East Midlands Gateway
Phase 2 (EMG2)

Document DCO 6.11A/MCO 6.11A

ENVIRONMENTAL STATEMENT

Volume 2 Technical Appendices

Appendix 11A

Lighting Strategy

July 2025

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The East Midlands Gateway Phase 2
and Highway Order 202X and The East Midlands Gateway
Rail Freight and Highway (Amendment) Order 202X

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EAST MIDLANDS GATEWAY

CHAPTER 11 APPENDIX 11A

OUTLINE LIGHTING STRATEGY

DOCUMENT DCO/MCO 6.11A

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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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1. INTRODUCTION

1.1. Executive Summary

1.1.1. This Lighting Strategy 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 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 forms an Appendix to **Chapter 11 (Document DCO/MCO 6.11)** of the Environmental Statement and must be read in conjunction with this document.

1.1.4. Lighting associated with the **EMG2 Project** (see ES **Chapter 2 (Document DCO/MCO 6.2)** and **Chapter 3 (Document DCO/MCO6.3)** for details) will comply with relevant British Standards and Institution of Lighting Professionals (ILP) guidance to ensure obtrusive light is minimised in accordance with best practice.

1.1.5. This report outlines the following:

- The relevant British Standards, Guidance and adoption specifications,
- Why the **EMG2 Project** requires artificial lighting,
- Details as to how lighting will be implemented for the **EMG2 Project**, 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.

2.3. BS EN 12464-2:2014 - Light and Lighting – Lighting of workplaces

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

3. GUIDANCE

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

3.1.1. The Lighting Strategy is informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, which is typically caused by poorly designed and installed exterior artificial lighting.

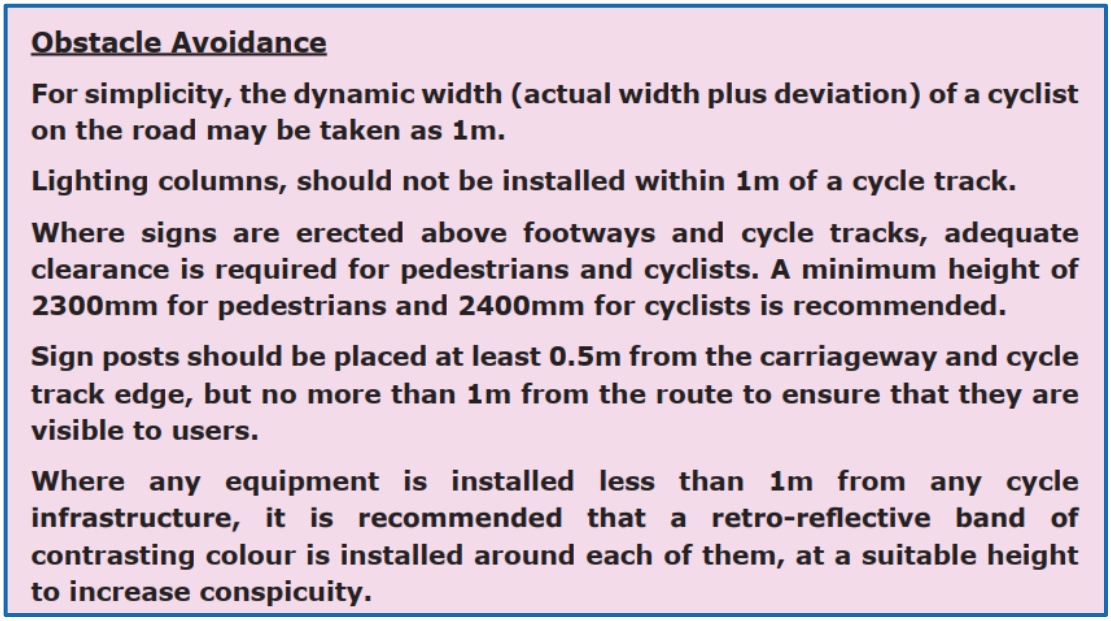
3.1.2. GN01:2021 provides guidance on best practice and suitable mitigation methods to be used when designing lighting for the exterior environment.

3.2. PLG23:2020 Lighting for Cycle Infrastructure – Institution of Lighting Professionals

3.2.1. Lighting for cycle infrastructure will be informed by guidance detailed in ILP PLG23:2020.

3.2.2. 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.

3.2.3. The placement of lighting columns within cycle infrastructure is important for achieving a safe and useful cycle route. **Figure 1** contains an extract from PLG23:2020 discussing this.



