



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

BROADWAY FARM SITE D

LIGHTING TECHNICAL REPORT

DFL-UK

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1. INTRODUCTION

- 1.1.1. This Lighting Technical Report provides a Lighting Strategy for the lighting within the Application Site, and to comply with local council policies.
- 1.1.2. This report outlines the following:
- Local policies and guidance which will be followed within the Lighting Strategy
 - A strategy for implementing lighting at the Application Site
 - The result of the model for the proposed Lighting Strategy
- 1.1.3. Through careful design and mitigation, the Lighting Strategy ensures the proposed lighting at the Application Site will be in accordance with Industry Guidance and Local Policy.

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: ¹

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

[...] artificial ²light 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 (Amended 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 considered³:

“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*

¹ <https://www.legislation.gov.uk/ukpga/1990/43/part/III/crossheading/statutory-nuisances-england-and-wales> Section 79, paragraph 1,

² 2005 Section 102 relating to section 79, Indent reference (fb)

³ Paragraph 198 NPPF 2024 page 57

- *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:⁴

"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.*

⁴ <https://www.gov.uk/guidance/light-pollution>, Paragraph 002 Ref ID: 31-002-20191101 revision 01 11 2019

- > *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. Eastleigh Borough Council, Eastleigh Borough Local Plan (2016 – 2036)

3.1.1. The relevant Local Planning Authority (LPA) for the Proposed Development is Eastleigh Borough Council, with policies detailed within the Eastleigh Borough Local Plan (2016 – 2036) adopted April 2022 applying to the lighting associated with the Proposed Development.

3.1.2. The applicable policies are:

DM8 - Pollution

“1. Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:

- a. air pollution (including odours or particulate emissions);
- b. pollution of surface, underground, coastal waters or other watercourses;
- c. noise or vibration;
- d. light intrusion, both generally and with respect to the South Downs National Park's status as an International Dark Night Skies reserve; or
- e. land contamination.

2. Development susceptible to particular forms of pollution will not be permitted:

- a. where it will be adversely affected by such pollution, unless measures can be taken that adequately mitigate the polluting effects; or
- b. where it would inhibit existing economic or other activities giving rise to acceptable polluting effects.

3. Where a development site is known or suspected to be contaminated, before the site is developed the Borough Council will require the contamination to be remediated to a standard where as a minimum it cannot be defined as 'contaminated land' under Part IIA of the Environmental Protection Act 1990.”

4. GUIDANCE

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

- 4.1.1. This Lighting Technical Report 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 (Max %)	Light Trespass (Into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew	Average L (cd/m ²)
E0	0	0	0	0
E1	0	2	0.1 (1 ⁵)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

⁵ If the installation is for public (road) lighting, then this may be up to 1 lx

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

- 4.2.1. 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 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)."

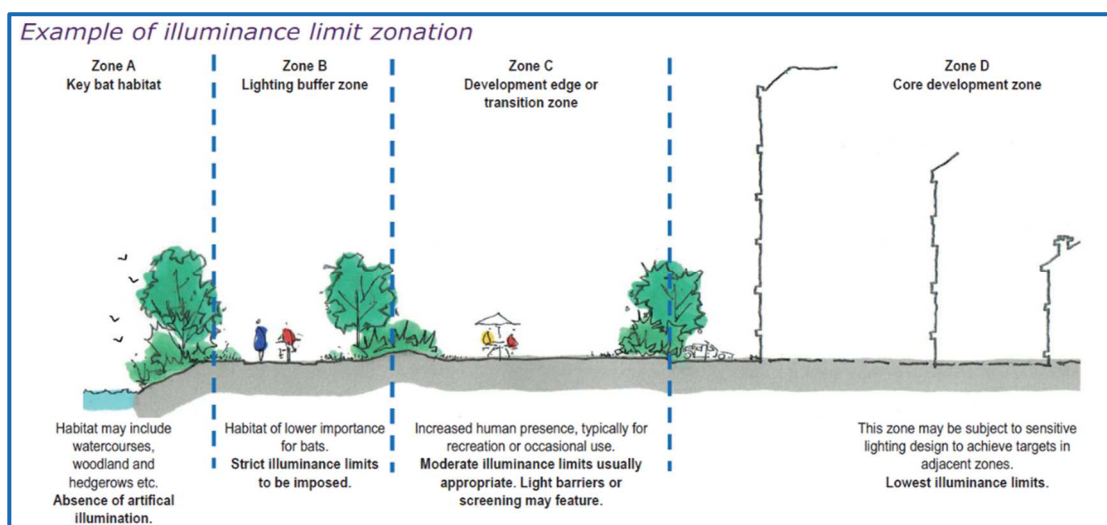


Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

5. PROPOSED LIGHTING STRATEGY

5.1. Purpose of the Lighting Strategy

5.1.1. The purpose of this Lighting Strategy is to:

- Provide a framework to propose reasonable lighting at the Application Site which is fit for the intended purpose and protects the character and appearance of the surrounding area,
- Provide protection to the boundaries of the Application Site and local residence from the effects of lighting in line with Policy DM8

5.1.2. Mitigation is included within the Lighting Strategy and is clearly noted within **Table 3**.

5.2. Lighting Strategy

5.2.1. Lighting is proposed for the Application Site for wayfinding only. This means no British Standard illuminance levels will be provided across the Application Site, and the proposed lighting will be used to provide visual guidance only.

