

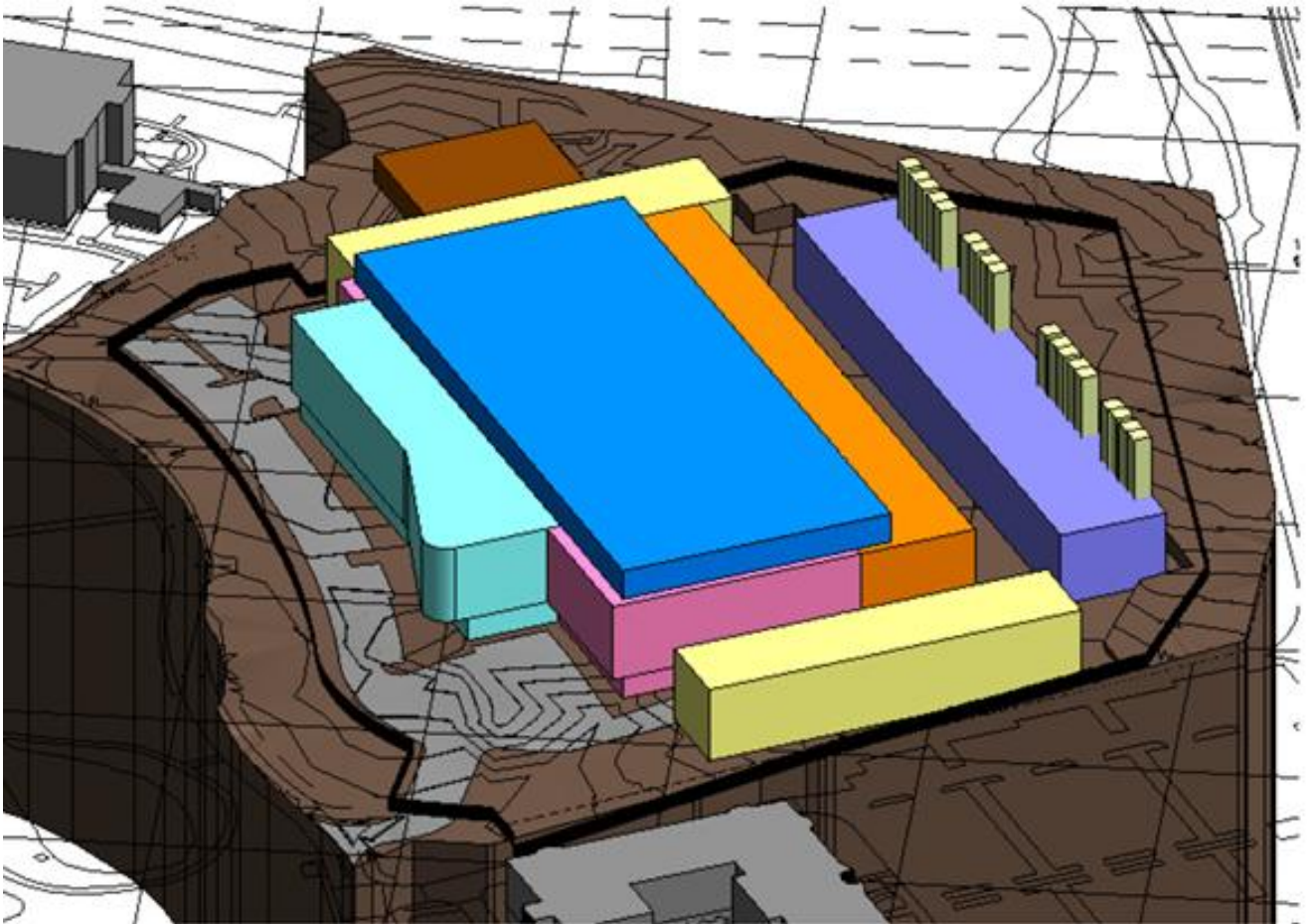


Thames Valley Park Data Centre

Exterior Lighting Strategy

Lumenata | On Behalf of FH Trustees
Revision P03 | September 2026





Thames Valley Park Data Centre 132KV substation

Exterior Lighting Strategy

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Issue 2a

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1. Executive Summary

Exterior Lighting Strategy – Thames Valley Park Data Centre (TVPDC)

This Exterior Lighting Design Strategy has been prepared for the Thames Valley Park Data Centre which involves the access roads and car parking area located within and/or bordering, the Thames Valley Park High Value woodland region.

The strategy demonstrates full compliance with ecological and dark skies requirements through a low-impact approach, combining the use of pole mounted LED Luminaires with wall/building mounted luminaires to illuminate the building perimeter road and car park access route. Detailed Dialux modelling confirms that cumulative effects remain minimal, with roadway average illuminance of 10-12lux considered for safety when there is potential for a mix of vehicle and pedestrian traffic (in the spirit of the targets of a E3 zone inhabited rural and urban settlements, business parks, industrial estates, and suburban locations).