Obstacle Avoidance

For simplicity, the dynamic width (actual width plus deviation) of a cyclist on the road may be taken as 1m.

Lighting columns, should not be installed within 1m of a cycle track.

Where signs are erected above footways and cycle tracks, adequate clearance is required for pedestrians and cyclists. A minimum height of 2300mm for pedestrians and 2400mm for cyclists is recommended.

Sign posts should be placed at least 0.5m from the carriageway and cycle track edge, but no more than 1m from the route to ensure that they are visible to users.

Where any equipment is installed less than 1m from any cycle infrastructure, it is recommended that a retro-reflective band of contrasting colour is installed around each of them, at a suitable height to increase conspicuity.

Figure 1: Obstacle Avoidance Guidance from PLG23:2020 Page 15

3.3. PLG02:2013 The Application of Conflict Areas on the Highway – Institution of Lighting Professionals

3.3.1. There are several roundabouts and junctions within the **Scheme**.

3.3.2. This document provides guidance on the best practice for lighting these locations

3.4. TR12:2007 Lighting of Pedestrian Crossings – Institution of Lighting Professionals

3.4.1. Where pedestrian crossing areas 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 (**Figure 2** and **Figure 3**).

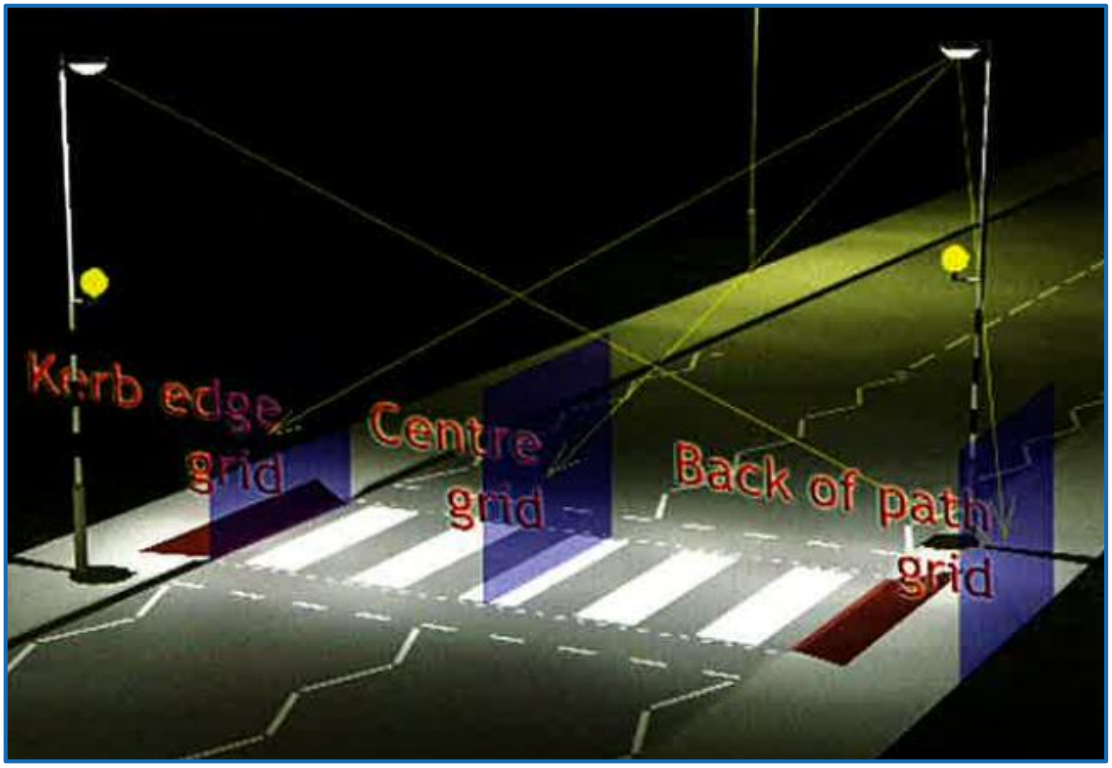


Figure 2: TR12:2007 Crossing Example

Design values

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

Carpet $\bar{E}$ = 3.5 x 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 3: TR12:2007 Lighting Levels

3.4.2. Where these crossings are adjacent to conflict areas (roundabout), and a risk assessment has been conducted, they may be included within the conflict area lighting to avoiding the need for specific lighting.

