

R500
Baldoyle Residential Development
SITE LIGHTING ANALYSIS
GA01

R500-OCSC-XX-XX-RP-E-0004

Planning Stage
P05

19.05.21

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1.0 EXECUTIVE SUMMARY

Client: The Shoreline Partnership
Project: Alterations to Shoreline GA01 Lands at Baldoyle

The proposed development site is located at Stapolin Growth Area 1, Baldoyle, Dublin 13.

The development will consist of alterations to the permitted development, as permitted under FCC Reg. Ref. 16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046) of 544 no. residential units (385 no. apartments and 159 no. houses), retail and a crèche, to the development of 882 no. new residential dwellings (747 no. apartments, 135 no. houses), residential tenant amenity, retail, crèche, parking, and public realm, over a total site area of c. 9.1 ha, and site development area of c. 8.89 ha. Landscaping will include extensive communal amenity areas, and significant public open space provision.

This report outlines the design intent and considerations to be taken into account with regard to residential lighting for the development roadways on the proposed residential development at Baldoyle, Co. Dublin.

The report considers the lighting design as developed by O'Connor Sutton Cronin (OCSC). The report has been developed with the following principal considerations:

- Provide adequate illumination to contribute towards the safe use of all development roads.
- Contain the lighting within the site.
- Minimise light pollution and visual glare to residential neighbours and areas
- Provide a visually interesting environment.
- Take account of ecological factors such as local bat populations.

The complete external lighting installation is to be designed in accordance with the regulations for electrical services as ETCI National Rules for Electrical Installations ET10101 2020 as well as BS5489-1:2003 Code of practice for the design of road lighting, IS EN 13201:2003-2, FCC. Public Lighting Installations in Residential Areas and CIE regarding Illumination levels. These design criteria are outlined in Section 2.0.

The predicted performance of the external lighting installations has been assessed in detail using Lighting Simulation software. The Lighting Simulation software used was Lighting Reality; which includes false colour rendering capabilities.

Our design intent comprising of column lighting for the development roads and adjoining pedestrian footpaths is set out in Section 3.0. An indicative example of the type of proposed luminaire (light fitting) and associated lamp specification have been included, with accompanying images, photometric and dimensional data.

Section 4.0 provides analysis of the illumination results for the development roadways (at ground level).

2.0 DESIGN CRITERIA

The design criteria applied to the proposed external lighting installations is in accordance with BS 5489-1:2003 Code of practice for the design of road lighting¹, CIE Guide to the Lighting of Urban Areas², NSAI EN I.S. 13201-2 Road Lighting Performance Requirements³, General Specification for Public Lighting Design and Installation in Residential, Industrial and Commercial Developments in the Fingal County Council Area⁴. The guidelines in “Bats & Lighting, Guidance Notes for Planners, engineers, architects and developers”, issued by Bat Conservation Ireland were also taken into account in the design of lighting.

