Lismore Homes Ltd. – Baldoyle GA2

Residential Development

Site Lighting Analysis

30th November 2021
Issue P3

ethos ENGINEERING

Lismore Homes Ltd. – Baldoyle GA2

Site Lighting Analysis

21_D068 Lismore Homes Baldoyle

CURRENT ISSUE			
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PREVIOUS ISSUES (Type Names)				
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P2	23/11/2021	Murilo Dias	Peter Farrell	For Planning

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1. Introduction

1.1. 1.1 Introduction

Ethos Engineering have been commissioned by Lismore Homes Limited to carry out the external lighting design for a proposed Residential Development on c. 6.0 ha site in the townland of Stapolin, Baldoyle, Dublin 13, referred to as GA02 Lands in the Baldoyle-Stapolin Local Area Plan 2013 (as extended) and which forms part of the wider landholding of lands formerly known as the Coast, Baldoyle, Dublin 13. The lands are bound by existing and proposed residential areas to the west and south, and the future Racecourse Park to the north and northeast.

The proposed development is for a Strategic Housing Development for the construction of 1,007 residential apartments (consisting of 58 no. studio units, 247 no. 1 bedroom units, 94 no. 2 bedroom 3 person units, 563 no. 2 bedroom 4 person units, and 45 no. 3 bedroom units), communal residential community rooms, and a ground floor creche in 16 no. buildings with heights varying from 4 to 12 storeys, basement and surface level car parking, secure bicycle parking, landscaping, water supply connection at Red Arches Road, and all ancillary site development works on a c. 6.0 hectare site located in the townland of Stapolin, Baldoyle, Dublin 13.

Figure 1: Architectural Residential Site plan, GA2, Residential Development Baldoyle

No changes are proposed to the existing public lighting at Red Arches Park.

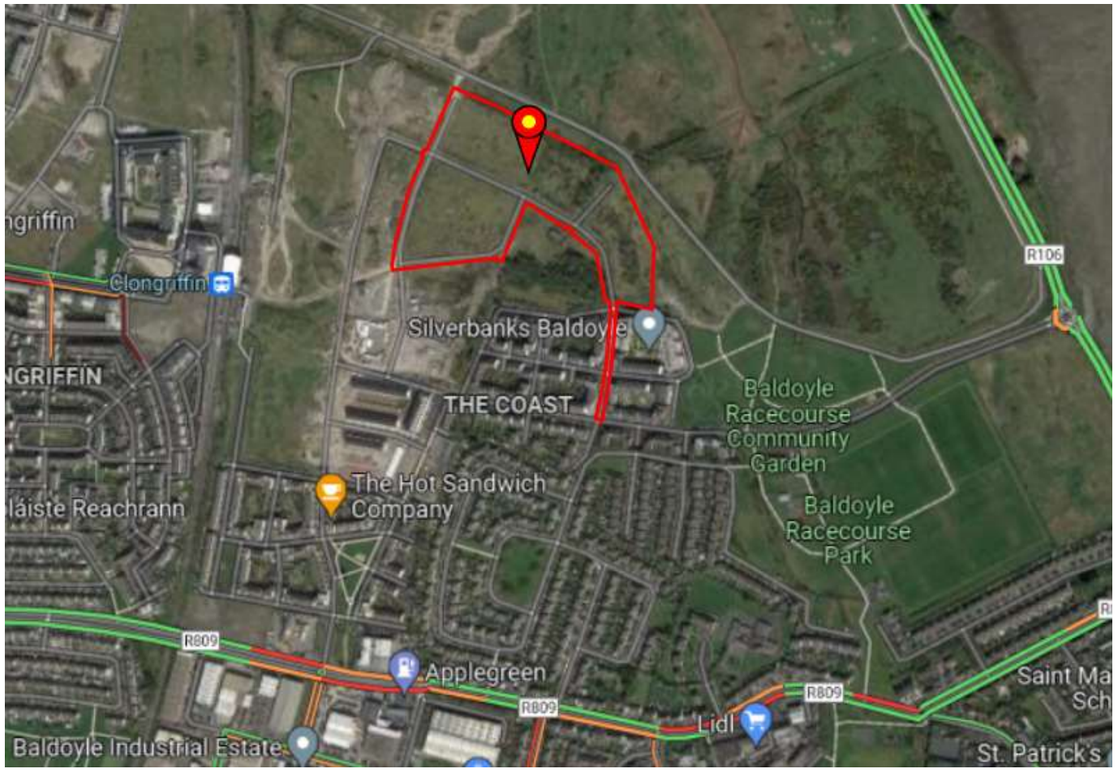

Figure 2: Location of GA2, Residential Development Baldoyle (Courtesy of Google Maps)

2. Executive Summary

2.1. General

This report outlines the external design lighting intent and considerations for the roadways for the proposed residential development at Baldoyle, Co. Dublin.

