

NORTHUMBERLAND DEVELOPMENT PROJECT **HOTEL**

S73 APPLICATION

LIGHTING STATEMENT

NORTH HUMBERLAND DEVELOPMENT PROJECT HOTEL

Lighting Statement

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Glossary

Term	Definition
Ave	Average value
Colour Rendering (Ra)	An indicator of how accurately colours can be distinguished under different light sources. The colour rendering index (measured in Ra) compares the ability of different light sources to render colours accurately. This measures the ability of a light source to render colours naturally, without distorting the hues seen under a full spectrum radiator (like daylight). The colour rendering index (CRI) ranges from 0 to 100. Colour rendering index CRI
Colour Temperature	The colour temperature provides an indication of the light colour and is expressed in Kelvin (K). Lamps are generally rated between 2700K (warm), 4000K (neutral) and 6500K (cool). Unit: kelvin, K.
Control Gear	A ‘package’ of electrical or electronic components including ballast, power factor correction capacitor and starter. High frequency electronic control gear may include other components to allow dimming, etc.
Curfew	A time defined by the local authority when outdoor lighting is reduced or switched off.
Glare	The uncomfortable brightness of a light source against a darker background which results in dazzling the observer or may cause nuisance. Condition of vision in which there is discomfort or a reduction in the ability to see significant objects, or both, due to an unsuitable distribution or range of luminance.
Glare Rating (GR)	Glare Rating values may be calculated for sports and area lighting applications to indicate the amount of glare present for an observer within the lighted area. GR values range from 10 to 90 (regardless of US or Metric units), where a value of 10 indicates unnoticeable glare and a value of 90 indicates unbearable glare. For most applications, the CIE (International Commission on Illumination) recommends that the maximum amount of glare allowed should be less than 45 to 55, depending on the application.
Horizontal Illuminance (E, Eh)	Illuminance incident on the horizontal surface. Unit: lux (lx) = lm/m² Symbol: E, Eh
Illuminance	The amount of light falling on a surface of unit area. The unit of illuminance is the lux, equal to one lumen per square metre. Unit: lux (lx) = lm/m²
LED	Light Emitting Diode used as a light source. Solid-state semiconductor device that converts electrical energy directly into light of a specific colour or even white light.
Light Output Ratio (LOR)	Ratio of the total light emitted by a luminaire to the total light output of the lamp(s) it contains measured at standard operating conditions.
Light Spill	The unwanted spillage of light onto adjacent areas which may affect sensitive receptors, particularly residential properties and ecological sites.
Light Trespass	The spilling of light beyond the boundary of a property which may cause nuisance to others, particularly when spilling into windows of neighbouring properties.
Lumen	Unit of luminous flux, used to describe the amount of light produced by a lamp or falling on a surface.
Lumen Depreciation	The decline in the light output of a light source during its lifetime.
Luminaire	The correct term for a light fitting. An apparatus which controls the light from a lamp and includes all components for fixing and protecting the lamps or light source, as well as connecting them to an electrical supply.
Maintained Illuminance (luminance)	Value below which the average illuminance on the specified surface is not allowed to fall. The maintained illuminance is specified at the end of the maintenance cycle, taking into consideration the maintenance factor. It is one of the main specification elements for the lighting designer. In the various slighting standards, the maintained illuminance is specified for various areas/activities. Unit: lux. Symbol: Em. (Eave)
Maintenance Factor	Correction factor used in lighting design to compensate for the rate of lumen depreciation, caused by lamp ageing (lumen depreciation and lamp failure) and dirt accumulation (luminaire and environment). It determines the maintenance cycle needed to ensure that illuminance does not fall below the maintained value.
Sky Glow	The upward spill of light into the sky which can cause a glowing effect and is often seen above cities when viewed from a dark area.
Source Intensity	This is the brightness of the source of the luminaires and applies to each source in the potentially obtrusive direction, outside of the area being lit.

Term	Definition
Uniformity Ratio	Ratio of the minimum over the average illuminance for a specified area (Emin/Eave). When defined as such, the uniformity ratio is also the ratio of the minimum over the maximum illuminance for a specified surface area (Emin/Emax).
Vertical Illuminance	Illuminance incident on the vertical surface. Unit: lux (lx) = lm/m² Symbol: Ev

1 Executive summary

1.1 Proposed Development

This Lighting Statement has been prepared on behalf of Tottenham Hotspur Property Company Limited (“THFC”) (“the Applicant”) in support of an application for minor material amendments to the London Borough of Haringey (“LBH”) made under Section 73 (“S73”) (“S73 Application”) of the Town and Country Planning Act 1990 (as amended), following the grant of planning permission for the Northumberland Park Development Project (“NDP”) (“the Site”) on 15 April 2016 (LPA ref HGY/2015/3000).

The NDP permission is a ‘hybrid consent’ (“the Hybrid Consent”) which comprises of: full planning permission for Plot 1 (The Stadium), Plot 2 (The Tottenham Experience) and Plot 3 (Hotel); and outline planning permission for Plot 4 (The Extreme Sports Building), Plot 5 (The Residential Buildings and Flexible B1/D1 Space) and Plot 6 (The Community Health Building).

This S73 Application proposes amendments focussed on Plot 3 (the “Plot 3 Site”). The revisions are intended to enhance the deliverability of the proposals and respond to the evolving regeneration of the surrounding area.

The changes to the Plot 3 hotel building relate to:

- Changes to the building form and layout
- Increase to the height of the building from 23 to 29 storeys
- An increase in the site wide hotel floorspace to 16,132m2.

Our report includes details from a site surveys. These details, together with available open-source information, are used to identify any potential impact from the proposed development.

1.2 Lighting Statement Objective

The objectives of this environmental lighting statement are to:

- o Support the planning application for planning consent.
- o Provide guidance and design criteria for future lighting designs to mitigate risk to the local environment and ecology.
- o Provide guidance and design criteria for any future lighting installation in alignment with the required British Standard, regulations, and best practice for lighting.
- o Provide site specific lighting recommendations to achieve the above.

The lighting guidance relevant to this specific site shall:

- o Limit the impact of obtrusive light and undue light spill on to surrounding areas, protected natural environments and sensitive receptors which include:
 - o Residential properties located on Park Lane, commercial business properties located on the High Road and areas immediately adjacent to the site boundary.
- o Detailed the lighting character for each type of external lighting application and function, these generally include for:
 - o Vehicular access routes
 - o Pedestrian access routes

- o Vehicular loading area
- o Cycle Storage
- o Exterior Landscape
- o Exterior Façade
- Design criteria including:
 - o Illumination levels in accordance with the British Standards and best practice, together with those applicable from the local plans.
 - o A level of permissible light spill outside the site boundary and onto the sensitive receptors
 - o Recommendations for the prevention of obtrusive light.

1.3 Key Risks

The main areas of environmental risk from the future developments exterior lighting will be:

- The residential properties adjacent to the site on Park Lane.

The lighting guidance has been co-ordinated with the landscape designers to meet both functional requirement and to minimise any adverse impact from the external lighting.

1.4 Summary

The exterior lighting for the proposed development would provide for a considered approach with subtle illumination of the building’s façade. The exterior lighting of the access routes and entrance would avoid any undue light spill onto adjacent areas and limit any direct light contributions toward the naked sky.

