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EXTERNAL LED LIGHTING ASSESSMENT REPORT

FOR:
NCP FLIGHTPATH HEATHROW

AUTHOR:
BENJAMIN TSANG

A PROJECT FOR:
HEATHROW NCP PROPERTY LIMITED

STATUS:
PLANNING

01908 320 099 | WWW.MBA-CONSULTANTS.CO.UK | ENQUIRIES@MBA-CONSULTANTS.CO.UK

MAPLE HOUSE | WOODLANDS BUSINESS PARK | LINFORD WOOD WEST | MILTON KEYNES | MK14 6FG

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1.0 INTRODUCTION

1. This assessment provides a detailed overview of the proposed new external lighting installation for the proposed development located approximately 1.6 miles off Junction 4 of M4 on Bath Road, West Drayton, London Borough of Hillingdon, described as follows:

   Demolition of existing car park and redevelopment for industrial (Use Class B2); storage or distribution (Use Class B8); and/or light industrial (Use Class E(g)(iii)) purposes, with ancillary office space, landscaping, car parking, servicing and access arrangements.

2. The lighting scheme covers all external areas of all the buildings including the access roads, walkways, car and cycle parking and service yards.

3. The scheme is based on the use of LED luminaires fixed to the building façades and lighting columns as detailed on the accompaning external lighitng layout, 22-112-EX-001 Rev P1.

4. The luminaires adjacent to site boundaries have been upgraded to have forward throw or asymmetric optics to minimise light spill outside the site boundaries.

2.0 LIGHTING SOLUTION

1. The following lighting standards, policies and guidance documents will form the basis within this report for assessment and were consulted during and post completion of the theoretical lighting design: -

   - National Planning Policy Framework (Revision 24th July 2018)
   - Clean Neighbourhoods and Environment Act 2005 (CNEA)
   - Environmental Protection Act (1990)
   - HSE Executive Lighting at Work (ISBN 978 0 7176 1232 1) 1997
   - British Standards, Design of road lighting - Lighting of roads and public amenity areas. Code of practice (BS 5489-1:2020)
   - British Standards, Lighting of Outdoor Work Places (BS EN 12464, 2:2014)
   - British Standards, Accessible & Inclusive Built Environment (BS 8300-1:2017)
   - British Standards, Photobiological Safety of Lamp Systems (BS EN 62471:2008)
   - CIBSE Lighting Guide LG1, The Industrial Environment (2012)
   - CIBSE Lighting Guide LG6, The Outdoor Environment (2016)
   - ILP Technical Report TR12 Lighting of Pedestrian Crossings (2007)
   - ILP Guidance Notes for the Reduction of Obtrusive Light (2011)
   - ILP Guidance Notes Guidance Notes for Bat & Artificial Lighting in UK.
   - ILP Technical Report TR23 Lighting of Cycle Tracks (1998)
   - CAA Advice Note 2 for Lighting Near Aerodromes
   - BREEAM International New Construction Version 6

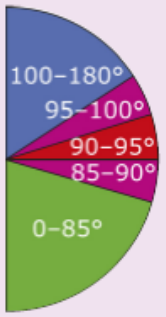
2. Care has been taken when selecting the luminaires that ensures the appropriate products will greatly reduce spill light and glare to and around site boundaries and prevent sky glow.

3. All luminaires have full cut-off optics, horizontally mounted, "flat glass" floodlights and LED modules that are housed in the luminaires canopy have been generally selected.

4. Best lighting practice design guidelines have been followed in order to achieve the criteria outlined in The Institution of Lighting Professionals: Guidance Notes for the Reduction of Obtrusive Light 01/21, covering Environmental Zones E0 to E4.

5. The proposed Holophane D-Series pole mounted and Denver ID Wall façade mounted luminaires have an Upper Light Output Ratio (ULOR) of 0% and drastically reduce the upward spread of light near to and above the horizontal.

6. The most sensitive/critical zones for minimising sky glow are those between 85 - 100° as shown in Table 1.



Indicative diagram

Angle of light emitted (degrees)	Sky glow effect	Glare effect
100 - 180	Local	Little
95 - 100	Significant	Some
90 - 95	High	High
85 - 90	Significant	High
0 - 85	Minimum	Some

Table 1: Critical Luminaire Angles for Minimising Sky Glow - [1]

7. With the proposed luminaires being strategically placed and having zero or minimal upward light ratio (ULR), the proposed design solution meets the criteria of environmental zone E4, Lighting Environment classification of High District Brightness and Maximum Upward Light Ratio of Luminaires as indicated respectively in Tables 2 & 3.