The report considers the externa lighting design as developed by Ethos Engineering. The report has been developed with the following external lighting design considerations:

- To provide adequate illumination in accordance with Fingal County Council and statutory lighting standards to contribute towards the safe use of all development roads.
- To contain the lighting within to the site boundary.
- Minimise light pollution and visual glare to residential development and neighbouring areas
- Provide aesthetically interesting environment with appropriate luminaires.
- Take account of ecological factors such as local Bat populations.

The complete external lighting installation is designed in accordance with the regulations for electrical services as I.S 10101:2020 National Rules for Electrical Installations, BS5489-1:2003 Code of practice for the design of road lighting, IS EN 13201:2003-2, Fingal County Council Public Lighting Installations for Residential Areas and CIE.

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 as illustrated within section 6 of this report.

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 detailed analysis of the illumination results for the development roadways at ground level.

3. Design Standards & Criteria

3.1. Electrical Design Standards

The External lighting installation shall be designed in accordance with the following standards and amendments thereof:

- BS 5489-1:2003 Code of practice for the design of road lighting 1,
- CIE Guide to the Lighting of Urban Areas 2,
- 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 Area
- The guidelines in "Bats & Lighting, Guidance Notes for Planners, engineers, architects and developers", issued by Bat Conservation Ireland were also referred to when designing the external lighting.

Lighting Class	Benchmark (e.g. < 60 or when S/P ratio of light source is not known or specified)		S/P ratio = 1.2 and Ra >= 60 (e.g. some types of warm white lamp such as metal halide)		s/p ratio = 2 and Ra >= 60 (e.g. some types of cool white compact fluorescent or LED)	
	Ē	Ē min	Ē	Ē min	Ē	Ē min
P1 or S1	15	3	13.4	2.7	12.3	2.5
P2 or S2	10	2	8.6	1.7	7.7	1.5
P3 or S3	7.5	1.5	6.3	1.3	5.5	1.1
P4 or S4	5	1	4.0	0.8	3.4	0.7
P5 or S5	3	0.6	2.2	0.4	1.8	0.4
P6 or S6	2	0.4	1.4	0.4	1.1	0.4

Table 1: Variation of maintained lighting level with S/P ratio of light source taken from BS 5489-1:2013 and County Council requirements.

Environment Zone	Sky Glow ULR inst. (max %)	Light Trespass (into windows) Ev (lux) max	Source Intensity / (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	25	25	25

4. Electrical Lighting Design

4.1. Guidelines to External Site Lighting Design

The following guidelines were used in the design of the external site 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 levels to be used or as required by Health & Safety
3. An Amber LED has been shown to have a reduced impact on Bats due to its narrow spectrum properties

- Fingal County Council public lighting guidance document, all roadways are to be designed to conform to required lux levels.
- Lighting Classification:
  - P2 8M columns for roadways
- White neutral light (4000K) has been utilised in this design.
- It is recommended that the actual overall uniformity of illuminance (Uo) be as high as reasonably practicable.

4. The lighting will be directional on to the development roads 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 Deg from the vertical plane.

   Consequently, a flat glass protector is often used to reduce light spillage. Other methods to control light spillage is as follows:

- Cowls/Shields: these can be mounted on lamps to control direction of the light.
- Masking: part of the luminaries is painted to block light to control the direction of the light.
- Louvres: either as internal or external slates organized in rows or at angles depending on the direction of light control.

5. The lights are designed to meet Fingal County Council approved tubular column complete with accessible door 385mm above ground level.

6. Lighting designed incorporates" constant light output" and "dimming and trimming" requirements by incorporating a 35/18 SELC 8482 mini photocell and an "Dusk and Dawn" individual driver that dims the luminaire to 75% between the hrs of 12am – 6am.

The proposed external lighting design uses a Fingal County Council approved high efficiency LED luminaire. The lighting design incorporates an 8-metre-high tubular lamppost with overhang outreach to provide directional light output direct to the road surface. This is selected to ensure compliance with guidelines and standards noted in Electrical Design Standards Section 3.1. 8-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.

