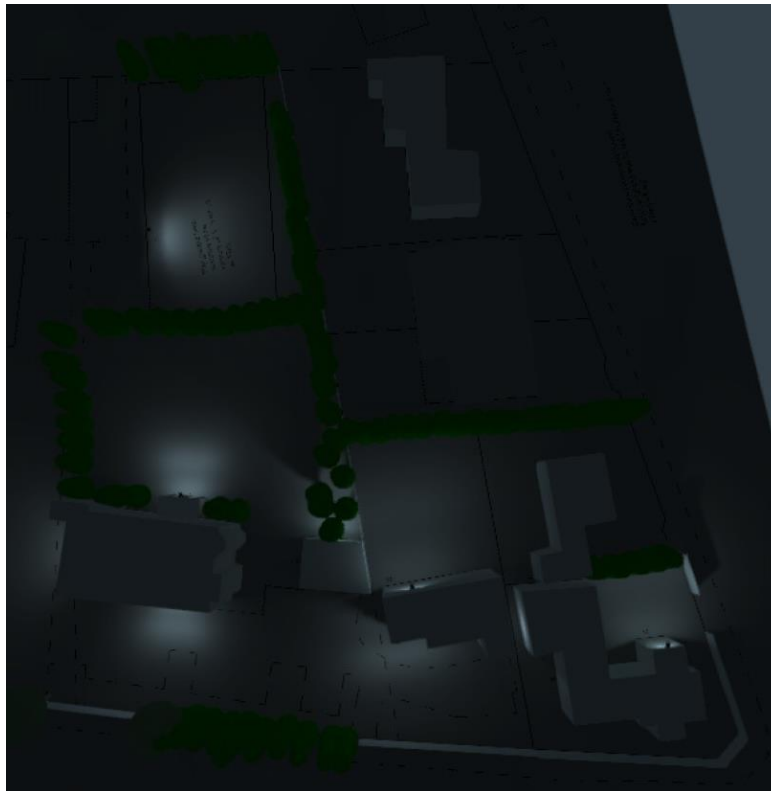


Caversham Preparatory School
Lighting Report
16 Peppard Road, Caversham Reading, RG4 8JZ

Report on Existing External Lighting Scheme
to School Grounds



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Section One
Clients Brief

NorWood Consultants Ltd were requested by Caversham Preparatory School to review the existing lighting scheme for the school grounds at 16 Peppard Road, Caversham Reading, RG4 8JZ as part of a wider planning requirement. The review shall include calculations based on the existing luminaire installation for both the school grounds and the 1 Derby Road staff flat.

The key aims to ensure that light spill to the local residences has been minimised ensuring the adopted solution has considered the local environment and minimise potential light pollution.

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Section Two
Information Provided

Caversham Preparatory School consists of a series two storey and single storey structures and a playground area contained within the school grounds. The existing external lighting scheme has been provided locally around the buildings to specific/key areas.

Norwood Consultants Ltd have been provided with details of the luminaire locations, luminaire types, manufacturer and a location plan. This information has been utilised as the basis for the review of the existing external lighting for the school grounds and the production of calculations intended to review the lighting levels achieved and any potential light spill from the school grounds to the local residences.

In addition, Norwood Consultants Ltd have been provided with an extract of a letter from Reading Borough Council regarding the wider planning application. The extract below relates to the purpose of the report and calculations relating to the existing external lighting installation at the school.

18. Within three months of the date of this Planning Permission details of an external lighting scheme (including any lighting to be retained) shall be submitted by the Occupier to the Local Planning Authority for approval. The scheme shall indicate the location and luminance levels of all external lighting within the school site.
Reason: as no details have been submitted and/or approved and to ensure the lighting on school site is suitable in terms of residential amenity. Policies: CS34, DM4

No further information was provided.

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Section Three
Relevant Standards and Statutory Requirements

The main pieces of statutory legislation, which relate to this type of environment, are as follows:

- The Health and Safety at Work Act, The Management of Health and Safety at Work Regulations, The Electricity at Work Regulations.

The Health and Safety at Work Act 1974 (Sections 2, 3 and 4) puts a duty of care upon both employer and employee to ensure the safety of all persons using the works premises.

