Land North of Borers Arms Rd, Copthorne

External Lighting Report

November 2025

P5090

Rev 1

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1	Nov 2025	MN	Update	JD	AS

INDEX

1.0 INTRODUCTION

PinnacleESP LTD were appointed by Fairfax to produce a lighting calculation for Land North of Borers Arms Rd, Copthorne to support the planning application for new private housing development.

2.0 DESIGN REQUIREMENTS

The Surrey County Council Lighting Design Guidance outlines that clients and designers are responsible for commissioning and designing all forms of exterior lighting within the county to ensure schemes meet the Council's technical standards and align with local planning and environmental policies. The guidance emphasises the need to minimise light pollution and to ensure lighting proposals are appropriate to their surrounding context. It provides criteria and environmental considerations against which the potential effects of artificial lighting should be assessed.

The environmental zone for the external lighting design has been taken from ILP GN01:2021 as Zone E2. This is defined as urban with the lighting environment being high district brightness applicable to town centres with high levels of night-time activity.

The design guidance is specified in the ILP GN01:2021 document as follows:

Environmental Zone	Sky Glow ULR (Max %)	Lighting Intrusion- maximum values of vertical illuminance on premises EV (lux)		Luminaire Intensity I (candelas)		Building Luminance Pre & Post Curfew
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L (cd/m2)
E2	2.5	5	1	7,500	500	5

Definitions:

ULR = Upward Light Ratio of the installation is the maximum permitted percentage of luminaire flux that goes directly into the sky.

EV = Vertical illuminance in lux measured flat on the glazing at the centre of the window.

I = Lighting intensity in candelas

L = Luminance in candelas per square meter

Curfew = The time after which stricter requirements for the control of obtrusive light will apply – taken as 23.00hrs as described within City of Westminster Lighting Design Guide clause 3.6.9 Lighting Curfew.

The lighting assessment has been undertaken in line with recognised national standards and ecological lighting guidance to minimise light spill and environmental impact. The design follows the principles outlined in BS 5489 – 1:2020 and ILP GN08:2023 (Bats and Artificial Lighting at Night).

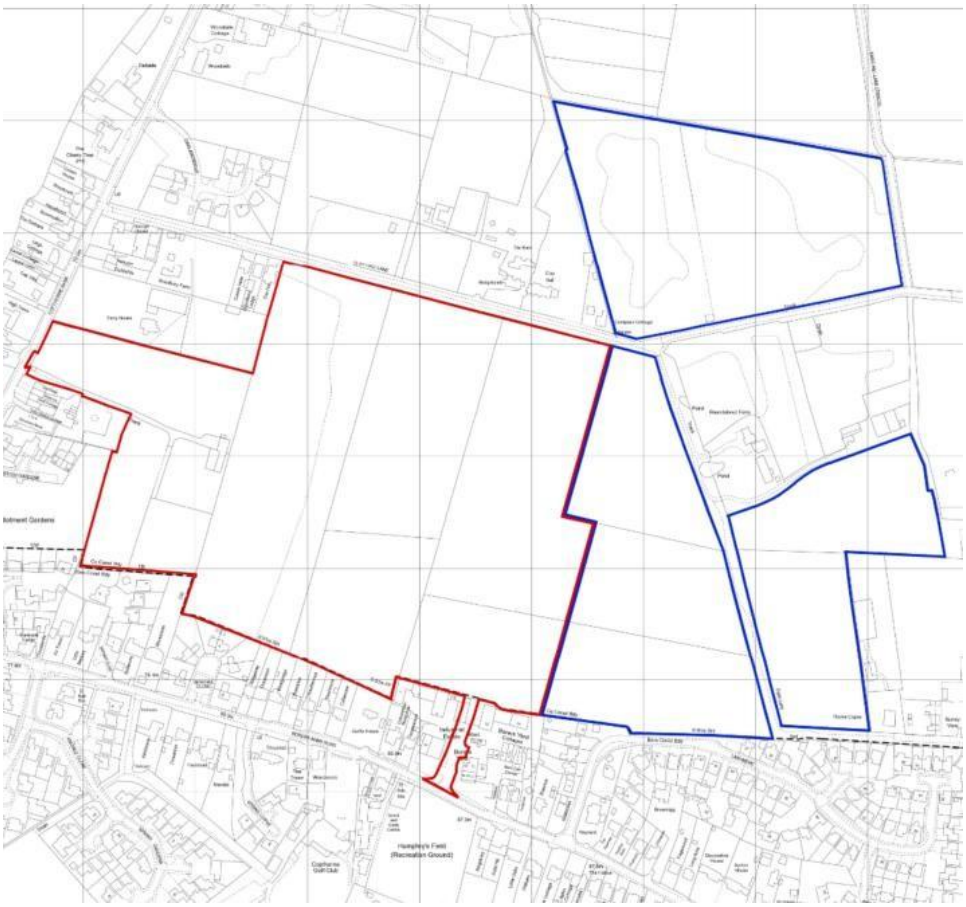
ILP GN08:2023 - Bats and Artificial Lighting at Night guidance along with BS 5489-1:2020 recommends that luminaires in ecological sensitive area should minimise short-wavelength specifically the blue light emission. High blue light emission is more present in high colour temperature light sources (e.g., 4000 K and above), this has been shown to disrupt the behaviour of nocturnal specie which includes bats by affecting its navigation.

