

Highgate School MSC 4 Phases

External Lighting



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Executive Summary

This report for External Lighting support the planning application for constructing a new sports hall and refurbishing the existing Mallinson Sports Centre facilities at the Bishopswood Road campus (Lower School) of Highgate School.

Planning Requirements - Highgate School Supplementary Planning Document March 2021 section 6.6 requires, “..... Any proposal for lighting will be subject to assessment of impacts and should accord with London Plan policy S5 and Local Plan Policy DM23.”

Local Plan Policy DM23: Light Pollution: Development proposals that include external lighting must mitigate potential adverse impacts from such lighting. Where appropriate, proposals will be required to submit details demonstrating that external lighting is:

- Appropriate for its purpose in its setting;
- Designed to minimise and provide protection from glare and light spillage, particularly to sensitive receptors such as residential properties and natural habitats, including watercourses; and
- Energy efficient

This report demonstrate the compliance with the above requirements using the methodology set by the Institution of Lighting Professionals (ILP) in Guidance Note 01/21.

A computational software is used to simulate the external lighting as coordinated with the Architect and Landscape Designer. The following pages shows the methodology, lighting strategy and compliance with the GN 01/21 and CIBSE SLL LG 21 in line with the Local Plan Policy.

The report from the external lighting simulation included in appendices of this report which indicates that all factors associated with the light “Pollution” / “Obtrusive” light have been mitigated within the design. By selecting the right light fittings, locating in the right locations and easy maintained lighting control system, an efficient, practical and external lighting for security and safe access have been designed with minimal adverse effect on the surrounding premises, environment, flora and fauna.

The report covers the method and results from mitigating the effects of upward light (Sky glow), light intrusion through windows on residents, viewed source intensity on residents, disability glare on read users, environment and high energy consumption.

Due to the effective screening of the surrounding land features, the type, number, colour temperature and positioning of the luminaires used and the limited duration of use, the assessment demonstrates little or no impact from the use of lighting in the surrounding areas, neighbours, and potential sensitive receptors.

Based on this assessment and subject to the incorporation of the recommendations in this report, it is considered that obtrusive lighting from the proposed Lighting Strategy does not constrain the proposed Development.



Figure 1 Aerial View of the site in Red

1.0. Introduction

Highgate School has commissioned Peter Deer and Associates to provide a BREEAM Pre-assessment, advice, and guidance concerning the proposed redevelopments of the Mallinson Sports Centre, Bishopswood Road, Highgate, London.

The purpose of this document is to outline the proposed external lighting design

The proposed Development is predicted to achieve a minimum BREEAM 'Excellent' rating, in line with London Borough strategic policy SP4: Working towards a Low Carbon Haringey and the Highgate School Supplementary Planning document (March 2021).

This document should be read in conjunction with:

- Design and Access Statement
- Energy Statement
- Ecology assessment

A lighting assessment has been undertaken to identify the baseline conditions of the current application site, including details of screening, topography, vegetation, buildings/structures and potential sources of existing artificial lighting; to identify potential sensitive receptors that may be affected by obtrusive light, and to assess the potential effects on those receptors from the new artificial lighting proposed for the Development as set out in the detailed Lighting Strategy submitted with the planning application.

1.1. Site and Location

The Mallinson Sports Centre (MSC) is located on the Bishopswood Road campus of the school estate near other principal school buildings such as the Mills Centre, the Dining Hall, the Pre-preparatory School, and the Junior School.

Site address is Mallinson Sport Centre, Bishopswood Road, London N6 4PH.

The main building comprises of the Pool Hall and associated changing rooms, which was the first building on the site in 1969, followed by the main sports hall with associated ancillary accommodation, gym, entrance hall, central offices and other sports spaces completed in 1989.

The overriding aim of the design seeks to transform this building and create enhanced building aesthetics within the Conservation Area whilst providing all the sports and ancillary-related facilities that the school will need soon.

The intention is to retain the essential elements of the existing building that have significant long-term value and condition, providing spaces of the required technical standard, and integrating them with alterations and extensions into a unified whole, a single sports centre.

The new sports hall is the principal component of the proposed Development of the school's indoor sports facilities. As part of the work, the school intends to demolish the existing Fives Court and Squash Courts building to open a large area within the site that can be more efficiently and architecturally developed. These works are also designed to incorporate a new sports centre building comprising an indoor sports hall, teaching classrooms and staff offices.

The hall's design is to accommodate a National Standard Netball Court within the hall, one that will allow Premier League games to be played. There is an aspiration nationally for netball courts of this standard, for a sport that is increasing in popularity. Many other sports courts will fit within this same interior footprint.

1.2. The Vision

The proposed Development is auxiliary to several other applications in various parts of the school. The vision behind all the proposed developments at the school is set out in the planning statement accompanying the applications, an extract of which is reproduced as follows:

"Being both a Charity and a School, sustaining and further improving what Highgate does for the benefit of its pupils and pupils of partner schools elsewhere within the borough is never finished business."
"The school has, over the last 15 years or so, been undertaking an extensive programme of modernising and renewing its extensive and mixed stock of buildings and facilities to meet the educational and other demands of a 21st Century establishment. Significant funds have been invested over that period, and the programme will continue over the next decade."
"This programme combines the continuing need to maintain, both in terms of safety and appearance, the buildings on several sites and in varying degrees of condition, with the need to provide essential, flexible, good quality and long-lasting educational facilities for its varied educational and charitable objectives, as well as catering for its diverse pupil-body, which meets the different educational and supporting requirements for each of the three Schools to satisfy Department of Education (DfE) and other statutory requirements."

1.3. Community Uses

The MSC sports centre is currently available to the community as a private sports club with membership. There are public uses for the outdoor pitches and the indoor sports centre, including other schools and sports clubs. In the holidays there are also holiday camps and other activities. The options for public use are noted as follows on the Camden Cindex website:

Private school facilities are available to the public. Term-time sports activities for children aged 5-14. School holiday courses include multi-activity, football, cricket, tennis, and dance. Facilities for adults include squash, fitness suite and tennis (courts available), 25m x 12.5m swimming pool. Children's parties for 5-15-year-olds (maximum 25 children) are available at weekends, including a variety of sports options and games and swimming sessions. Bouncy castle party available for children aged 5-7 years. Swimming club.



Figure 2 Site Location in Context (Open Street Map)

1.4. Proposed works

The new extensions will create a larger building with various sports facilities, including a second sports hall, which will also be used for other School events, parent evenings, examinations, and assemblies.

The principle of a single secure point of access at the south end is to be maintained, with a larger and more open entrance and foyer fronting the all-weather pitches. Once inside the foyer via a draught lobby, the main Sports Centre reception desk immediately controls the area, which will always be staffed during regular operational hours. The desk will be open within the space to create a friendly and welcoming impression for pupils and visitors and improve visibility. It is anticipated that turnstiles will be used to control and monitor access within the building – these are also provided at the west entrance next to the second hall. Turnstiles and entry doors would all be linked to the building fire alarm and detection system and default to open in the event of a fire for emergency egress.

As a result of the proposed extensions, new lifts will allow complete accessibility for disabled users to all areas of the building which is not currently wheelchair accessible.

Generally, during the school Day, the main doors will be openable, the entry doors being on automatic electric opening systems for disabled and Part M access. After School hours, it is anticipated that the main doors at both entrances will have access security control, operated by coded entry devices with magnetic closing locks. An option being investigated is to have the entry systems operated by pupil and staff cards, which will also serve several other functions in the school.

The proposed works in this submission include:

- Demolition of existing Fives Court and Squash Courts building at the north end of the site and remove the external games court area and high chain-link fencing.
- New north-west extension for a second indoor sports hall with associated new circulation corridor, viewing gallery, access stairs and lift, ancillary spaces for storage and plant, and a teaching block extension for 'Combined Cadet Force' and 'Outdoor Education' classrooms, offices, and associated storage.
- A new south extension to the existing sports hall for eight (8) no. New external covered Fives Courts with run-off area.
- New south-west extension and alterations to the existing building to create an enhanced entrance with foyer, reception, and café, with improved unique access stairs down to the current changing rooms.
- Alterations to the existing sports hall to enhance natural lighting by new roof lights, with interior changes to associated spaces.
- The New east extension in the existing open courtyard provides additional studio/gym spaces and forms connections back to the changing rooms, with ancillary external storage for sports.
- New hard and soft landscaping around the site's perimeter, including removing three Trees, replacing new semi-mature trees, and forming an entrance courtyard area at the new south main entrance.

The works are intended to be constructed as a phased development. They are related to the current project on-site for the refurbishment of the existing Pool Hall, which is being retained at the heart of the proposed scheme. This was granted planning permission on 31 May 2018, reference: HGY/2018/1223, and referred to this further project in the Design and Access Statement as a master-planning intention.

The proposed works will modernise this important indoor sports facility with alterations and extensions and significantly extend the life of the retained elements of the existing building while also providing significant

improvements to accessibility, energy efficiency and reduction of the carbon footprint of the whole Development.

1.5. Landscaping & External Works

The design strategy for the new sports centre is to:

- Create new landscape areas which maximise the amount of planting so that the new building becomes a recognisable and embedded part of the school's landscape and estate;
- Introduce new tree planting;
- Provide low-level, safe, and efficient lighting for students and visitors;
- Surface the paths with permeable paving as part of a sustainable drainage system;
- Utilise a no-dig construction methodology to prevent damage to tree roots where necessary.

The design strategy for the Orchard site is to:

- Create a new outdoor sports area with a unique and elegant oval-shaped amphitheatre that will not only provide seating around the pitch but also acts as a barrier and flood water storage device to prevent future flooding events;
- Introduce new tree planting;
- Provide accessible and safe access to the sports pitches for students and visitors, and connect with other areas of the school;
- Utilise a no-dig construction methodology to prevent damage to tree roots where possible;
- Minimise any impacts on the most valuable, existing trees around the site.
- There are mature trees around the site perimeter, between the MSC and the Orchard site, and all-round and to the east of the Orchard site, where there is a small natural wood.

2.0. Assessment Methodology and Criteria for External Lighting

2.1. Methodology

The methodology employed for this assessment was appropriate to the location of the application site. The baseline conditions were assessed by a desktop study. The methodology for this assessment is mainly established in ILP Guide 01: Guidance Notes for the Reduction of Obtrusive Light (2021), which is also required by the local planning policy.

The desktop study involved research into relevant local and national legislation, policy and guidance relating to obtrusive light. It also involved consultation with relevant parties and studying of ordnance survey maps, plans and aerial photography views to identify likely receptor locations.

2.2. GN01/21 The Reduction of Obtrusive Light

The above guidance published by "Institution of Lighting Professionals" which is in line with the international guidance for obstructive light CIE 150:2017 *Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations*, is being used to determine the effects of proposed artificial lighting for the development. The aim is to provide "The right light, at the right time, in the right place, controlled by the right system".

3.0. Planning Policies

3.1. Clean Neighbourhoods and Environment Act (CNEA) 2005

The Clean Neighbourhoods and Environment Act (CNEA) 2005 gives Local Authorities and the Environment Agency additional powers to deal with a wide range of issues by classifying artificial light emitted from defined premises as a statutory nuisance.

The CNEA 2005 amended section 79(1) of the Environmental Protection Act 1990 to extend the statutory nuisance regime to include light nuisance stating the following:

'(Fb) artificial light emitted from premises to be prejudicial to health or a nuisance.'

Guidance produced in Sections 101 to 103 of the CNEA 2005 by DEFRA (DEFRA, April 2006) extends the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances, including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice (following section 80(2) of the Environmental Protection Act 1990), requiring that the nuisance cease or be abated within a set timescale.

3.2. National Planning Policy Framework (NPPF)

The NPPF was introduced as a more concise and useable planning document to aid developers and designers in developing developments within the UK.

The National Planning Policy Framework 2021 makes little reference to lighting regarding the control of obtrusive light. The only reference states:

c) limit the impact of light pollution from artificial light on local amenities, intrinsically dark landscapes, and nature conservation.

Many Local Planning Authorities (LPAs) have already produced, or are producing, policies within the planning system which will become part of their local development framework. For new developments, there is an opportunity for LPAs to impose planning conditions related to external lighting, including curfew¹¹ hours.

3.3. National Planning Policy

The national online planning guidance resource looks at when lighting pollution concerns should be considered; the guidance provides a high-level overview for planners with links to a few appropriate documents to give planners an overview of the subject through seven discussion points as follows:

- When is light pollution relevant to planning
- What factors should be considered when assessing whether a development proposal might have implications for light pollution
- What factors are relevant when considering where the light shines
- What factors are relevant when considering when light shines
- What factors are relevant when considering how much the light shines
- What factors are relevant when considering possible ecological impact

¹¹ Curfew: The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied the local planning department. Depending upon application curfew times often commence between 21:00 to 23:00 and may run until 07:00. However, exact curfew hours should be carefully applied to ensure the reduction of obtrusive light is prioritised within the immediate environment and towards sensitive human as well as fauna and flora receptors.

- What other information is available that could inform approaches to lighting and help reduce light pollution

Artificial light requires consideration at the planning stage. To ensure that any proposed lighting installation conforms to the requirements of an area and its intended task, planners should consult with a competent lighting professional. The appropriate planning conditions for the project can then be established, the application reviewed, and the final performance of the installation confirmed.

4.0. Potential Effects from Artificial Light

There are a limited number of potential effects that arise from artificial lighting. These are as follows:

4.1. Effects from upward light (or sky glow)

Light emitted above the horizontal, either directly from luminaires or indirectly as reflected light from surfaces such as the landscape or buildings, has the potential to cause a sky glow. The ILP "Guidance Notes for the Reduction of Obtrusive Light" places limits on the percentage of direct upward light emitted from the luminaires in their installed attitude, which is dependent upon the environmental zone in which the site lies.

Indirect upward light is subject to material reflectance properties. It is not easily quantifiable but is unlikely to be as significant as direct upward light and is not an assessment criterion used in the ILP guidance notes.

4.2. Effects from light intrusion through windows on residents

Light Intrusion (or light spill) is the spilling of light beyond the boundary of the area being lit. The ILP Guidance Notes limit the amount of vertical Illuminance which falls upon the centre of a dwelling window. The suggested maxima values quoted are relative to the amount of light measured as a baseline without the presence of the obtrusive light source.

4.3. Effects from viewed source intensity on residents and sightseers

Table 1 below advises various lighting levels in different environmental zones and limits on luminaire intensity or viewed source intensity from luminaires to an observer. The most significant problems are usually from poorly aimed floodlights, security lighting, or lighting located too close to properties.

4.4. Effects from disability glare on road users

The proposed lighting strategy includes requirements for lighting to be installed such that Glare is minimised following the ILP guidance notes.

4.5. Effects of obtrusive light on the environment

Artificial light at night often has unexpected impacts on the environment. The light spill has the potential to affect both flora and fauna. Light spills can disrupt feeding patterns and force ecological receptors to leave their habitat. It has been noted that there are bat and hedgehog records within the vicinity of the site. The lighting strategy will seek to mitigate light spills with potential ecological receptors that could be adversely affected—reducing spill light using guidance provided by the ILP to reduce obtrusive light.

4.6. Effects of high energy consumption

Lighting installations have the potential to consume high quantities of energy, and competent lighting professionals should carefully design them. A good practice for energy-efficient lighting would be

implementing an LED-based lighting solution with a suitable lighting control system that applies to the application.

5.0. Obtrusive Light Limitations

To safeguard and enhance the night-time environment, it is necessary to control obtrusive light (also known as light pollution), which can present ecological and physiological problems to both natural and manufactured environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers. Figure 3 below is taken from the ILP guidance notes GN01:2021, shows the various forms of obtrusive light.

