

LIGHTING STRATEGY

PROJECT: LAND OFF PALK ROAD, BEDHAMPTON

PREPARED FOR: BELLWAY HOMES LTD

NOVEMBER 2022

PROJECT NUMBER: 2660			DOCUMENT REF: 2660-DFL-ELG-XX-RP-EO-13001			
P03	S3	For Approval	AJB	RC	RC	18-11-22
P02	S3	For Approval	AJB	DS	RC	08-11-22
P01	S3	For Approval	AJB	TP	TP	02-11-22
Revision	Suitability	Purpose Description	Originated	Checked	Reviewed	Date



Designs for Lighting Ltd

17 City Business Centre, Hyde Street, Winchester, SO23 7TA

T: +44(0)1962 855080, E: info@df-l-uk.com, W: www.DFL-UK.com

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1 Introduction

1.1 General

- 1.1.1 This Lighting Strategy has been written by Designs for Lighting Ltd, a lighting design consultancy with experience and knowledge in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.
- 1.1.2 The Lighting Strategy proposes good practice and outlines a suitable approach to apply to the installation of the proposed lighting. The aim of the Lighting Strategy is to outline a minimally obtrusive approach to lighting, which is necessary to ensure safety and sensitivity to both the environmental and nearby ecological receptors.
- 1.1.3 The Application Site is southwest of Havant abutting Bedhampton train station. The redevelopment of a brownfield site to include the provision of 90 residential dwellings (including 27 affordable units) (C3 use), parking, public open space, landscaping and other associated works, including demolition of existing buildings on site, with access from Palk Road as shown in **Figure 1** and **Figure 2**.
- 1.1.4 The Proposed Development requires artificial lighting for safety, security, and amenity, which can be applied sensitively to ensure that the potential for obtrusive light is suitably minimised to comply with the predetermined obtrusive light limits for the Environmental Zone in which the Application Site is located. This can be achieved through the implementation of a carefully planned and implemented lighting design strategy. This outlines the lighting design approach, as well as imposing limits on the technical specification of the luminaires.
- 1.1.5 Lighting associated with the Proposed Development will comply with Guidance Notes for the Reduction of Obtrusive Light outlined by the Institution of Lighting Professionals (ILP), as well as Guidance for the protection of ecology.
- 1.1.6 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.



2 Legislative Frameworks and Local Policies

2.1 Relevant National Policies

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:

“Artificial light emitted from premises so as to be prejudicial to health and nuisance constitutes a ‘Statutory 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”

National Planning Policy Framework 2021

- 2.1.2 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 July 2021 and states that the following elements are to be considered:

“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.”

Planning Practice Guidance

- 2.1.3 Guidance for assessing the effects of proposed artificial lighting is outlined in the planning practice guidance (PPG). The guidance states:

- *“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.)”*

2.2 Relevant Local policies

2.2.1 The Application Site is located within the administrative boundary of Hampshire Council and Havant Borough Council.

2.2.2 The most relevant local planning guidance issued by the Havant Borough Council is the Havant Borough Core Strategy March 2011 (Adopted March 2011), with the most relevant policy being Policy DM10.

DM10 - Pollution

“Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

1. *The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.*
2. *National air quality standards or objectives would not be breached.*
3. *The water environment would not be detrimentally affected.*
4. *. It would not lead to an unacceptable deterioration in the quality or potential yield of coastal, surface and ground water resources.*
5. *External lighting is of the minimum level of illumination and duration required for security and operational purposes.*
6. *External lighting would not interfere with safe navigation in either Chichester or Langstone Harbours and other coastal locations.”*

2.2.3 The technical guidance note TG13 – Street Lighting, issued by Hampshire County Council has also been taken into account and has been used to influence the Lighting Strategy contained within **Section 5** of this document.

3 British Standards and Guidance

3.1 British Standards

- 3.1.1 Lighting design criteria outlined within BS 5489-1:2020 – Code of Practice for the Design of Road Lighting – Lighting of Roads and Public Amenity Areas is applicable to the proposed on-site roads associated with the Proposed Development which are to be retained under private management.
- 3.1.2 Lighting is to be provided for wayfinding and amenity purposes and is not to be provided to a recognised class in accordance with BS EN 13201:2015. However, relevant guidance on the implementation of lighting within BS 5489-1:2020 is to be applied; for instance where guidance concerns column setback and positioning.
- 3.1.3 Lighting to the exterior of the commercial properties located within the boundaries of Application Site will be designed inline with the relevant sections outlined within BS EN 12464-2:2014.

