

**N324**  
**St. Paul's Residential Development, Raheny**  
**SITE LIGHTING ANALYSIS**

**N324-OCSC-XX-XX-RP-E-0001**

**Planning Stage**  
**Rev08**

**3<sup>rd</sup> October 2019**

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## 1.0 EXECUTIVE SUMMARY

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 St. Paul's College, Raheny, Dublin 5.

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 adjoining Public Park.
- 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 ET101:2008 as well as BS5489-1:2003 Code of practice for the design of road lighting, IS EN 13201:2003-2, DCC. 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 DIALux; 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 lighting<sup>1</sup>, CIE Guide to the Lighting of Urban Areas<sup>2</sup>, NSAI EN I.S. 13201-2 Road Lighting Performance Requirements<sup>3</sup>, General Specification for Public Lighting Design and Installation in Residential, Industrial and Commercial Developments in the Dublin City Council Area<sup>4</sup>. 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.

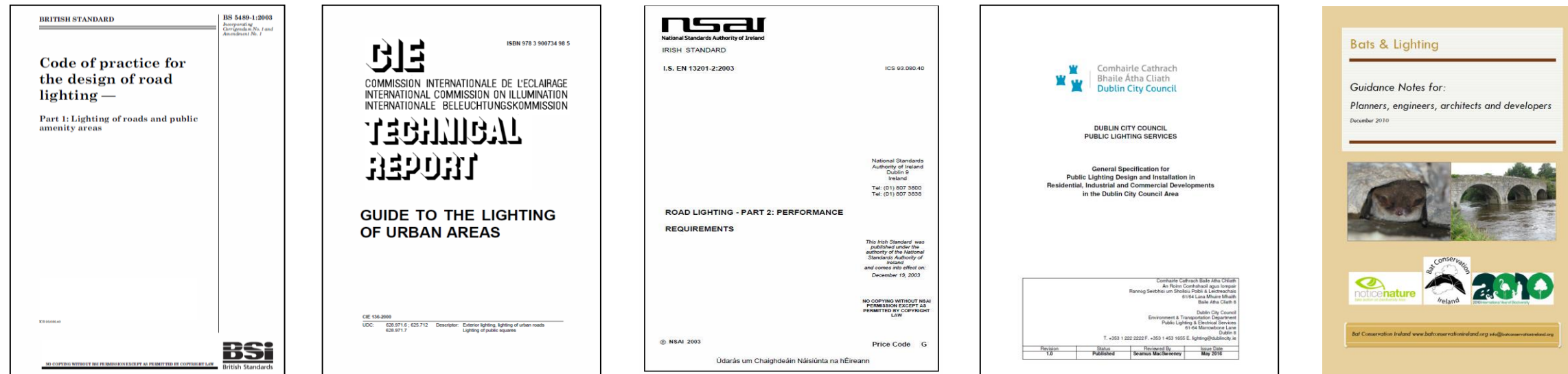


Figure 2.1 - Lighting Design Guides

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.

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

<sup>2</sup> Commission Internationale de l'Éclairage or International Commission on Illumination

<sup>3</sup> I.S. EN 13201 Road Lighting - Part 2 Performance Requirements

<sup>4</sup> Dublin City Council Public Lighting Services - General Specification for Public Lighting Design and Installation in Residential, Industrial and Commercial Developments in the Dublin City 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. Dublin City County Council public lighting guidance document, all roadways are to be designed to conform to required lux levels of 5 lux.
  - Lighting Classification P4 is intended for users of motorised vehicles on traffic routes where traffic speeds are from low to medium, pedestrian footpath / cycle ways.

- White neutral light (4000K) has been utilised in this design.
- To comply with P4 lighting classification the following parameters must be adhered to;
  - a. Average Horizontal Illuminance ( $\bar{E}$ ) must be an average of 5 lux.
  - b. Minimum Horizontal Illuminance ( $E_{min}$ ) must be a minimum of 1lux.
  - c. It is recommended that the actual overall uniformity of illuminance ( $U_o$ ) be as high as reasonably practicable.

	$\bar{E}$	$E_{min}$
P1 or S1	15.0	3.0
P2 or S2	10.0	2.0
P3 or S3	7.5	1.5
P4 or S4	5.0	1.0
P5 or S5	3.0	0.6
P6 or S6	2.0	0.4

Figure 2.2 - P4 - S4 Lighting Class

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 Dublin City 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 St Pauls Residential Apartment Development

The lighting design proposed is to use a Dublin City Council approved high efficiency LED luminaire. A lighting design incorporates a 6 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 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 Veelite Atina 36w LED Luminaire. 11no. Atina 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 produced an average light level of 4.36 lux with a minimum light level of 0.8 lux. The average light spill produced was 0.04 with a minimum lux level of 0 lux.

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 6m 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 36W LED lamp module 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.