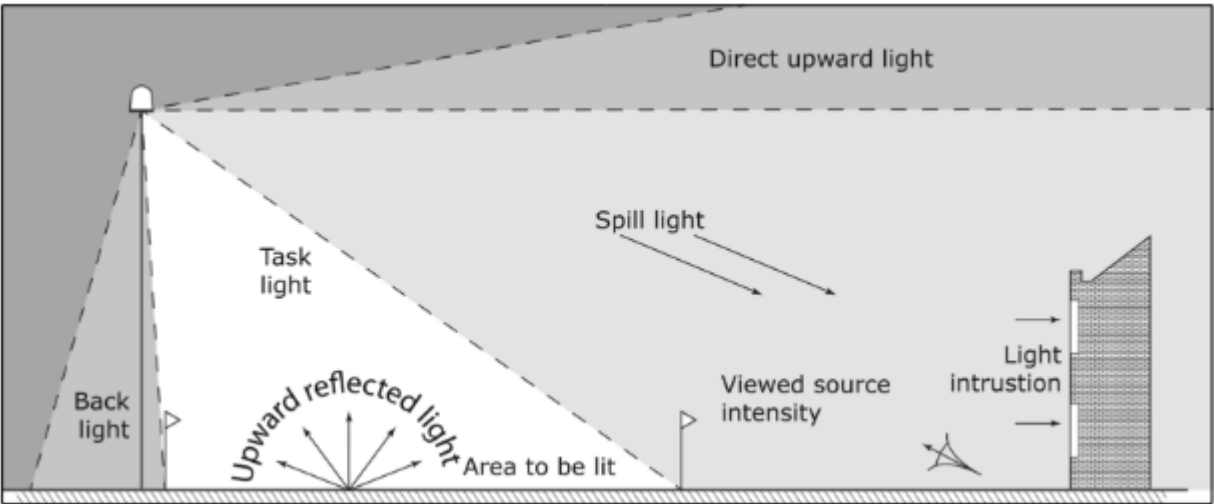


Figure 3 - Types of Obtrusive light

6.0. Environmental Zones

The ILP has established Environmental Zones for exterior lighting based on the area's existing external ambient lighting levels (see Table 1).

The ILP Environmental Zone classification for the site has been determined based on professional judgement.

The following Environmental Zones is extracted from ILP guidance note 01/21.

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

Table 1 (ILP Table 2): Environmental Zones

In the context of the existing lighting conditions, it has been established that the site and its surroundings can be categorised within ILP Environmental Zone E3 (Suburban), due to the medium level of district brightness identified.

7.0. Recommended Maximum Values of Light Parameters for the Control of Obtrusive Light

The following sections are extracts from the ILP Guidance Notes 01/21 which quantify the maximum values of illuminance or luminous intensity as identified within the International guidance CIE 150.

7.1. Limitation of illumination on surrounding premises

Table below indicates the maximum values of vertical illuminance on surrounding premises. It can also be considered for managing spill lights; however, the task performance requirements of any adjacent lit areas must be considered and ensure that any spill light does not adversely affect these performance parameters as this could affect their safe use. It may be necessary to minimise spill and intrusive lighting values to less than expected for the environmental zone within which the installation lies.

* If the installation is for public (road) lighting, this may be up to 1 lx.

Table 2 (CIE 150 table 2): Maximum Values of Vertical Illuminance on-premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

7.2. Limitation of bright luminaires in the field of view

The limits for the luminous intensity of bright luminaires are dependent on the viewing distance and the projected area of the bright part of the luminaire in the direction of the observer. The following table shows the maximum values for the luminous intensity of luminaires in designated directions where views of bright surfaces of luminaires are likely to be a nuisance to occupants of premises.

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0 Pre-curfew Post-curfew	0 0	0 0	0 0	0 0	0 0	0 0
	E1 Pre-curfew Post-curfew	0.29 d 0	0.63 d 0	1.3 d 0	2.5 d 0	5.1 d 0	2,500 0
	E2 Pre-curfew Post-curfew	0.57 d 0.29 d	1.3 d 0.63 d	2.5 d 1.3 d	5.0 d 2.5 d	10 d 5.1 d	7,500 500
	E3 Pre-curfew Post-curfew	0.86 d 0.29 d	1.9 d 0.63 d	3.8 d 1.3 d	7.5 d 2.5 d	15 d 5.1 d	10,000 1,000
	E4 Pre-curfew Post-curfew	1.4 d 0.29 d	3.1 d 0.63 d	6.3 d 1.3 d	13 d 2.5 d	26 d 5.1 d	25,000 2,500
	Aid to gauging A_p Luminaire diameter	2 to 5 cm	5 to 10 cm	10 to 20 cm	30 to 40 cm	40 to 80 cm	>80 cm
	Geometric mean of diameter (cm)	3.2	7.1	14.1	26.3	56.6	>80
	Corresponding A_p representative area (m^2)	0.0008	0.004	0.016	0.063	0.251	>0.5

Table 3 (CIE 150 table 3): Limits for the luminous intensity of bright luminaires from a given source.

The above information is applicable for the consideration of a single luminaire, but where two or more luminaires are located close to each other that to the observer they appear as a single light source, then the assessment shall be undertaken based upon the combined bright surfaces of luminaires (A_p) in the direction of the observer or, from positions where such views are likely to be maintained.

Definitions and Notes (as GN 01/21 Table 4)

d - is the distance between the observer and the glare source in metres;

A - luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions;

A_p - is the apparent surface of the light source seen from the observer's position

Note 5 - Upper limits for each zone shall be taken as those with column $A_p > 0.5$

Note 7 - A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions

Note 9 - For further information, refer to Annex C of CIE 150

To aid this assessment, values of A_p corresponding to the geometric mean diameter of each circular luminaire group have been extracted from CIE150 Annex C and included in Table 3. These areas can be considered for assessing likely A_p in the observer direction to calculate a maximum luminous intensity value.

7.3. Limitation of Sky glow

The following values can be used for different environmental zones in order to limit the upward light.

Light Technical Parameter	Environmental Zones				
	E0	E1	E2	E3	E4
Upward Light Ratio (ULR) / %	0	0	2.5	5	15
Road	n/a	2	5	12	35
Amenity	n/a	n/a	6	12	35
Sports	n/a	n/a	2	6	15

Table 4 (CIE 150 table 5&6): Maximum values of upward light ratio (ULR) of luminaires

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

Note 2 - This does not consider the effect of light reflected upwards from the ground that contributes to sky glow.

Note 3 - Some lighting schemes will require the deliberate and careful use of upward light, e.g., ground recessed luminaires, ground mounted floodlights and festive lighting, to which these limits cannot apply. However, care should always be taken to minimise upward waste light by correctly applying suitably directional luminaires and light-controlling attachments.

7.4. Limitation of the effect of over-lit building facades and signs

Table below provides recommendations regarding luminance values that provide visibility in order that a balanced urban lighting master plan can be considered.

Light technical parameter	Application conditions	Environmental zones				
		E0	E1	E2	E3	E4
Building façade luminance (L_v)	Taken as the product of the design average illuminance and reflectance divided by n	< 0.1 cd/m^2	< 0.1 cd/m^2	5 cd/m^2	10 cd/m^2	25 cd/m^2

Table 5 (CIE 150 table 7): Maximum permitted values of average surface luminance.

Note: The values apply to both pre-and post-curfew, except that in Zones 0 and 1, the values shall be zero post-curfew. The values for signs do not apply to signs for traffic control purposes.

8.0. BREEAM

The aim is to reduce the building's energy consumption through the specification of energy-efficient lighting including external lighting.

External light fittings within the Construction Zone are being specified with:

- a. The average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt
- b. Automatic control to prevent operation during daylight hours and post curfew (except for security lighting)
- c. Presence detection in areas of intermittent pedestrian traffic

Average Initial Luminous Efficacy of the external light fittings

The individual luminous fluxes of all luminaires within the construction zone are summed (in lumens) and then divided by the total circuit Watts for all the luminaires.

For lamps other than LED lamps, the luminous flux of a luminaire can be determined by multiplying the sum of the luminous fluxes produced by all the lamps in the luminaire by the light output ratio of the luminaire (as confirmed by the luminaire manufacturer).

LED lamps are typically integral to the luminaire (LED luminaires). As such, the manufacturer's literature will encompass the lamp and luminaire.

Suppose the assessed building is part of a larger development containing common areas and other buildings or is a new extension to an existing building. In that case, the external lighting criteria apply only to external new and existing lighting within the construction zone of the assessed building.

8.1. Temporary lighting, decorative lighting, and floodlighting

Temporary lighting such as theatrical, stage or local display installations can be excluded from the assessment of this issue. Decorative lighting and floodlighting must, however, be assessed for this issue.

8.2. Emergency lighting

Emergency light fittings, including security lighting used for normal operation, are assessed for this issue. Non-maintained lighting which only activates in an emergency can be excluded from the assessment of this issue.

8.3. Areas of intermittent pedestrian traffic

An area can have intermittent traffic where a pedestrian is approaching the space less than two-thirds of the time when the lighting, without presence detection, would be switched on.

8.4. Automatic control

An automatic external lighting control system prevents operation during daylight hours through either a time switch or a daylight sensor (a manually switched lighting circuit with a daylight sensor or time switch override is also acceptable). In addition to the above, the system should provide presence detection in areas of intermittent traffic. For external lighting not fitted with presence detectors, time switches must provide an automatic switch off from lighting after a specified curfew hour, except in cases where there is a specific requirement for lighting to be left on all night.

8.5. Construction zone

To this issue, the construction zone is defined as the site being developed for the BREEAM-assessed building and its external site areas, i.e., the scope of the new works.

8.6. Daylight sensor

A type of sensor that detects daylight and switches lighting on at dusk and off at dawn.

Luminous efficacy in luminaire lumens per circuit Watt

The ratio between the luminous flux produced by an entire luminaire (light fitting) (in lumens) and the total power consumed by the lamps and the control gear contained within the luminaire (Watts).

8.7. Presence detector

A sensor can turn lighting on when a presence is detected in the scanned area and off after a pre-set time when no presence is detected. Presence detectors must be compatible with the lamp type used as frequent switching can reduce the life of some lamp types.

In certain circumstances, other forms of presence-related control could be used if they switch off the lighting when nobody is in the space. Examples could include absence detection, where people switch on the lighting using a push button or similar control but switching off is done automatically; and key control in secure areas, where people use a swipe card or type a code on entering a space, and the lighting then comes on and remains on until they leave. Presence-related controls need careful design and commissioning to ensure that people cannot be left in the dark while still in the outdoor space.

8.8. Time switch

A switch with an inbuilt clock will allow lighting to be switched on and off at programmed times.

9.0. Assessment

A qualitative assessment has been completed to establish the possible effects of obtrusive light that may arise from the proposed development. The assessment includes the consideration of potential adverse effects of the following three components of obtrusive light (as expressed in Figure 3):

Sky glow – the brightening of the night sky above areas with large amounts of artificial light, which may be reflected from illuminated surfaces or come from direct upward lighting installations

Glare – the brightness of a light source which is uncomfortable when viewed against a dark background. Glare is mainly experienced when light sources are not covered by a shield or directed by a suitable lens/reflector set-up.

Light Intrusion – when light affects areas beyond the boundary of the area to be lit. Light Intrusion is also known as 'spill' or 'trespass' and may cause nuisance or disturbance to sensitive receptors.

Lighting Designers have developed a Lighting Strategy to provide quantitative analysis and proper calculations to determine the light levels from the proposed design for sky glow, Glare, and light Intrusion. The Lighting Strategy has been developed iteratively to meet the specified limitations of the relevant ILP Environmental Zone.

10.0. Operational Lighting

10.1. Lighting Requirements

Operational lighting is required for the proposed scheme to allow safe use of the development once it is occupied.

General principles considered to prevent obtrusive light and protect the sensitive receptors surrounding the site have been provided in this assessment. The lighting design for each space has been carried out as follows;

- Street elevation along Bishopswood Road,
- Street elevation along Broadlands Road,

Lighting in each area has been designed to meet the statutory requirements and guidelines governing the space that lighting is intended for or being used.

11.0. Lighting Strategy

11.1. Design Objectives

In addition to the requirements in Haringey Local Plan: Sustainable Design & Construction (March 2013) Section 7.3 Light Pollution, the key design objective for the Lighting Strategy has been for luminaires, and the design specified to seek to achieve the limitations set for obtrusive lighting for ILP Environmental Zone E3.

11.2. Employer's Requirements

The client brief was to provide an external lighting design in compliance with the statutory requirements in order to;

- Provide adequate lighting on the ramps, steps and the building façade with minimum clutter.
- Lighting around the building and along paths to provide safety and security for all routes around the new building.
- The paths to be lit with a combination of low-level bollard lights and wall lights on the building facades.
- Recessed light fittings on walls may be used to light the ramps and steps that connect the terraces around.
- No additional external lighting at entrances or signage.
- Light fittings of high efficacy of not less than 70 luminaire lumens per circuit Watt
- Automatic control to prevent operation during daylight hours.
- Presence detection in areas of intermittent pedestrian traffic.

11.3. Proposed Lighting Strategy

Lighting Strategies have been proposed for three areas as below;

The Lighting Strategy has been designed following the minimum lighting levels required in the following standards and guidance documents:

- - BS EN 5489-1:2013 Code of Practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas
- - CIBSE (2016) Lighting Guide 06: The Outdoor Environment

The Lighting Strategy (Appendix A) provides a location plan for the columns, bollards and wall lights in the building perimeter and walkways with a summary of the lux levels across the site. A 3D luminance image has also been provided, indicating what the proposed Development's ambient light conditions can be expected to look like. The design has been tested using computational modelling to understand whether it meets the lighting specifications for ILP Environmental Zone E3.

Element	Requirement	Reference Table
Location	Suburban	
Zone	E3	
Lighting Environment	Medium district brightness	
Illuminance in the vertical plane (Ev)	Pre-Curfew 10 lx	
	Post-Curfew 2 lx	
Maximum luminous intensity emitted by luminaire (I in cd)	Pre-Curfew 0.86d	
	Post-Curfew 0.29d	
Upward Light Ratio	Site 5%	

Table 6: Site Lighting Standards.

12.0. Mitigation Measures and Conclusion

12.1. Mitigation Measures

The general design principles that have been incorporated into the Lighting Strategy to mitigate adverse effects of obtrusive light include:

- Orientation – lighting units will be angled so that no light is released above the horizontal. To achieve wide beam, involves using a suitable luminaire positioned at a great height to allow light to be directed downwards. Lighting will be directed, so it does not intrude (or spill) outside the immediate working area.
- Placement – lighting will be located away from sensitive receptors wherever possible.
- Reflectance – any high-intensity lighting will be installed onto buildings or columns and directed to the area where the light is required, rather than facing a building façade which may be reflective and result in a sky glow.
- Quantity - Preference has been given to several lower lighting units rather than tall, wide beam lighting units to illuminate large areas as it will limit light intrusion, glare and sky glow.
- Operating Hours - Lighting will be reduced or switched off when not required for safety purposes. The working hours of the school sport centre will be mainly from 0700 to 2200.
- Security – Security Lighting will be kept at the minimum level needed for visual and security protection, and infrared floodlighting and CCTV systems will be used to reduce the need for visible lighting outside working hours.

Limitation of illumination on surrounding premises – In accordance to section 7.1 above the requirement for zone E3 for illuminance in the vertical plane is 10 Lux at Pre-Curfew hours and 2 Lux Post-

Curfew hours. Using the simulation software the vertical light levels at four different locations (neighbouring properties) are shown below;

Calculation Points List										
No.	Designation	Type	Position [m]			Rotation [°]			Value [lx]	
			X	Y	Z	X	Y	Z		
1	Broadland 24 - Vertical Point	vertical, normal	427.410	126.911	1.600	0.0	0.0	0.0	0.03	
2	Broadland 22 - Vertical Point	vertical, normal	432.340	166.836	1.600	0.0	0.0	0.0	0.10	
3	Bishopswood, HG Pre-Prep - Vertical Point	vertical, normal	527.779	117.598	1.600	0.0	0.0	95.0	0.75	
4	Bishopswood, Field House - Vertical Point	vertical, normal	483.130	109.060	1.600	0.0	0.0	95.0	0.22	
Summary of Results										
Calculation Point Types		Quantity	Average [lx]		Min [lx]	Max [lx]		u0	E _{min} / E _{max}	
Vertical, normal		4	0.28		0.03	0.75		0.10	0.04	

Figure 4: Values of vertical illuminance on neighbours' windows

Figure - External lighting Simulation Result for Vertical Calculation Points at the surrounding premises

The maximum illuminance level is 0.75Lux on Bishopswood Road towards the Highgate Pre-Prep School. This value is less than the requirement for zone E3 and E2 & E1. The external lighting will be switched off during post-curfew hours.

