

LIGHTING TECHNICAL REPORT

PROJECT: PAYSANNE, GOODSHILL,
FORDINGBRIDGE

PREPARED FOR: MR IAN VICKERS

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1. Introduction

1.1 General

- 1.1.1 This report has been written by Designs for Lighting Ltd, a lighting design consultancy with experience and knowledge in lighting impact assessments, obtrusive light mitigation, and detailed lighting design.
- 1.1.2 The purpose of this report is to support a planning appeal submitted in respect of the decision of the new forest national park to serve an enforcement notice of the alleged unauthorised construction of a dwelling on land at Paysanne, Godshill Wood, Fordingbridge, SP6 2LR (hereafter referred to as the Appeal Site).
- 1.1.3 The report provides an analysis of the predicted light spill of the exterior and interior lighting comparing the approved dwelling (consent 18/00262) and the as-built dwelling. Where necessary, a mitigation strategy will be provided within this document the as-built dwelling, on the Appeal Site.
- 1.1.4 The Appeal Site is located within the New Forest National Park in the north west of Landscape Character Area 21, Northern Heath and Forest. The Appeal Site sits approximately 1200m north east of the centre of Godshill and 790m south west of Undercastle Cottage.



Figure 1: Aerial view of the Appeal Site. The Appeal Site is highlighted in red.

2. Policy and Legislative Frameworks

2.1 National Policies

2.1.1 The following national and local policies and legislative frameworks are likely to apply to the Proposed Development:

- Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

2.1.2 Since 2005, artificial light was incorporated as a potential statutory nuisance. An amendment to section 79 of the Environmental Protection Act 1990, contained within the Clean Neighbourhoods and Environment Act 2005 states:

“... the following matters constitute “statutory nuisances” for the purposes of this Part, that is to say ... (fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance ... and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 ... and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint.”

- National Planning Policy Framework: (February 2019)

2.1.3 The National Planning Policy Framework (NPPF) sets out the government’s planning policies for England and how they are expected to be applied and provides a framework for local plans. With regards to light pollution, the NPPF was updated in November 2019 and states that the following elements are to be considered:

“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:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

- Planning Practice Guidance

2.1.4 Guidance for assessing the effects of proposed artificial lighting is outlined in this guidance. The guidance states:

- *“Does an existing lighting installation make the proposed location for a development unsuitable, or suitable only with appropriate mitigation? For example, this might be because:*
- *the artificial light has a significant effect on the locality; and/or*
- *users of the proposed development (e.g. a hospital) may be particularly sensitive to light intrusion from the existing light source.*

- *Where necessary, development proposed in the vicinity of existing activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme, reflecting the agent of change principle. Additional guidance on applying this principle is set out in the planning practice guidance on noise.*
- *Will a new development, or a proposed change to an existing site, be likely to materially alter light levels in the environment around the site and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?*
- *Will the impact of new lighting conflict with the needs of specialist facilities requiring low levels of surrounding light (such as observatories, airports and general aviation facilities)? Impacts on other activities that rely on low levels of light such as astronomy may also be a consideration, but will need to be considered in terms of both their severity and alongside the wider benefits of the development.*
- *Is the development in or near a protected area of dark sky or an intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting?*
- *Would new lighting have any safety impacts, for example in creating a hazard for road users?*
- *Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed.*
- *Does the proposed development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies? (As it may change natural light, creating polarised light pollution that can affect wildlife behaviour.)*

2.2 Local Policies

- 2.2.1 The relevant Local Planning Authority is the New Forest National Park, whose Local Plan (2016-2036) sets out policies applicable to development in the New Forest National Park. The most relevant policies to lighting outlined in the New Forest National Park Local Plan (Adopted August 2019) are:

Policy SP1: Supporting Sustainable Development:

“The National Park Authority will support sustainable development proposals that will conserve and enhance the natural beauty, wildlife and cultural heritage of the National Park and its special qualities; promote opportunities for their understanding and enjoyment by the public, and when doing so, will foster the social and economic well-being of local communities. Where there is an irreconcilable conflict between statutory purpose, greater weight will be attached to the conservation and enhancement of the National Park (in line with Section 62(2) of the Environment Act 1995)

Sustainable development in the National Park is considered to be that which:

- a) *makes the National Park a high-quality place to live, work, and visit – including appropriate new housing to address local needs; accessibility to local employment opportunities; improve public transport links; local infrastructure provision; and enhanced community and recreational facilities;*
- b) *has a positive impact on the ability of the natural environment to positively contribute to the society through the provision of food and water, regulation of floods, prevention of soil erosion and disease outbreaks, and the non-material benefits such as recreation;*
- c) *enhance the landscape of the New forest through high quality design and responding to the local distinctiveness of the area;*
- d) *contribute positively to the built and historic environment of the New Forest;*
- e) *does not impact on the integrity of the protected habitats of the New Forest, including its coastline;*
- f) *is resilient and responsive to the impacts of climate change through improving energy efficiency and making appropriate use of small-scale renewable energy; and*
- g) *makes use of sustainable building techniques, local materials and minimises energy use and waste.*

2.2.2 **Policy SP15: Tranquillity:**

“New development should avoid, or provide mitigation measures, if the proposal will lead to noise, visual intrusion, nuisance and other unacceptable environmental impact non the National Park and its special qualities.

This should include reducing the impact of light pollution on the ‘dark skies’ of the National Park and control of development to prevent artificial lighting from eroding rural darkness and tranquillity.

Development proposals that seek to remove visually intrusive man-made structures from the landscape will be supported.”

2.2.3 **Policy DP2: General development principles**

“All new development and uses of land within the New Forest National Park must uphold and promote the principles of sustainable development. New development proposals must demonstrate high quality design and construction which enhances local character and distinctiveness. This includes, but is not restricted to, ensuing;

- f) *Development would not result in unacceptable adverse impacts associated with traffic or pollution (including air, soil, water, noise, and light pollution).”*

2.2.4 The New Forest District Council Local Plan (2016-2036) also makes reference to the New Forest National Park. The most relevant policies to lighting outlined in the New Forest District Council Local Plan (Adopted July 2020) are:

2.2.5 **Policy STR1: Achieving Sustainable Development:**

- *“All new development will be expected to make a positive social, economic and environmental contribution to community and business life in the Plan Area by:*

- *Meeting most development needs within settlement boundaries, in a manner that is appropriate for and proportionate to the nature and size of the settlement, and where there is or will be sufficient supporting infrastructure and services;*
- *Ensuring that the housing needs of local communities are addressed by locating new residential development in sustainable and accessible locations, and ensuring that new development provides a mix of types of home by size, tenure and cost to help to address the full spectrum of local housing needs at all stages of life;*
- *Taking a context and landscape-led approach to the siting and design of development to deliver high quality design that maintains local distinctiveness, creates high quality new landscapes and townscapes, safeguards the Green Belt and AONB, sustains and enhances the heritage, scenic and amenity value of the Plan Area, and has appropriate regard to and the purposes of the adjoining New Forest National Park;*
- *Achieving an environmental net gain and avoiding wherever possible or mitigating where necessary the direct and indirect impacts of development on the integrity of the New Forest, Solent, River Avon and other International Nature Conservation sites, and on other areas, species or habitats of nature conservation value;*
- *Ensuring development contributes to a diverse and thriving local economy providing an overall balance of uses, services and opportunities that are accessible by sustainable transport modes as well as by car, in order that reliance on the private car is minimised;*
- *Ensuring communities and workers are safe and feel safe, and the risks to people, places and to the environment from potential hazards including pollution, flooding and climate change effects are minimised;”*

2.2.6 **Policy STR2:** *Protection of the countryside, Cranborne Chase Area of Outstanding Natural Beauty and the adjoining New Forest National Park.*

“Development should not have an unacceptable impact on the special qualities and purposes of the Cranborne Chase Area of Outstanding Natural Beauty, or on the adjoining New Forest National Park and their settings. In the determination and implementation of development proposals including planned growth, great weight will be given to ensuring that the character, quality and scenic beauty of the Cranborne Chase Area of Outstanding Natural Beauty and adjoining New Forest National Park are protected and enhanced.”

2.2.7 **Policy SO2:** *Biodiversity and environmental quality:*

“To safeguard and improve biodiversity, and the protection and enhancement of wildlife, species, habitats and water bodies in the Plan Area. To avoid where possible or fully mitigate where necessary, the direct and cumulative impact of development on designated nature conservation sites. To Promote the understanding of and care for the natural environment; managing recreational pressures in sensitive location. To manage and where possible reduce or mitigate activities that unacceptably impact on air quality or levels of noise, dust, odour or light pollution.”

