



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

CHAPTER 16 APPENDIX 16.1

LIGHTING STRATEGY – LAND AT TOTON WEST

DFL-UK

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Designs for Lighting (DFL) is a business built on successfully collaborating with our clients. We have over 20 years proven experience in our industry, listening to the challenges our clients face, developing the best solutions and being innovators in our specialism. Our role is to find the most effective and sustainable outcome to enhance and support your projects. We proudly work with recognised industry bodies to promote and shape the future of the industry and ensure our staff are trained to exceed the required competency levels of our industries. Above all, we ensure each project delivers against our values.



Quality



Knowledgeable



Dependable



Clear Advice

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Introduction

1.1. Executive Summary

- 1.1.1. This Lighting Strategy has been written by DFL (Designs for Lighting Ltd¹), a lighting design consultancy specialising in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.
- 1.1.2. The Lighting Strategy proposes good practice and outlines a suitable approach for the proposed lighting for the purpose of safety, security, wayfinding and amenity. The Lighting Strategy 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. This Lighting Strategy is in respect of Land at Toton West Site which is located to the west of the B6003 Stapleford Lane (known as 'Toton West') in Toton, Nottinghamshire.
- 1.1.4. This Lighting Strategy forms an Appendix to **Chapter 16** of the Environmental Statement and must be read in conjunction with this document.
- 1.1.5. Lighting associated with The Proposed Development (see ES **Chapter 4** for details of The Proposed Development) will comply with relevant British Standards and Institution of Lighting Professionals (ILP) guidance to ensure obtrusive light is minimised in accordance with best practice.
- 1.1.6. This report outlines the following:
 - The relevant British Standards, Guidance and adoption specifications,
 - Why The Proposed Development requires artificial lighting,
 - Details as to how lighting will be implemented for The Proposed Development, and;
 - The mitigation embedded into the Lighting Strategy.

¹ <https://www.dfl-uk.com/about/>

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 13201-2:2015 - Road lighting. Performance requirements

- 2.2.1. This British and European standard defines the performance requirements specified as lighting classes for road lighting aiming at the visual needs of the road users, as well as the consideration of the environmental aspects of the road lighting to be applied.

3. GUIDANCE

3.1. PLG23:2020 Lighting for Cycle Infrastructure - Institution of Lighting Professionals

- 3.1.1. Lighting for cycle infrastructure will be informed by guidance detailed in ILP PLG23:2020.
- 3.1.2. The lighting class for the cycle route will be selected based on its type: Unsegregated, Segregated, Strategic, Major, Local, Rural. This is then used to confirm the lighting class as detailed within BS 5489-1:2020.
- 3.1.3. The placement of lighting columns within cycle infrastructure is important for achieving a safe and useful cycle route.
- 3.1.4. Where possible cycle paths should have an 'approach zone' to either side for the safety and security of the cycle path users.

3.2. TR12:2007 Lighting of Pedestrian Crossings - Institution of Lighting Professionals

- 3.2.1. Where pedestrian crossings are included on main access roads and they take the form of Zebra, Toucan, Pelican, etc, and are not signal controlled, they may require lighting as outlined within TR12:2007.

4. LIGHTING STRATEGY

4.1. Construction Lighting

- 4.1.1. Lighting will be required during the construction phase of the Proposed Development to facilitate the safe transit and use of the Site for limited periods during the hours of darkness and for site security.
- 4.1.2. Construction lighting will be temporary in nature, as it will be installed and removed in phases and fully removed once the Proposed Development is completed.
- 4.1.3. Construction lighting will be provided in accordance with the guidance within BS EN 12464-2:2024; which defines appropriate lighting levels for outdoor work tasks. The levels required will vary depending upon the task being undertaken and will be assessed on a task-by-task basis. Construction lighting will not significantly exceed the relevant lighting standard for the task being undertaken to limit the visibility of construction lighting within the landscape.
- 4.1.4. Construction tasks will predominantly be undertaken during the hours of daylight and as such, there is a limited requirement for construction lighting throughout the construction phase of the Proposed Development. Construction tasks are not anticipated to be undertaken for significant periods during the hours of darkness.
- 4.1.5. Construction lighting will be maintained at a low level and focussed into the Site, onto the task being undertaken. Where possible, construction lighting is to be provided by handheld sources or headtorches, ensuring the lowest possible amount of light is used for the task at hand.
- 4.1.6. To limit the visibility of construction lighting within the landscape, it will be switched off when not in use. Task lighting for construction tasks is to be controlled by timed switches, ensuring that task lighting is only provided when needed and does not operate outside the hours of use.
- 4.1.7. Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding pole and will be oriented downwards only. To reduce the levels of light spill leaving the Site, security lighting will be focussed into the Site only.
- 4.1.8. Security lighting will be controlled via photosensor, ensuring that lighting is only operational during the hours of darkness.