Limitation of bright luminaires in the field of view – For mitigation in accordance with section 7.2 above, light fittings being specified are with a complete cut-off in the designated directions. All light fittings are recessed within the body of the light fitting and direct to the ground with minimal spread of light. The spill light is shown in the result from the simulation software in appendix B. It is to be noted that the nearest premises are about 20m or more from the construction zone with a road and mature trees in the between.



Figure 5: Sample External Wall mounted Light Fitting

Using the external lighting simulation software, 6 numbers Observer points located at sensitive locations i.e. windows of surrounding buildings. The values of GR Observers are less than 10.

GR Observerlist									
No.	Designation	Position [m]			Viewing sector [°]			Slope angle	Max
		X	Y	Z	Start	End	Increment		
1	Broadlands 22	432.510	168.150	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
2	Broadlands 22a	430.000	155.050	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
3	Broadlands 24	426.770	126.110	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
4	Broadlands 27	476.380	182.981	4.000	0.0	360.0	15.0	-2.0	<10 ¹⁾
5	Broadlands 22-4m	432.440	168.914	4.500	0.0	360.0	15.0	-2.0	<10 ¹⁾
6	Broadlands 24-4m	426.998	122.330	7.000	0.0	360.0	15.0	-2.0	10 ¹⁾

1) The equivalent veil luminance of the environment has been calculated precisely.

Figure 6: External Lighting Simulation Results – GR Observer

As set out, the Lighting Strategy meets the required pre-curfew limitations of ILP Environmental Zone E3. No instances have been identified where the lighting levels exceed the required pre /post-curfew limitations of ILP Environmental Zone E3. Achieving levels within the acceptable limits for ILP Environmental Zone E2 /E1 will maintain the 'low district brightness' for the Application Site, thus minimising the possible effects of obtrusive light.

Limitation of Sky glow – External lighting simulation for the entire development indicates Upward Light Ratio (ULR):1.0%.

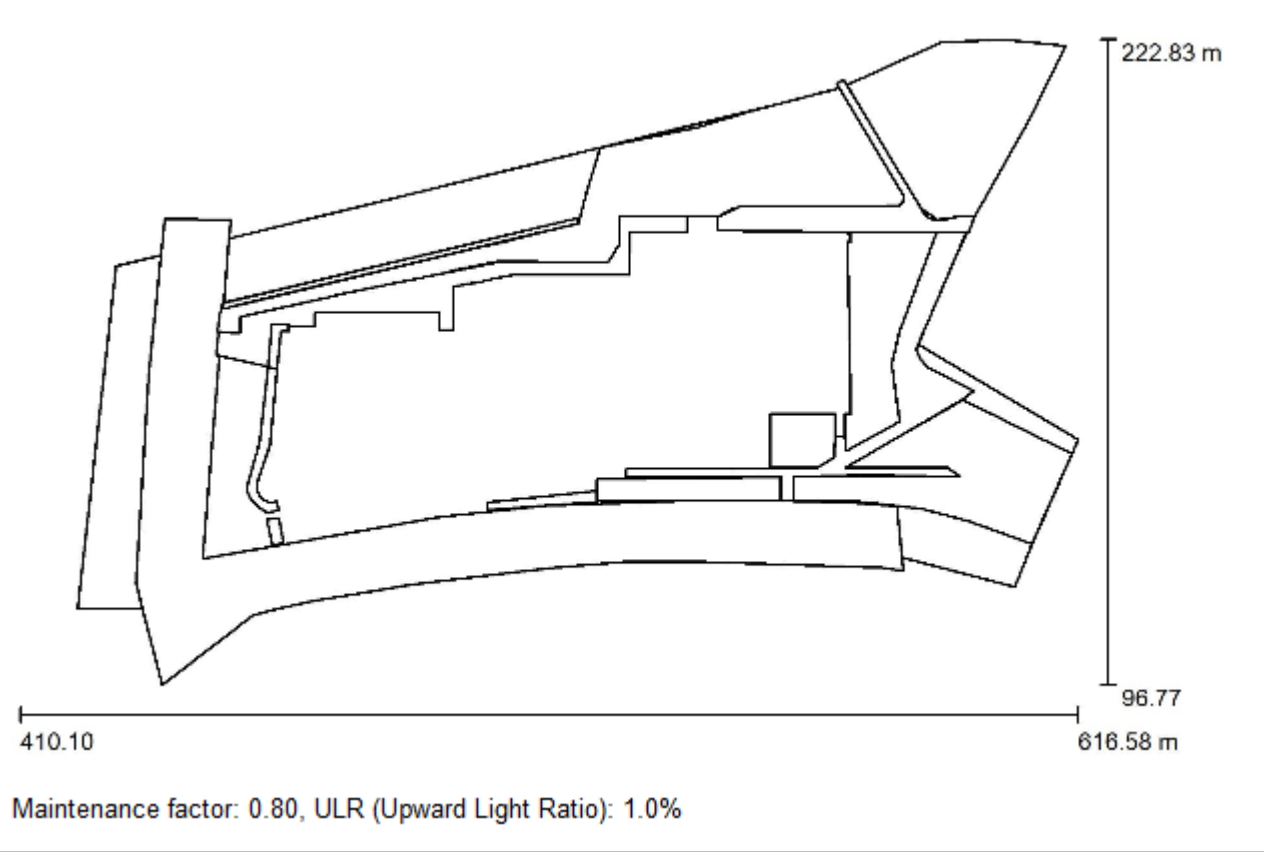


Figure 7 - External Lighting Simulation ULR Result

In accordance with section 8.3 above, the ULR for zone E3 is 5% and for zone E2 is 2.5%. The ULR for the development is better than the requirements for zone E2 (Rural).

Limitation of the effect of over-lit building facades – For limiting the light levels on the building façade, the illuminance levels on the building facade by the Bishopswood Road has been calculated and the result from the external lighting simulation indicates the maximum of 1.49cd/m² on one elevation. This result is better than requirement for zone E2 Rural areas.

12.2.Conclusions

Due to the effective screening of the surrounding land features, the type, number, colour temperature and positioning of the luminaires used and the limited duration of use, the assessment demonstrates little or no impact from the use of lighting in the surrounding areas, neighbours, and potential sensitive receptors.

Based on this assessment and subject to the incorporation of the recommendations in this report, it is considered that obtrusive lighting from the proposed Lighting Strategy does not constrain the proposed Development.

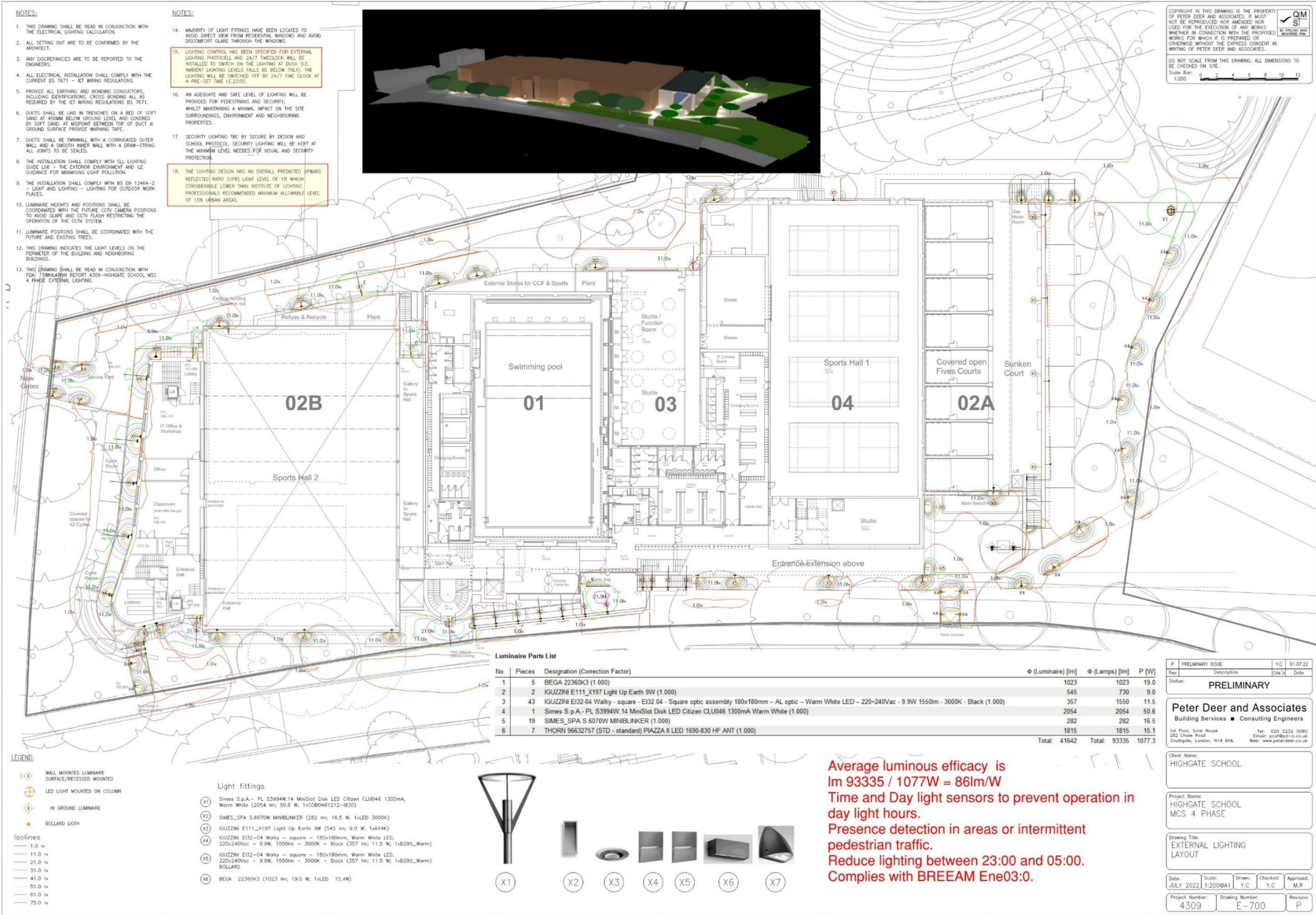
13.0. Appendices

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Appendix A External Lighting Design.



Appendix B External Lighting Simulation Report

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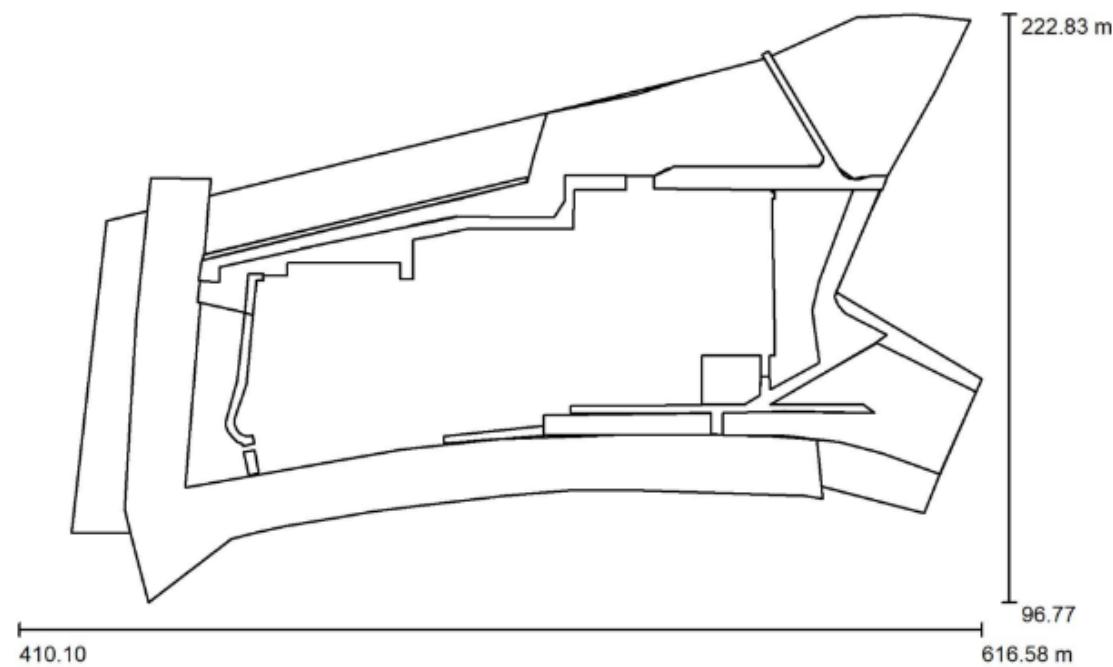
4309-Highgate school Mallinson Sports Centre - MR

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Highgate school Mallinson Sports Centre / Planning data



Maintenance factor: 0.80, ULR (Upward Light Ratio): 1.0%

Scale 1:1477

Luminaire Parts List

No.	Pieces	Designation (Correction Factor)	Φ (Luminaire) [lm]	Φ (Lamps) [lm]	P [W]
1	5	BEGA 22360K3 (1.000)	1023	1023	19.0
2	2	IGUZZINI E111_X197 Light Up Earth 9W (1.000)	545	730	9.0
3	43	IGUZZINI EI32-04 Walky - square - EI32.04 - Square optic assembly 180x180mm – AL optic – Warm White LED – 220+240Vac - 9.9W 1550lm - 3000K - Black (1.000)	357	1550	11.5
4	1	Simes S.p.A.- PL S3994W.14 MiniSlot Disk LED Citizen CLU046 1300mA Warm White (1.000)	2054	2054	50.6
5	19	SIMES_SPA S.6070W MINIBLINKER (1.000)	282	282	16.5
6	7	THORN 96632757 (STD - standard) PIAZZA II LED 1690-830 HF ANT (1.000)	1815	1815	15.1
Total:			41642	93335	1077.3

Total Luminaire Efficiency is 93335lm / 1077.3W = 86.63lm/W

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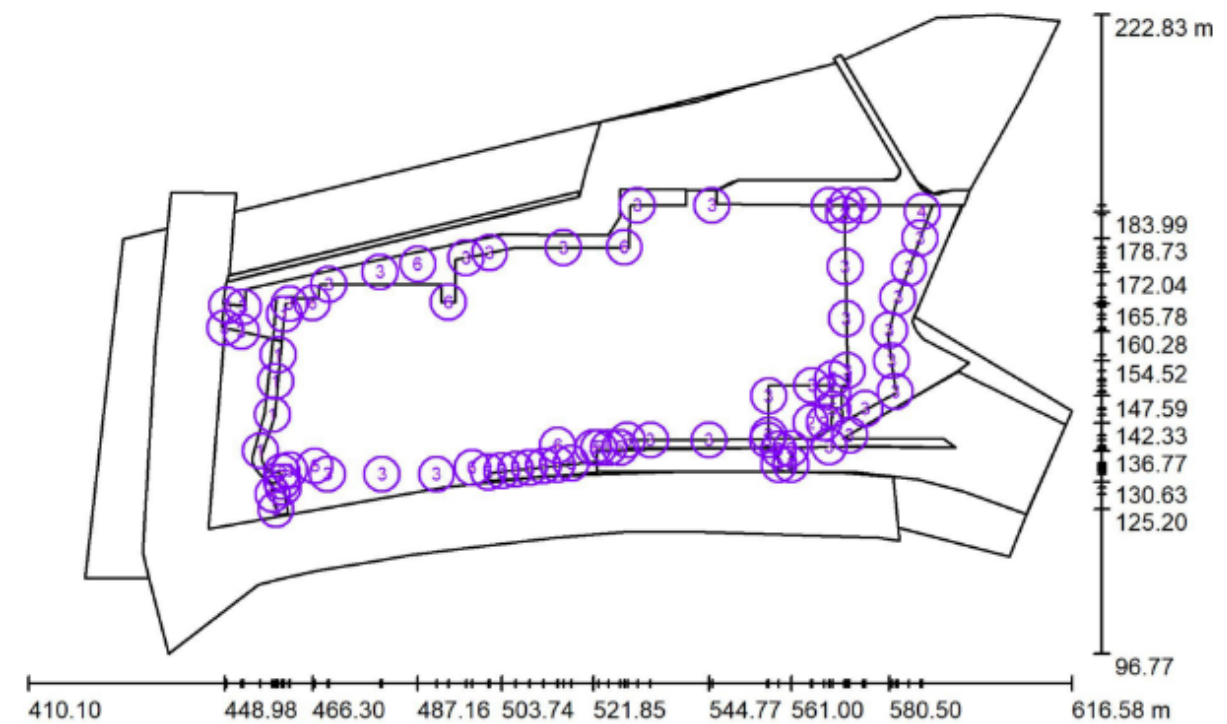
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Highgate school Mallinson Sports Centre / Luminaires (layout plan)