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones 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 of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Table 2: Environmental Zones - [1]

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

Table 3: Maximum Values of Upward Light Ratio (ULR) of Luminaires - [1]

8. Glare has been kept to a minimum by ensuring that the main beam angle of all the luminaires directed towards any potential observer is not more than 70 degrees as indicated in Figure 1.

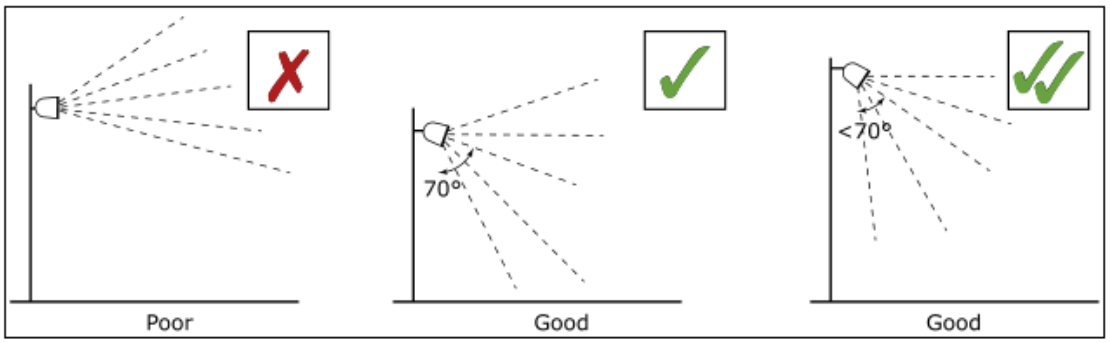


Figure 1: Luminaire Aiming Angels - [1]

In additional, the designed mounting heights and chosen luminaires ensure that greater spacing between luminaires is achieved thus reducing the number of overall lighting points and also reducing the spill and glare as indicated in Figures 2 and 3.

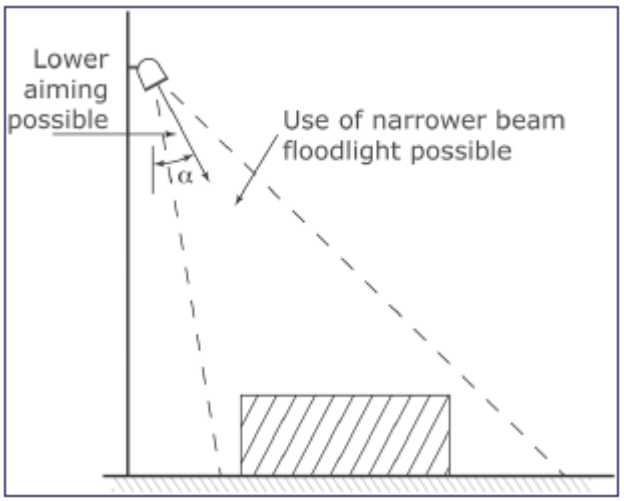


Figure 2: Higher Mounting Height – Less Spill and Glare - [1]

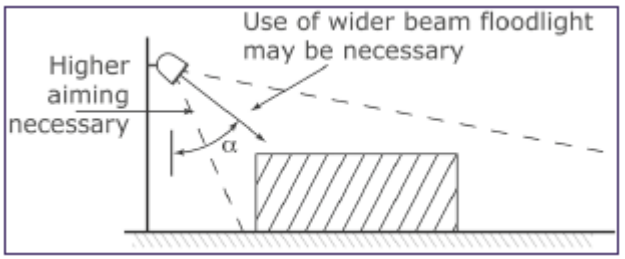


Figure 3: Lower Mounting Height – More Spill and Glare - [1]

9. Lighting pollution on adjacent properties has been kept to a minimum and in accordance with the respective environmental zone category indicated Table 4.

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

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

Table 4: Maximum Values of Vertical Illumination on Properties – [1]

10. During the design phase, particular attention was paid to eliminating any intrusive lighting to sensitive areas such as the residential area, lighting columns designated to illuminate the car park between the Unit 110-140 and 6 Dorton Villa and the row of dwellings on 33-95 Sipson Way have been positioned within the façade recesses. Each column has a projection arm so that, the luminaire/lamp clears the projected parts of facade. This strategy helps to reduce the level of light intrusion through the windows. A study has been carried out to measure the level of intrusive light and compared with the recommended maximum intrusive light levels set out within ILP Guidance Notes for the Reduction of Obtrusive Light (2021). The study methodology and results are presented in section 4 of this report.

