strategy to enable the sport to be played to “Class II” level.

8.2.2. Performance requirements for the Padel courts are outlined in **Figure 6.**

Table A.16

Outdoor			Reference area		Number of grid points	
			Length m	Width m	Length	Width
Tennis	PA		30	15	13	7
	TA		36	18	15	7
Padel [a]	PA		20	10	13	7
Class	Horizontal illuminance		Horizontal illuminance TA		R_G	R_a
	$E_{hor\ Ave}$ lx	$U2_{hor}$	$E_{hor\ Ave}$ lx	$U2_{hor}$		
I	500	0,70	75 % PA	75 % PA	50	70
II	300	0,70	75 % PA	75 % PA	50	60
III	200	0,60	75 % PA	75 % PA	55	60

[a] A safety zone around both entrances of width 2 m, height 4 m and extending 4m from the centre to both sides is to be kept clear of any obstacles.

Figure 6: Performance requirements

Equipment Specification	
Application Area	Full sized courts
Correlated Colour Temperature (Kelvin)	≤ 4000K
Luminaire Manufacturer	Aron Lighting
Luminaire Model	Padelite
Light Source	LED ≤40,000 lumens
Reference	
Height	≤ 6m
Mounting Arrangement	Post top
Luminaire Tilt	0%
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls	To be controlled via remote switching, such that lighting is switched off when not in use and from 23:00 to 6:00

Table 5: Luminaire performance requirements

8.3. Clubhouse ingress and egress

8.3.1. The Clubhouse ingress and egress will be lit for wayfinding and safety purposes only and will not be lit to a specific lighting class. The lowest practicable lighting levels are proposed within this Lighting Strategy.

8.3.2. Heights and outputs of the proposed lighting have been outlined within **Table 6** to ensure sensitive application of lighting into the Proposed Development.

Equipment Specification	
Application Area	Property frontages
Correlated Colour Temperature (Kelvin)	≤2700
Lumen Output	≤ 550
Height	≤2m
Mounting Arrangement	Wall Mounted
Luminaire Tilt	0
Upward Light Output Ratio **E2 < 2.5%**	0
Luminaire Manufacturer	Ligman (Or Similar Approved)
Luminaire family	Jet (Or Similar Approved)
Example Luminaire Image	
Light Spill Diagram reference	Type D
Controls	PIR on for one minute when activated with override switch

Table 6: Luminaire performance requirements

8.4. Wayfinding lighting

8.4.1. The Wayfinding lighting will be for wayfinding and safety purposes only and will not be lit to a class. The lowest possible lighting levels are proposed within this Lighting Strategy.

8.4.2. Heights and outputs of the proposed lighting have been outlined within **Table 7** to ensure sensitive application of lighting into the Proposed Development. Due to the likely low use of these roads during the hours of darkness.

Equipment Specification	
Application Area	Wayfinding Lighting
Correlated Colour Temperature (Kelvin)	≤2700k
Lumen Output	≤ 1620
Height	≤1m
Mounting Arrangement	Root mounted
Luminaire Tilt	0
Upward Light Output Ratio **E2 < 2.5%**	0
Luminaire Manufacturer	DW Windsor (Or Similar Approved)
Luminaire family	Pharola DS(Or Similar Approved)
Example Luminaire Image	
Light Spill Diagram reference	Type C
Controls	Timeclock in feeder pillar (on from dusk until dawn)

Table 7: Luminaire performance requirements

9. TECHNICAL ASSESSMENT

9.1. Overview

9.1.1. The Light Spill Diagram shown in **Appendix 1** demonstrates that the Light Spill Levels associated with the proposed lighting would comply with the obtrusive light guidance set out in ILP GN01/2021, 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 = 1.0[6]. 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 summarised results with a relevant maintenance factor applied, for the British Standards and guidance compliance can be seen in **Table 8** below.

