



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

ASHINGDON

DESIGN SUMMARY REPORT

DFL-UK

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1. INTRODUCTION

1.1. Scope of Works

- 1.1.1. This report will set out the proposed external lighting design for a residential car park serving a housing area in Ashington, West Sussex. The purpose of the lighting design is to provide a safe, functional, and appropriate level of illumination for vehicles and pedestrians using the car park during hours of darkness, while minimising light spill, glare, energy use, and impact on neighbouring properties and the surrounding environment.
- 1.1.2. Please refer to **Figure 1** for an overview of the site.

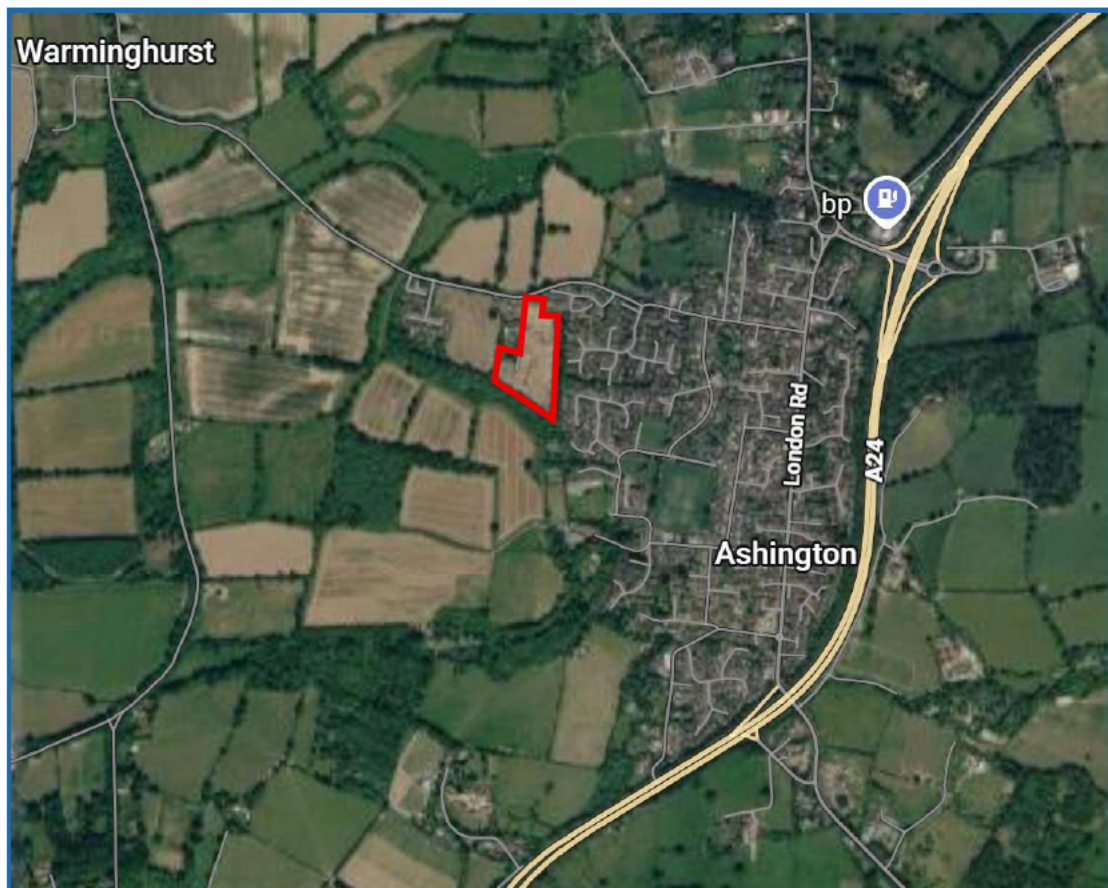


Figure 1: Site Plan

2. BRITISH STANDARDS

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

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

2.2. BS EN 12464-2:2024 - Light and Lighting – Lighting of workplaces

- 2.2.1. This British and European standard specifies lighting requirements for outdoor workplaces which meet the needs for visual and task performance. All visual tasks are considered with the exclusion of emergency lighting.

3. GUIDANCE

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

3.1.1. This Design Summary 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. It is informed by the most relevant sections of GN01:2021 that has recently been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks.
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty ¹ , 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 ⁴)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

1 Areas of Outstanding Natural Beauty (AONBs) have been redefined as National Landscapes. References within ILP GN01:2021 to AONBs should therefore be interpreted accordingly. This documentation will be updated in line with this change in future ILP guidance revisions as they are published.

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

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

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

4. DESKTOP ASSESSMENT

4.1. Site Description and Context

- 4.1.1. Ashington is a village and civil parish located within the Horsham District of West Sussex. The settlement is situated along the A24, north-east of Storrington, and has a mixed village-rural character, with established residential areas, local community facilities, recreation opportunities, and surrounding countryside associated with the wider rural landscape north of the South Downs.

4.2. Environmental Zone Classification

- 4.2.1. The Environmental Zone criteria detailed within **Table 1** and **Table 2** informs the basis of the design summary report.
- 4.2.2. The Application Site is considered to be located within an E2 environmental zone. This is because of the Application Sites location within a well inhabited urban area.
- 4.2.3. The lighting classes used within the Proposed Development, and the limitation placed on the lighting in terms of its environmental effect, is informed by the requirements for an E2 zone environmental zone (**Table 3**).

