

Dark Skies Assessment

Atlas Planning

41 Beach Road
Emsworth
PO10 7HR



Version	Revision	Date	Author	Reviewer	Project Manager
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Executive Summary

Executive Summary

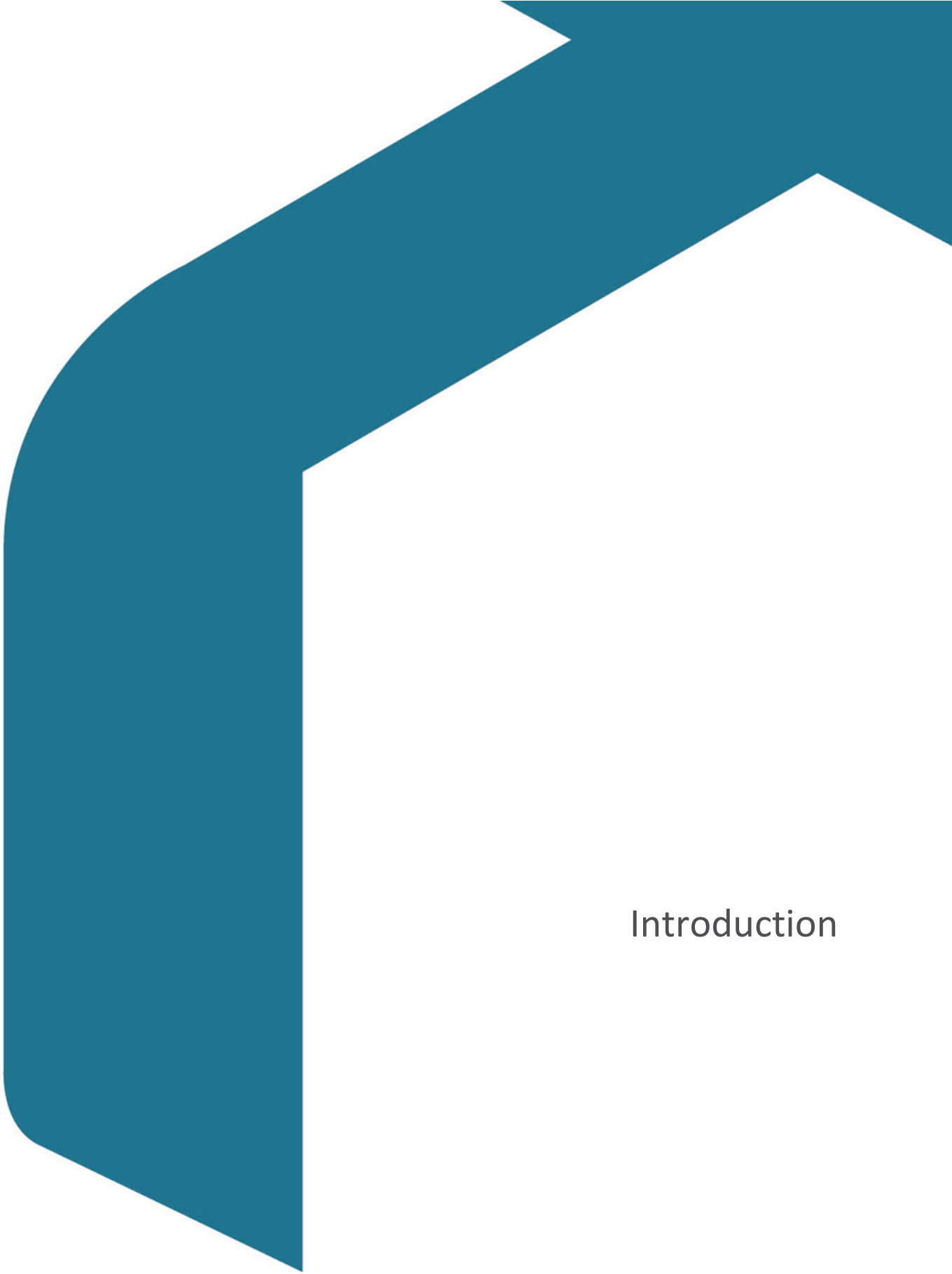
This Dark Skies Assessment has been undertaken by SRE in support of the revised planning application of the development at 41 Beach Road, Emsworth (Proposed Development). The residential scheme will meet relevant industry performance standards, including guidelines set out by ILE for avoidance of obtrusive light, British Standards for external lighting and the South Downs National Park Dark Night Skies policy.

The proposed lights to be installed are low level with directional LEDs that are downward facing, bollard lights on the driveway/pathway resulting in a minimal upward light spill.

The risk of the Proposed Development resulting in significant exceedances of 1lux (average) and 2lux (maximum) levels, along the site boundaries is considered to be low. The level of 'sky-glow' ULR (Upward Light Ratio) from the light fittings associated with the Proposed Development has been predicted as 0% and as such the Proposed Development will not have a significant effect on the surrounding landscape.

Due to the nature and scale of the Proposed Development, it is anticipated that there will be no increase in night light generated at the site.

The Proposed Development will not generate light pollution for the local area and adjacent buildings and is in accordance with the Chichester Harbour Management Plan, the Adopted Joint Chichester Harbour Area of Outstanding Natural Beauty Supplementary Planning Document, the Dark Night Skies requirements, ILE for avoidance of obtrusive light and BS5489-1:2013.



Introduction

1.0 Introduction

This Light Pollution Assessment has been undertaken by SRE for Atlas Planning (the Client) on behalf of the end client in support of the revised planning application of the new development at 41 Beach Road, Emsworth (Proposed Development).

The 3D models are based on the latest information and initial scheme drawings provided by OB Architecture. This is the worst case scenario as the revised scheme is smaller than the original.

Taking the proposed site layout and details of the indicative external light fittings into account, the 3D model has been completed using DIALux software to model and calculate the predicted light levels. This report describes the modelling exercise undertaken and lists all assumptions and approximations that have had to be made as part of the assessment.

For the purposes of this assessment, indicative external lighting positions and products have been used and although these will be finalised at the detailed design this assessment is to be used as guidance for their required performance specification.



Figure 1 – 3D representation of the updated Proposed Development, OB Architecture

In order to assess the potential biodiversity impacts associated with the fixed exterior lighting installation, the following has been undertaken:

- review of local and national policy and guidance;
- review of the site and surrounding area using aerial photography, OS mapping and site visit;
- identification of light-sensitive biodiversity, ecological receptors;
- detailed 3D modelling of the Assessed Scheme of Lighting;
- calculation of light spill (vertical illuminance – lux) at biodiversity, ecological receptors and surrounding residential buildings;
- comparison of the predicted light spill levels against the proposed criteria;
- production of light spill contours (horizontal illuminance – lux);
- calculation of 'sky-glow' (ULR); and
- comparison of the predicted ULR against local and national guideline values.

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Design Standards

2.0 Design Standards

The key national, regional, and local policy documents, in addition to technical requirements, that relate to the Proposed Development are summarised in this section and have been taken into account in the production of this Light Pollutions Assessment.

2.1 Design Standards

The proposed lighting will need to be designed in accordance with current versions of relevant European and British Standards, in particular:

- ILE Institution of Lighting Engineers Guidance Notes for the Reduction of Obtrusive Light (2011).
- BS 5489E1:2013: Code of Practice for the Design of Road Lighting. Lighting of Roads and Public Amenity Areas.
- BS EN 12464E2:2007: Lighting of Workplaces – Part 2: Outdoor Workplaces (building mounted fittings, car parking, entrances, and walkways).
- Lighting Guide LG6: The Outdoor Environment (1992); and
- Chichester Harbour Management Plan 2019 - 2024;
- Chichester Harbour Area of Outstanding Natural Beauty, Joint Supplementary Planning Document, Adopted 19 July 2017
- Emsworth Neighbourhood Plan 2019 – 2036, April 2019

2.2 National Policy

The National Planning Policy Framework (NPPF), February 2019 principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policymaking. The NPPF broadly retains the principles of PPS 23: Planning and Pollution Control and with regard to light pollution, paragraph 180 states:

“180. 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. limits the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

The National Planning Practice Guidance web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 and updated for lighting on the 1st of November 2019 to support the National Planning Policy Framework and make it more accessible. It states that “for maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time”.

In light of this guidance, the assessment has considered the following implications of the proposed lighting design:

2.3 Chichester Harbour Management Plan 2019 - 2024 Third Review

Local Plan Policy PP09 Dark Skies states:

“The Conservancy is likely to support lighting proposals that reduce the adverse impact of artificial light in Chichester Harbour. The Institution of Lighting Professionals published best practice guidance in 2011.

Lighting proposals that are adjacent to or impact on areas of nature conservation will only be supported in exceptional circumstances. A statement outlining where the light will shine; when the light will shine; how much light will shine; the possible ecological impact and a series of mitigation measures, if appropriate, should accompany a planning application.

The Conservancy is unlikely to object to the lighting element of applications for prior approval or planning permission within and adjacent to the AONB, where the application includes evidence to demonstrate the following:

The lighting proposals are the minimum needed for security and/or working purposes; and

- *Any obtrusive light from glare or light trespass is an acceptable level; and*
- *Light beams will not be pointed out of windows; and*
- *Security lights are fitted with passive infra-red detectors (PIRs) and/or timing devices so as to minimise nuisance to neighbours and are set so that they are not triggered by traffic or pedestrians passing outside the property or premises; and*
- *Overall compliance with the published best practice guidance from the Institution of Lighting Professionals.*

The Conservancy will object to any proposed development that includes smooth, reflective building materials, including large horizontal expanses of glass, particularly near the edge of the water, as this has potential to change natural light and to create polarised light pollution affecting wildlife.

Reasoned justification

The night sky is part of the scenic beauty of the AONB and should be conserved and enhanced. Light pollution is the light that is wasted upwards and reflects off the atmosphere, causing a visible night time blanket. According to the Campaign to Protect Rural England, Chichester Harbour has the third highest level of light pollution across all of England's

34 AONBs (as of 2016). Light pollution is a problem for various reasons, including energy wastage, detrimental effects on human health and psychology, erosion of tranquillity and disruption of ecosystems.

