Former Walkers Site, Crabtree Lane, Manchester

Prepared For:

Chancerygate Manchester Ltd.

EXTERNAL IMPACT LIGHTING ASSESSMENT



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Document Ref: 6624-CBC-OR-RP-E-001

Creation date: December 2023

Revision: P03

Revision Date: 24/10/2024

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RECORD OF REVISIONS.

Date.	Revision.	Description of change.
08/12/2023	P01	First Issue – For Comment
16/10/2024	P02	Updated plan
24/10/2024	P03	Updated to suit latest comments

1 INTRODUCTION

This report has been provided on behalf of Chancerygate Manchester Ltd., to review the proposed external lighting scheme at the Former Walkers Site, Crabtree Lane, Manchester, M11 4GU.

This document has been prepared as part of the supporting documentation for a Section 73 planning application for the variation of conditions on existing planning permission 138914/FO/2023. Full planning permission was granted on 17 April 2024 for 'Erection of 9 no. units (in 3 no. buildings) with access and servicing arrangements, car parking, landscaping and associated works (Use Classes E(g) (iii) B2 and B8) following demolition of existing buildings and structures'. Amendments have been made to the scheme and this Section 73 application seeks variation to conditions attached to the existing planning permission to enable variations to the proposed layout. The majority of the proposed development remains identical to that approved under planning permission 138914/FO/2023, but changes have been made to enable units 1 – 4 to be merged and create a single unit along the northern boundary which is to be occupied by a single operator.

In support of the development Planning Application, the intent of this report is to provide an External Lighting Assessment of the potential obtrusive light impact to surrounding building's and the environment within the vicinity.

Where applicable, this document will outline the requirements of mitigation measures to be implemented at design and operational stages to reduce or remove any potential impact.

The potential impact of obtrusive lighting is categorised below:

- Light Spill: The spilling of light beyond the boundary of a property which may cause nuisance to others.
- Glare: The uncomfortable brightness of the light source against a dark background which results in dazzling the observer, which may cause residents and a hazard to road users.
- Sky Glow: The upwards spill of light into the sky which can cause a glowing effect and is often seen above cities when viewed from a dark area.

The luminaires selected will be a combination of column and wall mounted LED fittings, which are to comply with BREEAM requirements; Pol 04 (Reduction of night time light pollution), ENE 03 (External lighting) & Part L2A of the building regulations.

The site has been classified as an E3 Environmental zone according to BS EN 12464-2:2014, Lighting of Work Places, Part 2. The table below is taken from BS 12464-2:2014, Table 2 and summarises the classifications of Environmental Zones.

Table 2 — Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light ratio	Luminance	
	E_v lx		I cd		R_{UL} %	L_b cd·m^{-2}	L_s cd·m^{-2}
	Pre-curfew[a]	Post-curfew	Pre-curfew	Post-curfew		Building facade	Signs
E1	2	0	2 500	0	0	0	50
E2	5	1	7 500	500	5	5	400
E3	10	2	10 000	1 000	15	10	800
E4	25	5	25 000	2 500	25	25	1 000

where

E1 represents intrinsically dark areas, such as national parks or protected sites;

E2 represents low district brightness areas, such as industrial or residential rural areas;

E3 represents medium district brightness areas, such as industrial or residential suburbs;

E4 represents high district brightness areas, such as town centres and commercial areas;

E_v is the maximum value of vertical illuminance on properties in lx;

I is the light intensity of each source in the potentially obtrusive direction in cd;

R_{UL} is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude, and given in %;

L_b is the maximum average luminance of the facade of a building in cd·m^{-2};

L_s is the maximum average luminance of signs in cd·m^{-2}.

[a] In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

The existing site is illuminated by halogen type building & column mounted luminaires. The existing luminaires shall be removed to make way for a new lighting layout which is in keeping with the proposed development and current British, European, and BREEAM standards.

2 TERMINOLOGY

Luminaire

Electrical device used to create artificial light, also know as a light or light fitting.

Luminous intensity

Power emitted by a light source in a particular direction, measured in candelas [cd].

Luminous flux

Measure of the amount of visible light from a source, measured in lumens [lm].

Note: one lumen is defined as the luminous flux produced by a light source that emits one candela of luminous intensity over a solid angle of one steradian [lm=cd.sr]

Illuminance

The total luminous flux incident on a surface, per unit area, measured in lux [lx] or lumens per square metre [lm.m-2] or [cd.sr.m-2].

