

Haringey Civic Centre

Lighting Statement

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Contents

1	Executive summary	6
1.1	Proposed Development	6
1.2	Lighting Statement Objective	6
1.3	Key Risks	6
1.4	Summary	6
2	Project Description	7
2.1	Project Site Location and Context	7
2.2	Project description	7
2.3	Existing baseline lighting conditions	8
2.3.1	Site survey conditions	8
2.3.2	Existing Site Conditions	9
2.3.3	Baseline Light levels	14
2.4	Identified Sensitive receptors	15
3	Regulatory Framework, Lighting Standards, Legislation and Guidance	16
3.1	Legislative framework	16
3.2	Planning policy	16
3.3	International Dark-Sky Association	16
3.4	Impact of light pollution	17
3.4.1	Bats .	17
3.4.2	Birds	17
3.4.3	Invertebrates	17
3.5	The ILP (Institute of Lighting Professionals) notes for the reduction of obtrusive light GN01	17
4	Lighting Objectives	19
4.1	Lighting objectives	19
4.1.1	Environmental impact	19
4.1.2	Social impact	19
4.1.3	Technological opportunities	19
5	Lighting design criteria	20
5.1	Criteria summary	20
5.2	Lighting Environmental Zones	20
5.3	Light colour temperature and colour rendering index	21
5.4	Colour rendering index	21
5.5	Light intensity and classification	22

5.6	Lighting classification	22
5.7	Mounting height and shielding	23
5.7.1	Integrated shielding	23
5.7.2	Integrated and external shielding	23
5.7.3	Exterior Lighting Applications	23
5.8	Lighting Applications	23
6	Lighting control	26
6.1	Recommended control	26
6.2	Automatic control systems	26
6.3	Programable control system	26
7	Conclusions	27

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

The proposed development is located on the High Road (A105), Wood Green, within the London Borough of Haringey. The development consists of the refurbishment of the existing Civic Centre with an annex to support additional accommodation for the use of the Civic Centre. The new annex building is to be located on the area of existing exterior car park south of Trinity Road within the existing red line boundary of the site.

Role of Buro Happold Specialist Lighting Buro Happold has been appointed to provide a Lighting Statement for the purposes of supporting the planning application for the proposed development on behalf of our client The London Brough of Haringey (LBH).

Our report includes details from a site survey of the existing baseline lighting conditions and lighting applications. 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:

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

The lighting guidance relevant to this specific site shall:

- Limit the impact of obtrusive light and undue light spill on to surrounding areas, protected natural environments and sensitive receptors which include:
 - Residential properties located on Trinity Road for the area adjacent the site boundary.
 - The traveller accommodation site located north of Bounds Green Road and west to the site boundary.
- Detailed the lighting character for each type of external lighting application and function, these generally include for:
 - Vehicular access routes
 - Pedestrian access routes
 - Vehicular loading area
 - Car parking
 - Cycle Storage
 - Exterior Landscape
 - Exterior Facade
- Design criteria including:

- Illumination levels in accordance with the British Standards and best practice, together with those applicable from the local plans.
- A level of permissible light spill outside the site boundary and onto the sensitive receptors
- 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 Trinity Road.
- Traveller accommodation located to the northwest of the site boundary off Bounds Green Road.

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 existing site is currently boarded and unable to access as the building is currently in an unoccupied. status in advance of the proposed refurbishment. However, the majority of the external areas surrounding the site had been accessible upon which the site survey has been conducted. The illumination of the exterior areas in front of the main building and car parks are illuminated by lighting columns and wall mounted building floodlights providing illumination of the perimeter external areas around the building.

The majority of the existing exterior lighting appears to be close to their usable service life with many units within the exterior car park areas not functioning.

The proposed exterior lighting for the refurbishment of the Civic Centre and Annex 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 best 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 Civic Centre. 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 Trinity Road and the traveller campus off Bounds Green Road.