Obtrusive light is generally a consequence of poorly designed or insensitive lighting schemes. The three main problems associated with obtrusive light are:

- *Sky glow - the orange glow seen around urban areas caused by a scattering of artificial light by dust particles and water droplets in the sky;*
- *Glare - the uncomfortable brightness of a light source when viewed against a darker background; and*
- *Light trespass - light spilling beyond the boundary of the property on which a light is located.*

Each of the three types presents very different problems for the general public and for the environment as a whole. Sky glow is the result of wasteful and ill-directed lighting and reduces the ability of people to see the natural night sky. This is a problem in rural locations. Artificial lighting can destroy local character by introducing a suburban feel into rural areas.

Glare and insensitive lighting can have serious implications for motorists who may become distracted or blinded by glaring lights spilling out on to the highway. Bright or inappropriate lighting in the countryside can also have severe ecological implications.

Obtrusive light in rural locations can affect the natural diurnal rhythms amongst a wide range of animals and plants. Light trespass is a common problem and can intrude on the residential amenity in both urban and rural settings causing stress and anxiety for people affected. In addition to these specific problems, obtrusive light represents a waste of energy, resources and money.

The Institution of Lighting Professionals has published guidance on acceptable levels of illumination for specific environmental zones, which relate broadly to the rural areas. All new developments should be designed so as to adhere to these best practice guidelines."

2.4 Chichester Harbour Area of Outstanding Natural Beauty, Joint Supplementary Planning Document (Adopted 19 July 2017)

Local Plan Policy 30. Dark Skies states:

“Applicants are encouraged to develop lighting proposals that reduce the adverse impact of artificial light in Chichester Harbour. Smooth, reflective building materials, including large horizontal expanses of glass, particularly near the Harbour, have the potential to change natural light and to create polarised light pollution affecting wildlife.

A statement outlining where the light will shine; when the light will shine; how much light will shine; the possible ecological impact and a series of mitigation measures, if appropriate, should accompany a planning application.

Applicants are encouraged to include evidence to demonstrate the following:

- The lighting proposals are the minimum needed for security and/or working purposes.*
- Any obtrusive light from glare or light trespass is an acceptable level.*
- Light beams will not be pointed out of windows.*
- Security lights are fitted with passive infra-red detectors (PIRs) and/or timing devices so as to minimise nuisance to neighbours and are set so that they are not triggered by traffic or pedestrians passing outside the property or premises.*
- Overall compliance with the published best practice guidance from the Institution of Lighting Professionals”*

2.5 Emsworth Neighbourhood Plan 2019 – 2036

Local Plan Policy D7 states:

Mitigate Light Pollution

“a) In any new development, light pollution shall be minimised by use of the lowest light levels compatible with safety, fittings that emit no upward light, low reflectance ground surfaces and use of spillover lighting where possible.

b) This policy will be particularly important on sites on or near the Emsworth waterfront and in areas adjacent to open countryside.

c) Lamp columns and other street furniture related to lighting shall be designed to respond in an appropriate manner to the heritage and conservation context of Emsworth.

d) The use of movement responsive lighting will be encouraged to minimise any unnecessary light pollution....

...Rural access and wildlife

14/ There is a need to minimise the visual impact of new buildings and the physical impact of increased access. Therefore, the use of permeable surfaces such as bound gravel and porous rolled surfaces is encouraged where appropriate....

...Lighting and safety

50/ Consideration should be given to the need for lighting, and where it is deemed essential, efforts should be made to seek to minimise its impact in the landscape through choice of light source and control of light spillage. Lighting should only be installed in areas of need, such as alongside pedestrian routes in and around the built areas. Areas adjacent to open spaces and undeveloped areas should be left unlit to avoid light pollution.

51/ All developments and improvements in Emsworth should be designed to ensure that safety and security are built in. Designs should ensure people feel safe during hours of darkness through unobtrusive

path lighting and active frontages (i.e. doors and windows facing onto the street) and safe, permeable routes where appropriate.”

2.6 Obtrusive Light

To safeguard and enhance the night-time environment, it is necessary to control obtrusive light (light pollution), which can present physiological and ecological problems to surroundings and people.

Light intensity and distribution need to be carefully considered to ensure that direct upward light is minimised, and light distribution cut offs from luminaries do not result in severe lighting contrast on light receiving surfaces such as floors and walls.

Luminaries, lamps, optics, and equipment shall be specified and located to minimise any direct upward light component in order to reduce light pollution. In addition, light trespass and spill light will need to be minimised through design.

Light Trespass is a form of light pollution that occurs when light spills beyond the boundary of a development. This most commonly causes a nuisance to neighbouring residential windows although it can also have detrimental effects on ecosystems.

Light Trespass is assessed using vertical illuminance in lux (Ev) measured flat on the glazing at the centre of the potentially effected neighbouring residential window or surface of an ecological receptor.

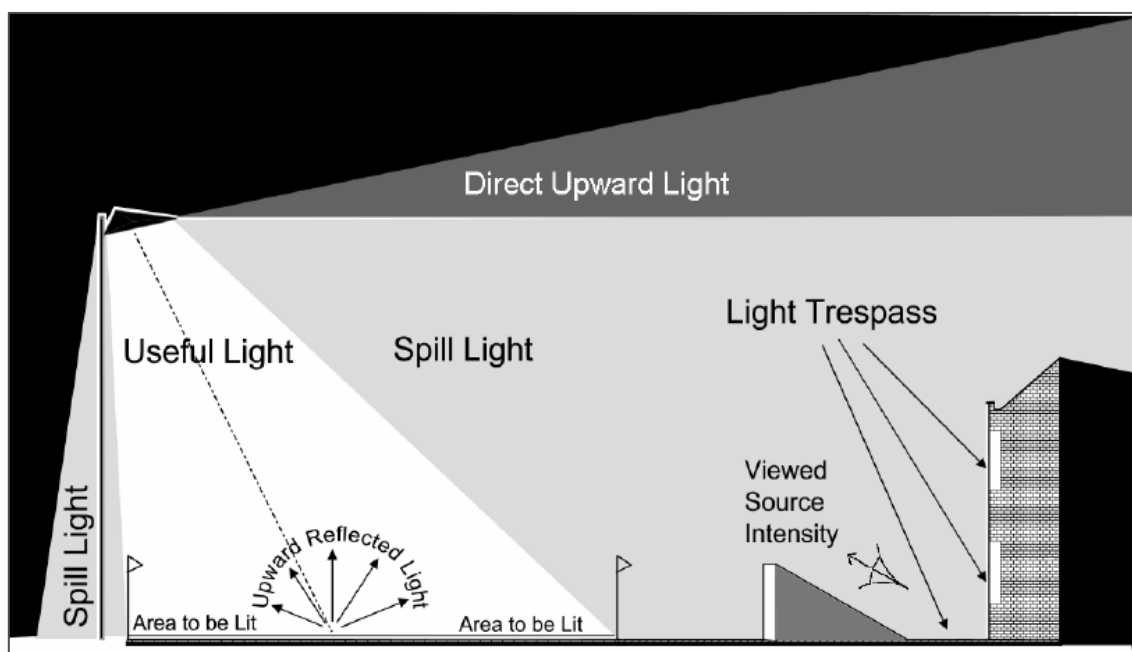


Figure 2: Obtrusive Light (ILE, 2011)

The ILP has developed an Environmental Zone classification system for the categorisation of areas with regards to suitable obtrusive lighting limits. The Environmental Zone classifications are reproduced in Table 1.

ILP Environmental Zone Classification				
Zone	Surrounding	Lighting Environment	Example	Dark Zone
E0	Dark	Dark	UNESCO Starlight Reserves	Dark Sky Core
E1	Natural	Intrinsically dark landscapes	National parks, areas of outstanding beauty etc	Intrinsic Rural/Transition
E2	Rural	Low district brightness areas	Rural, small village, or relatively dark urban locations	N/A
E3	Suburban	Medium district brightness areas	Small town centres or suburban locations	Urban
E4	Urban	High district brightness areas	Town/city centres with high levels of night-time activity	Urban City

Table 1: Environmental Zones (ILE, 2011)

Environmental Zone	Sky Glow ULR (Max %)	Light Trespass (into Windows) Ev [Lux]		Luminaire Intensity (candelas)	
		Pre\curfew	Post\curfew	Pre\curfew	Post\curfew
E0	0	0	0	0	0
E1 (a,b)	0	2	0	2,500	0
E2	2.5	5	1	7,500	500
E3	5	10	2	10,000	1,000
E4	15	25	5	25,000	2,500

Table 2: ILP Environmental Zone Criteria

Curfew is the time after which stricter requirements (for the control of obtrusive light) will apply and is often a condition of use of lighting applied by the local planning authority. For this assessment 23:00 is suggested.

41 Beach Road site is at the boundaries of Emsworth city and Emsworth Harbor. In accordance with ILE guidance, 41 Beach Road can be categorised under Environmental Zone E1a. As such, light trespass into windows should not exceed 2 Lux post curfew and the Sky Glow ULR (Upward Light Ratio) must be 0.

2.7 Biodiversity - Ecological Receptors

Although significant research into lighting and biodiversity effects is currently underway, there are currently no definitive guidelines in wide acceptance setting out absolute light pollution limits affecting biodiversity receptors. For this assessment, the widely adopted criterion for the control of light spill affecting bats of 1 lux has been utilized as the average level of illuminance to be met at biodiversity, ecological receptors.

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Methodology

3.0 Methodology

Light modelling was undertaken using DIALux software. DIALux is an independent lighting model software, which is capable of calculating daylight and artificial lighting scenes in interior and exterior scenarios. The model incorporates ILP, CIE 112 and BS EN 12464-2 calculation methodologies and is commonly used for lighting impact assessment.

The 3D model has been built based on the previous architectural drawings, which is for a larger building in terms of mass, footprint & height – *ie the worst case scenario*. Therefore the actual results will be less significant.

Within the context of this assessment, 3 no. vertical biodiversity, ecological receptors have been used outside the boundaries of the site that are looking towards the Harbour. The calculation grid points occur every 0.50 metres horizontally and vertically, up to ten metres high. In addition, vertical receptors have been used at all the surrounding residential properties.