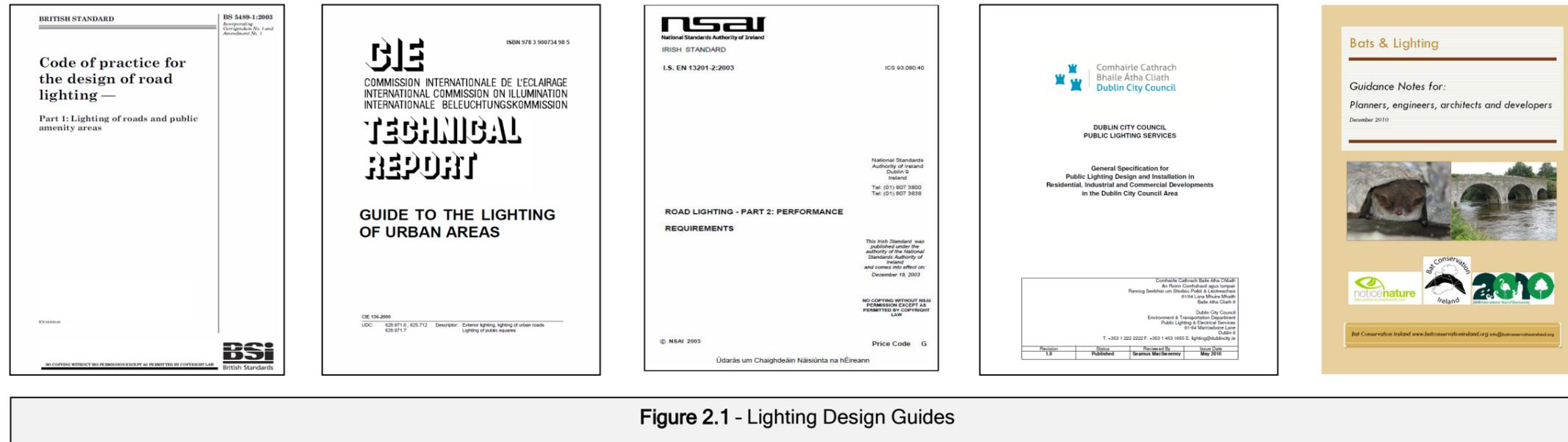


Figure 2.1 - Lighting Design Guides

The brief for this report was to define the design criteria and summarise the results of lighting calculations. Specific results are included for light spill from the site lighting to preserve neighbouring residential amenity & conform to BS, IS and EN guidelines in relation to minimum light pollution requirements.

OCSC conducted calculations in regard to light levels on the development roadways and adjoining proposed residential properties. To limit any excessive light trespass, which may impinge upon the residential amenity of housing units within the development, several preventative measures have been taken;

1. Firstly, Light posts have been consciously positioned, so as to limit negative spill, whilst also maintaining the required lux levels uniformly across the proposed development. This has positively negated excess spill levels across areas containing the local Bat habitat.
2. In addition, narrow beam optics are employed to physically contain unnecessary light spillage. This provision allows for a maximum level of delivered light to the road way, as opposed to territories outside the boundary area.

¹ British Standards Institution 5489-1:2003 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas

² Commission Internationale de l'Eclairage or International Commission on Illumination

³ I.S. EN 13201 Road Lighting - Part 2 Performance Requirements

⁴ Fingal County Council Public Lighting Services - General Specification for Public Lighting Design and Installation in Residential, Industrial and Commercial Developments in the Fingal County Council Area.

2.1 GUIDELINES TO EXTERNAL LIGHTING DESIGN

The points below were used as guidelines where feasible in the design of the external lighting.

1. No white light or other lighting with a UV component will be permitted in the vicinity of the Bat habitat;
 - Lighting with little or no UV will be utilised
 - Lighting with a narrow spectrum will be permitted to reduce impact
 - LED lighting with a broad spectrum will not be used
2. Minimum lux level to be used or as required by Health & Safety especially along the perimeters
3. An Amber LED has been shown to have a reduced impact on Bats due to its narrow spectrum properties
4. Fingal County Council public lighting guidance document, all roadways are to be designed to conform to required lux levels.
 - Lighting Classification
 - P2 – Longfield Road and Red Arches 8M columns
 - P3 – Irelands Eye Avenue and Stapolin way 6/8M columns
 - P4 – Minor roads
 - White neutral light (4000K) has been utilised in this design.

It is recommended that the actual overall uniformity of illuminance (U_o) be as high as reasonably practicable.

5. The lighting will be directional on to the development roads only with no significant spillage of light to adjoining habitats. To reduce light spillage from luminaires, lights that are designed not to emit light at angles greater than 70° from the vertical plane will be used.
 - Consequently a flat glass protector is often used to reduce light spillage. Other methods to control light spillage:
 - a. Cowls/Shields: these can be mounted on lamps to control direction of the light.
 - b. Masking: part of the luminaires is painted to block light to control the direction of the light.
 - c. Louvres: either as internal or external slates organized in rows or at angles depending on the direction of light control.
6. The lights are designed to meet Fingal County Council approved tubular column complete with accessible door 385mm above ground level.
7. Lighting designed to incorporate "constant light output" and "dimming and trimming" requirements by incorporating a 35/18 SELC 8482 mini photo cell and an "Dusk and Dawn" individual driver that dims the luminaire to 75% between the hrs of 12am – 6am.