5.2.2. Lighting is proposed to be mounted onto a solid board fence which will be installed along the boundaries of the Application Site and will replace any existing fencing in these locations.

5.2.3. An example of the type of fence to be used can be seen in **Figure 2**.

5.2.4. The example fence in **Figure 2** will act as a rear light shield, preventing lighting spill onto the surrounding woodland.



Figure 2: Example of a Solid Boarding Fence⁶

⁶ <https://firstfence.co.uk/2-5m-echoreflex-reflective-acoustic-fencing-kit>

5.2.5. There are several different options to provide lighting for wayfinding at night for the Application Site. The recommended installation method is shown in **Figure 3**.

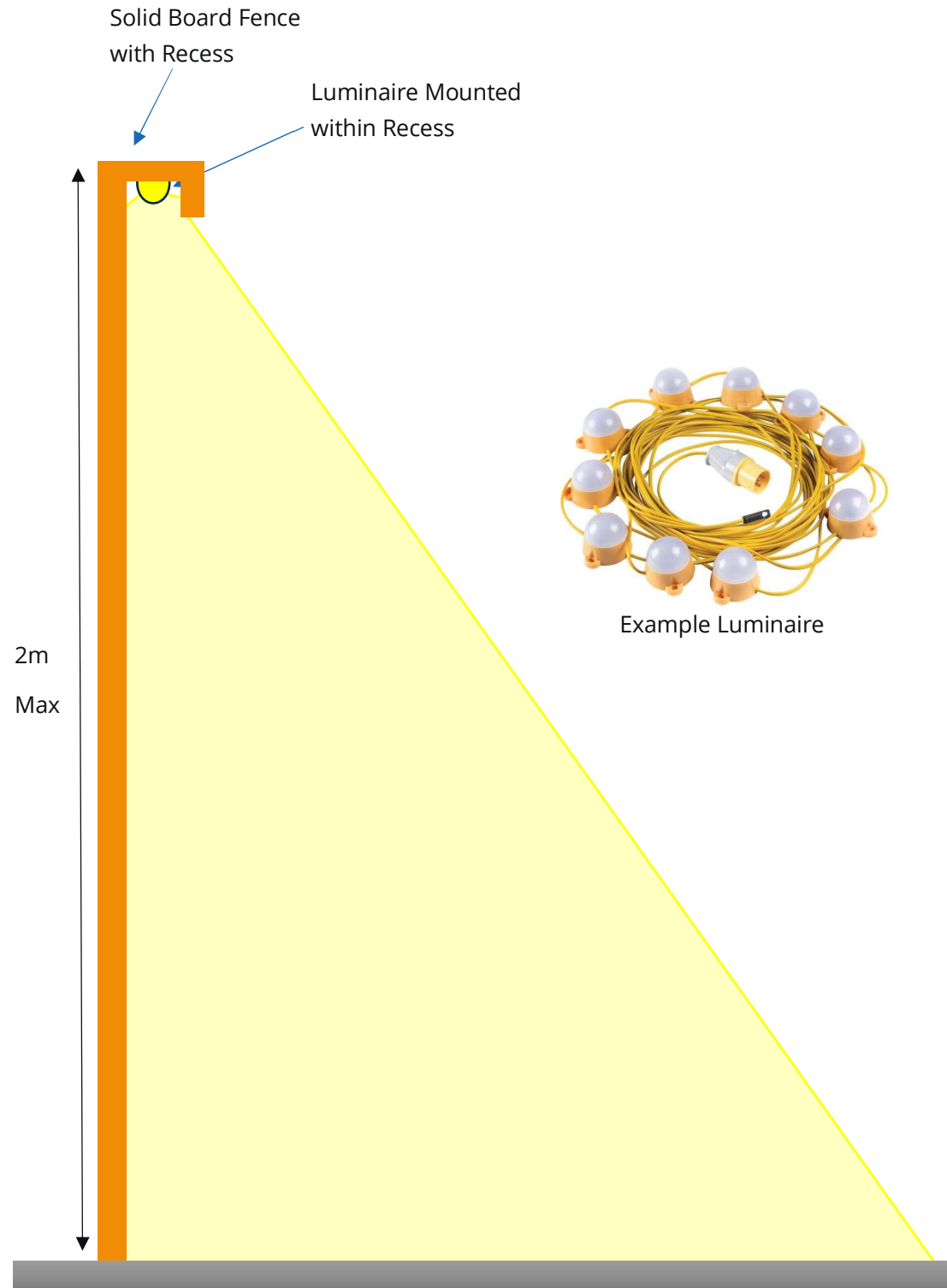


Figure 3: Fence Recess Option

5.3. Indicative Lighting Calculations

- 5.3.1. Indicative lighting calculations have been conducted for the lighting proposed within the Lighting Strategy (**Appendix 1**).
- 5.3.2. All lighting calculations have been conducted using a 3D Lighting Calculations software (Dailux Evo) and the fence has been modelled.
- 5.3.3. All luminaires have been set to a maintenance factor of 1 to represent the light output at the start of luminaire life.
- 5.3.4. All vertical light spill calculations have been conducted using the method detailed within ILP GN08:2023.
- 5.3.5. **Figure 4, Figure 5, Figure 6 and Figure 7** show the results of the light spill modelling.