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

- 3.2.1 The Lighting Strategy shall be informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, caused by poorly designed and installed exterior artificial lighting. The Lighting Strategy is informed by the most relevant sections of GN01/21 that has recently been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.
- 3.2.2 The Environmental Zone criteria detailed within **Table 1** and **Table 2** will form the basis for the Lighting Strategy.

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

Notes:

- Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.
- Rural zones under protected designations should use a higher standard of policy.
- Zone E0 must always be surrounded by an E1 Zone.
- Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas.
- SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.
- Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.
- Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

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*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2: Obtrusive Light Criteria

- ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky;
- E_v is Vertical Illuminance in Lux;
- L is Luminance in Candelas per square metre; and
- 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.
- (*) Permitted only from public road lighting installations up to a maximum of 1.0 lux.

3.3 GN08:2018 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

3.3.1 Guidance for artificial lighting and bats was updated in Autumn 2018, the guidance 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 averse behaviour (Stone, 2012).”

“Dark buffers, illuminance limits and zonation dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. Buffer zones rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in- to zones of increasing illuminance limits radiating away from the feature” (see Figure 3).”

Example of illuminance limit zonation

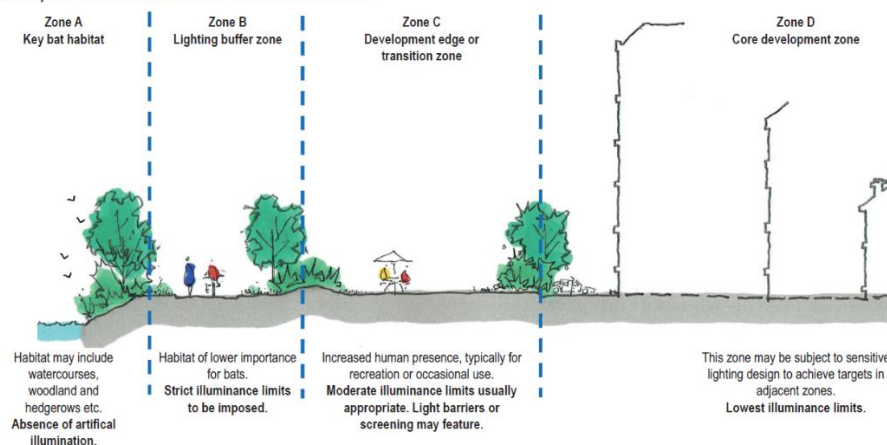


Figure 3 Example of lighting zonation near sensitive boundaries and known ecological habitats

4 Identified Receptors

- 4.1.1 Areas to the north, northwest, west, south, southwest and southeast boundaries of the Application Site have been identified as areas with potential for ecologically sensitive receptors.
- 4.1.2 To the north and east of the site, Potentially Sensitive human Receptors have been identified as shown in **Appendix 1**.
- 4.1.3 A rail line to the north and northwest of Application site has been identified as a potentially sensitive safety receptor with the potential to be negatively affected by high levels of glare produced by a poorly designed or implemented lighting layout.

5 Exterior Lighting Strategy

5.1 Brief

- 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 of amenity areas is vital for providing a safe and hospitable living environment. Lighting will be limited to wayfinding purposes and illuminating the property frontages and rears when a human presence is detected.
- 5.1.3 Lighting to the spine road into the Proposed Development will be designed in accordance with the Hampshire County Council Adoptable Specification for Street Lighting.
- 5.1.4 Lighting to the private access roads will be of an appropriate specification and designed in accordance with British Standards.
- 5.1.5 Amenity lighting for the proposed development will be provided through the provision of bollard lighting, with light sources mounted at a height no greater than 1.2m FFL (finished floor level).
- 5.1.6 Luminaires will be used with integral LED's 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.
- 5.1.7 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.
- 5.1.8 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.
- 5.1.9 Lighting will be required in the following application areas:
 - Spine road,
 - Residential Parking,
 - Dwelling Frontages and Rears,
 - Paths
 - Park area

