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6 JOHNSON DRIVE, FINCHAMPSTEAD

TECHNICAL REPORT

DFL-UK
17 City Business Centre, Hyde Street, Winchester, SO23 7TA
+44(0)1962 855080 | info@dfl-uk.com | www.dfl-uk.com

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EXECUTIVE SUMMARY

The Technical Report proposes good practice and outlines a suitable approach for the proposed lighting at 6 Johnson Drive, Finchampstead for the purpose of safety, security, wayfinding and amenity.

It has been identified that the Application Site is set within a relatively dark outer suburban location (E2).

The lighting complies with relevant industry standard guidance (GN01:2021 and GN08:2023) and addresses Planning Condition 14 (as below) and Local Policies CP3 and CP7 of the Adopted Core Strategy Development Plan and TB23 of the Adopted Managing Development Delivery Local Plan Document. This is achieved by directing light down, allowing no upward light and limiting mounting heights to minimise light spill into areas identified as ecologically sensitive.

14. No development shall commence until a biodiversity-sensitive lighting scheme designed in accordance with Bats and Artificial Lighting in the UK' Guidance Note GN 08 / 23 has been submitted to and approved in writing by the local planning authority. Such details shall include location, height, type and direction of light sources and intensity of illumination and through the provision of appropriate contour plans, curfews and technical specifications clearly demonstrate that any areas to be lit will not disturb or negatively impact biodiversity and dark corridors will be maintained. All lighting shall be installed in accordance with the specifications and locations set out in the strategy, and these shall be maintained thereafter in accordance with the strategy. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority. The lighting scheme shall not include any street lighting.

Reason: To limit the impact of light pollution on the Natural Environment, and bats, badger and herpetofauna in particular. Relevant policy: NPPF Paragraphs 180, 186 and 191 and Core Strategy Policies CP3 and CP7 and Managing Development Delivery Local Plan policy TB23.

1. INTRODUCTION

1.1. General

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 Lighting Strategy within this Technical Report 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 Industry 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 Industry 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 (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 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."*

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[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. Wokingham Borough Council, Adopted Core Strategy Development Plan Document.

3.1.1. The relevant Local Planning Authority (LPA) for the Proposed Development is Wokingham Borough Council, with policies detailed within the Adopted Core Strategy Development Plan Document adopted January 2010 applying to the lighting associated with the Proposed Development.

The applicable policies are:

CP3 – General Principles for development

"Planning permission will be granted for proposals that:

a) Are of an appropriate scale of activity, mass, layout, built form, height, materials and character to the area together with a high quality of design without detriment to the amenities of adjoining land users including open spaces or occupiers and their quality of life;

b) Provide a functional, accessible, safe, secure and adaptable scheme;

c) Have no detrimental impact upon important ecological, heritage, landscape (including river valleys) or geological features or water courses.

d) Maintain or enhance the ability of the site to support fauna and flora including protected species;"

CP7 – Biodiversity

"Sites designated as of importance for nature conservation at an international or national level will be conserved and enhanced and inappropriate development will be resisted. The degree of protection given will be appropriate to the status of the site in terms of its international or national importance.

Development:

A) Which may harm county designated sites (Local Wildlife Sites in Berkshire), whether directly or indirectly, or

B) Which may harm habitats or, species of principle importance in England for nature conservation, veteran trees or features of the landscape that are of major importance for wild flora and fauna (including wildlife and river corridors), whether directly or indirectly, or

C) That compromises the implementation of the national, regional, county and local biodiversity action plans will be only permitted if it has been clearly demonstrated that the need for the proposal outweighs the need to safeguard the nature conservation importance, that no alternative site that would result in less or no harm is available which will meet the need, and:

i) Mitigation measures can be put in place to prevent damaging impacts; or

ii) Appropriate compensation measures to offset the scale and kind of losses are provided."