This design will specify for warm-white LED luminaires with correlated colour temperature (CCT) of 2700K, in line with the ILP GN08:2023 recommendation for bat-friendly lighting. At this CCT, the proportion of blue light (<500 nm wavelength) is substantially reduced typically representing less than 10% of the total spectral output, limiting ecological disturbance while maintaining sufficient visual performance for residential and road safety requirements.

In addition, this design will implement a part – night dimming strategy, luminaires will operate at full output only during peak hours and dimmed or switched off during late-night periods of minimal use. This approach complies with ecological recommendation of ILP GN08:2023 but also supports sustainable design objectives and aligns with BS 5489-1:2020.

3.0 Existing External Layouts

Shown below the existing architectural site plan shown. This details the proposed roadworks and pathways.



4.0 ASSESSMENT METHODOLOGY

The external lighting calculations have been carried out to determine the average illuminance levels and ensure its compliance with relevant road lighting and ecological standards. The assessment

Luminaries schedule, mounting height, lighting controls and CCT 2700K have been considered to limit obtrusive light and align with ecological best practice.

Surrey County Council has defined a set of criteria to be met when preparing and submitting an external lighting scheme:

a) The siting of all external lighting, including floodlighting, security lighting, luminaires and/or any temporary lighting
b) The hours during which lighting would be illuminated and good practice measures to minimise its use including timers
c) The height and position of any lighting.
d) The intensity of the lighting specified in Lux levels.
e) Measures to control and minimise light spill.
f) Measures for reviewing any unforeseen impacts
g) Practical measures to minimise upward waste of light from lighting and to minimise
h) light spill outside of the boundary of the application site.

Lighting calculation Results:

The lighting design for Land North of Borers Arms Rd, Copthorne specifically the main access roads and residential parking has been designed in accordance with BS 5489-1:2020 and BS EN 13201-2:2015. Based on the usage of the areas it falls under lighting class P4, which is suitable for residential parking and low traffic access roads.

The results shown from the calculation shows an average illuminance level of >5 lux which is in line with lighting class P4 of 5 lux. Inconclusion both areas are compliant with the performance requirements of BS 5489-1:2020 and BS EN 13201-2:2015 for Class P4.

The lighting design for the pedestrian path ways has also checked in line with BS 5489-1:2020 requirements for path ways. Based on the locations and purpose of the paths it has been classified as lighting class P5, suitable for residential and low activity routes. The results of the calculations show an average lux ov >4 lux which meets the requirements for class P5 of 3 lux. The results confirm that the pathway lighting complies with BS 5489-1:2020 and BS EN 13201-2:2015.

5.0 BREEAM

To achieve BREEAM requirements we have considered luminaire selection and the lighting controls strategy.