5.2 Spine Road

- 5.2.1 The main road through the Application Site will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-1:2015. Illumination will be focused toward the road and pavement area, highlighting any changes in the road the user may need to be aware of during a night time setting.
- 5.2.2 Luminaires will distribute light downwards only, to reduce the potential for light spill onto the boundaries surrounding the building and upwards towards the sky.
- 5.2.3 Luminaires to be installed on root mounted columns in accordance with road layout guidance given in BS 5489-1:2020.
- 5.2.4 Luminaire performance parameters for the Spine Road through the Application Site are outlined in **Table 3**

<u>Equipment Specification</u>	<u>Description</u>
Location	Spine Road
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	TRT (or similar approved)
Luminaire Model	Aspect 1.6Klm GR5 Optic with rear spill shield (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6.0m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201-1:2015 – P5
Lighting Design Criteria	Average 3 lx, Minimum 0.6 lx, Rear light spill shields
Controls	Dusk- Dawn: On 35 Lux, Off 18

Table 3: Performance and installation requirements

5.3 Residential Parking

- 5.3.1 The residential parking areas throughout the Application Site with a greater potential for collision will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-1:2015. Illumination will be focused toward the road and pavement area, highlighting any changes in the road the user may need to be aware of during a night time setting.
- 5.3.2 Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the building and upwards towards the sky.
- 5.3.3 Luminaires to be root mounted in accordance with road layout guidance given in BS 5489-1:2020.
- 5.3.4 Luminaire performance parameters for the residential roads through the Application Site are outlined in **Table 4, Table 5 and Table 6.**

<u>Equipment Specification</u>	<u>Description</u>
Location	Residential Parking
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	TRT (or similar approved)
Luminaire Model	Aspect 1.6Klm GR5 Optic with rear spill shield (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6.0m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201-1:2015 – P5
Lighting Design Criteria	Average 3 lx, Minimum 0.6 lx, Rear light spill shields
Controls	Dusk- Dawn: On 35 Lux, Off 18

Table 4: Performance and installation requirements

<u>Equipment Specification</u>	<u>Description</u>
Location	Residential Parking
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	TRT (or similar approved)
Luminaire Model	Aspect 0.84Klm GR7 Optic with right side spill shield (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	6.0m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	BS EN 13201-1:2015 – P5
Lighting Design Criteria	Average 3 lx, Minimum 0.6 lx, Rear light spill shields
Controls	Dusk- Dawn: On 35 Lux, Off 18

Table 5: Performance and installation requirements

<u>Equipment Specification</u>	<u>Description</u>
Location	Residential Parking
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	BEGA (or similar approved)
Luminaire Model	77218K3 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	0.7m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding and Safety
Lighting Design Criteria	N/A
Controls	Dusk- Dawn: On 35 Lux Off 18 Lux

Table 6: Performance and installation requirements

5.4 Paths

- 5.4.1 The pathways surrounding the residential dwellings throughout the Application site will be illuminated for safety, amenity, and security during the hours of darkness.
- 5.4.2 Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.
- 5.4.3 Lighting to these areas will be for wayfinding and amenity purposes only.
- 5.4.4 Luminaire performance parameters for the Dwelling Frontages and Rears are outlined in **Table 7, Table 8** and **Table 9**.

<u>Equipment Specification</u>	<u>Description</u>
Location	Paths
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	BEGA (or similar approved)
Luminaire Model	77221K3 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	1.0m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding
Lighting Design Criteria	N/A
Controls	Dusk- Dawn: On 35 Lux Off 18 Lux

Table 7: Performance and installation requirements

<u>Equipment Specification</u>	<u>Description</u>
Location	Paths
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	Urbis (or similar approved)
Luminaire Model	77321K3 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	1.0m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding
Lighting Design Criteria	N/A
Controls	Dusk- Dawn: On 35 Lux Off 18 Lux

Table 8: Performance and installation requirements

<u>Equipment Specification</u>	<u>Description</u>
Location	Paths
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	BEGA (or similar approved)
Luminaire Model	77218K3 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	0.7m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding
Lighting Design Criteria	N/A
Controls	Dusk- Dawn: On 35 Lux Off 18 Lux