These receptors have been identified as being potentially light-sensitive and having the potential to be affected by light spill associated with the Proposed Development. The location of the receptors used in the study can be seen in Figure 3 and Figure 4.



Figure 3: Perspective view of the original model, with the biodiversity vertical calculation Planes. DIALux Software



Figure 4: Perspective view of the original model, with the biodiversity vertical calculation Planes. DIALux Software

3.1 Proposed Design

Artificial lighting will be required as part of amenity, safe passage and security requirements during periods of darkness. The associated potential light pollution effects would be minimised through the controlled application of lighting in accordance with current best practice. All external lightings will be switched off when not needed with the use of proximity sensors. The following measures are also incorporated in the Proposed Development:

- the use of luminaires with minimal to zero direct contribution to upward light;
- the use of bollards lighting to the pathway/driveway;
- the adoption of the low intensity LED modules;
- limiting the light source colour temperatures to 3000K

A series of external lights with a PIR movement have been proposed in key positions in the ground floor level, in the carport and pathway.

In this assessment, internal light fittings have not been used.

All external light fittings used in this assessment are looking downwards only, they have a warm colour and are less than 1000 lumens.

The following fittings have been selected for the Proposed Development. The drawing contained within Appendix B shows the positions of fittings.

Manufacturer Reference	No.	Location	Lumen Output	Colour Temperature	Image
BEGA 22172, Wall luminaire	10	Key positions in the ground floor level, Carports	295 lm	3000K	
Thorolux Passway (EPW19910-9W)	6	Pathway/Driveway	450 lm	3000K	
ENDO LED Downlighters	11	Lighting in soffit/overhangs	521 lm	3000K	

Table 3: Indicative light fittings in the Proposed Development

Roof Lantern

In the Proposed Development there are 3 no. rooflights. In order to ensure that these rooflights do not cause light pollution to the night skies the glass used will be tinted 'light control' low (35%) light transmission glass.

3.2 Modelling

Light modelling was undertaken using DIALux software. In order to represent a worst-case scenario for light assessment, all external light fittings, associated with this assessment, are modelled with maintenance factor of 1.0.

Ray-traced rendered lighting images of the model can be found in Appendices.

3.3 Results

Ecological Receptors, Light Spill (vertical illuminance)

The levels of light spill from the assessed Lighting scheme have been predicted at the biodiversity/ecological receptors. Results of light spill levels can be seen in Table 4.

Receptor	Pre\curfew Spill Criteria - E (lux)	Pre\curfew Average Spill - Eav (lux)	Pre\curfew Maximum Spill - Emax (lux)	Pass/Fail
ECO-01	1 (average) 2 (maximum)	0.23	1.13	Pass
ECO-02		0.14	0.98	Pass
ECO-03		0.12	0.66	Pass
ECO-04		0.11	0.036	Pass
ECO-05		0.057	0.2	Pass
ECO-06		0.067	0.42	Pass
ECO-07		0.28	0.86	Pass
ECO-08		0.38	0.88	Pass
ECO-09		0.052	0.26	Pass
ECO-10		0.001	0.008	Pass
ECO-11		0.005	0.017	Pass
ECO-12		0.042	0.22	Pass

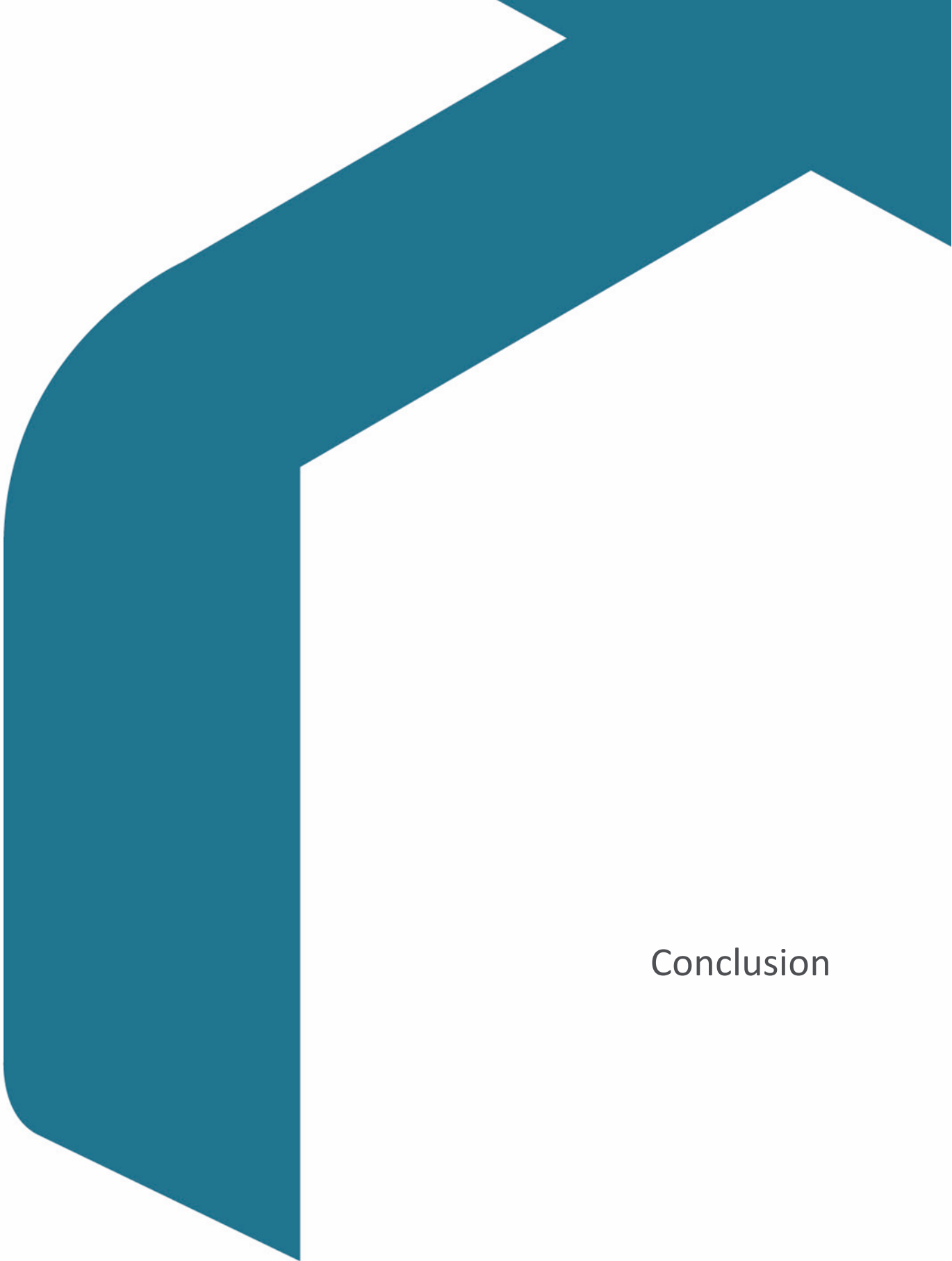
Table 4: Ecological Vertical Receptors, Light Assessment Results

As illustrated above light trespass associated with the Proposed Development is below 1 lux average and 2 lux maximum at all modelled ecological receptor locations. As such the Proposed Development is not predicted to result in any significant adverse impacts with respect to local sensitive ecological receptors.

Sky-glow' (upward light ratio)

The level of 'sky-glow' ULR (Upward Light Ratio) from the light fittings associated with the Proposed Development has been predicted as 0%. This has been achieved with the proposed lighting design, which has been designed to eliminate upward light spill.

As such the proposed lighting scheme meets the ILP limitations and is therefore not considered to impact the dark sky landscape.