This report also defines the external lighting 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.

Ethos carried out calculations regarding lighting level on the development roadways and adjoining proposed residential properties so as 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;

7. The lighting columns have been consciously positioned to limit negative light spill, whilst also maintaining the required lux levels and uniformly across the proposed development. This has positively negated excess spill levels across areas containing the local Bat habitat.

8. Narrow beam optics have also been used to contain unnecessary light spill. This provision allows for a maximum level of light to be delivered to the roadway, as opposed to illuminated outside the boundary area.

4.2. Site Lighting Luminaire Details

It is proposed to provide an 8m high column and post top luminaire type E1 light fittings to the road area with a 1 metre outreach required to achieve average Illumination levels in accordance with Fingal County Council Requirements, refer to schedule of luminaires for luminaire types. The proposed column light fitting is a 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) and is fully compliant with EN 60598:CE.

The luminaire proposed for the lighting design was a Schreder Axia LED Luminaire. These fittings were used to ensure that there was no light spill to the adjoining properties. The resulting light levels as indicated within section 5 of the report are in line with the design criteria as outlined above.

The LED proposed luminaire will be detailed as follows:

- CMS enabled
- Light fittings will have individual electronic photocells with 7-prong NEMA socket or Mini-Photocell to Zhaga Book 18 Protocol (with same functionality as 7-prong NEMA Socket)
- All photocells shall have 35/18 lux switching levels
- Wattage of lantern with constant light output at 75% must be provided
- Wattage of lantern when dimmed to 75% of CLO must be provided

The public lighting shall be capable of accepting photocells for individual light control, as detailed above.

Site Lighting Column Luminaire

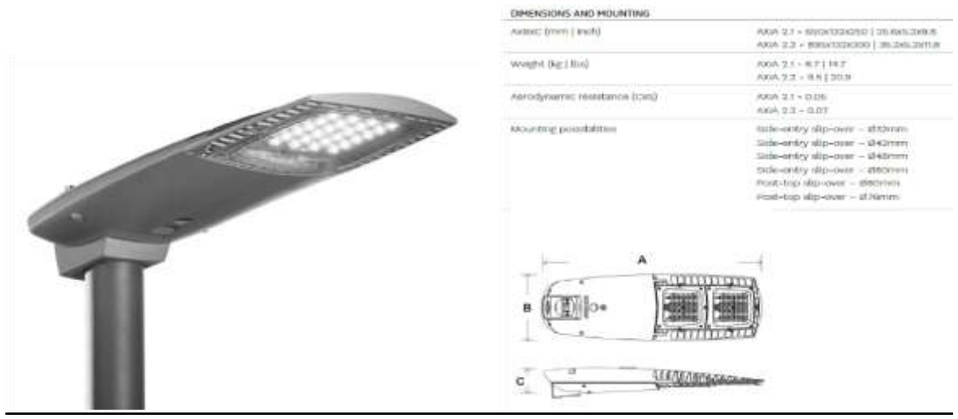

Figure 3: Proposed street lighting fixture.

5. Electrical Lighting Colour Rendering

5.1.1. Calculation Results

Site Lighting Column Luminaire

Figure 4: Calculation results for the Illumination Levels (Lux) for the Residential Development