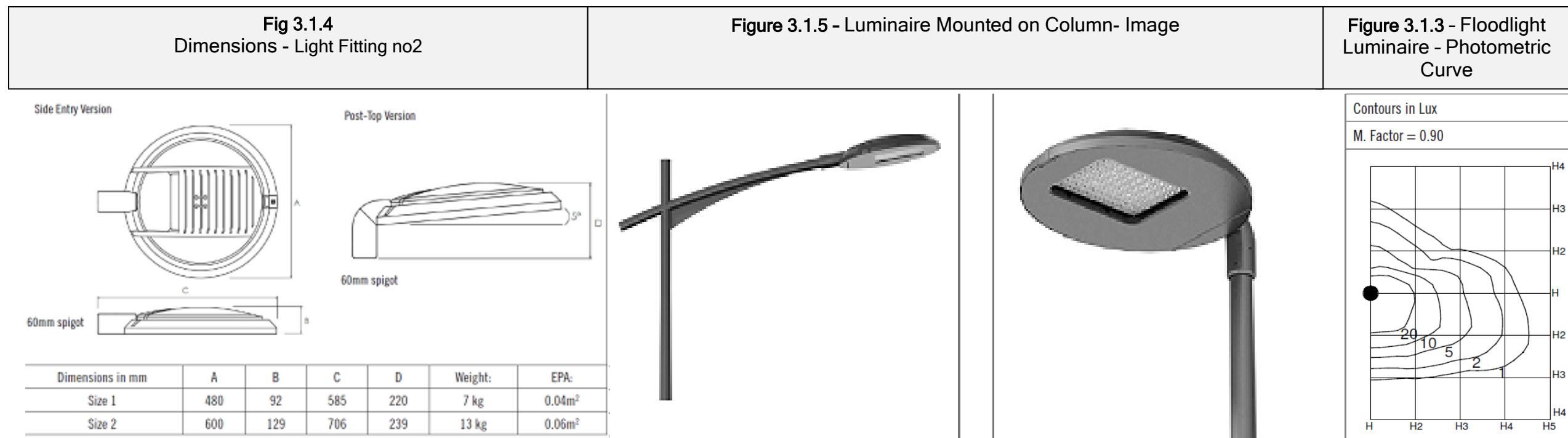


Figure 3.2 - Selected Luminaire Description



## 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 4.36 lux with a minimum lux level of 0.8 lux. The table also illustrates the light spill from the residential street lighting on to the park area, with an average light spill of 0.04 lux and minimum light spill of zero lux. The spill light from the street lighting to the park is within the permitted levels for zone classification of E2, i.e. rural, village and dark urban locations.

<b>Calculation Summary</b>						
<b>Description</b>	<b>Avg</b>	<b>Max</b>	<b>Min</b>	<b>Min/Avg</b>	<b>Min/Max</b>	<b>Units</b>
Light Spill	0.04	5	0	N.A.	N.A.	Lux
Road	4.36	24.5	0.8	0.18	0.03	Lux

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 P4 Classification with values of between 1 lux to 5 lux. 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 P4 Classification is adhered to on the roads within the development. The detailed results are illustrated further on drawing no. N324-OCSC-XX-XX-DR-E-0001-S8-P02.

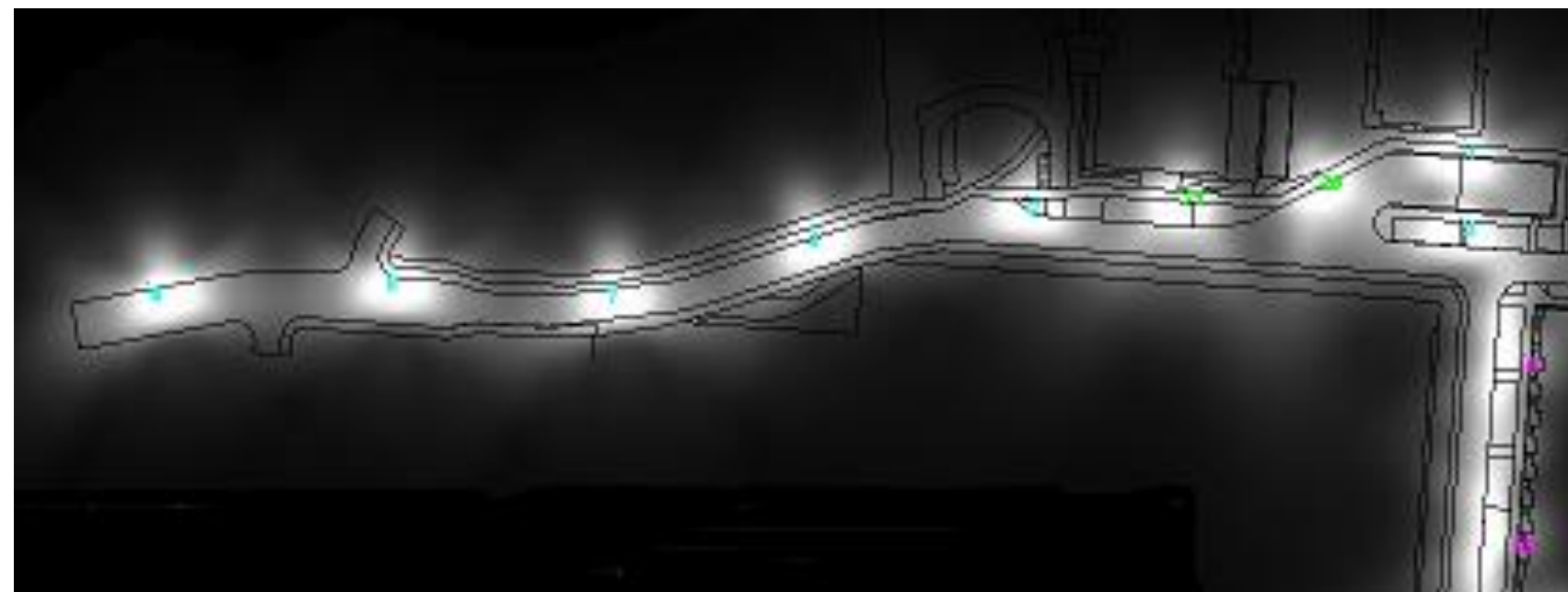


Figure 4.2 - Calculation results for the Illumination Levels (Lux) for the Residential Development



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## 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 Dublin City 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.

As shown in Figure 4.1 the illumination throughout the development roadways meets the lighting design requirements of P4 lighting class.

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, notably north of the incoming road from Sybil Hill Road, 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 and illumination results are shown on the accompanying drawing no. N324-OCSC-XX-XX-DR-E-0001-S8-P02.

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END OF REPORT