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ENERGY REDUCTION · LIGHTING IMPACT

MARKFIELD, LEICESTERSHIRE

TECHNICAL REPORT

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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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EXECUTIVE SUMMARY

This Technical Report is to assist in a cross boundary Application for the access to the Proposed Development for 115 new homes in Markfield, Leicestershire.

It has been identified that the Application Site is set within a suburban location (E3).

The planning application (P/22/1031/2) for 115 homes in Markfield is Proposed with an access path crossing multiple district boundaries, Charnwood Borough Council (CBC) and Hickley & Bosworth Borough Council (H&BBC). CBC has advised that a cross-boundary planning application is required for the pedestrian access track into the site crosses the boundary between CBC and H&BBC. This Technical Report outlines the requirement, equipment used, impacts and approach to lighting of this area.

The application of lighting to the access will not breach the limitations of the light levels proposed within the relevant industry standard guidance (GN08/223 and GN01/2021).

1. INTRODUCTION

1.1. General

1.1.1. This Lighting Strategy 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 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. 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: [2]

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

[....] artificial [3]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 (Published 2025)

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 February 2025 and states that the following elements are to be considered[4]:

"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] https://www.legislation.gov.uk/ukpga/1990/43/part/III/crossheading/statutory-nuisances-england-and-wales Section 79, paragraph 1,
[3] 2005 Section 102 relating to section 79, Indent reference (fb)
[4] Paragraph 198 NPPF 2024 page 57

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:[5]

"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.)"*

[5] https://www.gov.uk/guidance/light-pollution, Paragraph 002 Ref ID: 31-002-20191101 revision 01 11 2019

3. LOCAL POLICIES

3.1. Relevant Local Authorities

3.1.1. As the Section of the Application Site addressed within this document borders two different LPA's, both have been reviewed for their policy relevant to the Proposed Development. The relevant Local Authorities are Leicestershire County Council, Charnwood Borough Council and Hickley & Bosworth Borough.

3.1.2. Leicestershire County Council does not appear to have any specific policies that address the type of Proposed Development or the associated lighting impacts relevant to the subject matter of this document. lighting related to the subject matter addressed within this document.

3.2. Charnwood Borough Council,

3.2.1. CBC state the following relevant policy in regards to the control of light pollution within the jurisdiction of the CBC LPA.

POLICY EV/40

3.127 Planning permission for lighting installations, or for development requiring or likely to require external lighting, will only be granted where it can be demonstrated to the satisfaction of the local planning authority that:

i) the lighting scheme proposed is the minimum needed for security or working purposes;

ii) potential pollution from glare and spillage is minimised, particularly to residential areas, areas of nature conservation and locations in the open countryside or on the edge of existing settlements;

iii) the lighting proposed would not cause a distraction to drivers using nearby highways;

iv) the visual impact proposed lighting installation and structures on the character of the surroundings is minimised.

There is increasing concern about light pollution from external light sources. Where external

3.128 lighting can be controlled the Council will be concerned to ensure that excessive glare and light spillage are avoided and that the visual impact of lighting structures is minimised through appropriate design and landscaping measures. This can be achieved through careful control of both the amount and detailed design of external lighting. The Council will pay particular attention to proposals in sensitive locations in the open countryside or on the edge of existing settlements. In considering proposals involving external lighting, the Borough Council will have regard to guidance provided in the report "Lighting in the Countryside: Towards Better Practice" commissioned by the ODPM POLICY EXCERPT-

3.3. Hickley & Bosworth Borough, Draft Local Plan.

3.3.1. Whilst policy *"PMD03 Preventing Pollution"* does not mention lighting, light pollution is referenced later on in this section of the Local Plan.

Lighting Pollution

6.29 Light pollution (also known as obtrusive light) is caused by excessive artificial light being directed into the night sky. Outdoor lighting can cause intrusive and unnecessary light pollution in urban, suburban and rural areas, although it is in the open countryside hat light pollution is most noticeable. Excessive artificial light at night is visually intrusive impacting on local amenity, intrinsically dark landscapes, nature conservation and can cause physiological problems, in addition to it being a significant waste of energy. It is therefore vital to ensure appropriate controls on external lighting to avoid or mitigate against these adverse effects.