Area	Table	BS EN 12193 Requirements		MF used	Pass/fail
		Eav Lux	U^o		
Full sized Padel Court	A.16	300	0.7	0.87	Pass

Table 8: BS EN 12193 compliance

9.2.2. The proposed lighting within the task area(s) is compliant to the relevant policies, standards and guidance.

9.2.3. Human Receptors are unlikely to be affected by the application of artificial lighting due to their location and viewing angle in relation to the Proposed Development As evidenced by the spill light diagram in **Appendix 1**.

9.3. Brief

9.3.1. The Application Site has applied for the development of six Padel courts, which are to be lit to a British Standard as outlined in **Section 8**.

9.3.2. There is currently a football pitch on the Application Site, which is an unlit pitch with a high embankment surrounding it.

[6] https://www.dfl-uk.com/knowledge-hub/faqs/

9.4. Mitigation and Enhancements

9.4.1. Careful design ensures the lighting has been minimised onto sensitive receptors in accordance with standards and guidance.

9.4.2. The Application Site is located within an embankment (**Figure 7**) on three sides which minimises the impact on any sensitive receptors.

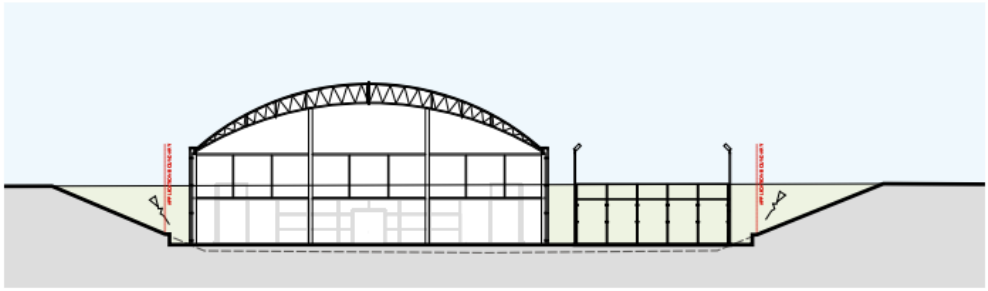

Figure 7 Section showing embankments surrounding padel courts

9.4.3. Four of the courts are housed within an indoor canopy. The north and west side elevations will be clad in a green mesh with an openness factor of 14% which significantly reduces light egress. The south and east elevations will be clad in a white mesh which will similarly significantly reduce obtrusive light.

6.4.3. The roof sections of the building will be opal 60 fire retardant fabric which will significantly reduce lighting from being transmitted upwards.

9.4.4. All luminaires to be fitted with rear spill shields.

9.4.5. Through the use of the control methods detailed above in **Section 8,** it limits the amount of light in the affected Application Area to minimum amount of time for amenity and safety purposes.

9.4.6. The detailed design is to be completed by a competent person or persons in accordance with the details within this Lighting strategy.

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. The lighting strategy has been written in line with the relevant British Standards, industry 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**.

10.1.4. Biodiversity has been protected through strict control of luminaires, outputs, directions, application of spill shields and control methodology.

10.1.5. The Proposed Development within the Application Site is not expected to affect human receptors, given its location and the limited viewing angles into the development, as illustrated in **Appendix 1**.

10.1.6. Through careful design and mitigation, this Lighting Strategy as shown in ensures the lighting installation at the proposed development will be in accordance with British Standards, and Local Plan Policy (DP29).

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document 3930-DFL-ELG-XX-LD-EO-13001-S3

