# Land south of Hey Beck Lane

## Lighting Assessment Report

Indicative outline assessment of potential lighting impacts on the Ancient Woodland of Dum Wood as a result of lighting introduced within the Proposed Development.

On behalf of C.C. Projects

415.065736.00001

22nd July 2026 | Rev.02

SLR





## Table 1 - Issue and Revision Record

| Revision | Date | Written | Edited | Checked | Authorised | Amendments |
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| 01 | 17.07.2026 | Noah Derrington | Ryan Dale | Tom Clements | Noah Derrington | First Issue |
| 02 | 22.07.2026 | Noah Derrington | Ryan Dale | Tom Clements | Noah Derrington | Response to Comments |

## Basis of Report

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**Figure 1 - Land south of Hey Beck Lane Proposed Development Site Location (Red Line Boundary)**

Proposed Development Site Location Scale 1:5,000 @ A3

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# Introduction

## 1 - About the Author

1-1 This document has been prepared by Noah Derrington, Principal Lighting Consultant who is a Lighting Designer and Assessor with extensive experience in this field of work and has stood as an expert witness in the field of Lighting Design and Lighting Impact Assessment.

1-2 The SLR Lighting design team have experience with residential masterplanning, architectural lighting design, landscape and urban realm, historic buildings and highways lighting schemes, with a specialisation in developing lighting schemes for ecologically and environmentally sensitive sites throughout the planning process. The team has specific expertise in managing complex assessments for high sensitivity receptors including light sensitive bat species, ancient woodland, Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) or other constraints such as sites within protected National Landscapes.

## 2 - The Brief

2-1 SLR Consulting Ltd (SLR) has been commissioned by C.C. Projects (the 'Appellant') to provide lighting consultancy services to inform the outline application (the 'Application' Ref. 2020/60/92350/E) for a new residential development (use class C3) of up to 181 dwellings, engineering and site works, demolition of existing property, landscaping, drainage and other associated infrastructure (the 'Proposed Development') on Land south of Hey Beck Lane, Chidswell, Shaw Cross, Dewsbury (the 'Site').

2-2 C.C. Projects intend to submit this document as part of the appeal process (the 'Appeal') to provide an assessment, with a basis of evidence, to inform the Inspector with relation to lighting effects on to the adjacent ancient woodland of Dum Wood and its associated ecological receptors.

2-3 An outline planning application was refused by Kirklees Council on 27 January 2026 and this document has been prepared in the context of the Appeal. The Application was refused on the basis of a sole reason for refusal as follows:

*"The proposed development, due to its size and proximity to Dum Wood, and due to the increased residential population that the development would introduce nearby and the insufficient depth of the proposed buffer, together would result in significant intensification in the use of Dum Wood, and unacceptable harm to and deterioration of this ancient woodland and Local Wildlife Site, contrary to policies LP30 and LP33 of the Kirklees Local Plan, and chapter 15 of the National Planning Policy Framework."*

2-4 The principle of the Lighting Assessment is to establish if there is any materially significant harm to Dum Wood or its capacity to support existing ecological receptors, such as light sensitive bat species, as a result of new lighting required within the Proposed Development. Consideration is made to the referenced Local Plan Policies and NPPF.

2-5 The Kirklees Local Plan Policy LP30 states:

*Development proposals will be required to:*

*(i) result in no significant loss or harm to biodiversity in Kirklees through avoidance, adequate mitigation or, as a last resort, compensatory measures secured through the establishment of a legally binding agreement;*

*(ii) minimise impact on biodiversity and provide net biodiversity gains through good design by incorporating biodiversity enhancements and habitat creation where opportunities exist;*

2-6 The Lighting Assessment is required to identify lighting related risks to ecological receptors, assess night-time impacts and establish suitable design parameters required to produce a compliant design for lighting within the Site boundary that does not result in any materially significant harm or deterioration to Dum Wood.

2-7 The Lighting Assessment sets out how the objective of preventing lighting adversely affecting ecological habitats or other sensitive receptors associated with Dum Wood will be achieved whilst maintaining the appropriate levels of lighting necessary for safety, security and amenity of road users and residents.

## 3 - Context

3-1 The boundary of the Site is shown edged in red in Figure 2 the 'Site Location Plan' (APP5). The Site, covering approximately 7.05 hectares, is located south of Hey Beck Lane, Chidswell, Kirklees:

- The Site, is in longstanding use as farmland, comprising agricultural land divided by hedgerows and mature trees. The extensive farming across the Site means biodiversity is limited.
- The Site is bound to the north and west by residential properties lining Hey Beck Lane and Leeds Road and sits within a wider context which is characterised by suburban development and major roads.
- The Site is adjacent to Dum Wood which is identified as a Local Wildlife Site and is part of the Wildlife Habitat Network. Dum Wood is also designated as Ancient Replanted Woodland.

*See.* **Figure 7 - Indicative Site Layout Plan on page 10**

## 4 - Methodology

4-1 A Site walkover was undertaken by SLR assessors on the 13th July 2026.

4-2 The project designated ecologist (Brooks Ecological) was engaged to provide relevant input to inform the basis of the Lighting Assessment through the knowledgeable identification of light sensitive receptors, as determined by ecological surveys, which in turn inform the selection of appropriate illuminance constraints to protect the quality of existing habitats. Specific consideration was made to the species that are most light sensitive, including bats utilising Dum Wood as part of a wider network of foraging and commuting routes.

4-3 This Lighting Assessment document provides reference to relevant standards, guidance, local and national policies to establish suitable design criteria and constraints.

4-4 This basis informs the indicative design specification, mitigation strategies and assessment criteria for the outline scheme and defines parameters for the application.

4-5 An outline impact assessment including a 3D photometric model of an indicative section of the development, referred to as the 'Area of Study', was made on the basis of these principles being applied to the Illustrative Site Layout.

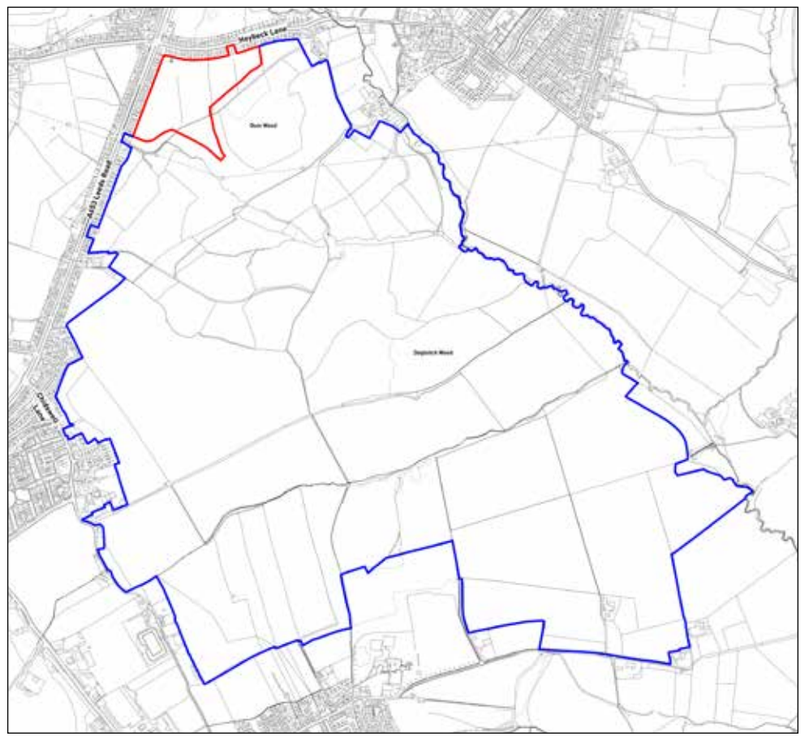
4-6 In accordance with Condition 27, it is recommended that a future detailed lighting design covering the full extent of the Proposed Development Site is to be produced, based on the design criteria, parameters and constraints set out in this document being applied to the detailed design layouts of the Proposed Development at the reserved matters stage.

4-7 A further lighting impact assessment must be provided on the basis of the detailed lighting design and this should include a future numerical assessment derived from full 3D photometric modelling. This assessment covering all identified receptors is to be provided at the detailed design stage along with details of equipment specifications and a control strategy.

4-8 The detailed lighting design must comply with the recommendations set out in this document for the benefit of light sensitive ecology.

### Figure 2 - Red Line Boundary & Blue Line Ownership Boundary

Extract of Document Shown:
APP5 Site Location Plan by Enjoy Design (Not to Scale)



# Site Survey

## 5 - Existing Site Condition

5-1 SLR conducted a site walkover during the evening of 13th July 2026 to better understand the Site's topography, identify potential receptors and assess the extent of artificial lighting on and around the Proposed Development Site location.

5-2 This does not constitute a full Baseline Lighting Survey as due to the time of year, there is no true night - with Astronomical Twilight only when the Sun's centre is between 12° and 18° below the horizon (23:38 - 02:44), as a result, no light measurements were taken.

5-3 At the time of observation (21:00 - 22:00) the ambient conditions were still within the range of Daylight and into Civil Twilight meaning no observations were able to be made in 'contextual darkness'.

5-4 For the avoidance of doubt this does not affect the conclusions of this Report.

5-5 6 viewpoints were visited and photography taken during the walkover.

5-6 The aerial photograph shown in **Figure 3** displays the view points' locations. For detailed location maps and GPS coordinates, refer to the individual view point summary pages within this document.

**5-7 Proposed Development Location:**

5-8 Land South of Hey Beck Lane, Chidswell, Kirklees

5-9 The boundary of the Proposed Development Site is shown in red in **Figure 3**.




**Figure 3 - On-Site Viewpoint Map**

Viewpoint Location Plan. Not to Scale - The licence for ESRI World Imagery:

Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community







## 6 - Receptor Group 1

Viewpoint: 53°42'50.7"N 1°35'24.9"W

### Dum Wood (Northern Edge)

6-1 Tree line spanning the northern periphery of Dum Wood, adjacent to the eastern development parcels of the Proposed Development Site.

6-2 Care should be taken to maintain this feature as dark habitat for light sensitive species to traverse around the periphery of the ancient woodland, maintaining the quality of the woodland as part of a wider network of linked foraging and commuting habitats.

6-3 No baseline data on existing lighting conditions could be collected at the time of observation but it is assumed to be in 'contextual darkness' with no nearby sources of light.




## 7 - Receptor Group 2

Viewpoint: 53°42'48.8"N 1°35'26.7"W

### Dum Wood (Western Edge)

7-1 Tree line spanning the western periphery of the ancient woodland of Dum Wood, adjacent to the southern development parcel of the Proposed Development Site.

7-2 Care should be taken to maintain this feature as dark habitat for light sensitive species to traverse around the periphery of the ancient woodland, maintaining the quality of the woodland as part of a wider network of linked foraging and commuting habitats.

7-3 No baseline data on existing lighting conditions could be collected at the time of observation but it is assumed to be in 'contextual darkness' with no nearby sources of light.




## 8 - Receptor Group 3

Viewpoint: 53°42'53.2"N 1°35'15.5"W

### Dum Wood (Interior)

8-1 Inside the ancient woodland of Dum Wood was observed to be well screened by the mature trees at the periphery of the woodland parcel.

8-2 Care should be taken to maintain this feature as dark habitat for light sensitive species to utilise the interior of the ancient woodland, maintaining the quality of the woodland as part of a wider network of linked foraging and commuting habitats.

8-3 No baseline data on existing lighting conditions could be collected at the time of observation but it is assumed to be in 'contextual darkness' with no nearby sources of light.









## 9 - Receptor Group 4

Viewpoint: 53°42'56.1"N 1°35'26.2"W

### Hey Beck Lane

9-1 The length of Hey Beck Lane that runs approximately east / west and forms the northern boundary of the Proposed Development Site is currently lit with typical street lighting.

9-2 The residential properties situated along Hey Beck Lane are subject to moderate levels of existing light spill from the existing street lighting.

9-3 The area to the north of the Proposed Development along Hey Beck Lane is observed to be urban in nature.

9-4 The proposed junction leading to the Proposed Development will join this well lit roadway and will likely be subject to appropriate street lighting.




## 10 - Receptor Group 5

Viewpoint: 53°42'56.2"N 1°35'35.9"W

### Leeds Road (A653) North

10-1 The A365 Leeds Road runs approximately north / south adjacent to the western boundary of the Proposed Development Site.

10-2 The roadway is observed to be a 40mph dual carriageway with residential properties facing the roadway with primary façades on both sides.

10-3 These properties are currently subject to high levels of existing lighting from the existing street lighting, and the area is generally observed to be an urban context.

10-4 The approximately 10 metre in height lighting columns are partially visible from within the Proposed Development Site.




## 11 - Receptor Group 6

Viewpoint: 53°42'48.4"N 1°35'41.2"W

### Leeds Road (A653) South

11-1 The A365 Leeds Road runs approximately north / south adjacent to the western boundary of the Proposed Development Site.

11-2 The roadway is observed to be a 40mph dual carriageway with residential properties facing the roadway with primary façades on both sides.

11-3 These properties are currently subject to high levels of existing lighting from the existing street lighting, and the area is generally observed to be an urban context.

11-4 The approximately 10 metre in height lighting columns are partially visible from within the Proposed Development Site.



## 12 - Lighting Zone Designation

12-1 The ecology report confirms the presence of a small number of light sensitive bat species utilising habitats within Dum Wood and around the Proposed Development Site. For the purposes of identifying parameters for the protection of light sensitive ecology such as bats, a hierarchy of illuminance limits is required.

12-2 Guidance set out in ***Section 4.28*** of ***ILP Guidance Note 08/23 - Bats and Artificial Lighting at Night*** states: *'The ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits'.*

12-3 The use of Illuminance Limit Zonation allows for the tapering of light from the areas within the development that require artificial light for the safety, security and amenity of humans within the Proposed Development and the habitats used by light sensitive species that must be protected from adverse lighting conditions, see **Figure 5**.

12-4 The illuminance limits apply at the boundary between zones. For example: at the boundary between the 'Zone C - Development Edge or Transition Zone' and the ' Zone B - Lighting Buffer Zone' the maximum light recorded should be less than the illuminance limit for Zone B.

12-5 Illuminance Limits are typically measured at ground level for horizontal measurements and in a vertical plane facing the development area or source of artificial lighting. Vertical measurement planes typically extend 0.5 to 8 metres in height to represent the typical flight heights of bats.

12-6 Guidance set out in ***Section 4.54*** of ***ILP Guidance Note 08/23 - Bats and Artificial Lighting at Night*** states: *'Complete Darkness' or a 'complete absence of illumination' is typically defined as 'Where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is at or below 0.2 lux on the horizontal plane, and at or below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night.'*

12-7 'Relative Darkness' is typically defined by the ecologist as a level of illumination deemed unlikely to deter use of an area by light sensitive ecology and considered safe to preserve the quality of the habitat. 'Contextual Darkness' is typically considered levels of light observed to be in line with the current ambient lighting conditions from predominantly natural sources but may include variation from the influence of moonlight and sky glow.

### Figure 4 - Examples of Physical Light Screening Options

Extract from 'Bats and Artificial Lighting at Night' (Institution of Lighting Professionals Guidance Note 08/23) Figure 6.




### Figure 5 - Example of Illuminance Limit Zonation

Extract from 'Bats and Artificial Lighting at Night' (Institution of Lighting Professionals Guidance Note 08/23) Figure 4.

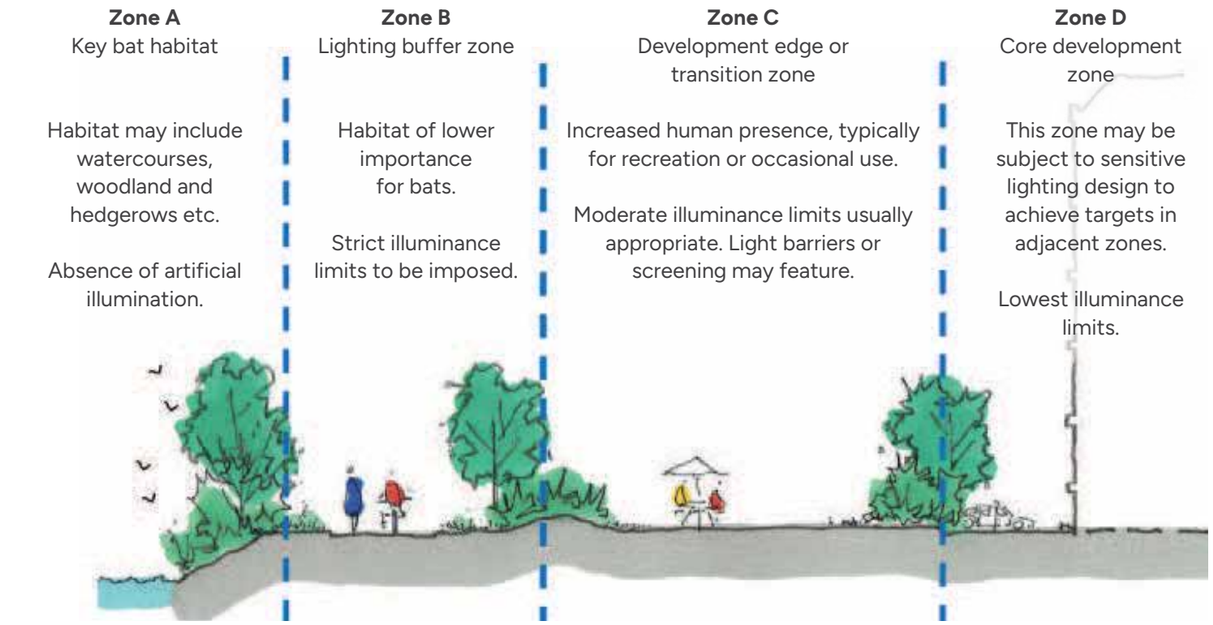






Illustration: Roadway & Dark Zone

## 13 - Ecological Buffer Zones

13-1 The plan in Figure 6 shows the application of lighting strategy parameters based on the Parameter Plan and Illustrative Site Layout by Enjoy Design.

13-2 Illuminance limits are as defined by the designated project ecologist including the locations of the 'Lighting Buffer Zones' and 'Dark Zones'.

13-3 The 'Zone A - Key Bat Habitat' is to be protected by a '**Dark Zone**' that is shown to include areas identified as supporting foraging and commuting routes for bats, including the ancient woodland of Dum Wood.

13-4 The restriction of light spill to the Dark Zone is defined by the ecologist as:

- Minimum buffer width from key habitat features: 20m.
- ≤ 0.4 lux peak on the vertical surface 0.5m to 8m from ground level.
- ≤ 0.2 lux peak on the horizontal plane at ground level.

13-5 The Zone B '**Lighting Buffer Zone**' is the designated area between the Proposed Development boundary and areas of ecological significance where there is to be no lighting installed and spill light must be minimised through appropriate mitigation. This area is to be maintained in darkness to the greatest degree possible, however no strict illuminance limits apply as the buffer is intended to act as a transition to 'contextual darkness' from the Development edge.

13-6 The Zone C - Development edge or '**Transition Zone**' is any area between the Lighting Buffer Zone and the Core Development area. No illuminance limits apply, however no lighting is to be installed within this area.

13-7 The Zone D - '**Core Development Zone**' is the area within the Proposed Development that will contain residential units, internal roadways and amenity spaces. As the scheme is presented at outline stage, there is no specific detail as to the setting out of the Development. A sensitively designed lighting scheme is required for safety, security and amenity of residents with appropriate Lighting Classes and illuminance criteria that will be developed at the Reserved Matters stage.

13-8 The layout shown in this plan is illustrative based on the Parameter Plan and Illustrative Site Layout, and is presented at an outline stage to set out a way that the Proposed Development could be built in line with the proposed parameters. These areas are to be designed according to the lighting strategy principles and best practice lighting design techniques to be applied at the future stages of detailed design.

## 14 - Residential Light Egress & Exterior Amenity Lighting

14-1 A contributing factor in terms of cumulative light spill to the Dark Zone is the interior light egress through windows from residential units arranged along the periphery, facing the areas of highest ecological sensitivity.

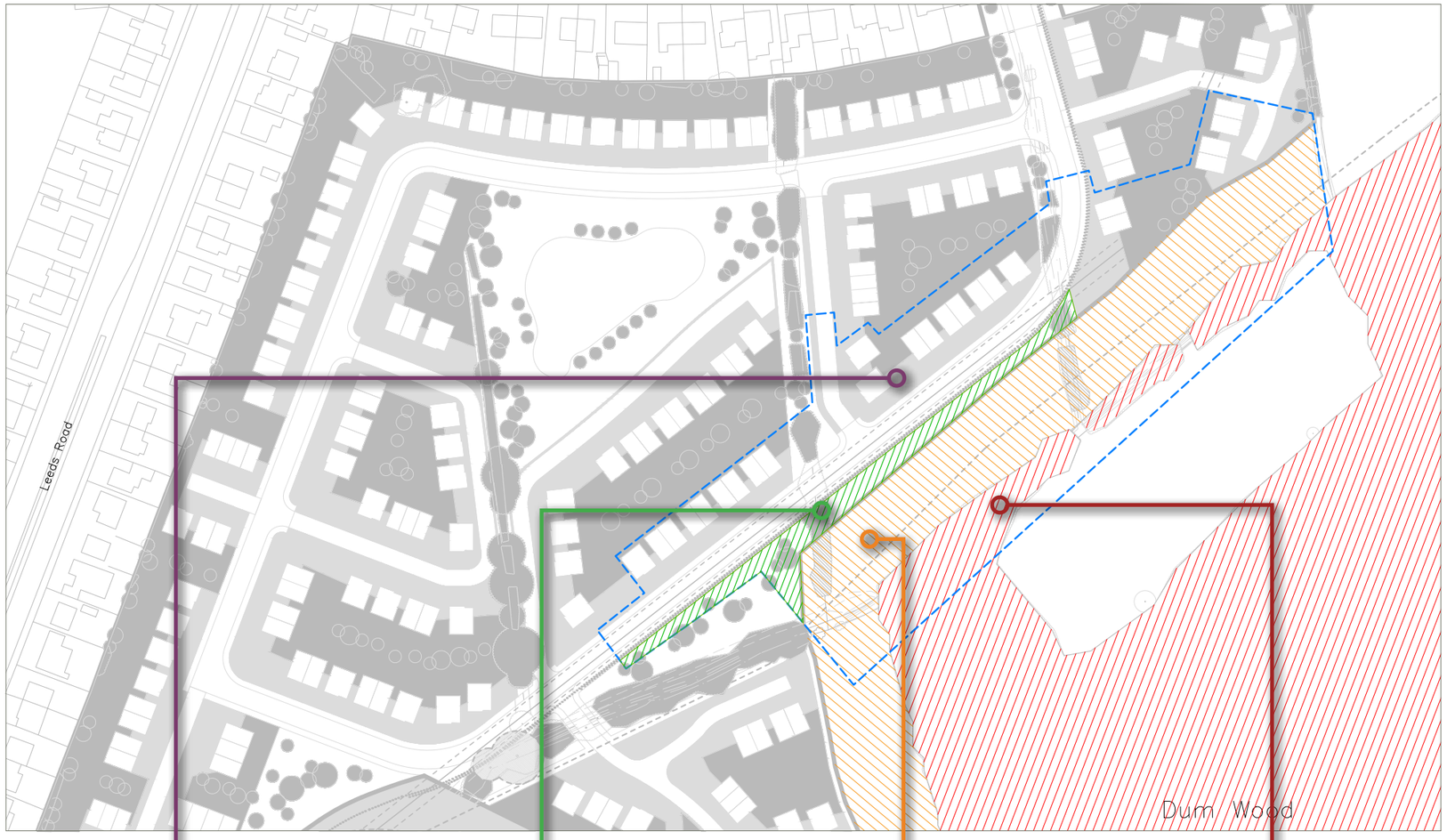
14-2 It is necessary to consider the contribution of interior light egress in the assessment of cumulative light spill to the designated Dark Zones. A 'worst case scenario' with all internal lighting 'on' and no window treatments (such as blinds or curtains) should be assessed to ensure compliance.