3.2. Wokingham Borough Council, Adopted Managing Development Delivery Local Plan.

3.2.1. The relevant Local Planning Authority (LPA) for the Proposed Development is Wokingham Borough Council, with policies detailed within the Adopted Managing Development Delivery Local Plan adopted February 2014 applying to the lighting associated with the Proposed Development.

The applicable policies are:

TB23 – Biodiversity and Development

"1. Sites of national or international importance are shown and sites of local importance are defined on the Policies Map.

2. Planning permission for development proposals will only be granted where they comply with policy CP7 – Biodiversity of the Core Strategy and also demonstrate how they:

a) Provide opportunities, including through design, layout and landscaping to incorporate new biodiversity features or enhance existing

b) Provide appropriate buffer zones between development proposals and designated sites as well as habitats and species of principle importance for nature conservation

c) Ensure that all existing and new developments are ecologically permeable through the protection of existing and the provision of new continuous wildlife corridors, which shall be integrated and linked to the wider green infrastructure network."

4. BRITISH STANDARDS

4.1.1. Lighting associated with the Proposed Development is required for safety, amenity and security purposes only and not in accordance with any British Standard. Light spill has been controlled by restricting the mounting heights and the use of motion sensor controls as detailed in **Table 5**. The lowest practicable lighting levels are proposed within this Technical Report.

5. GUIDANCE

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

5.1.1. The Lighting Strategy has been developed in accordance with industry guidance aimed at minimising the risk of obtrusive light, which often results from poorly designed or installed external lighting. It draws specifically on the most relevant sections of GN01:2021, which provides best practice recommendations for reducing obtrusive light across a wide range of outdoor 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.

5.2.2. Based on the information provided the following limitations are recommended

- Horizontal light levels are not exceeding 0.2 lux[9]
- Vertical light levels are not achieved greater than 0.4 lux[9] between 1.5mtrs and 6.5 mtrs above ground level [10]
- Correlated Colour Temperature (CCT) will be equal to or less than 2700K[11]

5.2.3. Where standardised mitigation is to be used, the Bat Conservation Trust Guidance (BCT), Landscape and urban design for bats and biodiversity [12]is consulted using the following methods in conjunction with ILP guidance (GN08).

- Minimum light for safety is to be used (as per British Standards or relevant guidance documents)
- Flat cut-off lanterns are to be proposed
- The most appropriate narrow spectrum light will be used avoiding blue wavelengths (less than 2700K)
- Pedestrian lighting in close proximity will be targeted below 3 Lux
- Increased lantern spacing
- Lighting of only high risk stretches of roads allowing headlights to provide necessary illumination at other times.
- Limiting the times of use to provide dark periods
- Use of temporary close-boarded fencing until vegetation matures shielding sensitive areas from lighting.
- Deployment of hop-over at crown height, hop over vegetation, hop over vegetation and walls and viaduct bridges.

5.2.4. Whilst lighting will be designed to comply with the GN08:2023 criteria for creation of a dark corridor (horizontal of 0.2 lux and vertical of 04 lux) any break in a foraging route will either be reconnected, diverted or mitigated where possible.

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[9] GN08:2023 Paragraph 4.54 page38

[10] GN08:2023 paragraph 4.56 page 39 for 1.5m height, 6.5m height based on the underside of an established tree canopy.

[11] GN08:2023 paragraph 4.29 page 29, BCT Bats and Lighting, Overview of current evidence and Mitigation paragraph 3.1.1 page 22.

[12] BCT Landscape and Urban design for bats and biodiversity page 28 and page 29

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 comprised of a lawned garden with scattered trees and a large conifer hedge to the western boundary. The southern boundary is marked by a tarmac driveway which provides access to 6 Johnson Drive. An indicative boundary of the site can be seen in **Figure 1.**

Figure 1: The Application Site Location and Boundary

6.1.3. The Proposed Development is a full application for the proposed erection of 1 no. detached five bedroom dwelling with associated parking. The Site Layout Plan is shown in **Figure 2**.