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Conclusion

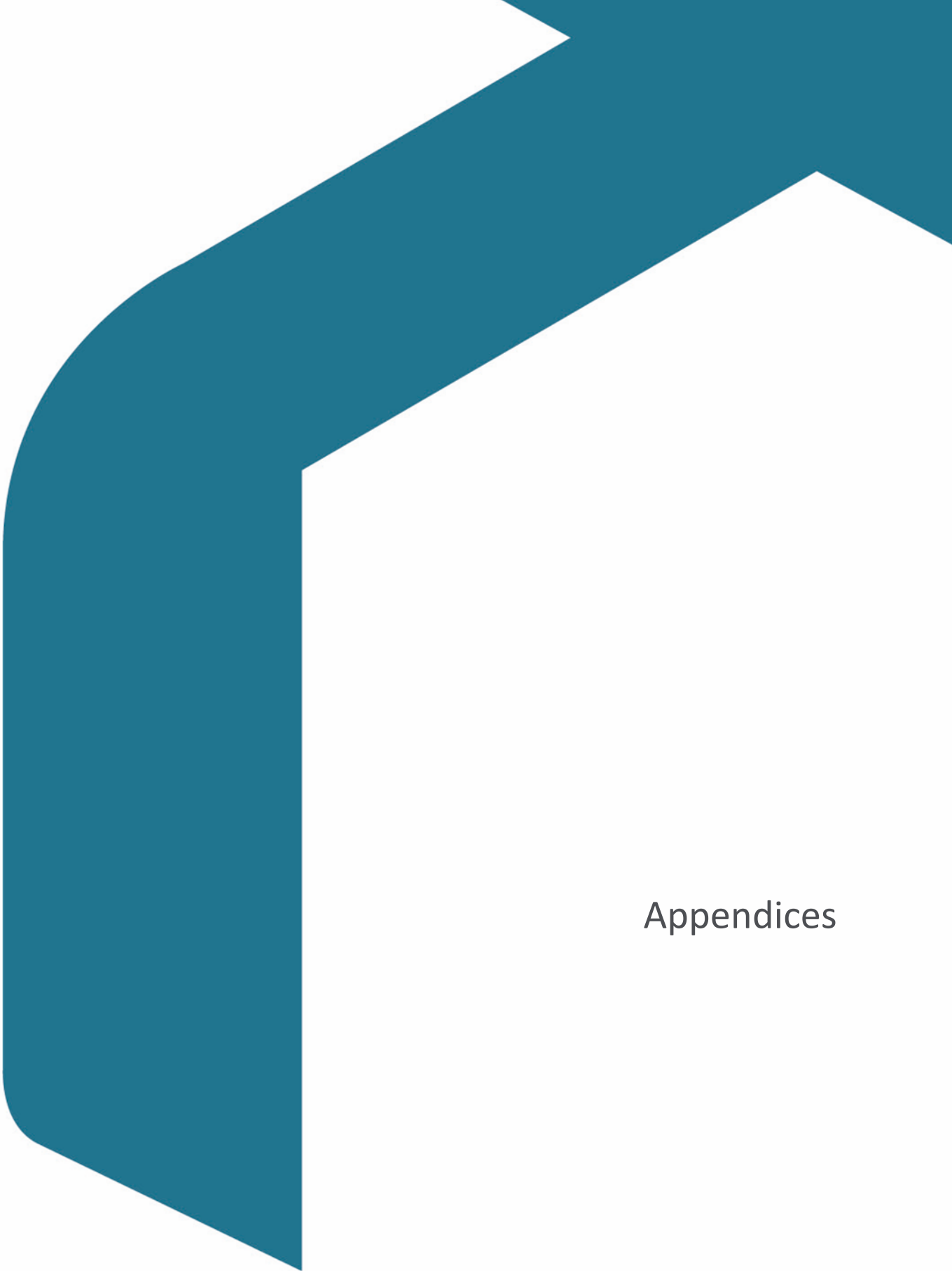
4.0 Conclusion

This Dark Skies Assessment has been undertaken by SRE on behalf of Atlas Planning (the Client) in support of the planning application of the Proposed Development at 41 Beach Road, Emsworth. The residential scheme will meet relevant industry performance standards, including: guidelines set out by ILE for avoidance of obtrusive light, and British Standards for external lighting.

The proposed lights to be installed are low level with directional LEDs that are downward facing, bollard lights on the driveway/pathway resulting in a minimal upward light spill.

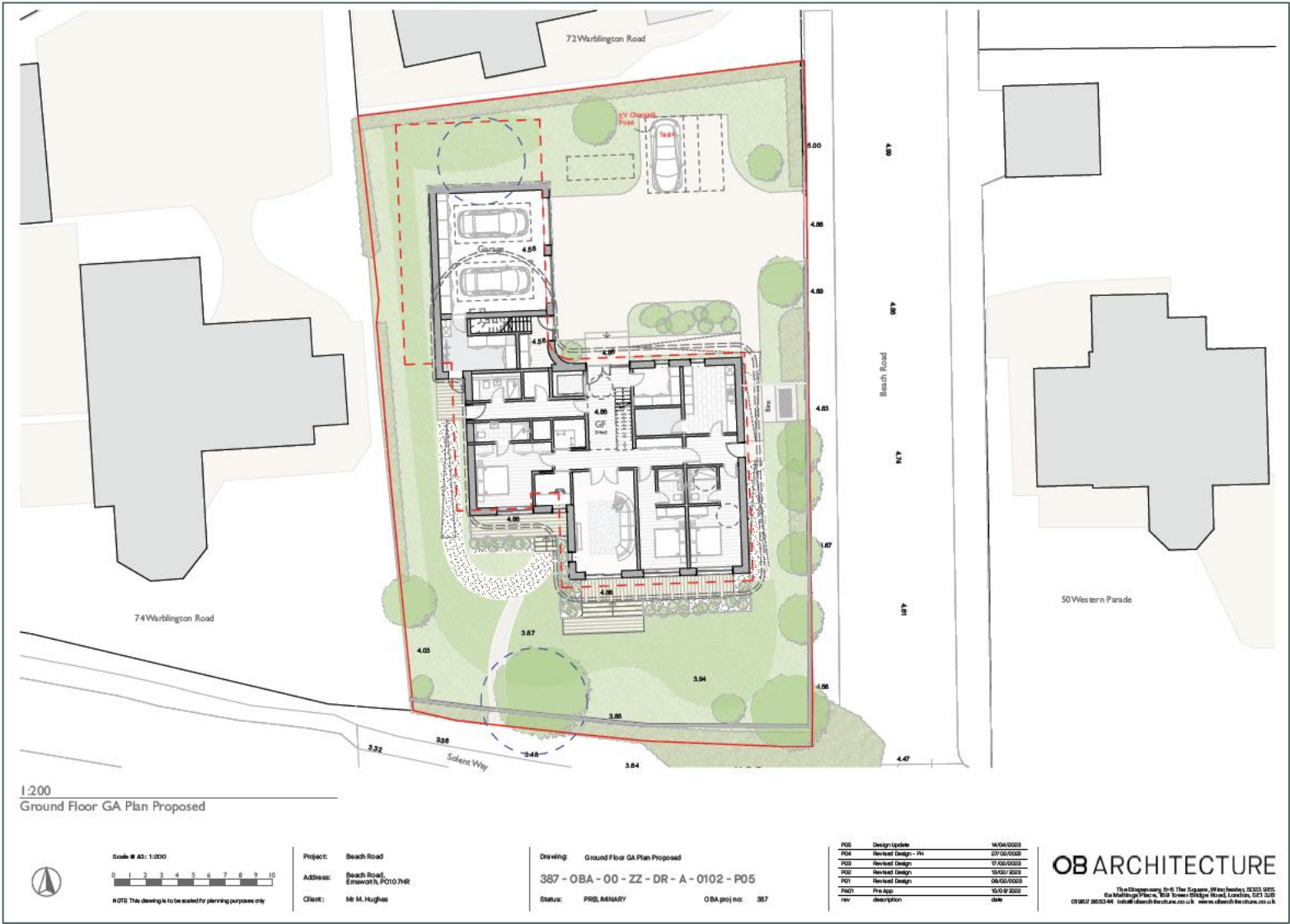
The risk of the Proposed Development resulting insignificant exceedances of 1lux average and 2lux maximum levels, along the site boundaries is considered to be low – especially as the revised scheme is now smaller than that modelled. The level of ‘sky-glow’ ULR (Upward Light Ratio) from the lighting fittings associated with the Proposed Development has been predicted as 0% and as such the Proposed Development will not have a significant effect on the surrounding dark sky landscape.

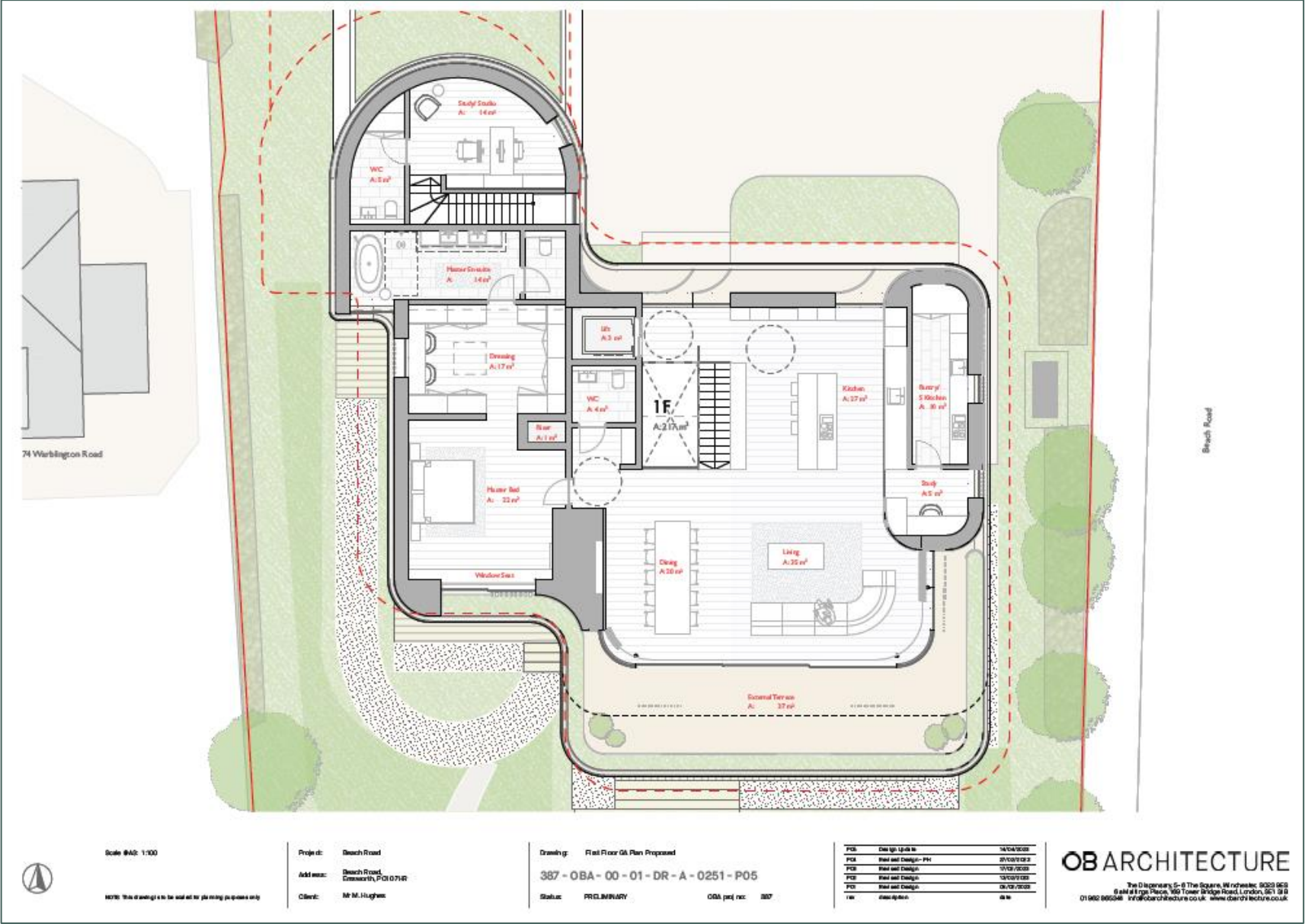
Therefore, it is anticipated that the Proposed Development will not generate light pollution and does not conflict with any national or local planning policies.