14-3 Exterior residential amenity lighting at the primary entrances must also be considered in calculations as this residential amenity lighting may cause an exceedance of light spill thresholds at sensitive ecological receptors.

### Figure 6 - Indicative Lighting Hierarchy and Constraints Plan

*ILP Zonation Types Overlaid on Illustrative Site Layout (Generated by SLR, Based on APP10 Illustrative Site Layout by Enjoy Design - Not to Scale)*

*The dashed blue line represents the Area of Study for the Lighting Assessment.*




**Core Development Zone (ILP Zone D)**

Lighting required for safety, security and amenity of residents.

Appropriate Lighting Classes and illuminance criteria apply for roadways and junctions.

Residential exterior amenity lighting installed by developer must be designed to minimise light spill.

**Transition Zone (ILP Zone C)**

Peripheral area between the core development and ecological buffer zone to be designated as a 'No Light Zone'.

No illuminance limits apply, however no lighting to be installed within this area.

**Lighting Buffer Zone (ILP Zone B)**

Minimum 20 metre Buffer (From Woodland Edge)

Designated to act as an area to be retained predominantly in darkness but allow for tapering of light spill from the Development edge.

No illuminance limits apply, however no lighting to be installed within this area.

**Dark Zone (ILP Zone A)**

Ancient woodland of Dum Wood to remain in 'contextual darkness' for the benefit of light sensitive ecology, as part of a network of linked habitats.

Illuminance Limits:

≤ 0.4 Lux Maximum Vertical

≤ 0.2 Lux Maximum Horizontal

## Figure 7 - Indicative Site Layout Plan

Site Layout Plan (Illustrative Only) - Composite Generated by SLR (Not to Scale) based on APP10 Illustrative Site Layout by Enjoy Design



**Red Line Boundary**
Proposed Development area indicated by the boundary of the Proposed Development Site.

**Residential Properties**
Existing residential properties along Hey Beck Lane with partial or screened views towards the Proposed Development Site.

**Illustrative Layout**
Illustrative layout of the proposed development including the indicative arrangement of roads and residential units.

**Residential Properties**
Residential properties, to the west of the Proposed Development Site, arranged along Leeds Road.

**Primary Roadway**
Illustrative arrangement of primary roadway, providing vehicular, pedestrian and cycle access through the Proposed Development.

**A635 Leeds Road**
Leeds Road running parallel to the western boundary, subject to existing highways lighting.

**Junction with Hey Beck Lane**
Proposed new junction providing primary access to the Site via Hey Beck Lane, which is subject to existing highways lighting.

**Agricultural Land**
Open fields and undeveloped farmland to the north and east of the Proposed Development.

**Woodland Edge**
Mature tree line and woodland edge of the designated ancient woodland of Dum Wood, facing the Proposed Development.

**Dum Wood**
Parcel of replanted ancient woodland forming Dum Wood and habitat supporting a range of species.

**Buffer Zone**
Minimum 20 metre buffer zone set out between the development boundary and the edge of Dum Wood.

**Strategic Green Space**
Areas within the Proposed Development Boundary with retained mature trees and improved green space.

## 15 - Relevant Standards

15-1 The following documents have been referred to in the preparation of this document.

### Government

- Clean Neighbourhoods and Environment Act 2005, (Section 102).
- DEFRA: Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005.
- Wildlife & Countryside Act 1981.
- Conservation (Natural Habitats etc.) Regulations 1994.

### ILP - Institution of Lighting Professionals

- GN01:2021. Guidance Notes for the Reduction of Obtrusive Light.
- PLG02:2013. The Application of Conflict Areas on the Highway.
- PLG03:2012. Lighting for Subsidiary Roads.
- PLG04:2013. Guidance on Undertaking Environmental Lighting Impact Assessments.
- Bat Conservation Trust ILP Guidance Note 08/23 - Bats and Artificial Lighting at Night.
- TR12-1:1997. Lighting of Pedestrian Crossings.
- TR25:2002. Lighting for Traffic Calming Features.

### SLL - The Society of Light and Lighting (CIBSE)

- Fact File 8: Lighting for People who are Visually Impaired 2012.
- The SLL Lighting Handbook 2018.
- The SLL Code for Lighting 2022.

### CIE - International Commission on Illumination

- CIE Publication 150-2017. Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations, 2nd Edition.
- CIE Publication 115-2010. Lighting of Roads for Motor & Pedestrian Traffic.
- CIE Publication 126-1997. Guidelines for minimising sky glow.

### British Standards

- BS 5489-1:2020 - Design of road lighting - Lighting of roads and public amenity areas. Code of Practice.
- BS EN 12464-2:2024 - Light and lighting - Lighting of work places - Part 2: Outdoor Work Places.
- BS EN 13201-1:2014 - Road Lighting - Guidelines on selection of lighting classes
- BS EN 13201-2:2015 - Road Lighting - Performance requirements

### Other

- DarkSky formerly known as International Dark-Sky Association.
- All-party Parliamentary Group (APPG) for Dark Skies.
- Eurobats Publication Series No.8 - Guidelines for Consideration of bats in lighting projects.
- Secured by Design Residential Homes Guide 2025 and Safer Streets Lighting Guide 2020.
- Kirklees Local Plan, Strategy & Policies 2019.

## 16 - General Limitations & Constraints

16-1 Lighting within the Proposed Development should conform to the Institute of Lighting Professionals' Guidance on Reduction of Light Pollution. Information in Table 2 (below) summarises recommended limitations for specific photometric criteria depending on the relevant Environmental Zone classification.

16-2 The Proposed Development Site sits within **Environmental Zone E2** due to the area being predominantly open agricultural fields and woodland, observed to be in contextual darkness. The Site is within the wider context of the conurbation of Woodkirk located to the south of Leeds. Immediate surroundings comprise the contextually dark agricultural fields, the ancient woodland of Dum Wood located to the east, with agricultural land beyond and further to the south and east. Residential areas are immediately adjacent to the northern and western boundary of the Proposed Development Site. Primary access is to be made by a new connection with Hey Beck Lane to the north of the Site. As the Site sits at the outer edge of the existing suburban development, it can be described as *'Sparsely inhabited rural areas, village or relatively dark outer suburban locations'*, defined as *'low district brightness'*, this is in line with the selection criteria set out in Table 2, as such **E2** is selected as appropriate.

16-3 Consideration must be given to minimising any negative impact from artificial lighting on habitats of light-sensitive ecological species, including the ancient woodland of Dum Wood, and associated habitats.

16-4 The site walkover survey demonstrates a low level of light pollution throughout the Proposed Development Site. The ancient woodland, hedgerows and stands of mature trees are not observed to be subject to significant levels of light pollution and therefore observed as good potential habitat for light sensitive ecology such as bats.

16-5 Care should be taken to mitigate light pollution to the south-eastern boundary with the ancient woodland of Dum Wood and associated mature tree lines, maintaining this as dark habitat for light sensitive species to traverse.

16-6 There are residential receptors identified to the north and west forming the urban edge of Woodkirk that have either partial or well-screened views of the Proposed Development Site.

16-7 The Proposed Development must also mitigate for sky glow and avoid contribution to light pollution from the proposed lighting scheme.

## 17 - Identified Areas for Consideration Against Obtrusive Light

- Potential light sensitive ecology such as bats associated with Dum Wood.
- Residential receptors to the north (Hey Beck Lane) and west (Leeds Road).

### Table 2 - Summary of Environmental Zones & Obtrusive Light Limitations for Exterior Lighting Installations

As defined within the ILP Guidance on Reduction of Light Pollution Tables

| Zone | Surrounding | Lighting Environment | Examples | Upward Light Ratio (ULR) / %^ | Illuminance in the Vertical Plane ($E_v$) | | Maximum Luminous Intensity Emitted by Luminaire (I in cd)# | | Building Façade Luminance ($L_b$) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Pre - Curfew | Post - Curfew | Pre - Curfew | Post - Curfew | |
| E0 | Protected | Dark (SQM 20.5+) | Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places | 0 | n/a | n/a | 0 | 0 | < 0.1 cd/m² |
| E1 | Natural | Dark (SQM 20 to 20.5) | Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc. | 0 | 2 lx | <0.1 lx* | 2,500 | 0 | < 0.1 cd/m² |
| E2 | Rural | Low district brightness (SQM ~15 to 20) | Sparsely inhabited rural areas, village or relatively dark outer suburban locations | 2.5 | 5 lx | 1 lx | 7,500 | 500 | 5 cd/m² |
| E3 | Suburban | Medium district brightness | Well inhabited rural and urban settlements, small town centres of suburban locations | 5 | 10 lx | 2 lx | 10,000 | 1,000 | 10 cd/m² |
| E4 | Urban | High district brightness | Town / City centres with high levels of night-time activity | 15 | 25 lx | 5 lx | 25,000 | 2,500 | 25 cd/m² |

ULR The maximum permitted values of upward light (lumens) that goes directly into the sky
$E_v$ Vertical illuminance in Lux, measured flat on the glazing at the centre of the window
I Light Intensity in Candelas
L Luminance in Candelas per Square Metre
^UFR Upward flux ratio maximum values are specific to the type of installation see table 7 (CIE 150 table 6) | #Upper limits $A_p$>0.5 | *If the installation is for public (road) lighting then this may be up to 1 lx.

## 18 - Roadway Lighting

18-1 Matters that need to be considered when planning and installing road lighting are summarised below from ***'CIE 115:2010 LIGHTING OF ROADS FOR MOTOR AND PEDESTRIAN TRAFFIC'***:

### Section 1.2: Need for Road Lighting

- *a) When the service level of traffic conditions and standard of the road are normal the need for road lighting will usually be evaluated on the basis of traffic volume and traffic speed.*
- *b) It is possible to estimate the savings in road usage costs that can be attained through the benefits of road lighting. The most important savings are through the reduction in accident rates and severity. In accordance with Publication CIE 93-1992, Road Lighting as an Accident Countermeasure, road lighting will decrease night-time accidents on average 30%. Calculations must always be based on the national values of reduction of night-time accident rates.*
- *c) The basis for calculating the benefits of those road lighting installations that are justified by traffic volume is the average personal injury and fatality rate for each road class. On motorways and other highways, the savings obtained in travel time are also considered.*
- *d) The profitability of road lighting in terms of traffic economy is analysed by comparing the average annual savings in total costs of road traffic with the annualized total costs of the lighting system and the annual cost of collisions with installed lighting columns. The traffic volume required to make road lighting profitable is obtained by performing the analysis for the period from installation to half of the anticipated service life of the road lighting system.*
- *e) Where traffic volumes are lower than those needed to justify lighting on accident reduction grounds alone, road lighting may be justified if there is an inhomogeneous traffic environment, poor road alignment, short spacing of junctions, greater than normal number of crossroads and bus stops, a lack of dedicated pedestrian footways, etc.*
- *The visual needs of road users under reduced traffic volumes during certain periods of night or under varying weather conditions, and the positive benefits of reduced energy consumption and potential environmental improvements, are some of the considerations which justify the installation of adaptive road lighting. There are a variety of suitable instruments, devices and methods which can be used for the intelligent control of a road lighting installation.*

### Section 4.2: The Role of Road Lighting in Motor Traffic Safety

- *The purpose of road lighting is to provide visual cues and reveal obstacles, so that safe vehicular operation is possible. While headlights and other traffic safety devices (road surface markings, delineators, signs, etc.) are of assistance in providing the motorist with guidance, there is a need to reveal extraneous objects that suddenly appear on the road. The distance required to bring a vehicle to a stop safely can exceed the distance at which headlights can adequately reveal the object, depending on recognition, reaction and braking times, and factors such as the speed of the vehicle and whether the road surface is wet or dry. Good quality road lighting can provide the visibility required at this distance, so that evasive action can be taken in good time, without resort to an abrupt manoeuvre.*
- *Fixed road lighting with its usual overhead sources, provides illumination on the road and its surrounds thereby opening up the field of view to something more approaching daylight conditions. This factor is primarily of importance in areas of high visual complexity, where there may be different types of road user (such as motorists, cyclists, pedestrians, and slow moving farm equipment) present at the same time. It is also of importance where there are sharp bends in the road.*

### Section 6.2.2: Adaptive Lighting

- *Adaptive Lighting, the normal lighting class is selected using the most onerous parameter values, and the application of this class may not be justified throughout the hours of darkness (This might be under changing conditions e.g. weekends, different weather conditions).*
- *Temporal changes in the parameters under consideration when selecting the normal lighting class could allow, or may require, an adaptation of the normal level of average luminance or illuminance, usually by reducing the level. The most important parameters in this respect are likely to be traffic volume and composition and weather conditions, but ambient luminance can also have an influence.*
- *The use of adaptive lighting can provide significant reduction in energy consumption, compared with operating the normal lighting class throughout the night. It can also be used to reduce energy consumption by reducing the lamp light output to the maintained value when the installation is clean and the lamps are new.*

### Section 8: The Lighting of Conflict Areas

- *Conflict areas occur whenever vehicle streams intersect each other or run into areas frequented by pedestrians, cyclists, or other road users, or when there is a change in road geometry, such as a reduced number of lanes or a reduced lane or carriageway width. Their existence results in an increased potential for collisions between vehicles, between vehicles and pedestrians, cyclists, or other road users, or between vehicles and fixed objects.*
- *The lighting should reveal the existence of the conflict area, the position of the kerbs and road markings, the directions of the roads, the presence of pedestrians, other road users, and obstructions, and the movement of vehicles in the vicinity of the conflict area. Where no lighting is otherwise provided on a road leading to or leaving the conflict area, the selected lighting class should be installed for a stretch long enough to provide about 5 seconds of driving distance at the expected traffic speed.*
- *The conflict area should as a minimum have a lighting level no lower than that of the connecting roads. However, it is recommended that the lighting class used for the conflict area should normally be one step higher than the highest lighting class used for the road or roads leading to the conflict area.*

18-2 Applied Strategy: Risk assessments will be used to determine the Lighting Classes of the different types of internal roadways, junctions and conflict areas. The lowest levels of illumination required by the selected Lighting Classes necessary to preserve the safety of road users and pedestrians will be specified to help reduce the cumulative effects of roadway lighting on surrounding ecology and the night sky.

18-3 Subject to risk assessment at detailed design stages, consideration toward the use of adaptive lighting will be made to further reduce night time lighting throughout the Proposed Developments internal roadways.



Illustration: Residential Street Lighting

## 19 - National Planning Policy Framework

19-1 Relevant extracts from the ***'National Planning Policy Framework (NPPF) February 2025'***:

19-2 Para 187: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value. d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures and incorporating features which support priority or threatened species such as swifts, bats and hedgehogs."*

19-3 Para 192: *"To protect and enhance biodiversity and geodiversity, plans should: a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity."*

19-4 Para 193: *"When determining planning applications, local planning authorities should apply the following principles: a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and. d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate."*

19-5 Para 195: *"The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site."*

19-6 Para 198: *"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."*

## 20 - Bat Conservation Trust ILP Guidance Note 08/2023 - Bats and Artificial Lighting at Night

20-1 *(1.12) - 'In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats. Many night-flying species of insect that bats hunt are attracted to light, especially those light sources that emit an ultraviolet component (Light Emitting Diodes (LEDs) have removed this) or have a high blue spectral content.'*

20-2 Applied Strategy: No lighting equipment to be specified that includes any UV emission and the colour temperature must be ≤ 3000k.

*20-3 (1.21) - 'Continuous lighting in the landscape, such as along roads or waterways, creates barriers which many bat species cannot cross, especially slower-flying species, even at very low light levels. Lesser Horseshoe bats have been shown to move their flight paths which link their roosts and foraging grounds to avoid artificial light installed on their usual commuting routes. Significant effects have been recorded from as low as 3.6 lux.'*

20-4 Applied Strategy: Careful consideration must be made for linear features such as the internal roadways requiring lighting at night, to prevent the bisection of parcels of habitat through continuous lighting. Mitigations such as part night lighting and part night dimming to be included in the control strategy as well as breaks in the lighting installed to create a network linked dark habitats via the hedgerows and tree lines throughout the proposed development.

20-5 (4.15) - *'An adverse impact from illumination onto a Key Habitat feature is likely to have a significant effect on the bats using it. Therefore, an absence of artificial illumination and glare acting upon both the feature and an appropriately sized buffer zone is most often the only acceptable solution. An ecologist will be best placed to set the size of such a buffer zone according to the species present and the level of usage, and these can be tens of metres if unattenuated light spill or glare from local sources is predicted. The input of a lighting professional should be sought when determining the distances of light spill from new sources and likelihood of glare.'*

20-6 Applied Strategy: In coordination with the ecologist as part of the detailed scheme design, buffers protecting areas of existing bat activity are to be defined with the intention of preserving relative darkness throughout those habitats, foraging and commuting routes.

*20-7 (4.16) - '...There is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety... Nevertheless, these are not exempt from the statutory protection afforded to bats, their roosts and commuting routes directly associated with roosts, and good design principles such as the Institution of Lighting Professionals' GN01: The Reduction of Obtrusive Light remain best practice. However, in the public realm, while lighting can increase the perception of safety and security, measurable, objective benefits on safety and security are less well established. Consequently, lighting design should be holistic, taking into consideration the relevant British Standards or local policies concerning lighting but, through a risk assessment-style process, be able to fully take into account the presence of protected species and the likely adoption of mitigation approaches through proper engagement with local communities.'*

20-8 Applied Strategy: Subject to risk assessments at the detailed design phase, consideration should be made to areas of conflict between maintaining dark corridors and lighting for safety, security and amenity to potentially abstaining from lighting those areas and maintaining unlit areas and to preserve hop-over links to habitats beyond.

*20-9 (4.31) - 'Light spill can be successfully screened through landscaping and the installation of walls and fences, or even banks and bunds. In order to ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Fencing can also be over planted with hedgerow species or climbing plants to soften its appearance and provide a vegetated feature which bats can use for navigation or foraging.'*

20-10 Applied Strategy: Where appropriate, opaque fences should be included within the landscaping design to help with the limitation of light spill to any identified areas of sensitivity or to preserve the quality of lighting buffers.

*20-11 (4.35) - 'Depending on the pattern of bat activity across the Supporting Habitat identified by the ecologist, it may be appropriate for an element of on-site lighting to be controlled by dimming or switching either diurnally, seasonally, or according to human activity (light on demand). This is known as Part-Night Lighting (PNL). It is important to state that PNL is not likely to be appropriate where Key Habitats are at risk, especially as PNL often results in lighting when bats are most active.'*

20-12 Applied Strategy: The inclusion of Part Night Lighting can be effective in managing areas such as roadways, car parks and associated active travel links that benefit from lighting in terms of road safety and a reduction in the fear of crime but would ideally not be continuously lit. Conflict areas and crossings may be continuously lit during the hours of darkness for safety whilst the typical roadway may be subject to 'switch off' during late night hours. This ensures the lighting is not continuous and therefore does not present a barrier to light sensitive species in the landscape.



Illustration: Bats & Insects

## 21 - Equipment Specification Guidance & Criteria

21-1 Reference Guidance: ***ILP GN08/23: Bats and Artificial Lighting at Night***:

*'4.29 - Light sources, lamps, LEDs and their fittings come in a myriad of different specifications which a lighting professional can help to select. However, the following should be considered when choosing luminaires and their potential impact on Key Habitats and features:'*

- All luminaires should lack UV elements when manufactured.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component.
- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Waymarking in-ground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered - See ILP GN01.
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt.

### Dimming and part-night lighting:

*4.35 - 'Depending on the pattern of bat activity across the Supporting Habitat identified by the ecologist, it may be appropriate for an element of on-site lighting to be controlled by dimming or switching either diurnally, seasonally, or according to human activity (light on demand). This is known as Part-Night Lighting (PNL). It is important to state that PNL is not likely to be appropriate where Key Habitats are at risk, especially as PNL often results in lighting when bats are most active.'*

*4.36 - 'A Central Management System (CMS) can be specified by the lighting engineer to dim or turn off individual or groups of luminaires when not in use or during less busy times. Dimming can be precisely controlled, with dimming states often being as low as 10 or 20%. However, due to the electrical difficulties of maintaining a dimming state of under 10%, luminaires should be set to off below this point.'*

*4.37 - 'Lighting could be set to a low output state by default, to turn up to a redetermined output in response to a trigger, and be combined with a timeclock or photocell to further add an element of seasonal or diurnal control. For example, Passive Infrared (PIR), Artificial Intelligence enabled cameras, on demand controls, or pressure sensors may be used to trigger lights to come on or dim in response to movements, either by vehicles (for example at car parks or industrial loading bays) or by pedestrians (for example a footpath leading from residential development through an area of Supporting Habitat). The timeclock or photocell could ensure that this response only occurs during a set window of hours after sunset and before sunrise'.*

*4.38 - 'Where some trigger is used to temporarily modify lighting states, it will be necessary to specify the timed trigger window during which the response is maintained beyond the last triggering activity. For most typical residential purposes, 1-2 minutes is likely to be sufficient, however risk assessments must be performed in line with BS5489-1. The proposed system of lighting control will be determined by the outcome of the risk assessment.*

- Where appropriate, external security lighting should be set on motion sensors and set to as short as possible a timer as the risk assessment will allow. For most general residential purposes, a 1 or 2 minute timer is likely to be appropriate.
- Use of a Central Management System (CMS) with additional web-enabled devices to light on demand.
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely'.