5.1.2. Calculation Surfaces

False Colour rendering Surface A

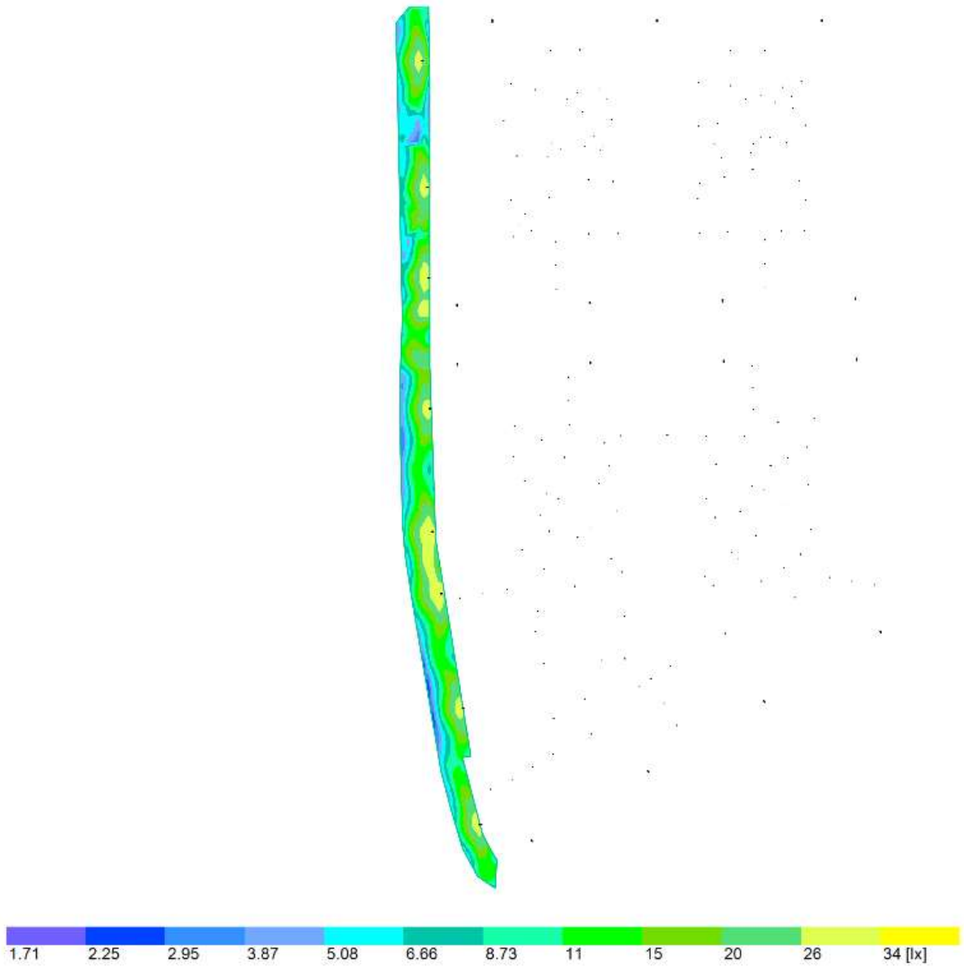

Figure 5: False colour rendering Surface Street A

False Colour rendering Surface B

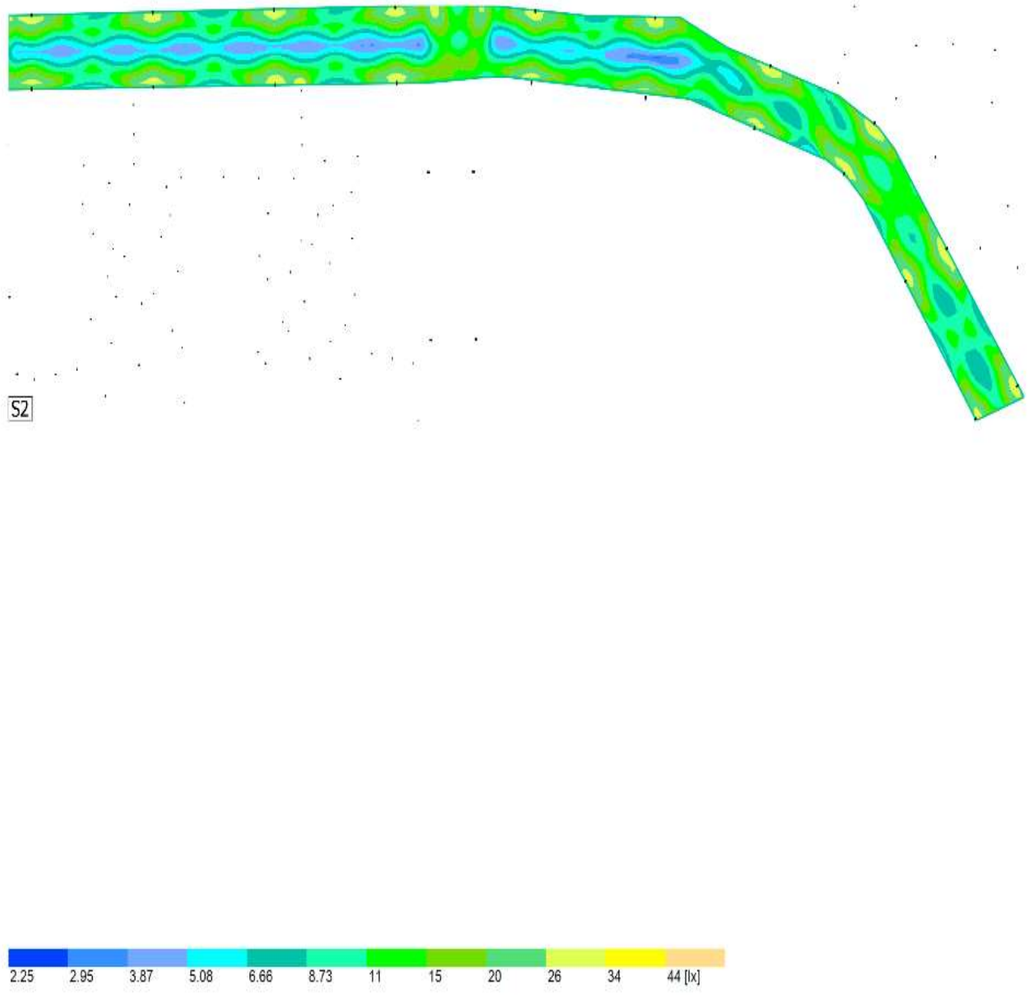

Figure 6: False colour rendering Surface Street B

Calculation Results Surface A		
	Calculated (lux)	Target (lux)
Average	14	10
Min	2.01	2
Max	32.7	
Uniformity (min/Average)	0.14	