Luminance

The luminous flux emitted per unit area, also measured in lux [lx] or [lm.m-2] or [cd.sr.m-2].

Photometric diagrams

The diagrams display luminous intensity of the luminaire as a function of direction. An example of a photometric diagram is given in the figure below. The distance from the centre of the diagram to the line corresponds to a luminous intensity value, in this case, measured in candelas per kilo-lumen [cd.klm-1]. The angles on the diagram are the elevation angle, usually denoted as gamma (γ). This angle is shown graphically in figure 2. The red and blue lines on the photometric diagram refers to the luminous intensity of the luminaire in the C= 0° & 180° planes and the C = 90° & 270° planes respectively. These C planes are also shown graphically in figure 2.

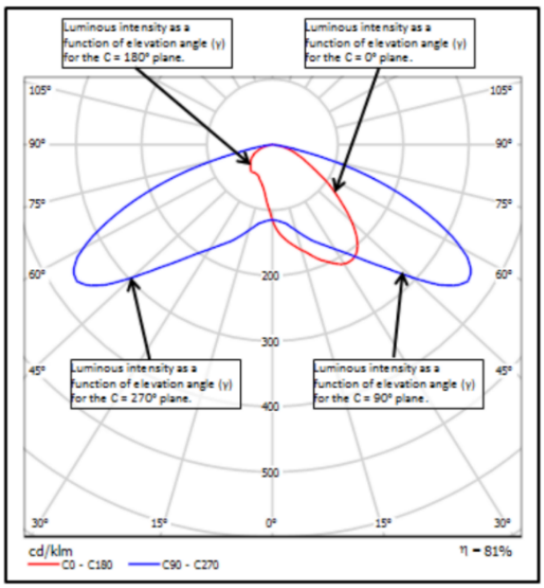


Figure 2

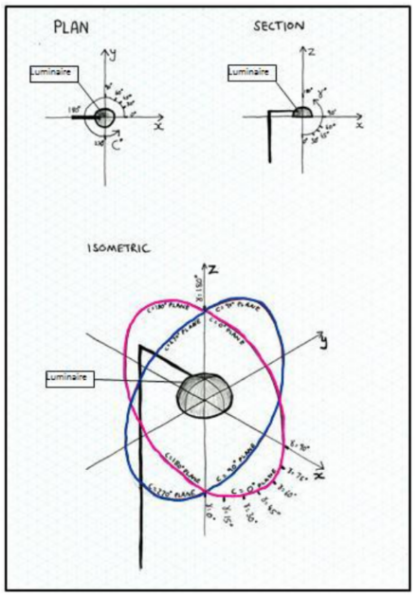


Figure 3

3 RELEVANT POLICY AND GUIDANCE

Legislations

Clean Neighbourhoods and Environment Act (CNEA) 2005

The Clean Neighbourhoods and Environment Act (CNEA) 2005 gives Local Authorities additional powers to deal with artificial lighting by classifying artificial light emitted from defined premises as a statutory nuisance (from April 2006). Guidance produced on Sections 101 to 103 of the CNEA extends the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light.

Empowerment to Light Roads - The Highways Act 1980

Section 97 empowers a Highway Authority to provide lighting for any highway or proposed highway for which they are or will be the Highway Authority. District Councils and many Parish or Town Councils also have the power to provide lighting as local lighting authorities.

National Planning Policy

The National Planning Policy Framework 2023

The National Planning Policy Framework (NPPF) encourages good design with planning policies and decisions limiting the effect of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Artificial lighting needs to be considered when a development may increase levels of lighting or would be sensitive to prevailing levels of artificial lighting. Artificial light provides a valuable benefits to society, including opportunities for sport and recreation grounds, and can be essential to a new development. However, for maximum benefit, it is important to get the right light, in the right place and for it to be used at the right time.

Artificial light is not always necessary. It has the potential to produce 'light pollution' or 'obtrusive light', and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife and undermine enjoyment of the countryside or the night sky, especially in areas with intrinsically dark landscapes. Intrinsically dark landscapes are those entirely, or largely, uninterrupted by artificial light. National parks and nature reserves can serve as good examples, particularly where they support habitats for native nocturnal animals. The following National Planning Practice Guidance (NPPG) further details the factors relevant to the control of obtrusive light.