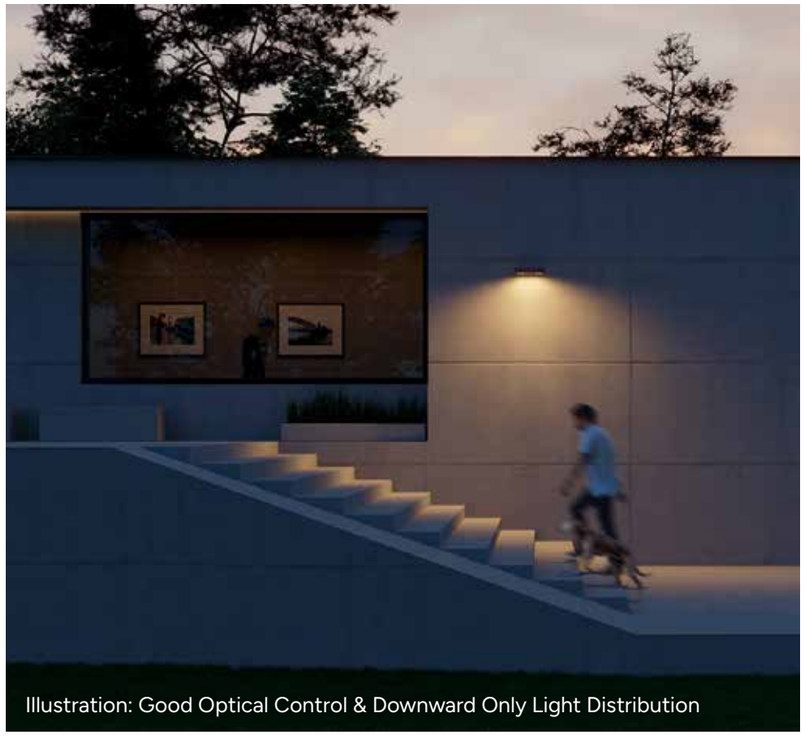


Illustration: Good Optical Control & Downward Only Light Distribution



Illustration: Warm White Light, Low Glare Lighting

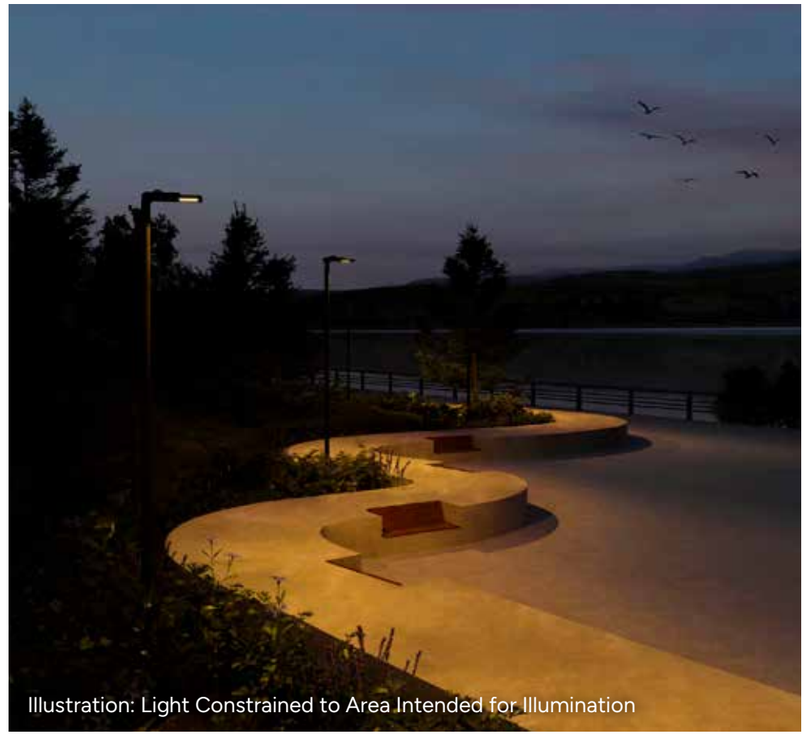


Illustration: Light Constrained to Area Intended for Illumination

## 22 - Lighting Specification

22-1 To comply with Condition 27, lighting equipment specified at reserved matters stage and used within the detailed lighting design should have good optical control of the beam to direct light to the area intended for illumination only and should have the following attributes:

- Glare control and mitigation.
- No light output above 90° and no upward tilt.
- Colour temperature and spectral power distribution of ≤ 2700k.
- Colour rendering index of ≥80 CRI.
- Suitable ingress protection rating for the location.
- Colour consistency between fixtures.
- Defined recycling procedures.

22-2 The colour temperature or warmth of the light is important in terms of protecting ecology and making the development more attractive as part of place-making.

22-3 LED equipment should be used throughout with high efficiency light engines and long operational lifespan which improves overall efficiency and reduces long term cost of ownership.

## 23 - Location & Orientation

23-1 Lighting should be applied only where necessary and to the appropriate level of intensity.

23-2 Mitigation for light spill and glare should be implemented on all lighting to avoid light pollution, discomfort or adverse lighting conditions for ecology.

23-3 Consider the light source position, aiming (if an adjustable luminaire), and integration detailing. Wherever possible conceal light sources from normal viewing angles for humans and wildlife.

23-4 Minimise upward light ratios by implementing shielded or controlled distribution luminaires. Always consider the amount of light directed above the horizontal zenith, and minimise where possible to avoid sky glow. Focus any up-lighting to the intended lit surfaces, with appropriate optics, positioning and aiming to minimise light spill or sky glow.

23-5 Lighting must be kept away whenever possible from light sensitive habitats for ecology such as bats.

23-6 Consider the effect of façade illuminance and avoid lighting vertical surfaces with light or reflective materials to avoid indirect light spill to the surroundings or visual impact in the landscape.

## 24 - Lighting Control

24-1 Implement active, smart lighting controls where possible and beneficial.

24-2 Activate lighting in relation to sunset timings, utilising transitional dimming periods where possible.

24-3 Implement automated energy and maintenance monitoring systems to ensure equipment is performing efficiently and as designed.

24-4 Extinguish, or significantly dim functional light levels at periods of low activity i.e. in the early hours of the morning.

24-5 Comply with curfew definitions, for decorative lighting and lighting with significant upward light emission.

24-6 Activate night modes such as reduced colour temperature to protect light sensitive ecology.

24-7 Changes in light level should be gradual and dim over time to avoid disturbance to residents and ecology.

24-8 Apply dimming or part night lighting in line with a hierarchy of lighting priorities to maintain safety and security in areas where lighting is essential.


Illustration: Good Optical Control


Illustration: Low Level Lighting


Illustration: Warm White Light


Illustration: No Upward Light


Illustration: Low Glare Fixtures


Illustration: Protect Night Skies

# Roadway Lighting

## 25 - Design Criteria for Internal Roadway Lighting

25-1 '***BS EN 13201-2:2015, Road Lighting – Performance Requirements***' gives details of the necessary minimum and average levels of lighting to be achieved at each of the lighting classes. The lighting classifications have been identified in accordance with ***BS EN 13201-1:2014*** and ***BS5489-1:2020***.

25-2 All luminaires used throughout the Proposed Development will utilise LED technology with a very low or 'very warm white' colour temperature of 2700 kelvin and with no UV emissions. The use of cool white (> 2700k) colour temperature LEDs in street lighting (especially if not properly shielded) is the cause of major disruptions to light sensitive ecological receptors, especially bats and should therefore not be used in any part of the Proposed Development.

25-3 The use of slow ramped dimming curves ensures no sudden changes in light output or colour which mitigates for road safety and ecology as well as residential receptors that are likely to be disturbed by sudden changes in lighting conditions in their field of view.

25-4 LED technology should allow for luminaires to have fully cut-off optics, meaning no direct upward light is emitted from the luminaire. Additional louvres, back spill control and glare shields should also be included to prevent artificial light from reaching beyond the intended area of illumination and on to the sensitive habitats and lighting buffer zones within and around the Proposed Development Site.

25-5 The output of LED fixtures do deteriorate over time for a number of reasons including depreciation of the fixtures, failure, replacement strategy and the build up of dust and grime on luminaire lenses and housings. To ensure the continued safety and amenity of residents and road users, an appropriate Maintenance Factor (MF) must be determined and applied when establishing the operational requirements. A suitable Maintenance Factor is to be used in the region of 0.83 (See **Table 5 on page 18**).

25-6 Column heights for lighting are expected to be related to the requirements of the area intended to be illuminated such as the junction design, available column locations and illumination requirements such as uniformity. The use of the lowest possible column height protects from visual impact across the landscape and constrains any spill light within the locality. Whilst this may result in more columns, this must be carefully balanced against the constraint of light to the roadway and away from 'Dark Zones' which have strict illuminance limitations. Whilst a taller column may result in fewer columns and a wider spacing, the light spill will be greater to the surrounding area and more visible in the landscape. Column positions are subject to these considerations, performance modelling and further more detailed risk assessments as part of the detailed design process.

25-7 Lighting equipment should be offset 0.8m from the roadside or cycle paths to avoid obstruction (***BS5489-1:2020 Section 6.13***) and should be placed so that they do not impinge on available widths of foot-ways in the interests of wheelchair users and people pushing prams, or pose a hazard for blind or partially-sighted people.

25-8 As the Distribution Network Operator (DNO):
Northern Powergrid (Yorkshire) should be contacted to provide low voltage un-metered electricity supplies to the proposed columns in adopted areas.

## 26 - Primary Circulation Roadway

26-1 The primary access roadway within the Proposed Development should be designed in accordance with guidance contained within '***BS 5489-1:2020 - Design of road lighting***' and '***BS 13201-1:2014 - Guidelines on selection of lighting classes***'.

26-2 Methodology for selecting appropriate Lighting Classes are set out in ***'CIE115:2010'***, an internationally used standard. These concepts have been adapted for UK conditions and the particular applications described in ***'BS5489-1:2020'***.

26-3 Guidance for selecting the appropriate P Lighting Class of the roadway is shown in '***BS 5489-1:2020 Table A.5 - Lighting classes for traffic routes (v≤ 30mph)***' which shows the appropriate lighting class of P4 given the following criteria:

- Proposed Speed Limit = 20mph (v ≤ 30mph)
- Busy Traffic Flow (Worst Case Scenario)
- Environmental Zone E2

26-4 The Risk Assessment provided in **Table 3** is based on the methodology for selecting appropriate Lighting Classes set out in '***BS 13201-1:2014***'. The risk assessment suggests that the appropriate P Class for the carriageway should be designated as **P4**, considering both the proposed roadway design and prevailing conditions.

### Table 3 - Primary Roadways Outline Risk Assessment

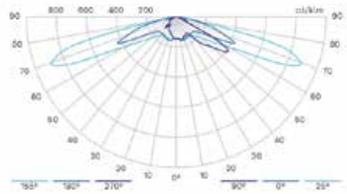
Parameters for **P** Lighting Class:

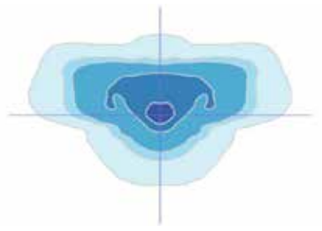
| Parameter | Option | Weighting |
|---|---|---|
| Speed | Low | 1 |
| Traffic Volume | Normal | 0 |
| Traffic Composition | Mixed | 2 |
| Parked Vehicles | Not Present | 0 |
| Ambient Luminance | Low | -1 |
| | Total: | 2 |
| ***BS EN 13201-1:2014 Table 4*** | [6 - Total = Lighting Class] | **P4** |

### Table 4 - Parameters for Primary Roadway Lighting:

| Parameter | Minimum Maintained (Lx) | Lux Min |
|---|---|---|
| Lighting Class **P4** | 5 - 7.5 | 1 |
| ***BS EN 13201-2:2015 Table 3*** | | |







## 27 - Equipment Specifications

27-1 The street lighting equipment selected for the assessment is from a reputable supplier and the product range is noted as being previously accepted and specified on developments previously adopted by Kirklees Highway Authority.

- Manufacturer: URBIS Schreder
- Model: AXIA 3.1
- Column Height: 6 m
- Column Spacing: 30-40 m
- Optic: '5267' - Rectangular Side Throw + Rear Shield Louvres
- Delivered Lumens: 2268 lm
- CCT: Warm White Light (2700 K)
- CRI: 70
- ULR / ULOR: 0%
- Control: DALI Control + Photocell
- Part Night Switch-Off Post Curfew 23:00 - 05:00

27-2 The International Dark-Sky Association (IDA) is the recognised authority on light pollution. It provides leadership, tools and resources to industries and companies willing to reduce light pollution. The IDA's Fixture Seal of Approval programme certifies outdoor lighting fixtures as being Dark Sky Friendly. All products approved by this programme must comply with the following criteria:

- *Maximum correlated colour temperature of 3000K;*
- *Uplight allowance limited to 0.5% of total output, or 50 lumens, with no more than 10 lumens in the 90-100 degree UL zone;*
- *The luminaires must have a dimming capability to 10% of full rating;*
- *The luminaires must be equipped with a fixed mounting option;*
- *The luminaires must have Safety Certification by an independent laboratory.*

27-3 This DarkSky approved Schréder range of luminaires complies with these requirements.

# Residential Amenity Lighting

## 28 - Residential Exterior Amenity Lighting

28-1 In locations where it is necessary to provide lighting fixtures to illuminate specific features such as entrance doorways, a fixture type should be specified that meets the following design requirements:

28-2 The fixture should not have visible light emitting elements or cause glare.

28-3 The fixture should have a physical design and optical control to project the light only downwards preventing contribution to sky glow or obtrusive light spill to the landscape beyond. 2700k warm white is to be used.

28-4 The fixtures' optics should be chosen to match the shape and size of the intended area of illumination. The use of any kind of fixture with omni directional output, floodlights, bulkhead wall lights, lighting with a diffused surface, up lights (including up/down wall lights) or those with exposed bulbs or light source are not suitable and should not be used.

28-5 The fixture should only emit sufficient light level to meet the minimum intended light level and should not be excessively bright.

28-6 Motion or presence detection should be used to ensure exterior lighting is only active when needed.

28-7 Exterior recessed and baffled medium beam (approx 25-40°) down lights within the entrance canopy is preferred as this prevents direct upward light emissions and constrains the light to the area immediately at the door threshold.

28-8 Control via a presence sensor is required to limit the time lighting is active to when it is needed.

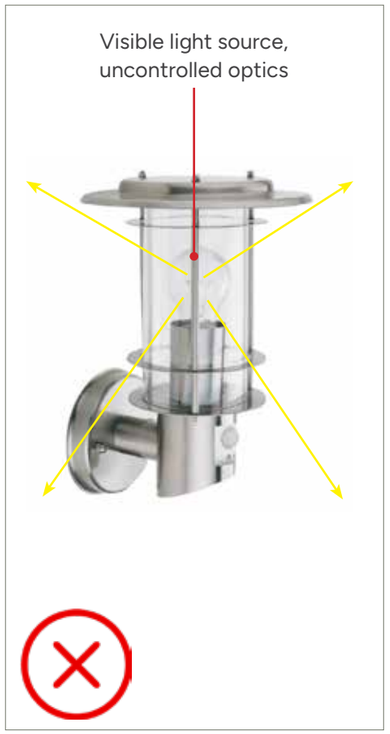
28-9 Examples are given opposite of appropriate and inappropriate lighting fixtures. The advice of the ecologist and lighting engineer should be sought to avoid the light pollution impacts from glare or light spill caused by inappropriate equipment specification.

28-10 Ad-hoc resident installed security lighting and flood lights are a significant cause of nuisance, obtrusive light and are highly detrimental to light sensitive ecology, especially near to 'Dark Zones'.

28-11 Suitable lighting should be installed by the developer to ensure a sensitive lighting solution is applied to any amenity areas such as garages, bin stores, rear gardens etc. to discourage residents from fitting ad-hoc lighting after occupation. These lighting fixtures must adhere to the specification criteria above.

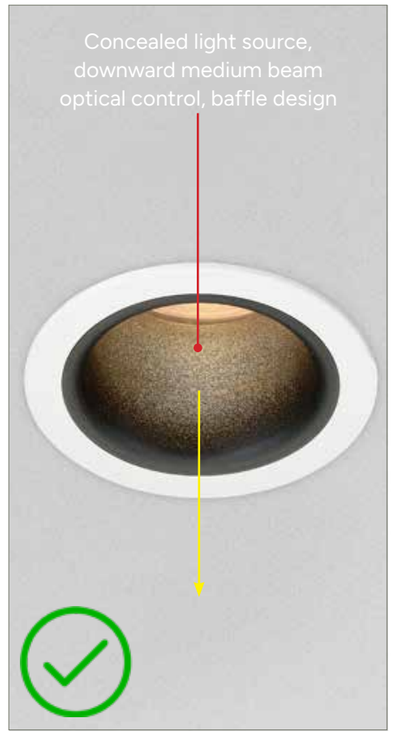
28-12 Properties that face the 'Lighting Buffer Zones' require lighting engineer and ecologist input at detailed design stages to ensure any specified exterior amenity lighting does not encroach on the 'Lighting Buffer Zones or Dark Zones'.

28-13 Opaque boundary fences at the periphery if residential gardens are adjacent to 'Lighting Buffer Zones' should be included to help constrain light spill within the garden and avoid light reaching sensitive areas for ecology.



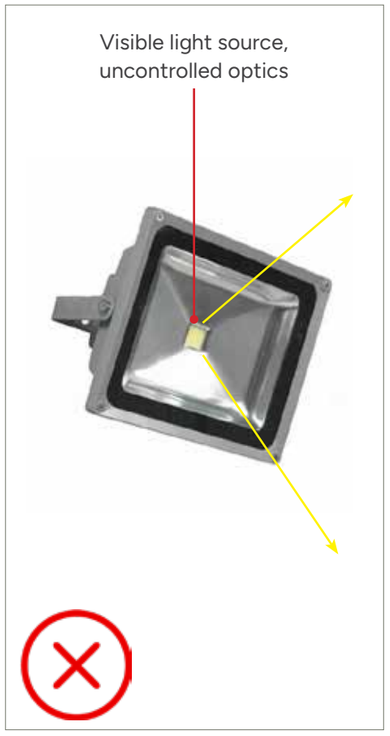


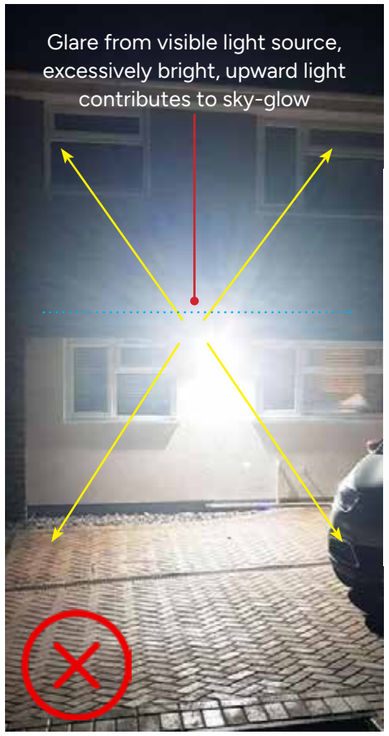






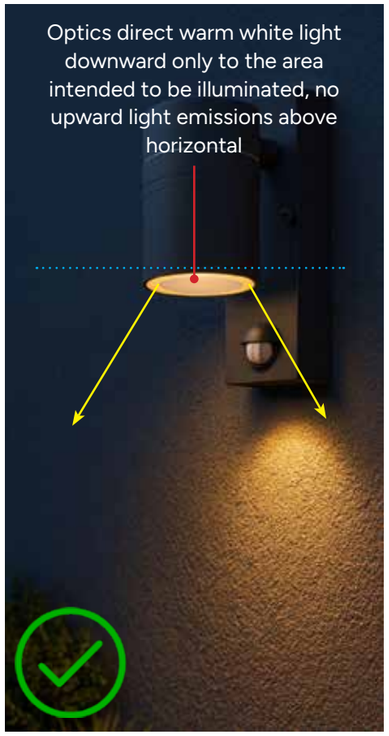










# Lighting Assessment

## 29 - Basis for Lighting Assessment

29-1 The new lighting installations forming part of the Proposed Development should ensure highway and pedestrian safety, reduce fear of crime and meet Secured by Design principles along with other best practice standards.

29-2 Due to the ancient woodland of Dum Wood being a foraging and commuting route for light sensitive bat species, any new lighting installations must be compatible with this function.

29-3 At the detailed design stage, a detailed Lighting Design and Impact Assessment is required to demonstrate:

- Lighting levels are provided to an appropriate adoptable Lighting Class to ensure highway and pedestrian safety.
- Mitigation to ensure bat foraging and commuting routes are not adversely affected by the introduction of new lighting installations.

29-4 At the outline stage the Lighting Assessment aims to demonstrate that a suitable and compliant scheme can be designed without resulting in adverse effects on Dum Wood as a supporting habitat for ecology.

## 30 - 3D Photometric Modelling

30-1 A representative Area of Study covering a section of the primary access roadway connecting the Proposed Development with Hey Beck Lane was modelled in DIALux Evo photometric modelling software to demonstrate compliance with selected lighting parameters and assess any potential impact of lighting.

30-2 The model is produced to a reasonable degree of spacial and photometric accuracy, intended to provide quantitative data on which to base a qualitative assessment of potential impacts to light sensitive receptors.

30-3 Operational compliance has been designed and assessed at a maintenance factor of 0.83 (See Table 5). The Assessment has been undertaken at maintenance factor 1.0 recognising 'a worst case scenario' in line with relevant standards and guidance on undertaking environmental impact assessments.

30-4 The new proposed internal roadway has been modelled using a suitable column mounted street lighting scheme to meet the appropriate Lighting Class **P4**. Modelling results are provided in Table 6 demonstrating compliance.

30-5 To measure the effect of residential amenity lighting, a representative and appropriate primary entrance amenity light was modelled for each of the properties within the Area of Study.

30-6 Internal light egress can be a significant contributing factor to the levels of vertical illumination of habitat features, as interior light can project laterally through windows towards an adjacent vertical feature. To measure the effect of interior light egress, a representative interior lighting scheme was modelled for the units within the Area of Study using ceiling recessed baffled down-lights with no window treatments (curtains or blinds).

30-7 To assess the impact of new lighting on existing habitats for light sensitive species, a number of measurement grids have been created within the model to show levels of light spill received at key locations and features. Modelling results are provided demonstrating compliance in Table 7:

- Horizontal Measurement Planes - Representing the extent of the Lighting Buffer Zone between Dum Wood and the Development Boundary.
- Vertical Measurement Grids - Representing the vertical face of existing tree lines forming the edge of Dum Wood, representing typical flight heights of bats.

30-8 To assess whether light sensitive ecology such as bats are likely to be disturbed by new lighting introduced as a result of the Proposed Development, thresholds were agreed with the project ecologist in line with the ILP definition of 'complete darkness':

- ≤ 0.4 Lux Peak in the Vertical Plane (Ev,max)
- ≤ 0.2 Lux Peak in the Horizontal Plane (Eh,max)

30-9 To be compliant, modelled results for the measurement grids representing the ecological habitat associated with the ancient woodland of Dum Wood must all show levels of illumination below the stated thresholds.