There is currently no known ecological wildlife sensitive receptors acknowledged within the proposed site location.

The proposed exterior lighting for the refurbishment of the Proposed Development shall comply with the British Standards and recommendations of CIBSE Society of Light and Lighting (CIBSE SLL), the Institute of Lighting Professionals (ILP) and those of standard practice.

A considerate lighting strategy is developed for the exterior lighting to include for the safe use of exterior areas by the staff, users, and visitors to the Proposed Development. The exterior lighting takes into consideration the existing surrounding areas to limit any undue light spill onto sensitive receptors to include the existing residential properties on Park Lane.

The application of lighting shall generally be provided by lighting columns to address the requirements of vehicular access routes and loading areas. The use lighting within the within the underside of the entrance canopy shall provide illumination of the exterior entrance areas and integrate handrail lighting for illumination of exterior steps. All lighting within the entrance areas shall generally have a downward light trajectory to illumination only areas required and avoid any undue light spill, glare or obtrusive light emissions.

The proposed exterior lighting is assessed to be within a Zone 4 Environmental Lighting Classification (Institute of lighting Professionals (ILP) reference document GN01:21 and shall maintain the existing lighting environmental zone classification of Zone 4 (urban area of high district brightness) with no change to the classification envisaged from the application of the exterior lighting.

2 Project Description

2.1 Project Site Location and Context

The proposed development is located on the Park Lane, Tottenham, N17, within the London Borough of Haringey. This report includes the lighting strategy for the external areas of the development.