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Appendices

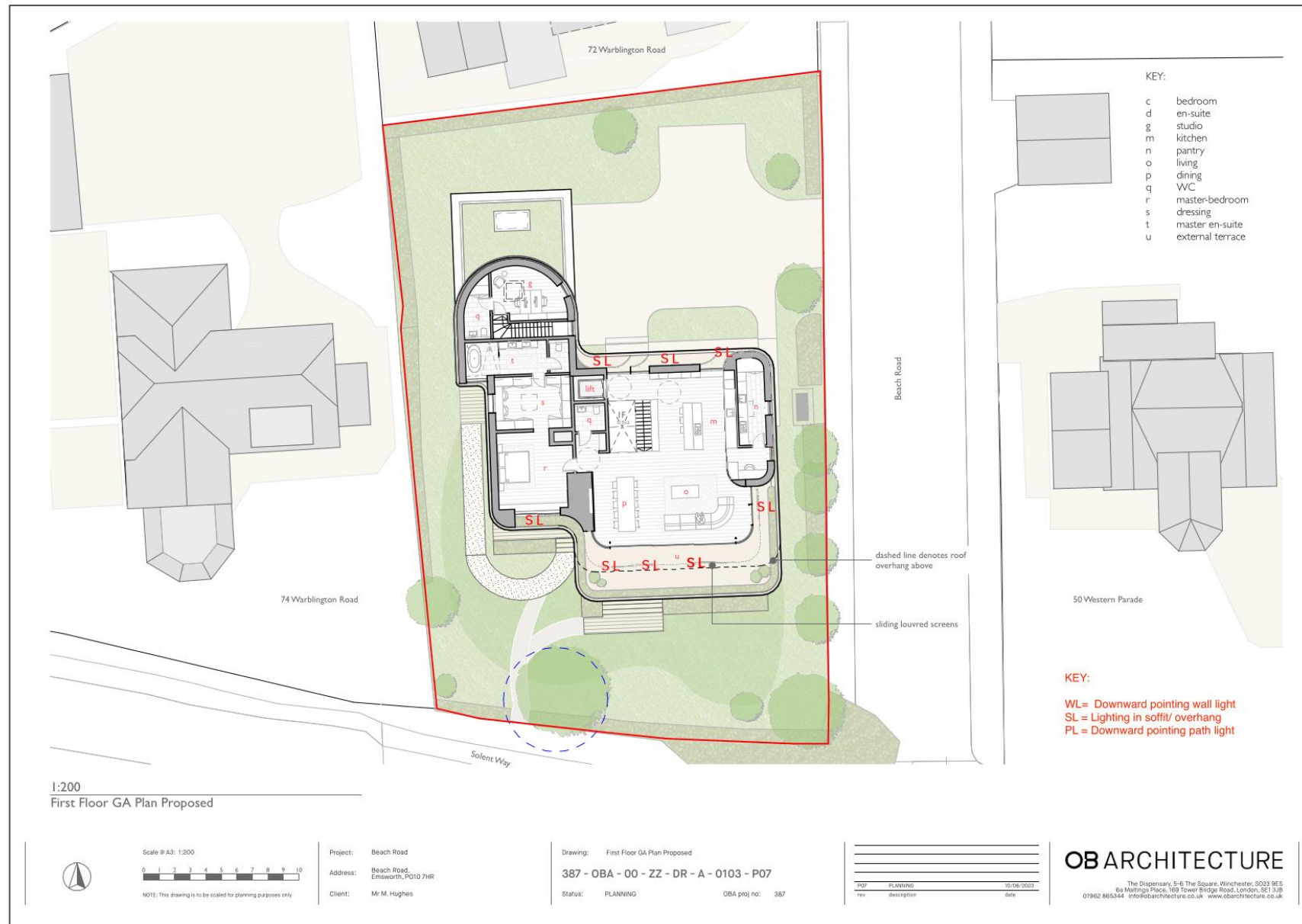
Appendix A – Proposed Plans & Elevations



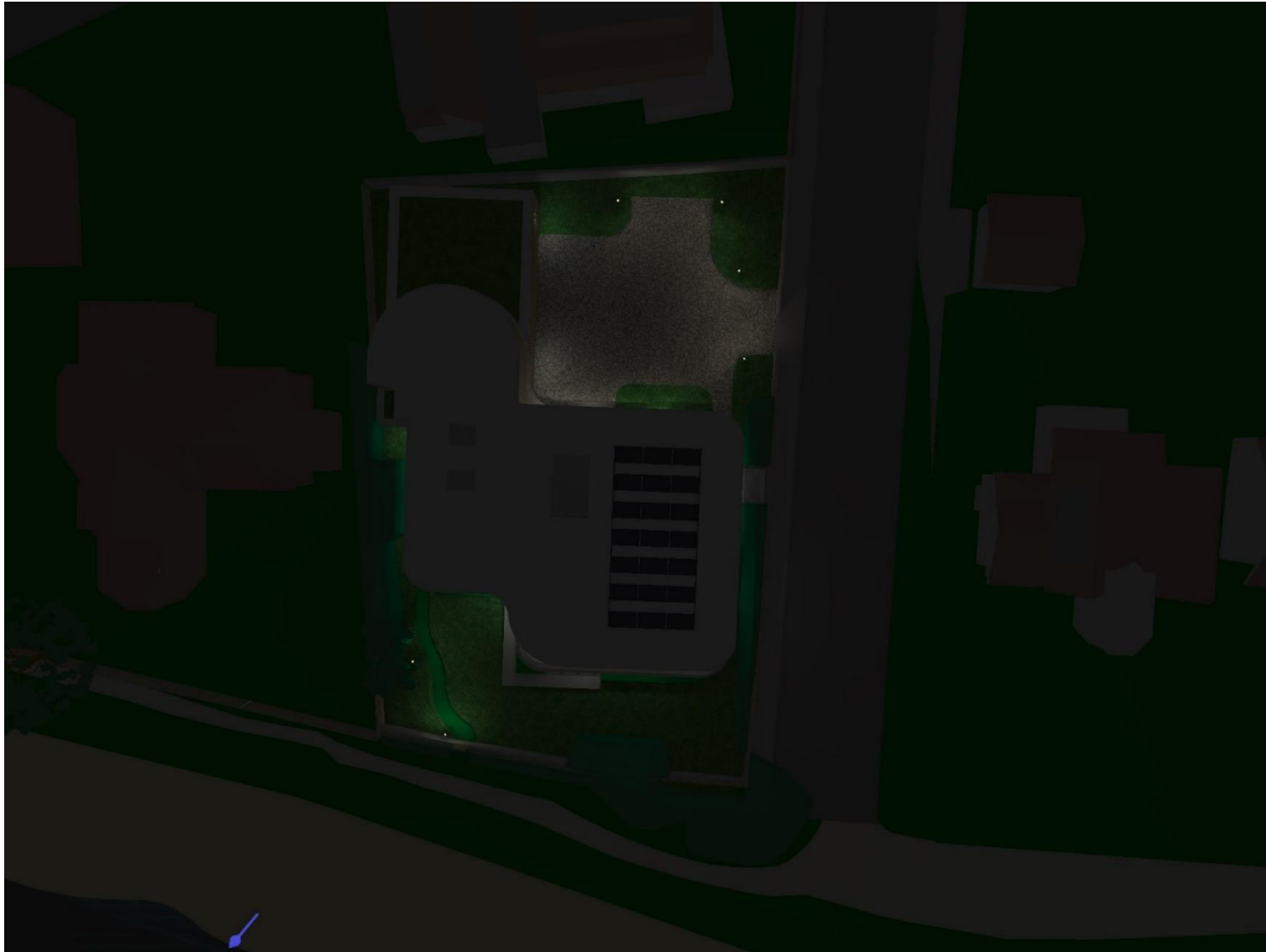


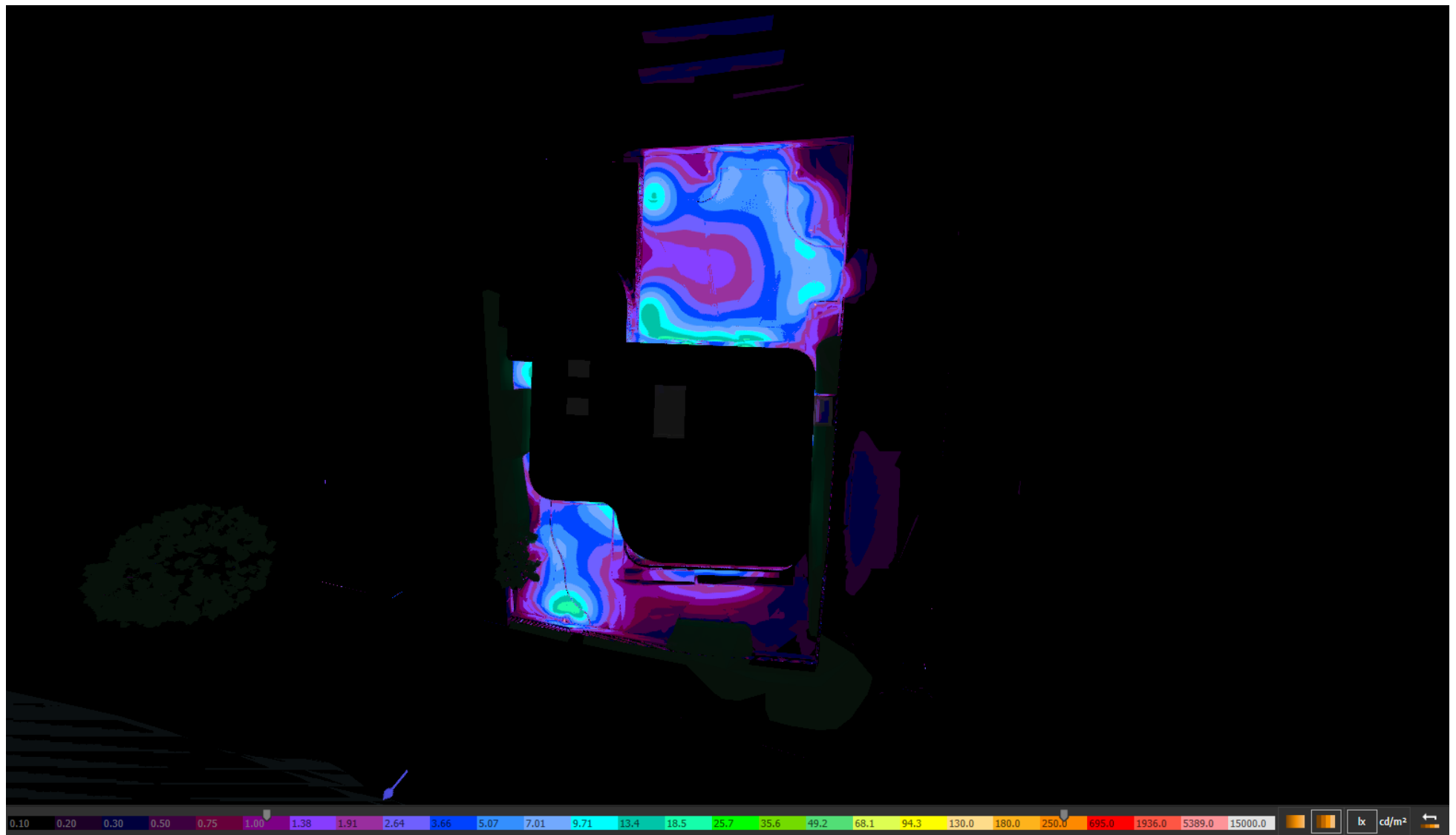
Appendix B – Proposed External Light Fitting Locations