Scale 1 : 1477

Luminaire Parts List

No.	Pieces	Designation
1	5	BEGA 22360K3
2	2	IGUZZINI E111_X197 Light Up Earth 9W
3	43	IGUZZINI EI32-04 Walky - square - EI32.04 - Square optic assembly 180x180mm – AL optic – Warm White LED – 220+240Vac - 9.9W 1550lm - 3000K - Black
4	1	Simes S.p.A.- PL S3994W.14 MiniSlot Disk LED Citizen CLU046 1300mA Warm White
5	19	SIMES_SPA S.6070W MINIBLINKER
6	7	THORN 96632757 (STD - standard) PIAZZA II LED 1690-830 HF ANT

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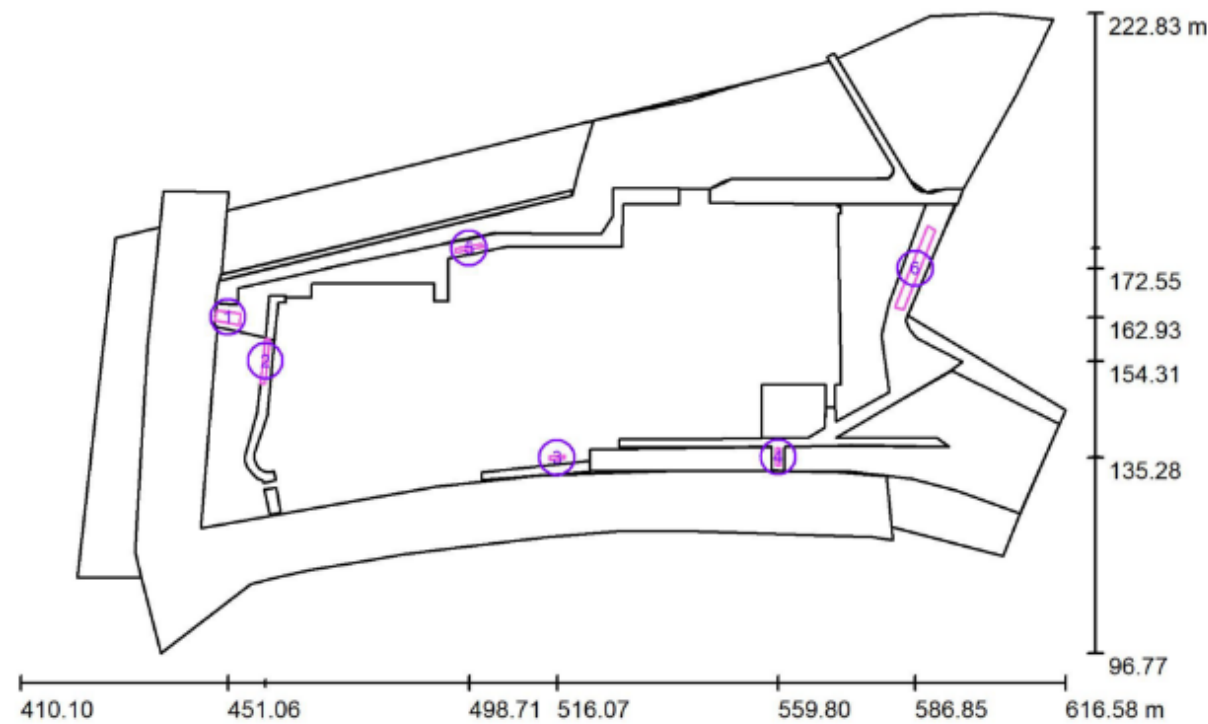
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Highgate school Mallinson Sports Centre / Calculation surfaces (results overview)



Scale 1 : 1477

Calculation Surface List

No.	Designation	Type	Grid	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u_0	E_{min} / E_{max}
1	New delivery gate and entry point to site	perpendicular	128 x 64	8.46	1.27	33	0.150	0.038
2	Walkaway	perpendicular	128 x 128	40	7.94	95	0.201	0.083
3	North 2nd Entrance	perpendicular	128 x 128	41	18	185	0.432	0.095
4	Final exit	perpendicular	8 x 32	54	24	103	0.448	0.236
5	Walkway East facade	perpendicular	128 x 32	2.92	0.70	15	0.241	0.046
6	Back walkaway	perpendicular	128 x 64	4.42	1.03	22	0.234	0.047

Summary of Results

Type	Quantity	Average [lx]	Min [lx]	Max [lx]	u_0	E_{min} / E_{max}
perpendicular	6	14	0.70	185	0.05	0.00

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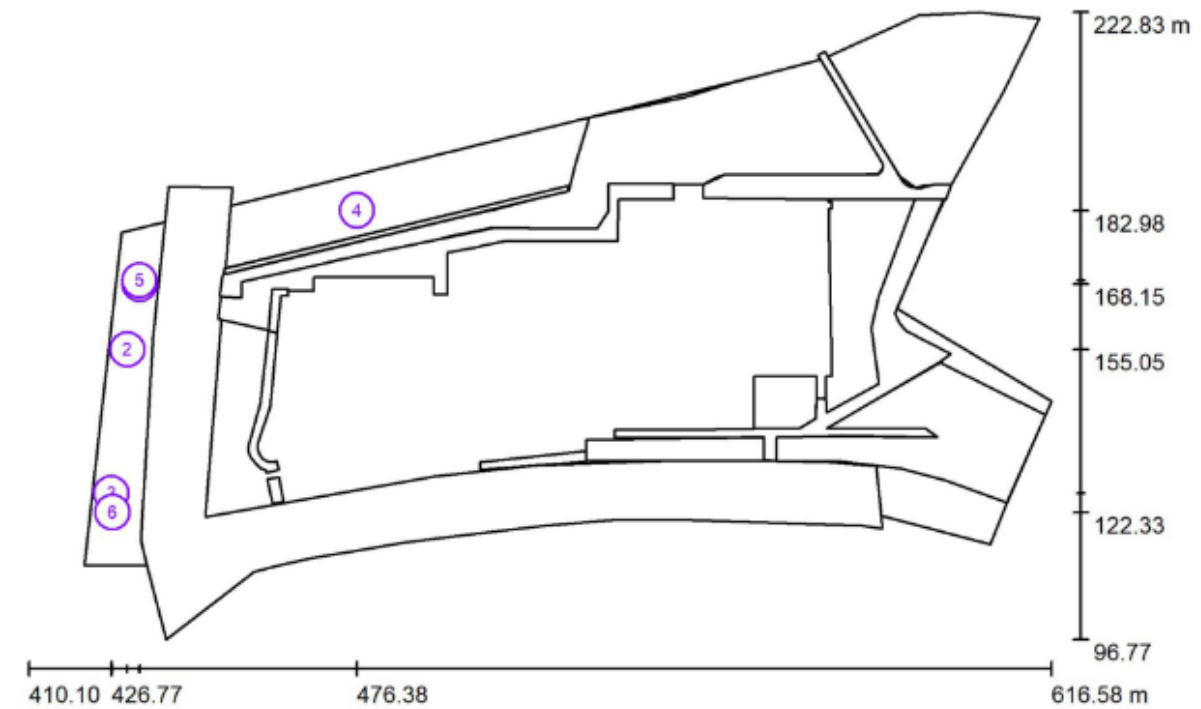
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Highgate school Mallinson Sports Centre / GR Observer (Results Overview)



Scale 1 : 1477

GR Observerlist

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
1	Broadlands 22	432.510	168.150	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
2	Broadlands 22a	430.000	155.050	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
3	Broadlands 24	426.770	126.110	1.700	0.0	360.0	15.0	-2.0	<10 ¹⁾
4	Broadlands 27	476.380	182.981	4.000	0.0	360.0	15.0	-2.0	<10 ¹⁾

No.	Designation	Position [m]			Viewing sector [°]				Max
		X	Y	Z	Start	End	Increment	Slope angle	
5	Broadlands 22-4m	432.440	168.914	4.500	0.0	360.0	15.0	-2.0	<10 ¹⁾
6	Broadlands 24-4m	426.998	122.330	7.000	0.0	360.0	15.0	-2.0	10 ¹⁾

1) The equivalent veil luminance of the environment has been calculated precisely.

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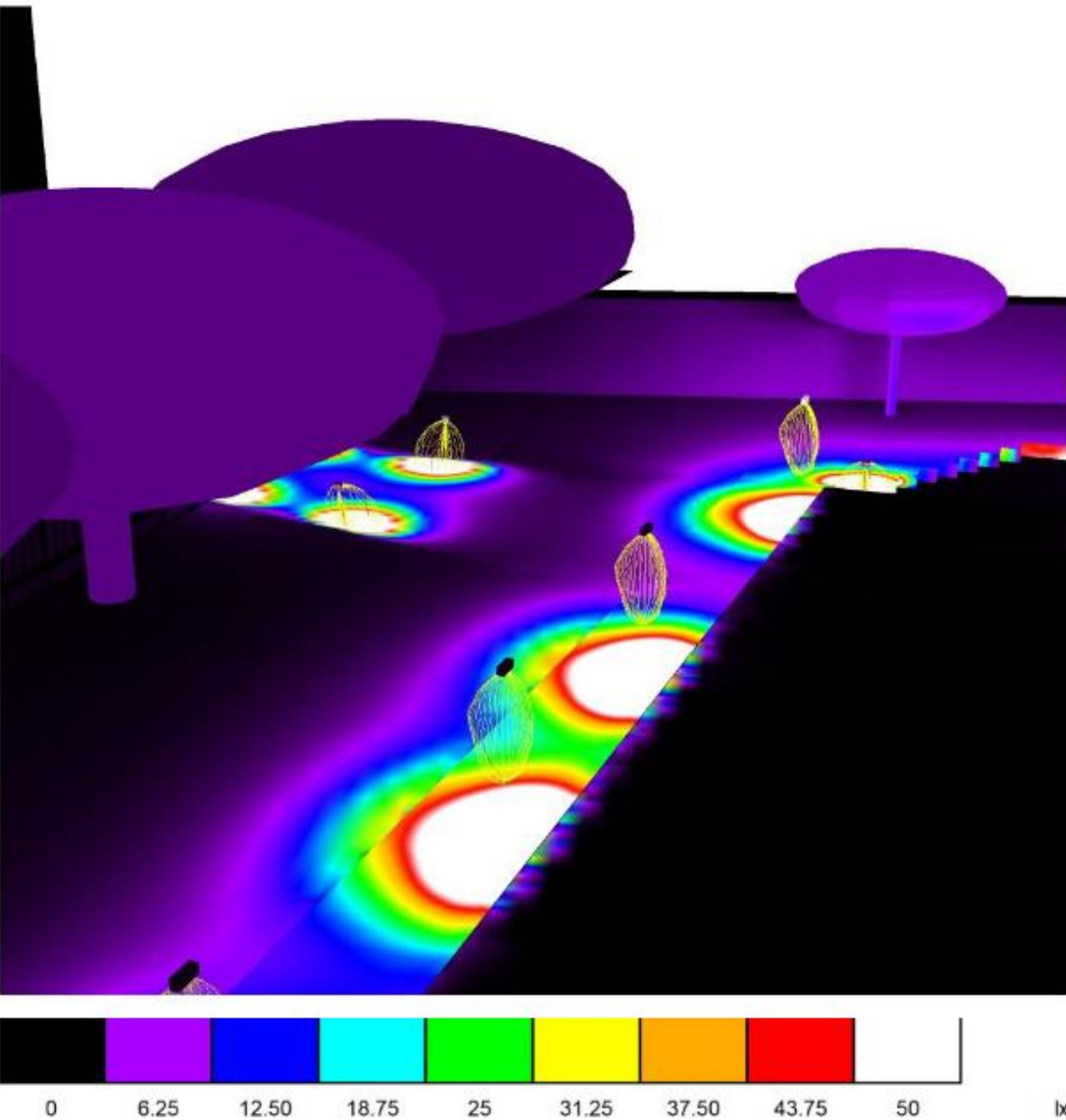
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Highgate school Mallinson Sports Centre / False Colour Rendering



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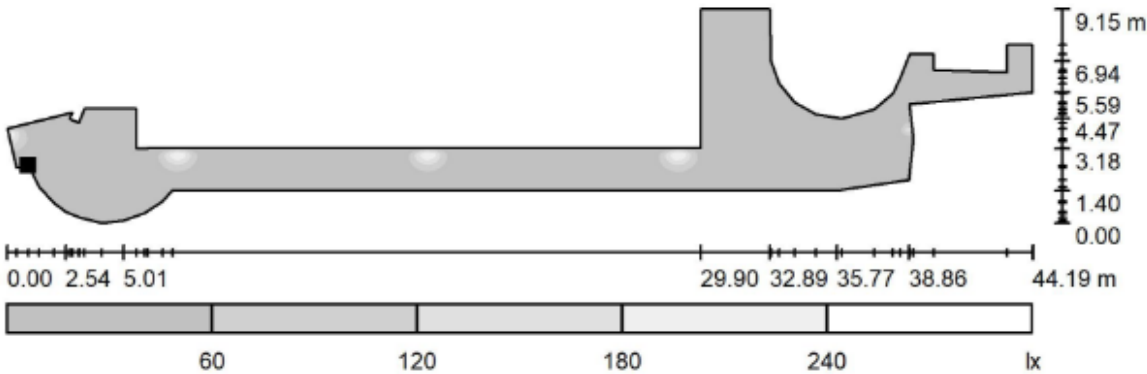
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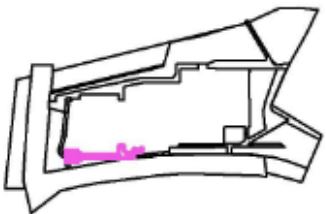
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Highgate school Mallinson Sports Centre / Walkway around the building 2 / Surface 1 / Greyscale (E)



Position of surface in external scene:
Marked point:
(462.850 m, 131.402 m, 0.900 m)



