

Lightable

INDUSTRIAL IT SYSTEMS

77 MARLBOROUGH ROAD

LANCING

LIGHTING ASSESSMENT

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DOCUMENT ISSUE RECORD

Document reference	L0193-LTBL-REP-001
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Revision	Date of Issue	Author	Description
P01	14.04.2026	Dan Alasfar MEng IEng MILP	For Information

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EXECUTIVE SUMMARY

This Lighting Impact Assessment has been prepared for Industrial IT Systems Ltd (“the Client”) by Dan Alasfar of Lightable Projects Ltd (“Lightable”), an Incorporated Engineer and Registered Member of the Institute of Lighting Professionals (“ILP”) with more than ten years’ experience of technical input for environmental lighting.

The assessment relates to the construction of a commercial unit with associated parking and access at 77 Marlborough Road, Lancing (“the Site”). The assessment evaluates compliance with relevant lighting standards and guidelines, balancing the need for lighting performance with potential adverse light impacts (light pollution).

Key Findings

- **Lighting performance:** The proposed scheme provides the Site with high quality functional and architectural lighting, compliant with BS EN 12464-2 Lighting of outdoor workplaces and designed to a tight tolerance of the target levels. Illuminated signage shall comply with ILP PLG05/23 Brightness of illuminated advertisements.
- **Light intrusion & glare:** Calculations confirm that light intrusion and glare levels remain within acceptable thresholds for surrounding residential properties and highways, compliant with ILP GN01/21 Guidance notes for the reduction of obtrusive light.
- **Sky Glow:** Upward Light Ratio (ULR) remains within the acceptable thresholds, compliant with ILP GN01/21 Guidance notes for the reduction of obtrusive light.

If external lighting is installed in accordance with this assessment the overall impact at sensitive receptors identified is anticipated to be **negligible**.

Recommendations

- Utilise high quality directional LED luminaires.
- All functional luminaires should be installed flat-to-ground with zero tilt angle.
- Architectural luminaires should be equipped with directional anti-glare optics.
- Illuminated signage shall not exceed the permitted size (10m²) and luminance (600cd/m²).
- Adopt a site-wide warm white colour temperature.
- Employ an automatic lighting control system to ensure that lights switch on only when required. The system shall be programmed to align with the proposed operating hours. Lighting shall otherwise remain switched off.

1.0 INTRODUCTION

1.1 This report sets out to achieve the following:

- Review relevant policy and guidance.
- Establish the baseline and location of all potentially sensitive receptors.
- Provide mitigation measures to remove potentially adverse impacts.
- Provide recommended luminaire types.
- Undertake detailed external lighting modelling, designed to provide a high-quality, low impact proposal for lighting.
- Demonstrate, by calculations, that the proposed external lighting installation will result in negligible adverse impacts on sensitive receptors.

2.0 POLICY AND GUIDANCE

Adur Local Plan 2017

“The Plan provides a comprehensive vision and strategy for the future of Adur (outside of the South Downs National Park) until 2032, based on extensive consultation and evidence gathering. It provides clear guidance on how new development can address the challenges we face and identifies where, when, and how much development will take place.”

Policy 15: Quality of the Built Environment and Public Realm

“[...] Lighting incorporated into developments should provide the minimum for public safety, be energy efficient, designed to illuminate the target only and avoid light pollution. [...]”

Policy 34: Pollution and Contamination

“Development should not result in pollution or hazards which prejudice the health and safety of the local community and the environment, including nature conservation interests and the water environment.

New development in Adur will be located in areas most suitable to the use of that development to avoid risks from noise, air, odour or light pollution.

Mitigation measures will need to be implemented for developments that could increase levels of pollution or have a negative impact on drinking water supplies in Adur. Where there are significant levels of increased pollution that cannot be mitigated, development will be refused.

Where appropriate, air quality assessments and/or noise assessments will be required in conjunction with development proposals. Investigations and assessments of all sites situated in or in close proximity to potentially contaminated land will be required in relation to relevant development proposals”

National Planning Policy Framework (2024)

- 2.1 The Revised National Planning Policy Framework (NPPF) provides guidance relating to planning and pollution control for new development in England. The purpose of the planning system is to contribute to the achievement of sustainable development. In relation to lighting, Paragraph 198 states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

Clean Neighbourhoods and Environment Act (2005)

- 2.2 The CNEA 2005 amended section 79(1) of the Environmental Protection Act 1990, extending the statutory nuisance regime to include light nuisance stating the following:

“(fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance.”

- 2.3 This Act provides the statutory framework for addressing artificial light as a potential statutory nuisance. This Act does not set prescriptive light pollution limits but instead allows local authorities to act where lighting is judged to cause harm to health or a material interference. In practice, ILP GN01/21 is commonly adopted as the benchmark guidance to demonstrate compliance and to assist in the assessment of lighting impacts.

ILP Guidance Note 01 for the Reduction of Obtrusive Light (GN01/21)

- 2.4 The ILP has proposed lighting guidance and criteria for local authorities with a recommendation that they are incorporated at the local plan level. The guidance supports planning policy by promoting well-targeted, controlled lighting that meets functional needs while safeguarding sensitive receptors from adverse effects.
- 2.5 ILP GN01/21 recommends that the immediate environment is classified into an environmental zone based on ambient lighting levels in the surrounding area. For each Environmental Zone, the ILP provide recommended obtrusive light limits for exterior lighting installations.

ILP Professional Lighting Guide 05 The Brightness of Illuminated Advertisements (PLG05/23)

- 2.6 This document is intended to provide pragmatic guidance to all involved with exterior illuminated advertisements, or such installations located within premises intended for exterior observers.
- 2.7 Illuminated signage and advertisements have become an integral part of our street scene and they are designed to have an impact. When considering any application for illuminated signage, thought should be given to how it is to be viewed within the street scene.

SLL Lighting Guide 06 The Exterior Environment

- 2.8 This document provides detailed guidance on the design and assessment of outdoor lighting in public and private spaces. It covers functional requirements for visibility and safety, while also addressing environmental considerations such as obtrusive light, energy efficiency, and the character of the built environment. The document is widely recognised by practitioners and complements ILP GN01/21 by offering practical design advice aligned with planning and environmental objectives.

SLL Lighting Guide 21 Protecting the Night-time Environment

- 2.9 This document focuses on limiting obtrusive light and safeguarding dark skies. It provides practical guidance on reducing glare, sky glow, and spill light, with a strong emphasis on sensitive design in areas with ecological or amenity value. LG21 is frequently cited alongside ILP GN01/21 as complementary guidance to help demonstrate good practice in planning and environmental assessments.

BS EN 12464-2 Lighting of Workplaces, Outdoor Workplaces (2024)

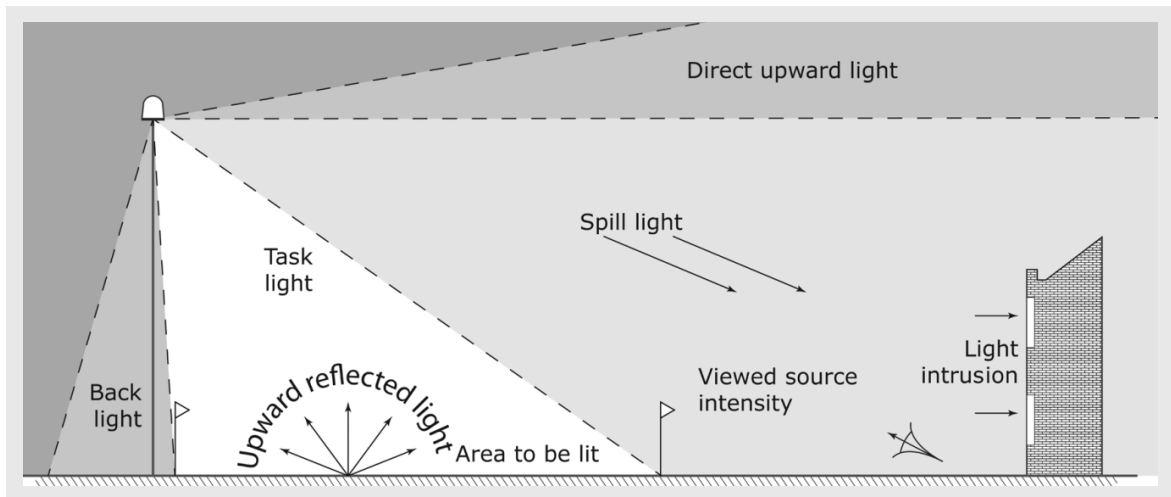
- 2.10 This standard specifies requirements for lighting of tasks in most outdoor workplaces and their associated area in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice. This standard includes important recommendations on how obtrusive light can be limited to keep night skies free of light pollution.

3.0 LIGHT POLLUTION

3.1 Light pollution describes the unintended or excessive effects of artificial lighting beyond its functional purpose. The main types are below.

- **Sky glow** : the brightening of the night sky caused by upwardly directed or reflected light scattering in the atmosphere. It reduces visibility of stars and undermines the character of dark landscapes.
- **Light intrusion** : unwanted light entering windows or private spaces, which can disturb sleep, affect health and wellbeing, and impact residential amenity.
- **Glare** : excessive brightness or contrast that causes discomfort or impairs vision. Glare can reduce safety for road users and pedestrians by making it difficult to see beyond the light source.
- **Clutter** : the over-concentration or poor arrangement of lights in an area, often seen along busy roads or commercial frontages. This creates visual confusion, can distract drivers, and detracts from the night-time environment.

Figure 3.1 Types of light pollution



3.2 In practice, light pollution commonly occurs due to poorly specified or installed luminaires, incorrect aiming or tilt, excessive light levels beyond what is required, and the absence of effective controls. It may also arise where lighting has been introduced without consideration of its wider context, including proximity to sensitive ecological habitats, neighbouring properties, or transport systems.

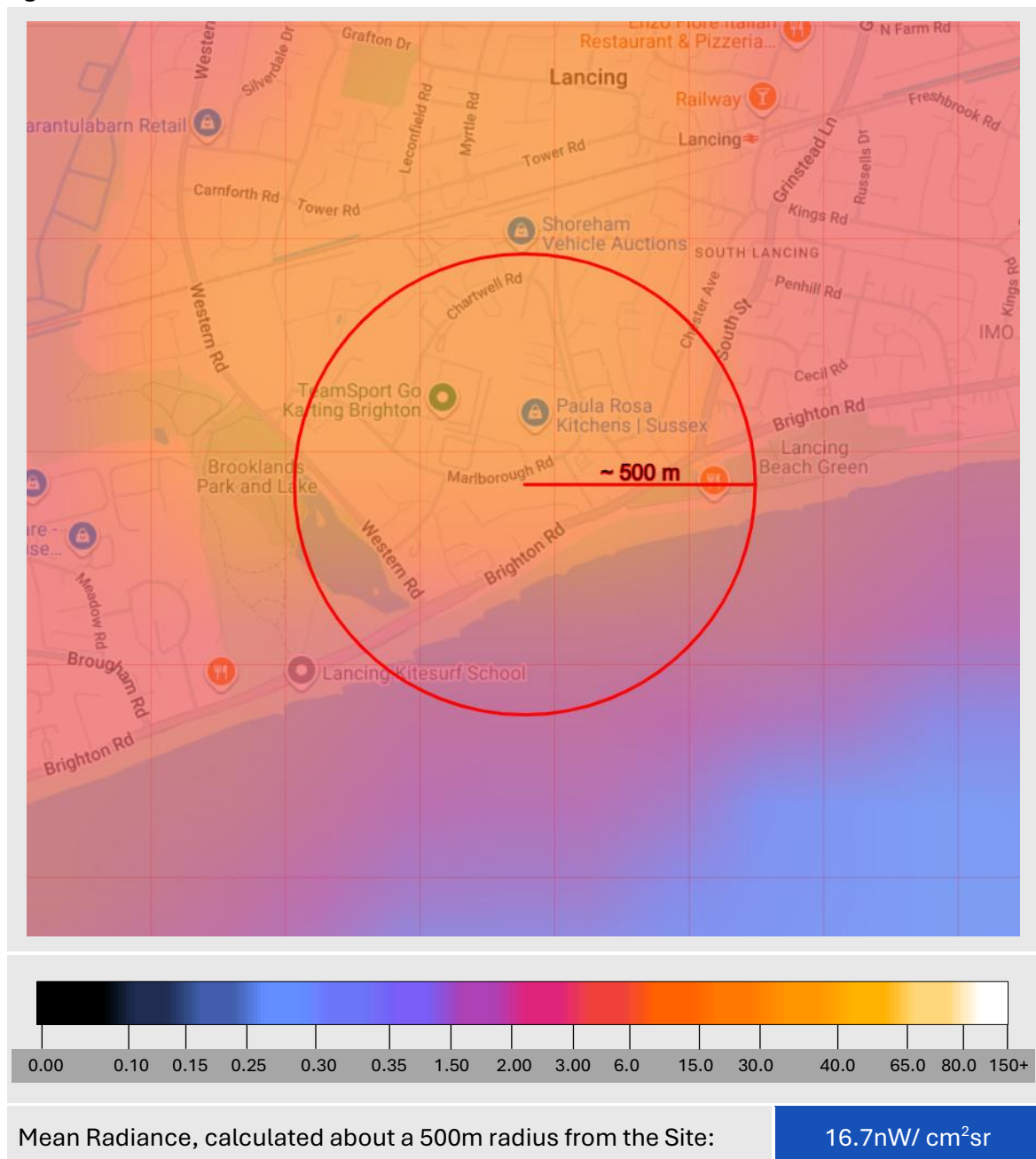
4.0 BASELINE

- 4.1 The study area includes the Site, the surrounding areas and any sensitive receptors which may have a direct view towards external lighting proposals and/or which may be affected during the construction and operation of the Site.
- 4.2 Assessment of designation, use, habitat, and external lighting condition dictates the classification of Environmental Zone across the proposed Site location and surrounding areas.

Local Radiance

- 4.3 The Visible Infrared Imaging Radiometer Suite (VIIRS) is a satellite instrument which orbits earth to collect and record radiance data (light emissions). The latest data was recorded in 2024 and is available in visual format. An extract at the Site location is included in Figure 4.1.