APPENDIX 2 – SENSITIVE RECEPTORS

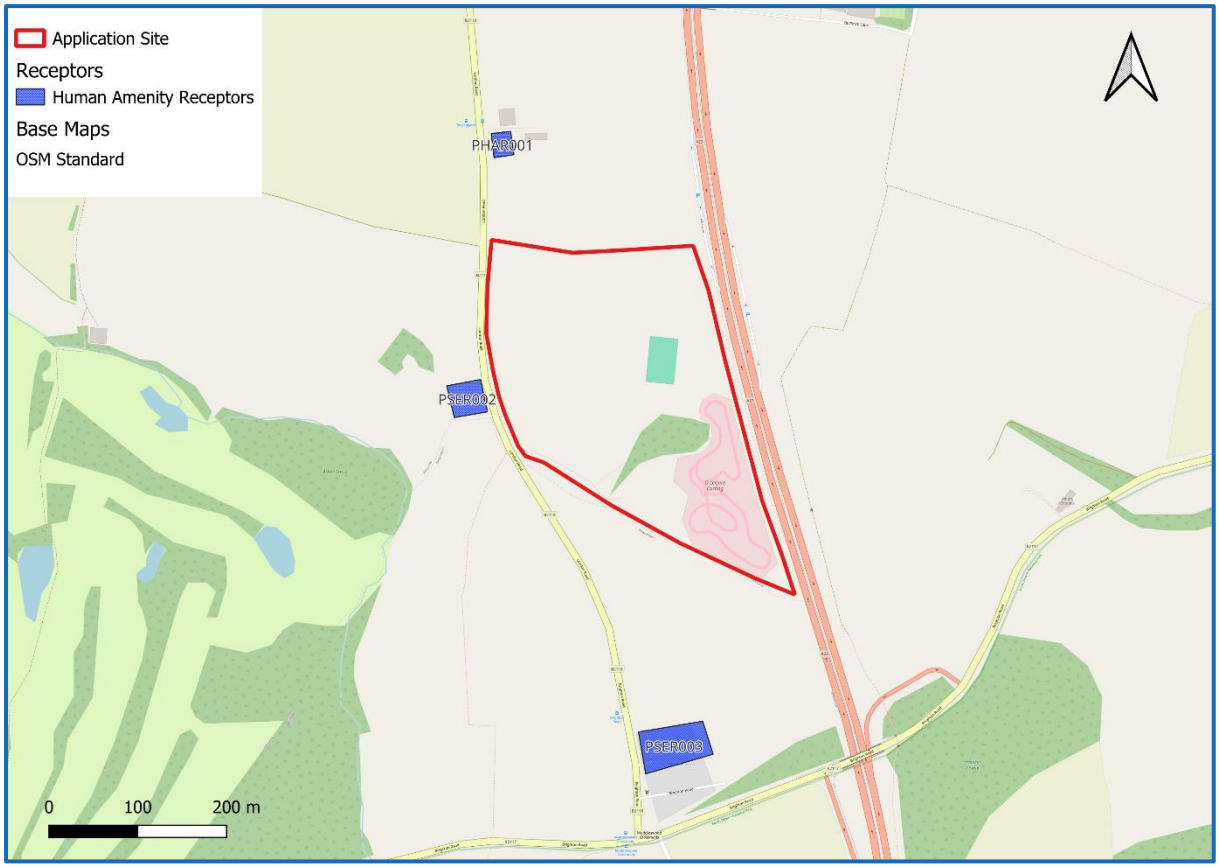

Figure 8: Sensitive Receptors

APPENDIX 3 – SITE SURVEY REPORT

See accompanying document 3290-DFL-ELG-XX-BS-EO-13003-S3

TECHNICAL DECRIPTIONS, DEFINITIONS AND ABBREVIATIONS

PHAR: is an abbreviation for a potential human amenity receptor, a location where an observer could have the potential to be affected by the proposed lighting to be installed *Abbreviation used by DFL LI and P.*

PSER: is an abbreviation for an area identified as or treated as a location that may host a potentially sensitive ecological receptor. This is generally used where light sensitive bats have the potential to live, forage or use as a flight path, other ecologically sensitive receptors such as (but not limited to) the Great Crested Newt may also be identified by this term. *Abbreviation used by DFL LI andP.*

PSR: is an abbreviation for an area where an individual maybe susceptible to light brightness (Light intensity) which may have the potential to cause a hazardous situation. *Abbreviation used by DFL LI andP.*