Scale 1 : 316

Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
16	0.11	280	0.007	0.000



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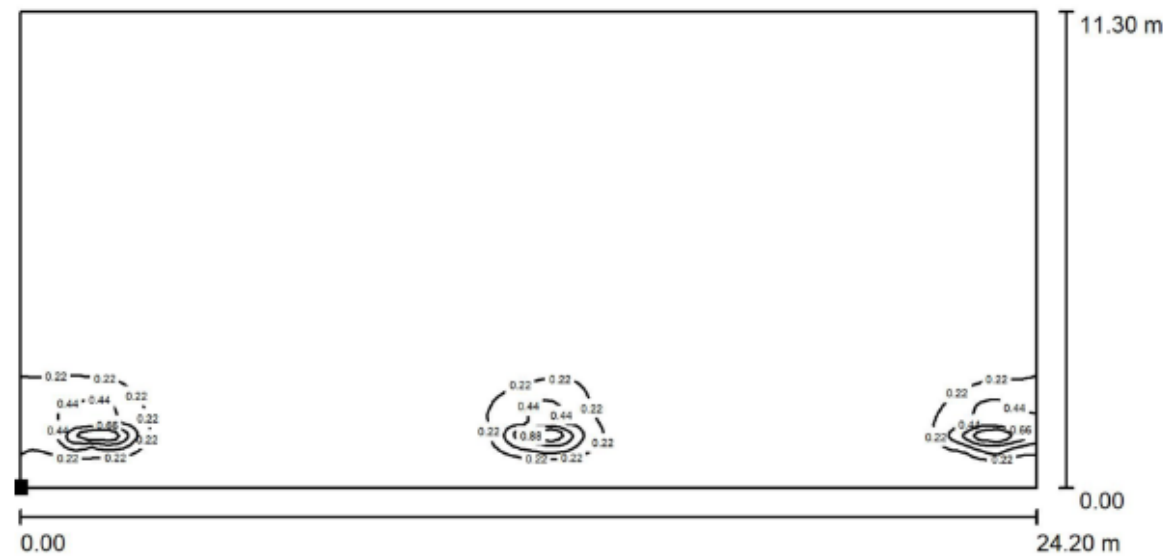
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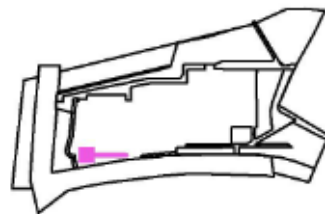
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Highgate school Mallinson Sports Centre / Proposed sport hall / Bishopwood Elevation / Isolines (L)



Position of surface in external scene:
Marked point:
(467.623 m, 132.205 m, 0.000 m)



Values in Candela/m², Scale 1 : 174

Grid: 128 x 128 Points

L_{av} [cd/m²]
0.04

L_{min} [cd/m²]
0.00

L_{max} [cd/m²]
1.11



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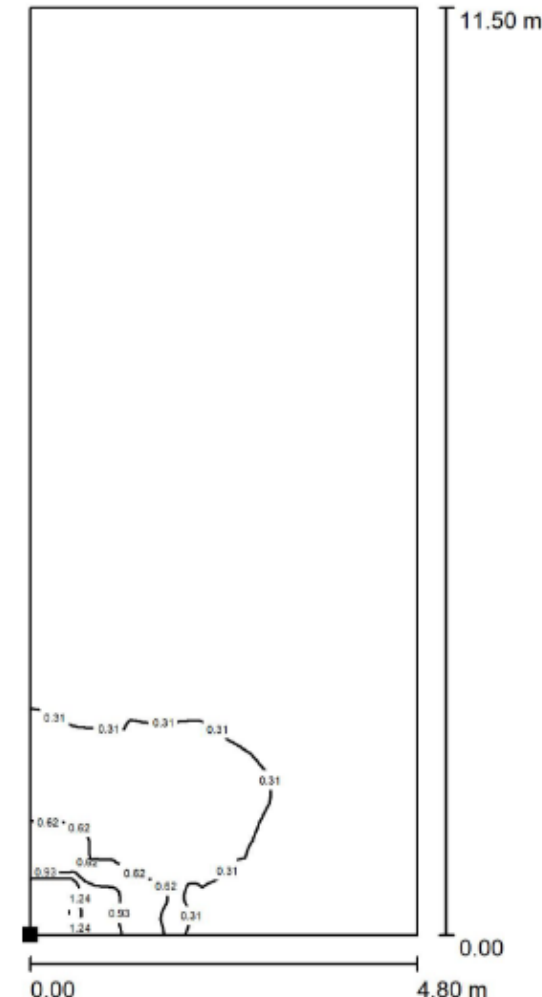
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Highgate school Mallinson Sports Centre / Proposed classrooms, offices, stores / Bishopwood Elevation / Isolines (L)



Position of surface in external scene:
Marked point:
(460.103 m, 132.577 m, 0.000 m)



Values in Candela/m², Scale 1 : 90

Grid: 128 x 128 Points

L_{av} [cd/m²]
0.15

L_{min} [cd/m²]
0.04

L_{max} [cd/m²]
1.57

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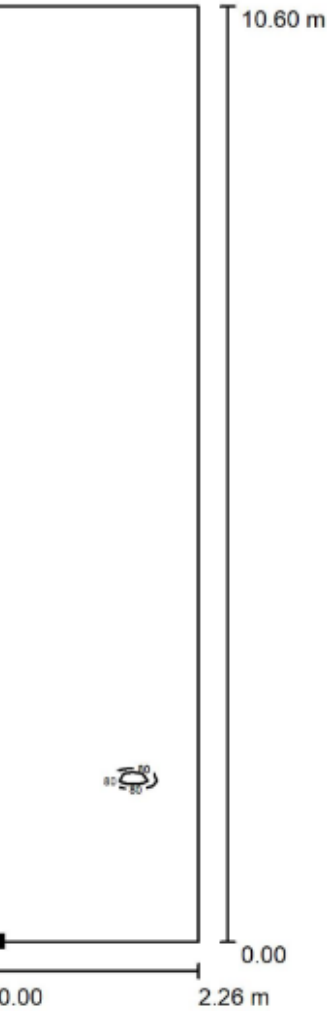
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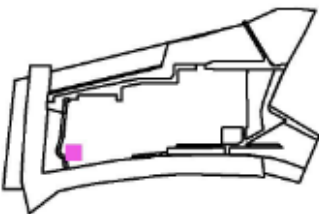
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Highgate school Mallinson Sports Centre / Proposed classrooms, offices,stores /
Bishopwood Elevation / Isolines (L)



Position of surface in external scene:
Marked point:
(465.261 m, 133.852 m, 0.900 m)



Values in Candela/m², Scale 1 : 83

Grid: 64 x 128 Points

L_{av} [cd/m²] 1.49 L_{min} [cd/m²] 0.03 L_{max} [cd/m²] 376

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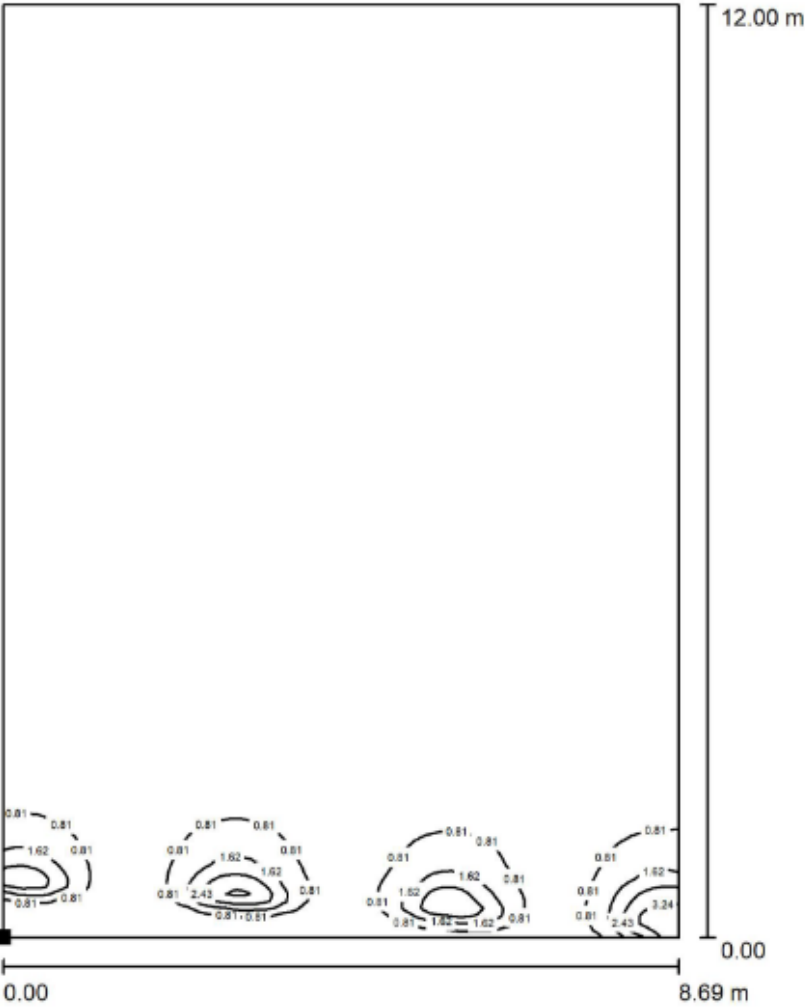
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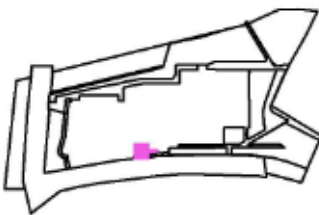
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Highgate school Mallinson Sports Centre / Proposed secondary entrance, studio /
Bishopwood Elevation / Isolines (L)



Position of surface in external scene:
Marked point:
(506.116 m, 134.582 m, 0.000 m)



Values in Candela/m², Scale 1 : 94

Grid: 128 x 128 Points

L_{av} [cd/m²] 0.19 L_{min} [cd/m²] 0.02 L_{max} [cd/m²] 4.08

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06.07.2022

Highgate school Mallinson Sports Centre / 3D Rendering



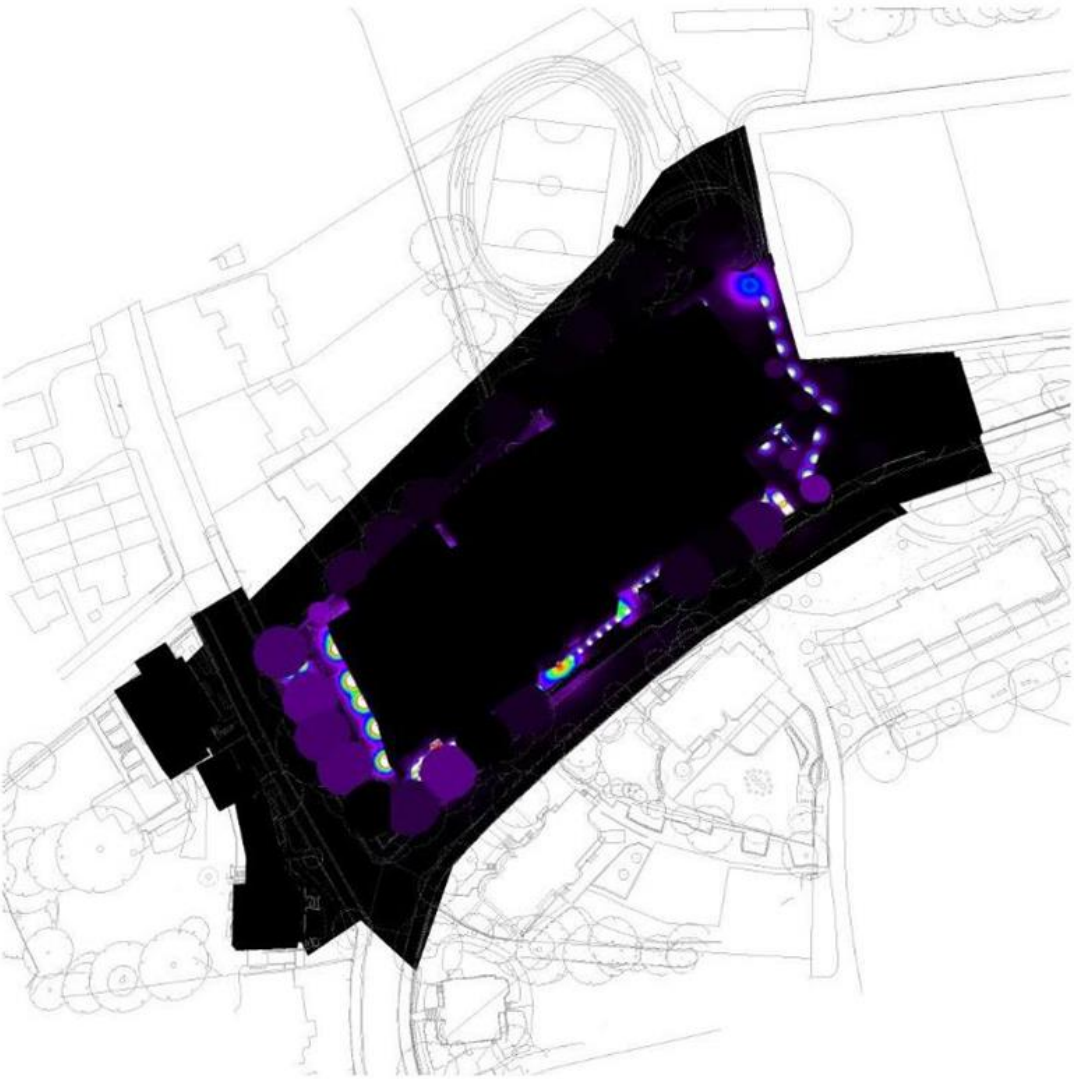
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Highgate school Mallinson Sports Centre / False Colour Rendering



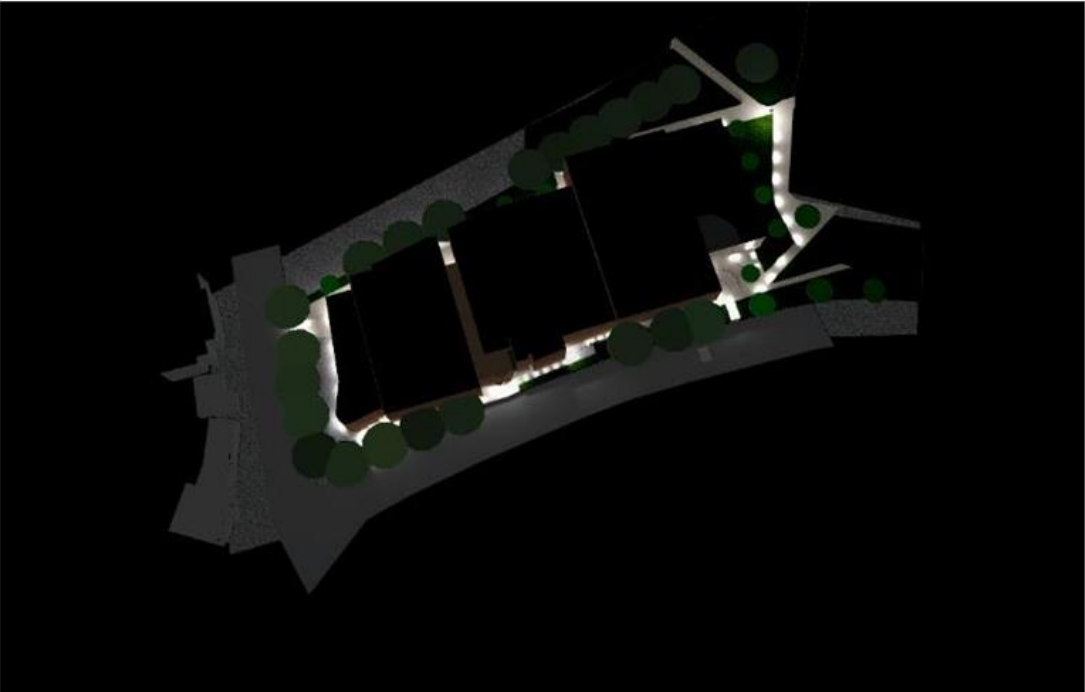
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Highgate school Mallinson Sports Centre / Bird view