Calculation Results Surface B		
	Calculated (lux)	Target (lux)
Average	12.8	10
Min	2.85	2
Max	41.6	
Uniformity (min/Average)	0.22	

False Colour rendering Surface C

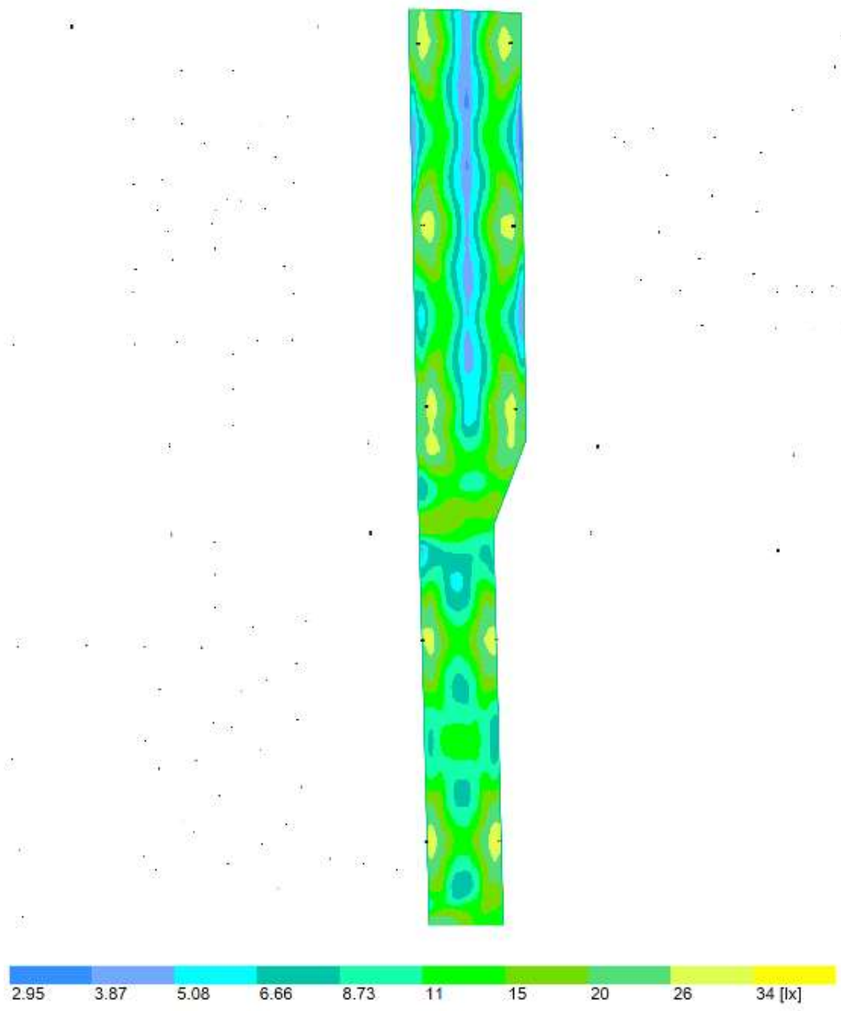

Figure 7: False colour rendering Surface Street C

Calculation Results Surface C		
	Calculated (lux)	Target (lux)
Average	13.4	10
Min	3.13	2
Max	29.5	
Uniformity (min/Average)	0.23	