2.2.8 **Policy ENV3:** *Design quality and local distinctiveness:*

“All development should achieve high quality design that contribute positively to local distinctiveness, quality of life and enhances the character and identity of the locality by creating buildings, streets, places, and spaces that are:

- *Functional: well connected to surrounding uses, and logically laid out so that different element work well together in a manner hat is safe to access, easy to navigate convenient to use and that makes effective use of both developed land and open spaces;*

- *Appropriate: sympathetic to its environment and context, respecting and enhancing local distinctiveness, character and identity; and*
- *Attractive, visually appealing and enjoyable to be in.*

New development will be required to:

- I. Create buildings, streets and spaces which are sympathetic to the environment and their context in terms of layout, landscape, height, appearance and density and relationship to adjoining buildings, spaces and landscape features;*
- II. Avoid unacceptable effects by reason of visual intrusion or overbearing impact, overlooking, shading, noise, and light pollution or other adverse impacts on local character or residential amenity;”*

2.3 Guidance Notes for the Reduction of Obtrusive Light (GN01:2020) Institution of Lighting Professionals [Relevant to exterior lighting only]

- 2.3.1 The lighting strategy shall be informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, caused by poorly designed and installed exterior artificial lighting. The lighting strategy is informed by the most relevant sections of GN01/20 (published in January 2020) to reduce the potential for obtrusive light from a wide range of exterior lighting applications.
- 2.3.2 The environmental zone criteria detailed within **Tables 1** and **2** will inform the lighting strategy.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5 +)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty etc
E2	Rural	Low district brightness (SQM ~ 15 to 20)	Sparsely inhabited rural areas, Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, Small town centres or suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Table 1 Environmental Zone Descriptions

Notes:

- Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.
- Rural zones under protected designations should use a higher standard of policy.
- Zone E0 must always be surrounded by an E1 Zone.
- Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas.
- SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.
- Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.
- Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

Environmental Zones	Sky Glow ULR (Max %)	Light Trespass (into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre-Curfew	Post-Curfew	Average L (cd/m ²)
E0	0	0	0	0
E1	0	2	0 (1*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 2 Obtrusive light criteria relating to each Environmental Zone

Notes to table:

- ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky;**
- E_v is Vertical Illuminance in Lux;**
- I is viewed Light source Intensity in Candelas;**
- L is Luminance in Candelas per square metre; and**
- Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off; this typically refers to 23h00 – 07h00.**
- (*) Permitted only from Public road lighting installations.**

2.4 GN08/18 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

2.4.1 Guidance for artificial lighting and bats was updated in Autumn 2018, the guidance states the following:

“It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate ‘complete darkness’ or a ‘complete absence of illumination’ on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where ‘complete darkness’ on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light averse behaviour (Stone, 2012).

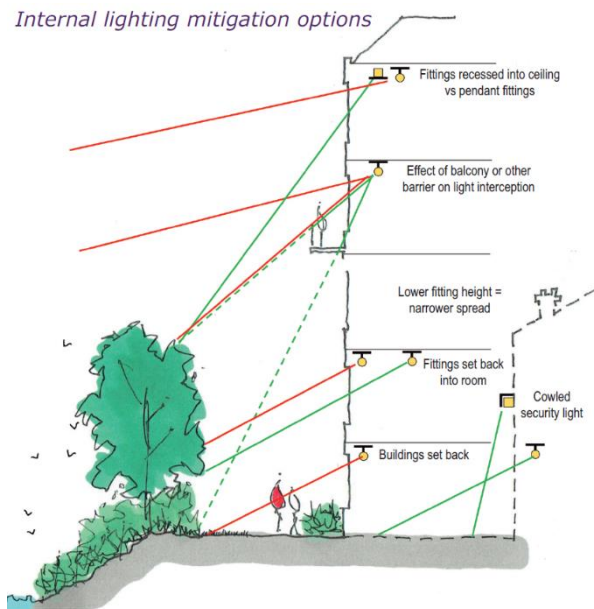


Figure 2: Internal light spill mitigation extract from GN08/18.

Example of illuminance limit zonation

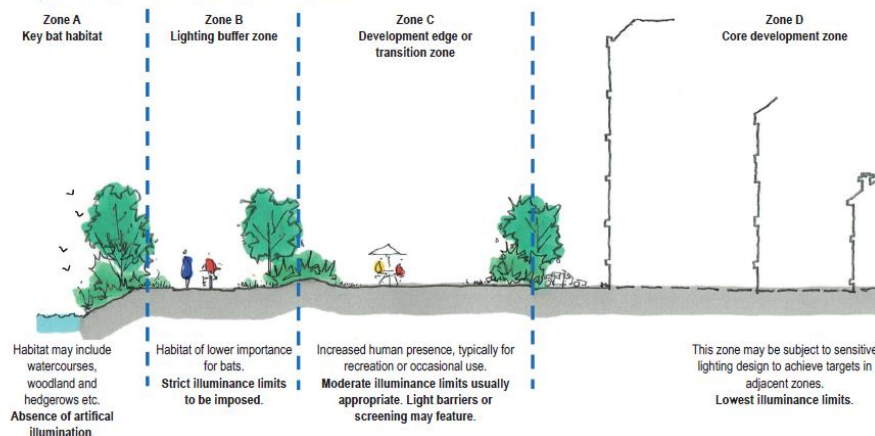


Figure 3: Illuminance limit zonation extract from GN08/18

3. Lighting Approach

3.1 Artificial Lighting

- 3.1.1 The requirement for artificial lighting to support the constructed dwelling means that (without mitigation) there could be some potentially detrimental effects caused the required lighting including; light spill (from windows), direct source luminance or glare (onto receptor views) and sky glow or upward light without suitable mitigation measures.
- 3.1.2 Standards relating to internal lighting are typically aimed at public facilities where buildings are subject to public use. Therefore, they state lighting levels primarily for safety and functionality of the facility.
- 3.1.3 Where privately owned residential properties are illuminated, the owner is not subject to the same requirements to illuminate the space to these high illuminance levels. This allows the owner of the property to illuminate the space to lower light levels to create a more holistic ambiance. Furthermore, lower lighting levels are desired for privacy purposes during the hours of darkness.
- 3.1.4 Guidance provided by the Institution of Lighting Professionals (ILP) for the Reduction of Obtrusive Light (GN01:2020) specifically relates to exterior lighting only. There is no relevant guidance for obtrusive light in relation to the interior lighting for the constructed dwelling.

3.2 General Approach

- 3.2.1 Lighting for the constructed dwelling will be designed to reduce the potential for excessive light spill to egress through the glazing.
- 3.2.2 Whilst the lighting design will provide functional lighting for the space, it will also seek to provide a calm and tranquil environment within the dwelling. This will be achieved through the use of wall mounted lighting that focuses light downwards onto the ground or upwards onto the ceilings, rather than outwards or towards glazed elevations.
- 3.2.3 The lighting design will apply the concept of accent lighting, ensuring that the areas that require lighting are targeted by the light sources, rather than washing the interior of the space with light.
- 3.2.4 Although there is potential for light spill through the glazing, this would be most significant if the interior lighting design achieved high levels of surface illuminance. However, in this case, the lighting will be designed to achieve low levels of surface illuminance for ambiance and tranquillity, through the use of low output luminaires.

4. The Approved Dwelling

4.1 Overview

4.1.1 In 2018 planning permission was granted for a two-storey detached property located on the Appeal Site. **Figures 4 - 7** shows the approved dwelling's elevations.



Figure 4: Approved dwelling north elevation



Figure 5: Approved dwelling east elevation.

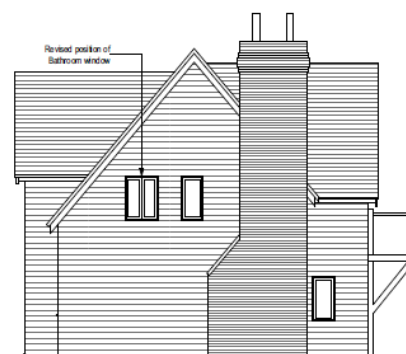


Figure 6: Approved dwelling west elevation.



Figure 7: Approved dwelling south elevation.

- 4.1.2 As can be seen in **Figures 4 and 7**, the approved dwelling had considerable glazing along the south façade, and a large expanse of glazing on the north facade. These façades face Bluebell Cottage to the north and the Landscape Character Area of Northern Heath and Forest to the south.
- 4.1.3 The Application Site Appeal Site is not isolated in its setting, with a number of similarly size properties located in the immediate area. Views towards the Appeal Site are restricted by boundary planting within and outside the Appeal Site, which is most dense in the north and west.
- 4.1.4 The surroundings of the Appeal Site are relatively sparsely inhabited, with eleven residential dwellings in the immediate surround. Although there are few dwellings surrounding the Appeal Site, these all consist of relatively large properties which have an impact on local character.
- 4.1.5 The Appeal Site sits in an area that has been given a class C level of tranquility according to the New Forest National Park Tranquil Area Mapping (2015) (**Figure 8**). This describes an area that remains comparably tranquil but that has been subject to development.