Light pollution – (https://www.gov.uk/guidance/light-pollution)

The National Planning Guidance (NPPG) advise on how to consider light within the planning systems, focusing mainly on the following:

- When light pollution is relevant to planning
- What factors should be considered when assessing whether a development proposal might have implication for light pollution
- What factor are relevant when considering where, when and how much light shines
- What factors are relevant when considering possible ecological effects.

Obtrusive Light and Design Guidance

Institute of Lighting Professionals – Guidance Notes for the Reduction of Obtrusive Light GN01:2020

This guidance provides measurable design guidance limits and recommendations to ascertain acceptability of obtrusive light levels at night time.

CIE – 150:2017 – Guidance on the Limitation of the effects of Obtrusive Light from Outdoor Lighting Installations

The purpose of this guide is to help formulate guidelines for assessing the environmental effects of outdoor lighting. This guide will also recommend limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. Obtrusive effects of outdoor lighting are best controlled initially by appropriate design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. This guide refers to the potential adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residence, sightseers, transport users to environmentalists and astronomers.

BS5489-1: 2020 – Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity area

This part of BS 5489 gives recommendations on the general principles of road lighting, and its aesthetic and technical aspects, and advises on operation and maintenance.

BS EN 13201-2: 2015 – Road lighting – Part 2: Performance requirements

This part of this European Standard defines, according to photometric requirements, lighting classes for road lighting aiming at the visual needs of road users, and it considers environmental aspects of road lighting.

BS EN 12464-2: 2014 – Lighting of Work Places – Part 2: Outdoor Work Places

This European standard specifies lighting requirements for outdoor work places, which meet the needs for visual comfort and performance. All usual visual tasks are considered.

Campaign to Protect Rural England (CPRE) – Night Blight 2017

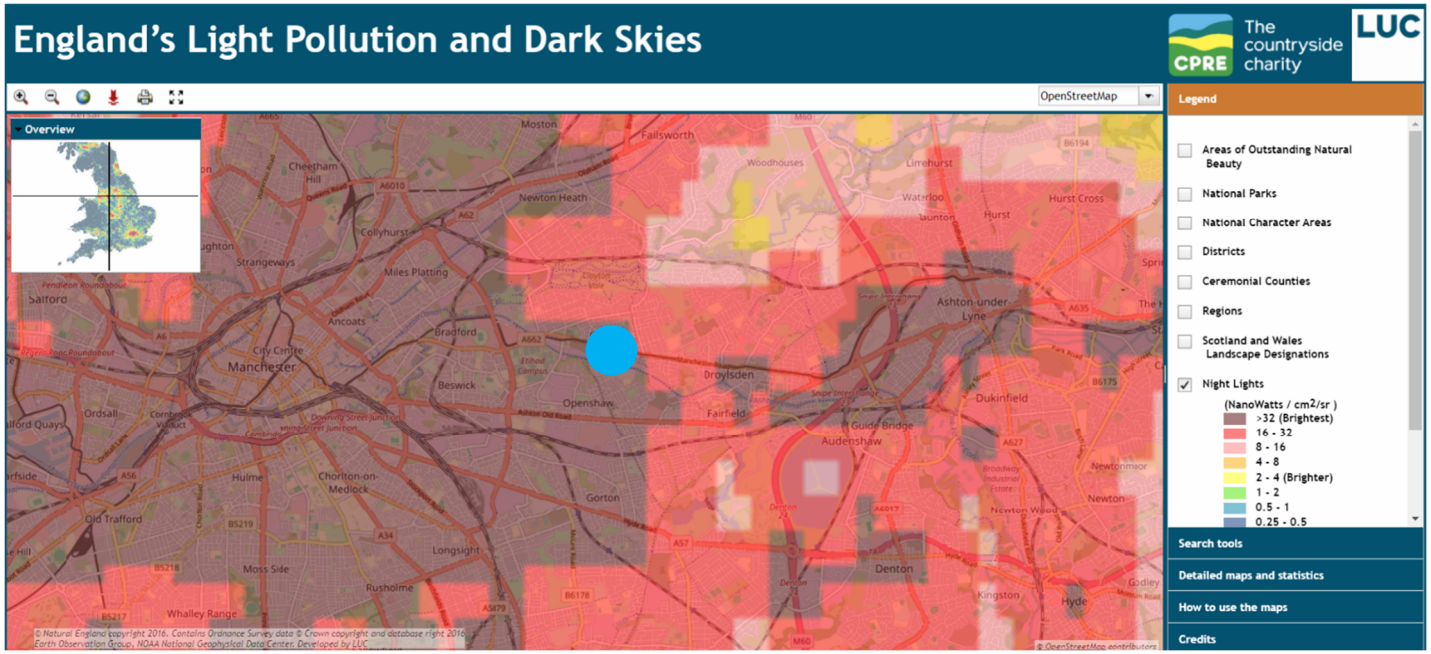
CPRE – Night Blight data (2017) gives a broad-brush indication of upwards light (sky glow) experienced within the UK. The interactive mapping tool allows specific areas and locations to be assessed with regards to a baseline condition.