Obtrusive Light: refers to excessive or bothersome artificial light that goes where it shouldn't, causing discomfort and disruption. *Spill light which because of quantitative, directional or spectral attributes in a given context gives rise to annoyance, discomfort, distraction or reduction in the ability to see essential information.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Sky glow: When lights are directed upwards or light is scattered by particles in the air, like dust or water droplets, it creates a glow that makes it hard to see stars. *The increase in diffuse illuminance of the night sky above that produced by natural sources such as the moon and visible star.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Vertical Illuminance: is how much light lands on upright surfaces like walls. It's measured in lux or footcandles and matters for places where the view from a vertical angle is important. *Lighting of vertical surfaces such as walls, windows, statues, sculptures and people's faces*. CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Correlated colour temperature (CCT): the appearance of light emitted by a light source measured in Kelvin (K), Lower CCT values such as 2700K represent warmer, more yellowish light, *similar to the light from older incandescent lamps. (Tcp)The temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions, measured in absolute temperature on the kelvin (K) scale.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lux: measures the brightness of light as perceived by the human eye at a specific point on a surface. *The SI derived unit of illuminance, measuring luminous flux per unit area (1 lux =1 lumen/m2).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lumens: measure how bright a light appears to our eyes. *The SI derived unit of luminous flux; a measure of the total quantity of visible light emitted by a source or received by a surface (unit: lumen).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Glare: refers to an excess of bright light that makes you uncomfortable or hinders your vision. It happens when there's a big difference between a bright light and the rest of the surroundings. *Glare: condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or by extreme contrasts.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.1.8

Luminous intensity: is light brightness or how intense the light source is. light intensity is how intense a light source is emitted or received in a particular direction, this is measured candelas and is termed as luminous intensity *Iv <of a source, in a given direction> quotient of the luminous flux, dΦv, leaving the source and propagated in the element of solid angle dΩ containing the given direction, by the element of solid angle (unit: cd =lm · sr -1.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.2.

Candela: is a measurement for the brightness of a light source, taking into account the direction in which the light is emitted. *Base unit of luminous intensity in the International System of Units (SI); the luminous power per unit solid angle emitted by a point light source in a particular direction.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Uniformity (Uo): is an explanation for the even distribution of light across an area or surface. *The overall uniformity shall be calculated as the ratio of the lowest luminance, occurring at any grid point in the field of calculation, to the average luminance.* BS EN 13201-3-2015, Calculation of Performance Section 8.3.

Luminance: is how bright a surface appears to our eyes. It considers the light coming from or reflected by an object. *Lv <in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: cd · m-2 = lm · m-2 · sr-1)* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.3.

Illuminance is how much light lands on a surface per square meter. It's measured in lux. More lux means a brighter area. *Ev (unit: lx = lm · m-2) 1. <at a point of a surface> quotient of the luminous flux dΦv incident on an element of the surface containing the point, by the area dA of that element 2. <at a point of a surface> equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.10.

Luminaire: a light fixture, this is also sometimes referred to as a lantern or a light fitting, is a product that produces artificial light. *apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.3

ULOR: upward light output ratio or ULOR refers to the amount of light the light fixture will produce upwards as a percentage of its total light output. *RULO <of a luminaire> ratio of the upward luminous flux of the luminaire, measured under specified practical conditions with its own lamp(s) and equipment, to the sum of the individual luminous fluxes of the same lamp(s) when operated outside the luminaire with the same equipment, under specified conditions* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.12.

Maintenance factor (MF): is an allowance for how well the lights keep working overtime. It considers things like dirt on the light fittings and "wear and tear". *DEPRECATED: light loss factor ratio of illuminance produced by the lighting installation after a certain period to the illuminance produced by the installation when new Note 1 to entry: The term depreciation factor has been formerly used to designate the reciprocal of the above ratio. Note 2 to entry: The maintenance factor takes into account light losses caused by dirt accumulation on luminaires and room surfaces (in interiors) or other relevant surfaces (in exteriors, where appropriate), and the decrease of the luminous flux of lamps*. BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.5.18.

***Tilt**: is how much the luminaire is lifted based on the fitting facing flat to the ground.*

***Outreach:** how far away the fitting is from the column/wall its mounted on to the light source*.

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