- The Management of Health and Safety at Work Regulations 1992 state

“Every employer shall make a suitable and sufficient assessment of

- (a) The risks to the Health and Safety of his employees to which they are exposed whilst they are at work and*
- (b) The risks to the Health and Safety of persons not in his employment arising out of or in connection with the conduct by him of his undertaking”. (Regulation 3(1)).*

It is clear that the Health and Safety at Work Act, in particular “making your workplace safe and without risks to health”, places a responsibility on the employer to ensure that good illumination is provided, for both normal working conditions, and of course in the event of a mains failure, (Generally considered relevant to internal conditions only).

- The Offices, Shops and Railways act also defines the minimum safe working requirements for areas such as these.

BS EN 12464 – 2 Light and lighting — Lighting of work places (Part 2: Outdoor work places), gives recommendations for general areas (walkways, traffic areas, parking areas,). There is often supplementary guidance for a particular activity which will also have particular guidance relating to column height, upward light spill, etc.

BS 5489-1. Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas gives recommendations for vehicle parking areas. This document tends to deal solely with the functional and safety aspects of lighting.

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Although not encompassed by statutory requirements, the Chartered Institute of Building Services Engineers, (CIBSE), have produced a code of practice for Lighting For Education, (Lighting Guide LG5:2011 Lighting for Education), this code contains specific guidance for external areas within school grounds

Again, not encompassed by statutory requirements, the Chartered Institute of Building Services Engineers, (CIBSE), have produced a code of practice for the exterior environments, (Lighting Guide LG6:2016 The Exterior Environment), this code contains specific guidance for external areas within general areas

The existing external lighting solution shall be assessed against the guidance of the above stated documents. The key aims to ensure that light spill to the local residences has been minimised ensuring the adopted solution has considered the local environment and minimise potential light pollution.

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**Section Four
Lighting Requirements**

The Site

Caversham Preparatory School is located on Peppard Road in the suburb of Caversham within the Borough of Reading. The school grounds have historically been part of the grounds of the Chiltern College. The nursery nurse training college has been on the site at Peppard Road since before World War Two.

The school is located on the main route through Caversham and bounded by Peppard Road (B481) to the west of the school grounds. On the opposite side of Peppard Road to the school the properties are residential dwellings.

To the south the school is bounded by Derby Road (Private road) which again consists of primarily residential dwellings with some education establishments.

Site Location Including Surrounding Areas



Image Courtesy of Google Earth

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To the east the school is bounded by residential properties and the grounds of the residential properties.

Derby Road (Private road) which again consists of primarily residential dwellings with some education establishments.

To the North of Caversham Preparatory School sharing a gated entrance is the Chiltern Nursery and Training College

Peppard Road being a B road and largely residential does have local authority provided street lighting furniture with columns located outside the boundary in front of No 16 and on the opposite side of the road in front of the main entrance to the School and Nursery/training College. Further street lighting columns are also located outside the boundary of the staff flat towards the entrance to Derby Road. Illuminated safety signage is located outside the boundary of the school along Peppard Road



Street Lighting Column (Peppard Road) Located Outside the Boundary of the Staff Cottage (Viewed from Staff Cottage Grounds)

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Peppard Road Boundary



Image Courtesy of Google Earth

Peppard Road/Derby Road Boundary



Image Courtesy of Google Earth

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The majority of the boundaries between the school and neighbouring residences are lined with relatively tall trees and hedges. The Peppard road boundary is partially fenced, partially tree lined and partially walled.

Caversham Preparatory School is located in a suburban residential area, it is understood that Reading Borough Council do not currently engage in a policy of switching off street lighting.

The wider Caversham area itself is ranked in the third tier of brightness by CPRE (Campaign to Protect Rural England) as shown in the image below.