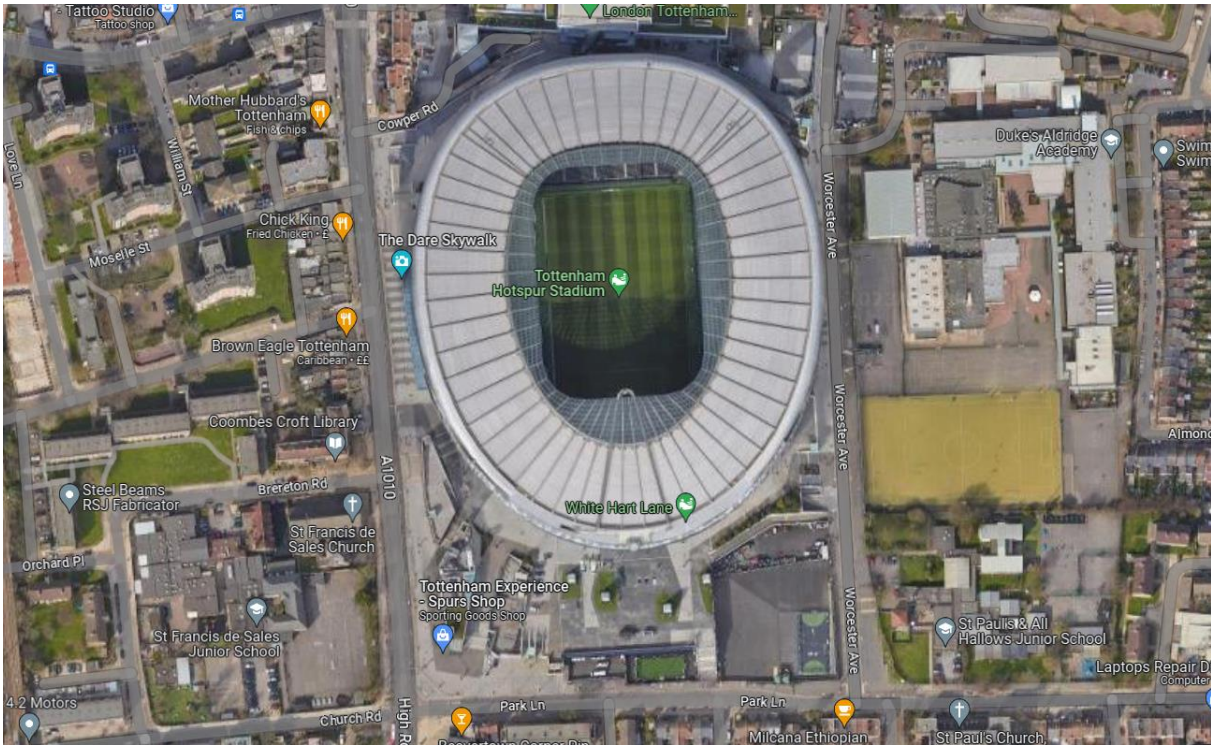


Figure 1—1 - Location Map. Image Google Maps 2022

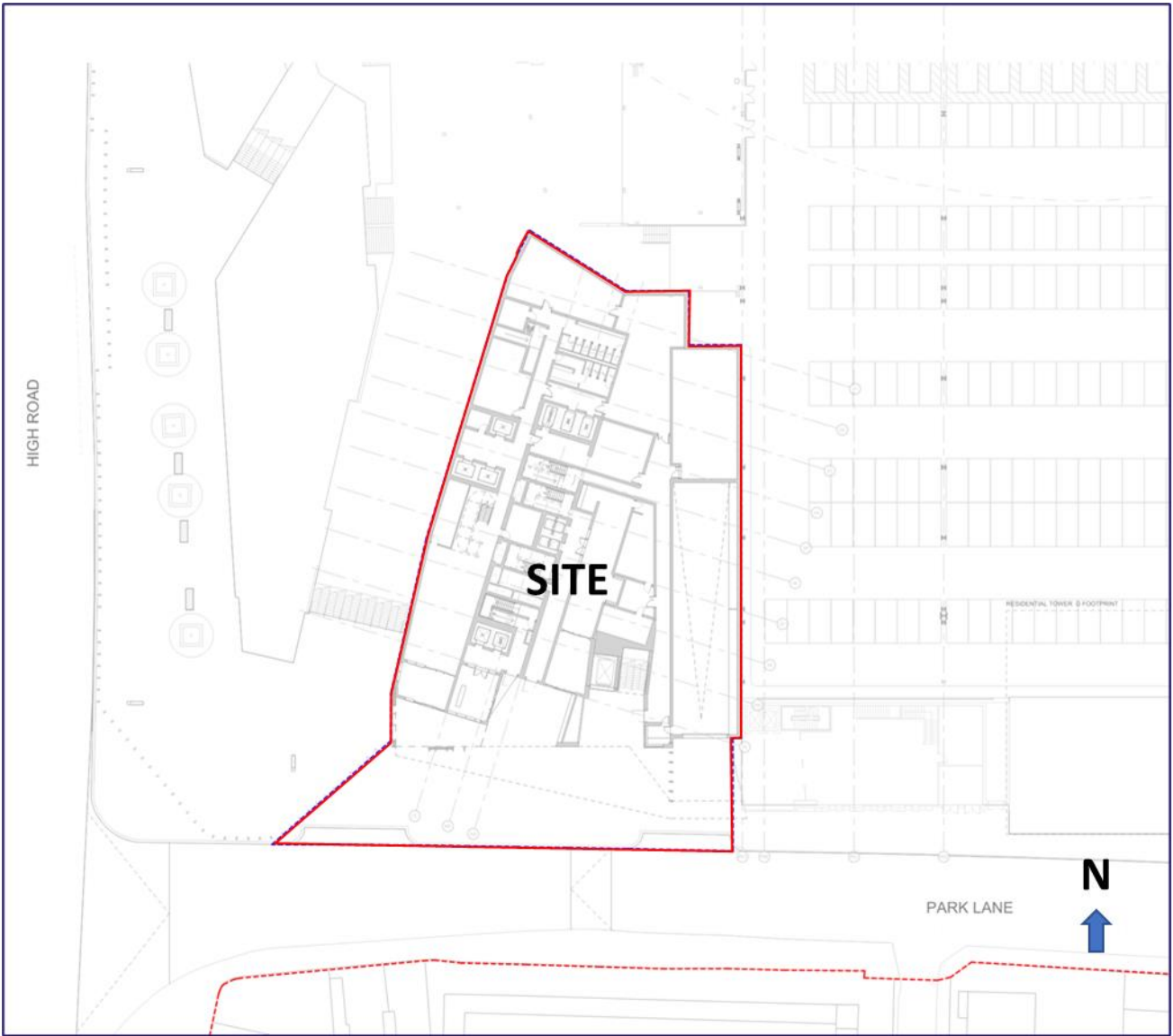


Figure 1—2 – Site Boundary

2.2 Project description

The Proposed Development consists of the following.

Land Use	Use Class	Area GIA (sq.m)	Units
Leisure (including stadium)	D2	122,000	n/a
Hotel	C1	16,132	180 rooms
Residential	C3	53,298	634
Sui Generis/Tottenham Experience	Sui Generis	4,311	n/a
Business	B1	4,000 (max)	n/a
Community and Culture	D1	6,000 (max)	n/a

Plot 3 proposed floorspace:

Residential: 11,246 sq.m (GIA) including 460 sq.m of amenity space

- Hotel:** 16,132 sq.m (GIA) including:
- 751 sq.m of Class E(b) (bar/restaurant)
 - 465 sq.m of music recording studios
 - 577 sq.m of Class E(d) (gym)
 - 859 sq.m of Class E(b) (all day dining restaurant)

Proposed Residential Mix

- 5 x 1b2p units
- 12 x 2b4p units
- 5 x 3b5p units
- 27 x 3b6p units
- Total: 49 units

Proposed Car Parking and Disabled Car Parking

The consented scheme included 76 car parking spaces at basement level, and these have been constructed as part of the wider NDP. The increase in the cycle parking and changes in the Proposed Development reduce the number of car parking spaces provided in the basement. Seven wheelchair accessible spaces and 57 standard spaces will be retained.

Cycle parking

Cycle parking shall be provided with long stay parking located within the basement and short stay externally.

Cycle parking allocations as follows:

Use	Long-stay	Short-stay
Hotel	10	4
Residential	96	4
Total	106	8

Open & Play Space

- Residential amenity space: 460 sqm including:
- A shared external terrace on Level 13 which extends to approximately 112 m².
This will include an element of playable spaces for younger (under 5 years) children measuring 35 m².
A playroom is located adjacent to the terrace which will measure 36 m² and provide internal play space
 - A library measuring 73 m²
 - A screening/cinema room measuring 75 m²
 - Two business suites measuring 7 m² and 12 m²

3 Regulatory Framework, Lighting Standards, Legislation and Guidance

3.1 Legislative framework

The **Clean Neighbourhoods and Environment Act 2005** provides local authorities and the Environment Agency additional powers to deal with a wide range of issues by classifying light pollution as a statutory nuisance.

The statutory nuisance regime does not include light emitted from light sources which are used for transport purposes and other premises where high levels of light are required for safety and security reasons.

It is expected that the following sources are those with greatest potential to generate issues relating to artificial lighting:

- External Lighting.
- Exterior lighting of buildings.

3.2 Planning policy

The **National Planning Policy Framework (NPPF) July 2021** by the Department for Levelling Up, Housing & Communities, which seeks to minimise the negative effects of artificial lighting.

Paragraph 185 of the NPPF states, *“Planning policies and decisions should also ensure that new development is appropriate for its location considering the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: (excerpt C) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation”.*

NPPF is supported by Planning Practice Guidance (PPG), which provides further guidance and makes the following references to light pollution:

- Paragraph 001 (Reference ID 31-001-20191101) states, *“Artificial light provides valuable benefits to society, including through extending opportunities for sport and recreation, and can be essential to a new development. Artificial light is not always necessary, it has the potential to become what is termed ‘light pollution’ or ‘obtrusive light’ and not all modern lighting is suitable in all locations. It can be a source of annoyance to people, harmful to wildlife, undermine enjoyment of the countryside or detract from enjoyment of the night sky. However, for maximum benefit, it is important to get the right light, in the right place and for it to be used at the right time”.*
- Paragraph 001 (Reference ID: 31-002-20191101) states, *“Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed”.*
- Paragraph 002 (Reference ID: 31-001-20191101) states, *“Light intrusion occurs when the light ‘spills’ beyond the boundary of the area being lit. These adverse effects can usually be avoided with careful lamp and luminaire selection and positioning”.*
- Paragraph 003 (Reference ID: 31-001-20191101) states, *“The use of lighting only when the light is required can have a number of benefits, including minimising light pollution, reducing energy consumption, reducing harm to wildlife and improving people’s ability to enjoy the night sky. Impacts on sensitive ecological receptors throughout*

the year, or at particular times (e.g. during bird migrations) may be mitigated by the design of the lighting or by turning it off or down at sensitive times”.

- Paragraph 005 (Reference ID: 31-001-20191101) of the PPG considers the character of the area and surrounding environment with reference to how these may affect what is an appropriate level of lighting for that type of development proposed. It cautions to avoid glare and an appropriate selection of lighting so that it fulfils its purpose without over-lighting.

3.3 International Dark-Sky Association

The International Dark-Sky Association is an organisation that provides guidelines for the creation of dark-sky reserves around the world. Its aim is to preserve and protect the night-time environment and our heritage of dark skies through environmentally responsible outdoor lighting.

The general lighting principles of the IDA should be followed to ensure good lighting that reduces light pollution and its impact on dark skies. Some of the principles established are as follows:

- New lighting should not adversely degrade the sky quality beyond the immediate area to be lit.
- Angle light downward always. No unnecessary light above or near the horizontal.
- Luminaires should be aimed towards where the light is needed, carefully considering the spill on the natural environment and neighbouring properties.
- Luminaires should be switched off when not needed. The use of smart control systems is highly recommended.
- Do not over illuminate.
- Avoid bright white and cooler temperature LED’s (anything above 3000K).
- Install luminaires at lowest possible height to achieve lighting levels.



Figure 3.1 - Example of luminaire types approved by the IDA - (Source IDA)

3.4 Impact of light pollution

The IDA guidance notes also contain information about the impact of light pollution in other areas. The impact of light pollution is not only confined to the visibility of stars at night and obtrusive light.

There are no identified ecological receptor within the site boundary, however the following provide advice on the considerations for wildlife and ecological sensitive receptors.

3.4.1 Bats

As nocturnal species, most bat species are susceptible to artificial light. Due to the decline in numbers, all bat species are protected by the Wildlife & Countryside Act (1981) and the Conservations Regulations (1994). This makes it illegal to kill,

capture or disturb bats, obstruct access to roosts or damage/destroy roosts. Lighting in the vicinity of bat roosts causing disturbance could constitute an offence. When working in an area where there are bat habitats, developers should:

- Not directly illuminate bat roosts.
- Avoid illuminating foraging areas and route.