6.30 The guidance notes for the Reduction of Obtrusive Light 202032 identifies forms of obtrusive light which may cause nuisance to others, or adversely affect fauna and flora as well as waste money and energy. These are defined as:

- *Sky Glow, which is the brightening of the night sky;*
- *Glare, the uncomfortable brightness of a light source when viewed against a darker background;*
- *Light spill, the spilling of light beyond the boundary of the area being lit, inclusive of light intrusion where this causes a nuisance to others.*

6.31 The guidance identifies environmental zones and corresponding lighting environments and recommends that these zones are specified in development plans. The Borough Council will publish an updated Light Zone map prior to adopting the plan to reflect the differing levels of light as defined in the guidance. The recommended light levels identified for each zone within the guidance both pre curfew (before 23:00 Hrs) and post curfew should be followed and applied as part of this policy.

6.32 The reduction of light pollution should not compromise crime prevention and public safety and alternative technological solutions should be explored to ensure these elements are not compromised whilst also mitigating against obtrusive light

3.4. UNADOPTED ROADS

3.4.1. Whilst the roads and paths within the Application Site will be privately maintained, they will be designed to an adoptable class and compliant with the relevant British Standards.

4. BRITISH STANDARDS

4.1. BS 5489-1:2020 - Lighting of Roads and Public Amenity Areas - Code of practice.

4.1.1. This standard gives recommendations on the general principles of road lighting, its aesthetics, technical aspects and provides guidance on operational maintenance. It also provides guidance on means of minimizing energy consumption and limiting the impacts on the environment and adjacent properties.

4.2. BS EN 13201-2:2015 - Road lighting. Performance requirements.

4.2.1. This British and European standard defines the performance requirements specified as lighting classes for road lighting aiming at the visual needs of the road users, as well as the consideration of the environmental aspects of the road lighting to be applied.

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[6] (Max %)	Light Trespass (Into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew[7]	Average L (cd/m^2)
E0	0	0	0	0
E1	0	2	0.1 (1[8])	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

[6] ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky.
[7] 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
[8] If the installation is for public (road) lighting, then this may be up to 1 lx

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**)."*

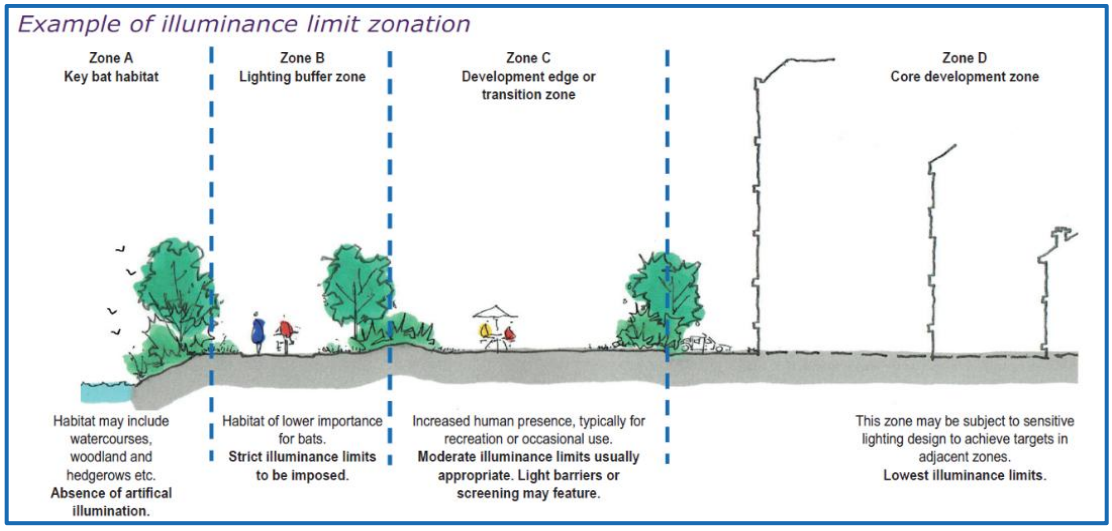

Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

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 occupied by a degraded hardstanding access drive, which leads to a bare ground field access track within pasture, with a grassland verge of approx. 0.6 metres each side of the tarmac drive. An indicative boundary of the site and proposed layout can be seen in **Figure 2**.