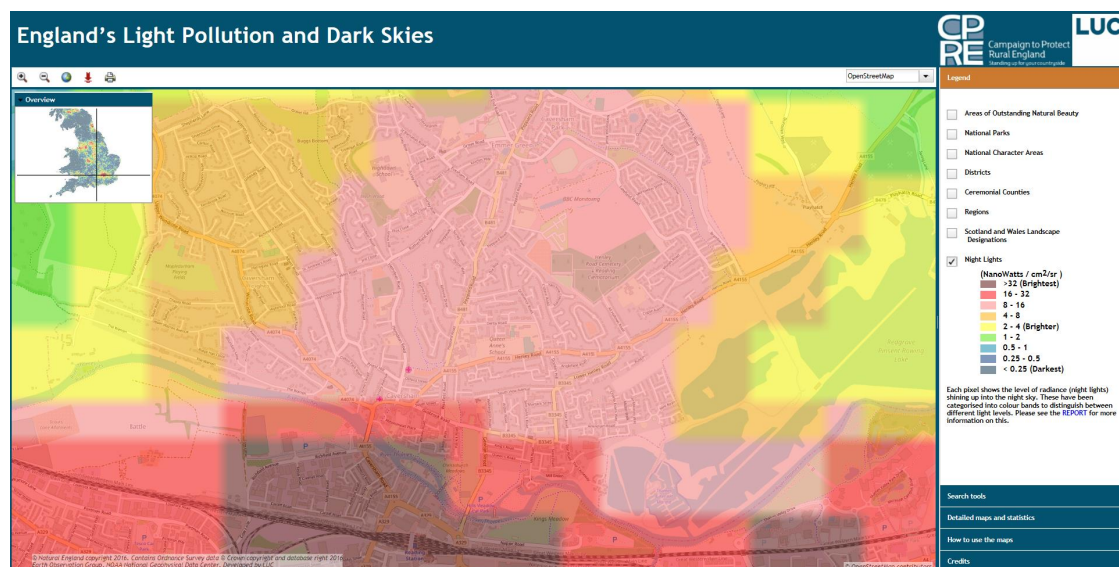


Image Courtesy of Campaign to Protect Rural England

The external lighting provision at the school is an existing scheme which has been retained. As such the requirement is to provide details of the retained scheme as part of an overall submission relating to other works at the School.

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In terms of current guidance, the following would be applicable to a new lighting scheme

BS EN 12464 – 2 Light and lighting — Lighting of work places (Part 2: Outdoor work places)

The above document defines areas and details the maximum permissible Obtrusive light as detailed in the excerpt below.

Table 2 — Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light ratio	Luminance	
	E_v lx		I cd		R_{UL} %	L_b cd·m ⁻²	L_s cd·m ⁻²
	Pre-curfew ^a	Post-curfew	Pre-curfew	Post-curfew		Building facade	Signs
E1	2	0	2 500	0	0	0	50
E2	5	1	7 500	500	5	5	400
E3	10	2	10 000	1 000	15	10	800
E4	25	5	25 000	2 500	25	25	1 000

where

E1 represents intrinsically dark areas, such as national parks or protected sites;

E2 represents low district brightness areas, such as industrial or residential rural areas;

E3 represents medium district brightness areas, such as industrial or residential suburbs;

E4 represents high district brightness areas, such as town centres and commercial areas;

E_v is the maximum value of vertical illuminance on properties in lx;

I is the light intensity of each source in the potentially obtrusive direction in cd;

R_{UL} is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude, and given in %;

L_b is the maximum average luminance of the facade of a building in cd·m⁻²;

L_s is the maximum average luminance of signs in cd·m⁻².

^a In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

*: - Table 2 extracted from BS EN 12464 – 2

For the purposes of the report Caversham Preparatory School would be considered as within Environmental Zone E3.

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We have based our assessment on the location of the school, proximity to the B481, the surrounding educational and training facilities, street lighting furniture and the relative density of the residential properties.

From the information, we have been provided no specific guidance is given in respect to any lighting Curfew.

In terms of lighting requirements BS EN 12464 – 2 provides no specific for schools, Table 5.1 below provides guidance for generic areas.

5.4 Lighting requirements for areas, tasks and activities

Table 5.1 — General requirements for areas and for cleaning at outdoor work places

Ref. no.	Type of area, task or activity	$\overline{E}_m$ lx	U_o –	R_{GL} –	R_a –	Specific requirements
5.1.1	Walkways exclusively for pedestrians	5	0,25	50	20	
5.1.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	0,40	50	20	
5.1.3	Regular vehicle traffic (max. 40 km/h)	20	0,40	45	20	At shipyards and in docks, R_{GL} may be 50
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0,40	50	20	
5.1.5	Cleaning and servicing	50	0,25	50	20	All relevant surfaces

The Chartered Institute of Building Services Engineers, (CIBSE), have produced a code of practice for Lighting For Education, (Lighting Guide LG5:2011 Lighting for Education), this code contains specific guidance for external areas within school grounds primarily in respect to sports facilities, for more general areas and requirements it reverts to BS EN 12464 – 2

The areas to the front of the school are essentially mixed use with what would be light slow-moving vehicle traffic and pedestrian walkways. The rear of the school would be mainly considered as pedestrian areas.