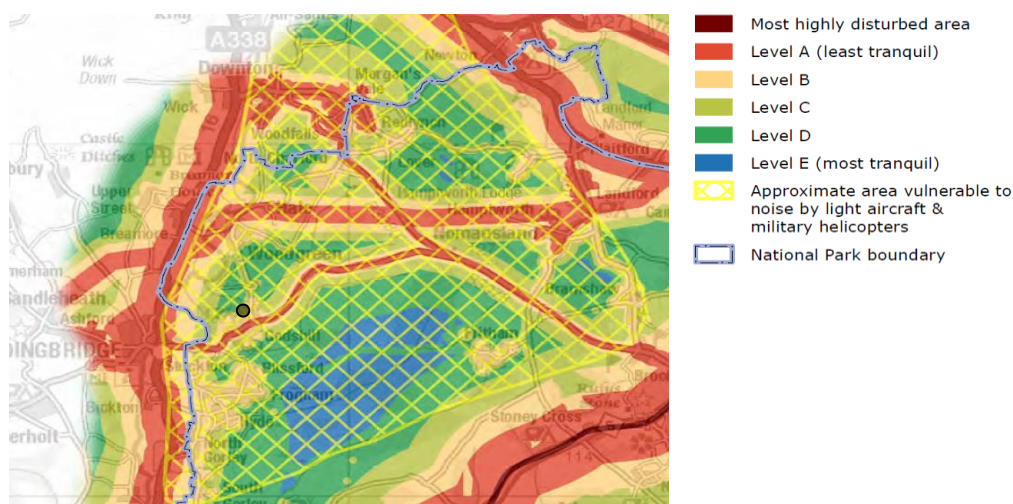


Figure 8: Extract from the New Forest National Park Tranquil Area Mapping (2015). The approximate Appeal Site is highlighted in black.

5. The Constructed Dwelling

5.1 General

5.1.1 The constructed development is a three-bedroom, two-storey dwelling, with associated outbuildings, swimming pool, and south facing balcony. **Figures 9 – 12** shows the constructed dwelling's elevations.



Figure 9: Constructed dwelling north elevation.



Figure 10: Constructed dwelling east elevation.



Figure 11: Constructed dwelling west elevation.



Figure 12: Constructed dwelling south elevation.

- 5.1.2 The constructed dwelling differs from the approved dwelling, and these differences have caused contention with the local planning authority. The main differences that can impact the light spill emanating from the Appeal Site are the increase in the glazed areas of the dwelling's façade and the repositioning of the dwelling in the Appeal Site.
- 5.1.3 On the ground floor, the open plan living, kitchen, and dining space has views to the south, with a small aperture providing views to the north. The entrance hall has views to the north through a small window and the largest section of glazing on the dwelling, and the ground floor bathroom has views to the north through a small aperture. On the first floor, the master bedroom, and two adjacent bedrooms have views to the south, the shower room and landing have views to the north through small windows. With the landing sharing the northern view with the entrance hall through the largest section of glazing, and the first floor bathroom has a view to the west through a small aperture.
- 5.1.4 Residential properties in the immediate vicinity are obscured from direct views of the Proposed Development via boundary screening or do not directly face areas of glazing on the dwelling's façade. This boundary screening is not equally dense across the whole Appeal Site, with restricted views of the constructed dwelling available in the north of the Appeal Site.
- 5.1.5 **Figure 13** shows the existing site location in context of the nearest surrounding residences.

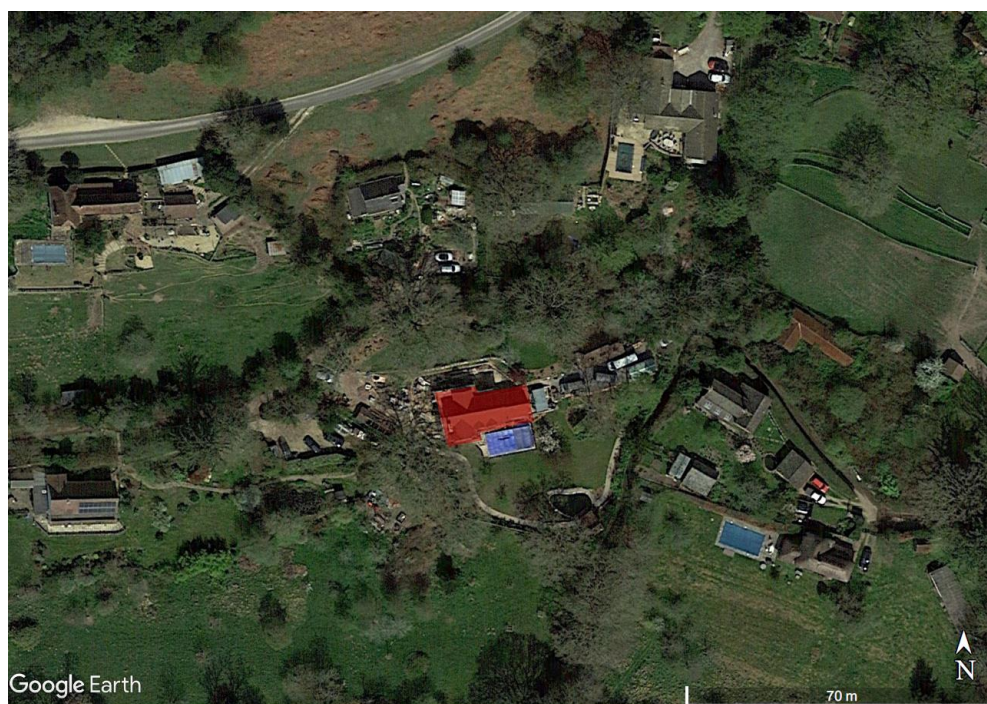


Figure 13: The existing site location in context of the surrounding residences. The existing dwelling is highlighted in red.

5.2 Potentially Sensitive Receptors

5.2.1 Several potentially sensitive receptors have been identified in the surroundings of the Appeal Site. These are:

- Residential dwelling 1, Bluebell Cottage (Latitude: 50°56'30.15"N, Longitude: 1°45'31.78"W) – Human – Amenity.
- Residential dwelling 2, Brookside (Latitude: 50°56'28.42"N, Longitude: 1°45'27.59"W) – Human – Amenity
- Residential dwelling 3, Long Orchard (Latitude: 50°56'28.28"N, Longitude: 1°45'35.67"W) – Human – Amenity
- Conservation Area surrounding the Appeal Site (Western Escarpment) – Ecological

5.2.2 Further detail on the locations of these potentially sensitive receptors can be found in **Appendix 6**.

5.2.3 Comments on these receptors have been made by the local planning authority:

- *“**Bluebell Cottage** – revised position of gable glazing provides clear view between properties, not screened by trees. Views of private garden and rear windows. Distance of 50m results in unacceptable overlooking.”*
- *“**Brookside** – raised concerns re overlooking and dominant impact on wider area. However, LPA agree that no material impact.”*
- *“**Long Orchard** – high gable and unauthorised spotlight on elevation (however no confirmation with regard to harm).”*
- *“However, while this additional, repositioned bulk has made a visual impact upon the Conservation Area, particularly to the views down the valley, it is not considered that the additional bulk of the property is significantly more impactful on or harmful to the character or appearance of the Conservation Area, than the approved scheme would have been. Likewise, in the more prominent and significant views from the South, across the valley, the additional bulk in its current position are not considered to be particularly more noticeable or harmful than the scheme that was approved in 2018.”*

5.2.4 Throughout the local planning authority’s written comments there are repeated mentions of concerns surrounding the impact of light pollution emanating from the Appeal Site on the surrounding potentially sensitive receptors, with particular attention focused on “*night time ecology*” and “*local tranquillity*”. With reference made to policies DP2 and SP15.

5.2.5 To assess the impact of light pollution emanating from the constructed dwelling, using the approved dwelling as a control, Dialux modelling has been conducted where the internal and dwelling mounted external lighting have been simulated (**Section 5.4**).

5.3 Existing Lighting

- 5.3.1 The Appeal Site sits in a relatively dark area, as seen in **Figure 14** by the dark blue coloration (0.25-0.5 NanoWatts / cm² / sr), with the closest medium brightness areas being Godshill and Fordingbridge. This level of darkness can almost exclusively be attributed to the complete lack of street lighting on the surrounding roads.