Figure 4.1 Local radiance



- 4.4 It is important to state that recognised organisations, such as the ILP, have not calibrated VIIRS radiance data with the Environmental Zones as defined by the ILP. It is also important to note the data should not accurately be relied upon and should be viewed conservatively. The data should be used as one tool to help understand the context of existing light emissions local to the Site.

Residential Receptors

- 4.5 Residential receptors surrounding the Site have been identified based on a desktop study using mapping data in conjunction with Google Earth satellite and street view imagery.
- 4.6 Residential properties within 50m and with a direct or partial view of the Site are considered potentially sensitive.
- 4.7 Potentially sensitive residential receptors surrounding the Site are illustrated in Figure 4.2. Mitigation measures and obtrusive light calculations are discussed later in this report.

Figure 4.2 Residential receptors



Transport Receptors

- 4.8 Transport receptors surrounding the Site have been identified based on a desktop study using mapping data in conjunction with Google Earth satellite and street view imagery.
- 4.9 Highway or railway lines within 50m and with a direct or partial view of the Site are considered potentially sensitive.
- 4.10 Potentially sensitive transport receptors surrounding the Site are illustrated in Figure 4.3. Mitigation measures and obtrusive light calculations are discussed later in this report.

Figure 4.3 Transport receptors



5.0 ASSESSMENT METHODOLOGY

Obtrusive Light Limits

- 5.1 ILP GN01/21 recommends that a site environment is classified into an environmental zone based on ambient lighting levels in the surrounding area. The environmental zones are detailed in Table 5.1. Zone E0 requires the strictest level of light pollution control and E4 the lowest.

Table 5.1 Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty, etc
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night- time activity

- 5.2 Based on the findings of the baseline study, the Site has been classified as Environmental Zone E3.
- 5.3 Tables 5.2 - 5.4 set out the relevant light pollution limits which shall form the basis of this assessment.

Table 5.2. Light intrusion limits

Parameter	Conditions	Environmental Zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (lux)	Pre-curfew	n/a	2	5	10	25
	Post-curfew	n/a	<0.1	1	2	5

Table 5.3. Sky glow limits

Parameter	Conditions	Environmental Zone				
		E0	E1	E2	E3	E4
Upward light ratio (%)	n/a	0	0	2.5	5	15
Note 1	This is the primary approach to limit skyglow and is suitable to compare different single luminaires and mitigate the contribution of each luminaire within an installation.					
Note 2	This does not take into account the effect of light reflected upwards from ground that also contributes to skyglow.					
Note 3	Some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlights and festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.					

- 5.4 The sky glow limits set out above are applicable to the control of upward light emitted directly from luminaires as part of the functional lighting design. According to Note 3, ILP GN01/21 acknowledges that these limits cannot apply to decorative or architectural lighting, such as façade and feature lighting. This type of lighting shall therefore be introduced responsibly with embedded mitigation measures implemented as set out in this report.

Table 5.4 Highways glare limits

Parameter	Environmental Zone			
	No road lighting	M6/M5	M4 / M3	M2 / M1
Threshold increment*	0.1	1.0	2.0	5.0
*15% based on an adaptation luminance of __ cd/m ²				

Lighting Performance Requirements

- 5.5 Lighting performance requirements for various task area types are provided in BS EN 12464-2 Lighting of outdoor workplaces.
- 5.6 For this project, lighting shall be provided to meet the criteria set out in Table 5.5.

Table 5.5 Selected lighting performance criteria

Task area type	Maintained average (lux)	Uniformity ratio
Site access and loading area	20	0.25
Car park	10	0.25
Rear access road	10	0.25

6.0 MITIGATION

- 6.1 Poorly thought-out lighting has the potential to cause unacceptable impacts on sensitive receptors. The following mitigation steps have been applied in an effort to reduce adverse impacts to negligible levels.
- 6.2 **Directional Light :** Luminaires shall be highly directional, full cut-off type, emitting all their light below the horizontal plane. All luminaires shall be installed at 0° tilt. Directional light also helps limit glare as can be seen in Figures 6.1 and 6.2.

Figure 6.1 Directional light

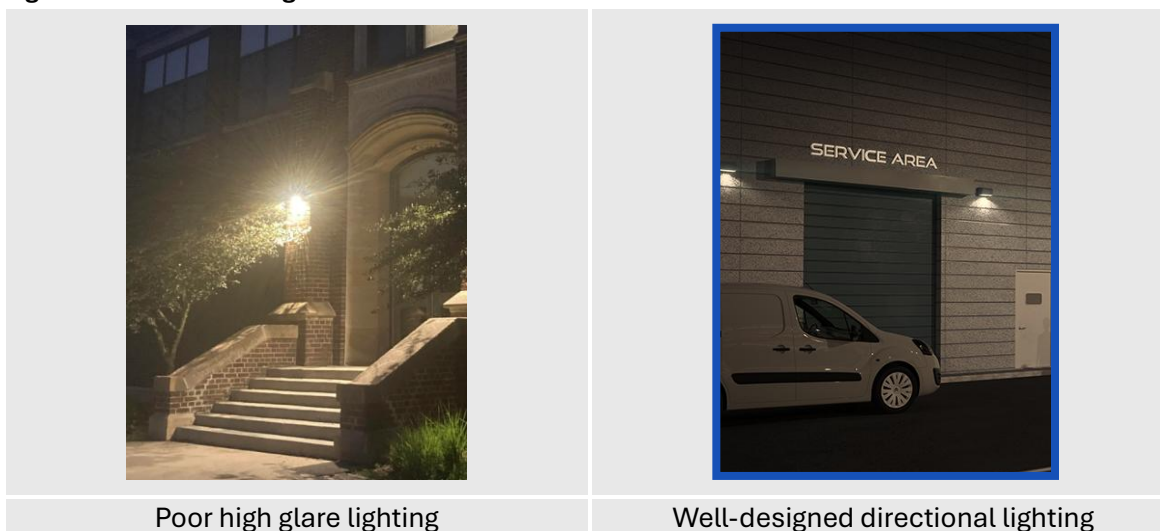
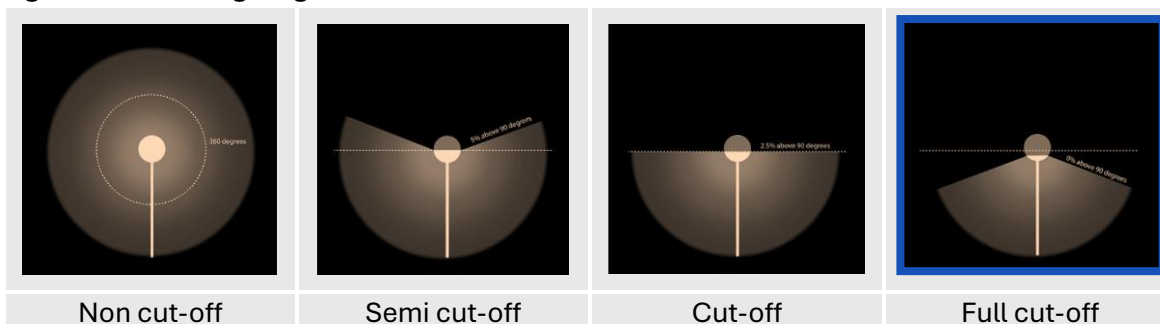


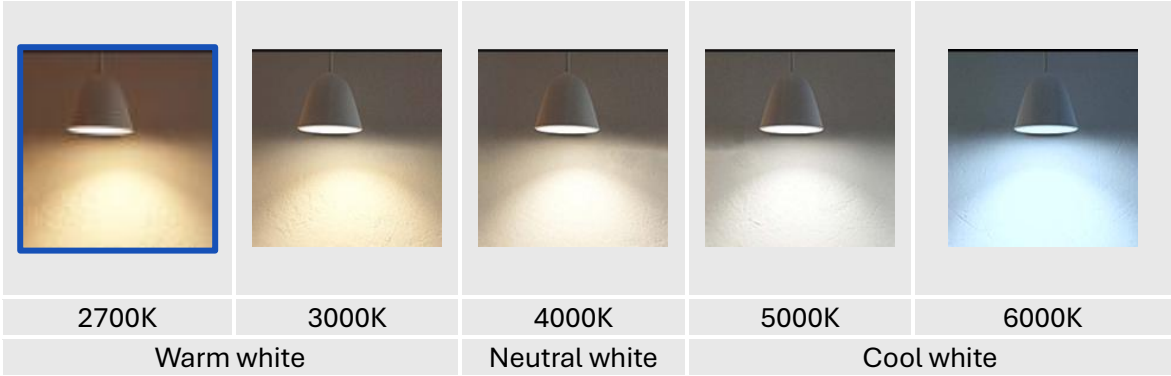
Figure 6.2 Cut-off lighting



- 6.3 **Optimised mounting heights :** Mounting heights shall be restricted the minimum practicable to light the Site. This helps reduce light spill and the overall size and scale of lighting.
- 6.4 **Spill control :** Luminaires shall be equipped with specific optics, designed to contain light within the Site as far as reasonably practicable. Integrated shielding shall be incorporated into the proposed architectural lighting.
- 6.5 **Lighting controls :** An automatic lighting control system shall be installed to ensure that lights switch on only when required. The system shall be programmed to align with the proposed operating hours. Lighting shall otherwise remain switched off.
- 6.6 **Avoiding over lighting :** Illumination levels across the site shall be designed to a tight tolerance of the lighting performance criteria. All luminaires shall be the minimum required intensity.

6.7 **Warm colour temperature :** Luminaires shall be 2700K warm white colour temperature with reduced blue light component. Warmer whites are less prone to disrupt natural sleep-wake cycles. Warm white also causes less light “scatter” which contributes to sky glow.

Figure 6.3 Selected colour temperature



7.0 LUMINAIRE SELECTION

- 7.1 The following luminaires have been used for this assessment. The luminaires are high quality LED type, offering excellent optical control, minimising obtrusive light.
- 7.2 Whilst specific products have been proposed, the final installation may differ provided a design is carried out by a competent lighting professional. The mitigation measures set out in this report should be followed and implemented.

Table 7.1 Luminaire Type A1

Type A1	
Specification	Description
Correlated Colour Temperature (CCT)	2700K
Mounting	Building mount @ 3.0m – 4.0m
Manufacturer	Kingfisher Lighting
Product	Semita Urban
Optic	Flood
Output	11.1W 1612 lumens
Luminaire image	

Table 7.2 Luminaire Type A2

Type A2	
Specification	Description
Correlated Colour Temperature (CCT)	2700K
Mounting	Wall mount @ 2.2m – 3.0m
Manufacturer	Kingfisher Lighting
Product	Semita Urban
Optic	ST
Output	11.1W 1497 lumens
Luminaire image	

Table 7.3 Luminaire Type B

Type B	
Specification	Description
Correlated Colour Temperature (CCT)	2700K
Mounting	1.1m bollard
Manufacturer	TRT Lighting
Product	VIA bollard
Optic	Asymmetric
Output	8W 347 lumens
Luminaire image	

Table 7.4 Luminaire Type X

Type X	
Specification	Description
Correlated Colour Temperature (CCT)	2700K
Mounting	Ground recess
Manufacturer	LED-linear
Product	Fusion IP67 wall grazer
Optic	Asymmetric optic anti-glare
Output	15W/m 1260 lumens/m
Luminaire image	

8.0 DESIGN AND ASSESSMENT

Introduction

- 8.1 Detailed lighting modelling has been undertaken using RELUX Desktop, an industry standard software package capable of raytraced scene rendering.
- 8.2 The Site and surroundings have been modelled based on the latest available architectural drawings.

Model Overview

- 8.3 Lighting performance and obtrusive light calculations have been undertaken and assessed against the selected lighting performance criteria set out in Section 5.
- 8.4 Luminance and false colour extracts from the lighting model are provided in Figure 8.1 and 8.2 to assist in visualising the predicted light distribution.
- 8.5 An external lighting layout drawing has been prepared which indicates proposed luminaire types, heights, and directions. This drawing is included in Appendix 2.
- 8.6 An external lighting lux plot layout drawing has been prepared to illustrate the proposed on and off-site illumination distribution, presented as lux contour lines with an overlaid calculation grid. This drawing is included in Appendix 3.