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Summary

From the various Standards and codes of practice quoted elsewhere in this document the current design parameters for the school would be as follows: -

Environmental Zone = E3
Illumination Level Range = 5 - 50 Lux (Average)
Uniformity Range = 0.25 – 0.4

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Section Five
Existing Lighting Solution

General Description

Caversham School is provided with an existing external lighting solution which consists largely of Thorn Sonpak (manufacturers details Appendix C) type area floodlights along with a limited number of compact fluorescent domestic style compact fluorescent floodlights and a surface mounted circular 2D compact fluorescent walkway luminaire.

The majority of the luminaires a surface mounted on the façade of the various buildings within the school grounds and the staff cottage.

The luminaire locations and types are shown on drawing number NCL/1947/E/001 Rev P1 located in appendix B of this document.

As shown on the drawing there is a domestic style compact fluorescent floodlight pole mounted adjacent to the playground area. This luminaire has been switched off since 2016 and was done so at the request of the resident of No 3A Derby Road. As such this luminaire position is not considered any further in the report or calculations of the existing scheme.

Additionally, there is a further domestic style compact fluorescent floodlight which is PIR operated, this is located between the old garages and No 16. The luminaire is provided as a security light and will only operate on detection of motion. This luminaire is not part of the overall school external lighting solution and therefore is not considered any further in the report or calculations of the existing scheme. The luminaire is between two buildings and would be masked from view from the residences along Peppard Road by the trees and hedges along both side of the road.

The external lighting scheme as previously mentioned is an existing scheme, the majority of the luminaires are Thorn Sonpak 7 type area floodlights which date back to approximately the 1990's which suggests the majority of the scheme pre-dates the current guidance.

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Having reviewed CS34 and DM4 these documents do not appear to offer any specific guidance or requirements relating to either new or existing lighting schemes.

External Lighting Scheme Design

NorWood Consultants Ltd were not responsible for the design of the current lighting scheme and our summary/review of the design is based solely on experience and observation.

The external lighting scheme predominately utilises floodlighting to illuminate low speed traffic areas/car parking, vehicle loading/unloading and pedestrian areas. The scheme itself appears to have been designed and installed to provide lighting to key locations around the building rather than a more area by area specific design solution.

The aiming points and angles of the floodlights appear to have been installed to minimise upward light spill and light spill beyond the property. Additionally, the luminaires have been positioned such that they are masked from the view of the residences by trees, hedges and the buildings themselves.

External Lighting Calculations (contained within Appendix A)

NorWood Consultants Ltd have endeavoured to replicate the existing lighting scheme, school buildings and surrounding areas as accurately as possible in the calculations provided in Appendix A.

The primary focus of the calculations provided being the general lighting levels and light spill beyond the boundary of the school.

To the north and west of the school our calculation boundary extends approximately 6m beyond the school boundary. On the west boundary (Peppard Road) the extent of light spill is minimal with the illumination levels beyond the boundary at values less than 1 lux. Given the location of the street lighting columns within the road and the proximity to the school the light spill would be insignificant when compared to the level of illumination provided by the street lighting columns.

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To the north of the school grounds our calculation boundary extends to 6m beyond the building. The illumination levels at this point drop to approximately 1.4 Lux. However, as the school shares the entrance with the Nursery and Training college any lights spill beyond the boundary of the grounds again would be minimal. Any spill at the entrance itself is less than 1 lux and again given the location of the street lighting columns this would be insignificant when compared to the level of illumination provided by the street lighting columns.

To the South of the staff cottage (Derby Road) our calculation boundary extends approximately 7m beyond the property boundary. As can be seen from the calculations the illumination level at the calculation boundary drops to less than 1 Lux. The properties to the east of the staff cottage are effectively shielded by the hedge/tree line as can be seen from the calculations there is virtually no light spill to the adjoining property and the illumination levels are at 0 Lux. Typically values of natural moonlight are reported as 1 lux or less.