The luminaires feature full cut-off optics, warm colour temperatures and this ecology-sensitive design minimises disturbance to bats and other nocturnal species (per BCT/ILP GN08/23), preserves dark skies qualities, and supports safe navigation while aligning with the site's protected landscape setting.

Critical note: The ecological, obtrusive-light, and planning-compliance performance of the entire scheme (car park, pathways, and building-mounted lighting) is wholly dependent on the exact luminaire types, optics, mounting details, shielding, and control settings specified in this document. Any substitution of alternative fittings or alterations during the construction phase will invalidate the compliance statements and is very likely to breach planning conditions and/or protected-species legislation. It is therefore essential that the luminaires, controls, and installation details set out in this approved strategy are adopted without modification at construction stage.

2. Introduction

2.1 Project Description

This Exterior Lighting Design Strategy has been prepared for the proposed TVPDC site. The development involves the construction and development of the commercial property and access facilities in the Thames Valley Park region located within the Wokingham Borough Council planning department area.

2.2 Purpose of the Lighting Strategy

The purpose of this document is to demonstrate how the proposed external lighting for access routes and pathways through good practice and lighting management, will minimise impacts on the site's dark skies qualities, nocturnal character, and sensitive environmental habitats. All proposed measures have been designed to meet or exceed relevant industry guidelines, including the Bat Conservation Trust and Institution of Lighting Professionals Guidance Note 08/23, while ensuring safe, functional and practical illumination.

2.3 ILP Environmental Zones

The Institution of Lighting Professionals (ILP) Guidance Note 01:2021 for the Reduction of Obtrusive Light defines a series of Environmental Zones (E0–E4) to ensure exterior lighting is appropriate to the ambient brightness and sensitivity of a location. These zones set maximum permissible values for sky glow (Upward Light Ratio), light intrusion into windows or habitats, source intensity, and curfew requirements.

Zone Surrounding		Lighting Environment	Examples
E0	Protected	Astronomical observable dark skies	UNESCO Starlight Reserves, IDA Dark Sky Places
E1	Natural	Intrinsically dark landscapes	National Parks, Areas of Outstanding Natural Beauty (AONB)
E2	Rural	Low district brightness	Villages, relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres, suburban residential areas
E4	Urban	High district brightness	Town/city centres with high night-time activity

The relevant zone for the Thames Valley Park Data Centre development is E3 (medium district brightness).

The site lies in a suburban area, bordering the Thames Valley Park landscape. This aligns directly with the ILP's E3 examples of inhabited rural and urban developments, business parks, industrial estates, and suburban locations, recognised for minimal light pollution and supporting Dark Sky Discovery Sites nearby. Local policies and guidance strongly emphasise protection of rural character, biodiversity, and low ambient light levels, consistent with an E3 zone. The E3 classification provides the appropriate balance for this protected suburban/commercial landscape. It ensures obtrusive light is minimised while allowing essential low-level illumination for safety.

For internal roadways in this mixed-use environment, an average maintained illuminance of 10 lux is justified as the minimum necessary to support safe, slow-speed vehicle and pedestrian movement while remaining fully compatible with E3 zone requirements in a suburban settings with minimal nighttime activity, low vehicle speeds (typically under 10-15 mph), and low pedestrian activity, higher illuminance levels are unnecessary and may introduce avoidable obtrusive light, sky glow, and ecological disruption.

Guidance such as BS 5489 and related ILP recommendations for subsidiary roads, access routes, and amenity areas in low district brightness environments support these reduced levels, prioritising uniformity and visibility for hazard detection rather than bright general illumination. This approach aligns with the principle of providing the right light at the right time in the right place: targeted, fully shielded luminaires can achieve adequate task visibility at these levels without significant spill beyond the boundary.

The 0% up light and sharp cut off angles preserve the site's dark skies qualities, minimising impacts and avoiding conflict with local dark sky policies.

2.4 Relevant Planning Policies and Legislation

2.4.1 ILP Guidance Note 08/23 – Bats and Artificial Lighting at Night

The Institute of Lighting Professionals, in association with The Bat Conservation Trust has produced a guide for designing lighting schemes that are less harmful to bats. The key points of this report are summarised below:

- All luminaires should lack UV elements
- A warm white spectrum (<2700K) should be adopted to reduce blue light
- Luminaires should feature peak wavelengths higher than 550nm
- Internal luminaires should be recessed in proximity to windows to reduce glare
- Column heights should be carefully considered
- Only luminaires with an upward light ratio of 0% and good optical control should be used
- Luminaires should always be mounted on the horizontal plane with no upward light
- A lighting buffer zone should be used where needed
- Screening should be used where needed

All of the above factors have been taken into consideration when designing the lighting for the proposed development as is explained in this report.