Figure 2: The Application Site location and boundary

6.1.3. The Proposed Development is for a public access, cycle path and pedestrian walk way connecting the previously Proposed Development (Application P/22/1031/2). The Site Layout Plan is shown in **Figure 3**.

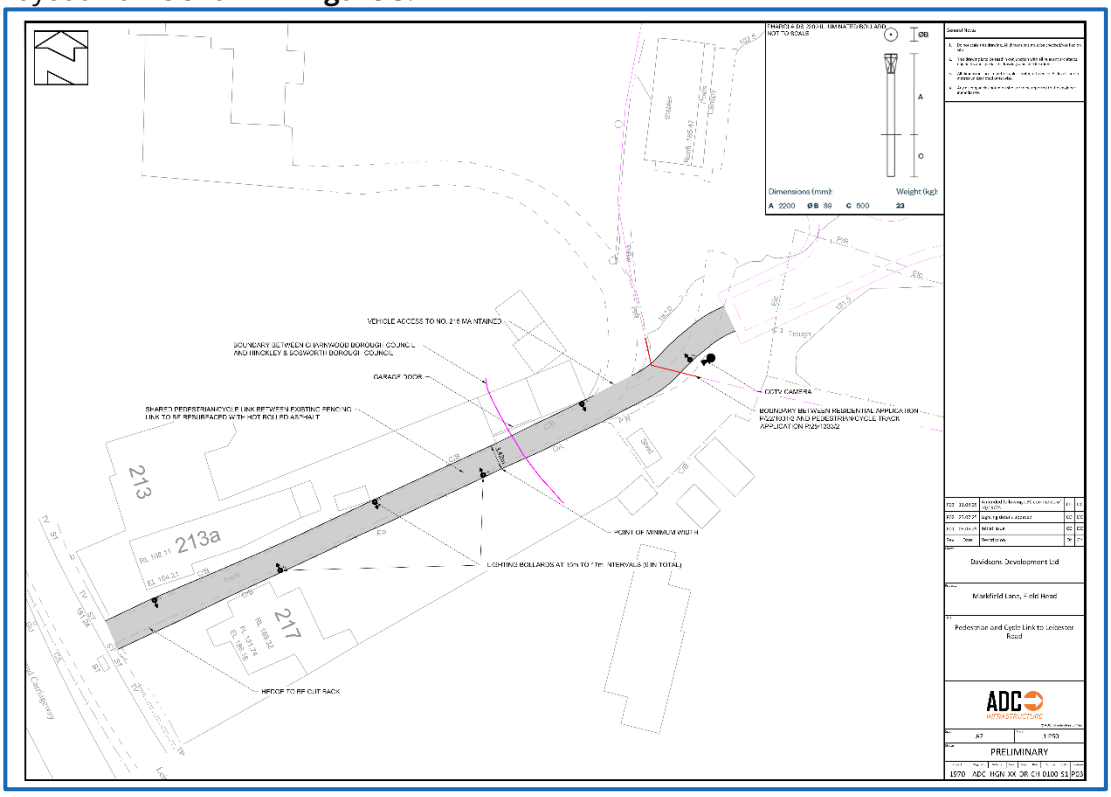

Figure 3: Proposed Development Site layout plan

6.2. Designations

6.2.1. The area is within 2 km proximity of a designated Site of Special Scientific Interest Site (SSSI) this is shown in **Figure 4** and referenced as.

- *Ulverscroft Vally SSSI – 3 separate sites relating to the SSSI are located within 2 km of the Application Site with the closest being approximately 850 m to the northeast.*

Figure 4: Site designation

6.3. Existing lighting

6.3.1. The Application Site currently has no formal lighting and comprises a degraded hardstanding access drive leading to an unlit field track within pasture. To the east, Leicester Road is lit by standard residential street lighting with lanterns mounted at approximately 5–6 metres. Residential dwellings along Leicester Road are likely to have domestic external lighting, including wall lights and occasional floodlights. To the north, Markfield Lane exhibits a similar lighting environment. A visual representation of the lighting surrounding the area can be seen in **Figure 5**.

