



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

BROOK STREET GARAGE

TECHNICAL NOTE

DFL-UK

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1. INTRODUCTION

1.1. General

- 1.1.1. This Technical note 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. This Technical note addresses Planning Condition 9 in respect of application ref DM/23/1400, for the demolition of existing commercial buildings and the erection of a replacement building. Planning Condition 9 relates to the lighting design as seen below.

"A lighting design scheme for biodiversity shall be submitted to and approved in writing by the local planning authority. The scheme shall identify those features on site that are particularly sensitive for bats and that are likely to cause disturbance along important routes used for foraging; and show how and where external lighting will be installed (through the provision of appropriate lighting contour plans, Isolux drawings and technical specifications) so that it can be clearly demonstrated that areas to be lit will not disturb or prevent bats using their territory. All external lighting shall be installed in accordance with the specifications and locations set out in the scheme and maintained thereafter in accordance with the scheme. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority."

"Reason: To allow the Local Planning Authority to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife and Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats and species)."

2. BRITISH STANDARDS

2.1. BS EN 12464-2:2014 - Light and Lighting – Lighting of workplaces

- 2.1.1. This British and European standard specifies lighting requirements for outdoor workplaces which meet the needs for visual and performance. All visual tasks are considered with the exclusion of lighting specified for the use of lighting required in an emergency.
- 2.1.2. The garage yard will not be lit to a British Standard. The client has requested the design to have a single floodlight facing the yard. This replicates the current lighting set up on the existing building, which is deemed sufficient by the client for their purposes.
- 2.1.3. The yard is enclosed for the sole use of this business with no through traffic and only slow-moving vehicles, so risk would be very low. Furthermore, this minimalistic approach reduces the impact on sensitive receptors bordering the site.

¹ <https://www.dfl-uk.com/about/>

3. GUIDANCE

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

- 3.1.1. 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**)."*

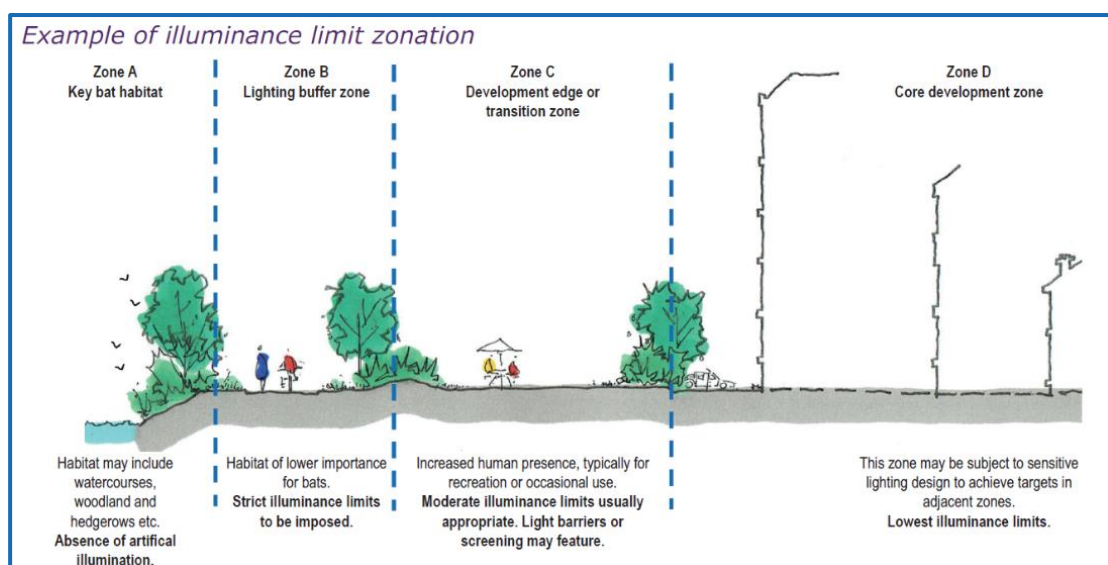


Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

4. LIGHTING APPROACH

General

- 4.1.1. The lighting design seeks to provide sufficient light for the operation and amenity of Brook Street garage during the hours of darkness, whilst ensuring no obtrusive light issues are caused to adjacent sensitive receptors.