4.2. Operational Lighting

- 4.2.1. The Proposed Development will require lighting for safety and amenity during the hours of darkness. Lighting will be fit for purpose and sensitive to nearby human and ecological receptors.

- 4.2.2. Lighting will be of an appropriate specification and designed in accordance with British Standards.
- 4.2.3. The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the Proposed Development is located, is sensitive to the area, and provides a recognised standard level of lighting for all adoptable areas requiring illumination.
- 4.2.4. Luminaires will distribute light downwards only, to reduce the potential for light spill onto the boundaries surrounding the buildings and upwards towards the sky.
- 4.2.5. The follow areas will require task lighting to facilitate the safe undertaking of operational tasks:
- 4.2.6. Lighting to an adoptable specification will be required in the following application areas:
 - > Primary Street
 - > Streets & Lanes
 - > Public Right of Way
 - > Pedestrian & Cycle Links
 - > Pedestrian Routes
 - > Pedestrian & Cycle Priority Crossings
 - > Vehicular Site Access Points
- 4.2.7. The following areas are not anticipated to require dedicated lighting.
 - > Play Space – daytime use only

4.3. Primary Streets

- 4.3.1. The Primary Streets will be illuminated in accordance with BS 5489-1:2020 and BS EN 13201-2:2015 for wayfinding, amenity and safety purposes. The lowest practicable lighting levels are proposed within this Lighting Strategy.
- 4.3.2. Performance requirements for the Primary Streets are outlined in **Figure 1** and the relevant illuminance criteria is given in **Figure 2**.
- 4.3.3. A risk assessment should be carried out to ascertain if the lighting class should be increased or decreased.

Table A.5 — *Lighting classes for subsidiary roads*

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

NOTE 1 Table A.5 assumes no parked vehicles; see risk assessment in [A.3.3.2](#).

NOTE 2 An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 The actual overall uniformity of illuminance, U_a , needs to be as high as reasonably practicable (see [7.2.6](#)).

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

NOTE 6 The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

^{A)} Environmental zone, as given in ILP GN01 [N2].

^{B)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{C)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{D)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road, and is mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Figure 1: Performance requirements as per BS5489-1:2020

Table 3 — P lighting classes

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}^a$ [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

^a To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Figure 2 "P" Lighting Class Illuminance values from BS EN 13201-2 Table 3

4.4. Streets & Lanes

- 4.4.1. The Streets & Lanes will be illuminated in accordance with BS 5489-1:2020 and BS EN 13201-2:2015 for wayfinding, amenity and safety purposes. The lowest practicable lighting levels are proposed within this Lighting Strategy.
- 4.4.2. Performance requirements for the Streets & Lanes are outlined in **Figure 3** and the relevant illuminance criteria is given in **Figure 2**.
- 4.4.3. A risk assessment should be carried out to ascertain if the lighting class should be increased or decreased.

Table A.5 — *Lighting classes for subsidiary roads*

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

NOTE 1 Table A.5 assumes no parked vehicles; see risk assessment in [A.3.3.2](#).

NOTE 2 An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 The actual overall uniformity of illuminance, U_a , needs to be as high as reasonably practicable (see [7.2.6](#)).

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

NOTE 6 The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

^{A)} Environmental zone, as given in ILP GN01 [N2].

^{B)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{C)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{D)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road, and is mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Figure 3: Performance requirements as per BS5489-1:2020

4.5. Public Right of Way

- 4.5.1. The Public Right of Way will be illuminated in accordance with BS EN 5489-1:2020 for wayfinding, amenity and safety purposes. The lowest practicable lighting levels are proposed within this Lighting Strategy.
- 4.5.2. Performance requirements for the Public Rights of Way are outlined in **Figure 4** and the relevant illuminance criteria is given in **Figure 2**.
- 4.5.3. A risk assessment should be carried out to ascertain if the lighting class should be increased or decreased.

Table A.5 — Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

NOTE 1 Table A.5 assumes no parked vehicles; see risk assessment in [A.3.3.2](#).

NOTE 2 An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 The actual overall uniformity of illuminance, U_a , needs to be as high as reasonably practicable (see [7.2.6](#)).

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

NOTE 6 The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

^{A)} Environmental zone, as given in ILP GN01 [N2].