The application of lighting shall generally be provided by lighting columns to address the requirements of vehicular access routes and loading areas. The use of low-level lighting bollards are used for the illumination of pedestrian access routes, with the inclusion of furniture integrated lighting within seating and outdoor tables (in the courtyard) to provide an ambient form of lighting within these dwell spaces.

The proposed exterior lighting shall maintain the existing lighting environmental zone classification of Zone 4 (urban area of high district brightness) and no change to the classification is envisaged from the application of the exterior lighting. In general, the proposed exterior lighting shall improve on the existing lighting during the operational period of the existing building by limiting upwards light spill and greater control of the light distribution to those currently present on site.

2 Project Description

2.1 Project Site Location and Context

The proposed development is located on the High Road (A105), Wood Green, within the London Borough of Haringey.

The Civic Centre is a statutory listed building and is located within the Trinity Gardens Conservation Area.

This report includes the lighting strategy for the external areas of the development. A site survey has been conducted to establish the existing base line lighting conditions upon which the baseline lighting conditions are established.



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

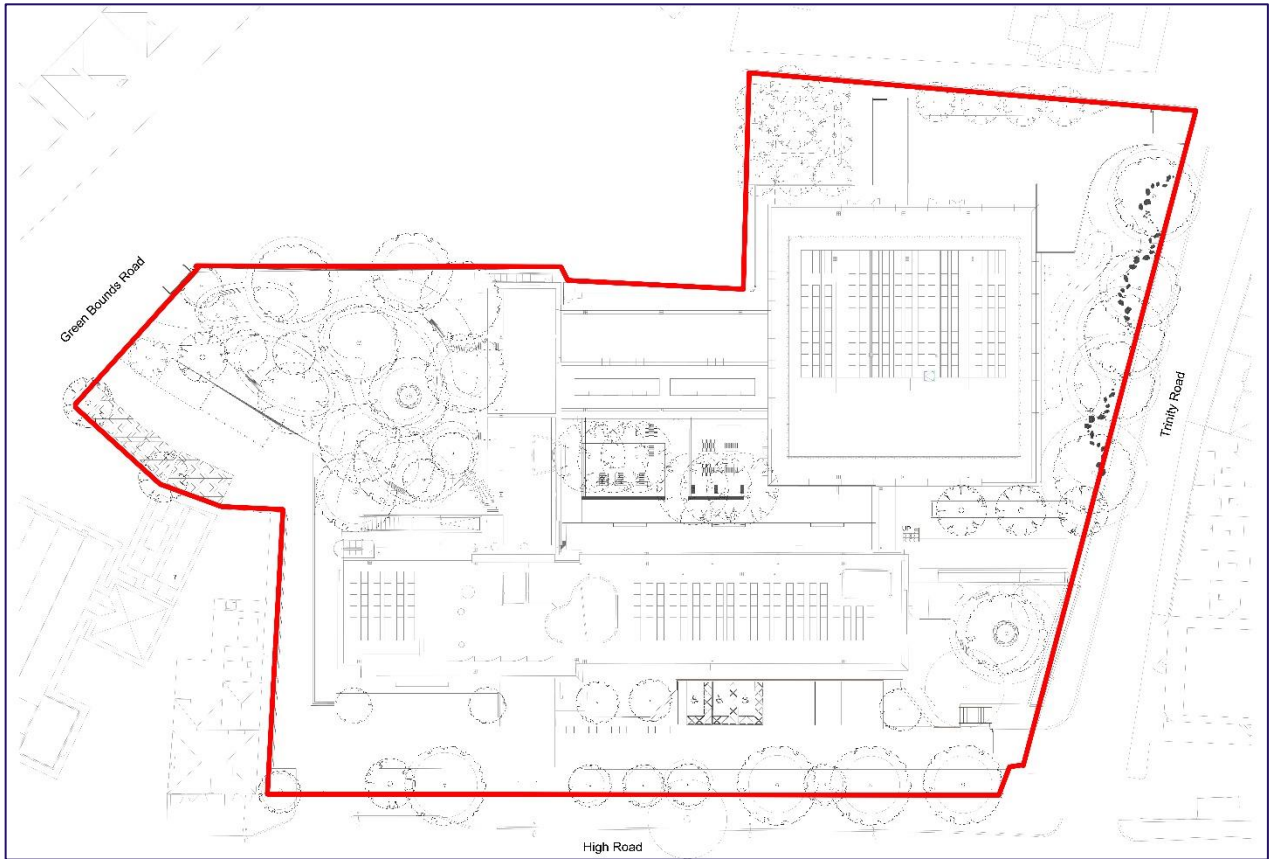


Figure 1—2 – Site Boundary

2.2 Project description

The development consists of the refurbishment of the existing Civic Centre with an annex to support additional accommodation for the use of the Civic Centre.

The project aims to:

- Upgrade existing facilities while providing additional working spaces, facilities and office accommodation.
- Future proof through flexibility of space
- Provide for more sustainable and efficient premises.
- Promote social and personal wellbeing through better provisions for staff and visitor amenities, including catering, social spaces and enhanced landscaped areas.
- Consolidation of car and cycle parking to promote sustainable modes of transport.

The project will comprise the following elements:

- Refurbishment of existing civic building.
- Development of new annex building within existing area of exterior car park.



Figure 1—3 – Site Boundary – Ariel View

Figure 1-3 illustrates the existing site layout within the site boundary.

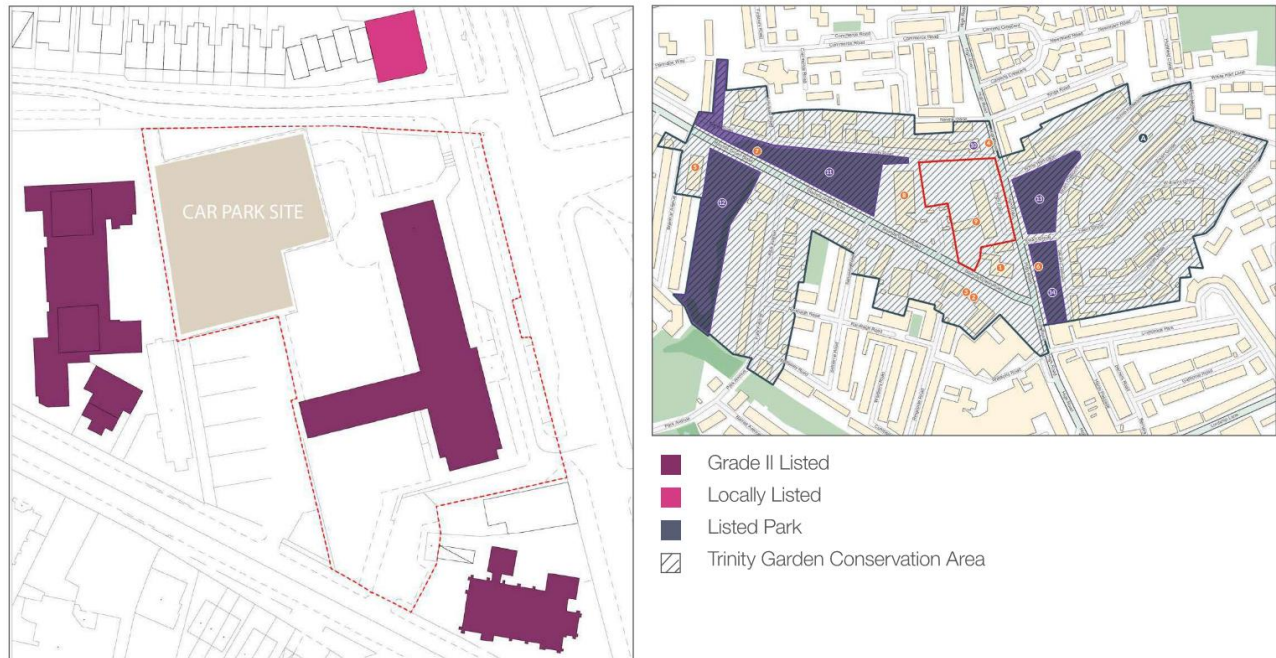


Figure 1—4 – Listed Buildings and Conservation Areas – Image Hawkins Brown

Figure 1-4 illustrates the existing listed buildings and conservation areas local to the site.