Table 9: Performance and installation requirements

5.5 Dwelling Frontages and Rears

- 5.5.1 The frontages and rears of residential dwellings throughout the Application site will be illuminated for safety, amenity, and security during the hours of darkness.
- 5.5.2 Luminaires will distribute light downwards only to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.
- 5.5.3 At the rears and frontage of the dwellings, Luminaires will be located near doorways, porches where relevant, focused downwards. Luminaires are to be of a low lumen output, to ensure light spill onto the Application Site boundaries is minimised.
- 5.5.4 Luminaire performance parameters for the Dwelling Frontages and Rears are outlined in **Table 10**.

<u>Equipment Specification</u>	<u>Description</u>
Location	Dwelling Frontages and Rears
Correlated Colour Temperature (Kelvin)	3000K (maximum)
Luminaire Manufacturer	BEGA (or similar approved)
Luminaire Model	77233K3 (or similar approved)
Light Source	LED (Light Emitting Diode)
Height	0.7 m (Maximum)
Mounting Arrangement	Root mounted
Luminaire Tilt	0 degrees from horizontal
Upward Light Output Ratio (ULOR)	0% (Fully Shielded)
Example Luminaire Image	
<u>Design Guidance</u>	
Lighting Class	Wayfinding
Lighting Design Criteria	N/A
Controls	Dusk- Dawn: On 35 Lux Off 18 Lux

Table 10: Performance and installation requirements

5.6 Control Methods

Light fitting control method table				
Area	Suggested average light level	Control	Pre-Curfew Status	Post-curfew status
Spine Road	N/A	Dusk to dawn	Active at Dusk (35 Lux on)	Off at Dawn (18 Lux off)
Residential Parking	N/A	Dusk to dawn	Active at Dusk (35 Lux on)	Off at Dawn (18 Lux off)
Frontages and Rears	N/A	Dusk to dawn	Active at Dusk (35 Lux on)	Off at Dawn (18 Lux off)
Paths	N/A	Dusk to dawn	Active at Dusk (35 Lux on)	Off at Dawn (18 Lux off)
* Suggested PIR type, BEG Luxomat, LCMini (or similar approved) 140-degree detection suggested for the frontages and 200-degree suggested for the rear of the residential properties, blinds to be supplied with units in order to black out any nuisance tripping.				