4 DARK SKY

The image below shows the satellite Sky Glow overview of Yate (http://www.nightblight.cpre.org.uk/maps/). The blue circle on the image below is the approximate location of the existing site. As shown below the brown and red shading around the blue circle identifies the current level of Sky Glow within the development areas.

It can be seen that current levels are at the upper end of the indicated Night Light levels. The external lighting strategy to be employed will ensure recommended Sky Glow limits are not exceeded.

The external lighting strategy to be employed will ensure recommended Sky Glow limits are not exceeded, or where existing local area Sky Glow levels already exceed recommended limits, then the proposed lighting solution will not produce an exacerbation or worsening of these levels



5 LUMINAIRE SELECTION AND TYPE

The following luminaires have been selected:

Qty	Range	Mounting Height (m)	Mounting Type	Lamp	Lm/W	LOR %	RA	L2A Compliant	BREEAM Compliant
3	Italo 1	6m	Column	52w	136.52	100%	70	Yes	Yes
3	Italo 1	6m	Column	68w	128.51	100%	70	Yes	Yes
6	Italo 1	6m	Column	52w	129.58	100%	70	Yes	Yes
5	Viva City Pro Flood	6m	Wall	120w	128.60	100%	70	Yes	Yes
2	Viva City Pro Flood	6m	Wall	60w	128.63	100%	70	Yes	Yes
22	Semita Urban	1.8m	Wall	6w	302.17	100%	70	Yes	Yes

6 LUMINAIRE CONTROL PHILOSOPHY

A combination of photocells & timeclocks shall be installed to control all external lighting. The time clocks will act as a master control and be set to switch off at times when the development is not in operation. Outside of these hours photocells will control the site external lighting according to day light levels. This will prevent night time lighting pollution and to comply with POL 04/L2A.

7 ASSESSMENT SUMMARY MATRIX

Effect/Description	Mitigation	Calculation Results
Light Intrusion: Light intrusion from the site to surrounding residential areas.	All luminaires will be fitted with suitable optics to limit excessive emissions on the horizontal plane.	The Light Trespass at the site has been calculated.* This is below the maximum permitted level of Light Intrusion for an Environmental Zone deemed to be E3.
Sky Glow: Brightening of the night sky	All Luminaires will be fitted with horizontal cut off optics to minimise upward light spill.	The sky glow achieved at the site is 0.00%. This is below the maximum permitted level of sky glow for an Environmental Zone deemed to be E3.
Luminaire Intensity: Glare, the uncomfortable brightness of light against a dark back ground	Lighting design will comply with the relevant limits on lighting intensity.	Luminaire Intensity (Pre and Post curfew) at the site has been assessed but not calculated.* This is below the maximum permitted level of luminaire intensity for an Environmental Zone deemed to be E3.

*Light intrusion have been taken into consideration, but not calculated. This is based on the assumption that no luminaire fittings will be left on, post curfew.

8 CONCLUSION

Relevant polices have highlighted that it is necessary to both ensure sufficient lighting is provided for security and working purposes, and also to ensure that light spillage from the site is minimised.

Guidance from relevant institutions has been used to set design lux levels at the levels for the scheme. As the site is classified as an E3 environmental zone, external lighting calculations have been carried out to achieve the correct lux levels for this site, taking into consideration, light pollution, surrounding the premises and other aspects.

The proposed lighting will be switched via a combinations of photocells & timeclocks. The time clocks will act as a master control and be set to set off at times when the development is not in operation. In addition, for security purposes, some lighting may be required to stay on throughout the night although this would be kept to a minimum.