Kingfisher lighting has been specified for the scheme. The fitting specified are selected in line with BREEAM guidance to provide energy-efficient, high-performance lighting with appropriate lighting controls and minimal upward light.

The design has also considered implementing a lighting control strategy where during class P4 levels (5 lux) it will run at its normal efficiency but will be dimmed down to class P5 (3 lux) between 11pm to 5am this is to reduce energy use and light pollution. The scheme with BREEAM ENE 06 (Energy Efficient External Lighting) and POL 04 (Reduction of Night-Time Light Pollution).

Lighting levels have been designed to maintain safe and comfortable conditions for all users while avoiding glare and excessive brightness, in line with BREEAM HEA 01 (Visual Comfort).

6.0 CONCLUSION

In conclusion, the external lighting assessment confirms that proposed lighting design meets the requirements of BS 5489-1:2020 whilst also achieving BREEAM and ecological standards.

Kingfisher Lighting luminaires were specified in line with BREEAM guidance to provide energy efficient performance and lighting controls. The lighting design and control strategy support compliance with BREEAM ENE 06 (Energy Efficient External Lighting), POL 04 (Reduction of Night-Time Light Pollution), and HEA 01 (Visual Comfort). The design also considers ecological impacts, following guidance from “Bats and Artificial Lighting in the UK” (ILP & BCT, 2018) to minimise light spill near vegetation and potential bat corridors.

Overall, the external lighting scheme is compliant with relevant Surrey County Council guides, supports BREEAM criteria, and minimises ecological impact, providing a safe, efficient, and sustainable lighting solution for the development.

APPENDIX A – LUMINIARE MANUFACTURE

Kingfisher Lighting

Part of the LUCECO group of companies

Datasheet

VIVA-CITY Pro

Specification Text

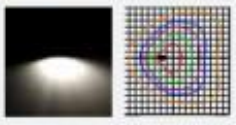
The VIVA-CITY Pro shall be manufactured from die-cast aluminium and powder coated in RAL 7016 Marine Grade finish. It shall have a power output ranging between 10 - 180W, with an efficacy of 66 - 150lm/W. The luminaire shall deliver 662 – 24,840 luminaire lumens. It shall have a fully programmable DALI driver. Available in 2700K or 4000K, the luminaire shall be IK08 and IP66 rated. It shall have photocell options available.

For DarkSky Specifications, the luminaire shall produce a CCT of 2700K.

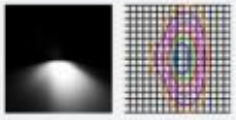
Specification

Weight:	4.5 - 9.1 kg
Windage:	0.06 - 0.09 m^2
Material:	Die-cast Aluminium
Paint Finish:	RAL7016 Anthracite Grey
Embodied Carbon:	89 - 182 kg CO^2e

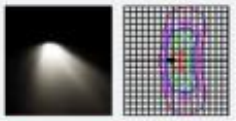
Optics



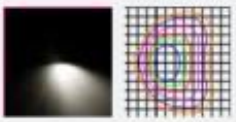
Forward Throw Optic 70°
Open areas perimeter lighting



Street Optic 70°
Roadways, pathways and narrow areas



Spill Shield Street Optic 70°
Roadways, pathways and narrow areas limiting obtrusive light



Spill Shield Forward Throw Optic 70°
Open areas perimeter lighting limiting obtrusive light

Product Description

Designed and Engineered in the UK, the VIVA-CITY Pro is a slimline luminaire featuring innovative optical systems to reduce light pollution within projects.