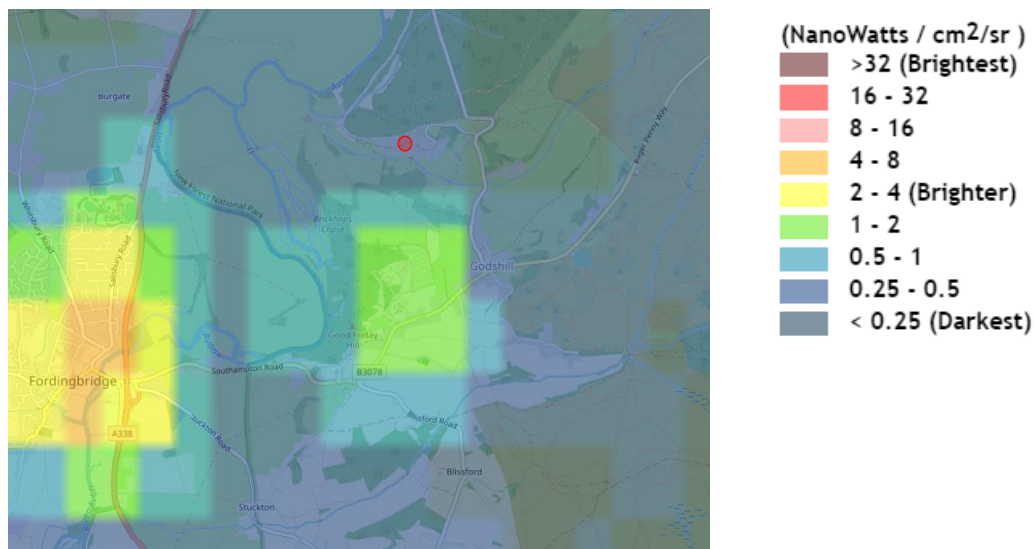


Figure 14: Extract from the CPRE Light Pollution Map. The approximate Appeal Site is highlighted in red.

- 5.3.2 As the Appeal Site falls under the ILP designation “*Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty etc*” an **Environment Zone of E1** described in **section 2.4.2** will be used to inform the lighting strategy for the constructed development.
- 5.3.3 The internal lighting for the constructed development consists of recessed downlighting and traditional pendant style lighting. **Image 1** depicts an example of the constructed dwelling’s internal lighting.



Image 1: The pendant luminaire installed in the staircase of the constructed dwelling. This luminaire is the main source of illumination in this space.

5.3.4 The external lighting installed on the constructed dwelling consists of Britannia Ships Light luminaires that utilise 7.5W 806lm traditional bulb style lamps using LED emitters. The light distributions of the luminaires are multi directional and exhibit little optical control. The specification sheet for these luminaires can be found in **Appendix 2**.

5.4 Dialux modelling

5.4.1 3D modelling of the approved and constructed dwelling has been conducted in order to assess the impact from lighting caused by the differences between the dwellings, and the impact from the associated external lighting on the surrounding landscape and the identified potential sensitive receptors.

5.4.2 The position, glazed area, and extent of the two dwellings have been modelled using the plans provided by Sage Gray Architects Ltd.

5.4.3 The internal lighting has been modelled using modern trends in residential lighting design and all available information on the internal lighting. Information on the luminaires used in the model can be found in **Appendix 3**.

5.4.4 The external lighting has been modelled using the provided luminaire specification (**Appendix 3**) and further comparative modelling was conducted using International Dark-Sky Association (IDA) approved luminaires (**Table 6** and **7**). The internal lighting was also included in the simulations of the exterior lighting to obtain a complete picture of the accumulative impact from artificial light on the Appeal Site.

5.4.5 External surface reflectance factors were 35% for the dwelling façade and all other façade elements and 20% for the dwellings roof.

5.4.6 Internal surface reflectance factors were 50% for the floor, 50% for the walls, and 30% for the ceiling.

5.4.7 The gazing parameters were a reflection factor of 10%, a degree of transmission of 90%, and a refractive index of 1.500.

5.4.8 The site topography and other screening features found on the site were not modelled and the maintenance factor was set to 1, as such the results can be considered to be the worst-case scenario at the period of initial installation.

5.4.9 To keep the results between the models as accurate as possible the location and size of the calculation grids was consistent across all models (**Appendix 4**). The calculation grids in the north of the site are elevated compared to the dwelling. The southern calculation grids occupying a lower position compared to the dwelling; all vertical grids have sections directly facing the façades of the dwellings to capture any potentially higher levels of illuminance that otherwise would be missed.

5.4.10 The comparative results of each simulation can be found in **Table 3 – 7**;

- **Table 3:** Light Spill Model Results Omitting All Exterior Lighting
- **Table 4:** Light Spill Model Results Including Dwelling Mounted Exterior Lighting
- **Table 5:** Light Spill Model Results Using IDA Approved Exterior Lighting
- **Table 6:** Light Spill Model Results Comparing The Installed Exterior Lighting With IDA Approved Exterior Lighting (Approved Dwelling)
- **Table 7:** Light Spill Model Results Comparing The Installed Exterior Lighting With IDA Approved Exterior Lighting (Constructed Dwelling)

Light Spill Model Results Omitting All Exterior Lighting				
Maintenance Factor: 1				
Calculation Grid #	Illuminance Calculation Type	Approved Dwelling (lux)	Constructed Dwelling (lux)	Change from Approved to Constructed (lux)
HO1	Ev ave	0.09	0.12	0.03
	Ev max	4.38	3.88	-0.5
HO2	Ev ave	0.051	0.053	0.002
	Ev max	1.32	0.95	-0.37
NB01	Ev ave	0.041	0.038	-0.003
	Ev max	0.18	0.17	-0.01
NB02	Ev ave	0.19	0.17	-0.02
	Ev max	0.48	0.47	-0.01
NB03	Ev ave	0.017	0.01	-0.007
	Ev max	0.11	0.04	-0.07
SB01	Eh ave	0.04	0.045	0.005
	Eh max	0.093	0.096	0.003
SB02	Eh ave	0.026	0.027	0.001
	Eh max	0.081	0.083	0.002

Table 3: Comparative modelling results omitting all exterior lighting.

- 5.4.11 As can be seen from **Table 3** the change in horizontal illuminance (H01 and H02) surrounding the two dwellings is negligible.
- 5.4.12 The vertical illuminances calculated at the north boundary (NB01-NB03) are low, with the maximum for the constructed dwelling only exceeding the recommended vertical illuminance stated by the ILP in GN08/18 of 0.40 lux by 0.07 lux. The change in vertical illuminance at the north boundary between the approved and constructed dwellings are also negligible.
- 5.4.13 The vertical illuminances calculated at the south boundary (SB01 and SB02) are also low, with all calculated levels below 0.1 lux. The change in vertical illuminance at the south boundary between the approved and constructed dwellings are also negligible.

Light Spill Model Results Including Dwelling Mounted Exterior Lighting				
Maintenance Factor: 1				
Calculation Grid #	Illuminance Calculation Type	Approved Dwelling (lux)	Constructed Dwelling (lux)	Change from Approved to Constructed (lux)
H01	Ev ave	2.12	2.15	0.03
	Ev max	29.3	25.1	-4.2
H02	Ev ave	0.22	0.11	-0.11
	Ev max	1.84	1.06	-0.78
NB01	Ev ave	0.24	0.23	-0.01
	Ev max	0.63	0.62	-0.01
NB02	Ev ave	0.85	0.81	-0.04
	Ev max	1.27	1.18	-0.09
NB03	Ev ave	0.57	0.56	-0.01
	Ev max	1.14	1.07	-0.07
SB01	Eh ave	0.63	0.64	0.01
	Eh max	0.98	1.13	0.15
SB02	Eh ave	0.36	0.36	0
	Eh max	0.86	0.83	-0.03

Table 4: Comparative modelling results including the specified exterior lighting.

- 5.4.14 As can be seen from **Table 4** the change in the horizontal illuminance surrounding the dwelling (H01 and H02) is negligible or negative. The negative result calculated for H01 is due to the change in the position of the dwelling on the site.
- 5.4.15 The vertical illuminance calculated on the north boundary show a negligible change between the two dwellings with an increase in the maximum from 0.47 to 1.18 (+0.71) calculated on NB02 compared to **Table 3** when adding the exterior lighting factors.
- 5.4.16 Calculations on the south boundary also show a negligible change between the approved and constructed dwellings. The increase due to the addition of the installed exterior lighting is greater than in the north of the Appeal Site, but is still low, with the maximum being below 1.2 lux.

Light Spill Model Results Using IDA Approved Exterior Lighting				
Maintenance Factor: 1				
Calculation Grid #	Illuminance Calculation Type	Approved Dwelling (lux)	Constructed Dwelling (lux)	Change from Approved to As Built (lux)
HO1	Ev ave	5.08	5.87	0.79
	Ev max	692	542	-150
HO2	Ev ave	0.051	0.054	0.003
	Ev max	1.32	0.95	-0.37
NB01	Ev ave	0.057	0.054	-0.003
	Ev max	0.22	0.22	0
NB02	Ev ave	0.28	0.27	-0.01
	Ev max	0.57	0.57	0
NB03	Ev ave	0.081	0.085	0.004
	Ev max	0.26	0.21	-0.05
SB01	Eh ave	0.14	0.16	0.02
	Eh max	0.28	0.4	0.12
SB02	Eh ave	0.065	0.071	0.006
	Eh max	0.24	0.27	0.03

Table 5: Comparative modelling results including the IDA approved exterior lighting.