^{B)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{C)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{D)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road, and is mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Figure 4: Performance requirements as per BS 5489-1:2020

4.6. Pedestrian & Cycle Links

- 4.6.1. The Pedestrian & Cycle Links will be illuminated in accordance with BS EN 5489-1:2020 and ILP PLG 23 2020 for wayfinding, amenity and safety purposes. The lowest possible lighting levels are proposed within this Lighting Strategy.
- 4.6.2. Performance requirements for the Pedestrian & Cycle Links are outlined in **Figure 5** and **Figure 6**.
- 4.6.3. A risk assessment should be carried out to ascertain if the lighting class should be increased or decreased.

Table 12: Recommended lighting classes for subsidiary roads

Traffic flow	E1 to E2 ^a				E3 to E4 ^a			
	Lighting Class	E _{AVE}	E _{min}	fTI	Lighting Class	E _{AVE}	E _{min}	fTI
Busy ^b	P4	5.0	1.0	30%	P3	7.5	1.5	25%
Normal ^c	P5	3.0	0.6	30%	P4	5.0	1.0	30%
Quiet ^d	P5	3.0	0.6	30%	P4	5.0	1.0	30%

Figure 5: Performance requirements as per ILP PLG 23

- 4.6.4. For segregated cycle paths, It is recommended that, where possible, a 3m visibility zone should be added to each side of a cycle path. This can be seen in **Figure 6**.
- 4.6.5. The Visibility Zone Ratio for both nearside and offside grids, the average illumination of Grid B (E_B) and Grid C (E_C), should be at least 50% of that calculated average illumination for the main cycle track running area, Grid A (E_A).

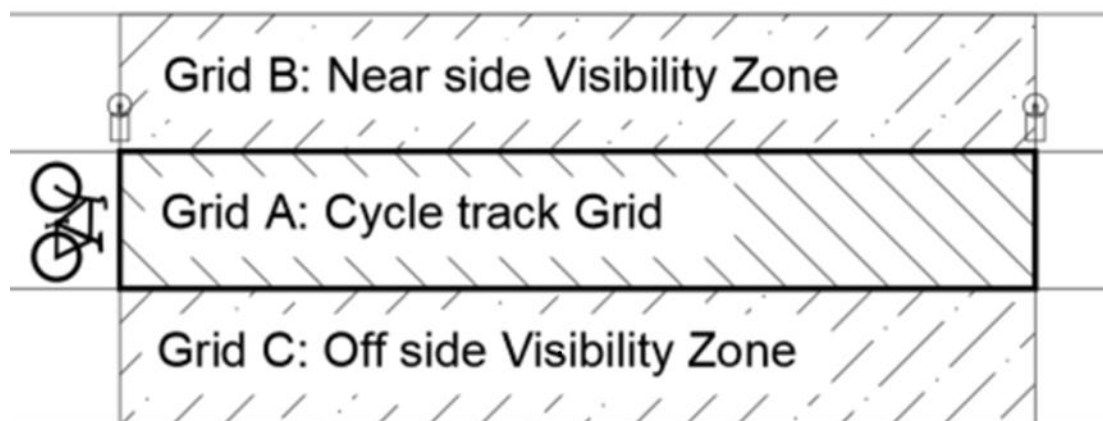


Figure 6: Visibility Zone Ratio diagram as per ILP PLG 23

4.7. Pedestrian Routes

- 4.7.1. The Pedestrian Routes will be illuminated in accordance with BS 5489-1:2020 for wayfinding, amenity and safety purposes. The lowest practicable lighting levels are proposed within this Lighting Strategy.
- 4.7.2. Performance requirements for the Pedestrian Routes are outlined in **Figure 7**.
- 4.7.3. A risk assessment should be carried out to ascertain if the lighting class should be increased or decreased.

Table A.5 — Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

NOTE 1 Table A.5 assumes no parked vehicles; see risk assessment in [4.3.3.2](#).

NOTE 2 An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 The actual overall uniformity of illuminance, U_{av} , needs to be as high as reasonably practicable (see [7.2.6](#)).

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

NOTE 6 The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

^{A)} Environmental zone, as given in ILP GN01 [N2].

^{B)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{C)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{D)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road, and is mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Figure 7: Performance requirements as per BS 5489-1:2020

4.8. Pedestrian & Cycle Priority Crossings

- 4.8.1. The Pedestrian and Cycle Priority Crossings will be illuminated in accordance with BS 5489-1:2020 and ILP TR12 for wayfinding and safety purposes. The lowest possible lighting levels are proposed within this Lighting Strategy.
- 4.8.2. Performance requirements for the Pedestrian & Cycle Priority Crossings are outlined in **Figure 8** and **Figure 9** for Crossing Levels.