3.0 PROPOSED INSTALLATIONS

3.1 Baldoyle Residential Development

The lighting design proposed is to use a Fingal County Council approved high efficiency LED luminaire. A lighting design incorporates a mixture of 6m and 8 metre high tubular lamppost with over hang out reach to provide directional light output direct to the road surface. This is selected to ensure compliance with guidelines and standards noted in Section 2 above. Six and eight metre high lamp posts have been selected due their characteristics enabling a lower quantity of luminaires to provide an even spread of luminance along the road. Provided below is an illustration of the lighting design incorporated into a colour rendered drawing.

Selected for the lighting design was a Schreder Axia LED Luminaire. These fittings were used to ensure that the spread of light achieves virtually no light spill to the adjoining properties. The resulting light levels are in line with the design criteria outlined above.

Environmental zone	Sky glow ULR inst. (max %)	Light trespass (into windows) E_v (lux) max	Source intensity I (kcd) max
E1 Dark landscapes	0	2	2.5
E2 Rural, village, dark urban locations	2.5	5	7.5
E3 Urban locations and small town centres	5	10	10
E4 Town and city centres	15	25	25

Figure 3.1 - Illumination Levels (Lux) for Residential Development

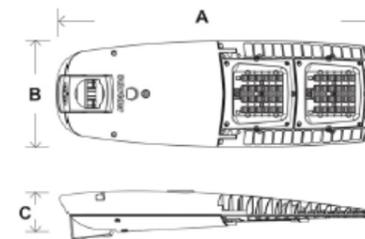
3.2 **Site Lighting Selected Luminaire**

It is proposed to provide both 6m and 8m high column-type light fittings to the road area with a 1m outreach required in order to achieve average Illumination levels. The proposed column light fitting is modern decorative LED luminaire with direct light spread. The luminaire is constructed out of die cast aluminium with integrated heat sink. The luminaire has the options to be installed with dimming, DALI & Constant Lumen Output (CLO). Fully compliant with EN 60598:CE.

Fig 3.1.4 Dimensions - Light Fitting	Figure 3.1.5 - Luminaire Mounted on Column- Image	
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DIMENSIONS AND MOUNTING	
AxBxC (mm Inch)	AXIA 2.1 - 650x132x250 25.6x5.2x9.8 AXIA 2.2 - 895x132x300 35.2x5.2x11.8
Weight (kg lbs)	AXIA 2.1 - 6.7 14.7 AXIA 2.2 - 9.5 20.9
Aerodynamic resistance (CxS)	AXIA 2.1 - 0.05 AXIA 2.2 - 0.07
Mounting possibilities	Side-entry slip-over - Ø32mm Side-entry slip-over - Ø42mm Side-entry slip-over - Ø48mm Side-entry slip-over - Ø60mm Post-top slip-over - Ø60mm Post-top slip-over - Ø76mm



4.0 RESULTS

4.1 Calculation Summary

Figure 4.1 indicates the predicted illumination levels at ground level and illustrate that the selected luminaire and the light design both achieve the desired average lux level of 7.56 lux with a minimum lux level of 1.58 lux.

Results

Eav	7.56
Emin	1.58
E _{max}	14.66
E _{min} /E _{max}	0.11
E _{min} /E _{av}	0.21

Figure 4.1 - Calculation results for the Illumination Levels (Lux) for the Residential Development

4.2 Ground Illumination (Residential Development)

Figure 4.2 illustrates the predicted illumination levels on Ground for the proposed installations. Illumination is indicated using a grey-scale rendering. As shown in Figure 4.1 the illumination throughout the residential development meets the requirements of P2, P3 and P4 Classifications. It should be noted that the illustration shows the design intent only. The luminaire positions will be installed as per the OCSC drawing to ensure that light spill on the park complies with an E2 zone, and to ensure P2, P3 and P4 Classifications are adhered to on the roads within the development.