Figure 8.1 Lighting model false colour view - measurements in lux

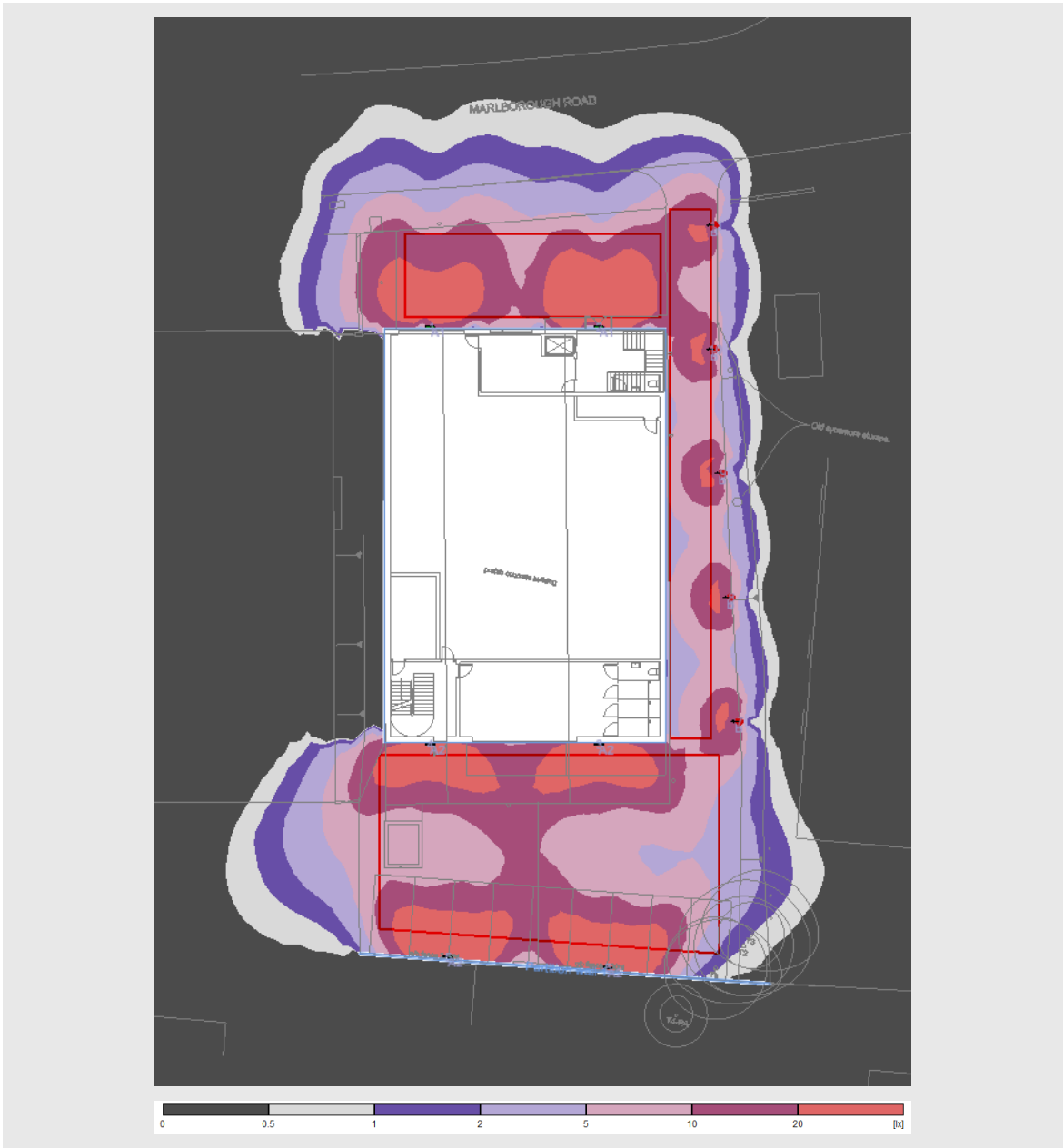


Figure 8.2 Lighting model luminance view



Obtrusive Light

- 8.7 Tables 8.1 – 8.3 summarise the obtrusive light calculation results with a **PASS** / **FAIL** assigned against each test. The calculations have been assessed against the limits for Environmental Zone E3. As can be seen the proposed installation **complies** with light pollution guidance as set out in ILP GN01/21. If external lighting is installed in accordance with this assessment the overall impact is anticipated to be **negligible**.

Table 8.1 Obtrusive light summary - Light intrusion

Receptor	Illuminance in the vertical plane			PASS / FAIL
	Pre-curfew limit (lux)	Post-curfew limit (lux)	Calculated (lux)	
R-1	10	2	0.43	PASS
R-2	10	2	0.51	PASS
R-3	10	2	0.25	PASS
R-4	10	2	0.23	PASS
R-5	10	2	0.20	PASS

Table 8.2. Obtrusive light summary – Sky glow

Receptor	Upward light ratio		PASS / FAIL
	Limit	Calculated	
Site	5%	0%	PASS

Table 8.3. Obtrusive light summary – Glare highways

Receptor	Threshold increment		PASS / FAIL
	Limit	Calculated	
T-1	15%	0.1%	PASS
T-2	15%	0.2%	PASS

Lighting Performance

- 8.8 Table 8.4 summarises the lighting design calculation results with a **PASS** / **FAIL** assigned against each test.

Table 8.4 Lighting performance summary

Site Area	Performance requirements		Calculated results		PASS / FAIL
	Maintained average (lux)	Uniformity	Maintained average (lux)	Uniformity	
Site access and loading area	20	0.25	22.6	0.28	PASS
Car park	10	0.25	14.2	0.29	PASS
Rear access road	10	0.25	10.1	0.29	PASS

Illuminated Signage

- 8.9 The final illuminated signage design shall comply with the following guidance given in ILP PLG05/23 'The Brightness of Illuminated Advertisements'.

- Lighting shall be static;
- No intermittent light sources, flashing lights, moving parts or features, no exposed cathode tubing, animation or reflective material;
- Illumination in a manner reasonably required to fulfil the purpose of advertisement; and,
- Maximum permitted size and luminance level in line with Table 8.5.

Table 8.5 Signage luminance limits

Illuminated area	Maximum luminance (cd/m ²)
Not more than 10m ²	600

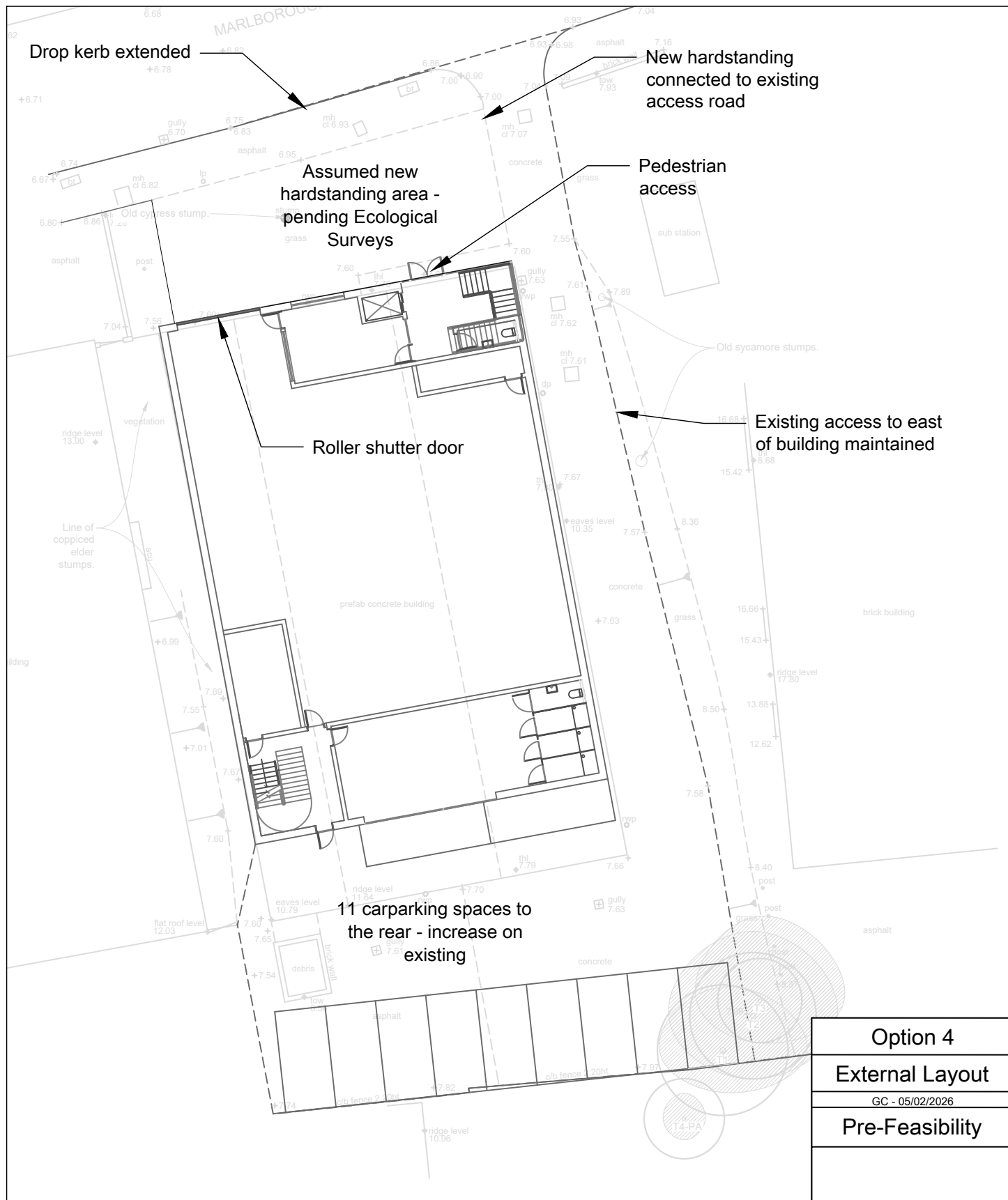
9.0 CONSTRUCTION PHASE LIGHTING

9.1 While construction phase lighting is expected to be short term and reversible it is important to minimise disruption as far as practicable. To reduce the effects of lighting during the construction phase the following measures should be put in place:

- Lighting will operate in all external areas used by construction workers after dark in order to provide a safe and secure working environment without over lighting. High quality LED light sources with high colour rendering index (CRI) shall be utilised to maximise visibility with efficient light output;
- Lighting shall be provided to meet the target lux level as set out in BS 12464-2 Lighting of outdoor workplaces without over lighting. Luminaires shall be mounted at the lowest practical mounting height, providing lighting only where lighting is required;
- The Contractor shall specify working hours, uses of lighting, location of temporary floodlights and construction compound and agreeing these with the local council to reduce duration of impact;
- Lighting controls should be employed to dim or switch off any lighting that is not needed;
- Lighting that needs to be sited close to the perimeter or sensitive areas should be fitted with shielding or be switched off or dimmed when not in use;
- Lighting should be controlled in such a way to illuminate high activity, hazardous or high security areas while reducing lighting levels at less pertinent areas; and
- The Contractor should act responsibly to adjust any temporary lighting reported as causing nuisance.

APPENDICES

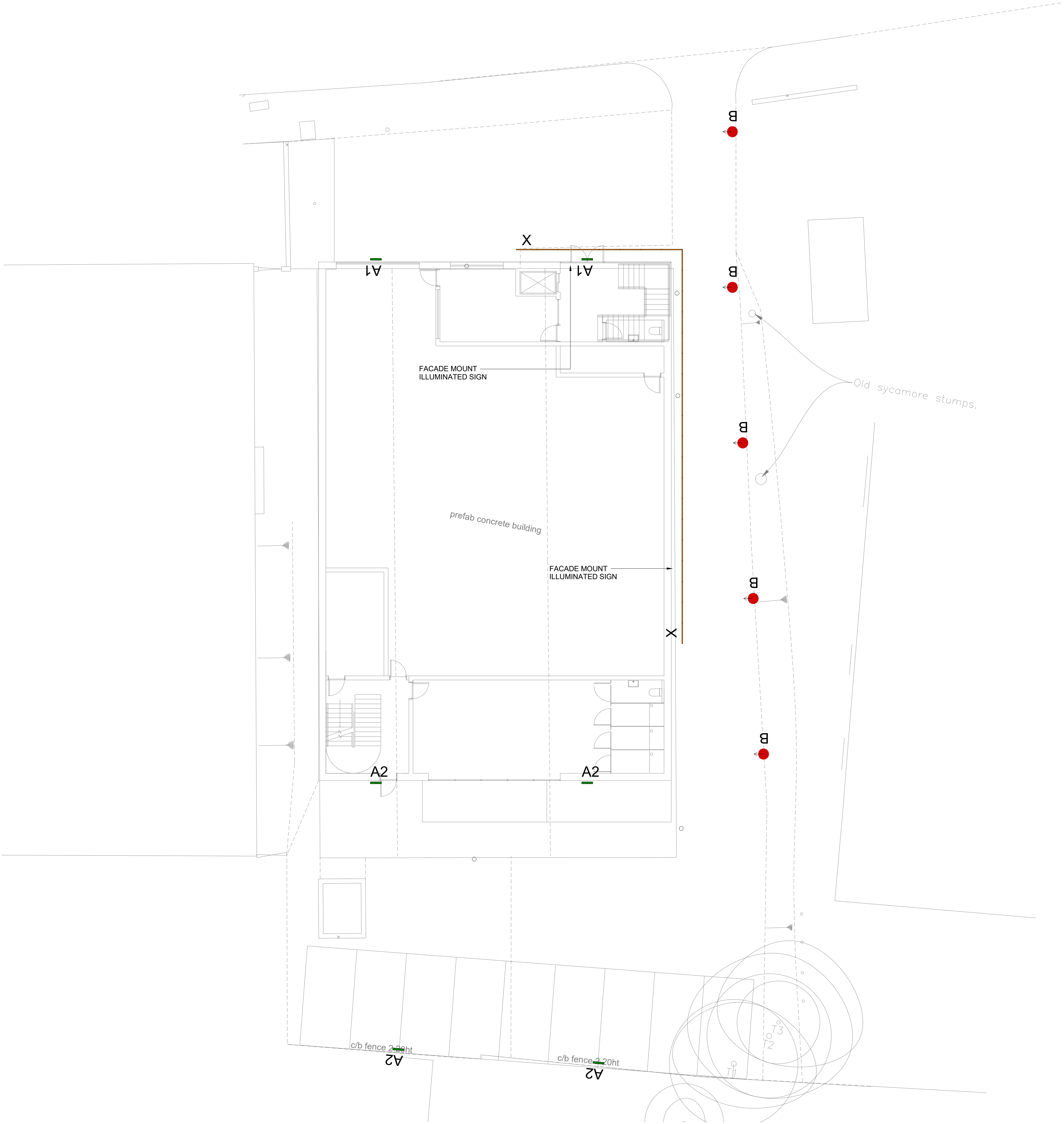
Appendix 1 : Proposed Site Plan



External Layout
Scale 1:250 at A4

Option 4
External Layout
GC - 05/02/2026
Pre-Feasibility
.\PROJECT 77_02 (1).png

Appendix 2 : External Lighting Layout



- NOTES
- THIS IS NOT A CONSTRUCTION DRAWING.
 - DO NOT SCALE FROM THIS DRAWING.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DOCUMENTS.
 - FACADE MOUNT ILLUMINATED SIGNS SHALL NOT EXCEED 10M² IN ILLUMINATED AREA AND 600cd/m² IN LUMINANCE, IN COMPLIANCE WITH ILP PLG05/23.