2.3 Existing baseline lighting conditions

This section provides information on baseline existing artificial lighting conditions present within the areas of the project.

The existing artificial lighting conditions were established with a site survey to determine the day and night-time characteristics for the area of the Proposed Development and its immediate surroundings.

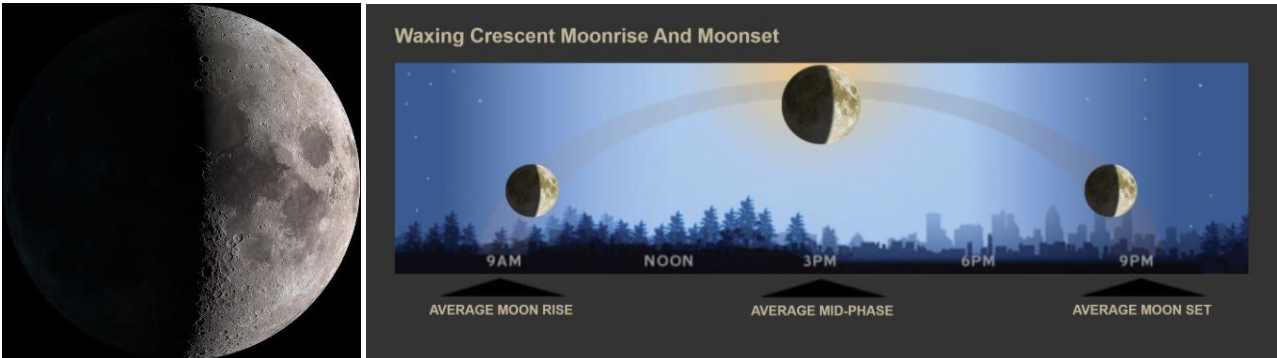
2.3.1 Site survey conditions

Photographs and measurements were taken under the following conditions:

The site visit was carried out between the hours of 16.00hrs and 19.30hrs on 7th February 2023.

Sky conditions: Clear.

Sunset: 17:01hrs



Moon conditions

Phase: Waxing Gibbous; Illumination: 98.55%
Moon Age: 16.28 days; Moon Angle: 0.49; Moon Distance: 404,170.41km
Sun Angle: 0.49; Sun Distance: 147542729km

Camera settings:

Make: Nikon D90 Digital SLR
Lens: Nikon AF-S 18-105mm f/3.5-5.6, f/22-36.
Aperture: F5.6

Samsung Galaxy S21 FE, Auto Night-time Setting.

Light meter:

Make: Konica Minolta Luminance Meter LS-100,
Type or meter: T-10;
Last calibrated: 11th January 2023.

2.3.2 Existing Site Conditions

The following provides details of visual observations of the existing external lighting applications within the site.

General observations on the existing base line lighting conditions were conducted. Due to the premises not being operational the majority of the building mounted exterior lighting and the lighting columns servicing the front access roadway was not operational at the time of the survey. The lighting columns servicing the park adjacent Trinity Road were not fully operational as approximately 30% of the lamps had failed. The lighting columns for the car park adjacent Bounds Green Road were also not operational with some of the wall mounted flood lighting being operational.

The base line lighting conditions however do record the existing illumination levels surrounding the site boundary to establish the baseline lighting conditions upon which any additional light contributions from the development can be assessed.



Figure 2.1 – Location of points of view for photographs across site.



Figure 2.2 – View 1 North – St Michael's Church. View 2 West - Haringey Civic Centre and entrance to Car Park (adjacent Bounds Green Road).