2.4.2 ILP Guidance Note 01/21 – The Reduction of Obtrusive Light

The Institute of Lighting Professionals has also issued a guidance note on ‘The Reduction of Obtrusive Light’. In this report, the ILP defines Sky Glow as the brightening of the sky at night, something that we aim to avoid protecting dark skies. The report also states that the primary approach to limit sky glow is to use luminaires with an upward light ratio of 0%, as shown in the extract from the report below:

The Reduction of Obtrusive Light

Limitation of skyglow

Table 6 (CIE 150 table 5): Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

Note 1 This is the primary approach to limit skyglow and is suitable to compare different single luminaires and mitigate the contribution of each luminaire within an installation.

Therefore, all exterior luminaires used in this lighting design have an upward light ratio of 0%, to protect the dark skies around the site.

2.4.3 Planning Authority Guidance local to the site

The TVPDC development falls under Wokingham Borough Council’s jurisdiction in a suburban/commercial area adjacent the Thames Valley Park Landscape. While no site-specific supplementary planning documents or guidance notes exist solely for this location, the following policies and guidance have been applied particularly due to the site’s ecological sensitivity (e.g. hedgerow and natural species including bats) and dark skies qualities:

1. Core policies relevant to the site and its setting require developments to conserve and enhance the distinctive landscape character, natural beauty, and tranquillity of the adjacent Thames Valley Park landscape, with particular regard to minimising light pollution and protecting dark night skies as a valued feature of the designated area. Policies addressing biodiversity and landscape protection emphasise the need to avoid adverse impacts on light-sensitive habitats and species through appropriate lighting design and mitigation.
2. Thames Valley Park considerations. The Thames Valley Park landscape emphasises the conservation of dark skies, tranquillity, and biodiversity in its management priorities. Developments in this location are encouraged to adopt minimal, low-level lighting to preserve natural darkness, support nocturnal wildlife, and maintain the area’s high-quality dark skies, which are recognised through CPRE designation and proximity to Dark Sky Discovery Sites.

3. Local dark skies guidance and validation requirements of Wokingham Borough Council's and related guidance for the rural spaces expect lighting schemes for new or expanded developments to demonstrate minimal obtrusive light through measures such as full cut-off luminaires, curfews, and light spill assessments, particularly where proposals could affect sensitive rural habitats or the wider landscape setting. This is reinforced by the area's classification under environmental lighting zones that prioritise very low ambient light levels.

3. Baseline Assessment

A pre-development night-time lighting survey and sky-quality measurement has been carried out on the existing site and installation to support this access road Exterior Lighting Strategy. Below is a summary of the survey.

3.1 The baseline survey summary

The baseline survey identifies a predominantly dark night-time environment across the site, broadly corresponding to ILP Environmental Zones E1–E2, with localised E3 influences around roads and developed frontages. Excluding measurements directly affected by street lighting, typical vertical and horizontal illuminance levels were generally below 2 lux, while higher levels were confined to existing streetlights, building-mounted luminaires and infrastructure. The exterior lighting strategy should therefore preserve this low-light character through carefully controlled, targeted illumination that meets operational and safety requirements while minimising glare, sky glow and spill beyond the site boundary, particularly towards nearby homes and sensitive ecological receptors, in accordance with relevant ILP guidance.

4. Identification of Sensitive Receptors

The site comprises developed areas internally but is bordered by higher-value habitats including rural hedgerow, deciduous woodland, scrub, and drains. It lies adjacent to the Thames Valley Park Landscape. Multiple bat species are believed to be present in the wider area, and adjacent open features provide commuting and foraging habitat for many nocturnal species. The Preliminary Ecological Appraisal highlights the sensitivity of nocturnal species to artificial lighting and recommends a sensitive lighting scheme in accordance with Bat Conservation Trust / ILP Guidance Note 08/23. This includes minimising light spillage onto boundary habitats, using warm white spectrum lighting (ideally <2700K), 0% upward light ratio, good optical control, and motion sensors to ensure illumination occurs only when needed. The proposed pole mounted full cut off luminaires with photocell, presence detection and controlled distribution support these requirements, helping to achieve neutral or better residual impacts on bats and other nocturnal fauna while preserving the site's dark skies qualities.

5. Proposed Lighting Design

5.1 Lighting Objectives

The primary objectives of this proposed exterior lighting strategy for the TVPDC development are as follows.

First, it aims to demonstrate, through detailed modelling, that light spill from the commercial units will have no adverse impact on sensitive habitats surrounding the site.