KEY

LUMINAIRE SCHEDULE		
SYMBOL	DESCRIPTION	IMAGE
A1	KINGFISHER LIGHTING SEMITA URBAN FLOOD OPTIC 11.1W 1612 LUMENS 2700K 3.0M - 4.0M WALL MOUNT	
A2	KINGFISHER LIGHTING SEMITA URBAN ST OPTIC 11.1W 1497 LUMENS 2700K 2.2M - 3.0M WALL MOUNT	
B	TRT LIGHTING VIA BOLLARD ASYMMETRIC OPTIC 8W 347 LUMENS 2700K 1.1M BOLLARD	
X	LED-LINEAR FUSION IP67 ASYMMETRIC OPTIC ANTI-GLARE 15W/M 1260 LUMENS/M 2700K GROUND RECESSED LINEAR LED	

P1	14.04.26	FOR INFORMATION
REV	DATE	DESCRIPTION

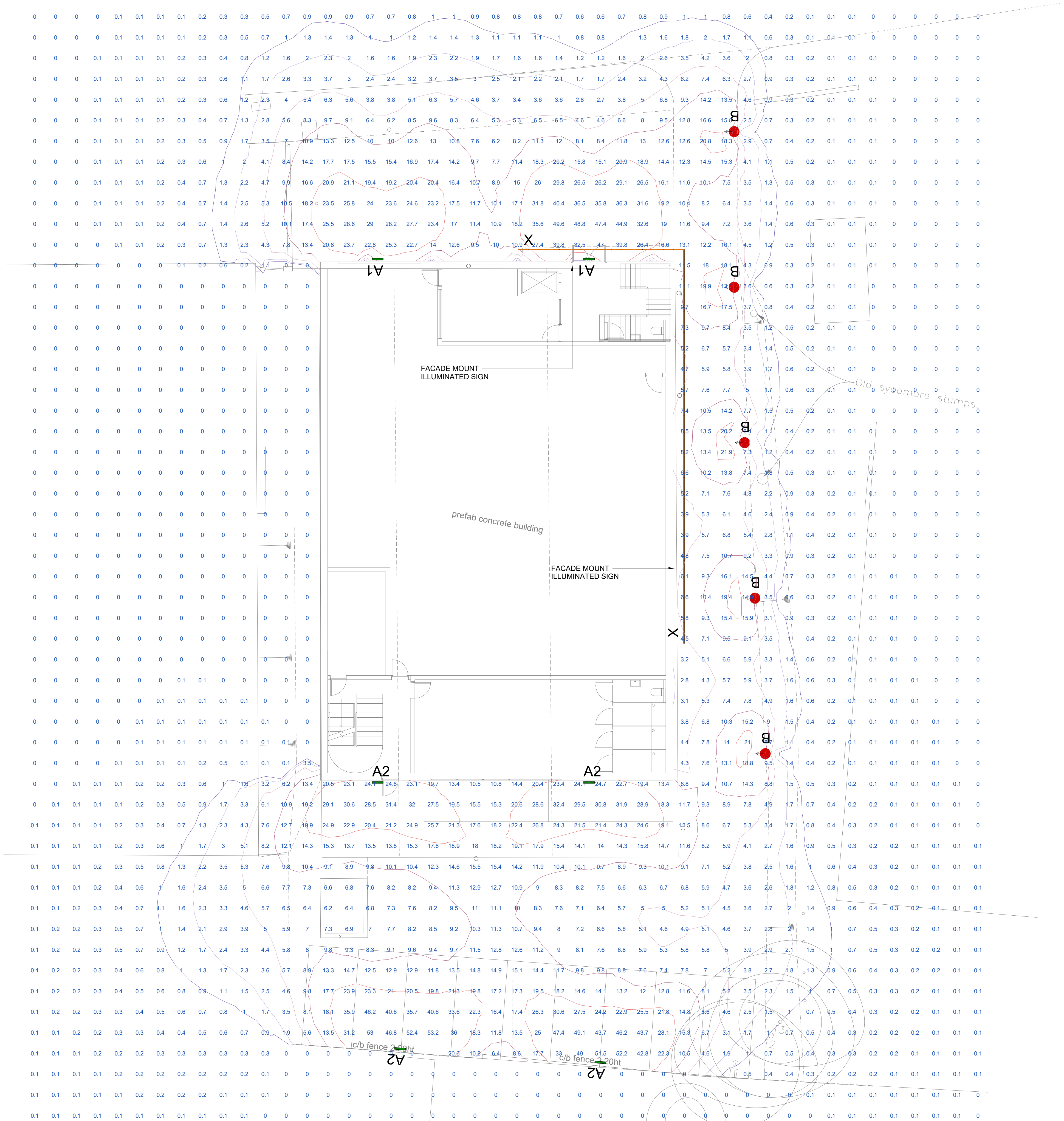
PROJECT
77 MARLBOROUGH ROAD
LANCING

DRAWING TITLE
EXTERNAL LIGHTING
LAYOUT

DRAWING NUMBER
L0193-LTBL-DWG-001

DAN ALASFAR MEng IEng MILP dan@lightable.co.uk 07877 912379	SCALE 1:100 @ A1	DATE 14.04.2026	REV P1
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Appendix 3 : Lux Plot Layout



- NOTES
- THIS IS NOT A CONSTRUCTION DRAWING.
 - DO NOT SCALE FROM THIS DRAWING.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER PROJECT DOCUMENTS.
 - FACADE MOUNT ILLUMINATED SIGNS SHALL NOT EXCEED 10M² IN ILLUMINATED AREA AND 600cd/m² IN LUMINANCE, IN COMPLIANCE WITH LIP PLG05/23.

KEY

LUMINAIRE SCHEDULE		
SYMBOL	DESCRIPTION	IMAGE
A1	KINGFISHER LIGHTING SEMITA URBAN FLOOD OPTIC 11.1W 1612 LUMENS 2700K 3.0M - 4.0M WALL MOUNT	
A2	KINGFISHER LIGHTING SEMITA URBAN ST OPTIC 11.1W 1497 LUMENS 2700K 2.2M - 3.0M WALL MOUNT	
B	TRT LIGHTING VIA BOLLARD ASYMMETRIC OPTIC 8W 347 LUMENS 2700K 1.1M BOLLARD	
X	LED-LINEAR FUSION IP67 ASYMMETRIC OPTIC ANTI-GLARE 15W/M 1260 LUMENS/M 2700K GROUND RECESSED LINEAR LED	

HORIZONTAL ILLUMINANCE (LUX)				
ISOLUX CONTOURS		ISOLUX GRID		
	20	0	0	1
	10	0	1	1
	5	0	1	1
	2	0	1	3
	1	0	1	3

P1	14.04.26	FOR INFORMATION
REV	DATE	DESCRIPTION

Lightable

PROJECT
77 MARLBOROUGH ROAD
LANSING

DRAWING TITLE
EXTERNAL LIGHTING
LUX PLOT LAYOUT

DRAWING NUMBER
L0193-LTBL-DWG-002

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Appendix 4 : Luminaire Datasheets



Kingfisher Lighting

Part of the LUCECO group of companies

Datasheet

SEMITA Urban



Specification Text

The SEMITA Urban shall be manufactured from high pressure die-cast aluminium and powder coated with a RAL 7016 Anthracite Grey marine grade finish. It shall have a power output ranging between 6 - 11W, with an efficacy of 127 - 146 lm/W. The luminaire shall deliver 744 - 1,611 luminaire lumens. The SEMITA Urban has a range of different optics to suit narrow, medium and wide paths, with a fully programmable DALI driver. Available in 2700K and 4000K, the luminaire shall be IK10 and IP66 rated with 3 hour integral emergency back-up and self-test options available.

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



Specification

Weight: 2.4 kg
Material: Die-cast Aluminium
Paint Finish: RAL7016 Anthracite Grey
Embodied Carbon: 44 kg CO₂e

Product Description

Designed and engineered in the UK, SEMITA Urban is a slimline wallpack, available with street, path or flood optics in addition to comfort options.



Kingfisher
Lighting

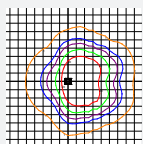
Part of the LUCECO group of companies

Key Features

- 6.0W - 11.0W
- 744 - 1,611 Luminaire Lumens
- Efficacy up to 146.0 lm/W
- 2700K, 4000K, CRI>70
- IP66, IK10
- Lifetime > 100,000hr, L80
- 3 Hour Integral Emergency
- DarkSky Approved

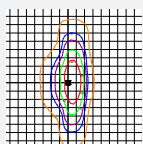
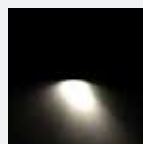
Available with integral 3 hour emergency using a 3.0W pack. Output range from 372 - 438 lm dependant on optic, CCT & accessories.

Optics



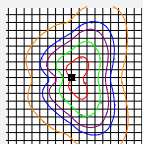
Flood Optic FL

Designed with excellent wide distribution for areas needing greater illumination such as car parks, children's areas and many more areas



Path Optic OC

Perfect for a variety of pedestrian areas in close proximity to buildings. E.g retail parks, façade lighting and offices



Street Optic ST

Ideal for illuminating areas such as building perimeters and access areas. It would be best placed in areas such with high security needs.



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

Other Options Available

Contact for further details

- 3 Hour Integral Emergency
- Colour Temperature Opportunities

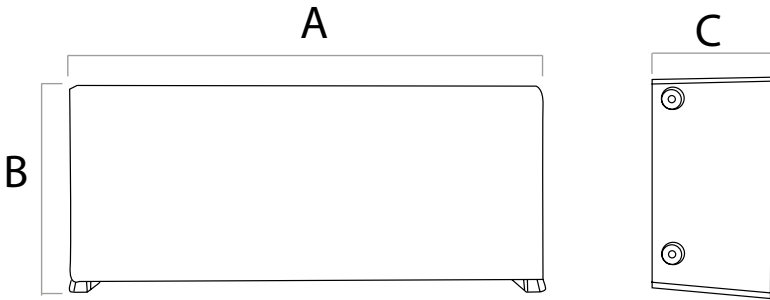
Mounting Options

- Wall Mount

Dimensions

Body Type	A	B	C
Standard	337	148	82

All measurements in mm



Code	Power (W)	Luminaire Lumens (lm)	Drive Current (mA)	Inrush Current (A pk)	Optic	CCT (K)	IP	IK	Weight (kg)	Driver Included	Driver Type
SEMUFL08D	6.0	812	205	5.0	Asymmetrical Flood Optic FL	4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUFL08D27K	6.0	771	205	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI
SEMUFL15D	11.0	1,611	410	5.0		4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUFL15D27K	11.0	1,530	410	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI
SEMUOC15D	11.0	1,570	410	5.0	Asymmetrical Path Optic OC	4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUOC15D27K	11.0	1,505	410	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI
SEMUOC08D	6.0	802	205	5.0		4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUOC08D27K	6.0	762	205	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI
SEMUST08D	6.0	783	205	5.0	Asymmetrical Street Optic ST	4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUST08D27K	6.0	744	205	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI
SEMUST15D	11.0	1,496	410	5.0		4000	IP66	IK10	2.4	Yes	Basic DALI
SEMUST15D27K	11.0	1,425	410	5.0		2700	IP66	IK10	2.4	Yes	Basic DALI

VIA

Bollard LED



IP66
Ingress Protection



IK10
Impact Resistance



10.5kg Weight



Electrical Class I



-20 to 45°C Ambient



LED Light Source

SPECIFICATION

- ✓ LED colour temp. PC-Amber*, 2700K, 3000K or 4000K
- ✓ Colour rendering index >70 (*>55)
- ✓ Projected L85 after 100,000 hours
- ✓ Power factor 0.95 at full load
- ✓ Polyester powder coat finish in light grey, dark grey, black or a bespoke colour
- ✓ High pressure die cast LM6 aluminium and high quality extruded 6063T6 aluminium housing
- ✓ UV stabilised polycarbonate lens
- ✓ In-built ventilation (breather) plug for pressure equalisation
- ✓ CLO available
- ✓ In-built OptiSet switch for asymmetric and symmetric distribution selection
- ✓ In-built PowerSet switch for high, medium and low output
- ✓ Optional Miniature Photocell available
- ✓ Part Night Dimming (PND)
- ✓ DALI compatible for use with CMS
- ✓ Optional surge protection 10kV/10kA
- ✓ Optional non-fused or fused isolators available
- ✓ Feeder pillar version available
- ✓ Root, socket or flange mount
- ✓ Anti-tamper door fixing as standard
- ✓ EN40 compliant door location, size and cable entry slots
- ✓ UMSUG codes available for full product range



International Dark-Sky Association approved Via bollard. Compliant when using a colour temperature of 1750K (PC Amber) only.



RANGE OVERVIEW

Type	System Power	CCT	Lumen Output	CRI
Via Asymmetric	4-19W	PC-Amber*, 2700K, 3000K or 4000K	Up to 950lm	>70 (*>55)
Via Symmetric	4-19W	PC-Amber*, 2700K, 3000K or 4000K	Up to 1,100lm	>70 (*>55)
Via PowerSet & OptiSet Asymmetric	5-14W	PC-Amber*, 2700K, 3000K or 4000K	Up to 750lm	>70 (*>55)
Via PowerSet & OptiSet Symmetric	5-14W	PC-Amber*, 2700K, 3000K or 4000K	Up to 868lm	>70 (*>55)

ELECTRICAL CHARACTERISTICS

	Via Asymmetric	Via Symmetric
System Power	4-19W	
LED CCT	PC-Amber*, 2700K, 3000K or 4000K	
LED CRI	>70 (*>55)	
Lumen Output	Up to 950lm	Up to 1,100lm
Lumen Maintenance	Projected L85 after 100,000 hours	
Drive Current	160-695mA	220-700mA
Driver Output	Constant current output with AM dimming	
Power Factor (Full Load/Half Load)	0.95/0.90	
Operational Voltage	220-240VAC rms	
Operating Frequency	50/60Hz	
Inrush Current (Apk/50%-µS)	25A/150µS	
Running Current (max)	60mA	
Surge Protection (COM/DIF)	10kV/6kV	
Additional Surge Protection (on request)	10kV/10kA	
Lighting Controls Options	Miniature Photocell, PND and CMS compatible	
Dimming Protocols	DALI	

MECHANICAL CHARACTERISTICS

Housing Material	High pressure die cast LM6 aluminium and high quality extruded 6063T6 aluminium
Housing Finish	Chromate free pre-treatment, polyester powder coat, light grey (RAL9006), dark grey (RAL7022), black (RAL9005) or bespoke colours on request
Lens Material	UV stabilised polycarbonate
Ingress Protection Rating	IP66
Weight	10.5kg
Impact Resistance Rating	IK10
Mounting Methods	Root, socket or flange

SHIELD OPTIONS

Universal Front/Rear	04GSK71899
Side	04GSK71725



FOR MORE INFORMATION



+44 (0) 1527 521 162

www.trtlighting.co.uk

All information detailed within this datasheet is accurate at the date of issue.