The proposed luminaires used to carry out external lighting calculations are LED. Utilising LED luminaires helps reduce light pollution and can reduce the overall power consumption by 40-60%.

In summary, it has been ensured that the entire proposed lighting scheme meets the minimum levels for security and working purposes while also meeting the post curfew requirements for a relatively dark urban area.

9 APPENDICES

9.1 LIGHTING DESIGN

9.2 LUMINAIRE TYPE 1 – ITALO

Kingfisher Lighting

Datasheet

Italo



Product Description

The Italo offers high performance functionality and comes with a wide optic selection suitable for any street, pathway or car park application.

Specification Text

The luminaire shall be manufactured from high-pressure die-cast aluminium. It shall have an LED efficacy of up to 131.0 lm/W and will be capable of producing up to 15,130 luminaire lumens at 4000K with a CRI >70. It shall have an asymmetric forward throw optic and is rated at IP66 and IK09.

Specification

Weight: 7.0kg
Windage: 0.06-0.18m²
Material: Die-cast Aluminium
Paint finish: Semi-Gloss Satin Grey

Key Features

- 15.0W - 146.0W
- 1,800 - 15,130 Luminaire Lumens
- Efficacy up to 131.0 lm/W
- 2700K, 3000K and 4000K, CRI >70
- Lifetime >100,000hr, L90
- Toolless Entry

AEC ILLUMINAZIONE

light life

LED | IP66 | IK09 | DIM | Control Compatible

Mounting Options

- 76mm Advised for Side Entry Fixing
- 76mm for Post Top as well as Side Entry

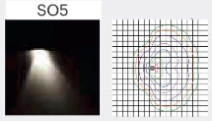
Other Options

- Colour Temperature Options
- Photocell Options
- Emergency Options
- Paint Finish Options

Contact for details

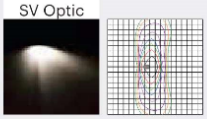
Optics

SO5



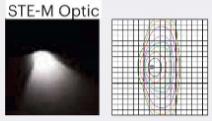
Asymmetrical optic suitable for street, urban and open area lighting

SV Optic



Asymmetrical narrow optic for lighting narrow urban streets and highway entrances and exits

STE-M Optic



Asymmetrical optic suitable for suburban areas

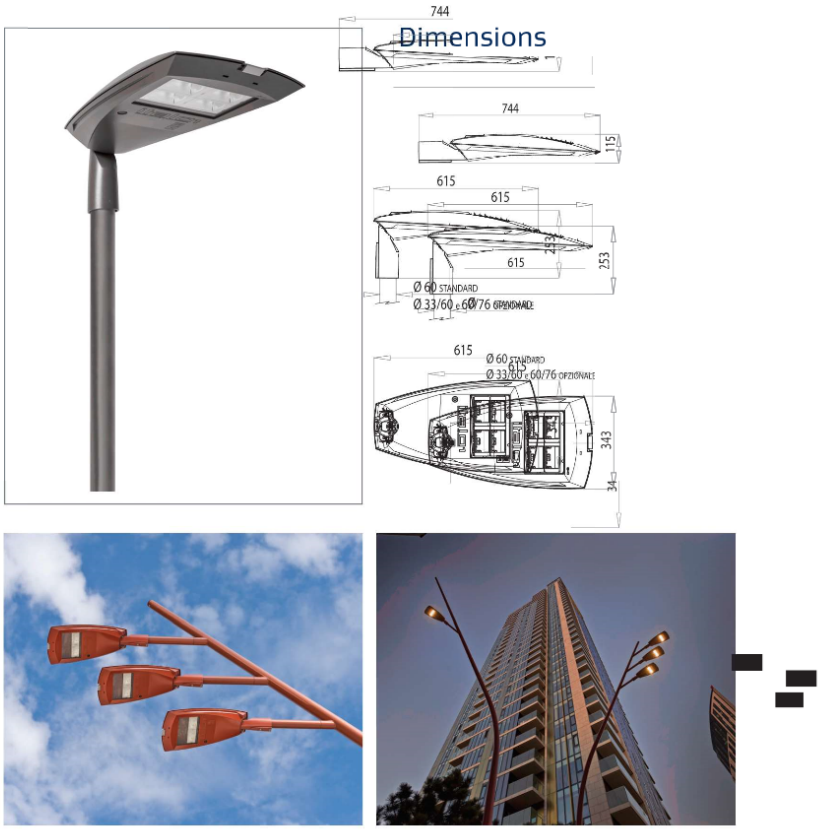
kingfisherlighting.com | 01623 415900 | sales@kingfisherlighting.com