### Assumptions:

- The representative Area of Study was established with input from the project ecologist to represent the area within the Proposed Development most likely to be at risk of light emissions influencing the behaviour of identified bat species.
- The Illustrative Site Layout was used to create an indicative arrangement of roadways and residential units within the Area of Study.
- The DAS was referenced when preparing indicative models of the residential units, arrangements (windows / doors) and materiality.
- Realistic surface reflectance values were applied.
- All lighting was modelled as 'On' simultaneously representing a 'worst case scenario' condition.
- A Maintenance Factor of MF-1.0 was used for Impact Assessments.
- Direct and indirect light was calculated.

30-10 False colour renderings presented show the calculated level of illuminance represented with areas shaded in colours for each set of Lux values. The brighter colours generally represent areas with higher levels of illumination and dark colours areas with very low levels of illumination. A colour reference chart is provided to aid interpretation of the diagrams.

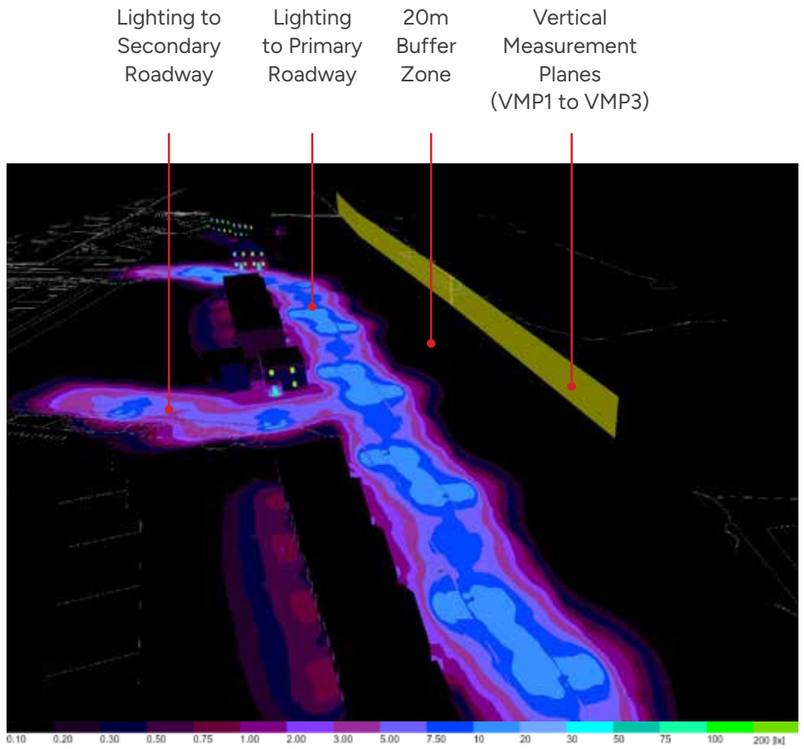
### Table 5 - Maintenance Factor

Derivation of the Maintenance Factor

| Parameter | Symbol | Value |
|---|---|---|
| Luminous Flux Factor | $f_{LF}$ | L90 (0.9) |
| Survival Factor | $f_{S}$ | 1 |
| Luminaire Maintenance Factor | $f_{LM}$ | 0.92 |
| **Maintenance Factor** | **MF** | 0.83 (2.dp) |
| Ref: BS EN 5489-1:2020 Annex C | | |

### Figure 8 - Modelling (Area of Study)

False Colour Rendering from 3D Photometric Model




### Table 6 - Operational Requirements

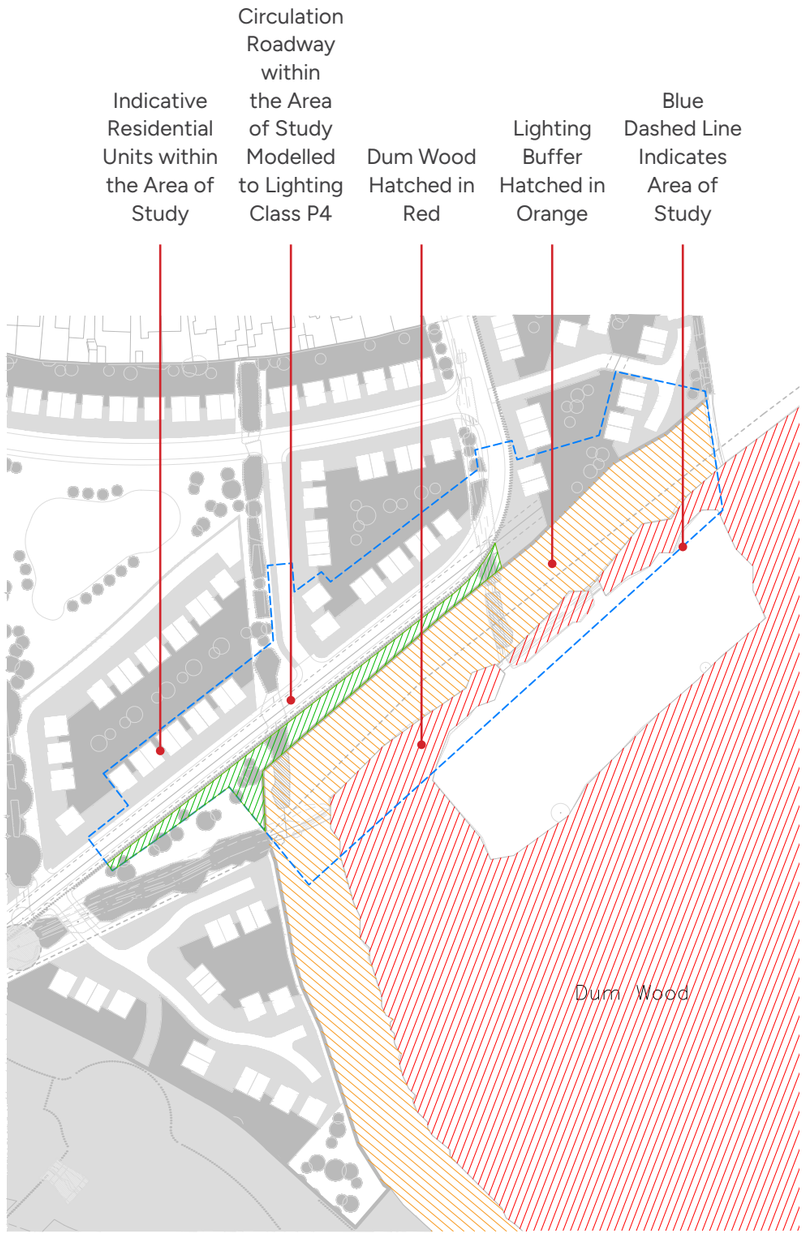
| Parameter (MF = 0.83) | Lux Average | Lux Min | Pass / Fail |
|---|---|---|---|
| Requirements for Lighting Class P4 | 5 - 7.5 | 1 | |
| HMP1 - Roadway | 7.44 | 1.74 | PASS |
| HMP2 - Cycle Route | 5.97 | 1.29 | PASS |
| HMP3 - Footpath | 5.94 | 2.91 | PASS |
| HMP4 - Footpath | 5.45 | 2.80 | PASS |
| HMP5 - Footpath | 5.78 | 1.59 | PASS |

### Table 7 - Impact Assessment

| Parameter (MF = 1.0) | Vertical (Ev,max Lux) | Pass / Fail |
|---|---|---|
| Ecologist Defined Limits | ≤ 0.4 | |
| VMP1 - Woodland Edge (80x8m) | 0.37 | PASS |
| VMP2 - Woodland Edge (85x8m) | 0.38 | PASS |
| VMP3 - Woodland Edge (40x8m) | 0.40 | PASS |

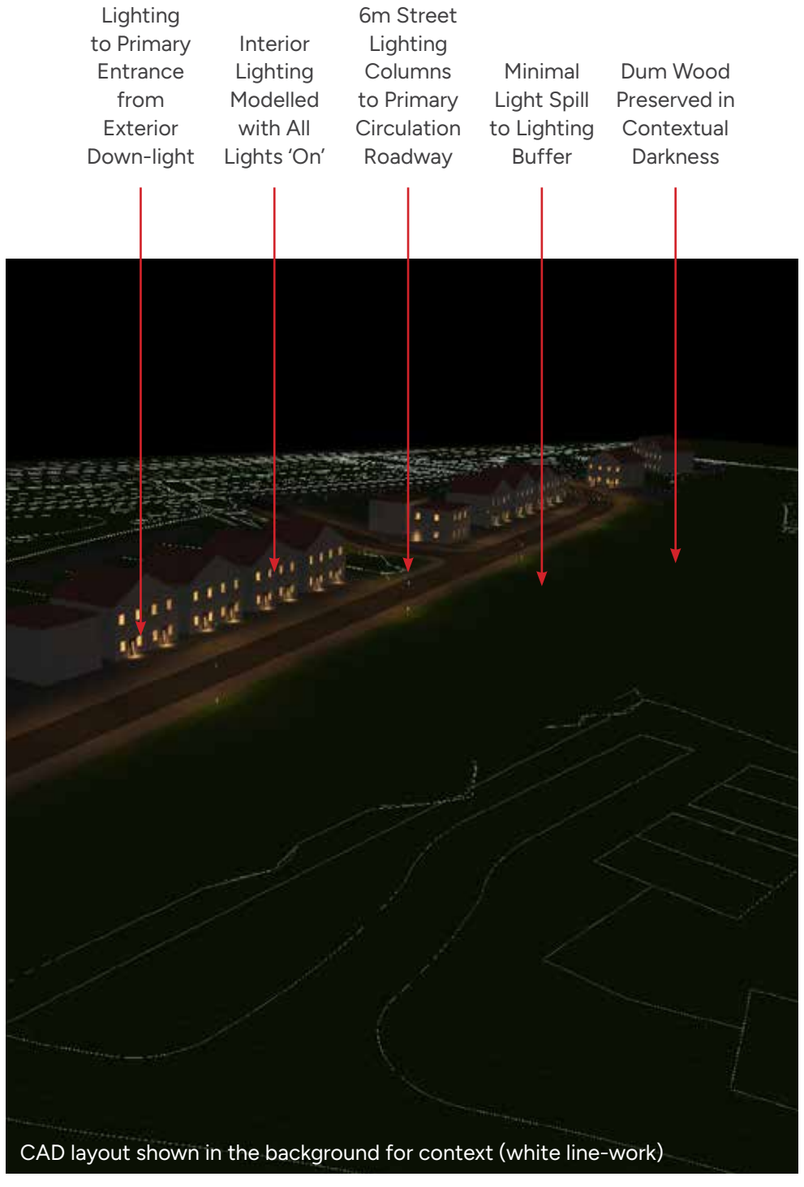
## Figure 9 - Area of Study

The extent of the Area of Study is shown by the dashed blue line. This area was agreed with input from the project ecologist as suitably representative of a 'worst case scenario' to test the compliance of the proposed lighting scheme against illuminance constraints due to being the closest proposed section of roadway to the Dum Wood.



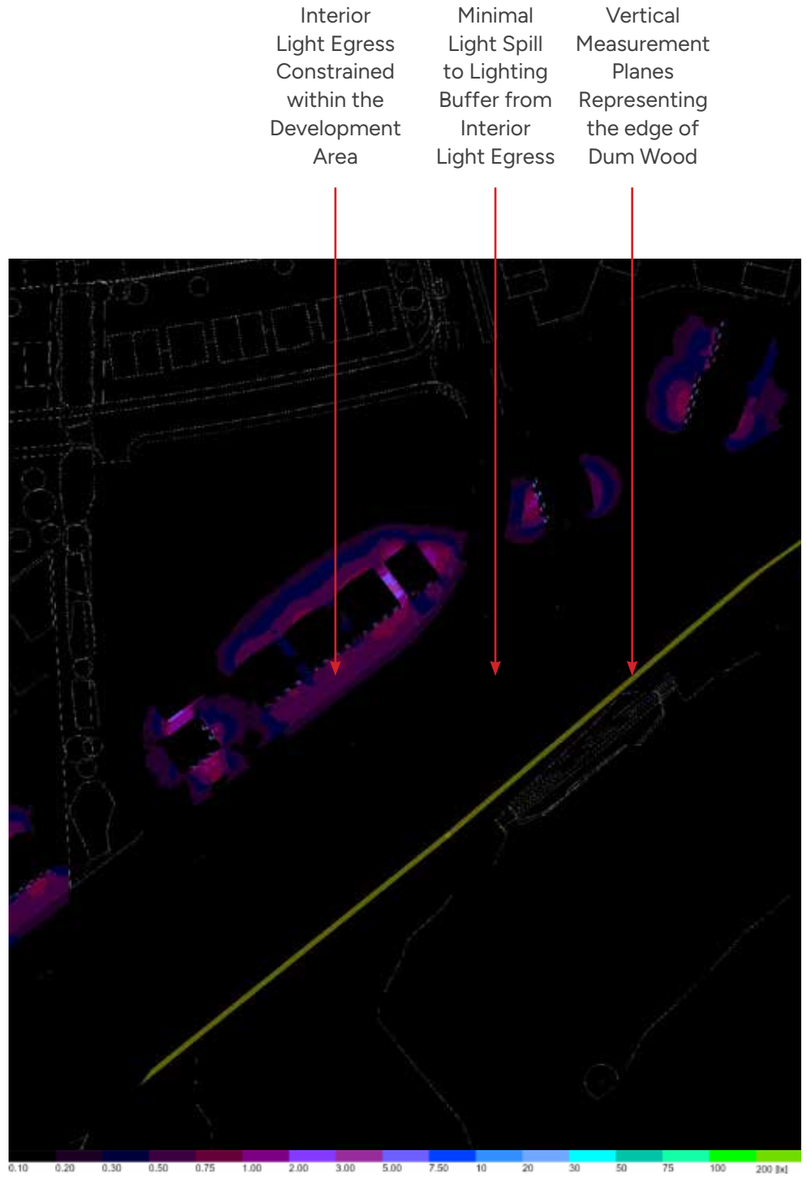

## Figure 10 - Light Rendering

The Area of Study rendered in 3D with all lighting 'On' demonstrating the visual appearance of lighting. The diagram shows the cumulative effect of street lighting to the primary circulation roadway, exterior domestic amenity lighting and interior lighting.



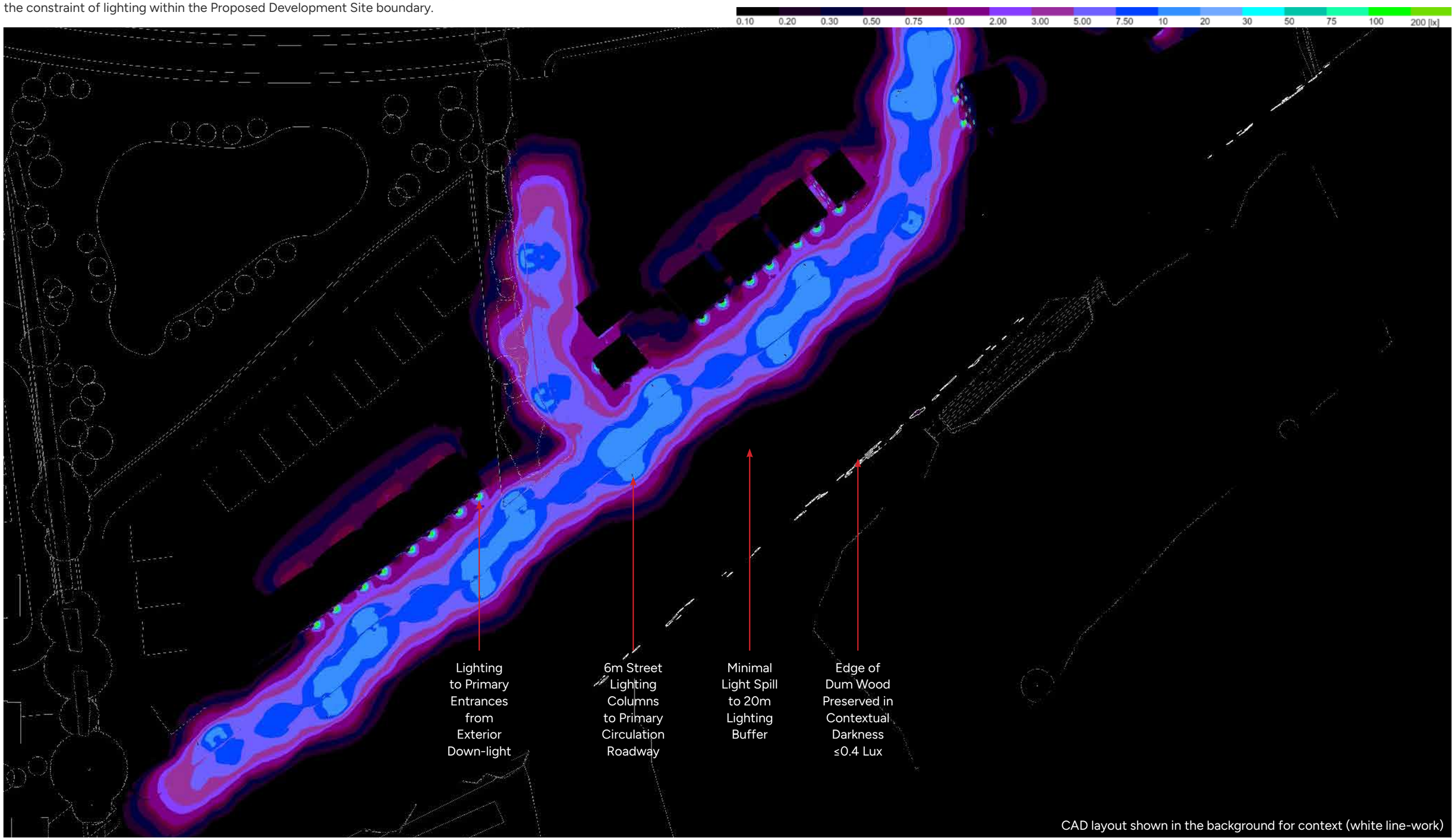

## Figure 11 - Interior Light Egress Study

The interior lighting was modelled for the purposes of testing the extent of light egress through windows of the units in the Area of Study under 'worst case scenario' conditions with all interior lighting 'On' and with no curtains or blinds in use at any residential property. The false colour diagram clearly shows the extent of light egress is well constrained to the area immediately adjacent to the units within the Development area.



## Figure 12 - False Colour Glow Plan

False colour rendering of the Area of Study with all lighting 'On' demonstrating the constraint of lighting within the Proposed Development Site boundary.



# Summary

## 31 - Summary of Lighting Impact Assessments

31-1 The internal roadways throughout the Proposed Development will require lighting for both the safety of road users and to reduce fear of crime. This requirement for lighting is to be balanced with the need to reduce the impact of light pollution on adjacent habitats and existing residential receptors.

31-2 Appropriate buffers and constraints protecting existing habitats around Dum Wood have been employed to preserve areas of existing dark habitat and the wider network of existing foraging and commuting routes. Light spill must be strictly limited at the boundary of the of Dum Wood to prevent harm to the species utilising this habitat feature and by extension to the wider network of interconnected habitats beyond.

31-3 To provide reassurance that the Proposed Development will not result in materially significant harm or degradation of the quality of Dum Wood as a habitat for light sensitive ecology, a detailed Lighting Assessment was undertaken using advanced 3D photometric modelling to quantify the cumulative effects of proposed lighting.

31-4 As this assessment is presented at outline stage and no fully defined layouts for development roadways or residential units exist, an Area of Study was defined with input from the project ecologist to test the potential effects of light pollution on to Dum Wood. The Illustrative Site Layout and DAS were used to approximate the Proposed Development to a reasonable degree of accuracy within the assessment model.

31-5 A street lighting scheme was developed for the internal roadways in the Area of Study, designed to the lowest appropriate Lighting Class suitable for adoption, thereby minimising the amount of artificial lighting within the development whilst still achieving all relevant requirements for road safety.

31-6 Suitable external amenity lighting to primary entrances of residential properties have been specified to ensure minimal impact on surrounding ecology. This amenity lighting is included within the assessment.

31-7 Interior lighting within residential units facing Dum Wood was also considered to ensure the effect of interior lighting does not encroach on the ‘Dark Zones’ through light egress.

## 32 - Technical Opinion Statement

32-1 As the proposed lighting design results in a fully compliant and adoptable lighting scheme for highway safety, and meets all compliance criteria, it is our opinion that the proposed indicative scheme is designed appropriately. The modelled results from this compliant scheme prove that there is no materially significant light spill to Dum Wood or its associated habitats. It is therefore our opinion that the proposed scheme would not adversely impact the suitability of Dum Wood as a habitat for light sensitive bat species. As such, Dum wood would continue to provide comparable environmental conditions following the implementation of the Proposed Development and its associated lighting infrastructure. Detailed evidence is presented within the attached appendices for reference including data outputs from the photometric model.

View of Dum Wood within the Proposed Development Site (by SLR)



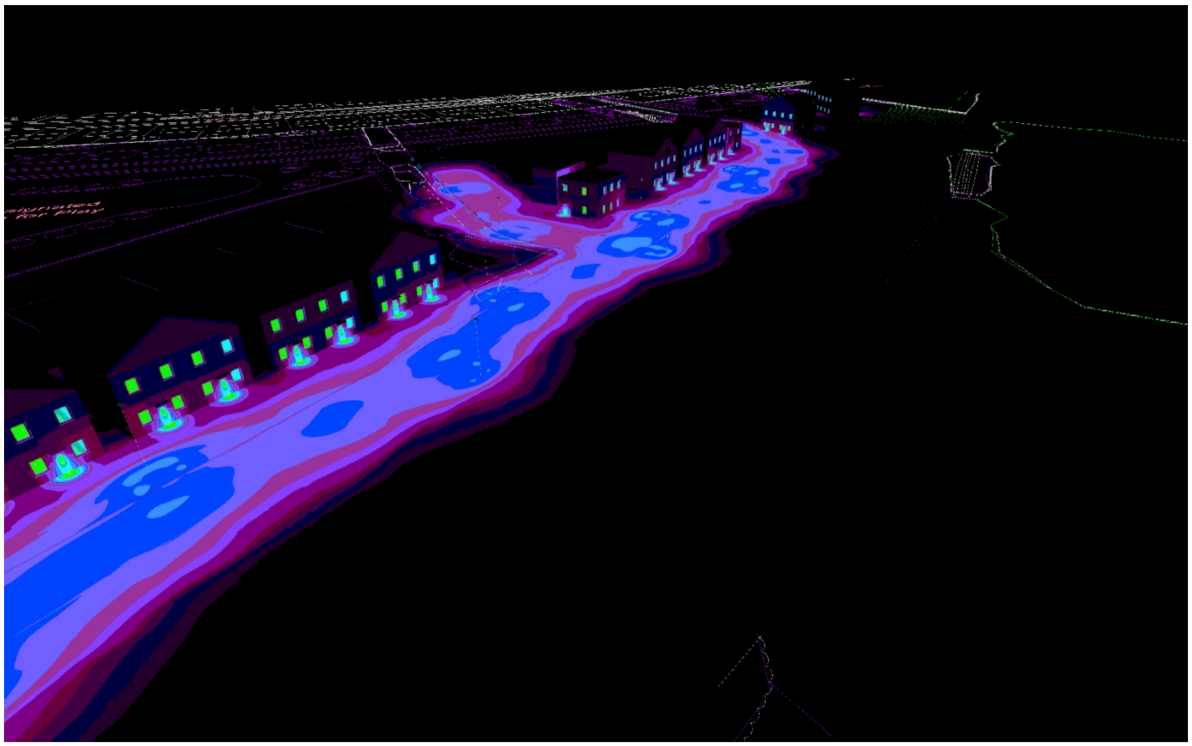
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slrconsulting.com

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**Date** 17/07/2026



# Hey Beck Lane

Appendix A: Lighting Operational Requirements

Report detailing the modelled lighting specifications and layout; and measurement planes across operational areas.