3.5. ASAN:2024 Aerodrome Safeguarding Advice Note – Combined Aerodrome Safeguarding Team April 2024

3.5.1. This advice note considers the location, height, brightness, type, and pattern of lights around the aerodrome, with an overall caveat that no light should be directed or pointed towards any aircraft.

3.5.2. This guidance document has informed the selection of lighting equipment and mitigation that is proposed in the Lighting Strategy.

4. ADOPTING AUTHORITY SPECIFICATIONS

4.1. National Highways

4.1.1. All highways proposed will be lit as outlined within the National Highways design guidance and specification documents. The relevant National Highways area that adopts and controls the lighting for highways with and near the **EMG2 Project** is Area 7 which incorporates Derby.

4.2. Leicestershire County Council

4.2.1. Where applicable the lighting specification of Leicestershire County Council (LCC) will be used.

4.2.2. The preferred luminaires by LCC are detailed in **Table 1**.

LCC Type	Model	LED's	Optic	Cable (m)	Use
T1	Ampera Maxi	96	5119	13	Junctions, Car Parks, Roundabouts
T2	Ampera Maxi	112	5119	13	Junctions, Car Parks, Roundabouts
T3	Ampera Maxi	96	5141	13	Straight Roads
T4	Ampera Midi	48	5119	13	Junctions, Car Parks, Roundabouts
T5	Ampera Midi	64	5119	13	Junctions, Car Parks, Roundabouts
T6	Ampera Midi	64	5139	13	Straight Roads
T7	Ampera Midi	48	5141	13	Straight Roads
T8	Ampera Midi	64	5141	13	Straight Roads
T9	Ampera Midi	32	5141	13	Header Columns, Turning Heads, Car Parks
T10	Ampera Maxi	112	5141	13	Straight Roads
R1	Ampera Mini	8	5136	9	Footways
R2	Ampera Mini	16	5141	9	Residential Roads

R3	Ampera Mini	16	5119	9	Header Columns, Turning Heads, Car Parks
R5	Ampera Mini	24	5119	9	Header Columns, Turning Heads, Car Parks
R6	Ampera Mini	24	5141	13	Straight Roads

Table 1: LCC Lantern Types with Uses

5. LIGHTING STRATEGY

5.1. Introduction

5.1.1. The **EMG2 Project** 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.

5.1.2. Lighting will be of an appropriate specification and designed in accordance with British Standards.

5.1.3. The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the **EMG2 Project** is located, is sensitive to the area, and provides a recognised standard level of lighting for all adoptable areas requiring illumination.

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

Construction

5.1.5. Lighting will be required throughout the construction phase of the **EMG2 Project** to facilitate the safe working of those carrying out construction activities, and to assist in maintaining the security of the construction sites.

Highways Works

5.1.6. Where proposed highways are to be lit, they will be lit as outlined in the National Highways guidance and specification document.

5.1.7. Not all highways area required to be lit, and those proposed to contain lighting are detailed in the relevant drawings and documentation.

5.1.8. As these highways will be lit as outlined within National Highways guidance and specification documents the specific illuminance requirements are not detailed in this Lighting Strategy.

5.1.9. **Table 2** contains a summary of the areas of highway, road and active travel that are proposed to be lit as part of the **EMG2 Project**.

Area of Scheme	Authority	Suggested extent of Lighting
M1 J24	NH	Yes as present, including on new M1-A50 link.
EMG1 private roads (amends in bus interchange area and access to P16)	Segro	Yes, as present.

EMG1-EMG2 active travel link	NH or LCC, TBC	No, except at junctions at each end.
A453 EMG2 site access	LCC	Yes, as present.
A453 The Green	LCC	No.
EMG2 private roads	Segro	Yes
Hyam's Lane	LCC	No except where it meets the EMG2 private road.

Table 2: Areas of Highways and Rod Proposed to Contain Lighting

5.1.10. Drawings showing the areas of highway proposed to be lit that are either on the Strategic Road Network or on the Leicestershire County Council Network can be found in **Appendix 11E (Document DCO/MCO 6.11E)**.