3.4.2 Birds

Evidence shows that artificial light can reduce sleep in birds, which disrupts the long-term circadian rhythm that dictates the onset of breeding. Birds are likely to be disrupted by changes to insect behaviour due to artificial lights.

3.4.3 Invertebrates

Moths attracted to lights are a familiar sight. Artificial light, particularly blue UV rich, significantly impacts invertebrates, disturbing feeding, breeding and movement which may reduce and fragment populations. It is estimated that a third of insects that are attracted to lights will die as a result of their encounter. Evidence also shows that pollination rates in illuminated plans can be reduced by 62% - (Knop et al 2017. Nature 548). In general:

- Avoid illuminating water or reflective surfaces.
- Do not illuminate ecologically sensitive areas.
- Use colour temperature, CCTs of less than 3000K.
- Use narrow band minimal UV source.

3.5 The ILP (Institute of Lighting Professionals) notes for the reduction of obtrusive light GN01

The Institute of Lighting Professionals (ILP) has produced the 'Guidance Notes for the Reduction of Obtrusive Light' (Guidance Note GN01:20), along with the 'SLL Code for Lighting 2023' provide guidance for local authorities with a recommendation that they are incorporated at the local plan level. The guidance defines various forms of light pollution and describes a series of environmental zones and how to provide external lighting in each of these zones to mitigate unwanted light. The ILP guidance notes provide suitable criteria against which the effects of artificial lighting can be assessed and have been used in this assessment.

The main potential issues with artificial lighting within a site of this environmental context are:

- poorly controlled sources.
- where light is not directed into the required area and is lit with excessive amounts of light; and
- where an area is lit too brightly for its purpose, and excess light is reflected upwards.

Figure 3.2 shows the key characteristics of how the artificial lighting design for a development should be developed – 'Useful Light' (as required for functional use), 'Spill Light', and 'Light Trespass' (Light that is not wanted or required. This light may be a nuisance to others, a waste of energy, and an unnecessary source of greenhouse gases).

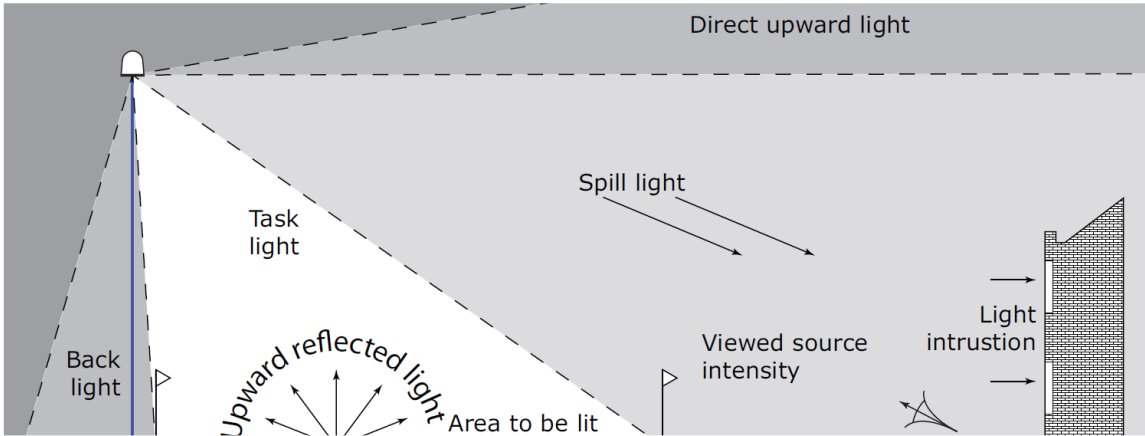


Figure 3.2 – Different types of light obstruction

The external artificial lighting for the Proposed Development shall be based on British Design Standards and the relevant guidance and codes.

These include:

Local Policies

- LBH Strategic Policies 2013 (with alterations adopted July 2017) (“SP”)
- LBH Development Management DPD (adopted July 2017) (“DM DPD”)
- Site Allocations DPD (adopted July 2017) (“SA DPD”)
- Tottenham Area Action Plan (adopted July 2017) (“TAAP”)
- London Plan (March 2021) (“LP”).

British Standards

- BS EN 5489-1:2020 Road Lighting
- BS EN 13201- 1/2/3/5 2015/2014 Road Lighting
- BS EN 12464-2: Outdoor workplaces
- BS EN 60598-1: 2004 – Luminaire General requirement
- Electricity at Work Regulations
- BS 8300-1, 2018 Design of an accessible and inclusive, Part 1 The Exterior Environment
- Health and Safety at Work Act

Main Building Services Related Guidance Documentations

- CIBSE Lighting Guides LG6 – The outdoor Environment
- CIBSE – SLL Code for Lighting
- CIBSE LG14 – Control of electric lighting
- BRE DG498: Selecting lighting controls
- BRE IP2/99: Photoelectric control of lighting design

- CIE Publication 129 (1998) - Guide for lighting exterior work areas

Installation

- CIE Publication 154 (2003) - The Maintenance of outdoor lighting systems (2003)
- CIE Publication 136 (2000) – Guide to the lighting of urban areas
- CIBSE - SLL Code for Lighting
- Construction Design and Management Regulations 2015 - HSE
- Secured by Design – Guidance for lighting against crime

Environmental guidance

- ILP GN01:2021 Guidance Notes for reduction of obtrusive light
- International Dark Sky Association – Recommendation for the protection of dark skies
- CIE Publication 126 (1997) - Guidance for minimizing sky glow
- CIE Publication 150 (2017) - Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting
- BS 42020, 2013 Biodiversity Code of Practice
- ILP GN08, 2018 Bats and artificial-lighting and Bat Conservation Trust
- PL G04 Guidance on undertaking Environmental Lighting Impact assessment
- ILP PLG05, 2014 The brightness of illuminated advertisements

4 Lighting Objectives

4.1 Lighting objectives

The THFC Hotel, lighting should aim to be appropriate to the local context and while mitigate lighting impacts upon identified habitats, neighbouring occupiers and the wider landscape.

The client’s vision and mission are as follows and any future lighting should be developed to help the client and the design team meet these goals.

Specific Objectives (for the external areas)	Lighting Strategy Objectives
Improve cycle and pedestrian connectivity	- Provide appropriate illumination of cycle stores and access to ensure safe use of the storage facilities and also provide for security. - Avoid over illuminating and light spill onto the adjacent natural environment. - Provide a secure and safe environment, accessible and easy to navigate through illumination of turning points and junctions.
Enhancement of external landscape	- Provide for safe use during hours of darkness. - Avoid undue light spill and obtrusive light. - Direct upward light distribution shall be mitigated to preserve dark skies. - Visually comfortable exterior spaces that cater for the use of staff and visitors.
Continued well-being and safety of staff and visitors	- Provide an overall sense of security supporting both active and general passive surveillance. - Lighting should provide adequate recognition and modelling of people where required. - Support the needs of all people visiting, working, and passing through after dark. Avoidance of high contrasts, direct and reflected sources of glare, and confusing upward lighting. - Provide positive definition of potential hazards such as level changes and borders, and the adequate illumination of areas where pedestrians are likely to encounter moving vehicles should take priority in the lighting design for the external areas of the site.