Figure 2: Proposed Development Site Layout Plan

6.2. Designated Sensitive Site

6.2.1. There is not a designated Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI) or National Landscape (Formerly AONB) within a radius of approximately 2 km[13] of the Application Site, as demonstrated in **Figure 3**.

Figure 3: Site Designation

[13] 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)

6.3. Existing lighting

6.3.1. Areas to the north and east of the Application Site are largely dark, being predominantly woodland with the presence of isolated detached dwellings with large gardens.

6.3.2. To the south and west of the Application Site is more suburban in nature with the village of Finchampstead and its residential development dominating. The main distributor roads through the village: Nine Mile Ride (B3430) to the south, Sandhurst Road (A321) to the east and Finchampstead Road (B3016) to the west are all lit as traffic routes with 8 m columns. Most of the subsidiary residential roads have lower-level street lighting with 6 m column mounted luminaires creating a well-lit suburban environment. **Figure 4** provides a visual representation of the surrounding lit environment, showing the higher-level lighting on Nine Mile Ride and the lower-level lighting on the subsidiary roads.

Figure 4: 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 6.1**) are similar to those expected within an E2 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 E2 Environmental Zone.

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. It has been assumed based on the available topographic view, that the areas to west and east are likely to be ecologically sensitive. The visual location of these areas can be seen in **Appendix 3 – Sensitive Receptors**.

7.1.2. A description of the potential ecological receptors can be seen in **Table 4**.

Receptor Type	Receptor No. (Appendix 3)	Description
Ecology	PSER 001	Hedgerow/treeline adjacent to the western boundary
Ecology	PSER 002	Woodland to the east beyond No. 6 Johnson Drive

Table 4: Potentially Sensitive Ecological Receptors (PSER)

7.2. Human Amenity

7.2.1. To the south, southwest, west and east of the site, Potential Human Amenity Receptors (PHAR) have been identified as shown in **Appendix 3 – Sensitive Receptors.** 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 can be seen in **Table 5.**

Receptor Type	Receptor No. (Appendix 3)	Description
Human Amenity	PHAR 001	Residential dwelling (No. 4 Johnson Drive) adjacent to southern boundary
Human Amenity	PHAR 002	Residential dwellings (No's.3,5 and 7 Johnson Drive) located to the southwest
Human Amenity	PHAR 003	Residential dwellings located on Tomlinson Drive to the west
Human Amenity	PHAR 004	Residential dwelling (No. 6 Johnson Drive) adjacent to eastern boundary

Table 5: 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 will be of an appropriate specification and designed in accordance with Industry Guidance.

8.1.3. 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.

8.1.4. 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 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.

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

- Property Fronts and Rears
- Driveway

8.2. Property Fronts and Rears

8.2.1. The Property Fronts and Rears will be illuminated for safety, security and amenity purposes only and not in accordance with any British Standard. Light spill has been controlled by restricting the mounting heights, Lumen outputs and the use of motion sensor controls as detailed in **Table 6**. The lowest practicable lighting levels are proposed within this Lighting Strategy.

8.2.2. Luminaires will distribute light downwards only, to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.

8.2.3. Luminaire performance requirements are outlined in **Table 6.**

Equipment Specification	
Application Area	Property Fronts and Rears
Correlated Colour Temperature (Kelvin)	≤ 2700K
Lumen Output (lm)	≤ 550
Height (m)	≤ 2
Mounting Arrangement	Wall mounted
Luminaire Tilt (°)	0
Upward Light Output Ratio (%) E2 < 2.5%	0
Luminaire family	Indicative GU10 Down Light
Example Luminaire Image	
Light Spill Diagram reference	Type D
Controls[14]	Motion sensor, off unless movement detected, on for one minute when motion is detected. Manual switching override on lights to the rear of the property

Table 6: Luminaire Performance Requirements

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

8.3. Driveway

8.3.1. The Driveway will be illuminated for safety, security and amenity purposes only and not in accordance with any British Standard. Light spill has been controlled by restricting the mounting heights and Lumen outputs as detailed in **Table 7**. The lowest practicable lighting levels are proposed within this Lighting Strategy.