5. ECOLOGICAL

Sensitivities

- 5.1.1. The western boundary of the Application Site has been identified in the Preliminary Roost Assessment and Barn Owl Survey by aLyne Ecology version 002, dated 23/02/2024, as an area where potentially sensitive ecological receptors maybe present, as shown in **Appendix 3**. Additionally, the Preliminary Roost Assessment recommends light is kept away from woodland and hedgerows, so the eastern boundary has also been treated as a sensitive ecological receptor. Therefore, this technical note has been written in accordance with GN08/2023. A description of Potentially Sensitive Ecological Receptors can be found in **Table 1**.

Receptor Type	Receptor No. (Appendix 3)	Description	Sensitivity
Ecology	PSER 001	Potential commuting and foraging opportunities for bats on land adjacent to western boundary.	High
Ecology	PSER 002	Potential commuting and foraging opportunities for bats on land adjacent to eastern boundary.	High

Table 1: Ecology locations

6. SUMMARY OF RESULTS

6.1. Overview

- 6.1.1. 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 GN08/2023, at sensitive receptors.

- 6.1.2. 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 $MF = 1.0^2$. This demonstrates the light levels at their highest (initial light levels at the start of luminaire life).
- 6.1.3. 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.
- 6.1.4. In line with section 4.56 of GN08/2023, the vertical grids will be mounted at a height of 1.5 metres above the ground level to simulate the likely flight path of a light sensitive bat. The results can be seen in **Table 2**.

Receptor No	GN08/2023 requirements	Maximum vertical Illuminance (Lux)	Pass/fail
PSER 001	0.40	0.00	Pass
PSER 002	0.40	0.22	Pass

Table 2: PSER results table, maximum illuminance.

² <https://www.dfl-uk.com/knowledge-hub/faqs/>

7. CONCLUSION

7.1. General

- 7.1.1. This technical note has been written in accordance with the relevant industry guidance to ensure it is unlikely to give rise to obtrusive light with the potential to affect ecological receptors.
- 7.1.2. Through the application of the processes proposed within this technical note, sensitive receptors will not be adversely affected by obtrusive light, as shown in **Appendix 1** and **2**.
- 7.1.3. The technical note addresses and satisfies Planning Condition 9, based on the ecologist's recommendations and following their restricted equipment specification are proven to not negatively impact ecology and ensure external lighting will not cause disturbance to commuting and foraging routes identified as being sensitive for bats.
- 7.1.4. Land adjacent to the eastern and western boundaries has been recognised by the ecologist as areas with potential to be sensitive for bats. Therefore, lighting has been restricted along the eastern boundary. The western boundary, as evidenced in **Appendix 1** and **2** is to be unaffected by light spill and will be protected from the Application Site's exterior lighting, due to the surrounding structures, these will form light blocking element.
- 7.1.5. Floodlighting should be a maximum colour temperature of 2700 Kelvin, with a mounting height no greater than 3 metres, maximum output of 2000 lumens and tilt angle of no greater than 15 degrees. Furthermore, lighting will be off during non-business hours unless triggered by motion sensor for security purposes.
- 7.1.6. Through the implementation of the restrictions outlined within this technical note, it can be demonstrated that the proposed external lighting will comply with the guidance (GN08/2023) for the protection of bats from the negative effects of artificial lighting.

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document 3691-DFL-ELG-XX-LD-EO-13001-S3

APPENDIX 2 – VERTICAL LIGHT SPILL DIAGRAM

See accompanying document 3691-DFL-ELG-XX-LD-EO-13002-S3

APPENDIX 3 – SENSITIVE RECEPTORS



Figure 2: Sensitive receptors

APPENDIX 4 – EQUIPMENT SPECIFICATION

1.1. Luminaire and control specification

Performance requirements are outlined in **Table 1.1**

Equipment Specification	
Application Area	Yard
Correlated Colour Temperature (Kelvin)	$\leq 2700\text{K}$
Luminaire Model	Indicative Symmetrical floodlight
Light Source	LED ≤ 2000 Lumens
Reference	Type G
Height	≤ 3 Mtrs
Mounting Arrangement	Wall mounted
Luminaire Tilt	$\leq 15^\circ$
Example Luminaire Image	
Controls	Motion sensors on for 2 minutes when presence detected for security in non-business hours. Manual switch override for use during operational hours.

Table 1.1: Luminaire performance requirements

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