- 5.4.17 Changing to IDA approved luminaires (detailed in **Table 5**) causes a marked increase in the horizontal illuminance calculated in the immediate surround of the dwellings (H01) compared to **Table 3** and **4**. This however does not extend beyond this area, with the calculated results at H02 showing a considerable decrease compared to **Table 4** and no change compared to **Table 3**.
- 5.4.18 All vertical illuminances calculated at the boundaries of the Appeal Site show either no change or negligible changes between the approved and constructed dwelling.
- 5.4.19 Comparing the results of the simulations of the specified exterior lighting with the results of the simulations for the IDA approved exterior lighting, consistent decreases in vertical illuminance at all boundary locations can be seen (**Table 6** and **7**).

Light Spill Model Results Comparing The Installed Exterior Lighting With IDA Approved Exterior Lighting (Approved Dwelling)				
Maintenance Factor: 1				
Calculation Grid #	Illuminance Calculation Type	Installed Exterior Lighting (lux)	IDA Approved Lighting (lux)	Change (lux)
NB01	Ev ave	0.24	0.057	-0.183
	Ev max	0.63	0.22	-0.41
NB02	Ev ave	0.85	0.28	-0.57
	Ev max	1.27	0.57	-0.7
NB03	Ev ave	0.57	0.081	-0.489
	Ev max	1.14	0.26	-0.88
SB01	Eh ave	0.63	0.14	-0.49
	Eh max	0.98	0.28	-0.7
SB02	Eh ave	0.36	0.065	-0.295
	Eh max	0.86	0.24	-0.62

Table 6: Comparative modelling results comparing the specified exterior lighting and the IDA approved exterior lighting for the approved dwelling.

Light Spill Model Results Comparing The Installed Exterior Lighting With IDA Approved Exterior Lighting (Constructed Dwelling)				
Maintenance Factor: 1				
Calculation Grid #	Illuminance Calculation Type	Installed Exterior Lighting (lux)	IDA Approved Lighting (lux)	Change (lux)
NB01	Ev ave	0.23	0.054	-0.176
	Ev max	0.62	0.22	-0.4
NB02	Ev ave	0.81	0.27	-0.54
	Ev max	1.18	0.57	-0.61
NB03	Ev ave	0.56	0.085	-0.475
	Ev max	1.07	0.21	-0.86
SB01	Eh ave	0.64	0.16	-0.48
	Eh max	1.13	0.4	-0.73
SB02	Eh ave	0.36	0.071	-0.289
	Eh max	0.83	0.27	-0.56

Table 7: Comparative modelling results comparing the specified exterior lighting and the IDA approved exterior lighting for the constructed dwelling.

6. Reducing Light Spill Potential (from Internal Lighting)

6.1 Main Staircase

- 6.1.1 As part of the proposed mitigation to reduce light spill, the main staircase, which is a corner stone of the constructed dwellings design, will be minimally illuminated during the hours of darkness.
- 6.1.2 Decorative light fittings are installed in this space, and although there is an increase in the glazed area of the façade, the impact from this decorative pendant luminaire is minimal (**Table 3**).

6.2 Internal Lighting Strategy

- 6.2.1 Typical lighting levels for residential dwellings are considerably lower than those found in public and commercial spaces. This will lead to far lower levels of light spill than would be associated with commercial or public developments of similar sizes.
- 6.2.2 To minimise the prominence of lighting throughout the constructed dwelling, it will be designed using ceiling recessed luminaires to provide focussed lighting to living spaces. Additionally, lighting will be specifically limited to warm colour temperatures (3000K max) and low lumen output luminaires, suitable for residential applications, to reduce the levels of lighting generated and enhance the views of the night skies from inside the dwelling.
- 6.2.3 The inclusion of low output lighting, and recessed ceiling luminaires, within the constructed dwelling reduces the potential additional impact when compared to the previous dwellings located on the site. Whereas there are greater extents of glazing associated with the constructed dwelling, the new lighting scheme uses more precisely controlled light distributions and is likely to reduce internal ambient lighting levels when compared to the previous dwellings.

6.3 Summary

- 6.3.1 Mitigation measures proposed against the reduction of light spill from internal lighting have been balanced against previous dwellings, to ensure the significance of the constructed dwelling is similar to the previous dwellings at night.
- 6.3.2 Whilst glazing is present throughout the constructed dwelling, 3D modelling has shown there is insignificant difference between the approved and constructed dwelling in regard to vertical illumination at the Appeal Site boundaries resulting from internal lighting.
- 6.3.3 The design of, and mitigation strategy outlined here for, the internal lighting of the constructed dwelling will ensure the internal lighting has minimal impact on the surrounding area.

7. Reducing Light Spill Potential (External Lighting)

7.1 General

- 7.1.1 This lighting strategy seeks to ensure that external lighting is applied carefully and sensitively to ensure the potential for effects on sensitive ecology and the tranquil area of Northern Heath and Forest are minimised or completely mitigated.
- 7.1.2 Mitigation measures for minimising the potential effects of external lighting on the night sky are also effective for minimising the potential for adverse effects on ecology. This is due to the principles applied, such as using warm white only light sources, and ensuring luminaires demonstrate superior levels of optical control, ensuring light is focussed only where required, and at a low levels, to reduce the potential for vertical light spill and upward light.
- 7.1.3 Light fittings have been selected with the aim of improving the quality of the luminaires found on the Appeal Site, and they must all have 0% Upward Light Ratio (URL) when installed with 0° of tilt.
- 7.1.4 External lighting will be limited to the façade of the constructed dwelling.
- 7.1.5 Further calculations were conducted using Lighting Reality, an industry standard software. The constructed building layout was used, and an indicative light spill diagram indicating the limited levels of light spill associated with external lighting is presented in **Appendix 6**.

7.2 Luminaire Types

- 7.2.1 Luminaires providing light around the constructed dwelling and approaching driveway will all have downward lighting distributions, and be installed in such a way as to avoid any direct source luminance being visible outside of the Appeal Site.
- 7.2.2 To minimise the potential visibility of luminaires, individual light sources will be focussed toward the ground, and will avoid directly illuminating the boundaries of the Appeal Site.
- 7.2.3 All specified luminaires will have IDA Dark Sky Approval.

7.3 Luminaire Colour Temperature

- 7.3.1 To ensure the potential for sky glow is minimised, luminaires will have a maximum Correlated Colour Temperature (CCT) of 3000K. Luminaires will be used with integral LED's and where the luminaire photometry is available from the manufacturer. This is to ensure the photometric footprint of the luminaires can be modelled to confirm the potential effects of light spill and upward light are unlikely to affect the tranquil area of Northern Heath and Forest.

7.4 Luminaire Summary Tables

- 7.4.1 Further information and example specifications of luminaire types for the constructed dwelling are presented in **Tables 8** and **9**.


Equipment Specification	Description
Light Source	LED [Light Emitting Diode]
Luminaire Type	LIGMAN JET 31 JE-30351-N-W27 (or similar approved)
CCT of Light Source (Kelvin)	3000K (maximum)
ULR (%)	0%
Luminaire Tilt	0 degrees from horizontal
Dimming and switching requirements	Reference Section 7.5 for detail
Example Luminaire Image	
Mounting Arrangement	Wall mounted
Restrictions	Maximum mounting height of 2m

Table 8: Luminaire Type A Specification


Equipment Specification	Description
Light Source	LED [Light Emitting Diode]
Luminaire Type	LIGMAN TRIANGLE 9 TR-31711-T3-W30 (or similar approved)
CCT of Light Source (Kelvin)	3000K (maximum)
ULR (%)	0%
Luminaire Tilt	0 degrees from horizontal
Dimming and switching requirements	Reference Section 7.5 for detail
Example Luminaire Image	
Mounting Arrangement	Wall mounted
Restrictions	Maximum mounting height of 2m

Table 9: Luminaire Type B Specification

7.5 Lighting Controls

- 7.5.1 External lighting will be controlled to ensure it is switched off when not required and operated by PIR sensors.
- 7.5.2 All PIR sensors must have a maximum time on adjustment of 5 minutes, and an 24hr timed switch will be used to ensure the PIR sensors are inactive after a curfew of 23:00. This will be installed with an override in case of an emergency after the curfew cut off.

8. Conclusion

8.1.1 The constructed dwelling has caused contention with the local planning authority, with a focus on the impact of light pollution emanating from the Appeal Site having an adverse impact on local tranquillity and night time ecology. Particular attention has been paid to the increase in glazing between the constructed dwelling and the approved dwelling.