EMG1 Works

5.1.11. The follow areas will require task lighting to facilitate the safe undertaking of operational tasks:

5.1.12. Lighting to a private specification will be required in the following areas:

- Terminal Gantry Crane

EMG2 Main Site and EMG1 Works Plot 16

5.1.13. The follow areas will require task lighting to facilitate the safe undertaking of operational tasks:

5.1.14. Lighting to an adoptable specification will be required in the following areas:

- Section 278 Areas for Roundabout Access

5.1.15. Lighting to a private specification will be required in the following task areas:

- Roads with the Commercial Site,
- The Roundabout,
- Bus Terminals,
- Car Parking Areas,
- Yards including HGV Parking,
- The Perimeter of the Commercial Units and Offices (where applicable),
- Hyam's Lane Improvements.

5.2. Construction

5.2.1. As detailed within the CEMP (**Document DCO/MCO 6.3A**), construction work within the development site will be confined to the following:

- 07:00 -19:00 hours Monday to Friday
- 07:00 -16:00 hours Saturday

5.2.2. No works will be undertaken on Sundays or public holidays, save in exceptional circumstances only and with prior notification to the LPA, and any changes to the above working hours will also be agreed with the LPA.

5.2.3. No works within the Main Site and Plot 16 are planned to be undertaken in periods of darkness and therefore it is unlikely that task lighting will be required. However, unplanned events can occur for which task lighting may be required for short periods; in this event each P-CEMP shall set out the maximum height of lighting lanterns and the average lux levels.

5.2.4. The P-CEMP for any component of the highway works shall provide details of requirements for night working and any associated proposals for lighting.

5.2.5. Temporary lighting will be provided in the contractor's compound for security and safety reasons. Details shall be set out in the P-CEMP including the average lux level; examples of the lux levels and typical luminaire used are shown below.

5.2.6. Construction lighting will be provided in compliance with the guidance within BS EN 12464-2: 2014 (an example of the lighting levels is shown in **Figure 4**), which defines appropriate lighting levels for outdoor work tasks. The levels required will vary depending upon the task being undertaken and will be risk assessed on a task-by-task basis. Construction lighting will not significantly exceed the relevant lighting standard for the task being undertaken in order to limit the visibility of construction lighting within the landscape.

Table 5.3 — Building sites

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.3.1	Clearance, excavation and loading	20	0,25	55	20	
5.3.2	Construction areas, drain pipes mounting, transport, auxiliary and storage tasks	50	0,40	50	20	
5.3.3	Framework element mounting, light reinforcement work, wooden mould and framework mounting, electric piping and cabling	100	0,40	45	40	
5.3.4	Element jointing, demanding electrical, machine and pipe mountings	200	0,50	45	40	

Figure 4: BS EN 12464-2: 2014 Table 5.3 Building Sites

5.2.7. Construction lighting will be maintained at the lowest safe level for the task and focussed into the site, onto the task being undertaken.

5.2.8. Construction lighting will be mounted an appropriate distance from the task being performed to ensure the required minimum illuminance levels and uniformity is achieved without the need to tilt the luminaires. Additionally, luminaires will be fitted with baffles or shields where necessary to ensure that light spill is not directed towards potentially sensitive receptors.

5.2.9. 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 **EMG2 Project**. Construction tasks are not anticipated to be undertaken for significant periods during the hours of darkness.

5.2.10. To limit the visibility of construction lighting within the landscape, it will be switched off when not in use.

5.2.11. Security lighting to the construction compound will be provided by luminaires fixed to site infrastructure, such as cabins or scaffolding poles, will be oriented downwards only and will be aimed into the site only to reduce the levels of light spill leaving the site.

5.2.12. Security lighting will be controlled via photosensor and Passive Infra-red Motion Sensor (PIR), ensuring that lighting is only operational during the hours of darkness and when required.

5.2.13. Construction lighting requirements are provided in the CEMP (**Document DCO/MCO 6.3A**) accompanying the application. Through the implementation of the CEMP (**Document DCO/MCO 6.3A**), potentially impacts associated with construction lighting will be minimised as far as practical.

5.2.14. Several different luminaire form factors are likely to be used during construction, this may include:

- Tower lighting
- Bulkhead luminaire
- Small floodlights, and
- Festoon for wayfinding