Figure 5: view of the lighting in the surrounding environment

6.4. Environmental Zone Classification

6.4.1. Based on the evidence of the existing lighting (seen in Section 6.3) and the description of the surrounding environment (seen in Section 6.2) are similar to those expected within an E3 zone.

6.4.2. 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 E3 Environmental Zone.

Zone	Surrounding	Examples	Limitations		Sky Glow ULR (Max)
			Pre-curfew	Post-curfew	
E3	Suburban	Well inhabited rural and urban settlements, small town centres or suburban locations.	10	2	5%

Table 4: Limitations of identified environmental zone.

7. IDENTIFIED RECEPTORS

7.1. Ecological

7.1.1. Preliminary Ecological Appraisal BG22.109 relating to the main development site to the north and Biodiversity Impact Assessment of the proposed pedestrian and cycle link from Leicester Road to the adjacent site do not identify any sensitive areas. However, trees at the northern end of the path will be retained and as a precautionary measure have been classified as a Potential Sensitive Ecological Receptor (PSER). Therefore, the Lighting Strategy seeks to ensure the lowest possible lighting levels are applied and obtrusive light levels are compliant with the relevant Environmental Zone criteria set out in ILP GN01/2021.

7.1.2. A description of the potential ecological receptors, as well as their likely sensitivity to light based on the desktop assessment of the surrounding environment, can be seen in **Table 5.**

Receptor Type	Receptor No. (Appendix 3)	Description
Ecology	PSER 001	Treeline to north of northern end of the path.
Ecology	PSER 002	Treeline to south of northern end of the path.

Table 5: Potentially Sensitive Ecological Receptors (PSER)

7.2. Human Amenity

7.2.1. To the north and south of the site, Potential Human Amenity Receptors (PHAR) have been identified as shown in **Appendix 3**. Therefore, this Lighting Strategy has been written in accordance with GN01/2021 (Table 2 - Obtrusive Light Criteria).

7.2.2. A description of the potential human receptors and their likely sensitivity to light can be seen in **Table 6.**.

Receptor Type	Receptor No. (Appendix 3)	Description
Human Amenity	PHAR 001	Residential dwellings 213A and 215 Leicester Road immediately to the north of the path.
Human Amenity	PHAR 002	Residential dwelling 217 Leicester Road immediately to the south of the path.
Human Amenity	PHAR 003	Residential dwelling 223B Leicester Road to the south of the path.
Human Amenity	PHAR 004	Rears of residential dwellings located to the north on Markfield Lane.

Table 6: 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 for this area will be to an adoptable specification but will not be put up for adoption.

8.1.3. Lighting will be of an appropriate specification and designed in accordance with British Standards.

8.1.4. 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.

8.1.5. 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.

8.1.6. 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.

8.1.7. All lighting unless otherwise stated is to emit a warm white colour temperature light (2700 Kelvin or less) to reduce the potential for adverse effects onto potentially sensitive receptors.

8.1.8. Lighting in unadopted areas will be required in the following task areas:

- Footpath and cycleway

8.2. Footpath and Cycleway

8.2.1. The Footpath and Cycleway will be illuminated for wayfinding only. The lowest possible lighting levels are proposed within this Lighting Strategy.

8.2.2. The layout proposed in **Appendix 1** has been designed based on the specification of the CCTV camera to be installed in the Proposed Development. As seen in **Table 7** the lowest detectable light level of the camera is 0.01 lux, as such the minimum level of light proposed would not drop below this.

8.2.3. For equipment specification and design parameters see **Table 8** and **Table 9**.

.Camera Specification		
Manufacturer	Redvision	
Part code	RVX2S-IR-B	
Description	30:1 4MP Zoom Ball PTZ, IR, WIPER - Black	
Min Illumination	Color: 0.01 Lux @ (F1.6, AGC ON) B/W: 0.001 Lux, 0 Lux (IR LED ON)	
Lighting & DORI (Detect, Observe, Recognise, Identify)		
	Illumination Range	IR (850nm) to 300m
	DORI Category	Distance Covered
	Detection	IR Light: 300m
	Observation	IR Light: 250m
	Recognition	IR Light 150m
	Identify	IR Light 75m
Length of Proposed Development (approximated)		94m total