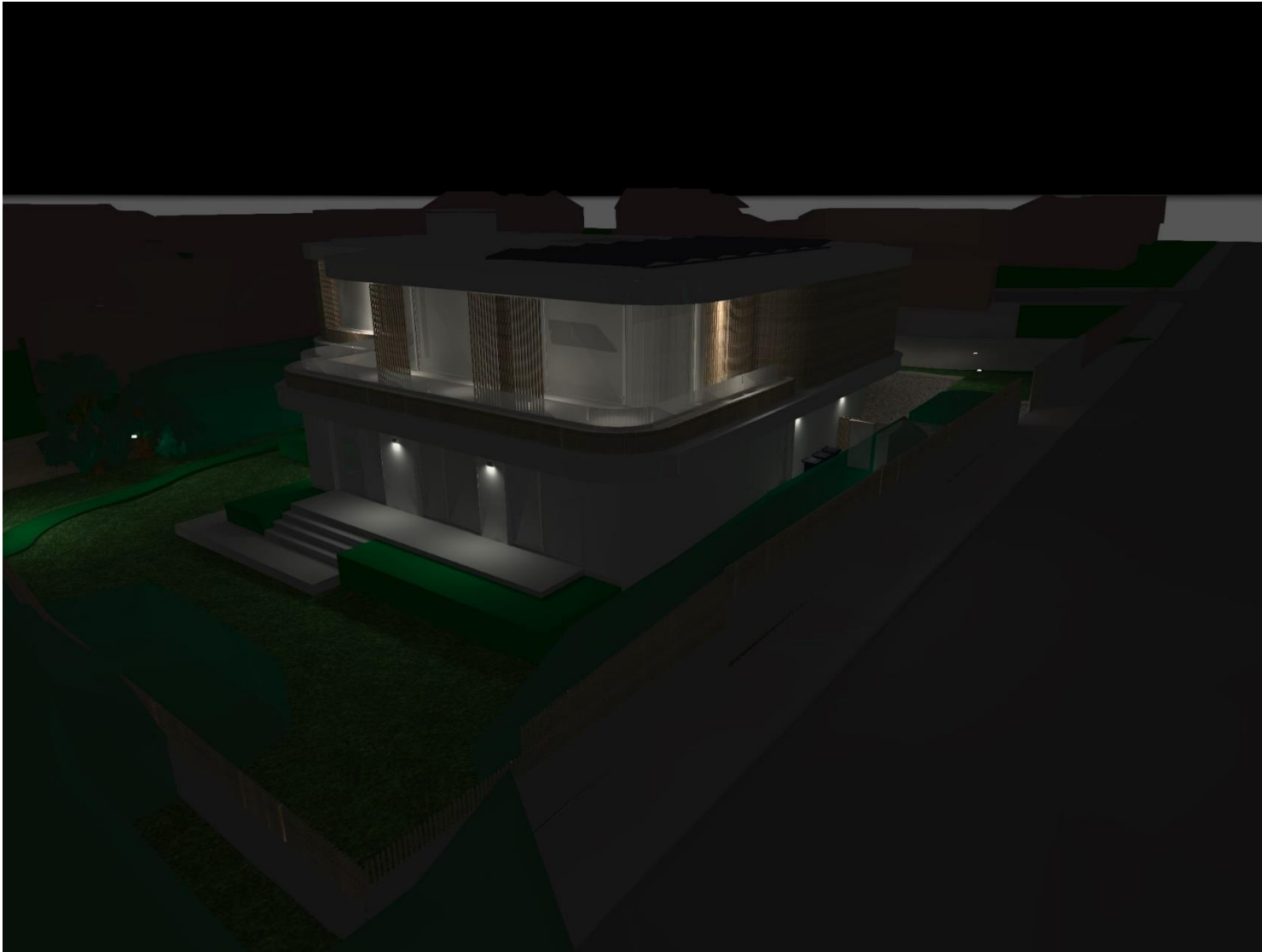


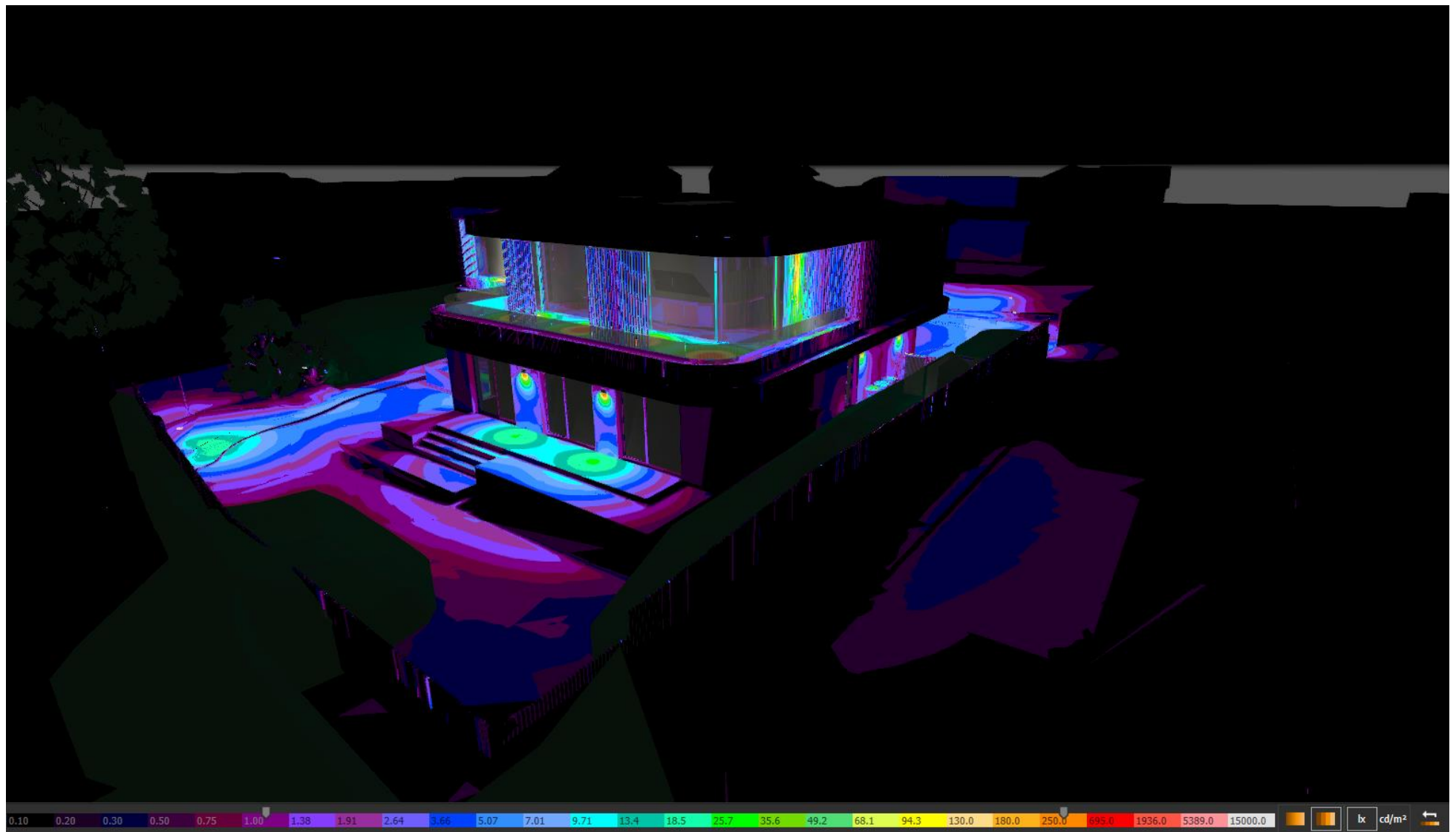
Appendix C – Night Scene and False Colour (lux), Top View – DIALux Model