False Colour rendering Surface D

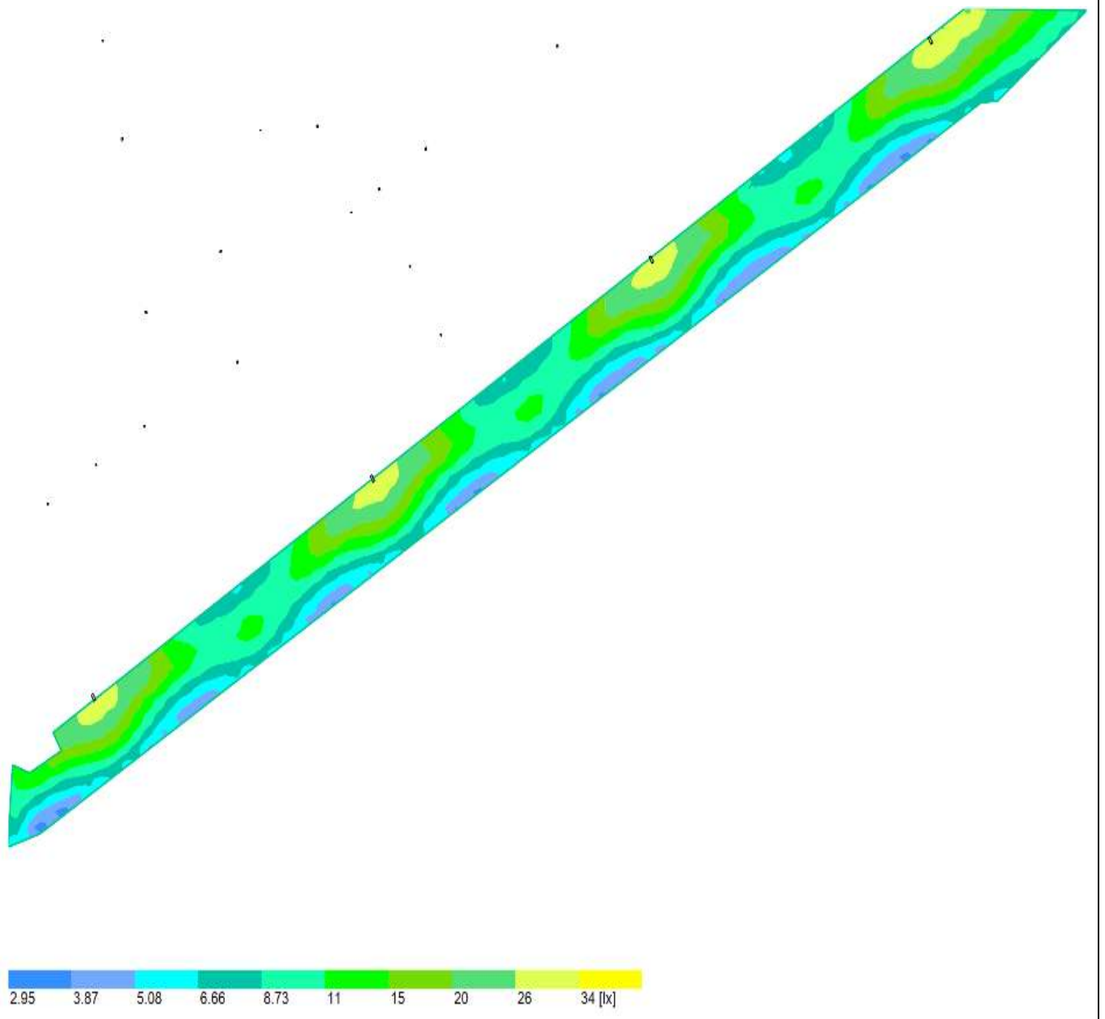

Figure 8: False colour rendering Surface Street D

Calculation Results Surface D		
	Calculated (lux)	Target (lux)
Average	12.2	10
Min	3.20	2
Max	29.4	
Uniformity (min/Average)	0.26	