5.2.15. Some examples of these luminaires are shown in **Figure 5** - **Figure 8**.

Figure 5: Example of Construction Tower Lighting produced by Prolectric

Figure 6: Example of Bulkhead Lighting

Figure 7: Example of Small Construction Floodlights

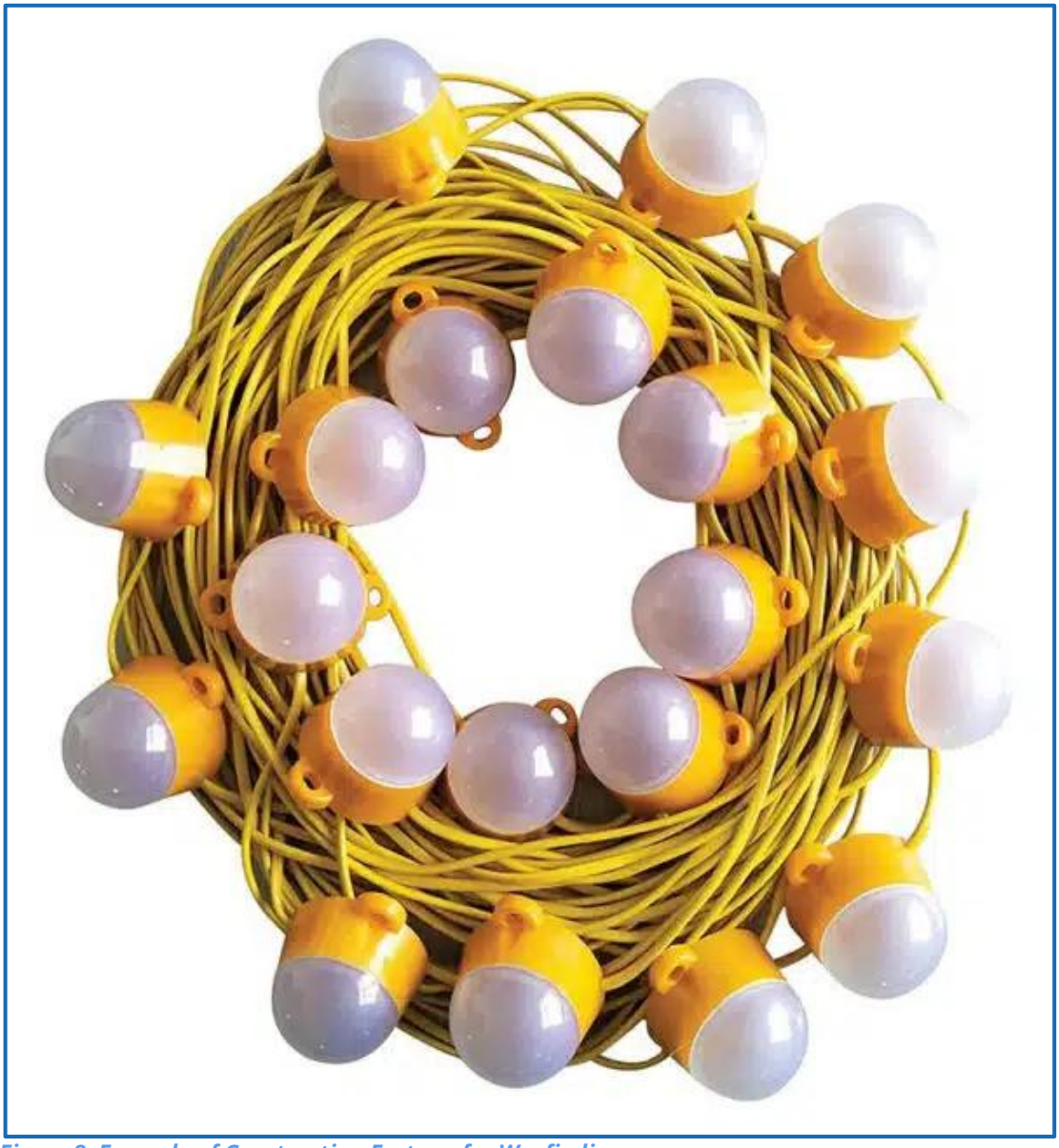


Figure 8: Example of Construction Festoon for Wayfinding

5.3. EMG1 Works

Terminal Gantry Crane

5.3.1. The lighting for the Terminal Gantry Cranes will be provide by the manufacture for the gantry cranes to the correct specification.

5.3.2. This lighting will conform to BS EN 12464-2:2014 (**Figure 9**)

Table 5.12 — Railways and tramways

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
General	Railway areas including light railways, tramways, monorails, miniature rails, metro, etc.					Avoid glare for vehicle drivers.
5.12.20	Stairs, large number of passengers	100	0,50	45	40	
5.12.21	Covered platforms in freight areas, continuous operation	100	0,50	45	40	$U_d \geq 1/5$
5.12.22	Inspection pit	100	0,50	40	40	Use low-glare local lighting

Figure 9: Illuminance Performance requirements for Freight Areas on Railways Under Continuous Operation (BS EN 12464-2:2014)

5.4. EMG2 Main Site and EMG1 Works Plot 16

Section 278 Areas for Roundabout Access

5.4.1. The Section 278 Areas for Roundabout Access will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-1:2015 (**Figure 10** and **Figure 11**).