8.3.2. Luminaires will distribute light downwards only, to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.

8.3.3. Luminaire performance requirements are outlined in **Table 7.**

Equipment Specification	
Application Area	Driveway
Correlated Colour Temperature (Kelvin)	≤ 2700K
Lumen Output (lm)	≤ 2450
Height (m)	≤ 1
Mounting Arrangement	Ground mounted
Luminaire Tilt (°)	0
Upward Light Output Ratio (%) E2 < 2.5%	0
Luminaire Manufacturer	Hunza (Or Similar Approved)
Luminaire family	Arch Bollard
Example Luminaire Image	
Light Spill Diagram reference	Type C
Controls	Solar time clock, on at dusk off at dawn

Table 7: Luminaire Performance Requirements

9. SUMMARY OF RESULTS

9.1. Overview

9.1.1. 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, 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[15]. 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 – 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.

9.2.3. 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	0.06	Pass
PSER 002	0.40 Lux	0.00	Pass

Table 8: 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 – 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.

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

Receptor No	GN01/2021 requirements		Maximum vertical Illuminance (Lux)	Notes
	Pre-curfew	Post-curfew		
PHAR 001	5 Lux	1 Lux	0.32	Pass
PHAR 002	5 Lux	1 Lux	0.00	Pass
PHAR 003	5 Lux	1 Lux	0.01	Pass
PHAR 004	5 Lux	1 Lux	0.04	Pass

Table 9: PHAR Results Table, Maximum Illuminance

9.3. Mitigation and Enhancements

9.3.1. Careful design ensures the lighting has been minimised onto sensitive receptors in accordance with Industry Guidance.

9.3.2. 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.

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

9.3.4. Additional mitigation and enhancement are detailed in **Table 10**.

Mitigation/Enhancement	Method	note
Motion sensors	Property lighting to be off unless presence detected and only on for 1 minute when triggered	Property lights only on when and where required and on for limited period

Table 10: Mitigation and Enhancements

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 Technical Report has been written in accordance with the relevant 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 – Light Spill Diagram** and **Appendix 2 – Vertical Light Spill Diagram**.

10.1.4. Planning Condition 14 has been addressed by a combination of the Technical Report and the Light Spill Diagrams. The Lighting Strategy in **Section 8** of the Technical Report provides details of the location, mounting height, type, direction and outputs of all proposed lighting. The Light Spill Diagrams demonstrate both horizontally and vertically that areas identified as ecologically sensitive are not negatively impacted by the lighting and dark corridors are preserved in full compliance with GN08:2023.

10.1.5. Through careful design and mitigation, including directing light down, restricting upward light, limiting mounting heights and utilising motion sensors on amenity lighting, this Technical Report ensures the lighting installation at the proposed development will be in accordance with Industry Guidance (GN01:2021 and GN08:2023) and Local Policy (CP3 and CP7 of the Adopted Core Strategy Development Plan and TB23 of the Adopted Managing Development Delivery Local Plan Document).

APPENDIX 1 – LIGHT SPILL DIAGRAM

See accompanying document 4487-DFL-ELG-XX-LD-EO-13001-S3

APPENDIX 2 – VERTICAL LIGHT SPILL DIAGRAM

See accompanying document 4487-DFL-ELG-XX-CA-EO-13001-S3

APPENDIX 3 – SENSITIVE RECEPTORS

Figure 5: 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 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 and 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 and 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 *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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Steve Parsons
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+44 (0)1962 855080

Steve.parsons@dfl-uk.com

www.dfl-uk.com/

17/18 City Business Centre, Hyde Street, Winchester, Hampshire, SO23 7TA