On the eastern boundary of the school, the residences are separated by trees and relatively tall hedges. These provide an effective screen between the school and the adjoining properties. The calculation boundary extends approximately 12m beyond the property boundary (playground end) as can be seen from the calculations there is virtually no light spill to the adjoining properties and the illumination levels are at 0 Lux. Typically values of natural moonlight are reported as 1 lux or less.

In general terms, the current lighting solution provides sufficient levels of illumination for the school's requirements and in the key locations.

Lighting Controls

The control and switching of the lighting system is generally via manual switching except for one luminaire which is controlled via a daylight sensor located on 16 Peppard road. Some of the domestic type security floodlights have PIR sensors to switch them on/off when motion is detected.

The luminaires are only switched on when children, Staff members and cleaners are in the school. The school is for small children with the hours of operation being generally short and during the day, the need for artificial lighting is greatly reduced. The school receives a fair amount of lighting from the adjacent college which is flood light lit.

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Section Six
Conclusion

The external lighting solution at Caversham Preparatory School is an existing provision and would appear to have been in place for a number of years. As mentioned earlier in this report some of the Thorn Sonpak 7 luminaires appear to date back to the 1990's.

In terms of the scope of this report and calculations, the existing external lighting scheme at Caversham Preparatory School along with the existing environment does appear to minimise light spill and potential nuisance to the surrounding premises.

The trees, hedges, fences and walls coupled with the luminaire locations and aiming points in respect to the calculations do limit light spill beyond the boundary of the school grounds.

These features also provide an effective screen masking the luminaires from the view of the local residences.

The calculations also suggest that the limited amount of light spill on the Peppard Road Boundary would not be significant given the street lighting and illuminated safety signage in close proximity to the school.

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Appendix A

Preliminary Lighting Design Calculations

1947-30-001 External Lighting

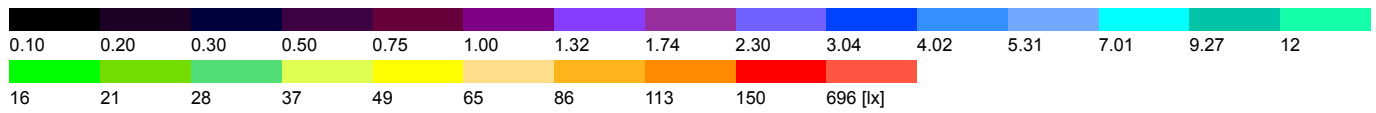
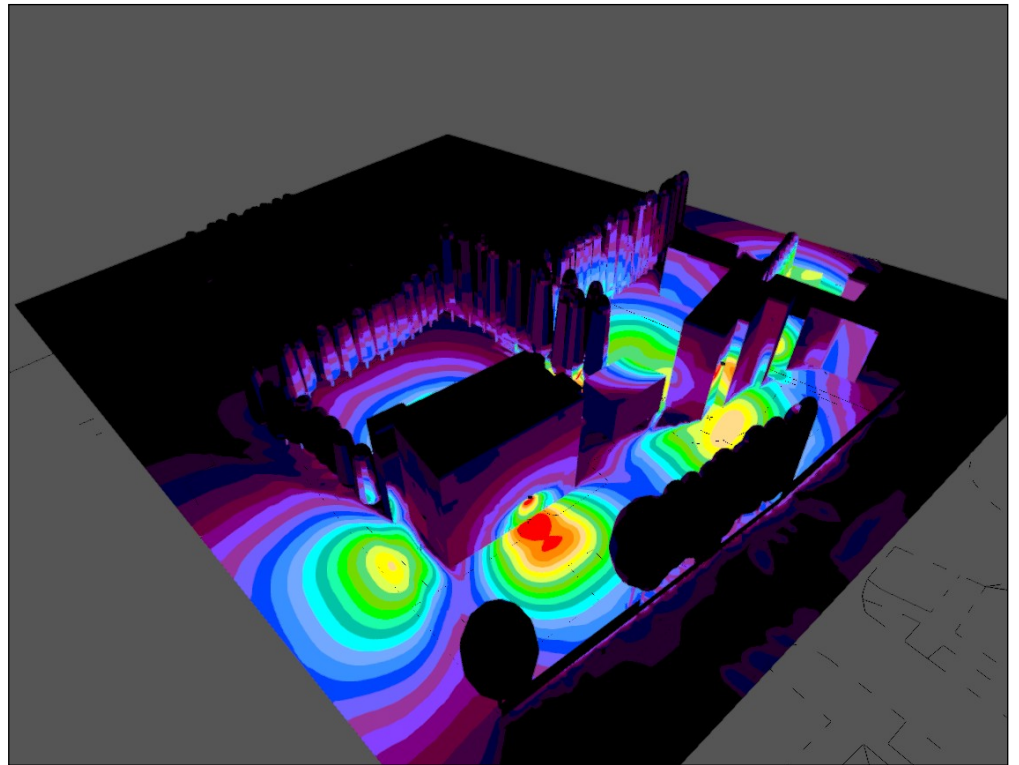