Second, the strategy seeks to provide adequate, safe illumination for access routes and pathways with no or minimal impact beyond the boundary—facilitating navigation and accessibility—while fully complying with ecological guidelines (including Bat Conservation Trust/ILP Guidance Note 08/23) and dark sky preservation principles through the use of pole and building mounted luminaires with warm colour temperatures, minimal maintained illuminance levels appropriate to the very low traffic in this suburban setting. Overall, these objectives support a sustainable, wildlife-friendly lighting scheme that enhances commercial park environment without compromising the site's dark skies qualities or protected landscape setting.

5.2 Luminaire Description and Schedule

The following luminaries have been selected in this lighting design strategy:

5.2.1 Access Road and Parking

In the perimeter access routes and to provide general lighting, post top and building mounted luminaires are proposed for use along access routes perimeter routes and car park spaces. These lights will incorporate a photocell and motion detector. This provides two key benefits as follows:

- These lights operate when low levels of natural light are detected, reducing disturbance to nocturnal wildlife (including bats) that may be active in adjacent habitats, thereby supporting biodiversity protection.
- The lower power consumption and motion detection, conserves energy and provide a sustainable performance, ensuring reliable performance with minimal impact the climate and environment.

The proposed luminaires for the access routes, perimeter roadways and car parking offer compliance with ILP Environmental Zone E3 (Very low Ambient), BS 5489-1:2020, CIBSE/SLL Lighting Guide 6 (The Exterior Environment), the Bat Conservation Trust and Institution of Lighting Professionals Guidance Note 08/23 (Bats and Artificial Lighting), and Policies, while aligning with dark sky preservation principles, for the following reasons:

- Colour temperature is 2700 K warm-white.
- The LED sources have a peak wavelength > 500 nm with zero measurable output in the ultraviolet (< 400 nm) or blue-rich (< 470 nm) spectrum that is most attractive or disruptive to bats and nocturnal insects.
- Light emission is exclusively downward through a full-cut-off optical system; the sources are mounted in the horizontal plane with no upward component.
- The luminaires are certified as having an Upward Light Ratio (ULR) of 0 % and produce no direct up light or glare above the horizontal. These lanterns therefore provide the necessary low-level guidance and spill control for safe pedestrian movement while

presenting no measurable ecological risk to the protected bat species or wider nocturnal wildlife on the site.

A single version of this luminaire has been used in this design, as follows:



Part No: STREET01-20-2700-OP3-GY-PD

5.2.3 Luminaire Schedule

The following table shows the schedule of luminaires used in this lighting strategy:

Drawing Ref	Part Code	Description	Quantity
PTSL25	STREET01-20-2700-OP3-GY-PD	LED Street Light	60

Please refer to separate AUTOCAD drawings for positions of individual luminaires.

5.3 Mounting Heights

The Lanterns are mounted at 4m as stipulated on the CAD drawings.

5.4 Control Strategy and Operating Hours

To further minimise impacts on nocturnal wildlife and preserve the dark skies qualities of the site, a controlled operating regime is included for all external lighting by use of photocells and motion detectors. This approach ensures illumination is provided only when needed while significantly reducing overall light spill, energy consumption, and potential disturbance.

6. Impact Assessment and Modelling

6.1 Assessment Methodology

The methodology for the TVPDC site exterior lighting strategy involves a sequential, evidence-based approach using industry-standard tools. First, consideration is given to the potential light spill from the development. These individual spill contributions are then incorporated into a comprehensive site plan constructed in Dialux lighting modelling software. Finally, the proposed pole and building mounted luminaires are added to the model, allowing full assessment of cumulative illuminance, uniformity, and obtrusive light effects across the development. This process ensures the combined scheme meets safety requirements while complying with ecological and dark skies constraints.