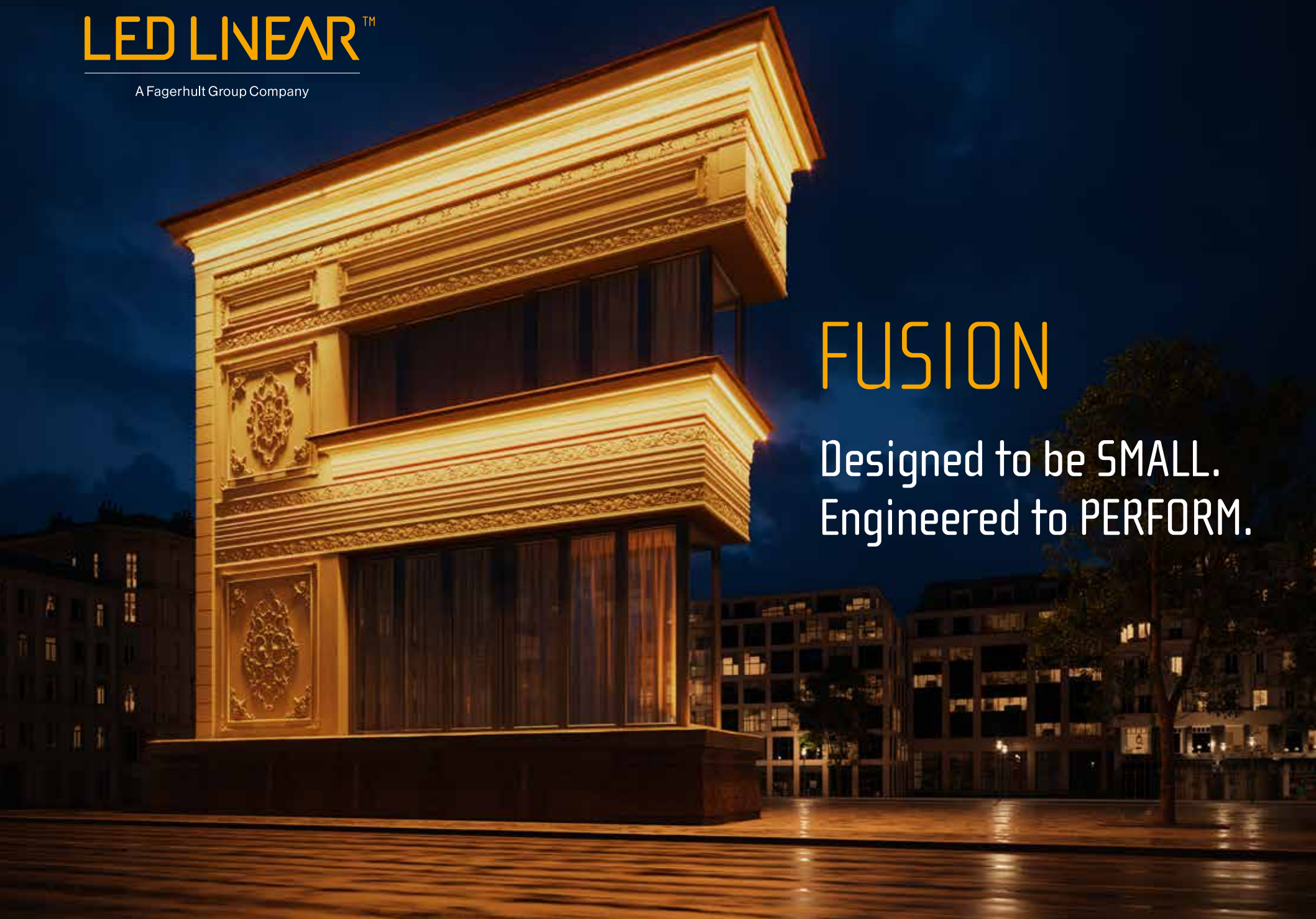
The information provided is subject to change at our discretion. If any questions arise or extra information is required, please contact TRT Lighting directly. Via bollard datasheet issue Feb 2024.

LED LINEAR™

A Fagerhult Group Company

FUSION

Designed to be SMALL.
Engineered to PERFORM.



FUSION: New Standards for Performance in Outdoor Lighting

LED Linear is driven by a singular vision:

To create and supply innovative, high-performance linear LED lighting solutions that are as sustainable as they are inspiring. With a deep commitment to quality and craftsmanship, we design and manufacture LED lighting systems for a multitude of applications while setting the standard for excellence across the industry.

Rooted in the belief that lighting should enhance visibility while delivering maximum durability, we integrate advanced optical control and cutting-edge encapsulation technology to ensure superior performance in even the most challenging environments. Our mission is to push the limits of lighting technology – creating energy efficient, reliable, and resilient lighting solutions.

LED Linear. The Difference is the Details.

FUSION combines our three core technologies for the first time – uniting robustness, precision and unmatched efficiency in one system. With its ultra-slim design and precise light control, FUSION sets a benchmark for lasting performance and visual brilliance in outdoor lighting.

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02	Intro
04	Key Features
10	Application Efficiency
14	Mounting & Accessories
16	Application Examples
24	Core Technologies
26	DarkSky

Introducing FUSION

Key Features Overview

Form Factor

FUSION delivers top-tier performance in an ultra-slim design. With a total height of just 28 mm, it blends effortlessly into architectural lines - no compromise on efficiency or control.

Robustness

Built to endure impact and extreme outdoor conditions. Rated IK10 and IP67, FUSION resists mechanical stress, dust, and water - even in harsh environments.

Long-Lasting & Sustainable

Encapsulated in high-grade PU, FUSION is resistant against UV, salt, and chemicals. Designed for decades of use with minimal degradation - and reduced environmental impact.

Optical Precision

Seven high-performance nano-optics ensure pinpoint light distribution. Optimized for visual comfort, the anti-glare eliminates spill light and supports versatile applications.

Unmatched Application Efficiency

FUSION achieves industry-leading efficiency in its class - up to 60 % higher than comparable systems. Every lumen is directed with purpose, not wasted.

The Benefits of FUSION

Form Factor

283 - 2033 mm / 0.93 - 6.67 ft

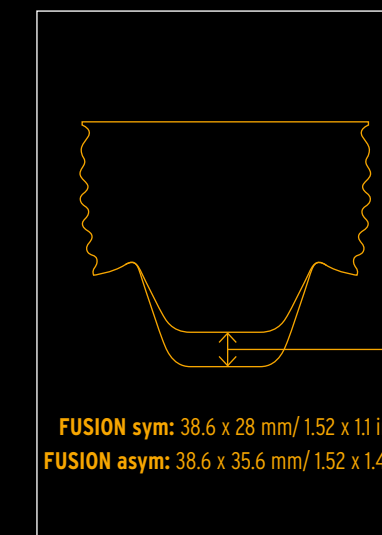
100% ACTUAL SIZE

Ultra-slim - just 28 mm high incl. anti-glare

With a width of 38.5 mm and a total height of only 28 mm including anti-glare, FUSION integrates effortlessly into minimalistic designs and tight architectural spaces.

Fits where others can't

See the white shape?
This represents common industry dimensions - highlighting how FUSION sets a new standard in compact design.



COMPETITORS: 50 x 70 mm / 2 x 2.75 in

The endcap of the asymmetrical Fusion is 5 mm deeper. This has no impact on installation height of the mounting options.

The Benefits of FUSION

Long-Lasting & Robust

Engineered for maximum resilience – in every environment. Proven through extensive internal and external testing.

Certification:        
On request: TM21, LM79, LM80 and TM82



IP67 Protection



Backed by over 20 years of polyurethane encapsulation expertise, FUSION ensures long-lasting IP67 protection - essential for installations exposed to heavy rain, high humidity and urban chemical exposure.



Additionally to the internal IP67 test in our climate chambers the ingress protection against water is externally tested as part of the CB-report.

CB-Report

Standard:
IEC 60598-2-1:2020;
IEC 60598-1:2020;
IEC 62031:2018

Another external saltwater test (EN IEC 60068-2-52:2018) underlines the durability for coastal regions.



Impact-Resistant IK 10



Its robust, powder-coated aluminum body combined with polyurethane achieves IK10 protection - tested to withstand a 5 kg object falling from a height of 40 cm (EN 62262:2002/A1:2021). A crucial feature for public area installations.



FUSION installed into the inground channel is approved for drive and walk-over situations and tested externally according to EN 60598-2-13: 2006 + A11: 2021.



UV & Heat Resistant



FUSION has outstanding UV resistance, tested according to DIN ISO 4892-2 with doses of UV-A and UV-B radiation equivalent to ten years of direct sunlight exposure.



FUSION does not show any discoloration or changes in material properties!



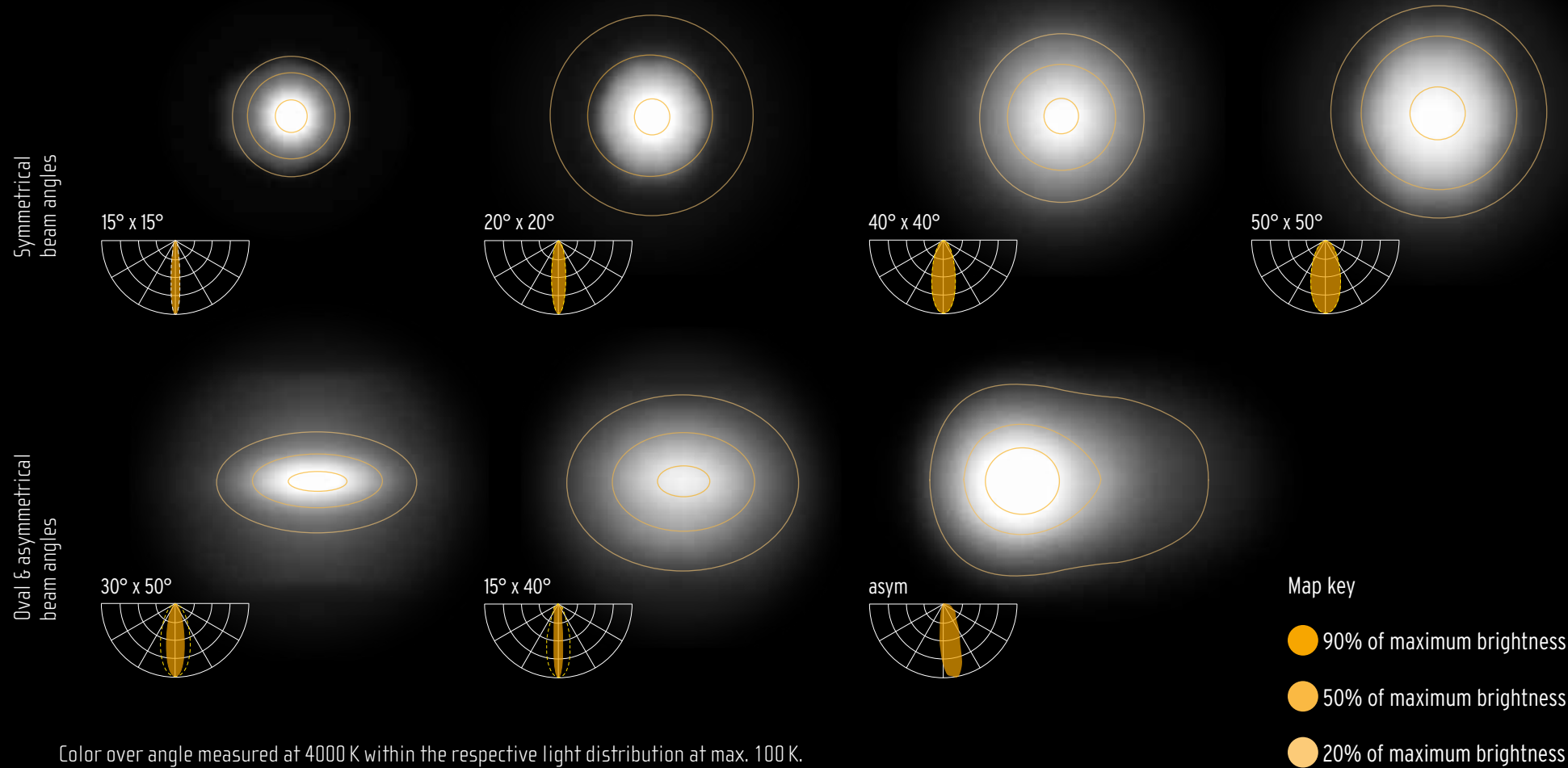
Minimal Use of Materials

For maximum sustainability. Through smart design and miniaturized optics, we use only as much material as truly needed – no more, no less. This reduces waste and makes our solution exceptionally eco-friendly.

99% of all components of FUSION are sourced in Europe to make sure that the quality and the working conditions are controlled and to reduce the CO₂ emissions from transportation.

The Benefits of FUSION

Optical Precision



Beams shaped precisely by every ray.

Our optics deliver precise light distribution tailored for a wide range of applications.

The simulations illustrate various beam angles - from symmetrical, elliptical to asymmetrical optics - showcasing the versatility of our lighting solutions. Using advanced simulations and high-precision lens manufacturing, we ensure uniformity, efficiency, and maximum control over the light pattern.

The Benefits of FUSION

Unmatched Application Efficiency

FUSION with integrated anti-glare technology takes performance to the next level.

Unlike conventional solutions, our anti-glare system maximizes visual comfort without compromising output. Conventional products typically sacrifice a significant amount of light when anti-glare is added - our engineering avoids this trade-off entirely.

60% more efficiency*

120 lm/w

*compared to similar competitor products with additional anti-glare based on: 15W@4000K

Optic	UGR longitudinal	UGR lateral
15° x 15°	13	11
20° x 20°	16	15
40° x 40°	18	16
50° x 50°	20	19
15° x 40°	19	13
30° x 50°	21	14

Integrated anti-glare

This is not just glare control.
This is not just an anti-glare.
It's comfort without compromise.