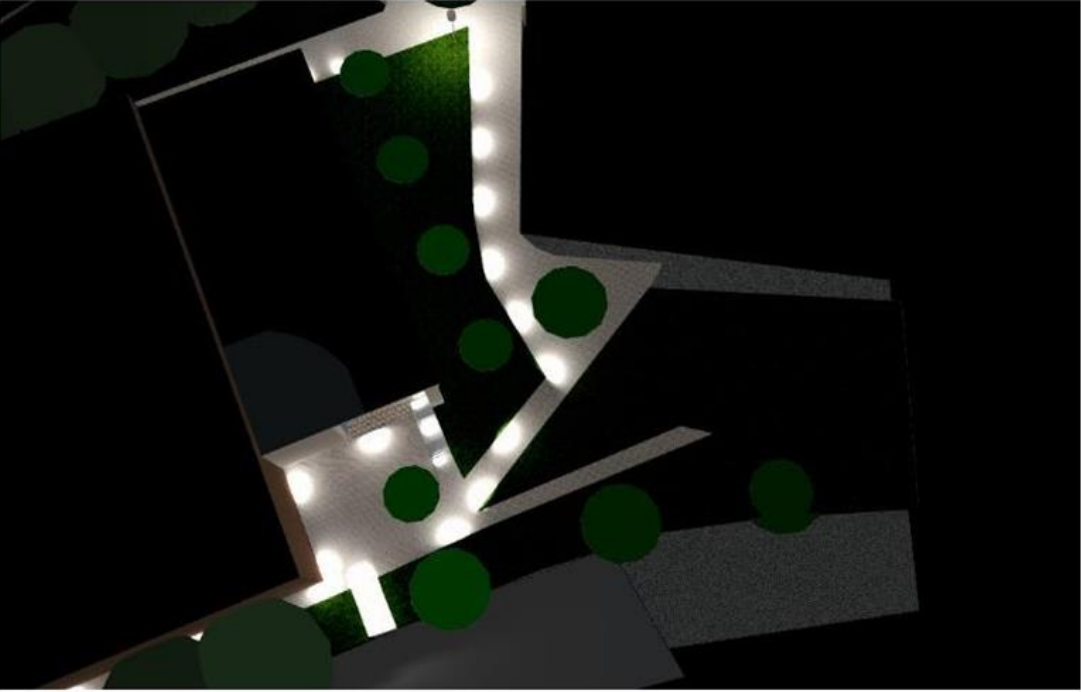
4309-Highgate school Mallinson Sports Centre



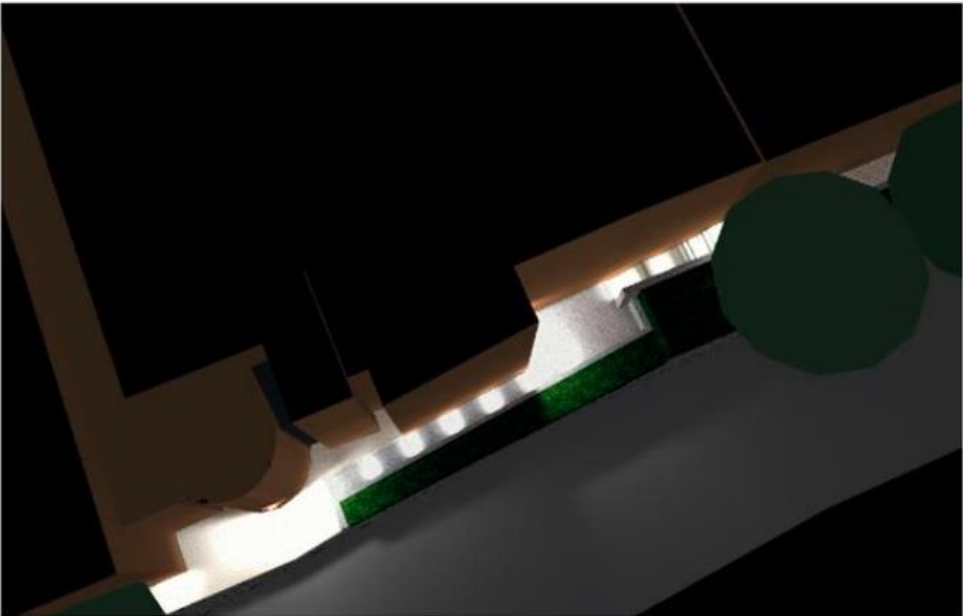
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Highgate school Mallinson Sports Centre / South-West view



Highgate school Mallinson Sports Centre / West ramp and stairs



Highgate school Mallinson Sports Centre / North-West view



4309-Highgate school Mallinson Sports Centre

Peter Deer & Associates
Solar House
282 Chase Road, Southgate
London, N14 6HA

Operator Y. Chorbadzhieva
Telephone 0203 232 00800
Fax
e-Mail yordanka.c@pd-a.co.uk



Highgate school Mallinson Sports Centre / South - East view



Highgate school Mallinson Sports Centre / South view



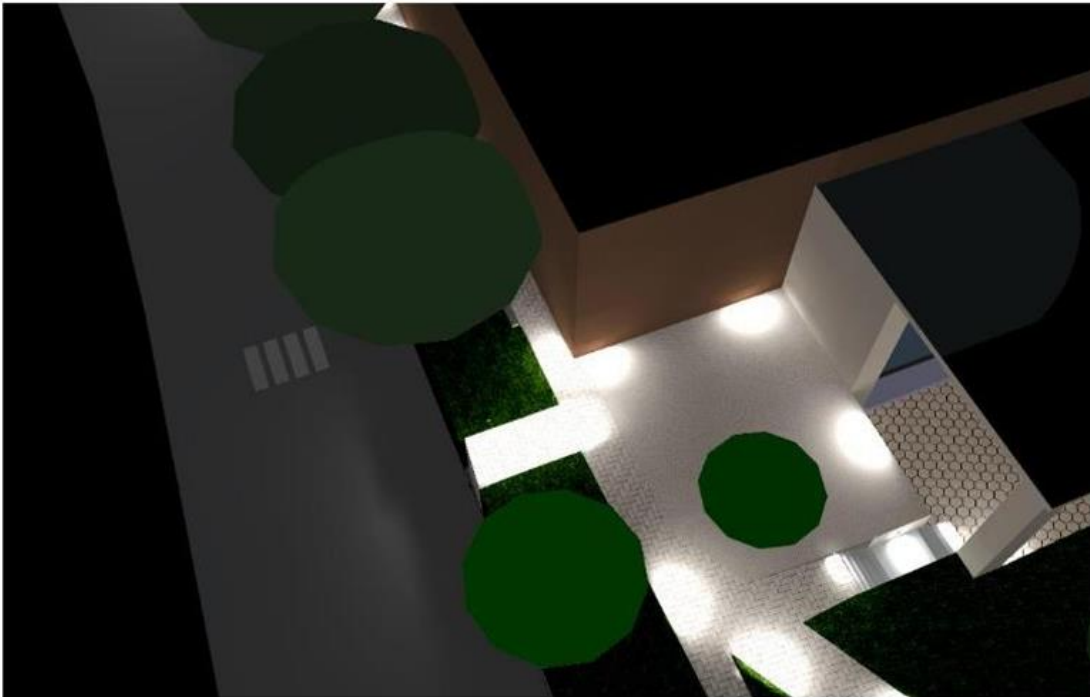
4309-Highgate school Mallinson Sports Centre

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Highgate school Mallinson Sports Centre / Puplic entrance



Highgate school Mallinson Sports Centre / New delivery gate and South walkaway



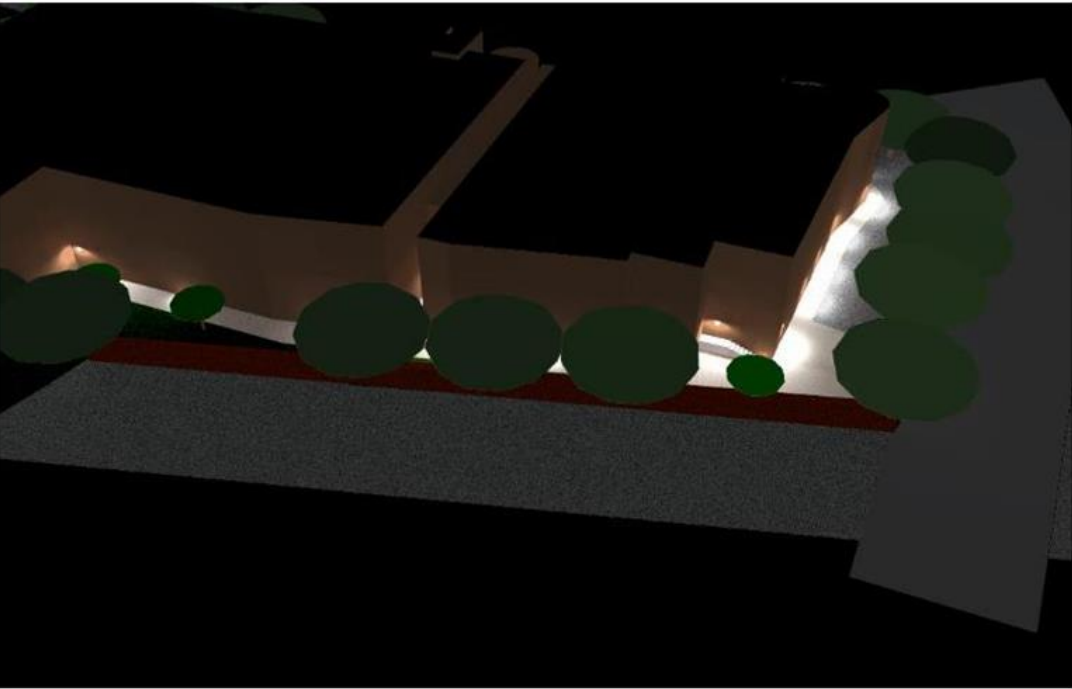
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Highgate school Mallinson Sports Centre / North East view



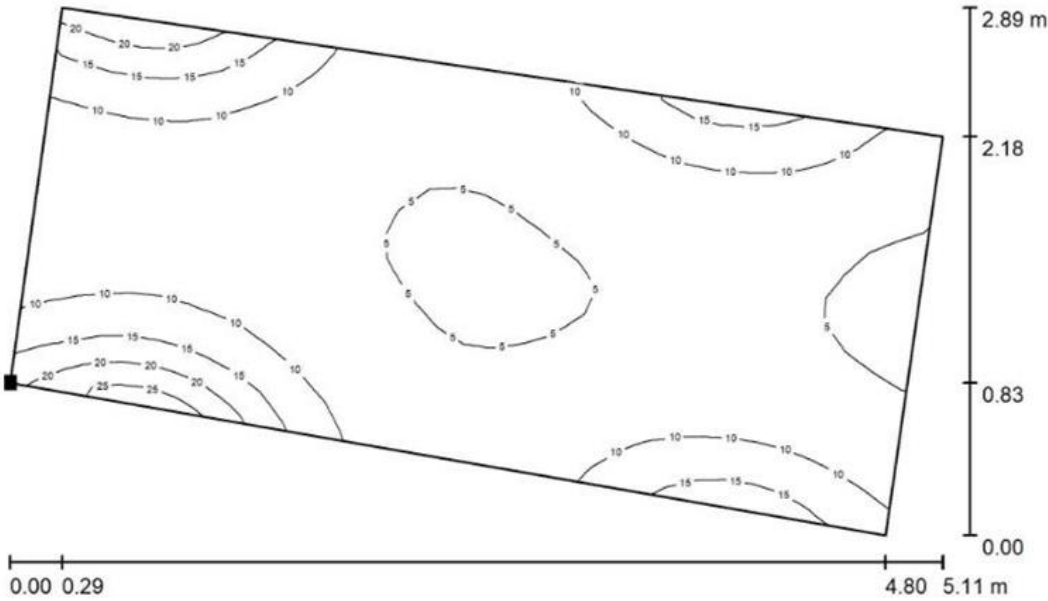
4309-Highgate school Mallinson Sports Centre

Peter Deer & Associates
Solar House
282 Chase Road, Southgate
London, N14 6HA

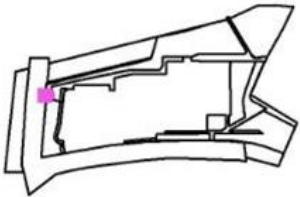
Operator Y. Chorbadzhieva
Telephone 0203 232 00800
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e-Mail yordanka.c@pd-a.co.uk



Highgate school Mallinson Sports Centre / New delivery gate and entry point to site / Isolines (E, Perpendicular)



Position of surface in external scene:
Marked point:
(448.485 m, 162.292 m, 0.300 m)



Values in Lux, Scale 1 : 37

Grid: 32 x 16 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
8.30	4.13	27	0.498	0.155

4309-Highgate school Mallinson Sports Centre

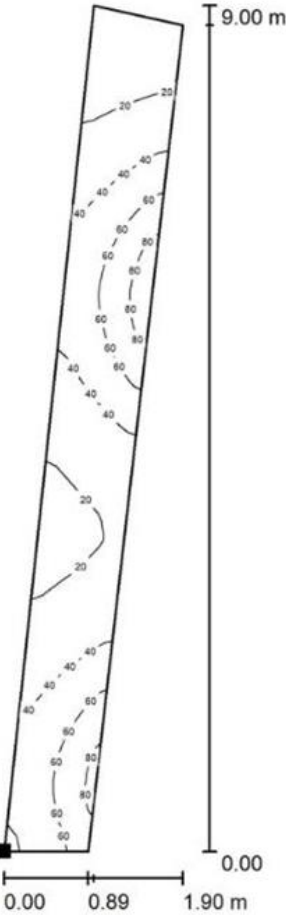
Peter Deer & Associates
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282 Chase Road, Southgate
London, N14 6HA

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e-Mail yordanka.c@pd-a.co.uk

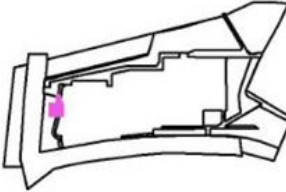


06.07.2022

Highgate school Mallinson Sports Centre / Walkaway / Isolines (E, Perpendicular)



Position of surface in external scene:
Marked point:
(457.495 m, 149.800 m, 0.200 m)



Values in Lux, Scale 1 : 71

Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
39	7.92	95	0.201	0.083

4309-Highgate school Mallinson Sports Centre

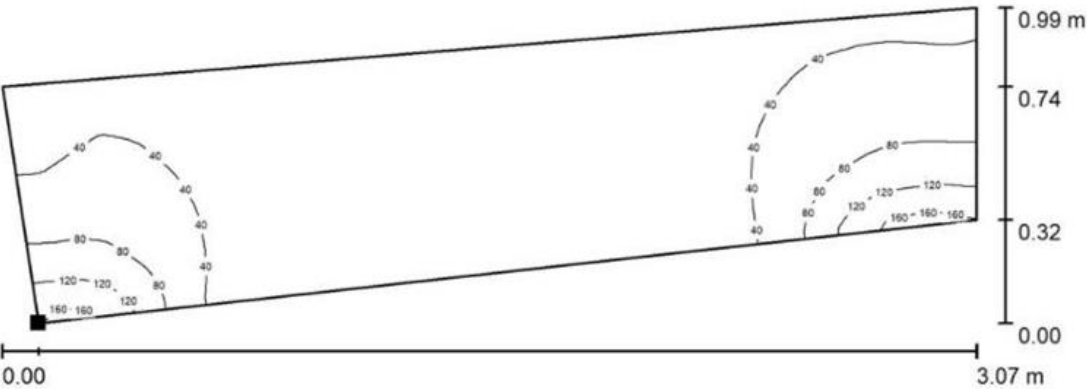
Peter Deer & Associates
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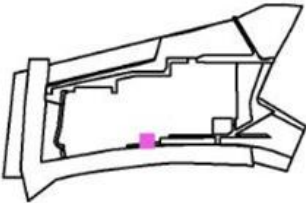
06.07.2022

Highgate school Mallinson Sports Centre / North 2nd Entrance / Isolines (E, Perpendicular)



Values in Lux, Scale 1 : 22

Position of surface in external scene:
Marked point:
(514.651 m, 134.764 m, 0.300 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
40	17	183	0.431	0.095

4309-Highgate school Mallinson Sports Centre

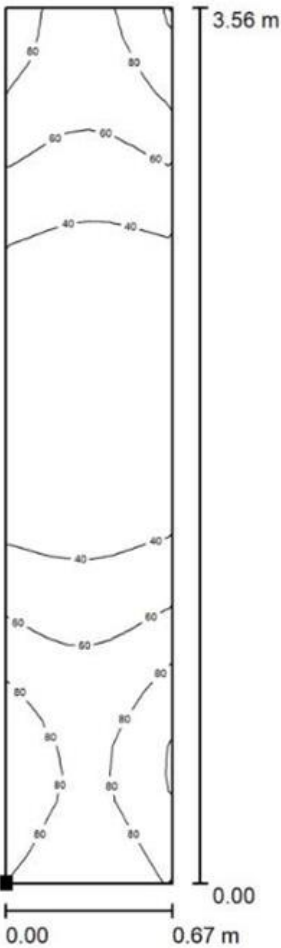
Peter Deer & Associates
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282 Chase Road, Southgate
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Operator Y. Chorbazhieva
Telephone 0203 232 00800
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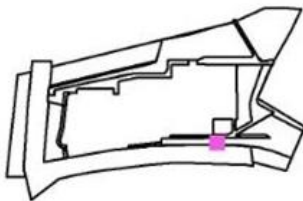