6.2 Horizontal Illuminance Contours

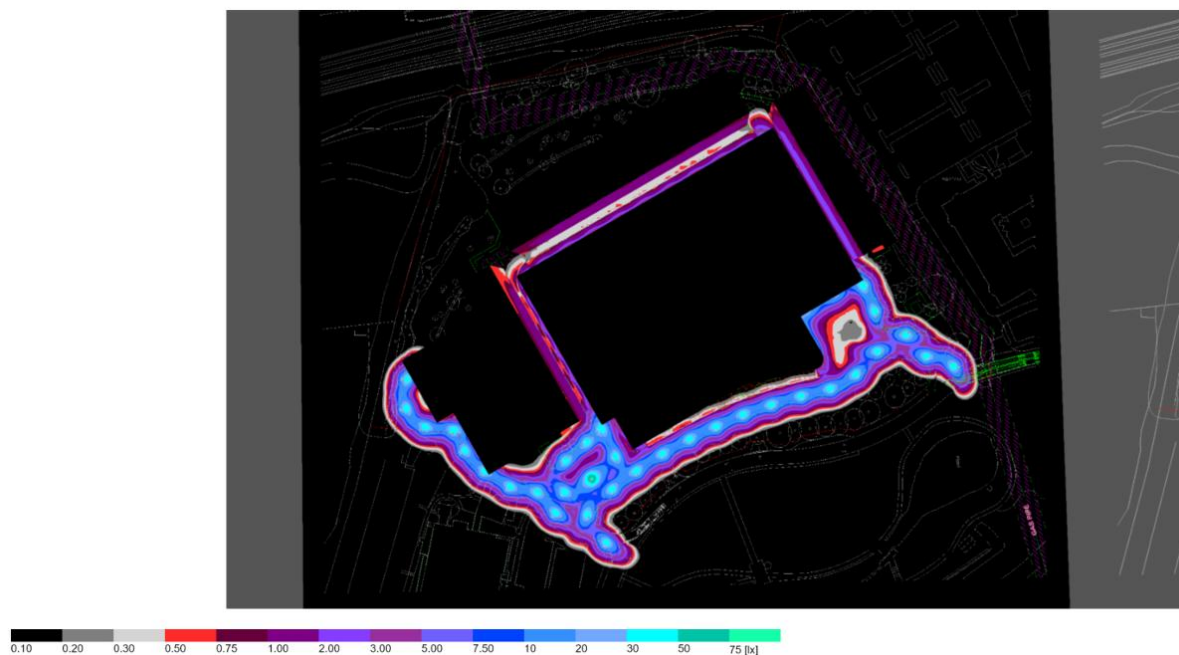
6.2.1 Modelling of the site

To assess potential obtrusive light from the proposed site, detailed Dialux modelling has been undertaken for the design consideration. The models simulate realistic external lighting conditions with all luminaires at 100%.

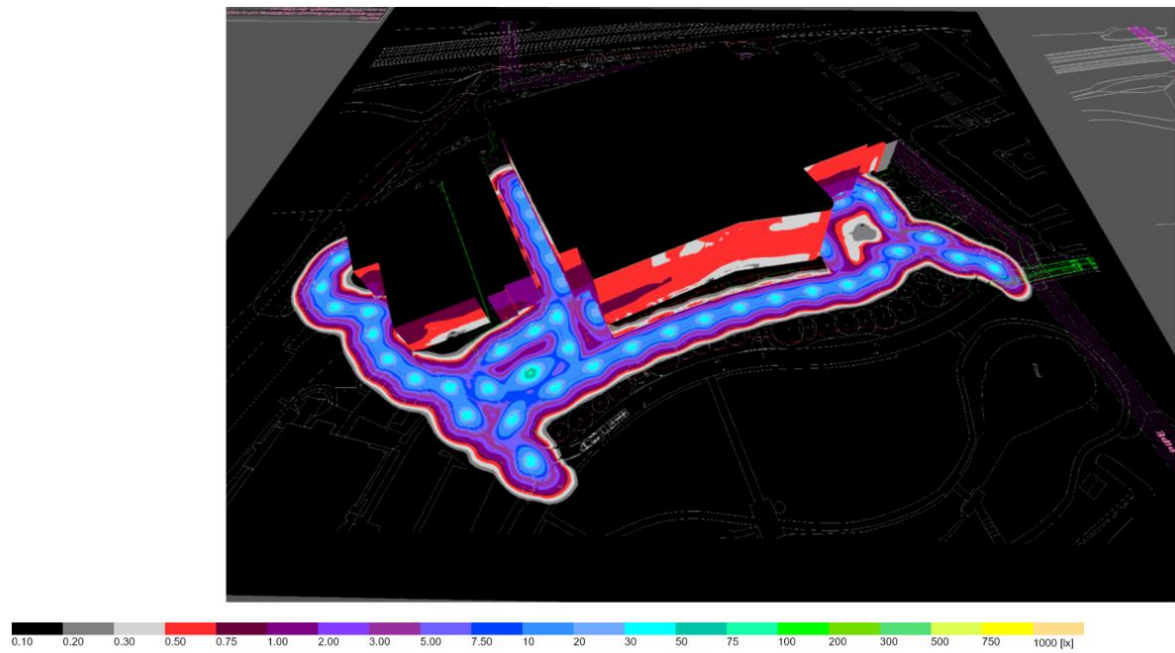
Results demonstrate very limited external spill beyond the site and access boundary, with illuminance levels dropping rapidly at the boundary and remaining well below thresholds that could affect sensitive boundary habitats or contribute meaningfully to sky glow.