Created with DIALux

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## Description

SLR Project Number: 415.065736.00001

Based on: '18008-00-101D_HeybeckLane, Illustrative Site Plan' (by Enjoy Design)

Environmental Zone E2: 'Low district brightness. Sparsely inhabited rural areas, village or relatively dark suburban locations.' (ILP GN01)

BS 5489-1:2020 - Maintenance Factor: 0.92
Based on Environmental Zone, E2; column height ≤6m; and a worst case scenario cleaning frequency of 72 months.

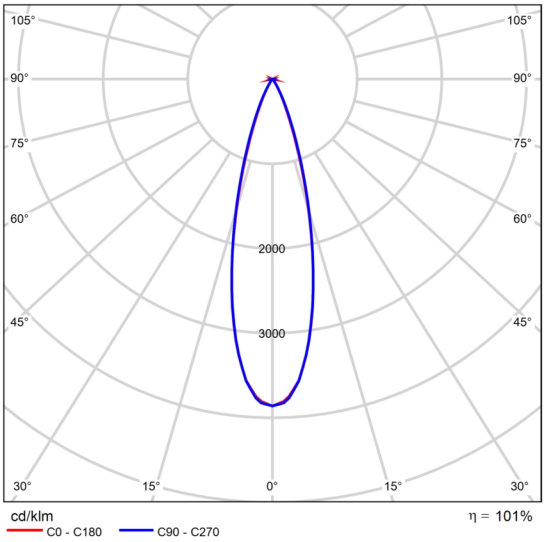
LED Lifetime / Luminous Flux: L90

∴ Project Maintenance Factor: 0.92 x 0.90 = 0.83

# Product data sheet

LightGraphix - LD782-E3

| | |
|---|---|
| Article No. | LD782-E3-350-LW30-MB |
| P | 4.4 W |
| $\Phi_{Lamp}$ | 266 lm |
| $\Phi_{Luminaire}$ | 269 lm |
| η | 101.03 % |
| Luminous efficacy | 61.1 lm/W |
| CCT | 2700 K |
| CRI | 85 |
| Index | D1 |

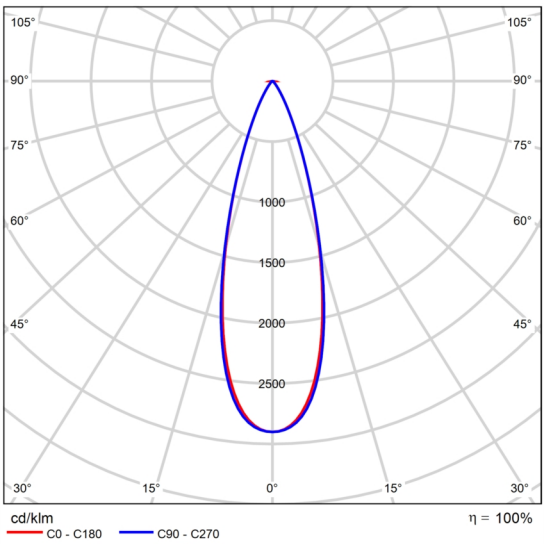



Polar LDC

# Product data sheet

LightGraphix - LD1090-E3

| | |
|---|---|
| Article No. | LD1090-E3-350-LW30-WB |
| P | 5.0 W |
| $\Phi_{Lamp}$ | 407 lm |
| $\Phi_{Luminaire}$ | 407 lm |
| η | 100.00 % |
| Luminous efficacy | 81.4 lm/W |
| CCT | 2700 K |
| CRI | 85 |
| Index | D2 |

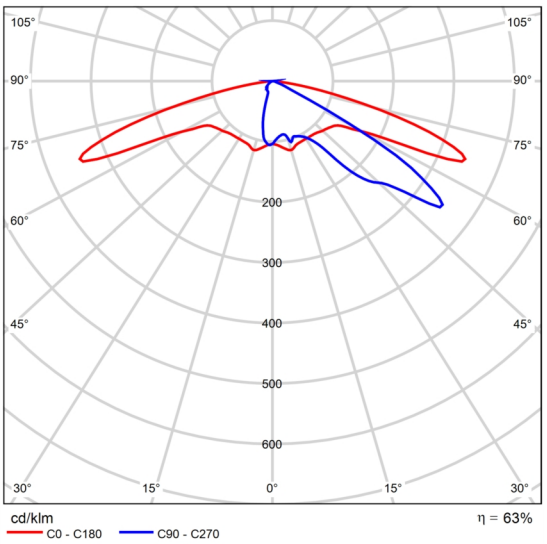



Polar LDC

# Product data sheet

Schréder - AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| | |
|---|---|
| Article No. | 457672 |
| P | 25.7 W |
| $\Phi_{Lamp}$ | 3576 lm |
| $\Phi_{Luminaire}$ | 2268 lm |
| η | 63.41 % |
| Luminous efficacy | 88.2 lm/W |
| CCT | 2700 K |
| CRI | 70 |
| Index | L1+2 |




Polar LDC

Hey Beck Lane

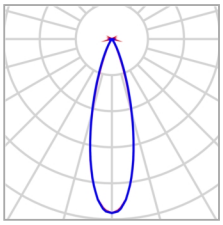
# Luminaire layout plan



Hey Beck Lane

# Luminaire layout plan



| | |
|---|---|
| Manufacturer | LightGraphix |
| Article No. | LD782-E3-350-LW30-MB |
| Article name | LD782-E3 |
| Fitting | 1x E3 |
| Index | D1 |

| | |
|---|---|
| P | 4.4 W |
| $\Phi_{Luminaire}$ | 269 lm |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 275.463 m / 177.383 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A10 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 275.463 m | 177.383 m | 2.100 m | 28 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 279.648 m / 180.649 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A11 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 279.648 m | 180.649 m | 2.100 m | 27 |

## 1 x LightGraphix LD782-E3

Hey Beck Lane

# Luminaire layout plan

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 269.561 m / 172.775 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A12 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 269.561 m | 172.775 m | 2.100 m | 32 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 265.354 m / 169.497 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A13 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 265.354 m | 169.497 m | 2.100 m | 36 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 289.749 m / 188.516 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A14 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 289.749 m | 188.516 m | 2.100 m | 25 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 285.564 m / 185.250 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A15 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 285.564 m | 185.250 m | 2.100 m | 26 |

Hey Beck Lane

# Luminaire layout plan

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 299.842 m / 196.398 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A16 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 299.842 m | 196.398 m | 2.100 m | 23 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 295.657 m / 193.132 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A17 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 295.657 m | 193.132 m | 2.100 m | 24 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 351.809 m / 236.934 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A18 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 351.809 m | 236.934 m | 2.100 m | 16 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 347.624 m / 233.669 m / 2.100 m |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 347.624 m | 233.669 m | 2.100 m | 17 |

Hey Beck Lane

# Luminaire layout plan

| | |
|---|---|
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A19 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 361.891 m / 244.799 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A20 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 361.891 m | 244.799 m | 2.100 m | 14 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 357.706 m / 241.533 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A21 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 357.706 m | 241.533 m | 2.100 m | 15 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 371.983 m / 252.672 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A22 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 371.983 m | 252.672 m | 2.100 m | 11 |

## 1 x LightGraphix LD782-E3

Hey Beck Lane

# Luminaire layout plan

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 367.798 m / 249.406 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A23 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 367.798 m | 249.406 m | 2.100 m | 12 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 403.743 m / 274.688 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A24 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 403.743 m | 274.688 m | 2.100 m | 8 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 402.090 m / 279.732 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A25 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 402.090 m | 279.732 m | 2.100 m | 6 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 325.544 m / 223.617 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.210 m |
| Arrangement | A26 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 325.544 m | 223.617 m | 2.100 m | 21 |

Hey Beck Lane

# Luminaire layout plan

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 376.662 m / 256.736 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.210 m |
| Arrangement | A27 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 376.662 m | 256.736 m | 2.100 m | 9 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 444.004 m / 294.625 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A28 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 444.004 m | 294.625 m | 2.100 m | 4 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 445.184 m / 299.804 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.190 m |
| Arrangement | A29 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 445.184 m | 299.804 m | 2.100 m | 3 |

## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 448.784 m / 306.674 m / 2.100 m |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 448.784 m | 306.674 m | 2.100 m | 2 |

Hey Beck Lane

# Luminaire layout plan

| | |
|---|---|
| X-direction | 1 pcs., Centre - centre, 1.200 m |
| Arrangement | A30 |

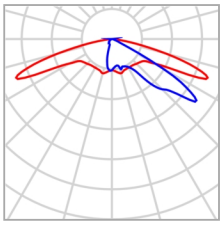
## 1 x LightGraphix LD782-E3

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 449.964 m / 311.854 m / 2.100 m |
| X-direction | 1 pcs., Centre - centre, 1.190 m |
| Arrangement | A31 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 449.964 m | 311.854 m | 2.100 m | 1 |

Hey Beck Lane

# Luminaire layout plan



| | | | |
|---|---|---|---|
| Manufacturer | Schréder | P | 25.7 W |
| Article No. | 457672 | $\Phi_{Luminaire}$ | 2268 lm |
| Article name | AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672 | | |
| Fitting | 1x 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 | | |
| Index | L1+2 | | |

3 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 243.506 m / 146.505 m / 6.000 m |
| X-direction | 3 pcs., Centre - centre, 40.000 m |
| Arrangement | A1 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 243.506 m | 146.505 m | 6.000 m | 33 |
| 275.050 m | 171.101 m | 6.000 m | 34 |
| 306.594 m | 195.697 m | 6.000 m | 35 |

2 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 337.365 m / 219.388 m / 6.000 m |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 368.903 m | 243.992 m | 6.000 m | 18 |
| 337.365 m | 219.388 m | 6.000 m | 19 |

Hey Beck Lane

# Luminaire layout plan

| | |
|---|---|
| X-direction | 2 pcs., Centre - centre, 40.000 m |
| Arrangement | A2 |

3 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 333.114 m / 200.936 m / 6.000 m |
| X-direction | 3 pcs., Centre - centre, 40.000 m |
| Arrangement | A3 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 333.114 m | 200.936 m | 6.000 m | 29 |
| 301.576 m | 176.332 m | 6.000 m | 30 |
| 270.038 m | 151.728 m | 6.000 m | 31 |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 364.741 m / 225.416 m / 6.000 m |
| X-direction | 1 pcs., Centre - centre, 4.000 m |
| Arrangement | A4 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 364.741 m | 225.416 m | 6.000 m | 20 |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement |
|---|---|
| 1st luminaire (X/Y/Z) | 393.080 m / 253.177 m / 6.000 m |
| X-direction | 1 pcs., Centre - centre, 4.000 m |
| Arrangement | A5 |

| X | Y | Mounting height | Luminaire |
|---|---|---|---|
| 393.080 m | 253.177 m | 6.000 m | 10 |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

Hey Beck Lane

# Luminaire layout plan

| Type | Line arrangement | X | Y | Mounting height | Luminaire |
|---|---|---|---|---|---|
| 1st luminaire (X/Y/Z) | 400.142 m / 291.532 m / 6.000 m | 400.142 m | 291.532 m | 6.000 m | 5 |
| X-direction | 1 pcs., Centre - centre, 4.000 m | | | | |
| Arrangement | A6 | | | | |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement | X | Y | Mounting height | Luminaire |
|---|---|---|---|---|---|
| 1st luminaire (X/Y/Z) | 313.135 m / 216.261 m / 6.000 m | 313.135 m | 216.261 m | 6.000 m | 22 |
| X-direction | 1 pcs., Centre - centre, 2.256 m | | | | |
| Arrangement | A7 | | | | |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement | X | Y | Mounting height | Luminaire |
|---|---|---|---|---|---|
| 1st luminaire (X/Y/Z) | 309.800 m / 246.573 m / 6.000 m | 309.800 m | 246.573 m | 6.000 m | 13 |
| X-direction | 1 pcs., Centre - centre, 4.420 m | | | | |
| Arrangement | A8 | | | | |

1 x Schréder AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672

| Type | Line arrangement | X | Y | Mounting height | Luminaire |
|---|---|---|---|---|---|
| 1st luminaire (X/Y/Z) | 388.648 m / 279.596 m / 6.000 m | 388.648 m | 279.596 m | 6.000 m | 7 |
| X-direction | 1 pcs., Centre - centre, 2.194 m | | | | |
| Arrangement | A9 | | | | |

Hey Beck Lane

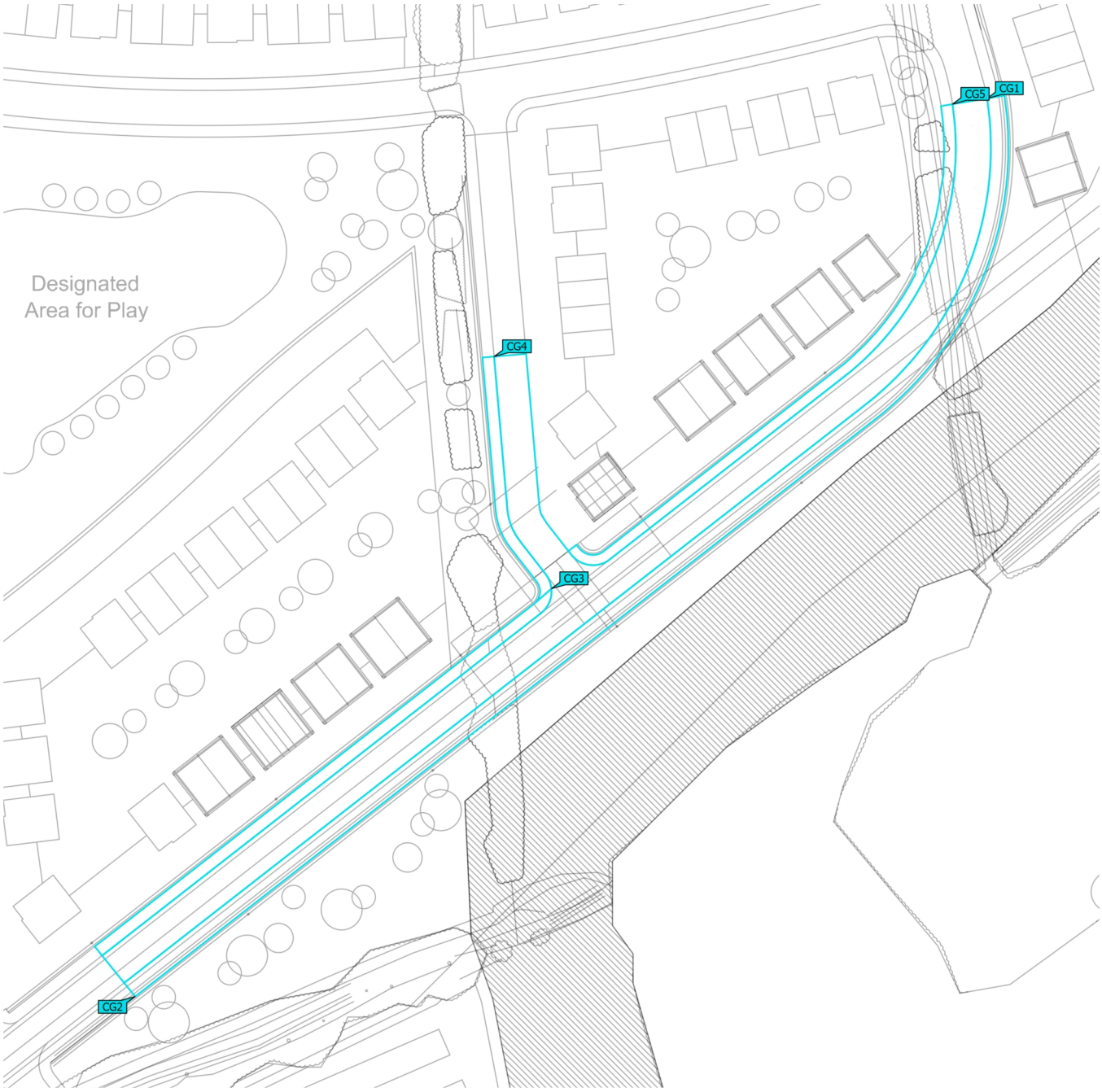
# Luminaire list

| $\Phi_{total}$ | $P_{total}$ | Luminous efficacy |
|---|---|---|
| 37670 lm | 456.6 W | 82.5 lm/W |

| pcs. | Manufacturer | Article No. | Article name | P | Φ | Luminous efficacy | Index |
|---|---|---|---|---|---|---|---|
| 22 | LightGraphix | LD782-E3-350-LW30-MB | LD782-E3 | 4.4 W | 269 lm | 61.1 lm/W | D1 |
| 14 | Schréder | 457672 | AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672 | 25.7 W | 2268 lm | 88.2 lm/W | L1+2 |

Hey Beck Lane (ALL ON 100%)

## Calculation objects



Hey Beck Lane (ALL ON 100%)

# Calculation objects

## Calculation surfaces

| Properties | $\bar{E}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP001 - Roadway<br>Perpendicular illuminance<br>Height: 0.100 m | 7.44 lx | 1.74 lx | 13.2 lx | 0.23 | 0.13 | CG1 |
| HMP002 - Cycle Route<br>Perpendicular illuminance<br>Height: 0.100 m | 5.97 lx | 1.29 lx | 11.7 lx | 0.22 | 0.11 | CG2 |
| HMP003 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.94 lx | 2.91 lx | 14.6 lx | 0.49 | 0.20 | CG3 |
| HMP004 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.45 lx | 2.80 lx | 9.05 lx | 0.51 | 0.31 | CG4 |
| HMP005 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.78 lx | 1.59 lx | 10.9 lx | 0.28 | 0.15 | CG5 |

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Hey Beck Lane (ALL ON 100%)

## HMP001 - Roadway




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP001 - Roadway<br>Perpendicular illuminance<br>Height: 0.100 m | 7.44 lx | 1.74 lx | 13.2 lx | 0.23 | 0.13 | CG1 |

Notes on planning:
Lighting Class P4
Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux

Hey Beck Lane (ALL ON 100%)

## HMP002 - Cycle Route

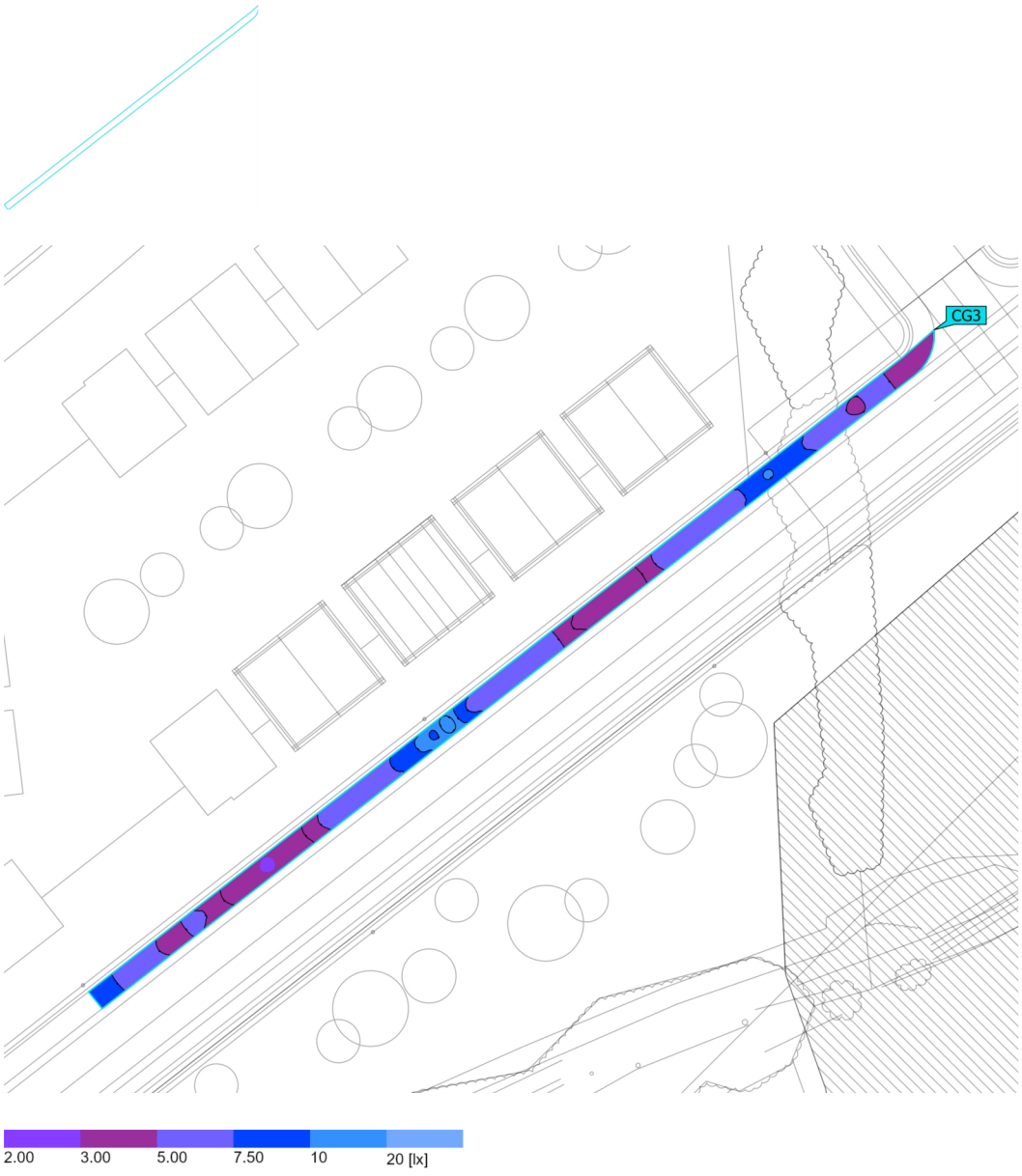



| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP002 - Cycle Route<br>Perpendicular illuminance<br>Height: 0.100 m | 5.97 lx | 1.29 lx | 11.7 lx | 0.22 | 0.11 | CG2 |

Notes on planning:
Lighting Class P4
Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux

Hey Beck Lane (ALL ON 100%)

## HMP003 - Footpath




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP003 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.94 lx | 2.91 lx | 14.6 lx | 0.49 | 0.20 | CG3 |

Notes on planning:
Lighting Class P4
Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux

Hey Beck Lane (ALL ON 100%)

## HMP004 - Footpath




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP004 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.45 lx | 2.80 lx | 9.05 lx | 0.51 | 0.31 | CG4 |

Notes on planning:
Lighting Class P4
Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux

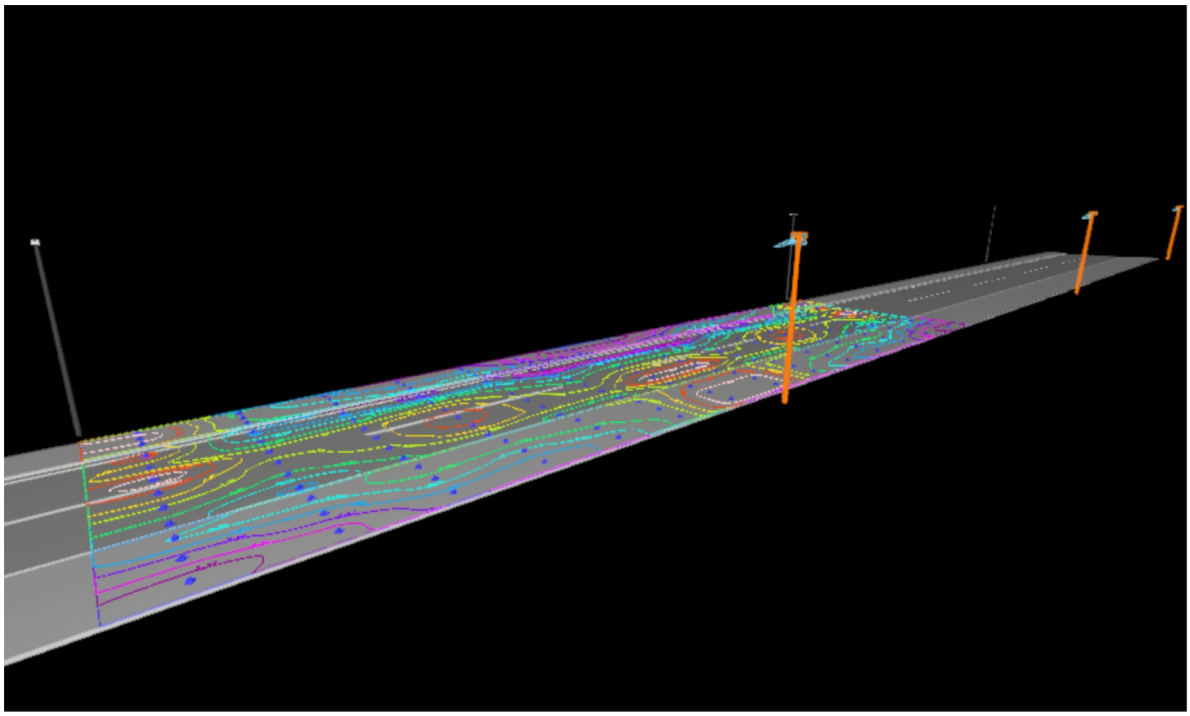
Hey Beck Lane (ALL ON 100%)

## HMP005 - Footpath




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| HMP005 - Footpath<br>Perpendicular illuminance<br>Height: 0.100 m | 5.78 lx | 1.59 lx | 10.9 lx | 0.28 | 0.15 | CG5 |

Notes on planning:
Lighting Class P4
Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux



Primary Roadway

## Description

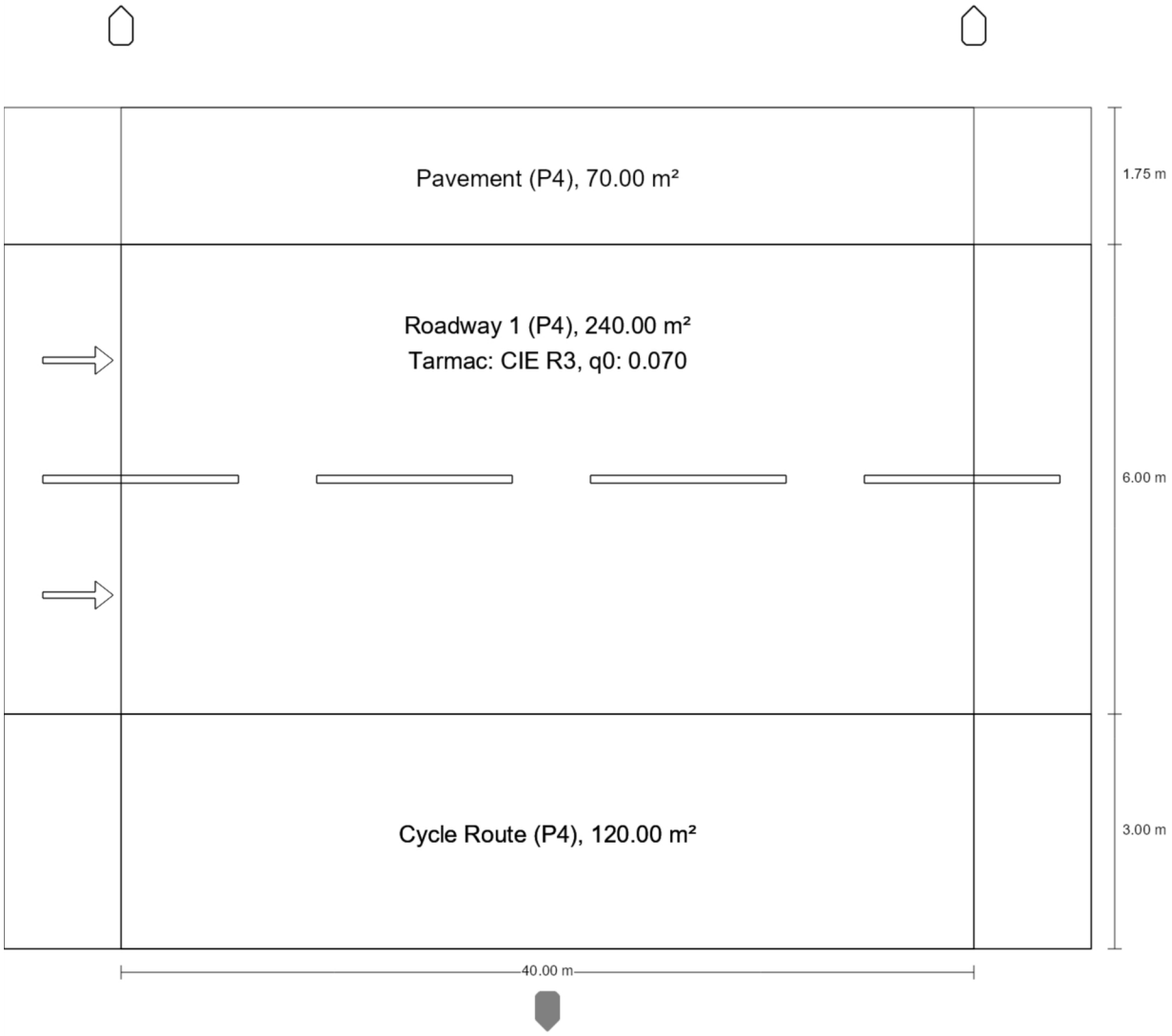
P Lighting Class Risk Assessment:
Speed - Low: 1
Traffic Volume - Moderate: 0
Traffic Composition - Pedestrians, Cyclists & Motorised: 2
Parked Vehicles - Not Present: 0
Ambient Luminance: Low: -1

Sum of Weighted Values: 2
∴ P Lighting Class = P4

Average, Ē: 5-7.5 lux; Minimum, Emin: 1 lux

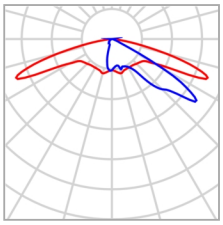
Primary Roadway

## Summary (according to EN 13201:2015)



Primary Roadway

## Summary (according to EN 13201:2015)

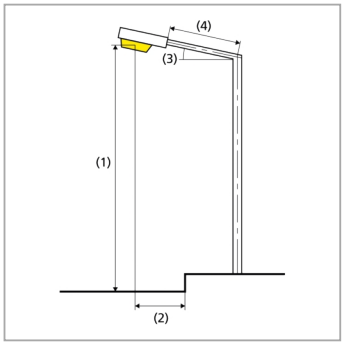


| | | | |
|---|---|---|---|
| Manufacturer | Schréder | P | 25.7 W |
| Article No. | 457672 | $\Phi_{Lamp}$ | 3576 lm |
| Article name | AXIA 3.1 5267<br>Integrated lenses<br>Rear louvers 16<br>OSLON SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814<br>457672 | $\Phi_{Luminaire}$ | 2268 lm |
| | | η | 63.41 % |
| Fitting | 1x 16 OSLON<br>SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814 | | |
| Index | L1+2 | | |

Primary Roadway

# Summary (according to EN 13201:2015)

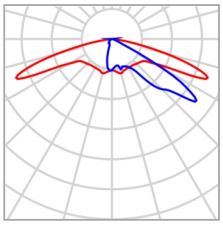
AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672 (single side bottom)




| | |
|---|---|
| Pole distance | 40.000 m |
| (1) Light spot height | 6.000 m |
| (2) Light point overhang | -3.800 m |
| (3) Boom inclination | 0.0° |
| (4) Boom length | 0.000 m |
| Annual operating hours | 4000 h: 100.0 %, 25.7 W |
| Wattage / route | 642.5 W/km |
| ULR / ULOR | 0.00 / 0.00 |
| Max. luminous intensities<br>Any direction forming the specified angle from the downward vertical, with the luminaire installed for use. | ≥ 70°: 1282 cd/klm<br>≥ 80°: 175 cd/klm<br>≥ 90°: 0.00 cd/klm |
| Luminous intensity class<br>The luminous intensity values in [cd/klm] for calculation of the luminous intensity class refer to the luminaire luminous flux according to EN 13201:2015. | G*1 |
| Glare index class | D.5 |
| MF | 0.80 |

Primary Roadway

## Summary (according to EN 13201:2015)

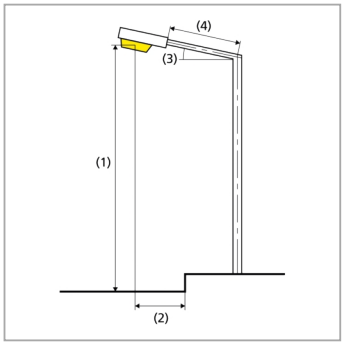


| | | | |
|---|---|---|---|
| Manufacturer | Schréder | P | 25.7 W |
| Article No. | 457672 | $\Phi_{Lamp}$ | 3576 lm |
| Article name | AXIA 3.1 5267<br>Integrated lenses<br>Rear louvers 16<br>OSLON SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814<br>457672 | $\Phi_{Luminaire}$ | 2268 lm |
| | | η | 63.41 % |
| Fitting | 1x 16 OSLON<br>SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814 | | |
| Index | L1+2 | | |

Primary Roadway

# Summary (according to EN 13201:2015)

AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672 (single side top)




| | |
|---|---|
| Pole distance | 40.000 m |
| (1) Light spot height | 6.000 m |
| (2) Light point overhang | -2.800 m |
| (3) Boom inclination | 0.0° |
| (4) Boom length | 0.000 m |
| Annual operating hours | 4000 h: 100.0 %, 25.7 W |
| Wattage / route | 642.5 W/km |
| ULR / ULOR | 0.00 / 0.00 |
| Max. luminous intensities<br>Any direction forming the specified angle from the downward vertical, with the luminaire installed for use. | ≥ 70°: 1282 cd/klm<br>≥ 80°: 175 cd/klm<br>≥ 90°: 0.00 cd/klm |
| Luminous intensity class<br>The luminous intensity values in [cd/klm] for calculation of the luminous intensity class refer to the luminaire luminous flux according to EN 13201:2015. | G*1 |
| Glare index class | D.5 |
| MF | 0.80 |

Primary Roadway

# Summary (according to EN 13201:2015)

## Results for valuation fields

A maintenance factor of 0.80 was used for calculating for the installation.

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Pavement (P4) | $E_{av}$ | 5.34 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 2.33 lx | ≥ 1.00 lx | ✓ |
| Roadway 1 (P4) | $E_{av}$ | 7.21 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 5.50 lx | ≥ 1.00 lx | ✓ |
| Cycle Route (P4) | $E_{av}$ | 5.60 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 2.28 lx | ≥ 1.00 lx | ✓ |

## Results for energy efficiency indicators

| | Symbol | Calculated | Energy Consumption |
|---|---|---|---|
| Primary Roadway | $D_p$ | 0.009 W/lx*m² | – |
| AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672 (single side bottom) | $D_e$ | 0.2 kWh/m² yr | 102.8 kWh/yr |
| AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672 (single side top) | $D_e$ | 0.2 kWh/m² yr | 102.8 kWh/yr |

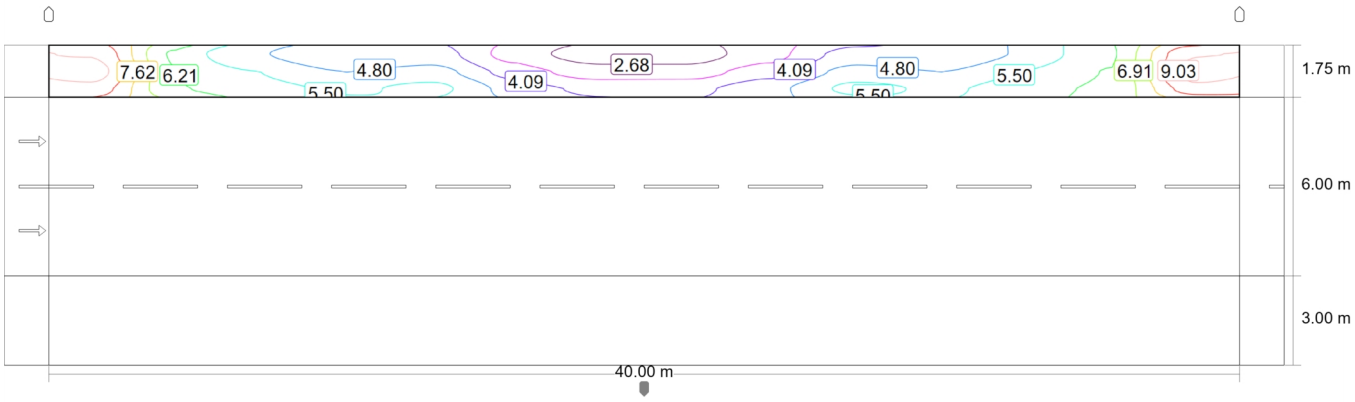
EN 13201:2015-5 does not include the case for planning with multiple luminaire arrangements. The calculation of the output values is done therefore only for the luminaire arrangement whose pole distance determines the length of the valuation fields.

Primary Roadway

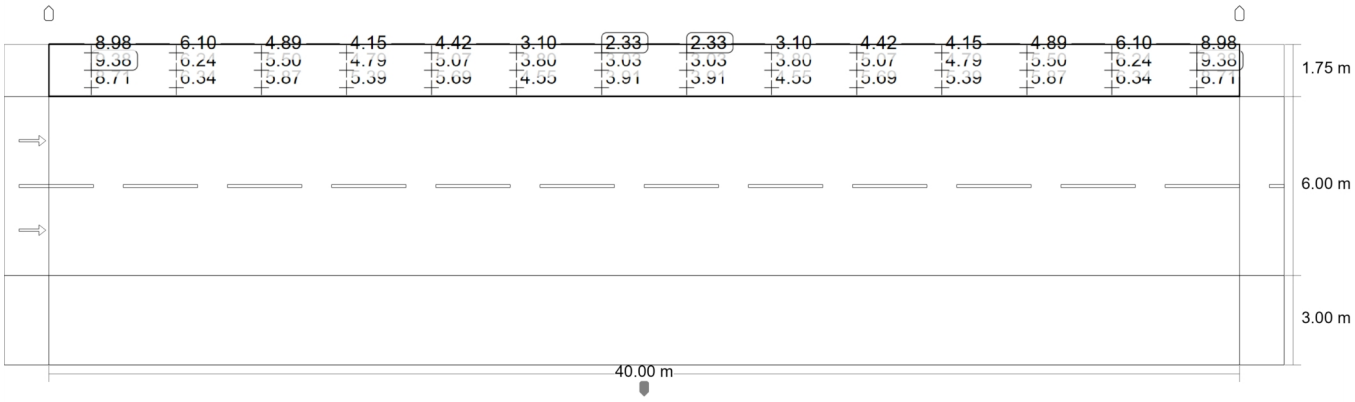
# Pavement (P4)

## Results for valuation field

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Pavement (P4) | $E_{av}$ | 5.34 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 2.33 lx | ≥ 1.00 lx | ✓ |




Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)



Primary Roadway

# Pavement (P4)

Maintenance value, horizontal illuminance [lx] (Value grid)

| m | 1.429 | 4.286 | 7.143 | 10.000 | 12.857 | 15.714 | 18.571 | 21.429 | 24.286 | 27.143 | 30.000 | 32.857 | 35.714 | 38.571 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.458 | 8.98 | 6.10 | 4.89 | 4.15 | 4.42 | 3.10 | 2.33 | 2.33 | 3.10 | 4.42 | 4.15 | 4.89 | 6.10 | 8.98 |
| 9.875 | 9.38 | 6.24 | 5.50 | 4.79 | 5.07 | 3.80 | 3.03 | 3.03 | 3.80 | 5.07 | 4.79 | 5.50 | 6.24 | 9.38 |
| 9.292 | 8.71 | 6.34 | 5.87 | 5.39 | 5.69 | 4.55 | 3.91 | 3.91 | 4.55 | 5.69 | 5.39 | 5.87 | 6.34 | 8.71 |

Maintenance value, horizontal illuminance [lx] (Value chart)

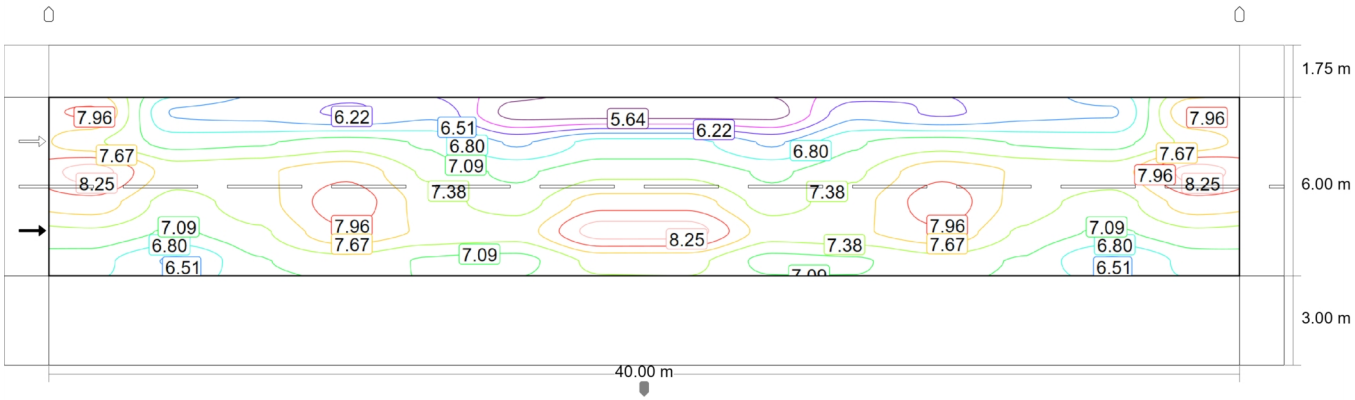
| | $E_{av}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ |
|---|---|---|---|---|---|
| Maintenance value, horizontal illuminance | 5.34 lx | 2.33 lx | 9.38 lx | 0.44 | 0.25 |

Primary Roadway

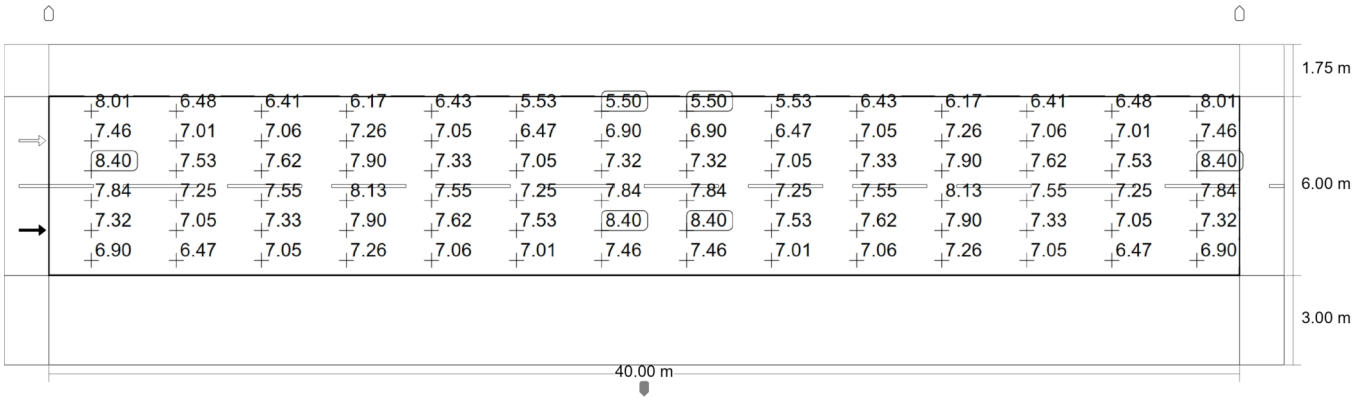
# Roadway 1 (P4)

## Results for valuation field

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Roadway 1 (P4) | $E_{av}$ | 7.21 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 5.50 lx | ≥ 1.00 lx | ✓ |




Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)



Primary Roadway

# Roadway 1 (P4)

Maintenance value, horizontal illuminance [lx] (Value grid)

| m | 1.429 | 4.286 | 7.143 | 10.000 | 12.857 | 15.714 | 18.571 | 21.429 | 24.286 | 27.143 | 30.000 | 32.857 | 35.714 | 38.571 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8.500** | 8.01 | 6.48 | 6.41 | 6.17 | 6.43 | 5.53 | 5.50 | 5.50 | 5.53 | 6.43 | 6.17 | 6.41 | 6.48 | 8.01 |
| **7.500** | 7.46 | 7.01 | 7.06 | 7.26 | 7.05 | 6.47 | 6.90 | 6.90 | 6.47 | 7.05 | 7.26 | 7.06 | 7.01 | 7.46 |
| **6.500** | 8.40 | 7.53 | 7.62 | 7.90 | 7.33 | 7.05 | 7.32 | 7.32 | 7.05 | 7.33 | 7.90 | 7.62 | 7.53 | 8.40 |
| **5.500** | 7.84 | 7.25 | 7.55 | 8.13 | 7.55 | 7.25 | 7.84 | 7.84 | 7.25 | 7.55 | 8.13 | 7.55 | 7.25 | 7.84 |
| **4.500** | 7.32 | 7.05 | 7.33 | 7.90 | 7.62 | 7.53 | 8.40 | 8.40 | 7.53 | 7.62 | 7.90 | 7.33 | 7.05 | 7.32 |
| **3.500** | 6.90 | 6.47 | 7.05 | 7.26 | 7.06 | 7.01 | 7.46 | 7.46 | 7.01 | 7.06 | 7.26 | 7.05 | 6.47 | 6.90 |