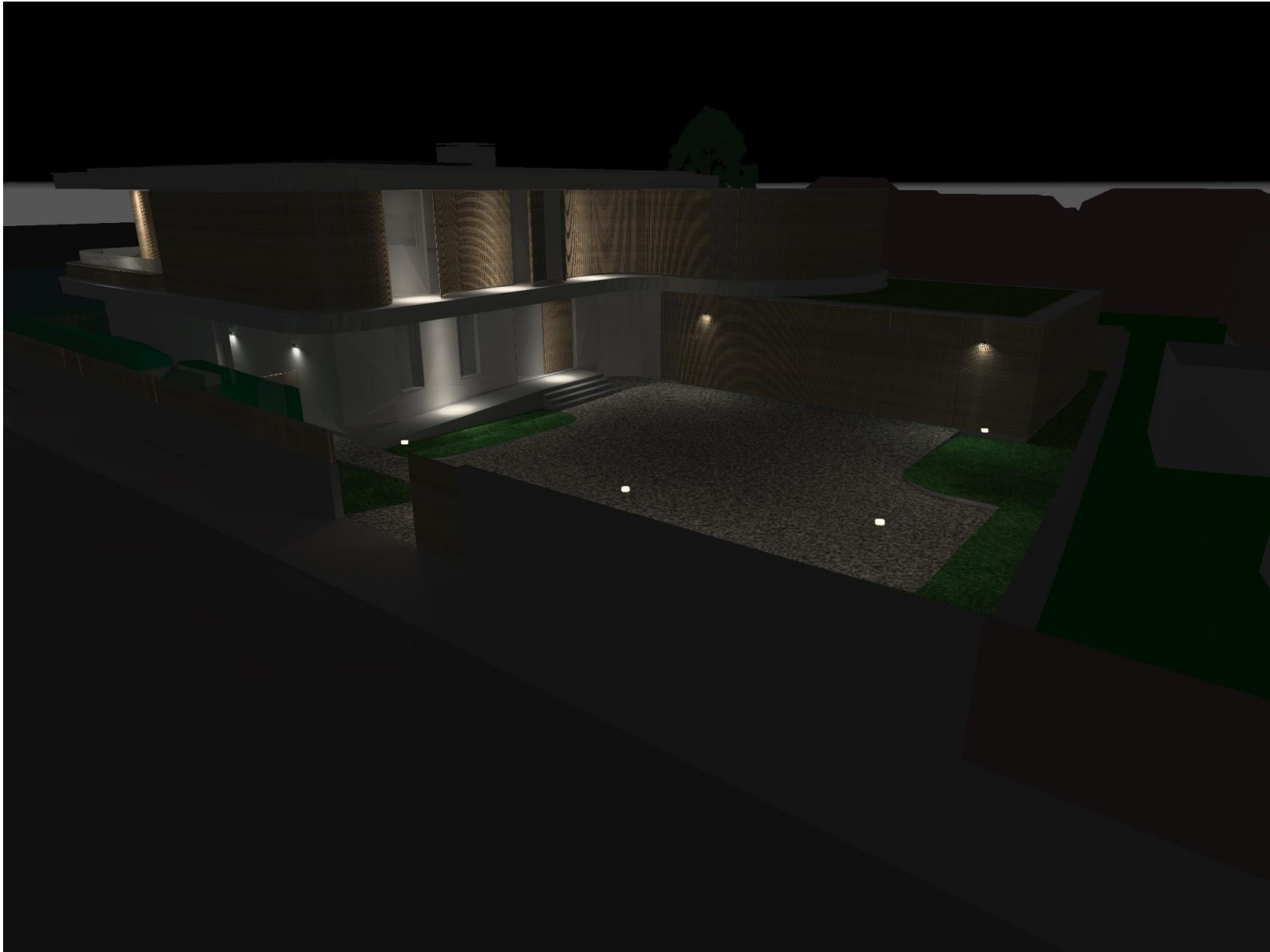


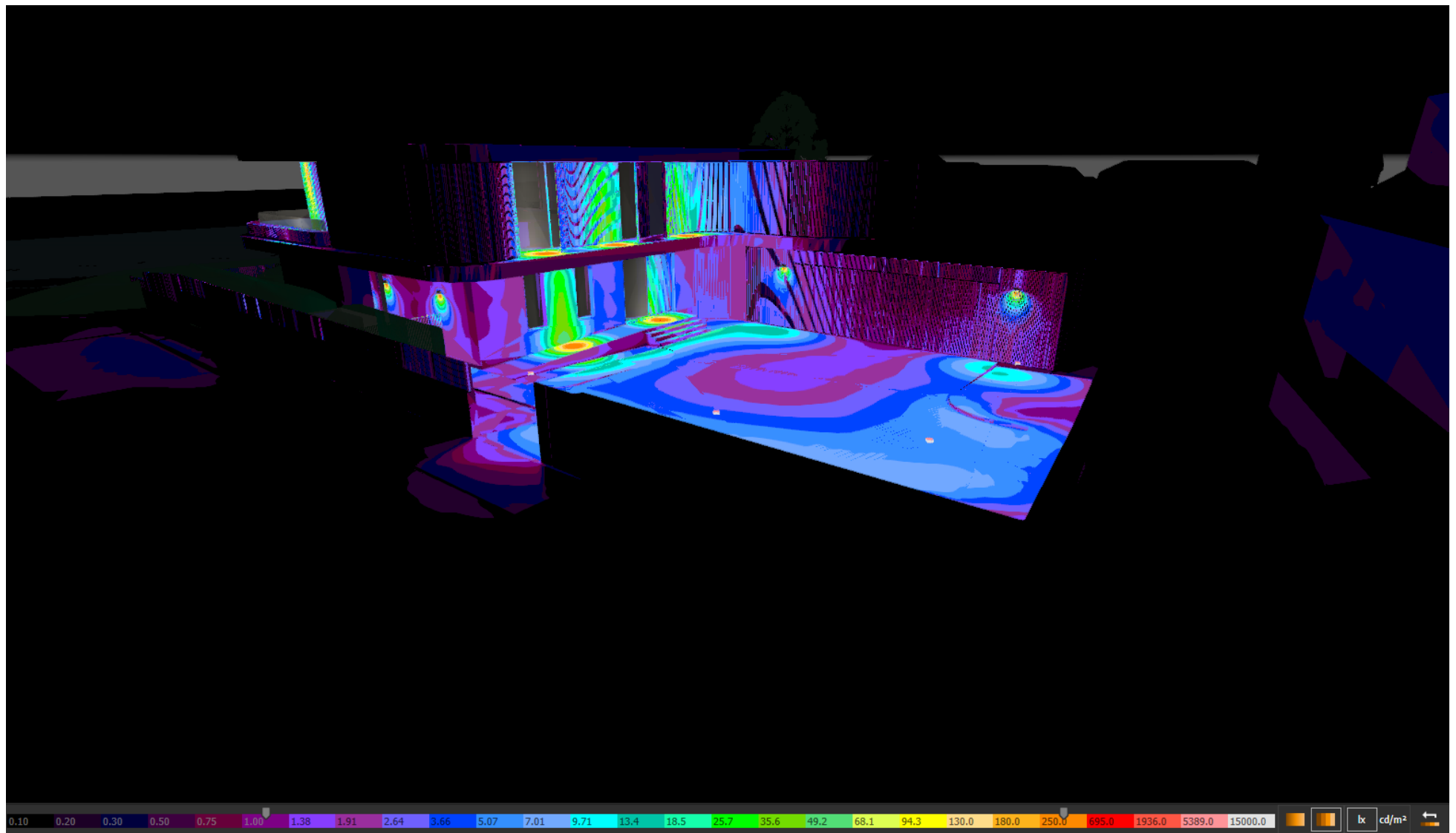


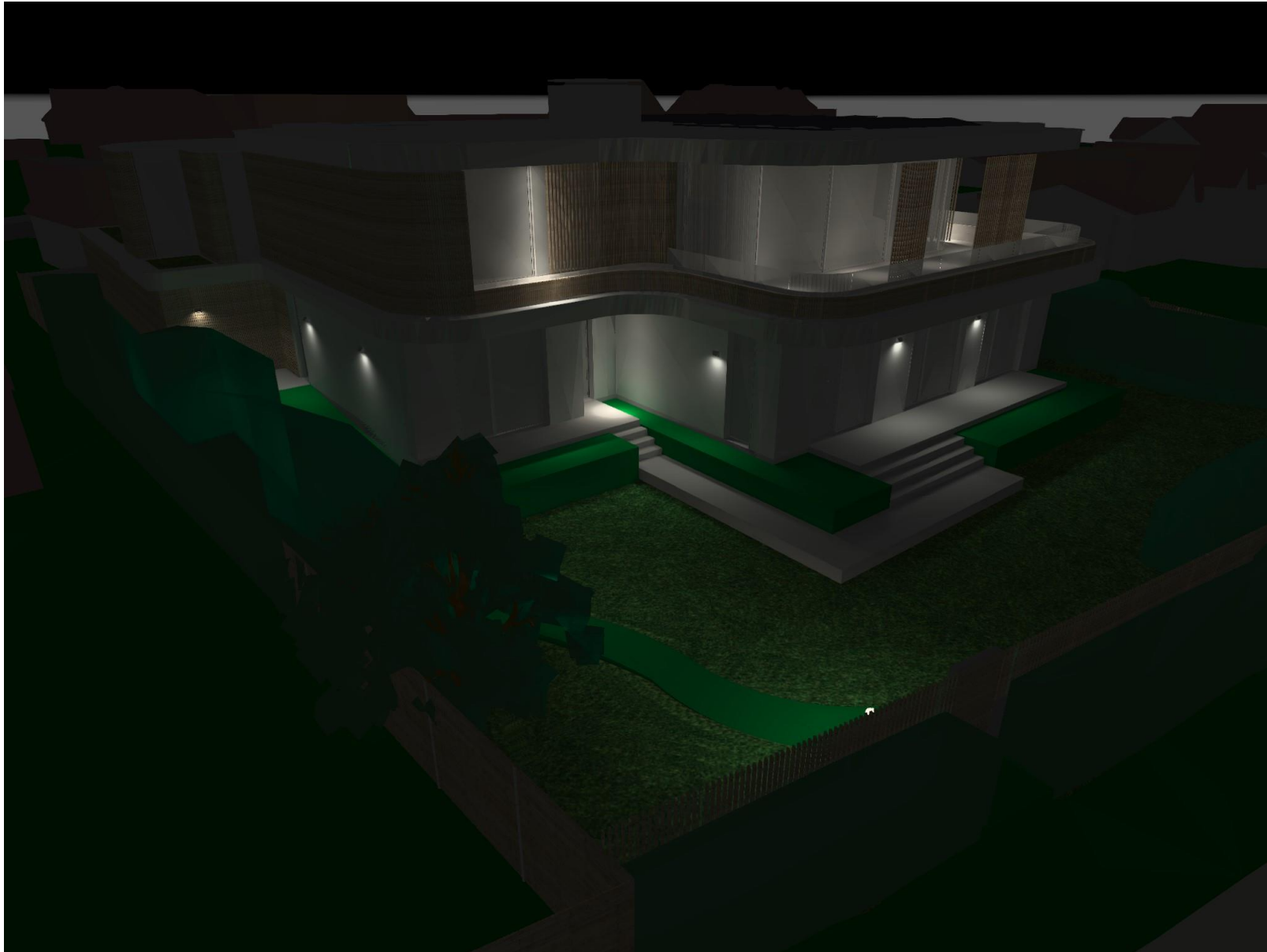
Appendix D – Night Scene and False Colour (lux), Perspective Views – DIALux Model