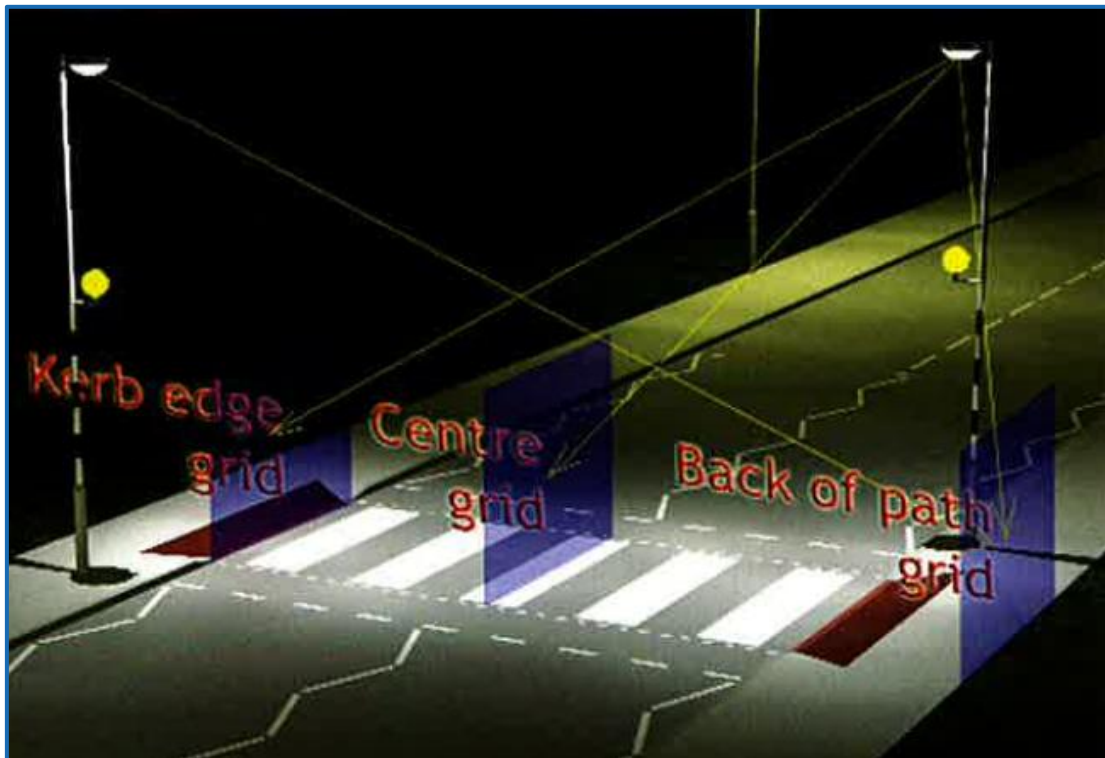


Figure 8: ILP TR12 Crossing Grids

Design values

Minimum average horizontal illuminance ($\bar{E}$) on the carpet:

Carpet $\bar{E} = 3.5 \times$ average horizontal road illuminance with $U_o > 0.6$

Minimum vertical illuminance at a point E_v :

Grid 1 (centre of crossing) = 2 x nominal average horizontal road illuminance

Grid 2 (kerb edge) = 2 x nominal average horizontal road illuminance

Grid 3 (rear of waiting area) = 1.5 x nominal average horizontal road illuminance.

Note: the value of the average road horizontal illuminance to be used is that designed within the standard installation in the vicinity of the crossing – and this average should be the actual design value in the particular installation and not the nominal value for the lighting class selected.

Figure 9: ILP TR12 Crossing Levels

4.9. Vehicular Site Access Points

- 4.9.1. The Vehicular Site Access Points will be lit as a conflict area in accordance with BS5489-1:2020. The selected class will depend on the approach roads to the Access Points. The conflict area should be lit to one class higher than the highest approach road (**Figure 10** and **Figure 11**) with the proviso that there is not more than a two class difference between areas. It is anticipated that the lighting will be no greater than a C4 class, ie 10.0 lux.

Table A.1 — *Lighting classes of comparable level*

M class	C class	P class
—	C0	—
M1	C1	—
M2	C2	—
M3	C3	P1
M4	C4	P2
M5	C5	P3
M6	—	P4
—	—	P5
—	—	P6

NOTE The data in this table are extrapolated from PD CEN/TR 13201-1:2014.