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: BS 5489-1:2020 Lighting Classes of Comparable Level

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: BS 5489-1:2020 C Lighting Classes

5.4.2. The specific lighting level for the access roundabout will be confirmed during the S278.

Roads within the Commercial Site

5.4.3. The Roads within the Commercial Site will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-2:2015 for amenity and safety purposes.

5.4.4. The illuminance performance requirements for the Roads within the Commercial Site are outlined in **Figure 12**.

5.4.5. Following a risk assessment, the lighting class will remain as recommended in BS 5489-1:2020 & BS EN 13201-2:2015.

Table A.3 — *Lighting classes for traffic routes (v ≤ 40 mph)*

Traffic flow	Lighting class		
	Dual carriageway		Single carriageway
	Junction density: high	Junction density: low	
High to very high[A)]	M3	M4	M3
Low to moderate[B)]	M4	M5	M4
Very low[C)]	M5	M6	M5

NOTE 1 High junction density would be junction centres spaced < 3 km apart. A risk assessment can determine whether some of the junctions constitute conflict areas (see A.3.2).

NOTE 2 Grey highlighting indicates situations that would not usually occur in the UK.

[A)] High to very high traffic flow might be defined as either having an ADT of > 40 000, or where the flow exceeds 65% of the lane maximum capacity for dual or multi-lane carriageways or 45% for single carriageways.

[B)] Low to moderate traffic flow might be defined as either having an ADT of between 7 000 and 40 000, or where the flow is between 35% and 65% for dual or multi-lane carriageways or between 15% and 45% for single carriageways.

[C)] Very low traffic flow might be defined as either having an ADT of < 7 000, or where the flow is < 35% for dual or multi-lane carriageways or < 15% for single carriageways.

Figure 12: Illuminance Performance requirements for Roadways (BS 5489-1:2020)

5.4.6. Due to the junction density within the **EMG2 Project**, a comparable lighting class will be used to ensure the uniformity of the roadway is maintained. This leads to a conflict light class of C4 being applied to the roadways (**Figure 13** and **Figure 14**).

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 13: BS 5489-1:2020 Lighting Classes of Comparable Level

5.4.7. The illuminance performance requirements for a C4 lighting class are detailed in **Figure 14**.

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 14: C Lighting Classes from BS EN 13201-2:2015

Roundabouts

5.4.8. The Roundabouts will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-2:2015 for amenity and safety purposes. The lighting class for the Roundabouts will be based on the lighting class of the adjacent roadways leading to the roundabout, and will be one level higher than the road lighting class.

5.4.9. The illuminance performance requirements for the Roundabouts are outlined in **Figure 15** and **Figure 16**.

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 15: BS 5489-1:2020 Lighting Classes of Comparable Level

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 16: C Lighting Classes from BS EN 13201-2:2015

Bus Terminals

5.4.10. The Bus Terminals will be illuminated in accordance with BS 5489-1:2020 & BS EN 13201-2:2015 for amenity and safety purposes.

5.4.11. The bus terminal will contain several intersecting flows of traffic as well as pedestrian use. As such, it is considered a conflict area and will be lit as such.

5.4.12. The lighting class used for this area will be one step above the roadway leading into it, and will be an extension of the conflict lighting class for the access roundabout.

5.4.13. The illuminance performance requirements for the Bus Terminal are outlined in **Figure 17**.

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 17: C Lighting Classes from BS EN 13201-2:2015

Car Parking Areas

5.4.14. The Car Parks will be illuminated in accordance with BS 5489-1:2020 and BS EN 12464-2:2014 amenity and safety purposes.