Kingfisher Lighting

Key Features

- 10.0W - 180.0W
- 662 - 24,840 Luminaire Lumens
- Efficacy up to 150.0 lm/W
- 2700K, 4000K, CRI>70
- IP66, IK08
- Lifetime > 100,000hr, L80
- DarkSky Approved
- Photocell Option
- 3 Hour Integral Emergency

DESIGNED & ENGINEERED in the UK

Kingfisher Lighting

Part of the LUCECO group of companies

Datasheet

VAILO

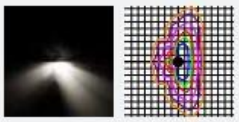
Specification Text

The VAILO Bollard shall be manufactured from high quality, non conductive, coloured GRP (RAL 7016). It shall have a power output ranging between 4 - 25W, with an efficacy from 52 - 91 lm/W. It shall produce 239 - 2,282 luminaire lumens. The VAILO bollard has single, twin pathway and area distributions to suit pathways, railway applications and other wide locations. It shall have 3 hour integral emergency options available. The luminaire shall come in 2700K and 4000K and be rated IK10 and IP66 with 1000mm high

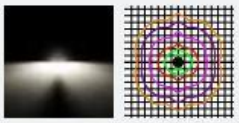
Specification

Weight:	6.82 - 7 kg
Windage:	0.08 m^2
Material:	GRP Non-Conductive
Paint Finish:	RAL7016 Anthracite Grey
Embodied Carbon:	83 kg CO^2e

Optics



Pathway



Radial

Product Description

VAILO is a sleek, low glare bollard offering a best-in-class optical system. Available with an array of lumen packages, as well as single or twin sided illumination and adjustable alignment on site.

Key Features

- 4.0W - 25.0W
- 239 - 2,282 Luminaire Lumens
- Efficacy up to 91 lm/W
- 8m - 10m Spacings
- Single or Twin Sided Illumination
- High Grade GRP
- 2700K, 4000K, CRI>70
- Lifetime 100,000 hours
- Photocell & Emergency Options
- Marine Grade Finish
- Fuse Cut Out Options
- Damage-Free Opening Tool

IP66 | IK10 | 100,000 hrs LIFETIME | 5 YEARS WARRANTY

EM | PEC | DIM | Marine Grade Finish | 2700K | 4000K | Control Compatible

DESIGNED & ENGINEERED IN UK

Circular Economy Score	
0 to 0.05	Very poor circular economy performance
0.5 to 1.5	Some circular economy functionality
1.5 to 2.5	Definite/substantial progress to circularity
2.5 to 4.0	Excellent circularity

APPENDIX B – PROPOSED EXTERNAL LIGHTING DRAWING

Calculation Summary									
Label	CalcType	Units	Avg	Max	Min	Uniformity (Min/Avg)	Diversity (Min/Max)	Meter Type	Description
Parking Court	Illuminance	Lux	5.97	20	1	0.17	0.05	Horizontal	
Parking Court_1	Illuminance	Lux	5.81	35	1	0.17	0.03	Horizontal	
Road	Illuminance	Lux	5.47	42	1	0.18	0.02	Horizontal	

Luminaire Schedule								
Symbol	Qty	Label	Arrangement	LLF	Description	Luminaire L/W	UWLR	TM65 & TM66 Information
	83	A	SINGLE	0.900	20W VIVA-CITY Pro·2700K·840mA·AYB70 spill control street optic Column mounted at 4m	76	0.00	
	5	B	SINGLE	0.900	5·4W VAILO bollard·2700K·1000mm·200mA·single sided·asymmetric AY optic	74	0.01	
	11	C	SINGLE	0.900	10W VIVA-CITY Pro·2700K·400mA·FWB70 spill control forward throw optic Column mounted at 4m	85	0.00	
	2	CT	BACK-BACK	0.900	10W VIVA-CITY Pro·2700K·400mA·FWB70 spill control forward throw optic Column mounted at 4m	85	0.00	
	6	D	SINGLE	0.900	20W VIVA-CITY Pro· 2700K·840mA·FWB70 spill control forward throw optic Column mounted at 4m	98	0.00	

NOTES:

Revision	Date	Description	Dwn./Chkd.
0	25.11.03	FOR INFORMATION	JD

ARCHITECTS LAYOUTS

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Project:
COPTHORNE BANK & ROUNDABOUTS FARM

Client:
FAIRFAX

Title:
PROPOSED EXTERNAL LIGHTING

Revision: 0

Drawn: JD
Date: SEPT' 25
Scale: NTS @ A1

Drw No. Copthorne Bank & Roundabouts