06.07.2022

Highgate school Mallinson Sports Centre / Final exit / Isolines (E, Perpendicular)



Position of surface in external scene:
Marked point:
(559.464 m, 133.622 m, 2.900 m)



Grid: 8 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
54	24	103	0.448	0.236

Values in Lux, Scale 1 : 28

4309-Highgate school Mallinson Sports Centre

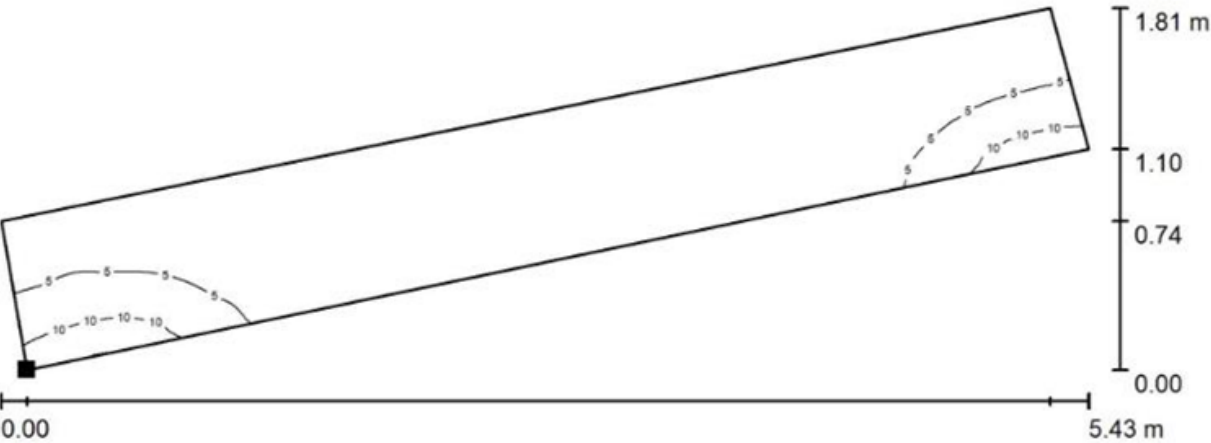
Peter Deer & Associates
Solar House
282 Chase Road, Southgate
London, N14 6HA

Operator Y. Chorbazhieva
Telephone 0203 232 00800
Fax
e-Mail yordanka.c@pd-a.co.uk

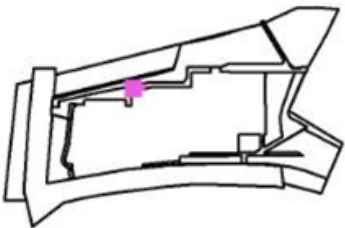


06.07.2022

Highgate school Mallinson Sports Centre / Walkway East facade / Isolines (E, Perpendicular)



Position of surface in external scene:
Marked point:
(496.153 m, 175.666 m, 0.400 m)



Grid: 128 x 32 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
2.92	0.70	15	0.241	0.046

Values in Lux, Scale 1 : 39

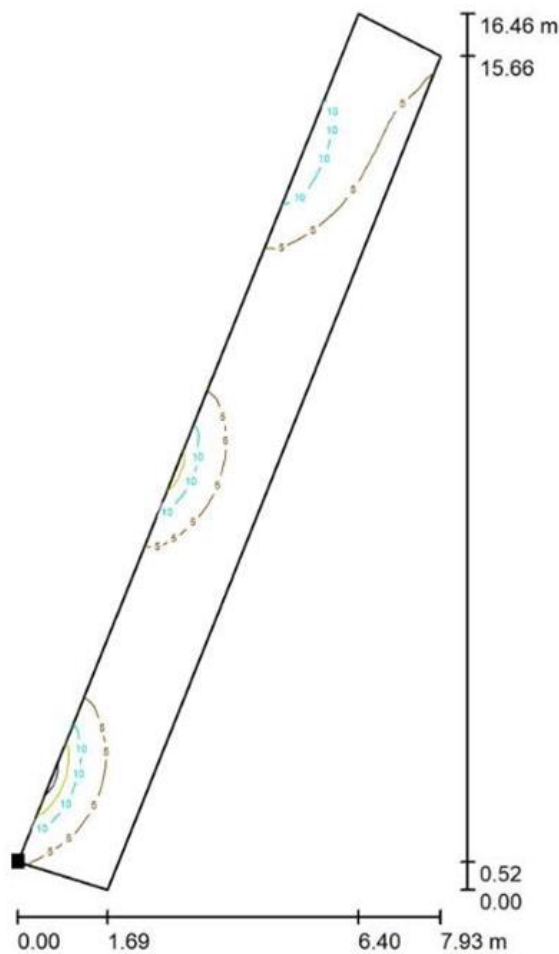
4309-Highgate school Mallinson Sports Centre

Peter Deer & Associates
Solar House
282 Chase Road, Southgate
London, N14 6HA

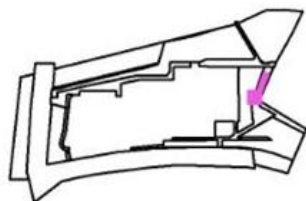
Operator Y. Chorbadzhieva
Telephone 0203 232 00800
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Highgate school Mallinson Sports Centre / Back walkaway / Isolines (E, Perpendicular)



Position of surface in external scene:
Marked point:
(582.860 m, 164.949 m, 2.800 m)



Values in Lux, Scale 1 : 129

Grid: 128 x 64 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
4.42	1.03	22	0.234	0.047

Appendix C External Light Fittings - Datasheets

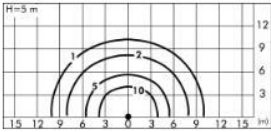
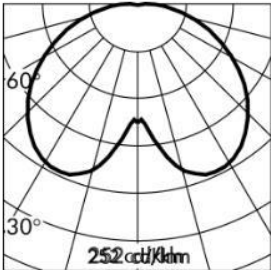
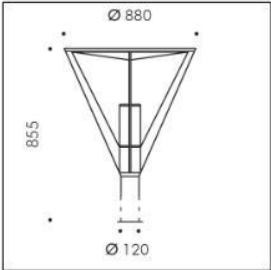
SIMES

X1 Lamp Post

UK partner of zumtobel group

MINISLOT DISK





Version is available on request.

S.3994W

1 module COB 3000K 2054lm 50W 220-240Vac ON-OFF

Post top luminaires

Light Source Technical Data

Light source type:	COB
Colour temperature:	3000K
Rated module luminous flux:	5626lm
Rated luminaire luminous flux:	2054lm
Rated input power:	50W
Luminaire efficacy:	41lm/W
ULR:	4%
BUG:	B1 - U3 - G1
CIE Flux Code:	39 71 90 96 100
Color Rendering Index:	CRI 90
Standard Deviation Color Matching:	MacAdam step 3

Power Supply Technical Data

Voltage (AC):	220-240Vac
Frequency (AC):	50/60Hz
Dimmable:	NOT DIMMABLE (DALI2; PUSH available with surcharge)

Technical Installation Data

Electrical insulation class:	II
Protection class IP:	IP65
Mechanical resistance:	IK08
Weight:	23.47Kg

Temperature and life time Technical Data

LED Lifetime:	L80 B10 70.000h Ta 25°C
	L80 B10 50.000h Ta 40°C
Lifespan of the LUMINAIRE:	min. 50.000h Ta 40°C
Performance ambient temperature:	Tq 25°C
Operating ambient temperature range:	da -20°C a +50°C
Storage temperature range:	da -20°C a +60°C

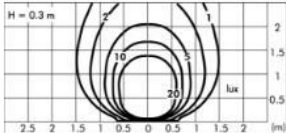
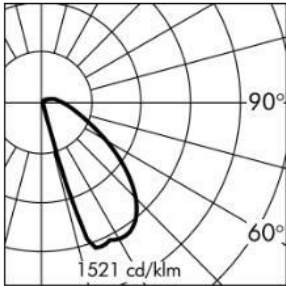
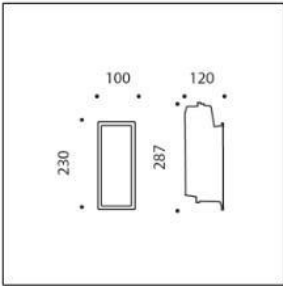
SIMES

X2 Recessed Step Light

UK partner of zumtobel group

MINIBLINKER





S.6070W

1 module COB 3000K 281lm 15.7W 220-240Vac DIMMABLE DALI2; PUSH

Step light

Light Source Technical Data

Light source type:	COB
Colour temperature:	3000K
Rated module luminous flux:	1565lm
Rated luminaire luminous flux:	281lm
Rated input power:	15.7W
Luminaire efficacy:	18lm/W
Color Rendering Index:	CRI 90
Standard Deviation Color Matching:	MacAdam step 3

Power Supply Technical Data

Voltage (AC):	220-240Vac
Frequency (AC):	50/60Hz
Voltage (DC):	198-276Vdc (No PUSH DIM)
Dimmable:	DALI2; PUSH
PUSH Synchronization:	- Max 4 Luminaires, distance <15m; - Max 35 Luminaires, distance <300m with S.2490 accessory.
Inrush Current:	5A 50µsec
Max. quantity of fixtures for Minature Circuit Breaker type B16A:	50
Max. quantity of fixtures for Minature Circuit Breaker type C16A:	85

Temperature and life time Technical Data

LED Lifetime:	L80 B10 70.000h Ta 25°C
	L80 B10 50.000h Ta 40°C
Lifespan of the LUMINAIRE:	min. 50.000h Ta 40°C
Performance ambient temperature:	Tq 25°C
Operating ambient temperature range:	da -20°C a +50°C
Storage temperature range:	da -20°C a +60°C

Technical Installation Data

Electrical insulation class:	I
Protection class IP:	IP65
Mechanical resistance:	IK06
Weight:	1.93Kg
Power cable:	1m - H07RNF

X3 Ground Uplight Light

Design iGuzzini

iGuzzini

Last information update: June 2022

Product configuration: E111+X197.04
E111: Recessed floor luminaire Earth D=144 mm - Warm White - Spot Optic
X197.04: Plastic casing for installation on floors + end cap - Black

Product code
E111: Recessed floor luminaire Earth D=144 mm - Warm White - Spot Optic

Technical description
Recessed luminaire applicable to the floor or ground, designed for fitting monochrome white LED sources, for illumination, fixed optic, with incorporated electronic control gear. The round frame has a diameter D=144 mm; the body and frame are made of AISI 304 stainless steel with sodium-calcium extra clear glass, thickness 12mm. Stainless steel body coated with black paint. The luminaire is fixed to the outer casing by means of two TORX-type screws that ensure proper anchoring. Inclusive of LED circuit, methacrylate lens and black plastic cover. The product is wired using an A2 stainless steel cable gland, with type-H07RNF 2x1 mm² outgoing power cable (L=1200 mm). The cable is equipped with an anti-transpiration device (IP68) consisting of a silicone seal placed on the power cable and housed inside the product. The outer casing for installation can be ordered separately from the plastic optical assembly. The assembly made up of the frame, optical assembly and outer casing guarantees 5000 kg resistance to static loads. Maximum glass surface temperature is lower than 40°C.

Installation
The product is secured to the outer casing by means of two TORX-type screws. The luminaire can be installed recessed, floor-standing, using an outer casing or on the ground.

Colour	Weight (Kg)
Steel (13)	1.63

Mounting
Floor recessed/ground recessed

Wiring
Product inclusive of 220-240 VAC electronic control gear

Notes
IP68 protection rating for both the product and the power cable using IP68 connectors * The product is not deemed suitable for installation in pools and fountains. Overvoltage protection: 2KV Common mode, 1KV differenzial mode

Complies with EN60598-1 and pertinent regulations

IK 10

5000 kg

IP66

IP68

10m

Complete immersion for limited periods, not suitable for use in swimming pools or fountains.

CE

RoHS

S&E

§

ERC

EN 12454-1

EN 12454-2

EN 12454-3

EN 12454-4

The lighting fixtures were designed and tested to withstand a static load of up to 50000 N and to resist drive-over stress by vehicles with tires. The fixtures cannot be used in lanes subjected to horizontal stresses due to acceleration, braking and / or changes of direction.

Accessory code
X197.04: Plastic casing for installation on floors + end cap - Black

Technical description
Made of plastic (polypropylene). Inclusive of front cap with system for extracting the cables and double cable entry.

Installation
Floor-standing (concrete)

Colour	Weight (Kg)
Black (04)	0.88

Mounting
ground surface/Floor recessed/ground recessed

Complies with EN60598-1 and pertinent regulations

ø 144

178

ø 90

ø 144

225

ø 279

X3 Ground Uplight Light

Technical data

lm system:	548	Life Time LED 1:	84,000h - L80 - B10 (Ta 25°C)
W system:	9	Ballast losses [W]:	2.4
lm source:	730	Lamp code:	LED
W source:	6.6	Number of lamps for optical assembly:	1
Luminous efficiency (lm/W, real value):	60.8	ZVEI Code:	LED
lm in emergency mode:	-	Number of optical assemblies:	1
Total light flux at or above an angle of 90° [Lm]:	548	Ambient operating temperature range:	from -25°C to 35°C.
Light Output Ratio (L.O.R.) [%]:	75	Power factor:	See installation instructions
Beam angle [°]:	10°	Inrush current:	5 A / 50 µs
CRI (minimum):	80	Maximum number of luminaires of this type per miniature circuit breaker:	B10A: 18 luminaires B16A: 30 luminaires C10A: 31 luminaires C16A: 51 luminaires
Colour temperature [K]:	3000	Overvoltage protection:	4kV Common mode & 2kV Differential mode
MacAdam Step:	2		

Polar

Imax=9984 cd

180°

90°

0°

7500

α = 10°

Lux	h	d	Em	Emax
	8	1.4	113	156
	16	2.8	28	39
	24	4.2	13	17
	32	5.6	7	10

UGR diagram

Corrected UGR values (at 730 lm bare lamp luminous flux)											
Reflect.:	viewed crosswise					viewed endwise					
ceiling	0.70	0.70	0.50	0.50	0.30	0.70	0.70	0.50	0.50	0.30	
walls	0.50	0.30	0.50	0.30	0.30	0.50	0.30	0.50	0.30	0.30	
work pl.	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
Room dim											
X	Y										
2H	2H	4.5	6.5	4.9	6.8	7.1	4.5	6.5	4.9	6.8	
3H	4.4	5.7	4.8	6.0	6.3	4.4	5.7	4.8	6.0	6.3	
4H	4.4	5.3	4.7	5.6	6.0	4.4	5.3	4.7	5.6	6.0	
6H	4.3	5.0	4.7	5.4	5.7	4.3	5.0	4.7	5.4	5.7	
8H	4.3	5.1	4.7	5.4	5.8	4.3	5.1	4.6	5.4	5.8	
12H	4.2	5.1	4.6	5.5	5.8	4.2	5.1	4.6	5.4	5.8	
4H	2H	4.4	5.3	4.7	5.6	6.0	4.4	5.3	4.7	5.6	
3H	4.2	5.1	4.6	5.5	5.8	4.2	5.1	4.6	5.5	5.8	
4H	4.0	5.2	4.4	5.6	6.0	4.0	5.2	4.4	5.6	6.0	
6H	3.7	5.4	4.2	5.8	6.3	3.7	5.4	4.2	5.8	6.3	
8H	3.6	5.4	4.1	5.9	6.4	3.6	5.4	4.1	5.9	6.4	
12H	3.5	5.4	4.0	5.9	6.4	3.5	5.3	4.0	5.8	6.3	
8H	4H	3.6	5.4	4.1	5.9	6.4	3.6	5.4	4.1	5.9	
6H	3.5	5.1	4.0	5.6	6.1	3.5	5.1	4.0	5.6	6.1	
8H	3.6	4.8	4.1	5.3	5.8	3.6	4.8	4.1	5.3	5.8	
12H	3.8	4.5	4.3	5.0	5.5	3.8	4.4	4.3	4.9	5.5	
12H	4H	3.5	5.3	4.0	5.8	6.3	3.5	5.4	4.0	5.9	
6H	3.6	4.8	4.1	5.3	5.8	3.6	4.8	4.1	5.3	5.9	
8H	3.8	4.4	4.3	4.9	5.5	3.8	4.5	4.3	5.0	5.5	
Variations with the observer position at spacing:											
S =	1.0H	5.3 / -9.4				5.3 / -9.4					
	1.5H	8.1 / -11.4				8.1 / -11.4					
	2.0H	10.1 / -11.9				10.1 / -11.9					

E111_EN 1 / 2

E111_EN 2 / 2

4309-230110mr ~ HGS MSC phase 2-4 - External Lighting.docx

Highgate School

28 of 32

X4 Recessed Bollard Down light

Walky

Design iGuzzini

iGuzzini

Last information update: June 2022

Product configuration: EI32.04

El32.04: Square optic assembly 180x180mm – AL optic – Warm White LED – 220+240Vac - Black

**Product code**

El32.04: Square optic assembly 180x180mm – AL optic – Warm White LED – 220-240Vac - Black

Technical description

Technical description
Luminaire for walkways designed to use high visual comfort LED lamps. Ceiling and wall-recessed installation. It consists of an optical assembly with an IP66 protection rating and an outer casing or wall-mounted base to be ordered separately. The optical assembly and base are made of aluminium alloy treated with powder paint, which provides a high level of resistance to weather and UV rays. Plastic closure guard at the rear of the optical assembly. Complete with plastic cable gland and outlet cable. Sodium-calcium tempered satin finish safety glass. Luminaire with no visible screws and an anti-vandal system that uses an opening key to access the rear wiring compartment (supplied in the package). All external screws used are made of A2 stainless steel.