5.4.15. The illuminance performance requirements for the Car Parks are outlined in **Figure 18**.

Table 4 — *Maintained lighting levels for outdoor car parks*

	Values in lux	
Type of area and usage	$\overline{E}$	U_o
Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25
Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0.25
Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose sports and building complexes	20	0.25

Figure 18: Illuminance Performance requirements for Car Parking Areas (BS 5489-1:2020 and BS EN 12464-2:2014)

Yards Including HGV Parking

5.4.16. The Yards Including HGV Parking will be illuminated in accordance with BS 5489-1:2020 and BS EN 12464-2:2014.

5.4.17. The illuminance performance requirements for the Yards Including HGV Parking are outlined in **Figure 19**.

Table 5.7 — Industrial sites and storage areas

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.7.1	Short-term handling of large units and raw materials, loading and unloading of solid bulk goods	20	0,25	55	20	
5.7.2	Continuous handling of large units and raw materials, loading and unloading of freight, lifting and descending location for cranes, open loading platforms	50	0,40	50	20	
5.7.3	Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	100	0,50	45	20	
5.7.4	Demanding electrical, machine and piping installations, inspection	200	0,50	45	60	Use local lighting

Figure 19: Illuminance Performance requirements for Yards Including HGC Parking (BS EN 12464-2:2014)

The Perimeters of The Commercial Units (Where Applicable)

5.4.18. Certain perimeter areas of the commercial units will require lighting for safety and amenity purposes for people entering and leaving the buildings and for those traveling around the units by car.

5.4.19. These perimeters require lighting in accordance with BS 5489-1:2020 and BS EN 13201:2015.

5.4.20. A P4 lighting class has been selected based on the expected mixed use by pedestrians and personal vehicles.

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 20: Illuminance Performance requirements for The Perimeter of The Commercial Units (Where Applicable) (BS EN 13201-2:2015)

Hyam's Lane

5.4.21. Hyam's Lane will be illuminated in accordance with BS 5489-1:2020 and BS EN 13201-2:2015 for amenity and safety purposes.

5.4.22. The illuminance requirements Hyam's lane are detailed in **Figure 21**.

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 21: Illuminance Performance requirements for Hyam's Lane (BS EN 13201-2:2015)

5.5. Mitigation

5.5.1. **Table 3** details the mitigation that will be embedded into the lighting designs for the **EMG2 Project**.

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 **EMG2 Project**
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 **EMG2 Project**
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 controlled (**Figure 22**). Where this is not available, traditional back light shields can be used (**Figure 23**).	Whole **EMG2 Project**: Where luminaires are installed on the boundary of an area facing into the site.
Using the lowest possible Correlated Colour Temperature	Throughout the **EMG2 Project** 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 increase 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 **EMG2 Project**
Using the lowest applicable lighting levels for tasks and areas	All areas and task will be lit using the lowest applicable lighting levels are defined in the relevant British Standard (**Section 2**). This will ensure a standard and recognised levels of light is provided for all areas of the **EMG2 Project**, while ensure no area is over lit. During the detailed lighting design, a risk assessment must be undertaken to help defined the specific lighting class for any area.	Whole **EMG2 Project**

Mitigation Name	Description of Mitigation	Installation Location
Centralised Lighting Controls	Throughout the **EMG2 Project** a centralised lighting control system/s will be used. This will ensure lighting is only active as require during the hours of darkness, will allow dimming based on traffic flow, and switching to take place based on the hours of use. For example: 1. When a car park is experiencing low use over night the lighting can be dimmed, 2. If a unit is closed overnight, then all associated lighting can be switched off. This will not only reduce the effects of lighting, but will save money and energy for the owner of the lighting system.	Whole **EMG2 Project**
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 **EMG2 Project**
Using appropriate optics for the areas being illuminated	The luminaire optic used will be specific to the area being lit (**Figure 24**). 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 **EMG2 Project**
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 (**Figure 24**). 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 **EMG2 Project**

Table 3: Embedded Mitigation Table

Figure 22: Example of Integrated Light Spill Control Options – Kingfisher Lighting