4.1.1 Environmental impact

Good lighting can bring both social and economic benefits, but the use of artificial lighting comes with environmental consequences. This not only includes power consumption, but also the risk of light spill, light pollution, excessive glare and over illumination all of which can have a detrimental impact on the well-being of neighbouring occupant and existing ecology. Therefore, the quantity of light and the equipment is kept to a minimum in those areas that need the least amount of light. The specification of the luminaires should consider optical control, efficacy and whole lifetime cost to keep energy consumption to a minimum and the light distribution only to where it is needed.

Obtrusive light, light spill and glare

As permanent and construction lighting will influence the ecological designations' areas, including flora and fauna, strict mitigation measures should be considered for all future lighting installations throughout the proposed development. Buro Happold Lighting Team has recommended that all exterior lighting elements should follow the guidance of the relevant documents from the Society of Light and Lighting (SLL-CIBSE) and in compliance with the Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light - GN01:2011, deemed as international best-practice for projects of this type.

The following elements must be considered:

- Light sources:** The lighting proposal should minimise the blue light spectral power of the light source and carefully balance the needs of task lighting with its impact on fauna, flora, and the night sky.
- Luminaires:** The selection of luminaires with the right optical distribution and shielding to be located at the right mounting height is critical to minimising light spill and obtrusive light effects while providing the right lighting performance on the exterior task areas. Orientation of each luminaire should also be considered, as the right aiming angle will determine the amount of spill light received by the surrounding areas.
- National and local planning frameworks:** the consideration of national and local policies will aid with the correct selection of a lighting strategy that meets the needs of a particular area within its local context.

4.1.2 Social impact

Effective and safe lighting can help create a positive environment for people and the natural surroundings. Appropriate lighting can help create greater interaction between the local communities and the proposed development by promoting a respectful use of lighting that is not obtrusive into any neighbouring community. Careful consideration of the lit character of each part of proposed development will also benefit the whole site, by example providing areas of greater activity by night within the areas surrounding the building and areas of low activity within the natural zones.

Social impact issues to consider:

- Safety:** The lighting should be designed to keep a safe environment by allowing the positive definition of potential hazards such as level changes and borders, and the adequate illumination of areas where pedestrians are likely to encounter moving vehicles.
- Security:** The lighting development for the proposed development should be designed to provide an overall sense of security supporting both active and general passive surveillance. Lighting should provide adequate recognition of people where required.
- Accessibility:** The design of the lighting must support the needs of all staff and people visiting the proposed development. Design measures shall avoid high contrasts, direct and reflected sources of glare, and confusing upward lighting.
- Legibility:** Key physical elements such as beacons and other parts of the urban realm should be careful and positively illuminated to aid wayfinding and create a mental map in visitors and staff. The lighting of key feature elements such as paths, meeting places, boundaries, gateways, and landmarks will also help to enhance people’s sense of safety and security.
- Identity:** The experience of the proposed development at night will play an important role in forming the image and memory of it in all its visitors and staff. A proper identity can be created by the careful and considered lighting approach that helps to enhance the character and legibility of the whole area.

4.1.3 Technological opportunities

Smart lighting control systems applied to the lighting equipment installed throughout the public realm in the proposed development can help to reduce energy consumption and operate the lighting schemes in a more efficient way. These systems can be linked to meteorological measurement devices, data collection and artificial intelligence development centres to create smart operation cycles that will keep non-essential lighting off working 24 hours to minimise energy consumption and reduce lighting levels of essential illumination equipment whilst maintaining safe levels of illuminance overnight.

Advanced lighting technology can limit the operating hours of lighting equipment to reduce running costs and limit environmental impact by setting scenes, curfew times, and dimming levels and times.

5 Lighting design criteria

5.1 Criteria summary

The primary lighting criteria have been identified below in a summary table.

Criteria	Design criteria recommendations	Further detail
Light spill / obtrusive light	Zone E4	Section 5.2
Colour temp	3000K	Section 5.3
CRI	minimum 70 CRI	Section 5.4
Lighting classification	Area specific refer to section 5.6	
Lighting control	Dali control with astronomical time clock	Section 6.3

5.2 Lighting Environmental Zones

The classification of Lighting Environmental Zones, in the UK, are established within the documents GN01/21, ‘Guidance notes for the reduction of obtrusive light’ published by the Institute of Lighting Professionals (ILP).

The identification of four environmental zones have been established as a basis for outdoor lighting regulations. The environmental zone rating can be used to help ensure that the lighting goals of an environment are appropriately defined and met, considering the context and relevant surroundings.

Table 5.1 denotes the valuation of environmental zones for the site based upon the ILP GN01:21. The final confirmation of Environmental Zones are to be determined by the Local Planning Authorities.

The area of development is assessed to be within an Environmental Lighting Zone Classification of E4, which forms the criteria upon which maximum permissible levels of light spill and obtrusive light are limited, with the main purpose of protecting the natural environment and neighbouring communities.

Table 5.1 - Extract table on guidance for the reduction of obtrusive lighting – (Source: ILP GN01/21)

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 5.2 – Permissible level of light spill beyond the site boundary – (Source: ILP GN01/21)

Environmental Zone	Sky Glow ULR (Max %)	Maximum values of vertical illuminance on properties		Luminaire Intensity I (cd)		Building Luminance (pre-curfew)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average L (cd/m2)
E4	15	25	5	25,000	2500	25

The ILP has produced guidance on the maximum permissible light spill into windows of adjacent properties, before and after the curfew time, based on the environmental zone the development is located within. Table 5.2 above illustrates the various lighting design criteria associated with meeting the recommendations set out in achieving lighting compliance.

For areas of ecological sensitive receptor, no more than 2lux shall be permitted onto these areas.



Figure 5.1 –Lighting Environmental Classification for the Proposed Development.

5.3 Light colour temperature and colour rendering index

The light colour temperature defines the colour appearance of the light. It is a quality to which people are subconsciously sensitive. Colour Temperature is measured in the unit Kelvin and is the standard method for measuring the colour of light emitted from a lamp.

Warm light is proposed to be used across proposed development with special importance with and adjacent areas of sensitive receptors for the following reasons:

- Warm light is mentally associated with safety, history, communion, relaxation, and intimacy, which are pivotal elements in the natural visitor experience around the proposed development.
- Any type of light could suppress the secretion of melatonin in human beings and different animals, however the exposure to blue light at night does so more powerfully as retina is more sensitive to blue light wavelength. Red light has very small impact on the melanopsin receptors, and they do not stimulate wakefulness. Warm light has higher quantities of red light, therefore is the appropriate light to generate a relaxed environment.
- Red, amber, and yellow light, and light up to 2200K have a shorter wavelength than 3000K, 4000K light. This is beneficial for the animals as they are less attracted to this type of light therefore generating less disturbance on the natural environment at night.
- According to different scientific studies and the International Dark Sky Association (IDA) blue light brightens the night sky more than any other colour of light, so it is important to minimize the amount emitted.