The site models are shown below:

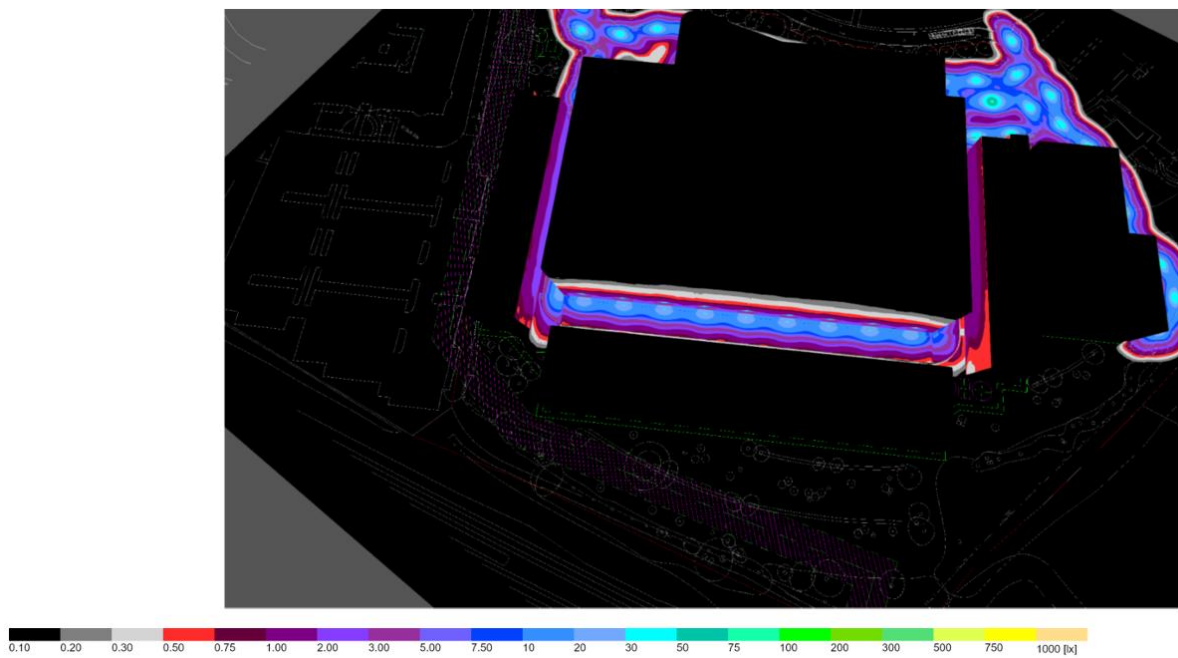
Typical site overview



View to the building Front facade



View to the Rear of the Building

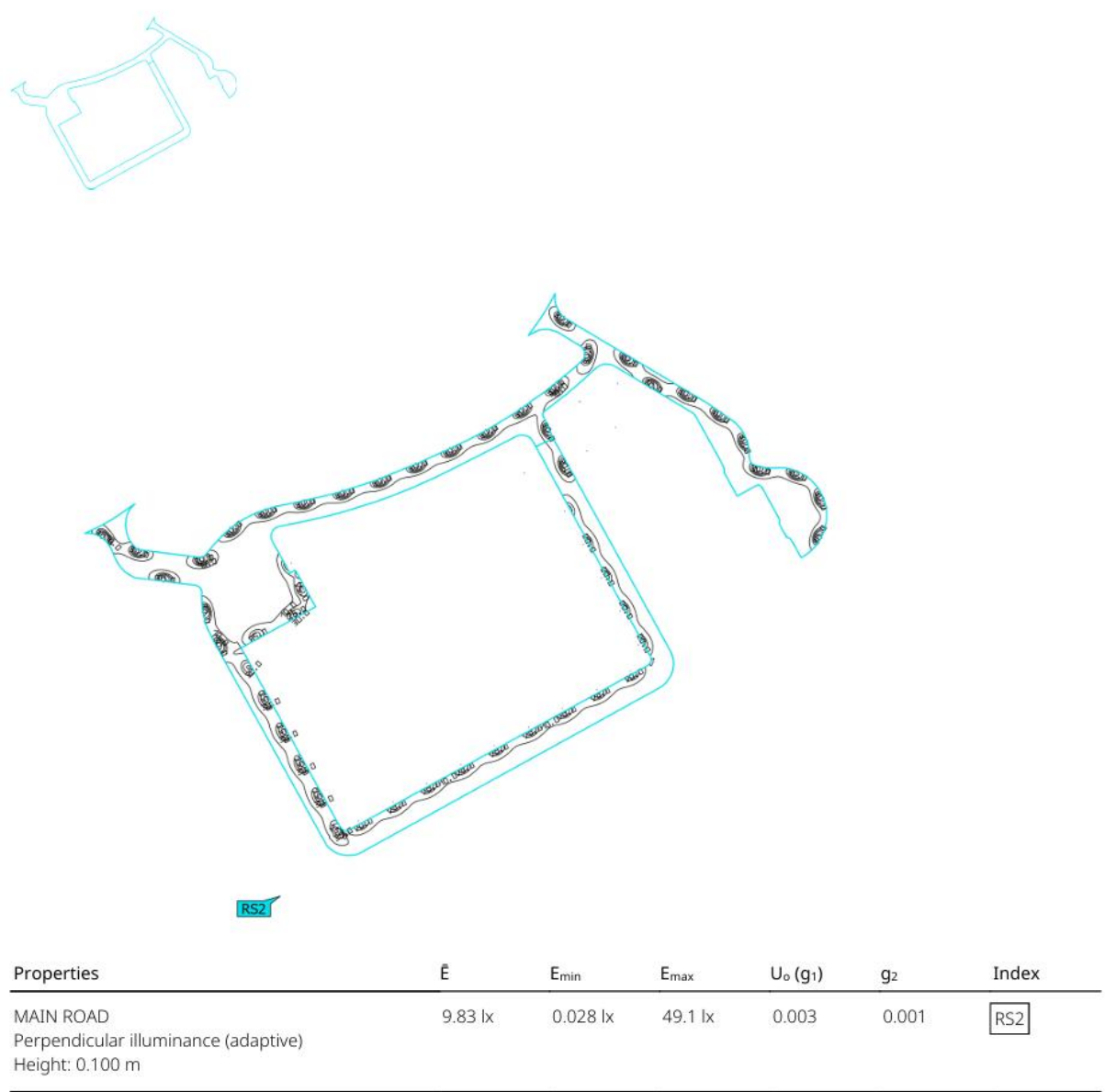


The previous images illustrate an absolute worst-case scenario in which all lighting on site is simultaneously illuminated at full output. In practice, the luminaires operating with photocells and presence detection would only activate when needed. The model demonstrates that because of the controlled beam angles and managed lumen output of the lighting employed on site, light is very well contained within the development itself. External spill beyond the site boundaries is negligible, with no significant illumination reaching sensitive adjacent habitats or contributing to sky glow in this suburban area.

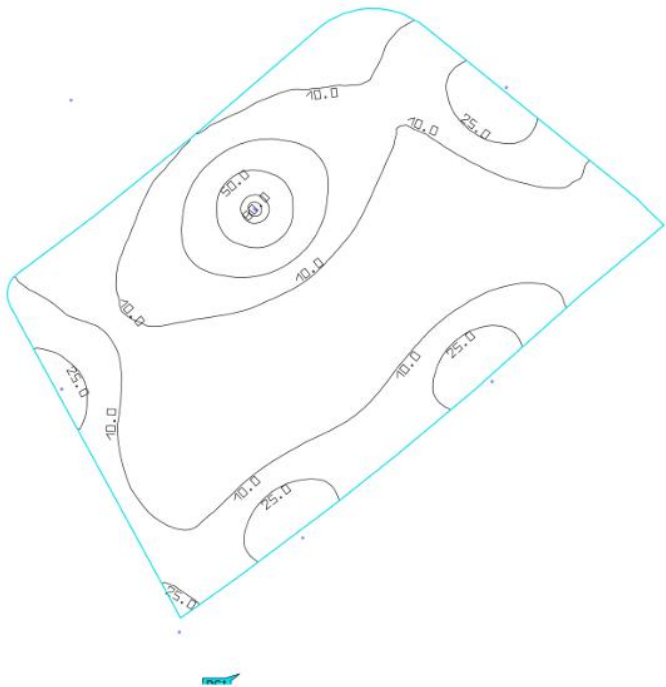
6.2.2 Modelling of Roadways and Car Parking areas

The Dialux light modelling software also enables precise calculation of the average maintained horizontal illuminance on the access routes. As demonstrated in the image below, the proposed pole and building mounted luminaires have minimal impact beyond the boundary.

Access and Perimeter Roads



Car Parking Area



Properties	E	E _{min}	E _{max}	U _o (g ₁)	g ₂	Index
PARKING Perpendicular illuminance (adaptive) Height: 0.100 m	14.2 lx	1.07 lx	81.5 lx	0.075	0.013	RS1

Note

From the above results it should be noted that to maintain the spirit of ILP Environmental Zone E3 (Very low Ambient), BS 5489-1:2020, CIBSE/SLL Lighting Guide 6 (The Exterior Environment), the Bat Conservation Trust and Institution of Lighting Professionals Guidance Note 08/23 (Bats and Artificial Lighting) it has been necessary to compromise the levels of uniformity however as this is not a public thoroughfare it is viewed as acceptable.