Installation

Wall-recessed installation with a plastic outer casing to be ordered separately. Disposable polystyrene formwork for creating the outer casing housings for installations in concrete walls that are then plastered or finished with bricks so the end surface is flush with the optical assembly. If ceiling-mounted an aluminium base is used to be ordered separately.

Colour
Black (04)

Weight (Kg)
0.74

Mounting

wall arm|wall recessed|wall surface

Wiring

Version with 220÷240Vac On-Off integrated ballast.

Complies with EN60598-1 and pertinent regulations



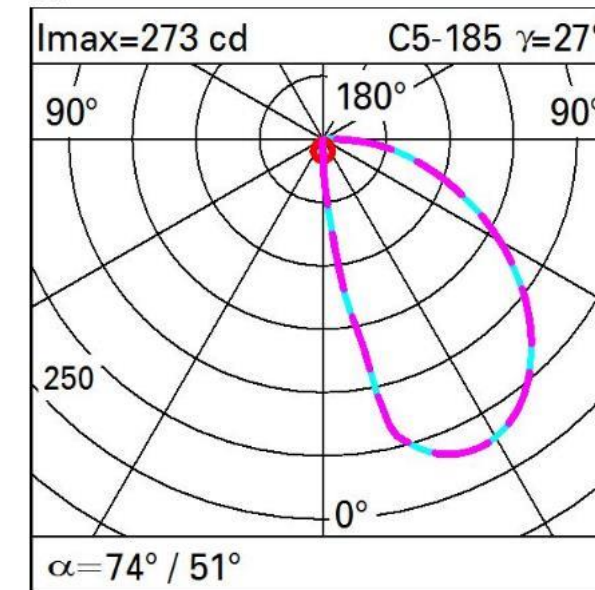
Technical data

Im system:	357	MacAdam Step:	3
W system:	11.5	Life Time LED 1:	77,000h - L80 - B10 (Ta 25°C)
Im source:	1550	Ballast losses [W]:	1.6
W source:	9.9	Voltage [Vin]:	230
Luminous efficiency (lm/W, real value):	31	Lamp code:	LED
Im in emergency mode:	-	Number of lamps for optical assembly:	1
Total light flux at or above an angle of 90° [Lm]:	4	ZVEI Code:	LED
Light Output Ratio (L.O.R.) [%]:	23	Number of optical assemblies:	1
CRI (minimum):	80	Ambient operating temperature range:	from -20°C to +35°C. (*)
Colour temperature [K]:	3000		

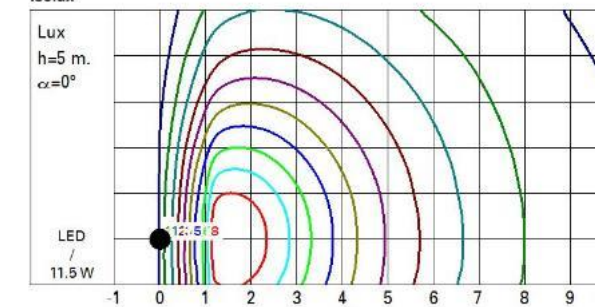
* Preliminary data

X4 Recessed Bollard Down light

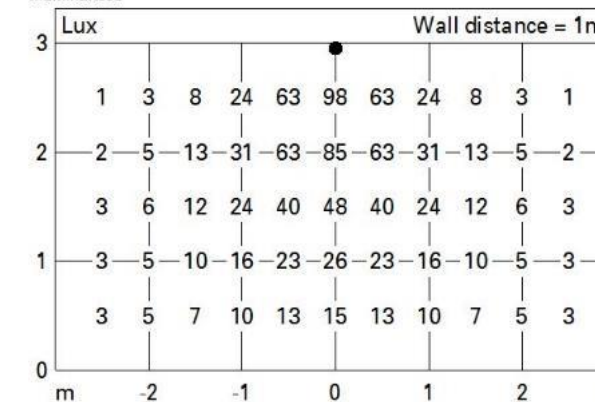
Polar



Isolux



Illuminances



X5 Recessed Down light

Walky

Design iGuzzini

iGuzzini

Last information update: June 2022

Product configuration: EI32.04

El32.04: Square optic assembly 180x180mm – AL optic – Warm White LED – 220+240Vac - Black

Product code

El32.04: Square optic assembly 180x180mm – AL optic – Warm White LED – 220-240Vac - Black

Technical description

Luminaire for walkways designed to use high visual comfort LED lamps. Ceiling and wall-recessed installation. It consists of an optical assembly with an IP66 protection rating and an outer casing or wall-mounted base to be ordered separately. The optical assembly and base are made of aluminium alloy treated with powder paint, which provides a high level of resistance to weather and UV rays. Plastic closure guard at the rear of the optical assembly. Complete with plastic cable gland and outlet cable. Sodium-calcium tempered satin finish safety glass. Luminaire with no visible screws and an anti-vandal system that uses an opening key to access the rear wiring compartment (supplied in the package). All external screws used are made of A2 stainless steel.

Installation

Wall-recessed installation with a plastic outer casing to be ordered separately. Disposable polystyrene formwork for creating the outer casing housings for installations in concrete walls that are then plastered or finished with bricks so the end surface is flush with the optical assembly. If ceiling-mounted an aluminium base is used to be ordered separately.

Colour
Black (04)

Weight (Kg)
0.74

Mounting

mounting
wall arm|wall recessed|wall surface

Wiring

Version with 220÷240Vac On-Off integrated ballast.

Complies with EN60598-1 and pertinent regulations



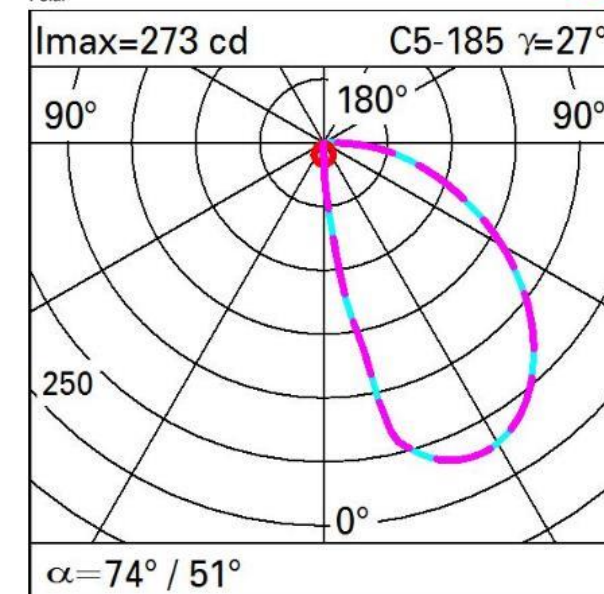
Technical data

Im system:	357	MacAdam Step:	3
W system:	11.5	Life Time LED 1:	77,000h - L80 - B10 (Ta 25°C)
Im source:	1550	Ballast losses [W]:	1.6
W source:	9.9	Voltage [Vin]:	230
Luminous efficiency (lm/W, real value):	31	Lamp code:	LED
Im in emergency mode:	-	Number of lamps for optical assembly:	1
Total light flux at or above an angle of 90° [Lm]:	4	ZVEI Code:	LED
Light Output Ratio (L.O.R.) [%]:	23	Number of optical assemblies:	1
CRI (minimum):	80	Ambient operating temperature range:	from -20°C to +35°C. (*)
Colour temperature [K]:	3000		

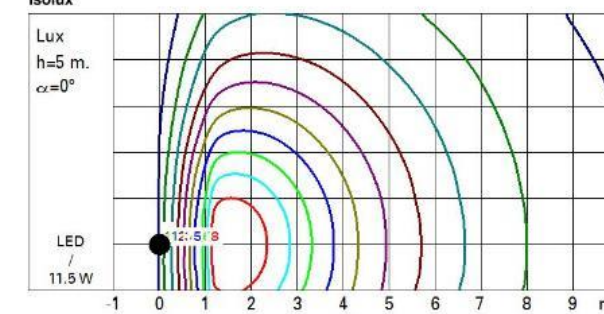
* Preliminary data

X5 Recessed Down light

Polar



Isolux



Illuminances

Figure 1 is a 3D plot showing the distribution of light intensity (Lux) in a corridor. The vertical axis represents height in meters (0 to 3), and the horizontal axis represents distance from the wall in meters (-2 to 2). The plot shows a grid of light intensity values, with a maximum value of 98 Lux at the center (0, 0, 3). A black dot is placed at the top center of the plot, indicating the maximum light intensity.

18.22 - Technical amendments reserved

BEGA

22 359

Wall luminaire

 IP 65

X6 Wall Downlight

Project - Reference number

Date

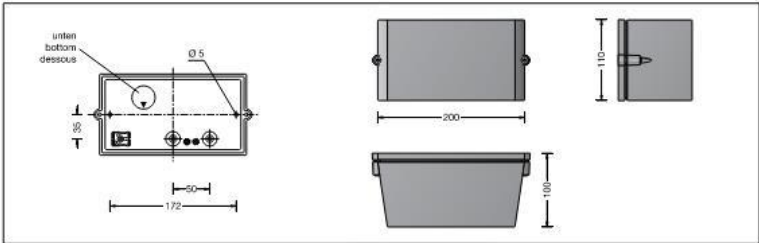
Product data sheet

Application
Wall luminaire with shielded light source.
A luminaire of high protection class and single-sided, downwards directed light sector.
For a variety of lighting tasks in interior and exterior lighting applications.

Product description
Luminaire made of aluminium alloy, aluminium and stainless steel
BEGA Unidure® coating technology
Matt safety glass
Silicone gasket
Reflector made of pure anodised aluminium
2 mounting holes ø 5mm
Distance apart 172mm
2 cable entries for through-wiring of mains supply cable ø 7-10.5mm
Connection terminal 2.5²
Earth conductor connection
LED power supply unit
220-240 V ~ 0/50-60 Hz
BEGA Thermal Control®
Temporary thermal regulation to protect temperature-sensitive components without switching off the luminaire
Safety class I
Protection class IP 65
Dust-tight and protection against water jets
Impact strength IK04
Protection against mechanical impacts < 0.5 joule
 - Safety mark
 - Conformity mark
Weight: 1.5 kg
This product contains light sources of energy efficiency class(es) C



Lamp	
Module connected wattage	7.7 W
Luminaire connected wattage	9.5 W
Rated temperature	t _a = 25 °C
Ambient temperature	t _{a, max} = 55 °C
22 359 K3	
Module designation	LED-1329/830
Colour temperature	3000 K
Colour rendering index	CRI > 80
Module luminous flux	1475 lm
Luminaire luminous flux	463 lm
Luminaire luminous efficiency	48,7 lm/W



22 359 K4	
Module designation	LED-1329/840
Colour temperature	4000 K
Colour rendering index	CRI > 80
Module luminous flux	1495 lm
Luminaire luminous flux	469 lm
Luminaire luminous efficiency	49,4 lm/W

Lighting technology
Luminaire data for the DIALux lighting design program for outdoor lighting, street lighting and indoor lighting, as well as luminaire data in EULUMDAT and IES format are available on the BEGA website at www.bega.com.

Service life - Ambient temperature
Rated temperature t_a = 25 °C
LED psu: > 50,000h
LED module: > 200,000h (L80B50)
100,000h (L90B50)

Ambient temperature max. t_a = 55 °C (100 %)
LED psu: 50,000h
LED module: 150,000h (L80B50)

Ratio of luminous flux
Luminous flux upper half-space 0 %
Luminous flux lower half-space 100 %

BUG rating according to IES TM-15-07:
0-0-0
CEN Flux Code according to EN 13032-2:
69-93-99-100-100

Inrush current
Inrush current: 5 A / 40 µs
Maximum number of luminaires of this type per miniature circuit breaker:
B 10 A: 50 luminaires
B 16 A: 50 luminaires
C 10 A: 80 luminaires
C 16 A: 80 luminaires

Article No. 22 359
LED colour temperature optionally 3000 K or 4000 K
3000 K - Article number + **K3**
4000 K - Article number + **K4**

Colour optionally graphite, white or silver
Graphite - Article number
White - Article number + **W**
Silver - Article number + **A**

Light distribution



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

X7 Large wall light

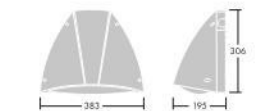
Product specification

thornlighting.com/PIA2

Application	Perimeter walls, social housing, schools and warehouses
Lumen Output	1690 lm/2 700 lm
Luminaire efficacy	106 lm/W
Lifetime	60 000 hours L70B50 @ 25 °C
Size	380 x 305 x 184 mm
CRI	80
Colour Temperature	4 000 K
Switch	DALI
Emergency	Central Battery and integrated 3 hour emergency



Design A modern, robust outdoor wall light with precise lens optics.	Light source information 3 MacAdam ellipse
Controls HF, DALI, photosensor	Materials/Finish Body: cast aluminium and polycarbonate, anthracite. Diffuser: polycarbonate.
Optics Precision lighting control using optimised lens optics for wide spacing and minimal upward light.	To specify state: A robust LED outdoor wall-mounted luminaire with less than 2.5% upward light, IP65, IK10 rating, and tamper resistant screws. Available in 1690 or 2 700 lumen outputs, 4 000 K, E3, E3TX, DALI or/ and photo sensor options. As Thorn Piazza II LED.
Installation BESA and surface mounted conduit compatible.	
Standards IP65 IK10 	





5 YEAR
GUARANTEE

As a globally leading luminaire manufacturer, Thorn Lighting provides a five-year warranty for its complete product range within all European Countries.
thornlighting.com/guarantee

Thorn Lighting is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. The right is reserved to change specifications without prior notification or public announcement. All goods supplied by the company are supplied subject to the company's General Conditions of Sale, a copy of which is available on request. All measurements are in millimetres and weights in kilograms unless otherwise stated.
02/2020 (INT)

WE
MAKE
LIGHT
WORK

X4 - Bollards