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 lux	1 lux	2.5%

Table 3: Limitations of the Environmental Zone

5. LIGHTING STRATEGY

5.1. Summary

- 5.1.1. 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.
- 5.1.2. Lighting will be for wayfinding only, due to the limited usage of area.

6. SUMMARY OF RESULTS

6.1. Design

6.1.1. The Light Spill Diagram shown in **Appendix 1 – Light Spill Diagram** and **Appendix 2 – Vertical Light Spill Diagram**, demonstrates that the Light Spill Levels associated with the proposed lighting would comply with the obtrusive light guidance set out in ILP GN01:2021 and ILP 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 = 1.0⁵. This demonstrates the light levels at their highest (initial light levels at the start of luminaire life).

6.2. Summary of Results

6.2.1. The proposed lighting within the task area(s) is for wayfinding purposes only.

6.2.2. Where ecological receptors are potentially sensitive to vertical light spill, a vertical illumination grid has been modelled, as shown in **Appendix 2 – Vertical Light Spill Diagram**. The light levels based on the modelling do not exceed 0.4 Lux, keeping the light levels within the guidance given within GN08:2023.

6.2.3. 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.

Receptor No	GN08:2023 requirements	Maximum vertical Illuminance (Lux)	Notes
PSER 001	0.40 Lux	0.04	

Table 4: PSER Results Table, Maximum Illuminance

6.2.4. Where human receptors are potentially sensitive to vertical light spill, a vertical illumination grid has been modelled, as shown in **Appendix 2 – Vertical Light Spill Diagram**. The light levels based on the modelling do not exceed 1 Lux, keeping the light levels within the guidance given within GN01:2021 for an area identified as an E2 environment.

Receptor No	GN01/2021 requirements		Maximum vertical Illuminance (Lux)	Notes
	Pre-curfew	Post-curfew		
PHAR 001	5 Lux	1 Lux	0.57	

Table 5: PHAR Results Table, Maximum Illuminance

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

7. LIGHTING DESIGN

7.1. Overview

- 7.1.1. It is proposed that the car park is lit with solar bollards, that switch on via a PIR, and switch off again after a period of non-detection to limit its impact on the environment and residents.

7.2. Column Locations (setbacks, clearances and clear zones)

- 7.2.1. The bollards are positioned away from the houses as much as possible to reduce the shadowing from the South aspect.
- 7.2.2. Where possible, proposed bollards have been designed at the front of the verge with a minimum setback of 800mm from the face of the kerb to the leading edge of the bollard.

7.3. Supply

- 7.3.1. All new bollards are solar powered, thus not needing a low voltage mains network.

7.4. Maintenance Factors

- 7.4.1. Maintenance factors have been based on manufacturer data.

$$OMF = 0.80$$

7.5. Dimming Regime

- 7.5.1. The bollards will trigger to 20% of maximum output and then switch to off after 30 seconds of non-detection. This ensures wayfinding lighting can be provided throughout the night, all year round.

7.6. Mitigation and Enhancements

- 7.6.1. Careful design ensures the lighting has been minimised onto sensitive receptors in accordance with standards and guidance.
- 7.6.2. With the residential dimming regime applied, the obtrusive light levels calculated will be within limits for an E2 Environmental Zone. Whilst the proposed product exceeds the upward light requirements of 2.5% (3%), this is limited to a 30 second period after non-detection before switching off.

8. ASSUMPTIONS

8.1. Overview

8.1.1. It is assumed the solar bollards will have the following dormancy between the hours below:

16:00 - 22:00 - Assumed 85% dormancy

22:00 - 06:00 - Assumed 95% dormancy

06:00 - 08:00 - Assumed 85% dormancy

8.1.2. The calculation assumes solar panels are not shadowed by buildings, fences or trees and have clear South facing aspect during the day.

8.1.3. The calculation is based on 5 years of historical weather data, future performance cannot be guaranteed.

9. RISK ASSESSMENT

9.1. Overview

9.1.1. Refer to **4775-DFL-HLG-XX-RA-EO-13001** for the full risk assessment.

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document 4775-DFL-HLG-XX-LD-EO-13001-S3

APPENDIX 2 – VERTICAL LIGHT SPILL DIAGRAM

See accompanying document 4775-DFL-ELG-XX-CA-EO-13001-S3

TECHNICAL DESCRIPTION, DEFINITIONS & 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&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&P.](#)

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&P.](#)

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 I_v <of a source, in a given direction> quotient of the luminous flux, $d\Phi_v$, leaving the source and propagated in the element of solid angle $d\Omega$ containing the given direction, by the element of solid angle (unit: $cd = lm \cdot sr^{-1}$). 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. L_v <in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: $cd \cdot m^{-2} = lm \cdot m^{-2} \cdot sr^{-1}$) 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. E_v (unit: $lx = lm \cdot m^{-2}$) 1. <at a point of a surface> quotient of the luminous flux $d\Phi_v$ 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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- **Residential** teams that cover all aspects of new development and redevelopment spanning private, section 38 and section 278 design packages.
- **Public Realm** teams that are experts in enhancing night-time public spaces to create inviting spaces and opportunity for local economies to thrive during the hours of darkness.
- **Electrical** teams – we don't just put a light in the ground, we can help you get power to it as well! Additionally, we also offer design services for EV charging. As this market rapidly expands, make sure you have the experts managing the load, otherwise your EV charging solutions might not live up to expectations.
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THE POWER TO MAKE LIGHT WORK



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