Why is it relevant?

Unmatched Application Efficiency



The **Application efficiency** measures the amount of light that really serves the application and neglects undesirable spill light that causes light pollution, especially in outdoor application scenarios.

$$\text{Application Efficiency} = \frac{\text{usable light flux in target area}}{\text{total lumen flux}}$$

Luminaire Efficiency

The luminaire efficiency measures the ratio of total lumen flux and the electrical power consumption. For technical illumination scenarios the efficiency does not give any clue on the amount of light that really benefits the desired application.

Application Efficiency

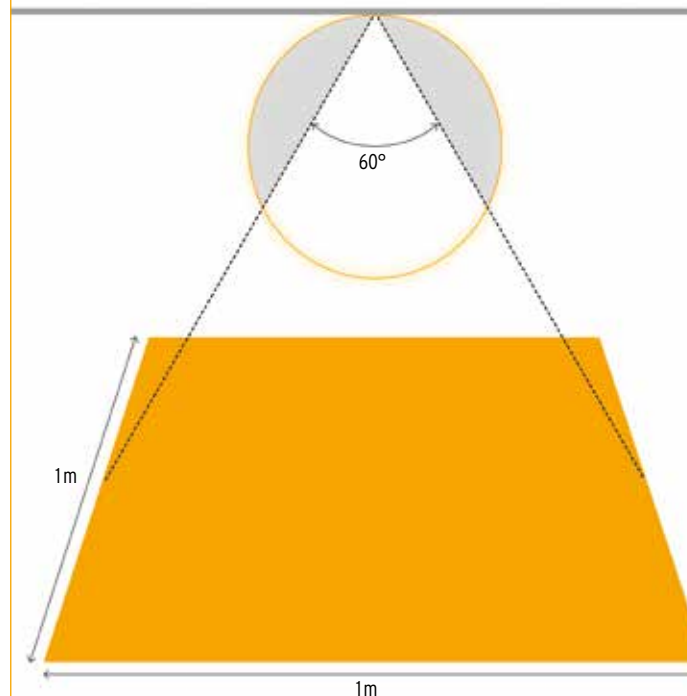
FUSION's application efficiency is unmatched, because the optical system combines a sophisticated glare control and ultra-precise nano-optics. The glare control eliminates straylight while the precision of the nano optics technology enables for excellent application match.

Difference between Luminaire Efficiency and Application Efficiency

See the difference

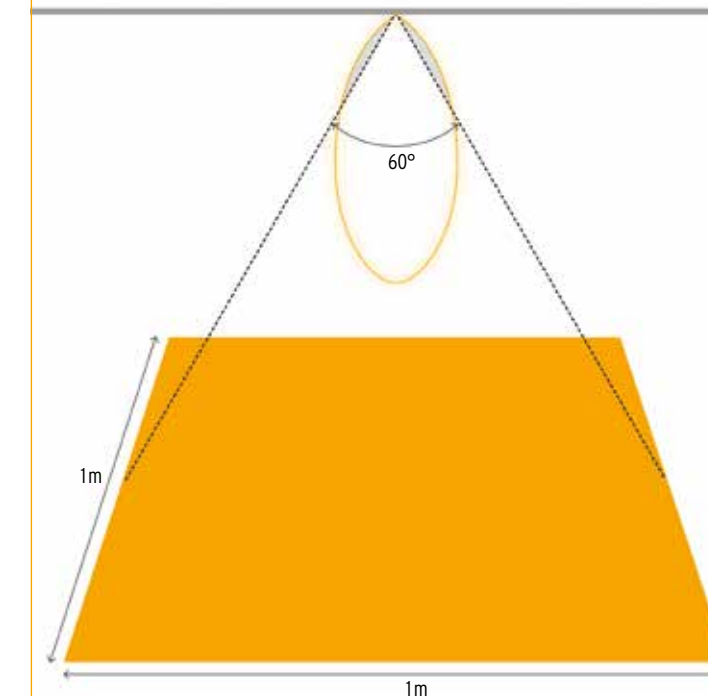
Opal light distribution

Luminaire efficiency	120 lm/W
Application efficiency	60% of lumen flux
Undirected spill light	40% of lumen flux



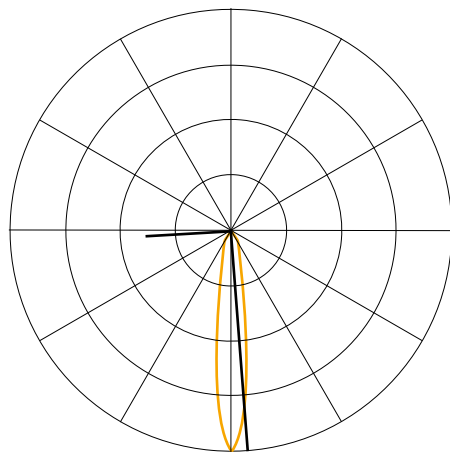
Targeted light distribution

Luminaire efficiency	120 lm/W
Application efficiency	90% of lumen flux
Undirected spill light	10% of lumen flux



Visible Results

Application Efficiency in Action



Wall Grazing

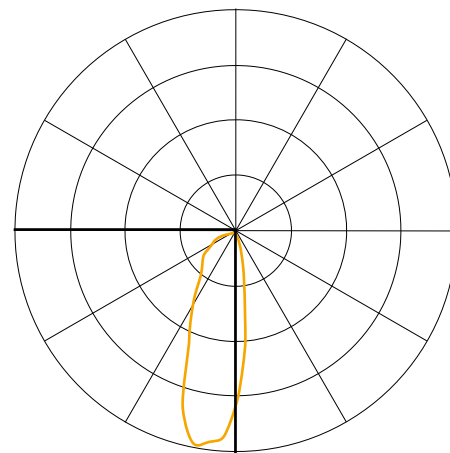
LDC 15° x 15°

Cut-off angle 90°
Total lumen flux 100 %
Spill light 19.3 %

Application efficiency 80.7 %

With a very precise beam angle of 15° x 15° and mounting angle of 5°, more than 80 % of the total lumen flux serves the application.

This helps to reduce the power level, because less lumens are wasted and contribute to light pollution. The light pollution is significantly reduced by choosing products with a high application efficiency combined with the right mounting accessory and, if needed, glare control tools.



Wall Washing

LDC asymmetric

Cut-off angle 90°
Total lumen flux 100 %
Spill light 13.3 %

Application efficiency 86.7 %

Optimized for wall or floor washing applications, the asymmetric light distribution with 0° tilt brings almost 90 % of the total lumen flux to the application surface.

An outstanding wall wash result is achieved with a 15° tilted angle and a distance of 1/3 of the wall height, using the C15 surface clip or the adjustable wall mount arm. The integrated glare control reduces spill light to a minimum. In combination with the precise optic the FUSION highlights architectural features by adding an outstanding contrast to the lighting scene utilizing more than 85% of the lumen flux.



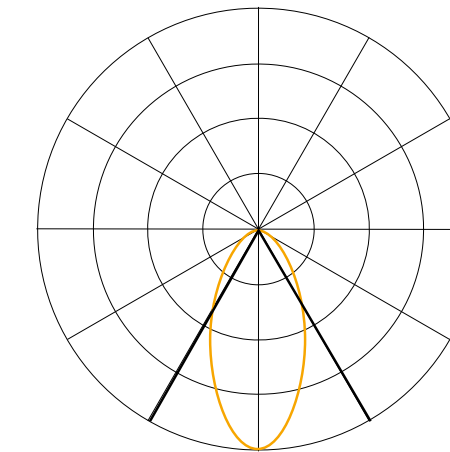
General Lighting

LDC 50° x 50°

Cut-off angle 60°
Total lumen flux 100 %
Spill light 8.2 %

Application efficiency 91.8 %

For general lighting applications the wide 50° x 50° optics combined with an integrated glare control directs more than 90 % of the lumen output to the surfaces to be illuminated while offering an outstanding visual comfort with an UGR expected from office lighting standards.



Adapted to every Space

FUSION in Practice

Designed to be small. Engineered to perform. FUSION adapts effortlessly to diverse architectural conditions with multiple mounting solutions. The tiltable surface clips allow precise alignment in 5° steps, with three selectable angle ranges. For wall installations, our wallmount arm is available in four different distances (40, 100, 200 or 300 mm) with 120° tilting to each side, to position the light exactly as required.

FUSION can also be seamlessly integrated into the architecture using an inground frame. For public areas the mounting lock secures for vandalism and heavy weather conditions.

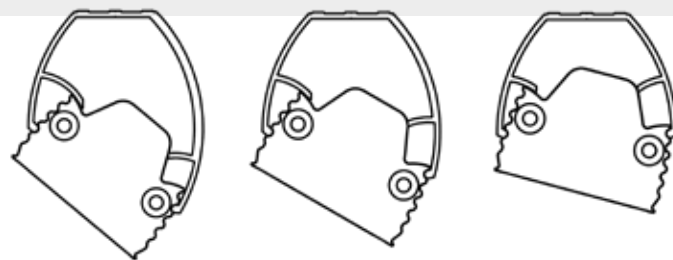
Mounting Options

Surface clips tiltable in 5° steps

C30: 30-45°

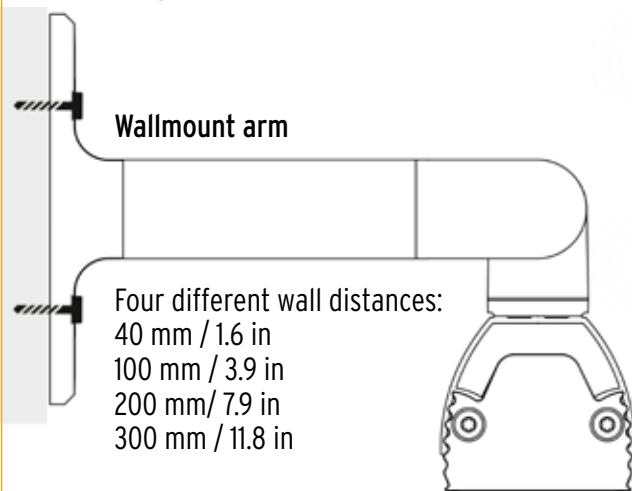
C15: 15-30°

C00: 0-15°

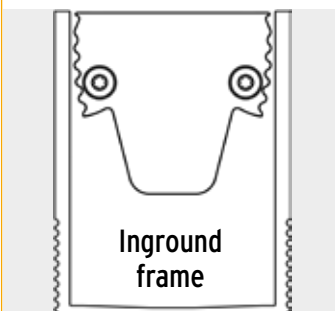


Wallmount arm

Four different wall distances:
40 mm / 1.6 in
100 mm / 3.9 in
200 mm / 7.9 in
300 mm / 11.8 in



Inground frame



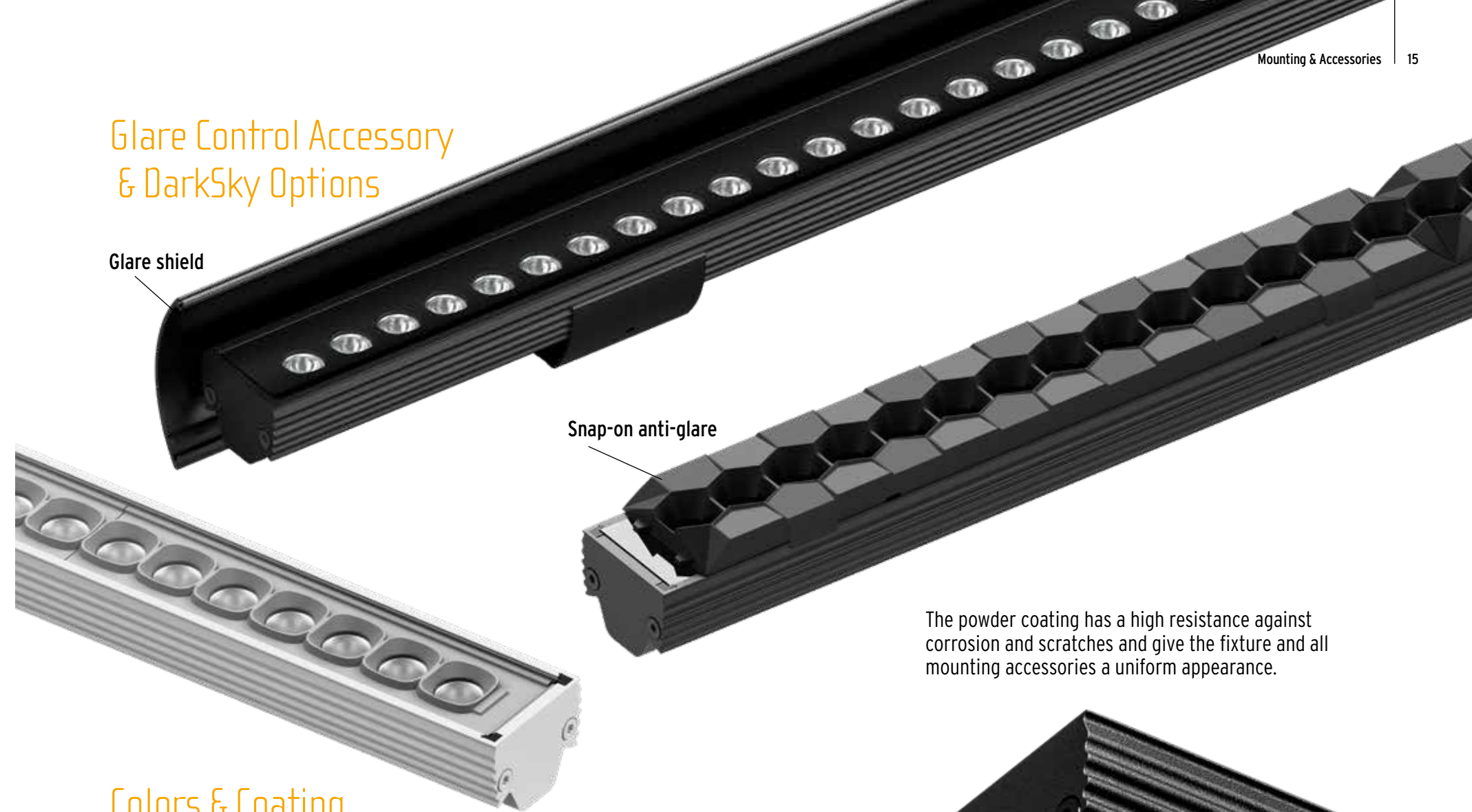
Mounting lock 0°



Glare Control Accessory & DarkSky Options

Glare shield

Snap-on anti-glare



The powder coating has a high resistance against corrosion and scratches and give the fixture and all mounting accessories a uniform appearance.