False Colour rendering Surface E

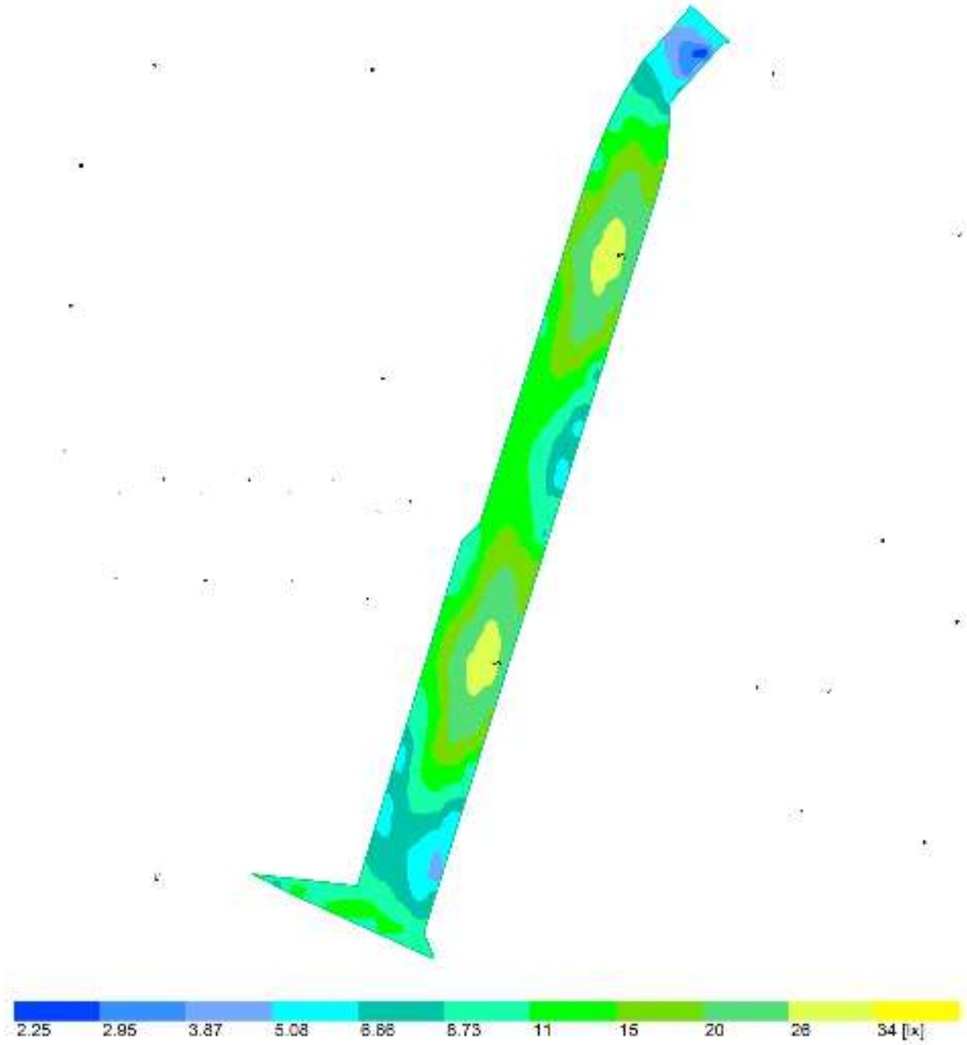

Figure 9: False colour rendering Surface Street E

False Colour rendering Surface F

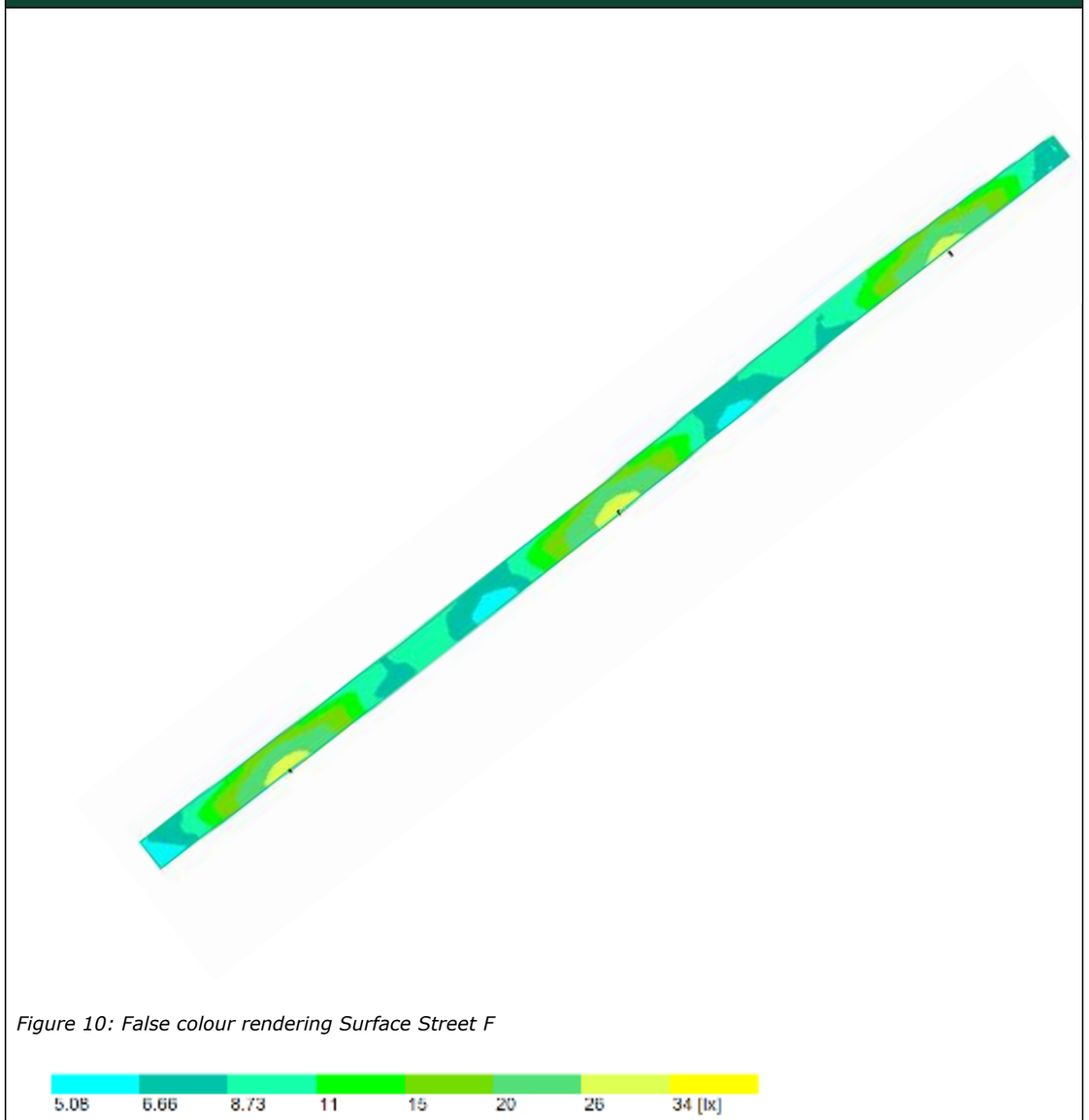

Figure 10: False colour rendering Surface Street F

Calculation Results Surface E		
	Calculated (lux)	Target (lux)
Average	14.1	10
Min	2.44	2
Max	28.5	
Uniformity (min/Average)	0.17	

Calculation Results Surface F		
	Calculated (lux)	Target (lux)
Average	13.6	10
Min	5.09	2
Max	28.6	
Uniformity (min/Average)	0.18	

6. Conclusion

Section 5.1 illustrates the illumination using colour render for the calculated lighting levels to the overall site. The illumination as calculated throughout the residential development meets the requirements of P2 Classifications. It should be noted that the illustration shows the design intent only. The luminaire positions will be installed as per the Ethos drawing to ensure that light spill on the P2 Classifications is adhered to on the roads within the development.

Ecologist considerations and requirements were reviewed during the design process 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 use of shield also can be applied where necessary.

The calculated light spill from the residential street lighting shows a lux level of less than 2 lux adjacent to the park which is incompliance with regulations. 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.

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 site layout are shown on the accompanying drawing No. LHB-ETH-ZZ-XX-DR-E-SS100 (1), (2), (3) & (4) for reference.

ethos
ENGINEERING

Penthouse Suite, Apex Business Centre,
Blackthorn Road, Sandyford,
Dublin 18, Ireland

Phone +353 (0) 1 293 2220
Web www.ethoseng.ie

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