8.1.2 Using a 3D modelling and lighting calculation software the approved and constructed dwellings have been modelled, with calculations of vertical illuminance conducted at the identified sensitive boundaries (north and south). The results of this modelling show either a negligible or no change in the vertical illuminance falling onto the Appeal Site boundaries as a result of the repositioning of, and glazed area increase, on the constructed dwelling compared to the dwelling approved in 2018.

8.1.3 Additionally, mitigation measures for minimising the effects of lighting will significantly reduce any impact the constructed dwelling will have on the tranquil area of the Northern Heath and Forest and the conservation area of Western Escarpment. This is due to the strict controls on colour temperature, light output and light distribution from light sources that have been outlined in the lighting strategy.

8.1.4 Mitigation measures outlined within this assessment have been developed with reference to the New Forest National Park Local Plan (2016-2036), in particular to Policy SP15 Tranquillity;

“New development should avoid, or provide mitigation measures, if the proposal will lead to noise, visual intrusion, nuisance and other unacceptable environmental impact on the National Park and its special qualities.

This should include reducing the impact of light pollution on the ‘dark skies’ of the National Park and control of development to prevent artificial lighting from eroding rural darkness and tranquillity.

Development proposals that seek to remove visually intrusive man-made structures from the landscape will be supported.”

8.1.5 And to policy DP2 General development principles;

“All new development and uses of land within the New Forest National Park must uphold and promote the principles of sustainable development. New development proposals must demonstrate high quality design and construction which enhances local character and distinctiveness. This includes, but is not restricted to, ensuing;

f) Development would not result in unacceptable adverse impacts associated with traffic or pollution (including air, soil, water, noise, and light pollution).”

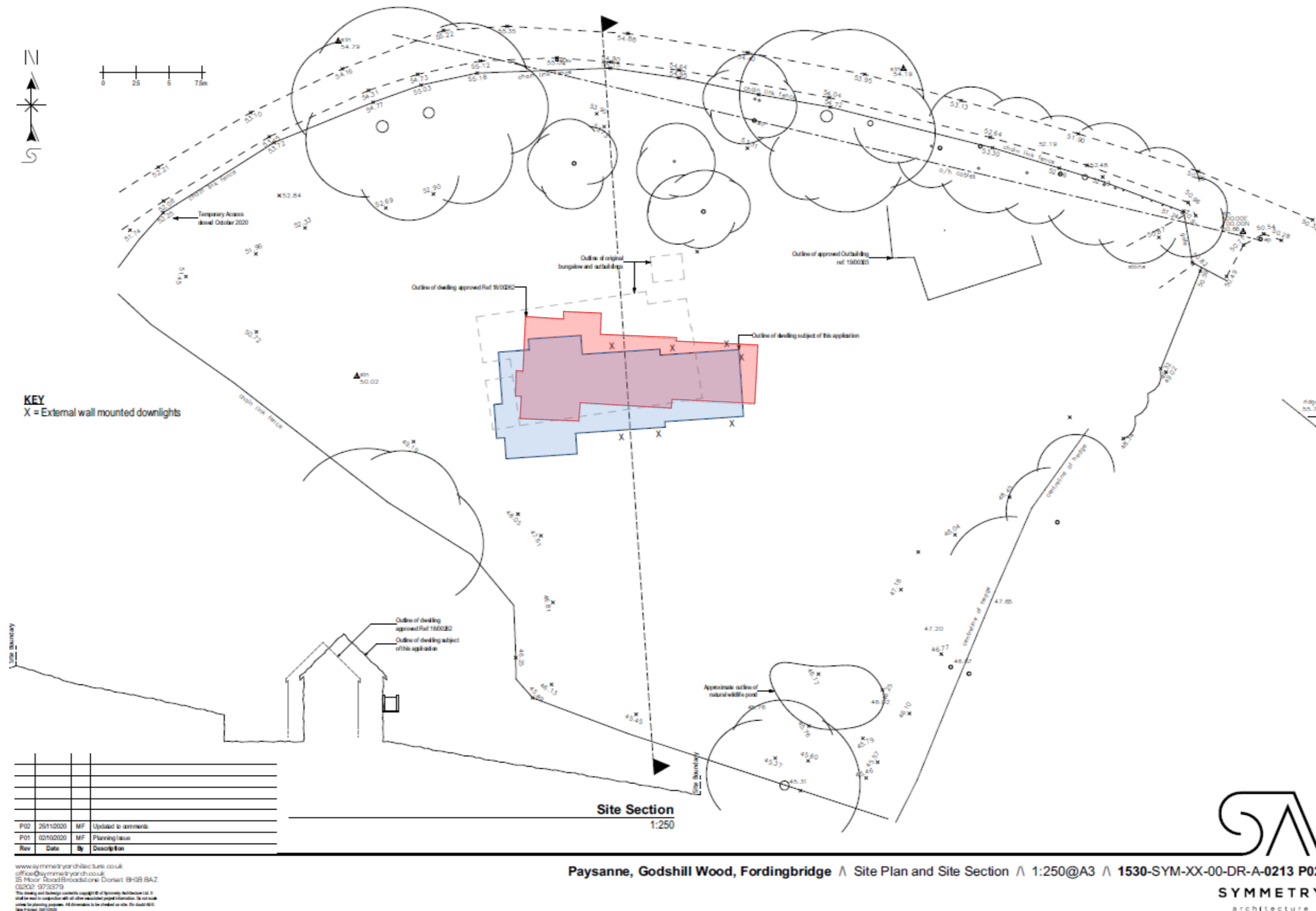
8.1.6 This has been achieved chiefly through careful consideration in luminaire selection, through the use of sensors, and by installing lighting only in areas where it is required for safety and amenity.

8.1.7 Through compliance with the relevant criteria outlined in ILP GN01/20 and the external lighting strategy outlined in this assessment, the exterior lighting would comply with the legislative policies within the Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005, along with those outlined in the NPPF 2019 that are in place to protect the environment and neighbourhoods from obtrusive exterior lighting sources.

8.1.8 Considering the above, the mitigation strategy, the natural screening, and the light spill modelling, the visual impact of the interior lighting from the constructed development is unlikely to adversely affect the tranquil area of the Northern Heath and Forest, the conservation area of Western Escarpment, or local amenity.

9. Appendix 1 – Site Layout Plan

9.1.1 The site layout plan depicts the location of the approved dwelling (red) and the constructed dwelling (blue) in the Appeal Site.



10. Appendix 2 – Luminaire specification for the installed exterior lighting

STEPHEN GRAESER PLANNING

Ivy Cottage, Shillingstone, Blandford Forum, Dorset DT11 0SJ
Tel: 01258 861527 Mobile: 07827 758190
E-mail: sgraeserplanning@gmail.com
www.sgraeserplanning.co.uk

Paysanne, Godshill Wood, Fordingbridge SP6 2LR:

External Lighting Specification

Manufacturer:	www.jim-lawrence.co.uk
Product:	Britannia Ships Light
Dimensions:	200mm (w) x 240mm (h) x 220mm (d)
Materials	Antiquated brass
Bulb	Classic GLS LED Filament Bulb
Watts	7.5W (equivalent to 60W incandescent)
Lumens	806 lumens



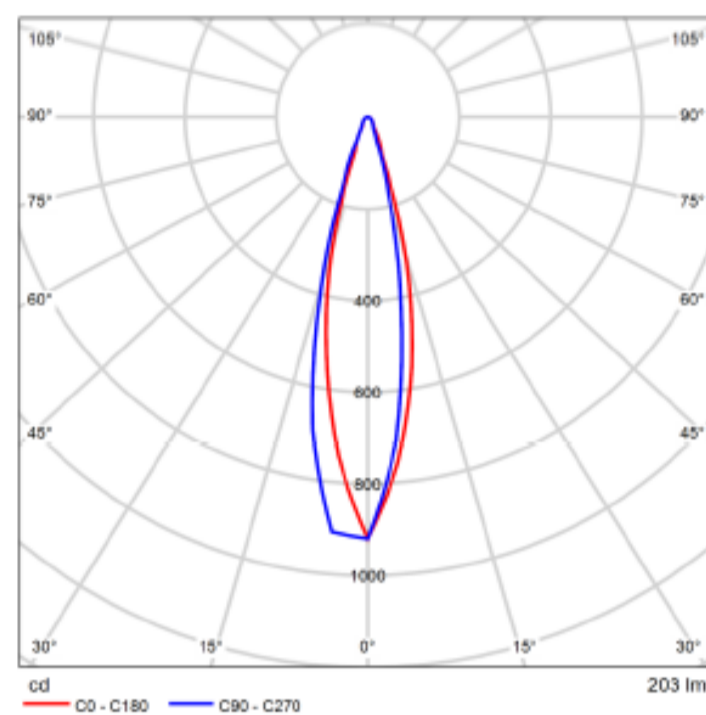
Note: Image for illustrative purposes only - not to scale