KF ITALO

PAGE 1 OF 3

Code	Power	Luminaire Lumens	No. Modules	Drive Current	Optic	CCT(K)	IP	IK	Weight kg	Paint Finish	Driver Included	Driver Type
IT1-SO5-4.5-1M1F	15.0	1,800	1	525	Asymmetric Suburban Street Optic (SO5)	4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.7-1M1F	21.5	2,420	1	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.5-2M1F	30.5	3,690	2	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.7-2M1F	40.0	4,720	2	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.5-3M1F	44.0	5,530	3	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.7-3M1F	58.0	7,030	3	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.5-4M1F	57.0	7,150	4	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.7-4M1F	76.0	8,990	4	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.8-4M1F	93.0	10,380	4	850		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SO5-4.100-4M1F	146.0	15,130	4	1000		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.5-1M1F	15.0	1,800	1	525	Asymmetric Urban Street Optic (SV)	4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.7-1M1F	21.5	2,420	1	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.5-2M1F	30.5	3,690	2	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.7-2M1F	40.0	4,720	2	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.5-3M1F	44.0	5,530	3	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.7-3M1F	58.0	7,030	3	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.5-4M1F	57.0	7,150	4	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-SV-4.7-4M1F	76.0	8,990	4	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI

Code	Power	Luminaire Lumens	No. Modules	Drive Current	Optic	CCT(K)	IP	IK	Weight kg	Paint Finish	Driver Included	Driver Type
IT1-STE-M-4.5-1M1F	20.5	2,610	1	525	Asymmetric Suburban Street Optic (STE-M)	4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.7-1M1F	28.0	3,270	1	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.5-2M1F	39.0	5,160	2	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.7-2M1F	52.0	6,530	2	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.5-3M1F	57.0	7,490	3	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.7-3M1F	76.0	9,420	3	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.5-4M1F	76.0	9,950	4	525		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI
IT1-STE-M-4.7-4M1F	102.0	12,550	4	700		4000	IP66	IK09	7.0	Semi-Gloss Satin Grey	Driver Inc	DALI



9.3 LUMINAIRE TYPE 3 – VIVA CITY FLOOD

Kingfisher Lighting
Part of the LUCECO group of companies

Datasheet



Viva-City Flood

Product Description

The Viva-City Flood is a sleek, powerful luminaire with asymmetrical distribution. It is part of the Viva-City family.

Specification Text

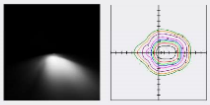
The luminaire shall be manufactured from high-pressure die-cast aluminium. It shall have an LED efficacy of up to 128.0 lm/W and will be capable of producing up to 15,320 luminaire lumens at 4000K with a CRI >70. It shall have an asymmetric forward throw optic and is rated at IP66 and IK08.

Specify 2700K for IDA compliance.

Specification

Weight: 7.5 - 8.1kg
Windage: 0.5m²
Material: Die-cast Aluminium
Paint finish: RAL7016 Anthracite Grey

Optics



Flood Optic - 50°

Key Features

- 6.0 - 120.0W
- 7,320 - 15,320 Luminaire Lumens
- Efficacy up to 128.0 lm/W
- 4000K, CRI >70
- Lifetime > 100,000hr, L80

Kingfisher Lighting

LED | IP66 | IK08 | DIM | Control Compatible

Mounting Options

- Surface Mount Bracket

Other Options

- Part Night Dimming
- Colour Temperature Option
- Photocell Option
- Emergency Option
  Contact for details