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Site 1

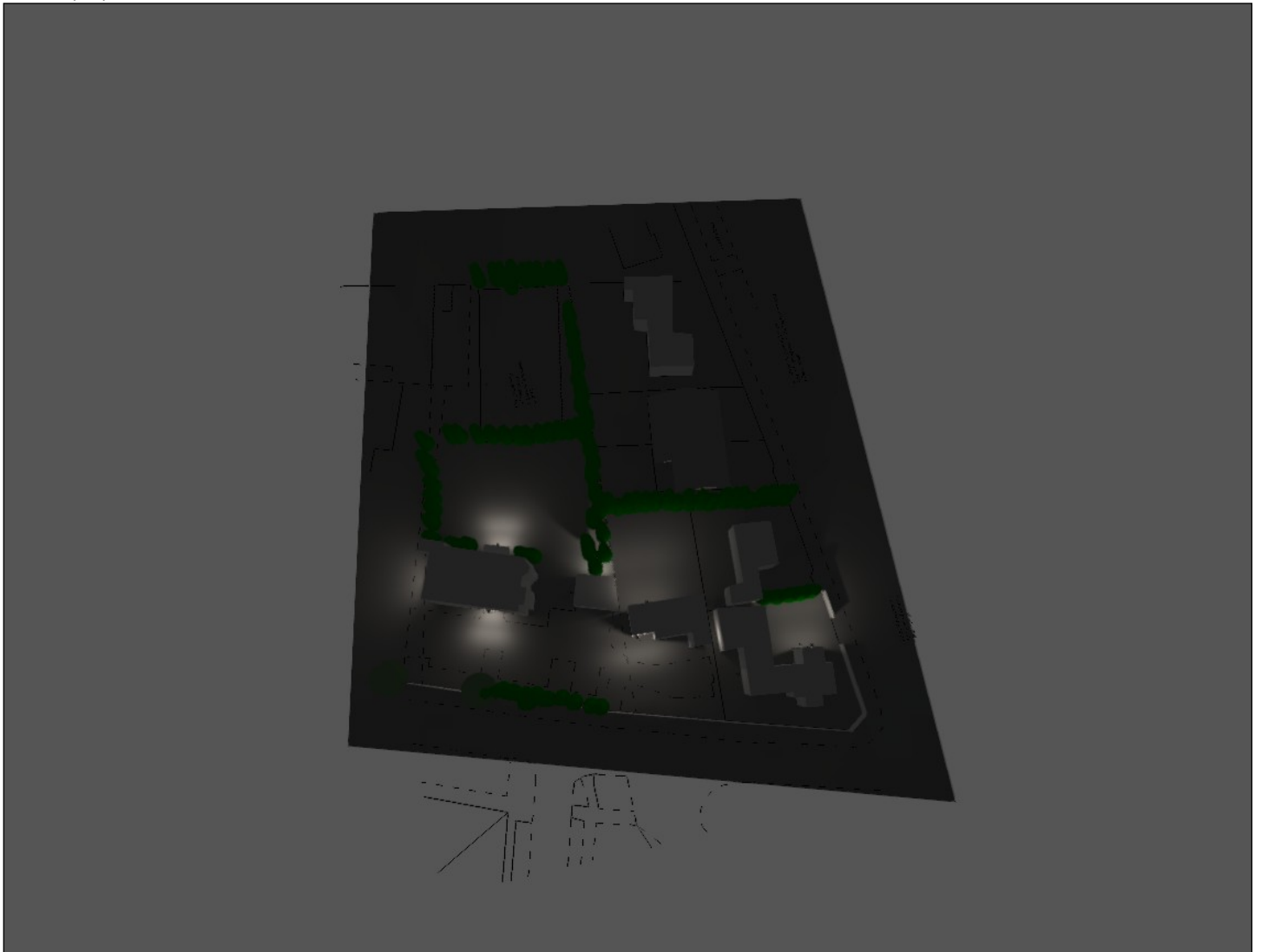


Thorn Lighting 96 232 640 SONPAK LX 70W 240V HSE-I/E27/220 A/S [STD]