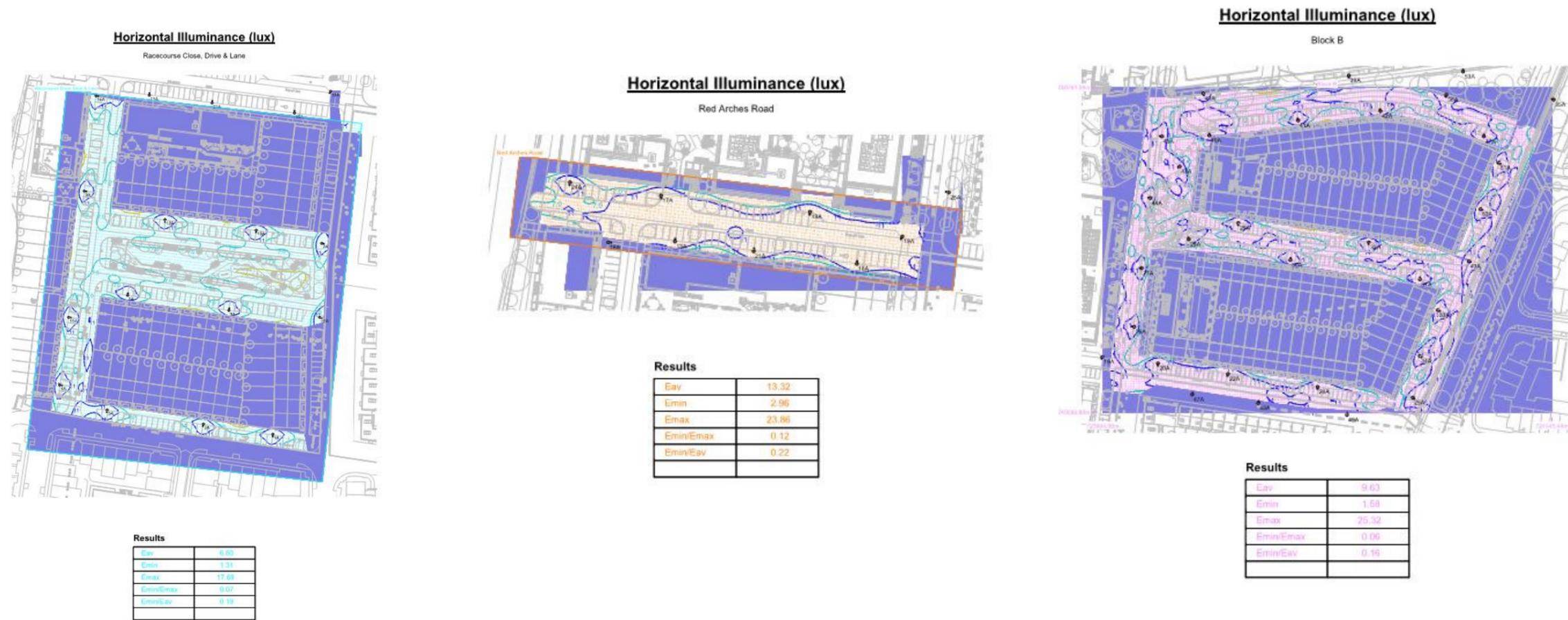


Figure 4.2 - Calculation results for the Illumination Levels (Lux) for the Residential Development

5.0 CONCLUSION

The suggestions on light fittings by the ecologist were taken into account during the design of the site lighting. Low pressure sodium or amber LED fittings were not sufficient to provide the required lighting levels and would not meet Fingal County Council's public lighting specification. Metal halide lighting is not Bat friendly and it is not used in the design. LED fittings with no UV output were used throughout. A specific pitch angle of the fittings was required to minimise spillage.

The illumination throughout the development roadways meets the lighting design requirements of P2, P3 and P4 lighting classes.

The resulting light spill from the residential street lighting shows a lux level of less than 1 lux adjacent to the park. The calculated figures are acceptable and do not exceed the recommended obtrusive light limitations for E2 rural, villages and dark urban locations. In some very limited marginal areas, spill light is between 1 and 5 lux. This would be still within the limitations for E2 environmental zone classification.

It should be noted that the results in Figure 4.1 and Figure 4.2 show the design intent only. Lamp standards positions must be installed to drawing requirements to ensure reduced light spill is adhered to, while ensuring lux level requirements are maintained throughout.

The details of the proposed lighting layout are shown on the accompanying drawing no. R500-OCSC-GA01-XX-DR-E-0001.

END OF REPORT