11. Appendix 3 - Specification information for the internal luminaires used in the 3D modelling

SIMONCHINA LED 晶纯36°KC1光源模组 3W 2700K



Article No.	N0424-0241
P	3.0 W
$\Phi_{\text{Luminaire}}$	203 lm
Luminous efficacy	67.7 lm/W
CCT	2700 K
CRI	90



Polar LDC

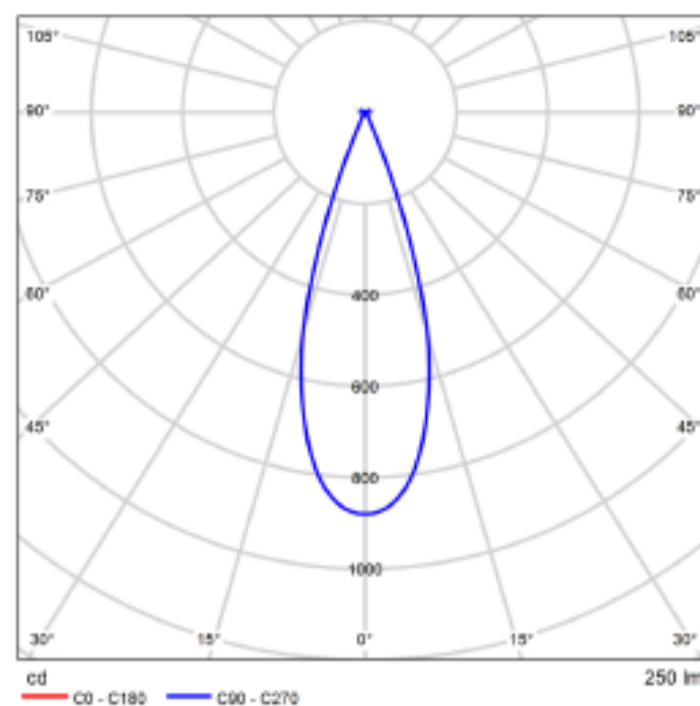
3W 36D

DRAFT

MOLTO_LUCE TRIGGA HL XL VOLARE 6W 3000K 30° bronze eloxiert - chrom

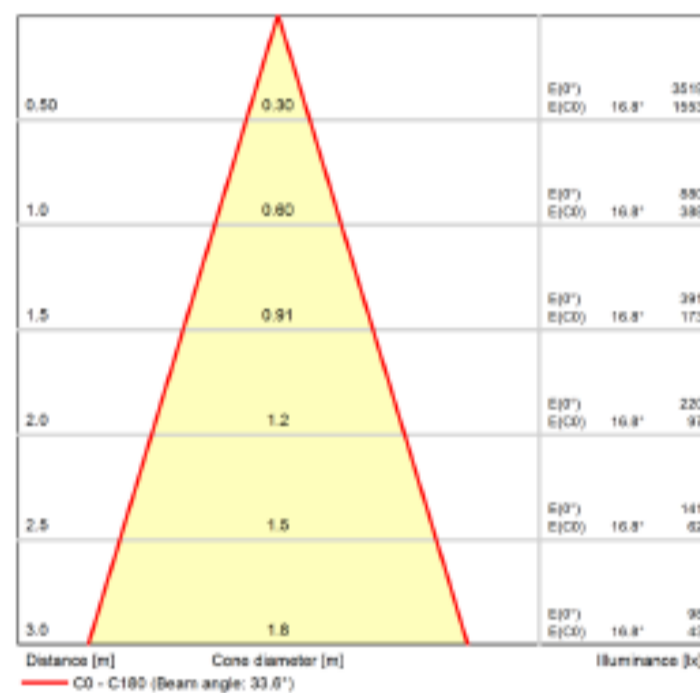


Article No.	662-020020229120
P	6.0 W
$\Phi_{\text{Luminaire}}$	250 lm
Luminous efficacy	41.7 lm/W
CCT	3000 K
CRI	90



Polar LDC

TRIGGA HÄNGELEUCHTE VOLARE aus Aluminium, bronze eloxiert, LFO Linse perfekt entblendet durch filigraner Mikrofacettenstruktur Ausstrahlwinkel 30°, Lichtaustritt direkt, UGR <16, mit Betriebsgerät, max. 350mA Kabel schwarz, Stoffgeflecht, Adapter/Baldachin chrom, IP20

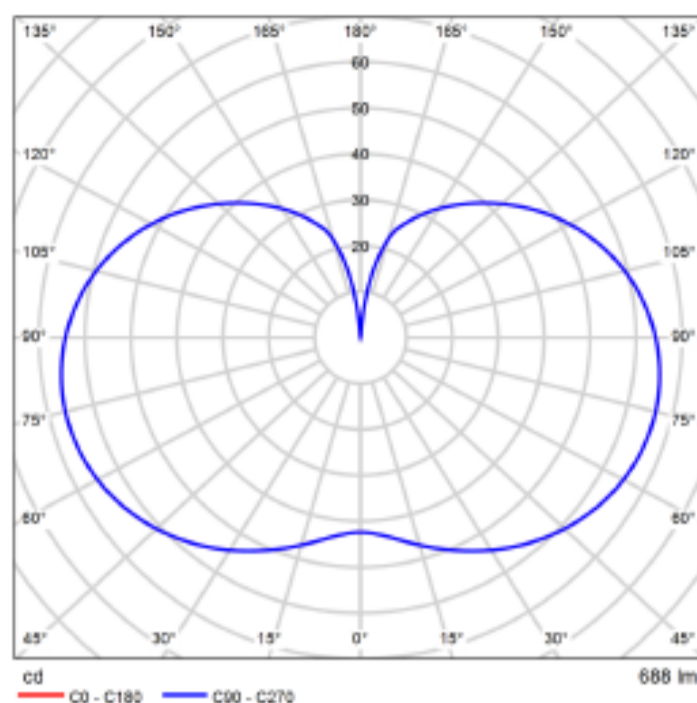


Cone diagram

FRANKLITE PCH228



Article No.	Almond pendant Opal
P	9.0 W
$\Phi_{\text{Luminaire}}$	688 lm
Luminous efficacy	76.4 lm/W
CCT	2700 K
CRI	81



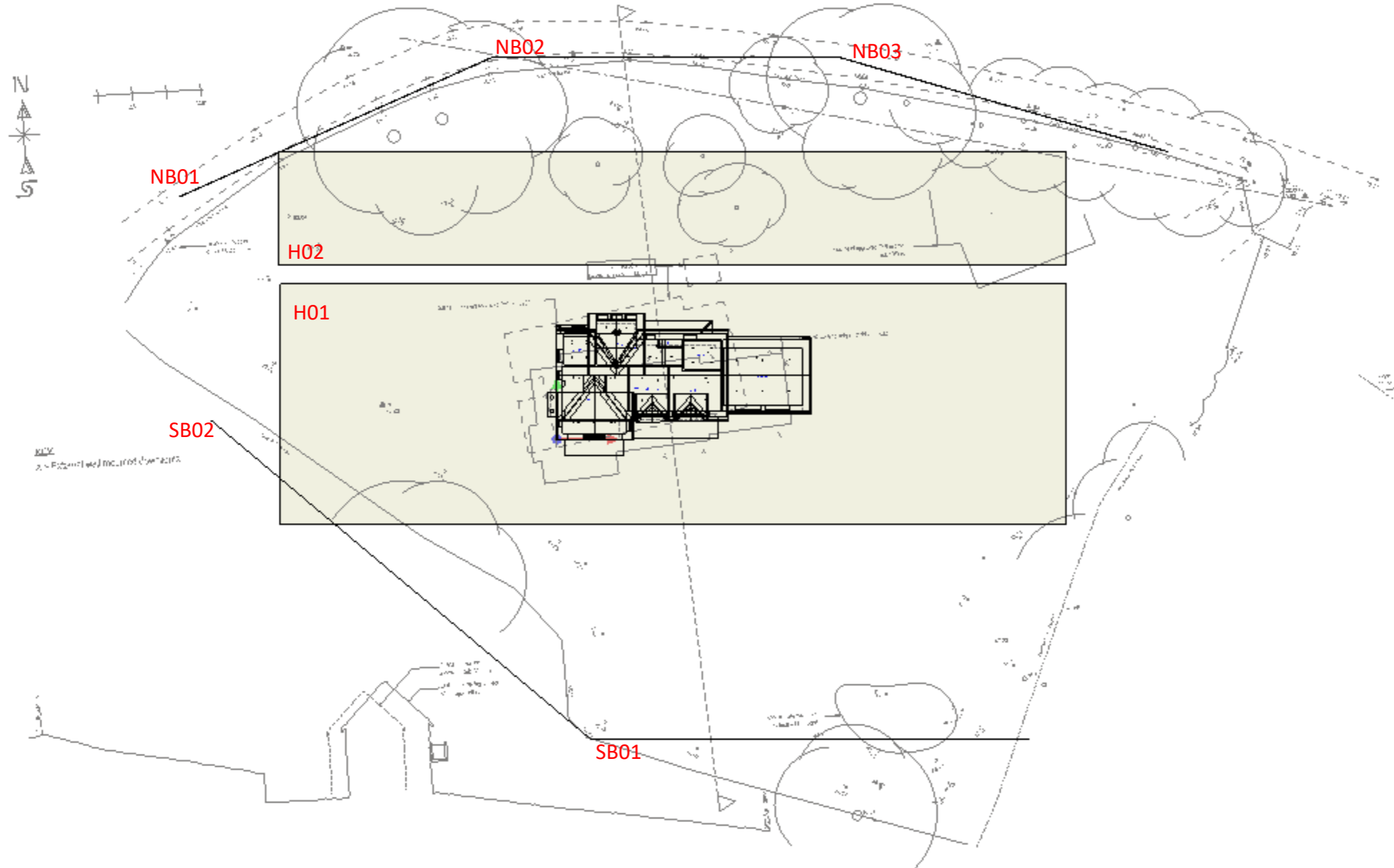
Polar LDC

Ribbed glass on a satin nickel and clear cable suspension.