Figure 2.3 – View 3 West – Haringey Civic Centre.



Figure 2.4 – View 4 West – Haringey Civic Centre, entrance canopy.

The front entrance canopy supports recessed luminaires which appear to be past their service life with use of fluorescent diffusers.



Figure 2.5 – View 4 North and View 5 South. Front entrance access road.

The illumination of the front access roadway and parking area are addressd via lighting columns. The lighting columns appear close to the end of their service life with use of matal halide lamps.



Figure 2.6 – View 5 West – Trinity Road.

Street lighting columns provide illumination of Trinity Road. The predominant contributions of illumination onto residential properties being from the street lighting.



Figure 2.7 – View 6 South – Car Park.



Figure 2.8 – View 7 North – Car Park.



Figure 2.10 – View 7 East – Car Park.



Figure 2.9 – View 7 North East – Car Park.



Figure 2.11 – View 8 West – Access road to car park (Adjacent Bounds Green Road).

The illumination of the access road from A105 to the car park adjacent Bounds Breen Road is addressed via lighting columns. The lighting columns appear to be past their service life with indication of lamps failed and potentially being non-operational for a period of time. Supplementary lighting is currently provided from wall mounted flood lights.



Figure 2.12 – View 9 North– Car Park.



Figure 2.14– View 9 South – Bounds Green Road.

Illumination of the car park is provided from 6m high lighting columns.



Figure 2.13 – View 9 West – Bounds Green Road.



Figure 2.15– View 7 East – -Car Park lighting.



Figure 2.16– View 7 East – -Car Park lighting.

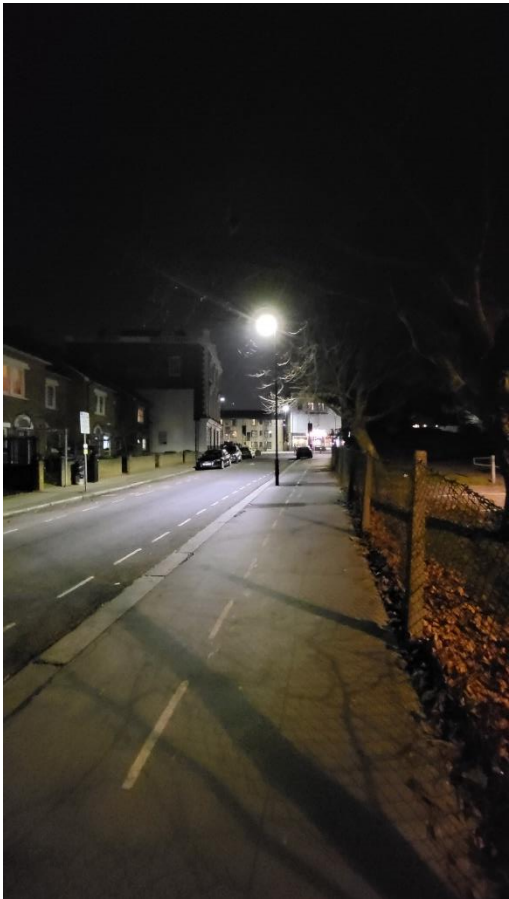


Figure 2.17– Trinity Road Street Lighting.

2.3.3 Baseline Light levels

The following layouts provide information on the illumination readings gathered during the site visit. The figures noted are those of illumination levels in units of Lux.