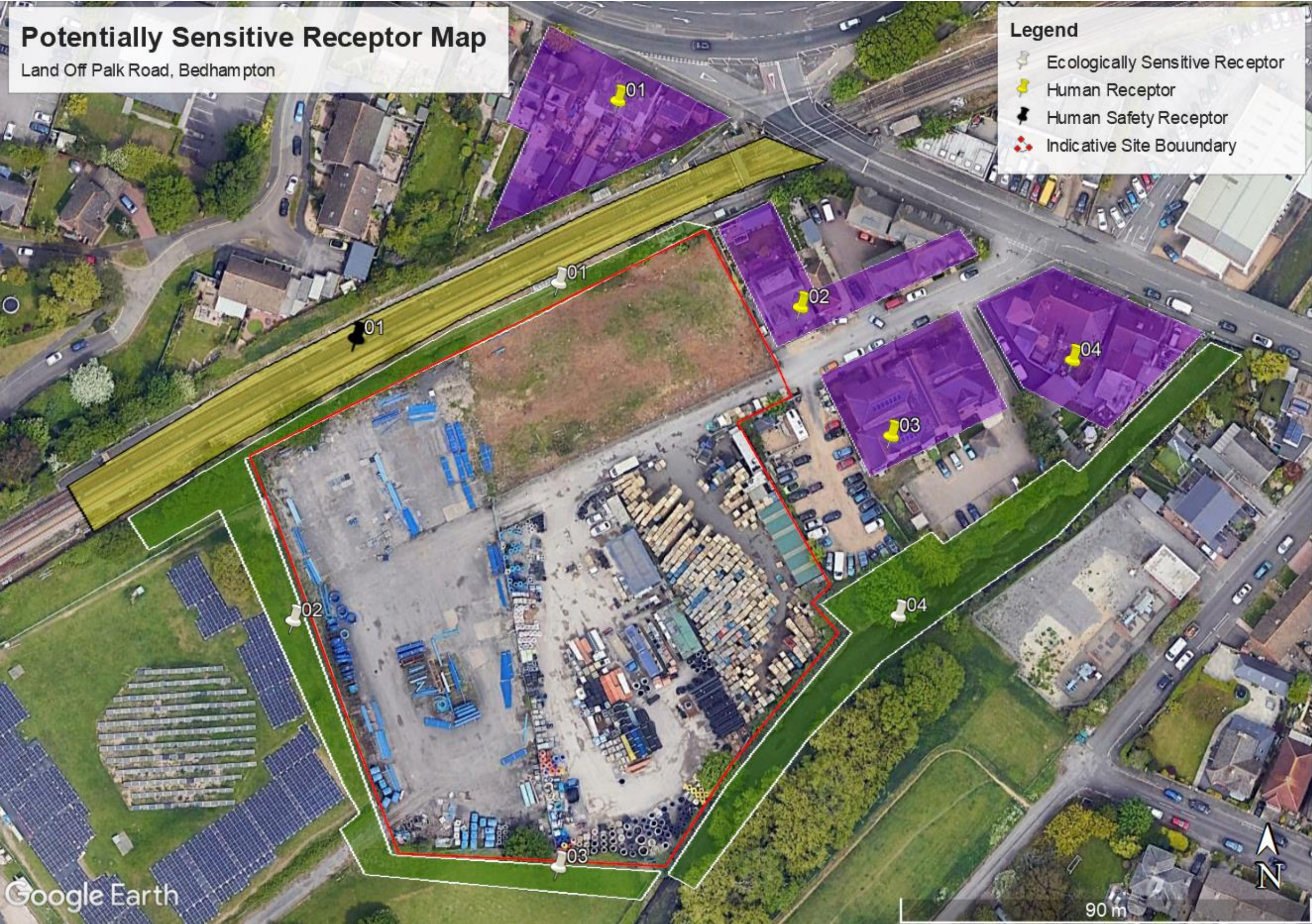
Table 11: Performance and installation requirements

6 Conclusion

6.1 General

- 6.1.1 Lighting associated with the Proposed Development shall be designed in accordance with the Lighting Strategy for the Application Site outlined in **Section 5** to ensure it is unlikely to give rise to obtrusive light with the potential to affect residential and ecological receptors. This has been achieved through ensuring the relevant British Standards, industry guidance and local policies have informed the Lighting Strategy.
- 6.1.2 Using mitigation methods such as light spill shields as outlined in **Section 5**, the horizontal light spill will be restricted, Human receptors identified in **Appendix 1** will not be affected due to the containment of horizontal illumination as shown in **Appendix 2**.
- 6.1.3 Where a Potentially Sensitive Human Receptor has been identified as shown in **Appendix 1**, a vertical illumination grid has been modelled, as shown in **Appendix 3**. The light levels based on the modelling do not exceed 0.92 Lux, keeping the light levels within the guidance given within GN01:2021 for an area identified as an **E3** environment.
- 6.1.4 Where required within the Application Site, spill shields have been specified to protect the identified receptors within the Proposed Development and external to the Application Site as shown outlined in **Section 5**.
- 6.1.5 Where There may be potential for ecology receptors, potentially sensitive to light, a vertical grid has been modelled (as shown in **Appendix 3**). The light levels, based on the modelling outlined in **Appendix 2** did not exceed 0.37 Lux, keeping the light levels within the guidance given in GN08:2018.
- 6.1.6 The Vertical illuminance to the Identified Human Safety receptor was modelled at no greater than 0.16Lux, however, Glare is the greater concern when taking into consideration Human Safety Receptors such as the train line identified to the north/northwest of the Application.
- 6.1.7 As outlined in GN01:2020, post-curfew glare should not exceed 1,000 cd (Candela), a model was created without the use of blocking elements such as trees, during this modelling the intensity from the column lighting to the north and northwest (the identified safety receptor) of the development did not exceed 77cd (Candela).

Appendix 1-Potentially Sensitive Receptor Maps



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See separate file: 2660-DFL-ELG-XX-LD-EO-13001



Appendix 3- Vertical Illumination Grids