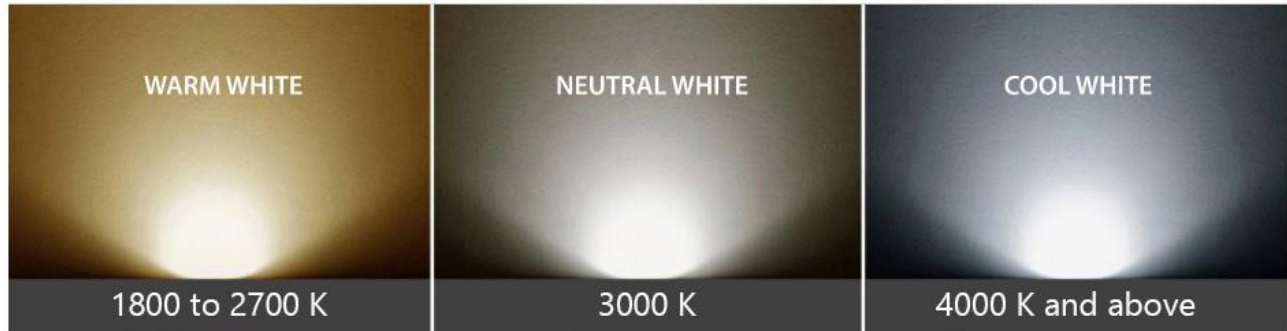


Figure 5.2 - Light colour temperature example chart



Figure 5.3 – The application of lighting colour temperature for the site.

Figure 5.3 denotes the colour temperature to be utilised for the exterior areas which shall be of 3000 Kelvin.

5.4 Colour rendering index

The Colour Rendering Index provides an objective indication of the ability of a light source to render the colours of various objects faithfully, in comparison with a natural light source. The general colour rendering index Ra has been introduced to specify the colour rendering properties of a light source. The maximum value of Ra is 100. This figure decreases with decreasing colour rendering quality.

It is important for visual performance and the feeling of comfort and well-being that colours of objects and of human skin are rendered naturally, correctly and in a way that makes people look attractive and healthy.

In principle, a CRI of minimum 70 is required across this project.



Figure 5.4 - Differences between CRI levels

5.5 Light intensity and classification

The intensity of light across the project site must be appropriately considered from the brightest thoroughfares to the dimmest landscaped areas, both for the area in question, and in relation to adjacent areas.

Users’ safety, security and comfort is of primary importance and a considered approach to the amount of light employed across the proposed development will help improve all these measures. Varied levels of light intensity will act to increase the legibility of the proposed development improving peoples’ orientation as they move through the site.

It is suggested that the levels of illumination should be at their highest when spaces are shared by vehicles and pedestrians, and when the speed of their movements are highest. When the movement of people is slower, though, or when there is less interaction with motorised traffic, the lighting levels can be much lower, while still providing an appropriate level of safety, and comfort.

The different levels of light that apply to each area in the project are defined by the type of usage and classification of roadways for vehicular and pedestrian access.

5.6 Lighting classification

The application of lighting is categorised based upon the BS5489-1:2020 Design of road lighting Part 1: Lighting of roads and public amenity areas — Code of practice and the BS EN 13201-2:2015 Road lighting Part 2: Performance requirements. The lighting performance criteria for the areas particular to site are noted on table.

Table 5.3 – Lighting classification

Basis of Design - Lighting Design Criteria								
Area	Environment al Zone	Reference document	Lighting Class	Illuminance (av)	Uniformity (Uo)	Reference plane	Colour temperature	Light Source Mounting height
Vechular Access	E4	BS EN 13201	P3	7.5lux	0.25	Horizontal ground plane	3000K	4m AGL (column mounted luminaires) 6m AGL (building mounted luminaires)
Parking Bays	E4	BS 5489-1:2020 - Section 7.4.8.3	n/a	10lux	0.25	Horizontal ground plane	3000K	6m AGL
Cycle Park	E4	BS 5489-1:2020 - Section 7.4.8.3	n/a	5lux	0.25	Horizontal ground plane	3000K	0.5m AGL
Plaza	E4	BSEN 12464-2 (no specific criteria for open spaces)	n/a	5-10lux	0.25	Horizontal ground plane	3000K	4.5m AGL
Pedestrian paths	E4	EN 12464-2:2014	P4	5lux	0.25	Horizontal ground plane	2700K	0.5m AGL
Steps	E4	SLL LG16, 2017 Lighting to stairs	-	15lux	Continuous band of light needed	Step threads	2700K	1.2m AGL

Table 5.3 provides the lighting classification. These should be reviewed at the start of the design process to ensure co-ordination and appropriateness with the most current proposed site development and vehicular/pedestrian parameters.

5.7 Mounting height and shielding

The mounting height of the lighting equipment will contribute to the perceived scale of spaces.

This project Utilises 4-metre-high columns to maintain a low profile of lighting columns and provide a differentiation of area to the adjacent street lighting utilising higher lighting columns (6m and 8m). Shielding is required in certain lighting fixtures to minimise the amount of light that can spill onto the night sky and the surrounding natural environment.

In principle luminaires across the proposed development area should:

- Have integrated or integrated and additional external shielding.
- Have forward-throwing light distribution with a reduced kickback.

5.7.1 Integrated shielding

A full cut-off shielded light fixture has an integrated solid barrier at the top, located over the light source (lamp) such that it is covered. The solid housing should not have any translucent parts or diffused materials which will allow for lighting escaping towards the dark sky. These luminaires allow light to be accurately cast downwards into the desired area without major levels of light spill. Spread lenses, snoots, internal/external louvres, honeycomb louvres and other glare mitigation and light control measures can be used in these luminaires to further limit the spread of light beyond a targeted area.

5.7.2 Integrated and external shielding

Where lighting is required in close proximity to sensitive receptors. Light source shielding can be achieved using physical landscape and architectural barriers (such as: dense shrubs and trees and dense low-level vegetation, dunes, bunds, berms, etc.) and, furniture-integrated (or otherwise recessed) luminaires, solid balustrade, solid or very dense screens, and others, in combination with full cut-off fixtures.