6.3 Glare and Sky Glow Analysis

All luminaires specified in this Exterior Lighting Strategy produce very low glare and have upward light ratios of 0%. This eliminates both sky glow and intrusive glare, fully satisfying ILP Zone E3 requirements for zero upward light, local dark-sky policies, and the recommendations of ecologists for protection of nocturnal wildlife.

7. Conclusions

This Exterior Lighting Design Strategy demonstrates that an ecology-sensitive lighting design has been developed for the TVPDC site development. Through detailed Dialux modelling of unit light spill and the proposed Luminaires, the scheme delivers the required low illuminance levels for safe navigation on internal roadways in this very low traffic E3 zone application. All elements incorporate full cut-off optics, warm colour temperatures, and zero upward light ratio. The resulting minimal external spill ensures compliance with ecological requirements (including Bat Conservation Trust/ILP GN08/23), preserves the site's dark skies qualities, and supports the protected landscape setting while enhancing safety.

Critical Implementation Requirement The ecological, obtrusive-light, and regulatory compliance of the entire scheme is wholly dependent upon the exact luminaire types, optics, mounting details, shielding arrangements, and control settings specified in this document. Any substitution of alternative fittings or modifications during construction will invalidate the compliance statements presented herein and is very likely to breach planning conditions and/or protected-species legislation. It is therefore essential that the luminaires, controls, and installation details set out in this approved strategy are adopted without alteration at construction stage.

Appendices

Appendix A: Luminaire Suppliers and Datasheets

The of the luminaires used in this report are details below with data sheets provided on the following pages.

Drawing Ref	Part Code	Description	Supplier
PTSL25	STREET01-20-2700-OP3-GY-PD	LED Street Light	Illorion Limited

Supplier Contact Details:

Illorion Limited

Tel: 01772 319 185

info@illorion.co.uk

www.illorion.co.uk

STREET01-20

20 W LED STREET LUMINAIRE

Compact, high-performance road luminaire with tool-less access, die-cast aluminium housing and configurable optics and controls. Suitable for local roads, residential streets, pedestrian crossings and parking areas.

20 W • 3,100–3,640 lm • up to 182 lm/W
• IP66



20 W PERFORMANCE OPTIONS				
Configuration	Model	LED package	Efficacy	Luminaire output
Standard	STREET01-20	3030	155 lm/W	3,100 lm
Enhanced	STREET01-20+	5050	170 lm/W	3,400 lm
Ultra	STREET01-20++	Ultra	182 lm/W	3,640 lm
ELECTRICAL, OPTICAL & MECHANICAL				
Input / frequency	100–240/277 VAC, 50/60 Hz		Power factor / THD	>0.95 / <15%
CCT options	1800–6500 K*		Colour rendering	Ra >70; Ra >80 optional
Optical distribution	Type II / III; pedestrian optic		Surge protection	10 kV standard; 20 kV optional
Ingress / impact	IP66 / IK08 or IK10		Electrical class	Class I standard; Class II optional
Dimensions / weight	610 × 190 × 143 mm / 4.7 kg		Mounting	Side-entry or post-top
Spigot / tilt	Ø60 mm; Ø80 mm option / ±15°		Operating range	–40 °C to +50 °C
Housing / cover	Die-cast aluminium / tempered glass		Lifetime / warranty	>100,000 h L70 / 5 years
CONTROLS, CERTIFICATION & ORDERING				
CONTROL OPTIONS 1–10 V dimming (default), timer dimming, DALI, photocell, motion sensor, NEMA or Zhaga socket, Zigbee / LoRa smart control.		PUBLISHED CERTIFICATION CE, RoHS, ENEC, ENEC+, CB, Zhaga-D4i, DarkSky, LM79, LM80, TM-21, IP66 and IK08/IK10. Certification availability depends on the ordered configuration.		
CONSTRUCTION FEATURES Tool-less driver compartment, adjustable fitter, level bubble, vent and optional safety knife switch.		ORDER REFERENCE STREET01-20 – [OUTPUT] – [CCT] – [OPTIC] – [CLASS] – [CONTROL] – [FINISH]		

* CCT availability includes 1800, 2200, 2700, 3000, 4000, 5000, 5700 and 6500 K; published lumen values are calculated above 3000 K. At 3000 K values are approximately 5% lower. Performance data based on the original manufacturer technical data, version 5.0 dated 28 November 2024. Confirm the selected LED, optic, driver, class and controls before order. Specifications may change without notice.

Appendix B: AUTOCAD Plans

Please note that separate AutoCAD plans are available in pdf and dwg. format showing the layout of the luminaires on site.