Maintenance value, horizontal illuminance [lx] (Value chart)

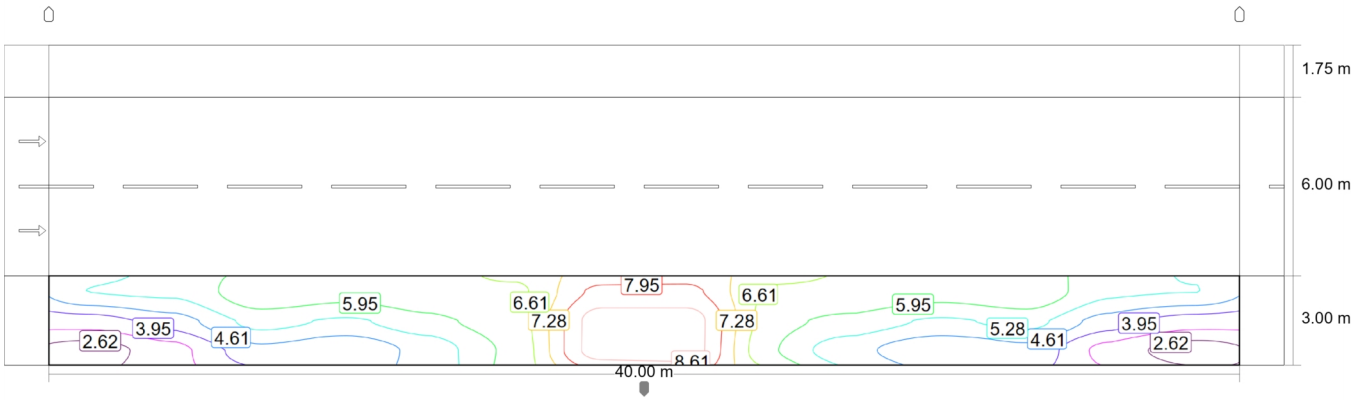
| | $E_{av}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ |
|---|---|---|---|---|---|
| Maintenance value, horizontal illuminance | 7.21 lx | 5.50 lx | 8.40 lx | 0.76 | 0.65 |

Primary Roadway

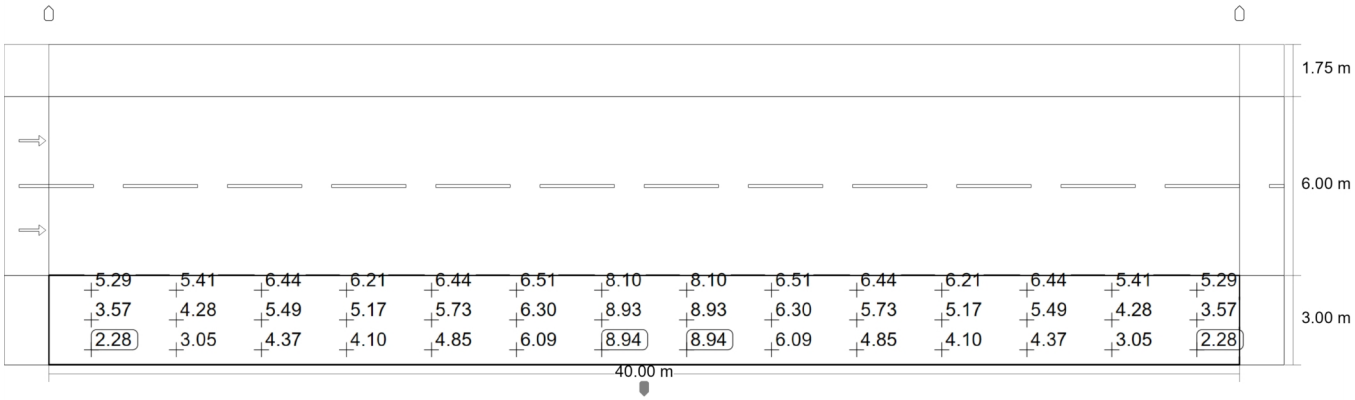
# Cycle Route (P4)

## Results for valuation field

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Cycle Route (P4) | $E_{av}$ | 5.60 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 2.28 lx | ≥ 1.00 lx | ✓ |




Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)



Primary Roadway

# Cycle Route (P4)

Maintenance value, horizontal illuminance [lx] (Value grid)

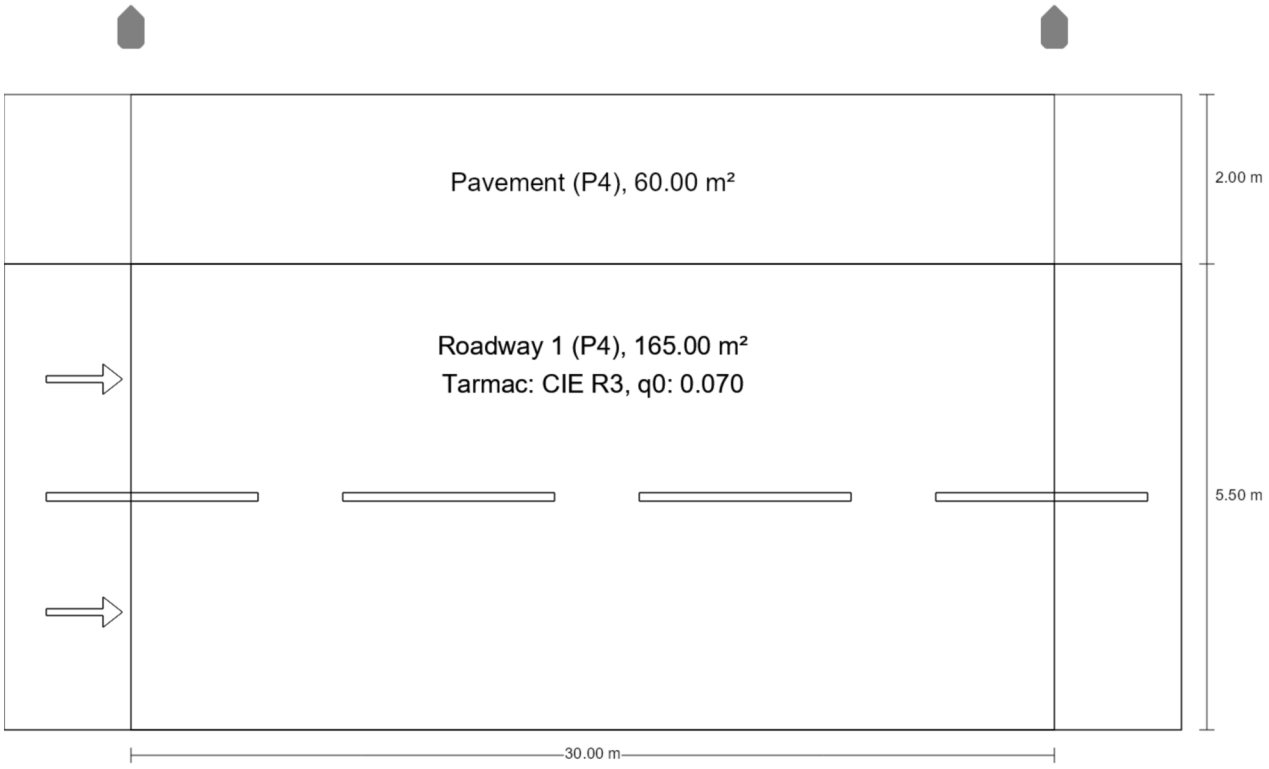
| m | 1.429 | 4.286 | 7.143 | 10.000 | 12.857 | 15.714 | 18.571 | 21.429 | 24.286 | 27.143 | 30.000 | 32.857 | 35.714 | 38.571 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.500 | 5.29 | 5.41 | 6.44 | 6.21 | 6.44 | 6.51 | 8.10 | 8.10 | 6.51 | 6.44 | 6.21 | 6.44 | 5.41 | 5.29 |
| 1.500 | 3.57 | 4.28 | 5.49 | 5.17 | 5.73 | 6.30 | 8.93 | 8.93 | 6.30 | 5.73 | 5.17 | 5.49 | 4.28 | 3.57 |
| 0.500 | 2.28 | 3.05 | 4.37 | 4.10 | 4.85 | 6.09 | 8.94 | 8.94 | 6.09 | 4.85 | 4.10 | 4.37 | 3.05 | 2.28 |

Maintenance value, horizontal illuminance [lx] (Value chart)

| | $E_{av}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ |
|---|---|---|---|---|---|
| Maintenance value, horizontal illuminance | 5.60 lx | 2.28 lx | 8.94 lx | 0.41 | 0.26 |

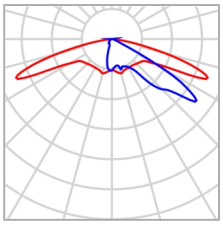
Secondary / Minor Roadway

## Summary (according to EN 13201:2015)



Secondary / Minor Roadway

## Summary (according to EN 13201:2015)

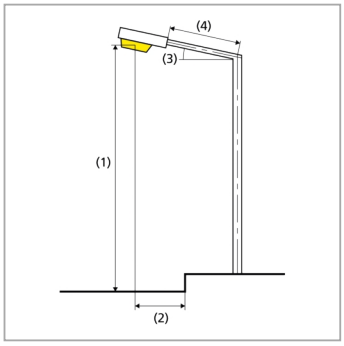


| | | | |
|---|---|---|---|
| Manufacturer | Schréder | P | 25.7 W |
| Article No. | 457672 | $\Phi_{Lamp}$ | 3576 lm |
| Article name | AXIA 3.1 5267<br>Integrated lenses<br>Rear louvers 16<br>OSLON SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814<br>457672 | $\Phi_{Luminaire}$ | 2268 lm |
| | | η | 63.41 % |
| Fitting | 1x 16 OSLON SQUARE<br>GIANT@500mA WW<br>727 230V 01-11-814 | | |
| Index | L1+2 | | |

Secondary / Minor Roadway

# Summary (according to EN 13201:2015)

AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814  457672 (single side top)




| | |
|---|---|
| Pole distance | 30.000 m |
| (1) Light spot height | 6.000 m |
| (2) Light point overhang | -2.800 m |
| (3) Boom inclination | 0.0° |
| (4) Boom length | 0.000 m |
| Annual operating hours | 4000 h: 100.0 %, 25.7 W |
| Wattage / route | 848.1 W/km |
| ULR / ULOR | 0.00 / 0.00 |
| Max. luminous intensities<br>Any direction forming the specified angle from the downward vertical, with the luminaire installed for use. | ≥ 70°: 1282 cd/klm<br>≥ 80°: 175 cd/klm<br>≥ 90°: 0.00 cd/klm |
| Luminous intensity class<br>The luminous intensity values in [cd/klm] for calculation of the luminous intensity class refer to the luminaire luminous flux according to EN 13201:2015. | G*1 |
| Glare index class | D.5 |
| MF | 0.80 |

Secondary / Minor Roadway

# Summary (according to EN 13201:2015)

## Results for valuation fields

A maintenance factor of 0.80 was used for calculating for the installation.

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Pavement (P4) | $E_{av}$ | 5.15 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 3.71 lx | ≥ 1.00 lx | ✓ |
| Roadway 1 (P4) | $E_{av}$ | 5.00 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 3.99 lx | ≥ 1.00 lx | ✓ |

## Results for energy efficiency indicators

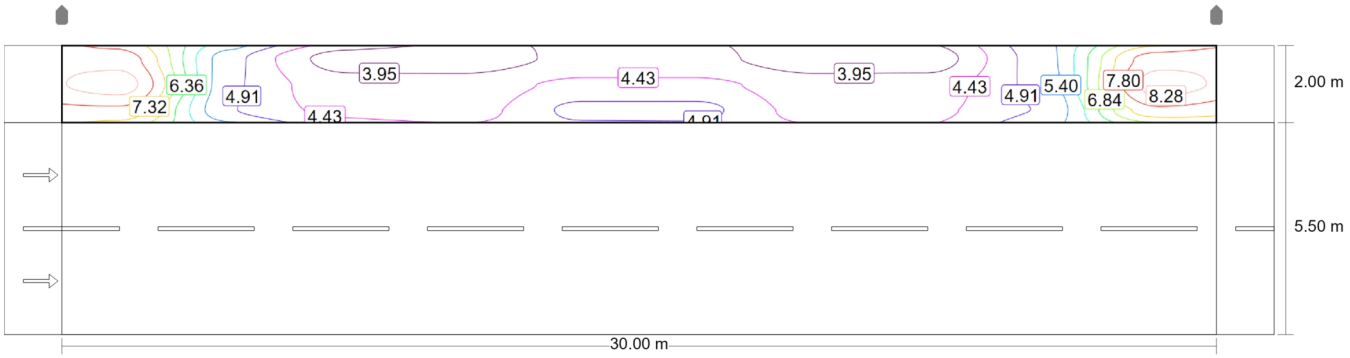
| | Symbol | Calculated | Energy Consumption |
|---|---|---|---|
| Secondary / Minor Roadway | $D_p$ | 0.023 W/lx*m$^2$ | – |
| AXIA 3.1 5267 Integrated lenses Rear louvers 16 OSLON SQUARE GIANT@500mA WW 727 230V 01-11-814 457672 (single side top) | $D_e$ | 0.5 kWh/m$^2$ yr | 102.8 kWh/yr |

Secondary / Minor Roadway

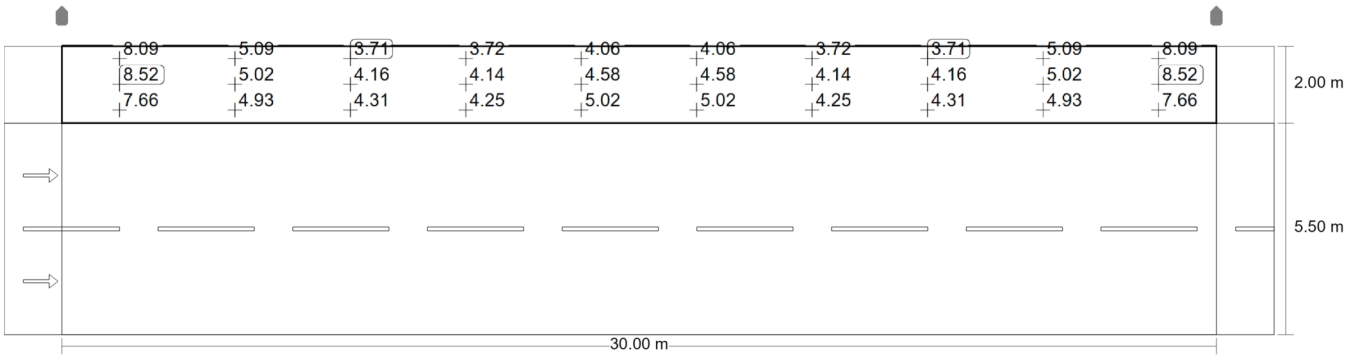
# Pavement (P4)

## Results for valuation field

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Pavement (P4) | $E_{av}$ | 5.15 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 3.71 lx | ≥ 1.00 lx | ✓ |




Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)




Maintenance value, horizontal illuminance [lx] (Value grid)

| m | 1.500 | 4.500 | 7.500 | 10.500 | 13.500 | 16.500 | 19.500 | 22.500 | 25.500 | 28.500 |
|---|---|---|---|---|---|---|---|---|---|---|
| 7.167 | 8.09 | 5.09 | 3.71 | 3.72 | 4.06 | 4.06 | 3.72 | 3.71 | 5.09 | 8.09 |
| 6.500 | 8.52 | 5.02 | 4.16 | 4.14 | 4.58 | 4.58 | 4.14 | 4.16 | 5.02 | 8.52 |
| 5.833 | 7.66 | 4.93 | 4.31 | 4.25 | 5.02 | 5.02 | 4.25 | 4.31 | 4.93 | 7.66 |

Secondary / Minor Roadway

## Pavement (P4)

Maintenance value, horizontal illuminance [lx] (Value chart)

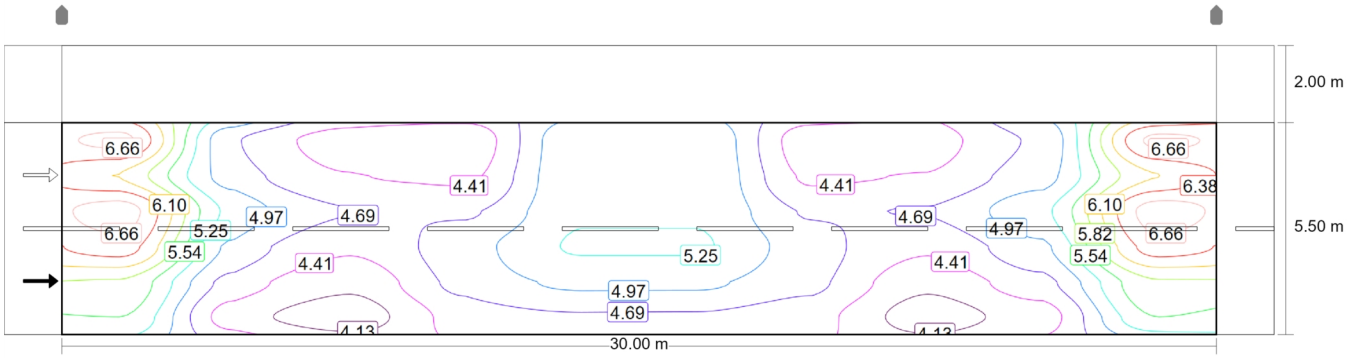
| | $E_{av}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ |
|---|---|---|---|---|---|
| Maintenance value, horizontal illuminance | 5.15 lx | 3.71 lx | 8.52 lx | 0.72 | 0.44 |

Secondary / Minor Roadway

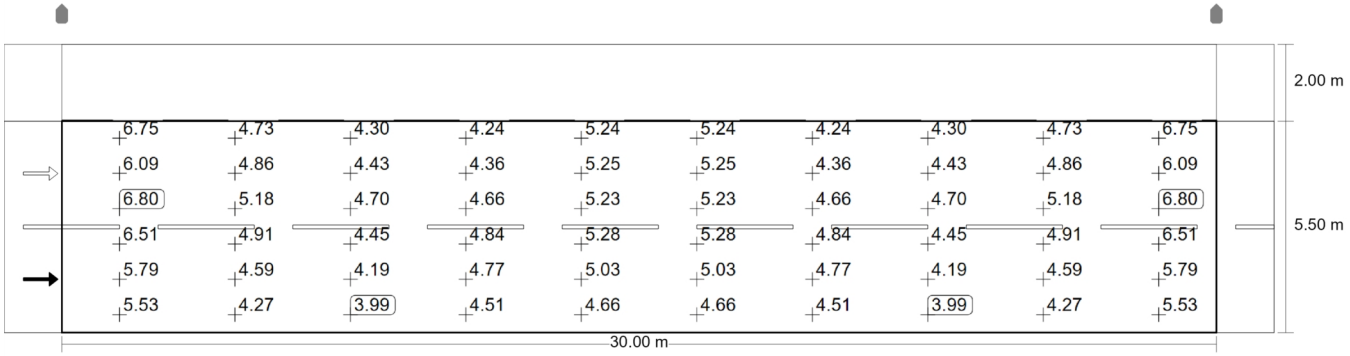
# Roadway 1 (P4)

## Results for valuation field

| | Symbol | Calculated | Target | Check |
|---|---|---|---|---|
| Roadway 1 (P4) | $E_{av}$ | 5.00 lx | [5.00 - 7.50] lx | ✓ |
| | $E_{min}$ | 3.99 lx | ≥ 1.00 lx | ✓ |




Maintenance value, horizontal illuminance [lx] (Iso-illuminance curves)




Maintenance value, horizontal illuminance [lx] (Value grid)

| m | 1.500 | 4.500 | 7.500 | 10.500 | 13.500 | 16.500 | 19.500 | 22.500 | 25.500 | 28.500 |
|---|---|---|---|---|---|---|---|---|---|---|
| **5.042** | 6.75 | 4.73 | 4.30 | 4.24 | 5.24 | 5.24 | 4.24 | 4.30 | 4.73 | 6.75 |
| **4.125** | 6.09 | 4.86 | 4.43 | 4.36 | 5.25 | 5.25 | 4.36 | 4.43 | 4.86 | 6.09 |
| **3.208** | 6.80 | 5.18 | 4.70 | 4.66 | 5.23 | 5.23 | 4.66 | 4.70 | 5.18 | 6.80 |
| **2.292** | 6.51 | 4.91 | 4.45 | 4.84 | 5.28 | 5.28 | 4.84 | 4.45 | 4.91 | 6.51 |

Secondary / Minor Roadway

# Roadway 1 (P4)

| m | 1.500 | 4.500 | 7.500 | 10.500 | 13.500 | 16.500 | 19.500 | 22.500 | 25.500 | 28.500 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.375 | 5.79 | 4.59 | 4.19 | 4.77 | 5.03 | 5.03 | 4.77 | 4.19 | 4.59 | 5.79 |
| 0.458 | 5.53 | 4.27 | 3.99 | 4.51 | 4.66 | 4.66 | 4.51 | 3.99 | 4.27 | 5.53 |

Maintenance value, horizontal illuminance [lx] (Value chart)

| | $E_{av}$ | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ |
|---|---|---|---|---|---|
| Maintenance value, horizontal illuminance | 5.00 lx | 3.99 lx | 6.80 lx | 0.80 | 0.59 |

**Date** 17/07/2026




# Hey Beck Lane

Appendix B: Impact Assessment

Created with DIALux




## Description

SLR Project Number: 415.065736.00001

Based on: '18008-00-101D_Heybeck Lane, Illustrative Site Plan' (by Enjoy Design)

Environmental Zone E2: 'Low district brightness. Sparsely inhabited rural areas, village or relatively dark suburban locations.' (ILP GN01)

Maintenance Factor: 1.0 (Worst Case Scenario)

Hey Beck Lane (Obtrusive light scene)

## Summary



Hey Beck Lane (Obtrusive light scene)

# Summary

## General information on the obtrusive light calculation

| | |
|---|---|
| Standard | EN 12464-2:2014 |
| Zone | Environmental Zone E2 |
| Period under review | Pre-curfew |
| Apply limits for | General lighting |