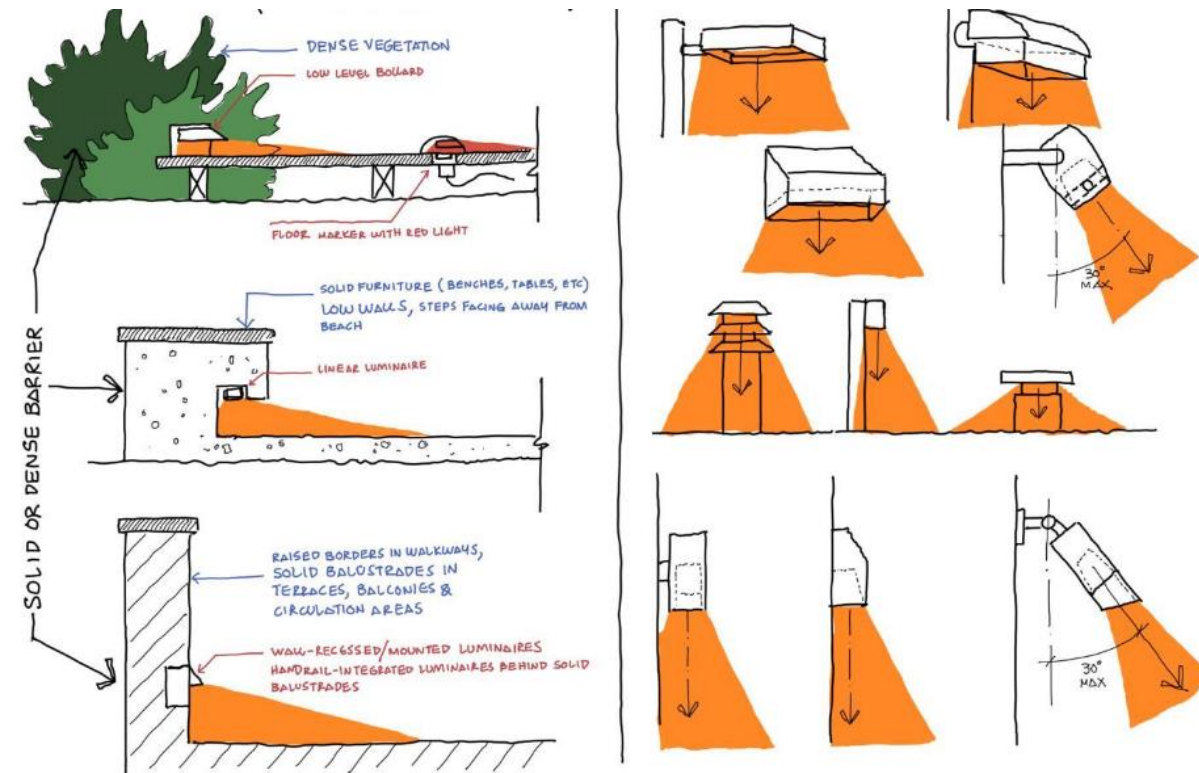


Figure 5.5 – Integrated and external shielding methods

Figure 5.5 - Sketches on the left on the above figure show examples of luminaires with integrated shielding and external shielding. The sketches on the right show luminaires with only integrated shielding.

5.8 Exterior Lighting Applications

The following chapter describes the proposed lighting applications for the exterior environment. The existing street lighting columns include for lamp heads directed towards the exterior front entrance area of the building and shall be retained. Additional lighting shall be located on the underside of the front entrance canopy together with integrated lighting within the seating benches. Visual enhancement of the exterior space is provided via lighting integrated within the planters.

The illumination levels for the front entrance area shall provide for obtaining 20lux average at floor. This is excess to the 5lux recommended by the BS EN 124464-2:2014 to ensure the requirements of Condition 9 are satisfied. The higher illuminations levels shall provide for the safety of staff and visitor and to also deter antisocial behaviour.



Figure 5.6 – Existing Street lighting installation along Park Lane. Image Google Maps 2023

Figure 5.6 illustrates the existing street lighting columns currently providing illumination of the area adjacent the front entrance of the Proposed development. The rear facing side of the columns include for lamp heads providing illumination of the pavement section and contribute towards the illumination of the access road and the external front entrance areas of the Proposed Development. The lighting columns shall be retained.



Figure 5.7 – Exterior Entrance and Drop-Off zone.

The illumination of the external entrance area shall include for the integrated lighting within the low-level seating benches and lighting integrated within the inner wall of the planters at low level to provide glow of light and provide visual enhancement.

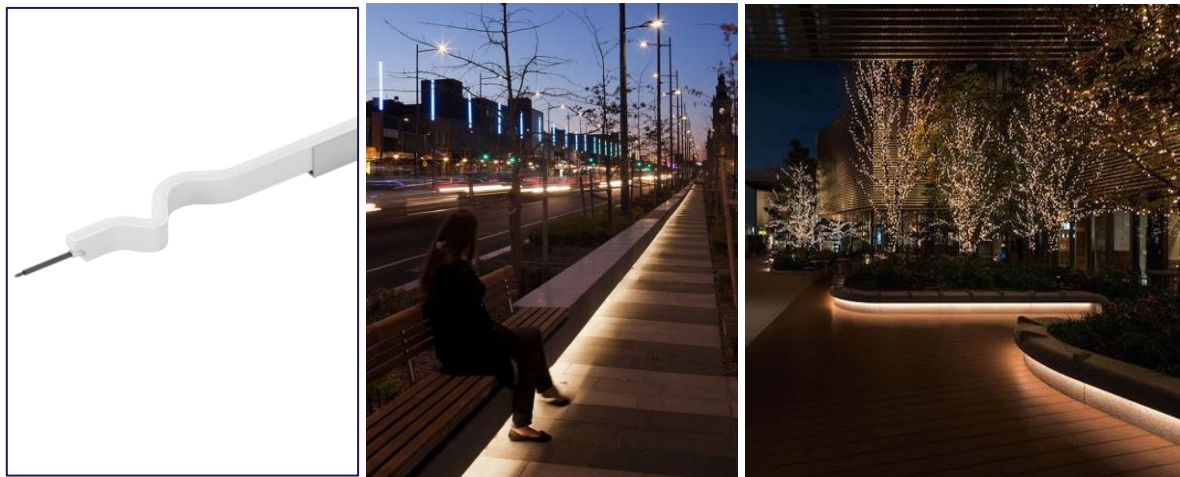


Figure 5.8 – Integrated seat lighting within landscape areas.

The external seating areas located within the landscape shall include for integrated lighting to provide a form of low-level lighting to add visual enhancement and limit the extent of light spill within the areas local to the areas of seating.

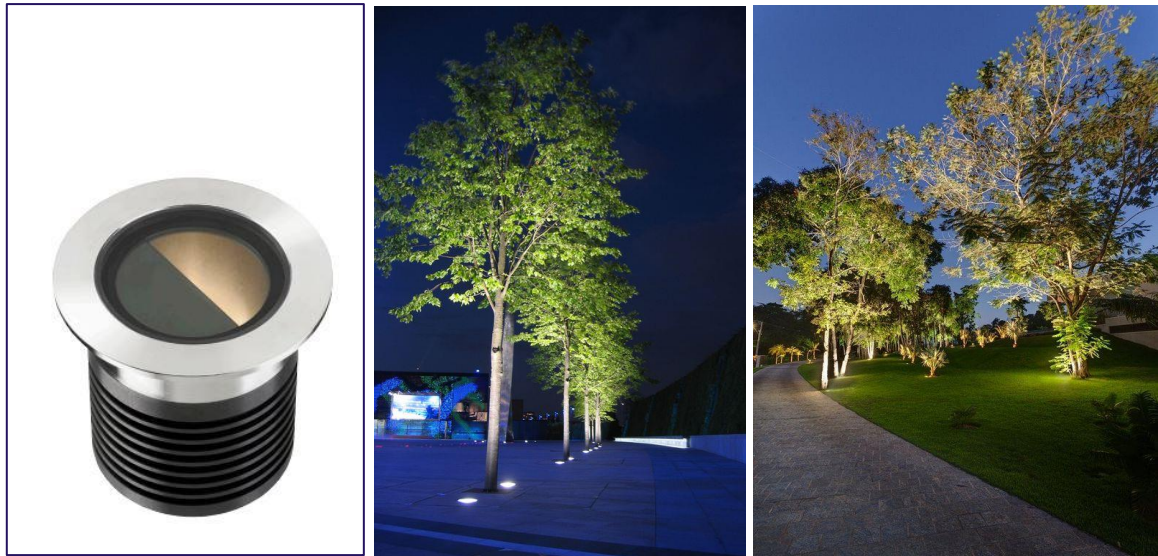


Figure 5.9 – Up-lighting of selected trees to create placemaking.