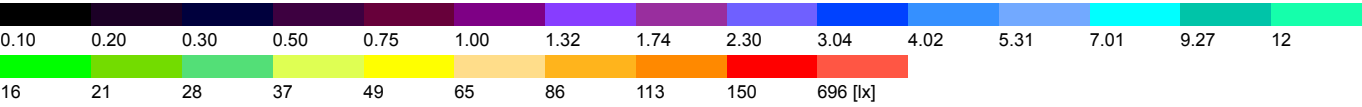
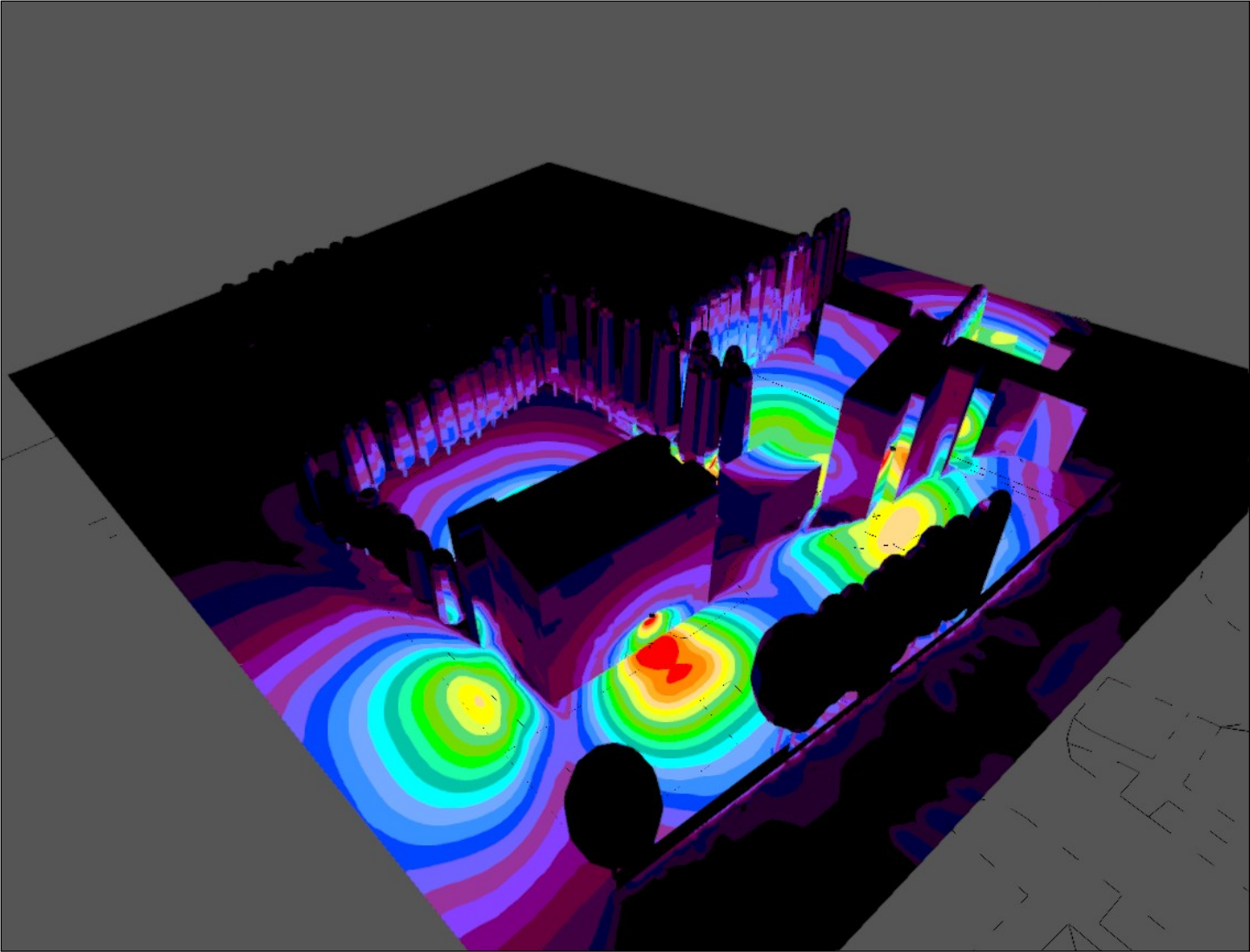
No.	X [m]	Y [m]	Mounting height [m]
1	15.592	10.212	3.750
2	21.848	23.715	4.500
3	19.214	25.103	4.500
4	23.963	37.734	2.000
5	27.391	41.979	2.200
6	29.671	36.079	2.000
7	25.286	27.546	2.000