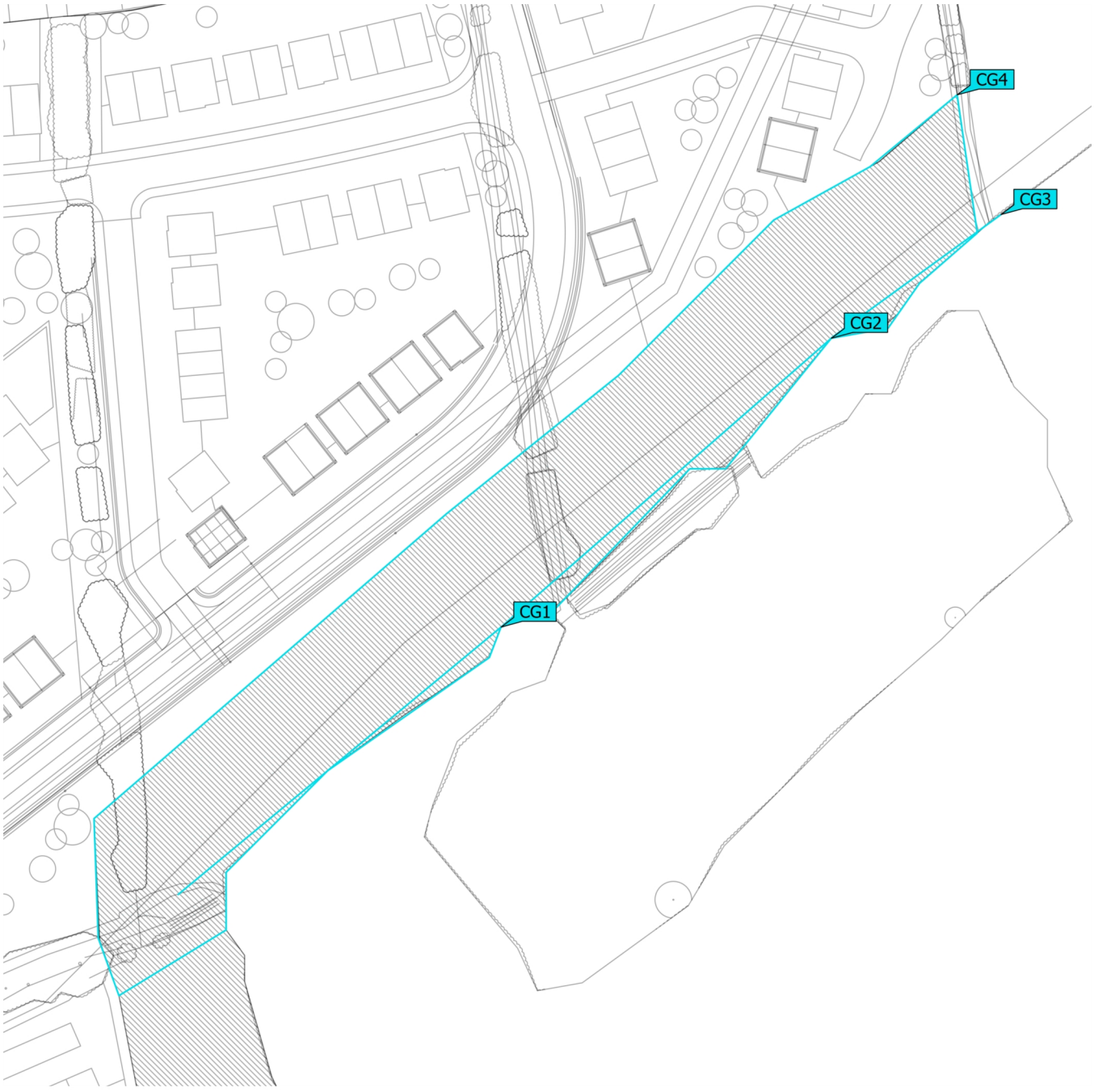
## General obtrusive light scene results

| Symbol | Calculated | Threshold value | Check |
|---|---|---|---|
| $R_{UL}$ | 0.0 % | ≤ 5.0 % | ✓ |
| $R_{DLO}$ | 67.4 % | – | |
| $R_{ULO}$ | 0.0 % | – | |

Flux ratios are also calculated using only luminaires in the obtrusive lighting scene.

Hey Beck Lane (ALL ON 100%)

## Calculation objects



Hey Beck Lane (ALL ON 100%)

# Calculation objects

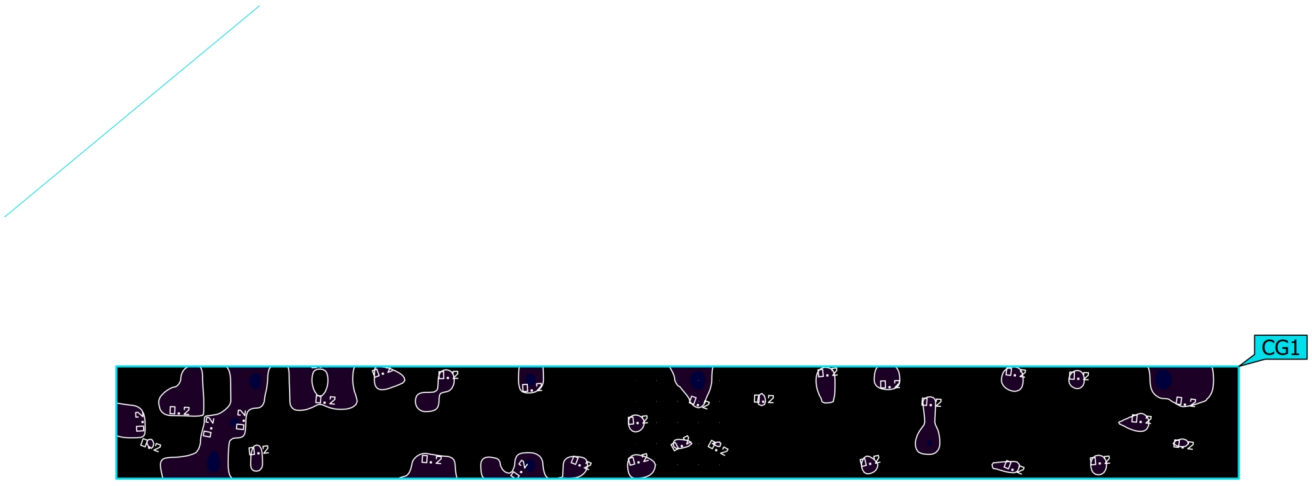
## Calculation surfaces

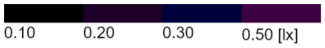
| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| 20m Lighting Transition / Buffer Zone<br>Perpendicular illuminance<br>Height: 0.100 m | 0.047 lx | 0.003 lx | 1.07 lx | 0.064 | 0.003 | CG4 |
| VMP001 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.15 lx | 0.056 lx | 0.37 lx | 0.37 | 0.15 | CG1 |
| VMP002 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.10 lx | 0.013 lx | 0.38 lx | 0.13 | 0.034 | CG2 |
| VMP003 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.13 lx | 0.012 lx | 0.40 lx | 0.092 | 0.030 | CG3 |

Utilisation profile: DIALux presetting (5.1.4 Standard (outdoor transportation area))

Hey Beck Lane (ALL ON 100%)

## VMP001 - Woodland Edge



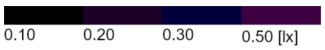

| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| VMP001 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.15 lx | 0.056 lx | 0.37 lx | 0.37 | 0.15 | CG1 |

Notes on planning:
ILP GN08, Paragraph 4.54
0.4 lux Maximum (Emax ≤ 0.4 lux)

Hey Beck Lane (ALL ON 100%)

## VMP002 - Woodland Edge



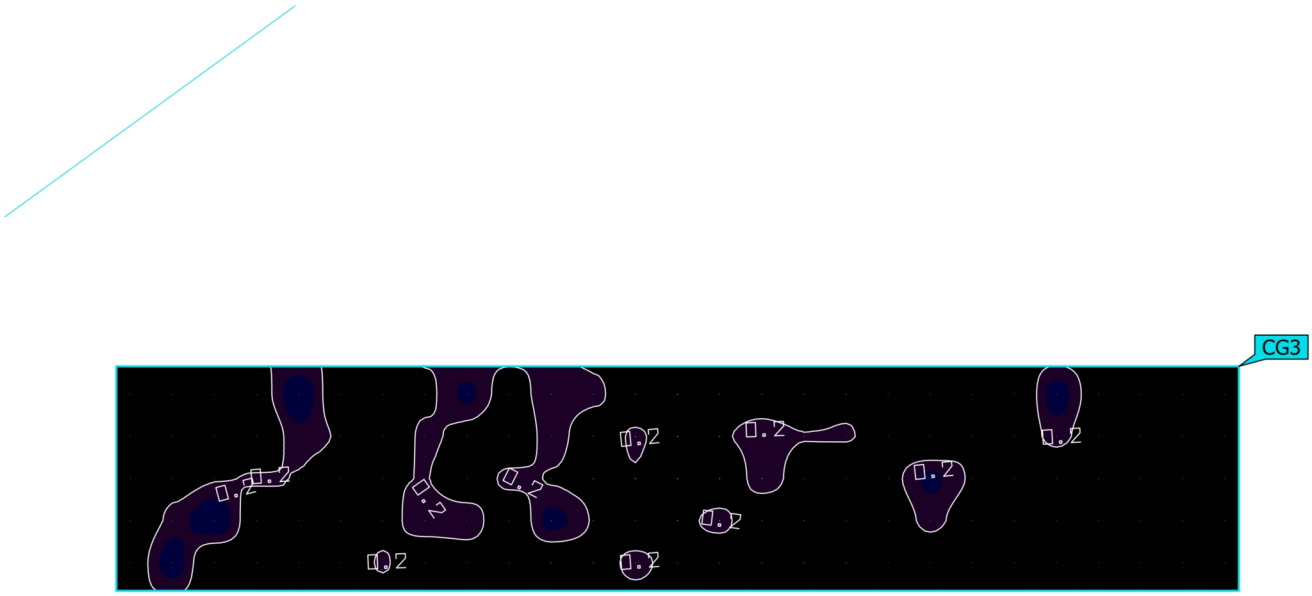




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| VMP002 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.10 lx | 0.013 lx | 0.38 lx | 0.13 | 0.034 | CG2 |

Notes on planning:
ILP GN08, Paragraph 4.54
0.4 lux Maximum (Emax ≤ 0.4 lux)

Hey Beck Lane (ALL ON 100%)

## VMP003 - Woodland Edge




| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| VMP003 - Woodland Edge<br>Perpendicular illuminance<br>Height: 4.500 m | 0.13 lx | 0.012 lx | 0.40 lx | 0.092 | 0.030 | CG3 |

Notes on planning:
ILP GN08, Paragraph 4.54
0.4 lux Maximum (Emax ≤ 0.4 lux)

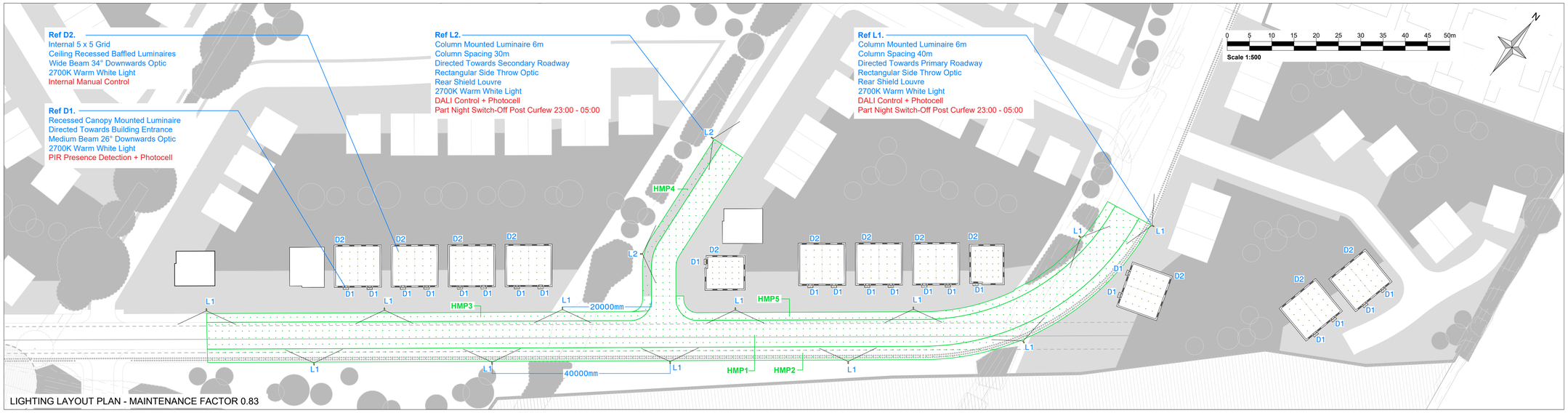
Hey Beck Lane (ALL ON 100%)

## 20m Lighting Transition / Buffer Zone

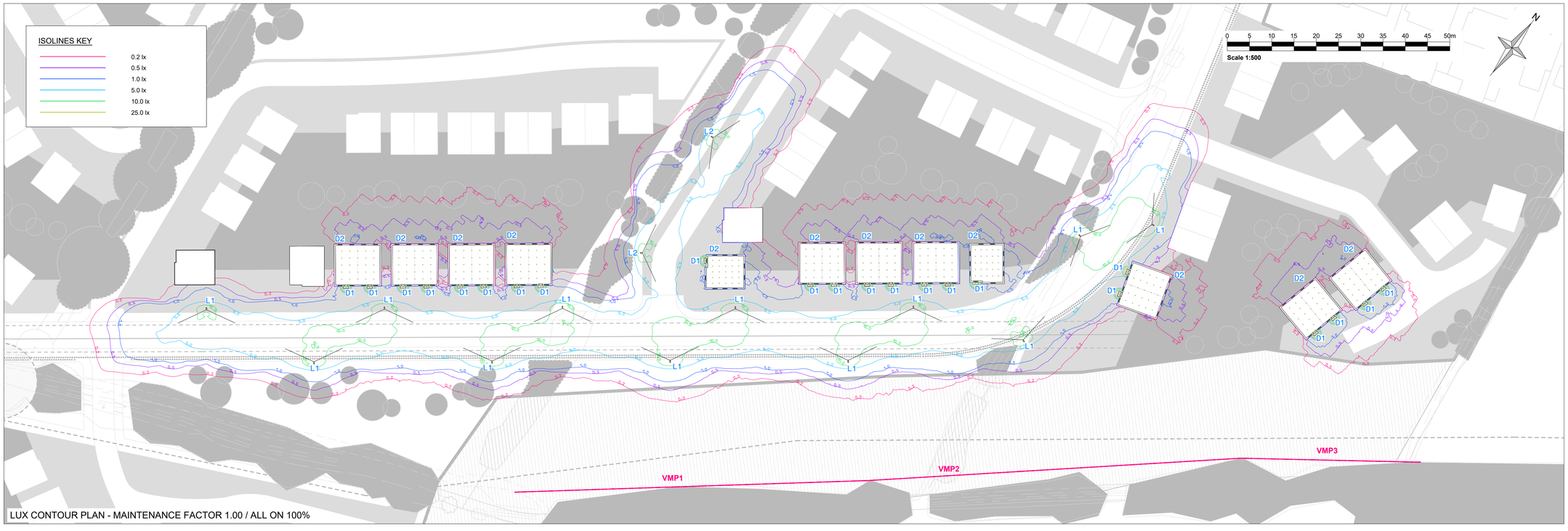



| Properties | Ē | $E_{min}$ | $E_{max}$ | $U_o$ ($g_1$) | $g_2$ | Index |
|---|---|---|---|---|---|---|
| 20m Lighting Transition / Buffer Zone<br>Perpendicular illuminance<br>Height: 0.100 m | 0.047 lx | 0.003 lx | 1.07 lx | 0.064 | 0.003 | CG4 |

Notes on planning:
20 metre lighting transition / buffer zone from woodland edge. No specific illuminance limits apply, however no lighting equipment to be installed.




LIGHTING LAYOUT PLAN - MAINTENANCE FACTOR 0.83




LUX CONTOUR PLAN - MAINTENANCE FACTOR 1.00 / ALL ON 100%

| LUMINAIRE REF | QTY | LOAD (WATTS) | TOTAL LOAD (Watts) |
|---|---|---|---|
| **L1**<br>Manufacturer: URBIS Schreder<br>Model: AXIA 3.1<br>Column Height: 6 m<br>Column Spacing: 40 m<br>Optic: '5267' - Rectangular Side Throw<br>Delivered Lumens: 2268 lm<br>CCT: Warm White Light (2700 K)<br>CRI: 70<br>Control: DALI Control + Photocell<br>Part Night Switch-Off Post Curfew 23:00 - 05:00 | 12 | 25.7 W | 308.4 W @ 100% |
| **L2**<br>Manufacturer: URBIS Schreder<br>Model: AXIA 3.1<br>Column Height: 6 m<br>Column Spacing: 30 m<br>Optic: '5267' - Rectangular Side Throw<br>Delivered Lumens: 2268 lm<br>CCT: Warm White Light (2700 K)<br>CRI: 70<br>Control: DALI Control + Photocell<br>Part Night Switch-Off Post Curfew 23:00 - 05:00 | 2 | 25.7 W | 51.4 W @ 100% |
| **D1**<br>Manufacturer: Light Graphix<br>Model Ref: LD782-E3-350-LW30-MB<br>Recessed Ceiling Mounted<br>Optic: 26° Medium Beam<br>Directed Towards Primary Entrance<br>Delivered Lumens: 269 lm<br>CCT: Warm White Light (2700 K)<br>CRI: 85<br>IP Rating: IP65<br>Control: PIR Presence Detection + Photocell | 22 | 4.4 W | 96.8 W @ 100% |
| **D2**<br>Manufacturer: Light Graphix<br>Model Ref: LD1080-E3-350-LW30-WB<br>5 by 5 Grid<br>Ceiling Recessed Baffled Luminaire<br>Optic: 34° Wide Beam<br>Delivered Lumens: 407 lm<br>CCT: Warm White Light (2700 K)<br>CRI: 85<br>Control: Internal Manual Control | 600 | 5 W | 3000 W @ 100% |

## DESIGN NOTES

All works shall comply with BS 5489 1, BS EN 13201, BS 7671, and the adopting authority's requirements.
Contractor shall verify all dimensions, levels and existing utilities on site before installation; any discrepancies must be reported to the Engineer.
Columns, brackets and luminaires shall be installed to manufacturer's instructions; mounting heights and orientations shall match the drawing.
LED luminaires shall be supplied with the specified wattage, optical distribution and control settings.
All electrical works shall comply with DNO requirements where applicable; provide fused cut outs and appropriate earthing.
All installations shall be tested and certified to BS 7671; as built information shall be provided prior to handover.
Lighting design undertaken in accordance with ILP Guidance Note 01/21 - The Reduction of Obtrusive Light and relevant environmental zone criteria.
Scheme designed to minimise light spill, sky glow, and glare, with optical control selected to avoid illumination of adjacent properties, habitats, or sensitive receptors.
Colour temperature to be ≤ 2700 K to reduce ecological impact.

Environmental Zone E2: 'Low district brightness. Sparsely inhabited rural areas, village or relatively dark suburban locations.' (ILP GN01)

BS 5489-1:2020 - Maintenance Factor: 0.92

Based on Environmental Zone, E2; column height ≤6m; and a worst case scenario cleaning frequency of 72 months.

LED Lifetime / Luminous Flux: L90

Project Maintenance Factor: 0.92 x 0.90 = **0.83**

Drawing based on:
'18008-00-101D_Heybeck Lane, Illustrative Site Plan'
(by Enjoy Design)

**CIE 115:2010 GUIDANCE ON ROADWAY LIGHTING**

| HORIZONTAL ILLUMINANCE Pre Curfew Normal Operation MF = 0.83 | LIGHTING CLASS | AVERAGE ILLUMINANCE | | MINIMUM ILLUMINANCE | | TARGET |
|---|---|---|---|---|---|---|
| **AREA / USAGE** | | **REQUIREMENT** | **RESULT** | **REQUIREMENT** | **RESULT** | **PASS/FAIL** |
| HMP1 - Roadway | P4 | 5 - 7.5 | 7.44 | 1.00 | 1.74 | PASS |
| HMP2 - Cycle Route | P4 | 5 - 7.5 | 5.97 | 1.00 | 1.29 | PASS |
| HMP3 - Footpath | P4 | 5 - 7.5 | 5.94 | 1.00 | 2.91 | PASS |
| HMP4 - Footpath | P4 | 5 - 7.5 | 5.45 | 1.00 | 2.80 | PASS |
| HMP5 - Footpath | P4 | 5 - 7.5 | 5.78 | 1.00 | 1.59 | PASS |

**ILP GN08: GUIDANCE ON BATS & ARTIFICIAL LIGHTING**

| CURFEW: 23:00 | UPWARDS LIGHT RATIO, ULR [MAX %] | PEAK ILLUMINANCE IN VERTICAL PLANE ILP GN08, DEFINITION OF DARKNESS, MAX LUX, $E_{MAX}$≤ 0.4 lux [0.5m - 8m VERTICAL PLANE HEIGHT] | | TARGET |
|---|---|---|---|---|
| MAINTENANCE FACTOR (MF) = 1.0 (Zero Depreciation Applied) | | PRE CURFEW [VMP] (ALL ON 100%) | POST CURFEW [VMP] (INTERNAL LIGHTING ONLY) | PASS / FAIL |
| **ENVIRONMENTAL ZONE E2** | **5.00** | **0.40** | **0.40** | |
| ULR | 0.00 | | | PASS |
| **RECEPTOR ASSESSMENT** | | | | |
| VMP1 - Woodland Edge [80M WIDTH x 8M HEIGHT] | | 0.37 | 0.31 | PASS |
| VMP2 - Woodland Edge [85M WIDTH x 8M HEIGHT] | | 0.38 | 0.30 | PASS |
| VMP3 - Woodland Edge [40M WIDTH x 8M HEIGHT] | | 0.40 | 0.30 | PASS |

| Rev | Amendments | Date | By | Chk | Auth |
|---|---|---|---|---|---|
| 01 | First Issue | 17.07.26 | RD | ND | ND |

www.slrconsulting.com

Drawing Purpose: **FOR PLANNING** | Suitability Code: **S1**
Client: CHURCH COMMISSIONERS FOR ENGLAND
Project: HEY BECK LANE
Drawing Title: OUTLINE LIGHTING LAYOUT & LUX CONTOUR PLAN
Scale: 1:500 @ A1 | SLR Project No.: 415.065736.00001

| Designed | Drawn | Checked | Authorised |
|---|---|---|---|
| RD | RD | ND | ND |
| Date: 17.07.26 | Date: 17.07.26 | Date: 17.07.26 | Date: 17.07.26 |

Drawing Number: **415.065736.00001-LLP+LCP** | Rev: **01**

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