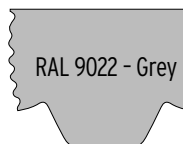
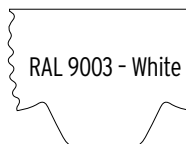
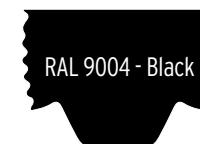
Colors & Coating

FUSION offers three different standard colors black, grey and white. For special demands also custom colors are available on request, to match perfectly into the application.

RAL 9004 - Black

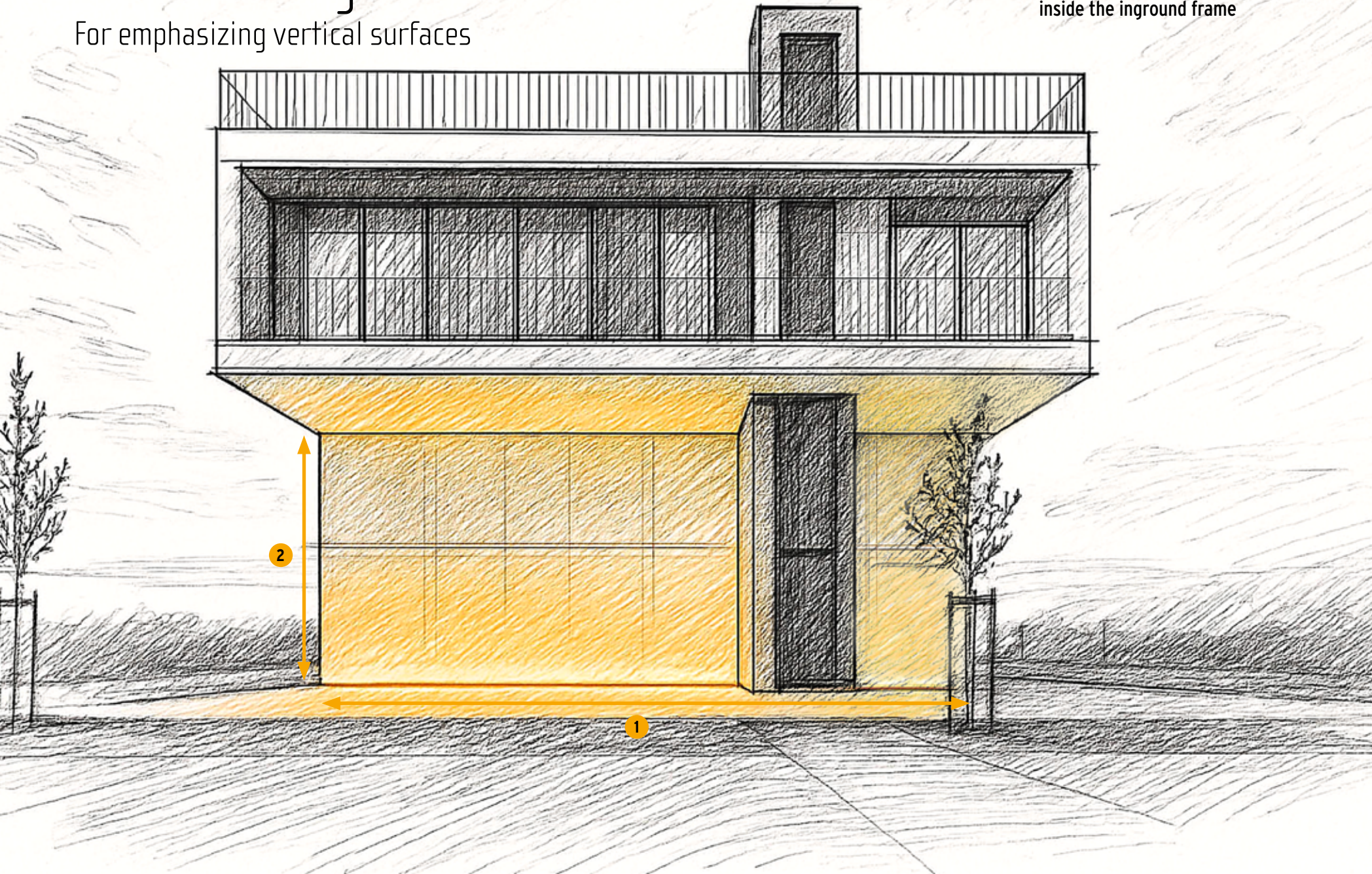
RAL 9003 - White

RAL 9022 - Grey



Wall Grazing

For emphasizing vertical surfaces



1 Width of the wall 10 m

2 Five fixtures each 2 m length inside the inground frame

60.8 mm / 2.4 in

46.2 mm / 1.81 in

Inground frame

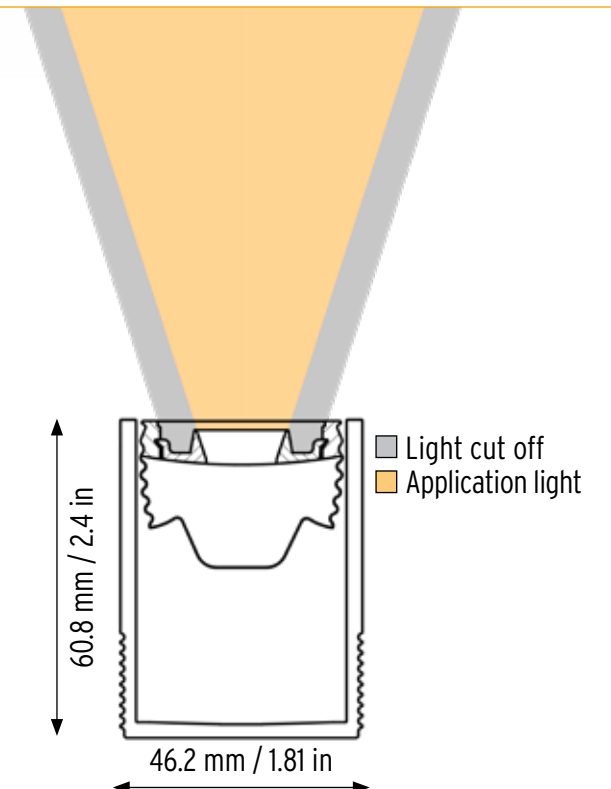
Available in luminaire length or as line installation. Mechanical connection possible. Cabling inside the frame. Drainage is needed.

Light distribution: 15°x40°
Power level: 25 W/m with 1662 lm/m
CCT: 2200 K
CRI: 86

Why FUSION for Wall Grazing:

FUSION is purpose-built for precise wall grazing. Its ultra-slim 38.6 mm profile and integrated glare control ensure discreet integration with clean vertical illumination. With the easy to install inground frame FUSION offers a solution if the facades are listed or if wall mounting is not possible. With a IK10 rating and a drive over release, FUSION as inground-version can be used as walk over fixture.

With high performance optics and up to 16 m reach at 3000 K, FUSION dramatically enhances textures, lines, and architectural elements. The 15° x 40° oval optic enables a narrow light distribution along the wall, maximizing illumination while minimizing the number of fixtures required - making it both cost-effective and sustainable.



NEW COLORS

- RAL 9003 - White
- RAL 9022 - Grey
- RAL 9004 - Black

Accent Lighting

For dramatic façade effects

1 Façade height 6 m

2 Column width 1 m
FUSION length 783 mm

98.4 mm / 3.87 in



Adjustable arm L100

Distance: 100 mm distance, tilted 10°
Four different distances from 40-300mm.
Allows tilting by 120° in any direction.

Light distribution: 15° x 15°

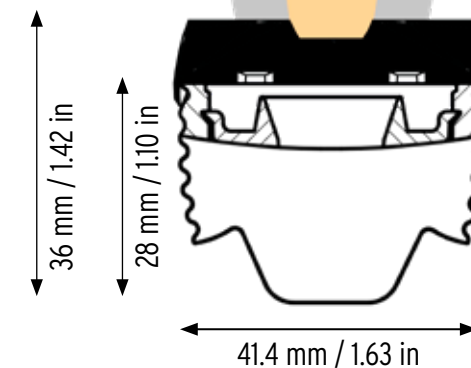
Power level: 25 W/m with 1178 lm/m

CCT: 2700K

CRI: 95



Light cut off
Application light



Snap-on anti-glare

Easy mounting by clicking on the luminaire.
Delivered in 250 mm pieces only in black.

Why FUSION for Accent Lighting:

FUSION brings depth and drama to façades by precisely highlighting architectural details. Its compact design (28 x 38.5 mm H x W) allows for subtle placement, while narrow beam optics create sharp contrasts that emphasize columns, arches, and edges. Ideal for adding structure and rhythm to vertical surfaces, FUSION transforms buildings into visual statements – even from a distance.

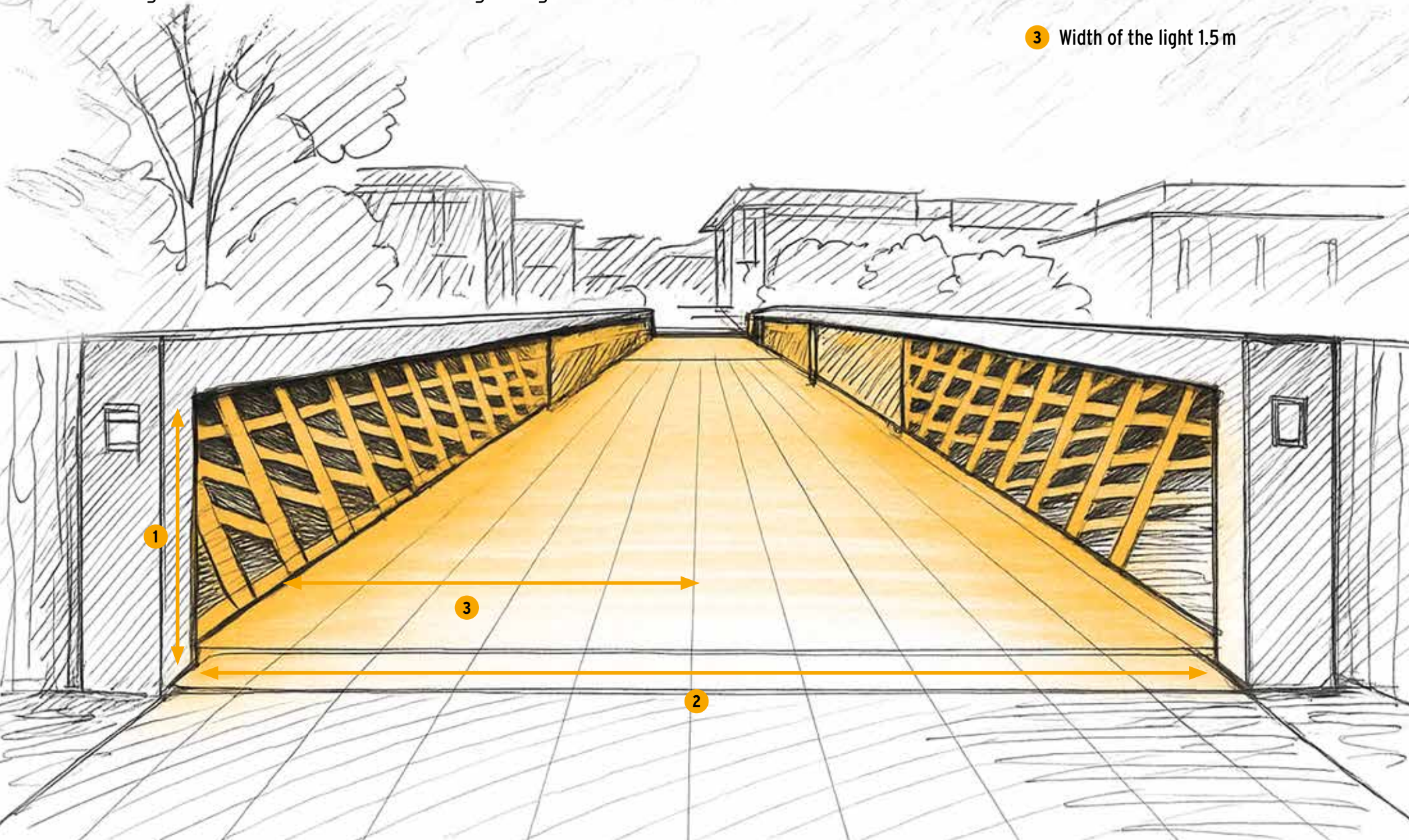
The 15° x 15° optic enables a sharp separation between illuminated and non-illuminated surfaces – ideal for precise accenting without spill light. Additionally, glare control accessories, such as snap-on anti-glare, eliminate unwanted spill light entirely to enhance dramatic contrast between light and shadow.

NEW COLORS

- RAL 9003 - White
- RAL 9022 - Grey
- RAL 9004 - Black

Floor Washing

For night-sensitive orientation lighting



1 Height of the balustrade 1.2 m

2 Width of the bridge 3 m

3 Width of the light 1.5 m

Why FUSION for Floor Washing:

FUSION asymmetric enables the perfect light distribution to illuminate even and homogeneous a floor or a wall. In combination with the 15° tilt with the C15 surface clip FUSION has a perfect wall wash light distribution to highlight floors and walls to create a quiet and safe environment.

With the asymmetric optic inside the small form factor of 33 x 38.5 mm, FUSION can be used for orientation lighting in public spaces. The integrated anti-glare reduces the spill light to the opposite direction to increase the application efficiency to a maximum.