Linear lighting shall be integrated within the exterior canopy to provide illumination of the drop-off areas and front entrance of the building.



Figure 5.10 – Linear lighting integrated within exterior canopy.

The illumination of tree is limited to a selection to provide for visual enhancement of key locations within the site. The light upwards is controlled and shall be angled toward the trunk of the trees to limit the extent of upwards light contributions towards the night sky.

The design shall cater for an illumination level of 20lux, with the facility to increase illumination levels directly outside the front entrance via the front entrance canopy lighting to cater for 50lux should there be any issue with antisocial behaviour or high crime during the initial operational period.

5.9 Exterior Façade Lighting Applications

Recessed lighting shall provide a subtle illumination of the vertical façade surfaces for the lower sections of the building, with use of optically control light distribution to ensure avoidance of any undue lighting spill onto the naked sky or surrounding areas.

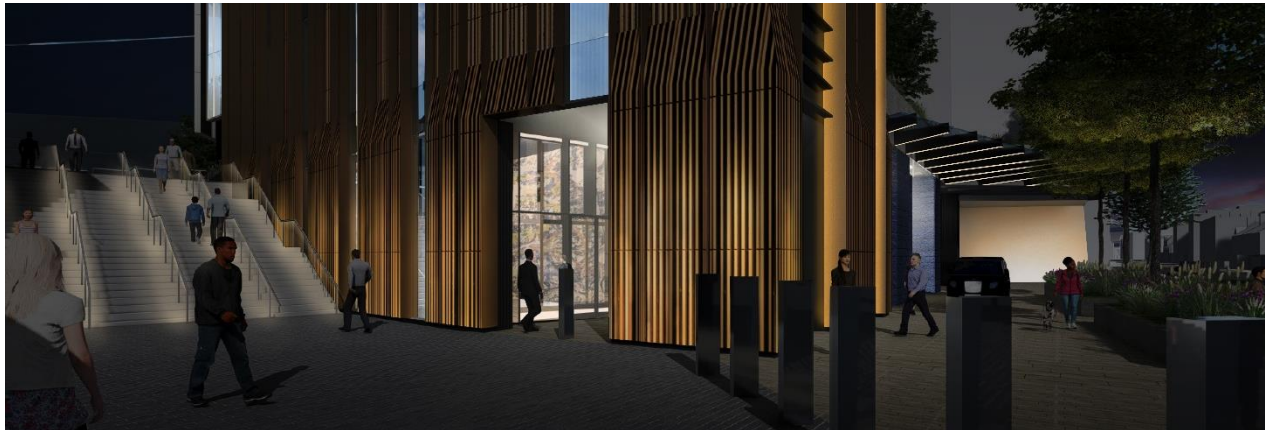


Figure 5.11 – Exterior entrance and access area.



Figure 5.12 – Facade Lighting – North Elevation.

The proposed illumination of the exterior façade shall include for the subtle illumination of the facade fins. The top section of the facades shall include for miniature downlights to optic control of the light distribution to disperse light sideways onto the vertical façade fin surfaces creating a fade of lighting from the top.

Those showing a continuous illumination of the fins from the top to the bottom of the building façade as illustrated on Figure 5.12, include for a linear lighting element integrated within fin and building detail provide for of light from the building outwards to taper off toward the outer edges of the fins.

The external façade illumination for area with glazed elevation shall consist of miniature downlight located at the top section for façade fins to distribute light onto the side vertical surfaces of the façade fins to provide subtle and unobtrusive form of illumination to extenuate the building form, structure, and materiality.



Figure 5.13 – Facade Lighting – Lighting Effect.

Figure 5.13 provides a reference image of the typical distribution of light onto the vertical façade fins.



Figure 5.14 – Facade Lighting – South Elevation

The areas of façade with solid surfaces shall include for slim line LED profile to run the full length of the façade elevation with light source concealed and integrated within the façade fin details to illuminate the vertical side surfaces of the façade fins.

6 Lighting control

6.1 Recommended control

The lighting shall maintain the existing operational timings and include for automated Dusk till dawn operation and daylight sensing to ensure the lighting operates during hours of darkness and switch off when sufficient daylight contributions are present. If deemed appropriate by safety and security further dimming or switching off should be considered outside of peak hours and triggered on by presence detection.

6.2 Automatic control systems

Astronomical timeclock

Timers with both astronomic and Daylight-Saving Time (DST) functionality automatically adjust to the seasonal day-to-night-time changes throughout the year. An electronic timer with astronomic functionality determines each day's sunrise and sunset times based on geographic location, while the automatic DST functionality resets the clock by one hour in the spring and fall.

Photocells

Photocells are devices that can be incorporated to luminaires or installed remotely and connected to a control system. Photocells can turn lighting on when the ambient light falls below a pre-set level, or automatically adjust the light output of luminaires depending on the amount of natural light available to a maintained illuminance level.

Motion sensors

These devices can be used as energy-saving sensors in exterior and interior areas, turning of lights in empty zones and turning them on when someone moves along the space. Many of these products have adjustable sensing areas, allowing for different coverage areas in specific locations. They can also be integrated into general control systems and can be used to override lighting scenes.

6.3 Programable control system

DALI

The DALI control protocol shall be adopted for the control of the lighting. DALI stands for **Digital Addressable Lighting Interface** and is a manufacturer-independent standard for lighting control in external areas and buildings. It is specifically used in external areas and properties such as offices, shops, restaurants, and hotels, but can perfectly be used in for the external areas of the Proposed Development to provide variation from high density use circulation route and dwell spaces to create lighting schemes for each area of use.

It is a communication protocol for building lighting applications and is used for communication between lighting control devices, such as electronic ballasts, brightness sensors or motion detectors and lighting fixtures. It allows the creation and programming of lighting scenes and their triggering times.

The DALI systems can be programmable and connected via wired and wireless systems. They can also receive input from manual switches.

These control mechanisms guarantee that the maximum levels of light can be defined and never be more than 10% of the maximum defined level for specific zones.

7 Conclusions

The lighting for the proposed development is assessed to have negligible impact to the existing lighting conditions and environment.

The inclusion of the proposed development would be a change of silhouette to the landscape and therefore be of potential visual impact, however the external and internal lighting shall comply with the recommendations of the ILP and CIBSE and shall not constitute any adverse light spill from the premises beyond the site boundary beyond those permissible.

The lighting statement and strategy provided for the exterior lighting scheme which mitigates potential light spill from the exterior lighting applied for the development to be within the permissible levels directed by the ILP and conforms to the British Standards and local regulations.

The exterior entrance and exterior areas within the site boundary are to be illuminated to an average of 20lux. This is an increase in the level of illumination to those recommended by the British Standards to ensure greater visibility at night-time to ensure the safety of visitors and staff. The design shall cater for the facility to increase illumination levels directly outside the front entrance via the front entrance canopy lighting to cater for 50lux should there be any issue with antisocial behaviour or high crime during the initial operational period to ensure condition 9 is satisfied.

The proposed lighting strategy is deemed to have negligible impact on to the existing lighting conditions and shielded from the sensitive receptors described. The existing lighting environmental classification of Zone 4 shall remain unchanged and the distribution of light beyond the boundary would not exceed those of the existing levels when the Proposed Development exterior lighting had been in full operation.

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