ida DARK SKY APPROVED

kingfisherlighting.com | 01623 415900 | sales@kingfisherlighting.com

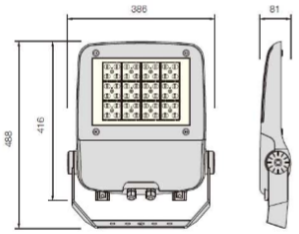
KF VIVA-CITY FLOOD PAGE 1 OF 2

Code	Power	Luminaire Lumens	Drive Current	Optic	CCT(K)	IP	IK	Weight kg	Paint Finish	Driver Included	Driver Type
VCYF-FL50-4.6-60D	60.0	7,320	805	Asymmetrical Flood Optic - 50°	4000	IP66	IK08	7.5	RAL7016 Anthracite Grey	Driver Inc	Dali
VCYF-FL50-4.6-60DPEC	60.0	7,320	805		4000	IP66	IK08	7.6	RAL7016 Anthracite Grey	Driver Inc	Dali
VCYF-FL50-4.8-120D	120.0	15,320	808		4000	IP66	IK08	8.0	RAL7016 Anthracite Grey	Driver Inc	Dali
VCYF-FL50-4.8-120DPEC	120.0	15,320	808		4000	IP66	IK08	8.1	RAL7016 Anthracite Grey	Driver Inc	Dali



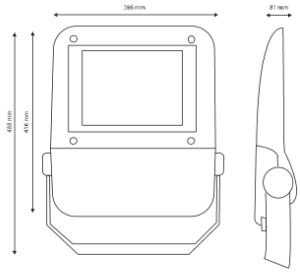


Dimensions









Kingfisher Lighting

9.4 LUMINAIRE TYPE 4 – SEMITA URBAN

Kingfisher Lighting
Part of the Luceco group of companies

Datasheet

ZACTIS



Product Description

Zactis is a high-performance flat-to-ground LED flood light perfect for sports, high mast and area applications. As well as facilitating easy installation and maintenance, the sleek, low-profile design, reduces the load together with decreasing windage.

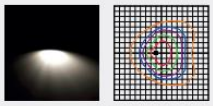
Specification Text

The luminaire shall be manufactured from high-pressure die-cast aluminium. It shall have an LED efficacy of up to 134.0 lm/W and will be capable of producing up to 43,026 luminaire lumens at 2700K, 4000K, with a CRI >70. It shall have an asymmetric forward throw optic and is rated at IP65 and IK08.

Specification

Weight:	15.0 - 16.5kg
Windage:	0.1m²
Material:	Die-cast Aluminium
Paint finish:	RAL7016 Anthracite Grey Marine Grade
Embodied Carbon:	236 - 289 kg CO^2e

Optics



Asymmetrical Forward Throw Optic 70°

Key Features

- 125.0 - 320.0W
- 16,447 - 43,026 Luminaire Lumens
- Efficacy up to 134 lm/W
- 2700K, 4000K, CRI >70
- Lifetime >100,000hr, L70

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LED | IP65 | IK08 | DIM | Marine Grade Finish | Control Compatible

Mounting Options

- Stirrup Mount

Other Options

- Part Night Dimming
- Colour Temperature Options
- Photocell Option
  Contact for details

DESIGNED & ENGINEERED IN THE UK

Circular Economy Score	
0 to 0.5	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

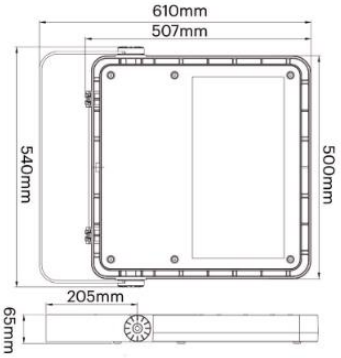
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Code	Power	Luminaire Lumens	Drive Current	Optic	CCT(K)	IP	IK	Weight kg	Paint Finish	Driver Included
ZAC-FW70-27.5-125D	125.0	16,447	645	Asymmetrical Forward Throw Optic - 70°	2700	IP65	IK08	15.0	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-27.7-160D	160.0	20,166	808		2700	IP65	IK08	15.0	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-27.5-250D	250.0	33,327	645		2700	IP66	IK08	16.5	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-27.7-320D	320.0	43,026	808		2700	IP66	IK08	16.5	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-4.5-125D	125	17,125	645		4000	IP65	IK08	15.0	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-4.7-160D	160	21,920	808		4000	IP65	IK08	15.0	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-4.5-250D	250	34,250	645		4000	IP66	IK08	16.5	RAL7016 Anthracite Grey Marine Grade	Driver Inc
ZAC-FW70-4.7-320D	320	44,156	808		4000	IP66	IK08	16.5	RAL7016 Anthracite Grey Marine Grade	Driver Inc







All measurements in mm





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