Figure 10: Table of Comparable Levels

Table 2 — *C lighting classes based on road surface illuminance*

Class	Horizontal illuminance	
	$\bar{E}$ [minimum maintained] lx	U_o [minimum]
C0	50	0,40
C1	30	0,40
C2	20,0	0,40
C3	15,0	0,40
C4	10,0	0,40
C5	7,50	0,40

Figure 11: Lighting Levels of Conflict Areas from BS EN 13201-2:2015

4.10. Embedded Mitigation

- 4.10.1. **Table 1** details the mitigation that will be embedded into the lighting designs for the Proposed Development.

Mitigation Name	Description of Mitigation	Installation Location
Restricting the Upward Light Output Ratio	All luminaires will have an Upward Light Output Ratio of 0%.	Whole Proposed Development
Restricting Luminaire Tilt	All luminaires will be installed with a 0° as standard. An allowance to tilt luminaires to 5° may be made, where it is demonstrated that: 1. This is required to achieve a standard lighting level on the task or area, and 2. This will not result in any significant effects on the surrounding receptors.	Whole Proposed Development
Installation of Back Light Shielding	Manufactures often provide “back light optics” where back light mitigation is integrated on the lenses of the luminaires. This is the preferred option as it provides the greatest degree of control. Where this is not available, traditional back light shields can be used.	Whole Proposed Development: Where luminaires are installed on the boundary of an area facing into the site.
Using the lowest possible Correlated Colour Temperature	Throughout the Proposed Development the standard Correlated Colour Temperature used will be ≤ 3000K. Where there are areas of specific ecological sensitivity the lighting near this area will be dropped to ≤ 2700K. In locations where there are specific safety concerns, for example in the substations, the Correlated Colour Temperature may be increased to ≤ 4000K. However, a risk assessment needs to be undertaken to justify this increase if this does not form part of a local authority adoptable specification.	Whole Proposed Development
Using the lowest applicable lighting levels for tasks and areas	All areas and tasks will be lit using the lowest applicable lighting levels as defined in the relevant British Standard. This will ensure a standard and recognised level of light is provided for all areas of the Proposed Development, while ensuring no area is over lit. During the detailed lighting design, a risk assessment must be undertaken to help define the specific lighting class for any area.	Whole Proposed Development
Centralised Lighting Controls	Throughout the Proposed Development a centralised lighting control system/s will be used.	Whole Proposed Development

Mitigation Name	Description of Mitigation	Installation Location
	This will ensure lighting is only active as required during the hours of darkness, will allow dimming based on traffic flow, and switching to take place based on the hours of use. This will not only reduce the effects of lighting but will save money and energy for the owner of the lighting system.	
Using the minimum practical mounting height	All luminaires will be mounted at the minimum practical mounting height for the area or task. This will reduce the visibility of the luminaires in the landscape, by allowing surrounding trees and buildings to act as blocking features to direct views of luminaires. This will also help ensure there is minimum need to tilt luminaires, by providing enough height for the light to travel forward into the task area.	Whole Proposed Development
Using appropriate optics for the areas being illuminated	The luminaire optic used will be specific to the area being lit This will ensure the task and area is lit to a standard level of light, while also allowing the lux contours to be shaped to the specific areas. This will help reduce light spill out of areas and the either over lighting or under lighting of areas.	Whole Proposed Development
Only using Luminaires where Photometry is Available from the Manufacturer	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 reported and minimised or mitigated.	Whole Proposed Development
Further Construction Phase Mitigation	Further embedded mitigation for the construction phase of the Proposed Development is detailed within Chapter 4. This includes limiting the hours of work.	Whole Proposed Development

Table 1: Embedded Mitigation for Construction and Operational phases of the Proposed Development

5. OPERATIONAL EQUIPMENT SPECIFICATION

5.1. Luminaire and control specification Tables

Equipment Specification	
Application Area	All Areas
Correlated Colour Temperature (Kelvin)	≤ 4000K (Neutral White)
Luminaire Manufacturer	Holophane (Or Similar Approved)
Luminaire Model	V-Max (Or Similar Approved)
Light Source	LED
Column	Fabrikat Tubular Steel Column as per NCC Spec Dwg No: ESD6/5
Mounting Arrangement	Post Top or Side Entry
Luminaire Tilt	0°
Upward Light Output Ratio E2 < 2.5%	0%
Example Luminaire Image	
Controls ²	Lucy Zodion ZCell (20:20 Lux) 5/7 Pin NEMA Photocell Lucy Zodion Titan (PN) or Trojan (DNO) Isolators

Table 2: Luminaire performance requirements

² Dimming: when dimming is applied it is announced as a percentage still in use of the total percentage output (dimmed too, not dimmed by).

TECHNICAL DESCRIPTIONS, 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.

This isn't the end...

We don't just have the solution for what you need today. We also have the solutions you might need for the future. We have dedicated teams that deliver.

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