Table 7: Camera information

Area	Light level		MF used	Note
	Eav Lux	Min[9]		
Footpath and Cycleway	3.47	0.17	0.85	The minimum light level should not be less than 0.1 lux

Table 8: design parameters BS5489

[9] Minimum required lux level

Equipment Specification	
Application Area	Footpath and Cycleway
Correlated Colour Temperature (Kelvin)	≤2700K
Lumen Output	≤ 1200
Height	≤2.2
Mounting Arrangement	Root mounted
Luminaire Tilt	0
Upward Light Output Ratio E3 < 5%	0
Luminaire Manufacturer	DW Windsor
Luminaire family	Pharola DS with 180^0 back shield
Example Luminaire Image	
Light Spill Diagram reference	Type A
Controls[10]	Solar Time Clock, on at Dusk off at Dawn

Table 9: Luminaire performance requirements

[10] Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

9. TECHNICAL OVERVIEW

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 GN01/2021, 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[11]. 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

9.2.2. Where ecological 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 0.4 Lux, keeping the light levels within the guidance given within GN08/2023.

9.2.3. In line with section 4.56 of GN08/2023, the vertical grids are mounted at a height of 2 metres above the ground level to simulate the likely flight path of a light sensitive bat. See **Table 10** for the relevant vertical grid results.

Receptor No	GN08/2023 requirements	Maximum vertical Illuminance (Lux)	Notes
PSER 001	0.40	0.18	N/A
PSER 002	0.40	0.38	N/A

Table 10: PSER results table, maximum illuminance.

9.2.4. 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 2 Lux, keeping the light levels within the guidance given within GN01/2021 for an area identified as an E2 environment. See **Table 11** for the relevant vertical grid results.

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

Receptor No	GN01/2021 requirements		Maximum vertical Illuminance (Lux)	Notes
	Pre-curfew	Post Curfew		
PHAR 001	10 Lux	2 Lux	1.53	Less than post Curfew limitations
PHAR 002	10 Lux	2 Lux	0.48	
PHAR 003	10 Lux	2 Lux	0.01	No perceivable increase on the existing baseline
PHAR 004	10 Lux	2 Lux	0.01	

Table 11: PHAR results table, maximum illuminance

9.3. Technical Summery

9.3.1. Based on the figures shown in **Table 11**, the application of lighting to the adoptable standard can be applied, and privately maintained, in a fashion that will not negatively affect the existing or future potential huma receptors.

9.3.2. Whilst the section of land highlighted within this report was not deemed to be ecologically sensitive, the row of trees retained as a precautionary measure will still be within the limitations of the GN08/2023 guidance limitations in terms of maximum levels of illumination.

9.3.3. The Lighting proposed is of a height whereas to alter the light source would be difficult, it would not obstruct the use of the Proposed Development and would not significantly impact the existing visual landscape.

9.3.4. The light level proposed is appropriate to ensure optimal use of the CCTV system to be installed.

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. Where applicable, shields are proposed in particularly sensitive areas to further minimise spill.

9.4.3. Through the use of the control methods detailed in **Section 8**, the amount of light in the affected Application Area is to be restricted to the amount of time required for amenity and safety purposes only.

9.4.4. 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. 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** and **2**.

10.1.4. The Application of light to ensure safe passage will be in accordance with the ILP GN01/2021 guidance and the light spill limitations within GN08/2023.

10.1.5. The lighting will provide safe wayfinding , and a level of light uniformed enough to offer a suitable visual continuity for the use of CCTV proposed.

10.1.6. The light source will be mounted 2.2mtrs above ground level making it hard to access.

10.1.7. Although the light levels do not align with those specified in the British Standards (BS 5489-1:2020 and BS EN 130201-2:2015), the use of advanced technology and equipment capable of operating effectively at lower illumination permits a reduced lighting level.

10.1.8. 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 of both LPA's previously mentioned

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document 4069-DFL-ELG-XX-LD-EO-13001-S3

APPENDIX 2 – VERTICAL LIGHT SPILL DIAGRAM

See accompanying document 4069-DFL-ELG-XX-CA-EO-13001-S3

APPENDIX 3 – SENSITIVE RECEPTORS

Figure 6: Sensitive receptors

TECHNICAL DESCRIPTIONS, 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 andP.*

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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