11. Particular attention was also paid to the lighting scheme due to the adjacent runway of the London Heathrow Airport to comply with specific paragraphs from CAA Advice Note 2 for Lighting Near Aerodromes as below.
    - Paragraph 2.2 Confusing Lighting
        i. To avoid confusing lighting and minimise the upward light output ratio caused by the proposed artificial lighting installed on site, all column and wall mounted luminaires are full cut off and will have zero-degree tilt angle.
    - Paragraph 2.4 Height Limitations for Lighting Structures
        i. The site is positioned approximately 400 m away from the northern runway beneath the inner horizontal surface in accordance with London Heathrow Airport's OLS model. The maximum altitude to which the proposed development can be built under this surface is 67.87 m. The proposed development does not infringe the OLS considering the proposed lighting column heights have been kept to 8 m high or equivalent to maximum altitude of 34.0 m in line with the street columns on Bath Road.

3.0 DESIGN STATISTICS

1. The following Table 5 details the design statistics achieved within the various areas of the development with the overall output based at 100% output and should be read in conjunction with the external lighting drawing provided, 22-112-EX-001 Rev P1.

Statistics				
Description	Symbol	Avg	Min	Min/Avg
Building Perimeter	+	13 lux	6 lux	0.46
Car Park	+	13 lux	4 lux	0.31
Estate Road	+	22 lux	12 lux	0.55
Shared HGV Turn	+	33 lux	29 lux	0.88
Spill	+	1 lux	0 lux	0.00
Unit 110 Loading Bays	+	32 lux	22 lux	0.69
Unit 110 Yard	+	28 lux	12 lux	0.43
Unit 140 Loading Bays	+	37 lux	34 lux	0.92
Unit 140 Yard	+	31 lux	13 lux	0.42
Path	+	22 lux	15 lux	0.68
Path	+	14 lux	9 lux	0.64
Path	+	10 lux	5 lux	0.50
Cycle Store	+	15 lux	11 lux	0.73
Substation Access	+	13 lux	10 lux	0.77
Unit 120 Loading Bays	+	36 lux	32 lux	0.89
Unit 120 Yard	+	35 lux	20 lux	0.57
Unit 130 Loading Bays	+	37 lux	32 lux	0.86
Unit 130 Yard	+	32 lux	17 lux	0.53

Table 5: Design Lux Levels

2. The results obtained fall in line with the respective guidelines Environmental Zones E4 inclusive as detailed elsewhere in this report.

3. As further detailed on the drawing any potential light spill over the boundaries into adjoining areas including surrounding habitat which has been kept to the minimum which is detailed on the drawing as a blue contour line which clearly details the expected spill zone from the respective level.

4.0 LUMINAIRE DETAILS

4.1 D-Series 0 Post Mounted and Façade Mounted LED Luminaire

1. The D-SERIES Streetlight luminaire has a single-piece die-cast aluminium housing that conforms to EN 1706 AC-46500 with integral heat sink fins to optimise thermal management through conductive cooling. Figure 4 indicates an image of the proposed luminaire.

2. LED modules are IP65 with individual lenses, and high grade aluminium housing to transfer heat away from the LEDs and dissipate through the finned housing for cooling.

3. The LED driver is mounted in direct contact with the finned housing for cooling to promote low operating temperature and long system life.

4. The housing is completely sealed against moisture and environmental contaminants (IP65) and against impact protection (IK07).

5. With 0% upward light ratio this luminaire complies with Environmental Zones E0 to and including E4.

6. The luminaire has been chosen for access road, service yard, car parks, cycle shelter and substation access.

Figure 4: D-Series 0 Luminaire

4.2 Denver iD Wall Mounted LED Luminaire

1. The Denver iD Wall luminaire consist of a die cast aluminium body with LED modules which are sealed with a high transparency glass. The asymmetric optic distribution has been used on this project to suit the area being lit. Figure 5 indicates an image of the proposed luminaire.

2. The luminaire is completely sealed against moisture and environmental contaminants (IP65) and against impact protection (IK10).

3. With 0% upward light ratio this luminaire complies with Environmental Zones E0 to and including E4.

4. The luminaire has been chosen for the footpaths along building perimeter.

Figure 5: Denver iD Wall Luminaire

5.0 CONCLUSION

1. The total lighting solution has been carefully generated to ensure the immediate environment has been protected adjacent to the site.

2. The illumination that would normally be free flowing from site boundaries has been restricted and has been further designed to mitigate any potential impact to properties on Sipson Way adjacent to the proposed site.

3. Careful consideration has also been taken to ensure no loss of amenity to road users due to glare through zero degree tilt angle and choice of LED modules optics.

6.0 REFERENCES

[1] – 2021/01 - Institute of Lighting Professionals – GN 01-21 Guidance Note for the reduction of obtrusive light.