Figure 23: Example of a Traditional Back Light Shield

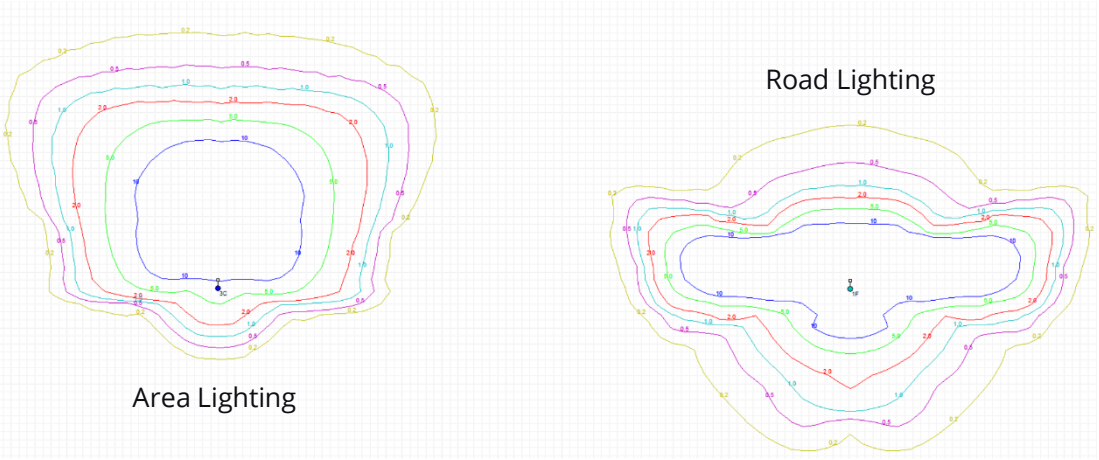


Figure 24: Example of Two Different Luminaire Optics

6. OPERATIONAL EQUIPMENT SPECIFICATION

6.1. Luminaire and control specification Tables

Equipment Specification	
Application Area	National Highways
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Philips (Or Similar Approved)
Luminaire Model	Luma Gen 2 (Or Similar Approved)
Light Source	LED
Height	≤15m
Mounting Arrangement	Post Top or Side Entry
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[2]	Lighting shall be CMS controlled. Road lighting lanterns, illuminated signs and bollards require CMS control with a node fitted to each lantern. Individual PECU control shall not be used.

Table 4: Luminaire performance requirements For Highways (National Highways)

[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).

Equipment Specification	
Application Area	LCC Adoptable Areas
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Urbis Schreder (Or Similar Approved)
Luminaire Model	Ampera (Or Similar Approved)
Light Source	LED
Height	≤10m
Mounting Arrangement	Post Top
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[3]	As per Leicestershire County Council Adoptable Specification

Table 5: Leicestershire County Council Adoptable Luminaires

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

Equipment Specification	
Application Area	Private Roads, Roundabouts, Car Parks and Yard/Commercial Unit Perimeters
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	Urbis Schreder (Or Similar Approved)
Luminaire Model	Axia 3 (Or Similar Approved)
Light Source	LED
Height	≤8m
Mounting Arrangement	Post Top
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[4]	Wirefield Eye-Wi (or equivalent approved) Wirefield Eye-Wi Zhaga node- Dusk to Dawn (35 lux switch on/18 lux switch off) (or equivalent approved)

Table 6: Luminaire performance requirements Private Roads, Roundabouts, Car Parks and Yard/ Commercial Unit Perimeters

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

Equipment Specification	
Application Area	Central Areas in Car Parks
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	DW Windsor (Or Similar Approved)
Luminaire Model	Milano Classic (Or Similar Approved)
Light Source	LED
Height	≤8m
Mounting Arrangement	Post Top
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[5]	Wirefield Eye-Wi (or equivalent approved) Wirefield Eye-Wi Zhaga node- Dusk to Dawn (35 lux switch on/18 lux switch off) (or equivalent approved)

Table 7: Luminaire performance requirements Central Areas in Car Parks

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

Equipment Specification	
Application Area	Yards
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	DW Windsor (Or Similar Approved)
Luminaire Model	Sabre (Or Similar Approved)
Light Source	LED
Height	≤8m
Mounting Arrangement	Post Top and Wall Mounted on Brackets
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[6]	Wirefield Eye-Wi (or equivalent approved) Wirefield Eye-Wi Zhaga node- Dusk to Dawn (35 lux switch on/18 lux switch off) (or equivalent approved)

Table 8: Luminaire performance requirements Yards

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

Equipment Specification	
Application Area	General Amenity and Wayfinding
Correlated Colour Temperature (Kelvin)	≤3000K
Luminaire Manufacturer	DW Windsor (Or Similar Approved)
Luminaire Model	Kirium Wall (Or Similar Approved)
Light Source	LED
Height	≤3m
Mounting Arrangement	Wall Surface Mounted
Luminaire Tilt	0°
Upward Light Output Ratio **E2 < 2.5%**	0%
Example Luminaire Image	
Controls[7]	Wirefield Eye-Wi (or equivalent approved) Wirefield Eye-Wi Zhaga node- Dusk to Dawn (35 lux switch on/18 lux switch off) (or equivalent approved)

Table 9: Luminaire performance requirements General Amenity and Wayfinding

[7] 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 *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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