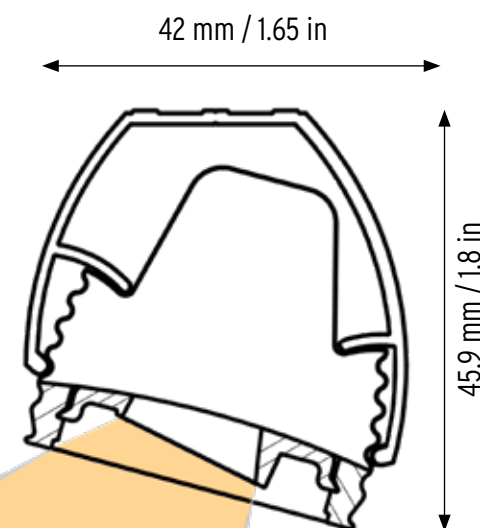
Light distribution: asymmetric
Power level: 15W/m with 1070 lm/m
CCT: 2200K
CRI: 86



15° aluminium mounting clip

5cm long, surface mounting brackets
 15° tilt for optimized floor wash effect
 0° and 30° tilted clip also available

■ Light cut off
 ■ Application light



NEW COLORS

□ RAL 9003 - White
 ■ RAL 9022 - Grey
 ■ RAL 9004 - Black

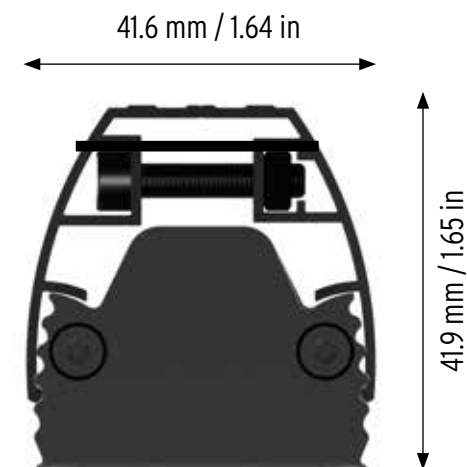
General Lighting

For seamless flow through transit spaces



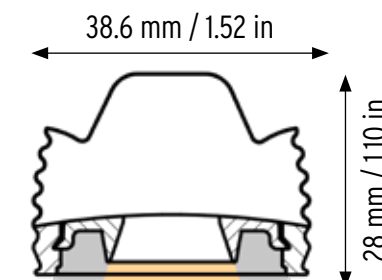
1 Ceiling height 3 m

2 6 m width
Lux-level floor: 900 lx



Mounting lock 0°

5 cm long, surface mounting brackets.
Product is tiltable in 5° steps up to 15°. 15° and 30° tilted clips also available.



With 50 x 50 optics:
UGR longitudinal = 20
UGR lateral = 19

IK10 rated
IP67 safe
Vandal-proof

Light cut off
Application light



Light distribution: 50° x 50°
Power level: 40 W/m with 2784 lm/m
CCT: 4000 K
CRI: 95

Why FUSION for General Lighting:

In transit zones like hallways, train stations or others, FUSION ensures uniform brightness, safe orientation and glare-free visibility. The light source, electronics and optical system are 100 % separated from the environment through our full encapsulation which ensures that FUSION can be cleaned easily and will not be damaged or affected through dust, dirt or water (IP67, IK10).

With tailored optics, FUSION delivers seamless light distribution across wide surfaces – minimizing shadows and maximize guiding flow. With the integrated anti-glare FUSION offers 60 % more application efficiency which helps to reduce the energy consumption for application where light is used 24/7 in demanding public environments.

NEW COLORS

□ RAL 9003 - White
■ RAL 9022 - Grey
■ RAL 9004 - Black

Fusion of our Core Technologies

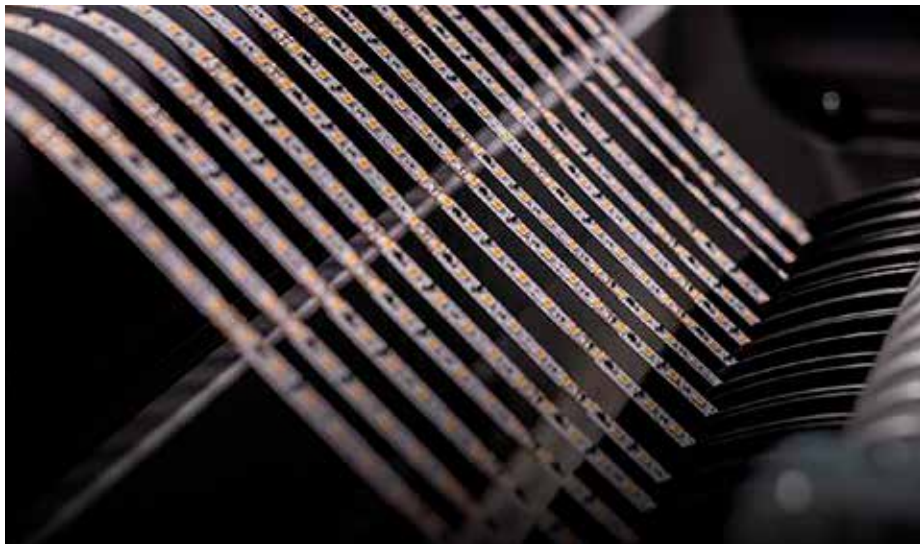
Reel-2-Reel Production

Efficient thermal management enables a longer lifetime of the LEDs.

Our proprietary substrate draws heat directly away from the LED source into high-quality aluminum profiles. This prevents heat build-up inside the luminaire. The result: reduced aging, improved color and light stability and significantly extended lifetime.

R2R in detail

- Fully automated reel-to-reel production with in-line inspection.
- Light engine produced seamlessly “all of a piece” without any breaking points or inter-board connectors.
- Outstanding heat management due to minimal thermal resistance between heat source (LED) and heat sink (Alu profile).
- LED $T_j < 80^\circ\text{C}$. Temperature has the highest influence for aging of the chips. Our light engines never exceed 80°C .
- LED chips are carefully qualified and selected for excellent color consistency throughout lifetime within less than 3-Step Mc Adams.
- Integrated circuits for active current regulation (IC's) guarantee stable lumen maintenance within the maximum specified run length.



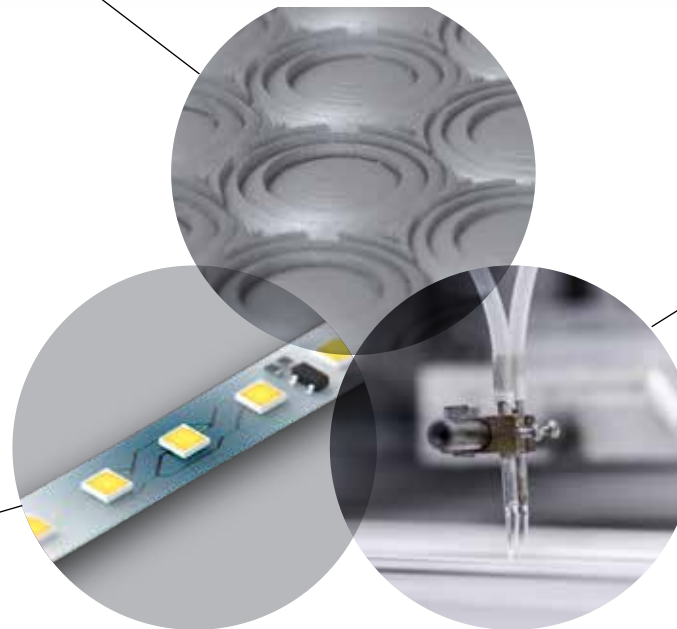
Nano Optics – NanoRay

Precision on a microscopic scale.

Our custom-developed nano optics enable exceptionally accurate light control – even in extremely compact formats. Designed specifically to meet the demands of architectural miniaturization, they ensure maximum efficiency and precision.

Nano Optic in detail

- NanoOptical System engineered and produced in Europe.
- Light engine = chip scale LED package with $1 \times 1 \text{ mm}^2$.
- CSP Chip enables minimal distance between light source and optical structure.
- More than 1 Mio. Nano lenses per optical element.
- One meter of the nano optical system weights just 50 g equivalent to one single glass or silicon TIR-lens.
- As result: the light distributions represent perfect gaussian distributions with the desired full widths at half maximum.



PU Encapsulation

Engineered for lasting reliability.

Our specially formulated 2K polyurethane offers complete protection against UV exposure, urban atmosphere/gases, and extreme environmental conditions. The crystal-clear encapsulation maintains optical performance and ensures long-term durability – even in the harshest settings.

PU in detail

- Proprietary polyurethane formula made for LED technology developed together with our German partner.
- Compared to other sealing materials such as silicone or epoxy, PU has a significantly higher resistance to water.
- Superior test performance against environmental impact:
 - UV resistance
 - Corrosive gases like Sulfur, Chlorines or Salt mist
 - Production & Material 100% in Europe
- Fully automated and reliable encapsulation process in house.
- 100% visual and functional inspection of every fixture – not only FUSION.

Light Pollution is a Growing Challenge



The 5 principles of DarkSky lighting

Useful

1

Use light only if it is needed

All light should have a clear purpose. Consider how the use of light will impact the area, including wildlife and their habitats.

Direct light so it falls only where it is needed

Use shielding and careful aiming to target the direction of the light beam so that it points downwards and does not spill beyond where it is needed.

2

Targeted

Low level

3

Light should be no brighter than necessary

Use the lowest light level required. Be mindful of surface conditions, as some surfaces reflect more light into the night sky than intended.

4

Controlled

Use light only when it is needed

Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.

Warm-colored

5

Use warmer color lights where possible

Limit the amount of shorter wavelength (blueish) light to the least amount needed.

For millennia, the natural rhythm of day and night has shaped life on Earth. Darkness is more than just the absence of light - it is essential for ecosystems, human well-being, and climate impact. But with increasing urbanization and artificial lighting, the natural night is disappearing. As cities grow brighter, uncontrolled lighting spills into the sky, disrupts wildlife, and leads to excessive energy consumption. At the same time, well-designed lighting can enhance safety, create atmosphere, and improve quality of life - if used responsibly.

At LED Linear™, we actively combat light pollution by adhering to DarkSky International Standards, ensuring that our lighting solutions contribute to a more sustainable and well-balanced nighttime environment.

Achieving this balance requires a new approach:

Application efficiency means delivering light only where it is needed. By reducing glare, spill light, and upward emissions, our solutions not only support Dark Sky principles but also ensure maximum usable light.

The examples shown here illustrate how precise optics and glare control achieve high efficiency in real-world applications - turning theory into measurable results.



Glare-shield

Completely cut-off to one side.

Snap-on anti-glare

Deeper light source to cut off spill light. For symmetrical distributions only.

Integrated glare control Highest application efficiency.

Example: FUSION with 15° x 15° for wall grazing

COO Surface clip **5° tilted**

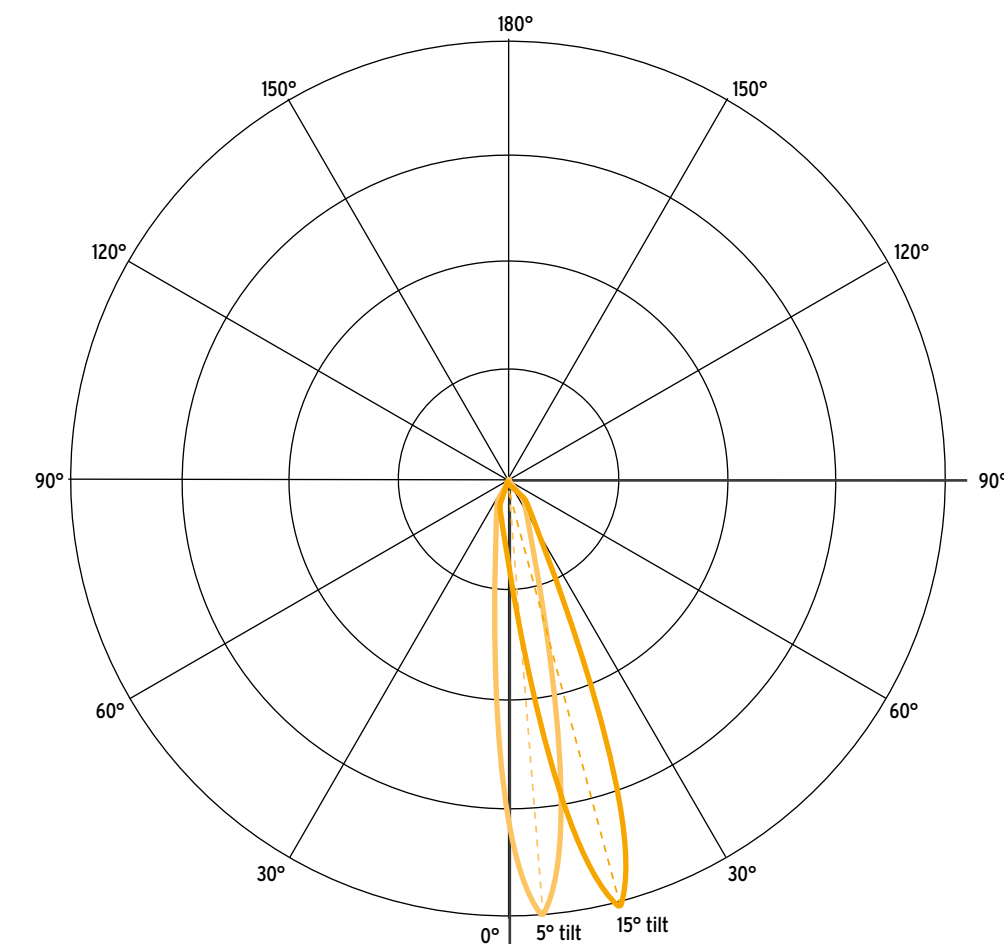
Application efficiency 80.7% of lumen flux
Undirected spill light 19.3% of lumen flux

COO Surface clip **15° tilted**

Application efficiency 98.7% of lumen flux
Undirected spill light 1.3% of lumen flux

With a difference of 10° tilt the undirected spill light decreases down to **less than 2% of the total lumen flux.**

The way of installation makes the difference between less light pollution and no light pollution.





LED LINEAR™

A Fagerhult Group Company

LED Linear in Virtual Reality



Check out our FUSION VR Experience

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Art.-# 3300058 · Edition 10/2025
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Lightable

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