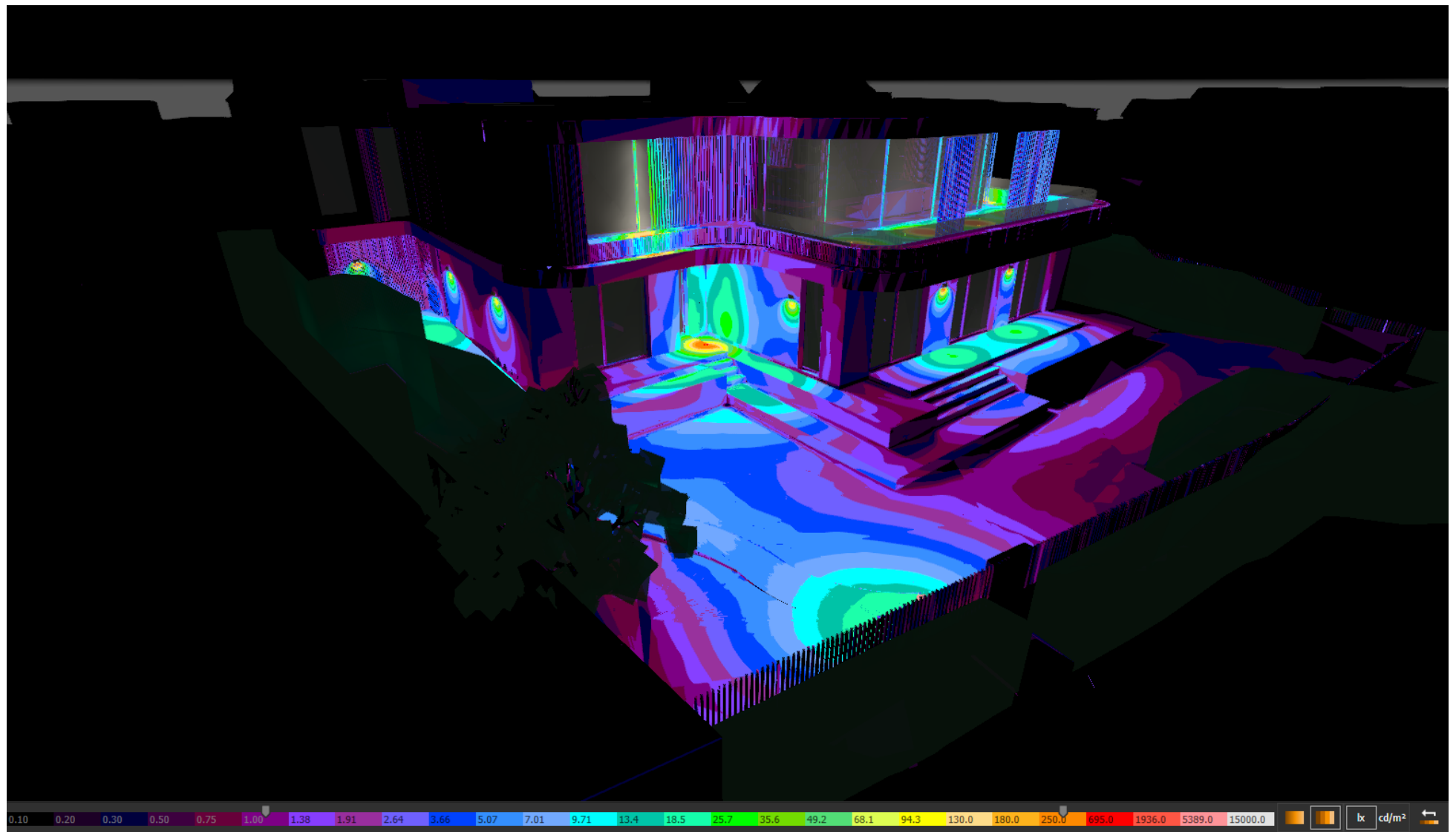












Appendix E – Light Fittings Data Sheets

27.18 - Technical amendments reserved

BEGA

Wall luminaire

22 172

 IP 65

Project - Reference number

Date

Product data sheet

Application
Wall luminaire for orientating lighting tasks.

Product description
Luminaire made of aluminium alloy,
aluminium and stainless steel
BEGA Unidure® coating technology
Matt safety glass
Reflector made of pure anodised aluminium
Silicone gasket
2 mounting holes $\varnothing$ 4.5 mm
Distance apart 168 mm
2 cable entries for through-wiring of mains
supply cable $\varnothing$ 7-10.5 mm
Connection terminal 2.5²
Earth conductor connection
BEGA Ultimate Driver®
LED power supply unit
220-240 V $\sim$ 0/50-60 Hz
DC 176-264 V
BEGA Thermal Switch®
Temporary thermal shutdown to protect
temperature-sensitive components
Safety class I
Protection class IP 65
Dust-tight and protection against water jets
Impact strength IK10
Protection against mechanical
impacts < 20 joule
 – Safety mark
 – Conformity mark
Weight: 0.95 kg

Lamp
Module connected wattage 2 W
Luminaire connected wattage 2.8 W
Rated temperature $t_a = 25^\circ\text{C}$
Ambient temperature $t_{a\text{ max}} = 65^\circ\text{C}$

22 172 K3
Module designation LED-0582/830
Colour temperature 3000 K
Colour rendering index CRI > 80
Module luminous flux 295 lm
Luminaire luminous flux 160 lm
Luminaire luminous efficiency 57,1 lm/W

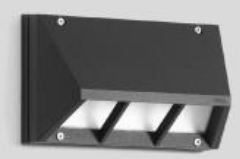
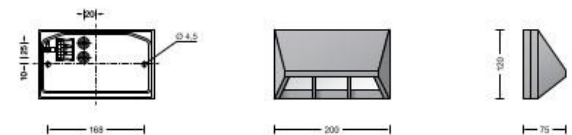
22 172 K4
Module designation LED-0582/840
Colour temperature 4000 K
Colour rendering index CRI > 80
Module luminous flux 295 lm
Luminaire luminous flux 160 lm
Luminaire luminous efficiency 57,1 lm/W

Service life - Ambient temperature
Rated temperature $t_a = 25^\circ\text{C}$
LED psu: > 50,000 h
LED module: > 200,000 h (L 80 B 50)
100,000 h (L 90 B 50)
Ambient temperature $t_{a\text{ max}} = 65^\circ\text{C}$ (100 %)
LED psu: 50,000 h
LED module: 65,000 h (L 80 B 50)
98,000 h (L 70 B 50)

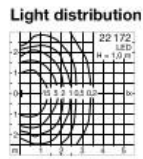
Inrush current
Inrush current: 7 A / 102 μs
Maximum number of luminaires of this
type per miniature circuit breaker:
B 10 A: 60 luminaires
B 16 A: 96 luminaires
C 10 A: 100 luminaires
C 16 A: 161 luminaires

Light technique
Luminaire data for the light planning program
DIALux for outdoor lighting, street lighting and
indoor lighting as well as luminaire data in
EULUMDAT- and IES-format you will find on the
BEGA web page www.bega.com.

Article No. 22 172
LED colour temperature optionally 3000 K
or 4000 K
3000 K – Article number + **K3**
4000 K – Article number + **K4**
Colour graphite or silver
graphite – article number
silver – article number + **A**

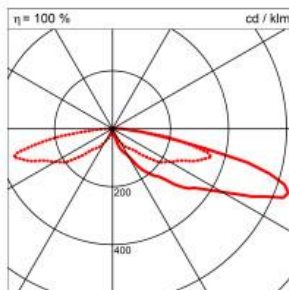



Light distribution



BEGA Gantenbrink-Leuchten KG · Postfach 31 60 · 58689 Menden · info@bega.com · www.bega.com

Passway LED
PW19910



Luminaires

Hersteller	Thorlux Lighting
Article number	PW19910
Product name	Passway LED
Mounting type	Freestanding
Mounting place	Floor
Test mark	  

Model / Variant / Configuration

Number / Name	---
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Description

Product without accessories

Luminaires

Absolute Photometry	
System Light flux	450.00 Lm
Luminaire output	50.00 Lm/W
LiTG class	A10
CIE flux codes	9 34 79 99 100
System power	9.0W
Protection degree	IP 66

Dimensions

Diameter/Height	165mm/1100mm
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Light Source

Lamp type	1 x LED
Lamp power	5 W
System power	9 W
Light flux	450 lm
Colour temperature	4000

Powered by © Relux

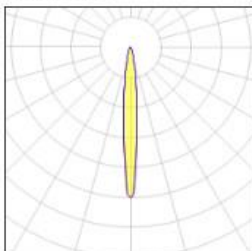
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Product data sheet

ADJUSTABLE DOWNLIGHT
ERD3286W_RAD731N
ENDO



Light output 1



1 x LED

Nominal lamp power	5.9 W	LOR	90%
Lamp flux	580 lm	Total flux	521 lm
Luminous efficacy	88 lm/W	Total power	5.9 W
CCT	3000 K		
CRI	83		

Mounting mode

Ceiling recessed

Electric

System power: 5.9 W

Shape and measurements

Height: 6.02 in

Diameter: 5.71 in

Adjustability

Fixed



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