Figure 4: Horizontal Light Spill Diagram

Notes to **Figure 4**:

- The red lines shown in **Figure 4** represent 0.2Lux. Any area outside of red lines exhibits horizontal illuminance levels below 0.2Lux.

Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2
North Edge of Woodland Perpendicular illuminance Height: 8.000 m	0.067 lx	0.000 lx	0.69 lx	0.00	0.00

Figure 5: Woodland Boundary to the North of the Application Site

Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2
West Edge of Woodland 001 Perpendicular illuminance Height: 8.000 m	0.12 lx	0.008 lx	0.90 lx	0.067	0.009

Figure 6: Woodland Boundary to the West of the Application Site 001

Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2
West Edge of Woodland 002 Perpendicular illuminance Height: 8.000 m	0.12 lx	0.001 lx	0.65 lx	0.008	0.002

Figure 7: Woodland Boundary to the West of the Application Site 002

Notes to **Figure 5**, **Figure 6** and **Figure 7**:

- The height shown is for the middle of the calculation grid. The calculations grids are 12m tall making the bottom of the calculation grid 2m from ground level as per GN08:2023.
- 5.3.6. There are small exceedances in the lighting model of the 0.5lux recommended maximum illuminance on the woodland calculation grids (by 0.19Lux, 0.4Lux and 0.15Lux). However, the average illuminance readings across the calculation grids are very low (0.067Lux and 0.12Lux). This shows that the woodland will not experience a perceptible level of illuminance while the lighting is active.
- 5.3.7. The effects of these levels of illuminance will be further reduced through the use of motion sensor control on the Application Site. This will ensure that the lighting is only active when needed, both reducing any visual effects of lighting within the landscape and reducing energy consumption.

5.4. Mitigation

5.4.1. The mitigation proposed is detailed within **Table 3**.

Mitigation Name	Description of Mitigation	Installed location
0% Upward Light Output Ratio	All luminaires within the Application Site to be installed within a recess in the fence (Figure 3). Additionally, all luminaires to be installed facing down (0° of tilt).	On all proposed luminaires
Motion Sensor Control	All lighting within the Application Site will be controlled by motion sensors. This will limit the amount of time the lighting is active and will ensure it is only on when needed.	At the entrance to the Application Site
Solid Boarding Fence	Any perimeter fence is to be changed to a solid boarding fence no more than 2.5m in height (Figure 2). The proposed luminaires are to be mounted to this at 2m in height maximum. This combined with the recess on the fence will act as light shields, thus protecting the surrounding woodland from the effects of lighting.	On the North, South and West boundaries of the Application Site

Table 3: Mitigation Table

6. CONCLUSION

6.1. Lighting Strategy and Lighting Modelling

- 6.1.1. A recommended option for the installation of the sensitive lighting system have been provided within the Lighting Strategy (**Figure 3**).
- 6.1.2. The Proposed Lighting Scheme is suitable for the use of the Application Site for the purpose of wayfinding and aims to protect the character and appearance of the surrounding area, living conditions of nearby residents and adjacent woodland.
- 6.1.3. Mitigation measures have been recommended in **Table 3** to comprehensively reduce unnecessary light spill. This includes:
 - Application of fences being used as back light shields
 - The installation of PIR controls will ensure lighting is only being used when needed
- 6.1.4. To assess the effects of the proposed lighting, the option shown in **Figure 3** has been modelled in a 3D lighting calculation software. The results of this modelling can be seen in **Figure 4, Figure 5, Figure 6** and **Figure 7**.
- 6.1.5. These results show that the Lighting Strategy would result in a comprehensive Proposed Lighting Scheme for wayfinding, without excess light spill. This also shows that there would not be significant effects on the character and appearance of the surrounding area, living conditions of nearby residents, or on ecology from lighting.

6.2. Policy Compliance

- 6.2.1. The results of the light spill modelling as shown in **Figure 4, Figure 5, Figure 6, Figure 7** and in **Appendix 1** show that the proposed lighting strategy would not result in:

"1. Development will not be permitted if it is likely to cause loss of amenity or impact on public health or other unacceptable environmental impacts through:

....

e. light intrusion, both generally and with respect to the South Downs National Park's status as an International Dark Night Skies reserve; or

..."

- 6.2.2. and therefore, is compliant with Policy DM8 – Pollution of the Eastleigh Borough Council, Eastleigh Borough Local Plan (2016 – 2036).

APPENDIX 1

Indicative Lighting Calculations

See separate document: **3850-DFL-ELG-XX-CA-EO-13004**

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