Site 1

Site 1 (43)



Site 1 (40), Illuminance values in [lx]



Workplane 2 / Perpendicular illuminance (adaptive)



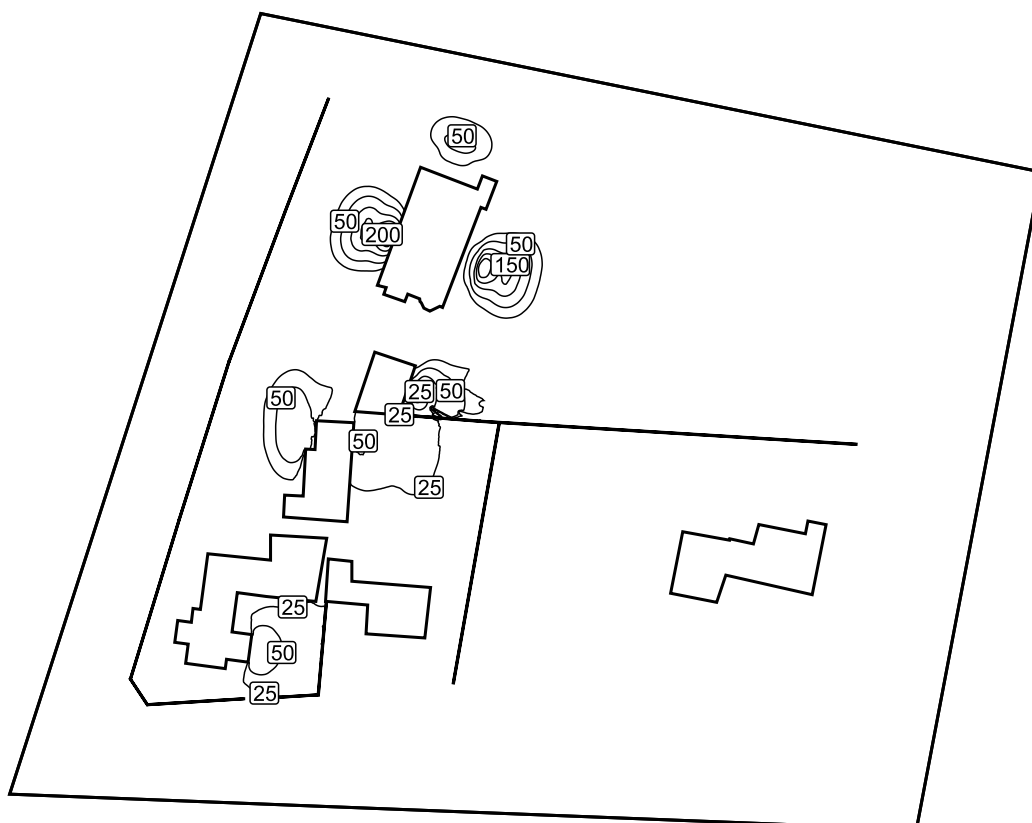
Workplane 2: Perpendicular illuminance (adaptive) (Surface)

Light scenes: Light scenes 1

Average: 4.69 lx (Target: ≥ 50.0 lx), Min: 0.00 lx, Max: 247 lx, Min/average: 0.00, Min/max: 0.00

Height: 0.000 m, Wall zone: 0.000 m

Isolines [lx]



Scale: 1 : 500