Glare evaluation according to UGR											
		70	70	50	50	30	70	70	50	50	30
μ Ceiling		50	30	50	30	30	50	30	50	30	30
μ Walls		20	20	20	20	20	20	20	20	20	20
μ Floor		20	20	20	20	20	20	20	20	20	20
Room size	Viewing direction of right angles to lamp axis	Viewing direction parallel to lamp axis									
X	Y										
2H	2H	7.4	8.4	8.2	9.3	10.4	7.4	8.4	8.2	9.3	10.4
	3H	9.9	10.8	10.7	11.7	12.8	9.9	10.8	10.7	11.7	12.8
	4H	11.2	12.1	12.9	13.0	14.1	11.2	12.1	12.6	13.0	14.1
	6H	12.4	13.3	13.3	14.2	15.3	12.4	13.3	13.3	14.2	15.3
	12H	13.1	13.9	13.9	14.6	15.9	13.1	13.9	13.9	14.6	15.9
4H	2H	8.2	9.1	9.1	10.0	11.1	8.2	9.1	9.1	10.0	11.1
	3H	10.9	11.7	11.8	12.6	13.8	10.9	11.7	11.8	12.6	13.8
	4H	12.3	13.0	13.2	14.0	15.2	12.3	13.0	13.2	14.0	15.2
	6H	13.5	14.4	14.7	15.5	16.5	13.5	14.4	14.7	15.5	16.5
	12H	14.4	15.0	15.4	16.0	17.2	14.4	15.0	15.4	16.0	17.2
8H	2H	15.1	15.7	16.1	16.6	17.9	15.1	15.7	16.1	16.6	17.9
	3H	12.8	13.4	13.8	14.4	15.8	12.8	13.4	13.8	14.4	15.8
	4H	14.5	15.0	15.5	16.0	17.2	14.5	15.0	15.5	16.0	17.2
	6H	15.4	15.9	16.3	16.8	18.1	15.4	15.9	16.3	16.8	18.1
	12H	16.2	16.6	17.2	17.6	18.9	16.2	16.6	17.2	17.6	18.9
12H	4H	12.9	13.5	13.9	14.5	15.7	12.9	13.5	13.9	14.5	15.7
	6H	14.7	15.1	15.7	16.1	17.4	14.7	15.1	15.7	16.1	17.4
	8H	15.6	16.0	16.6	17.0	18.3	15.6	16.0	16.6	17.0	18.3
	12H	15.6	16.0	16.6	17.0	18.3	15.6	16.0	16.6	17.0	18.3
Variation of the observer position for the luminaire distances S											
S = 1.0H	+0.1 / -0.1					+0.1 / -0.1					
S = 1.5H	+0.2 / -0.2					+0.2 / -0.2					
S = 2.0H	+0.3 / -0.4					+0.3 / -0.4					
Standard table	BK11					BK11					
Correction summand	0.9					0.9					
Corrected glare indices referring to 688lm Total luminous flux											

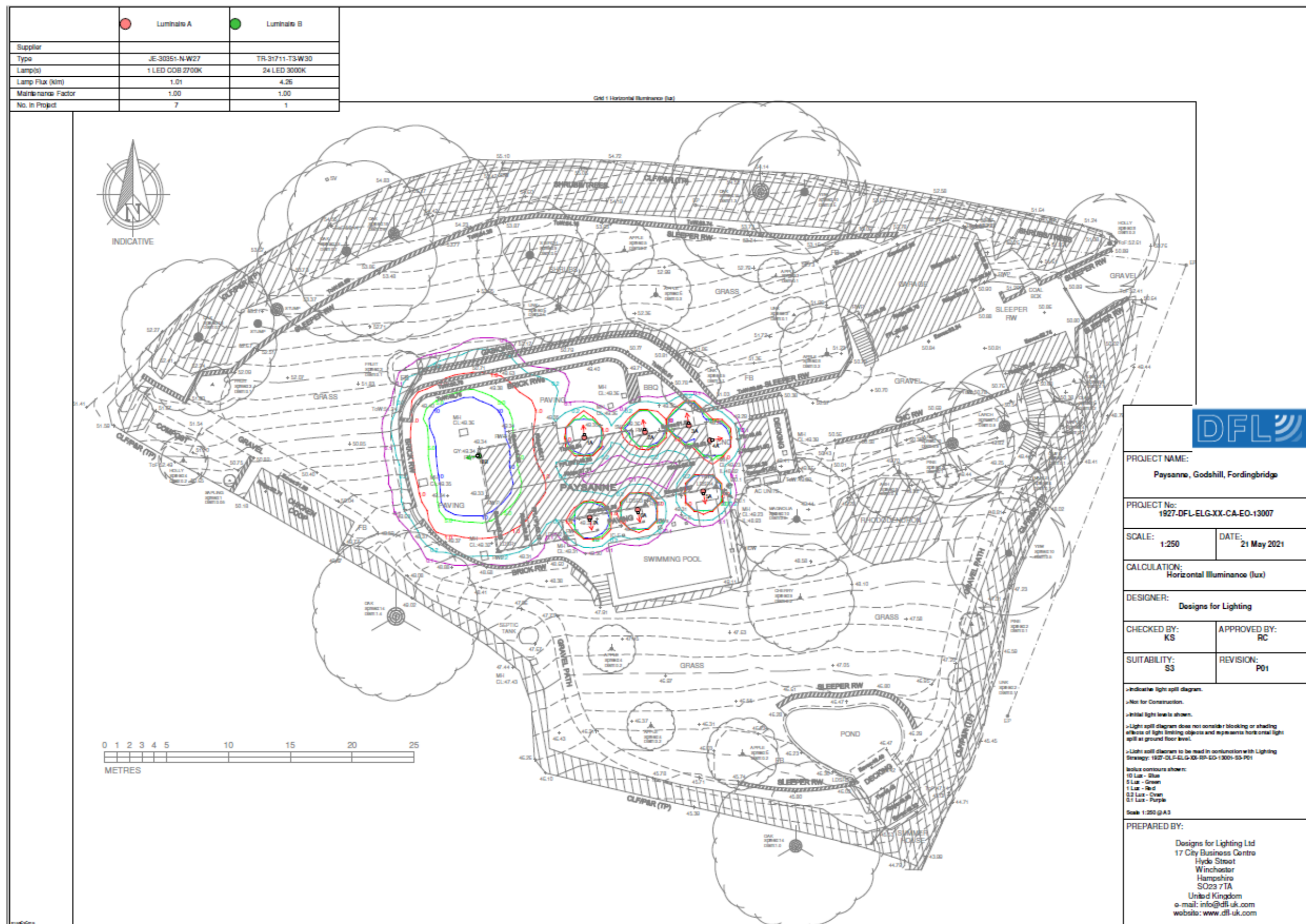
UGR diagram (SHR: 0.25)

12. Appendix 4 – Dialux calculation object locations



13. Appendix 5 – Indicative exterior light spill diagram

See separate file: 1927-DLF-ELG-XX-CA-EO-13007-S3-P01



14. Appendix 6 – Identified sensitive receptor map



Receptor Number	Receptor Name	Receptor Type	Marker Colour
1	Residential dwelling 1, Bluebell Cottage (Latitude: 50°56'30.15"N, Longitude: 1°45'31.78"W)	Human – Amenity	Yellow
2	Residential dwelling 2, Brookside (Latitude: 50°56'28.42"N, Longitude: 1°45'27.59"W)	Human – Amenity	Green
3	Residential dwelling 3, Long Orchard (Latitude: 50°56'28.28"N, Longitude: 1°45'35.67"W)	Human – Amenity	Purple
4	Conservation Area of Western Escarpment	Ecological	Light Purple