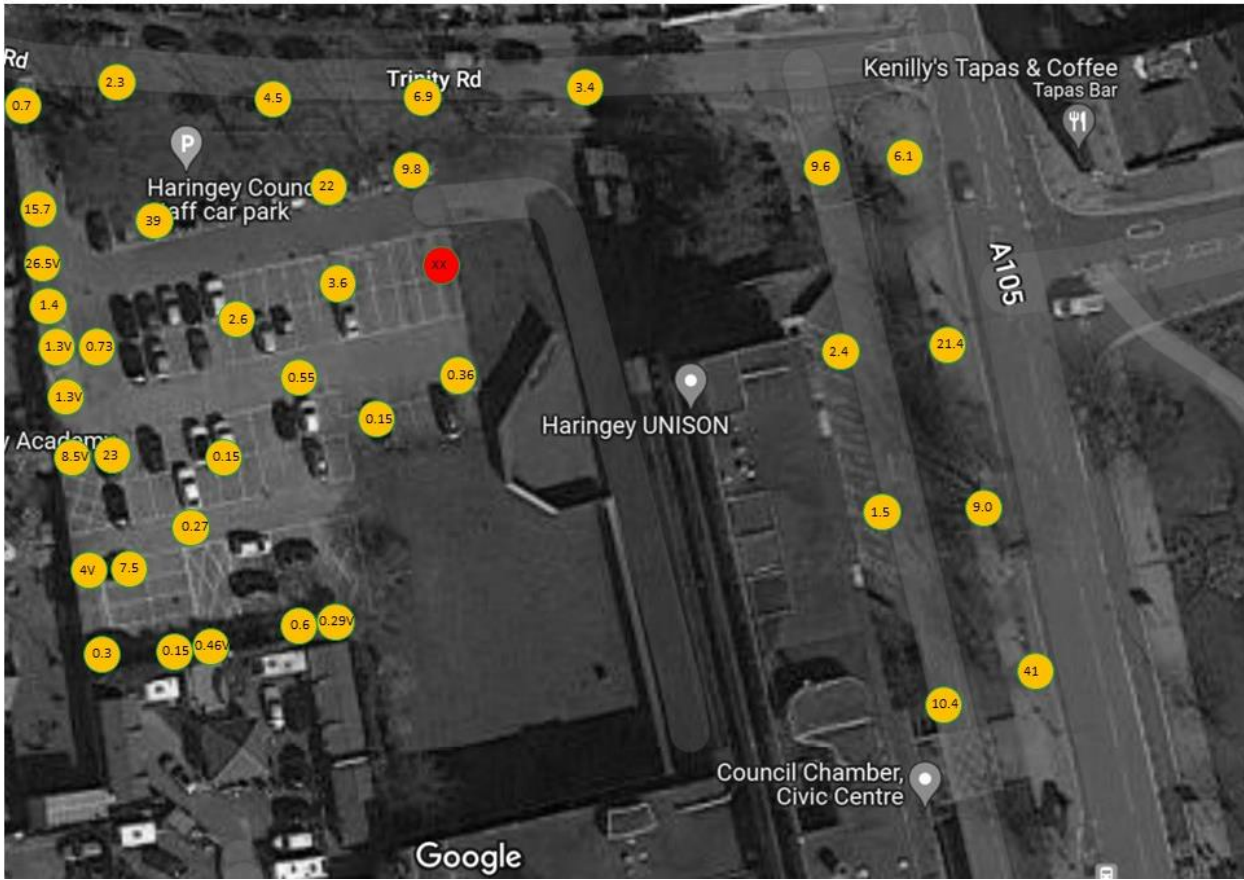


Figure 2.16 – Existing Illumiantion levels noted in values of Lux.



Figure 2.17 – Existing Illumiantion levels noted in values of Lux.

The illumination levels recorded are those present on site during the time of the survey. It should be noted majority of the exterior lighting within the site boundary were non-operational with the excpetion the Trinty Rioad car aprk, of which approximatley 30% of the lighting were not functional potentially due to lamp failure and lighting columns being past their serviceable life.

The illumination levels recorded within the site boundary are generally low with low uniformity for the areas of use, due to the majority of luminaires not being operational at the time of the survey. The areas with functional lighting were those of the car parks and a high percentage of the lighting columns not being operaational due to lamp failure or equipment being past their service life.

2.4 Identified Sensitive receptors

In the wider ecological sense, sensitive receptors include the occupants of an areas (whether there are people, animals, or vegetation) that are more susceptible to the adverse effects of exposure to pollutants.

For the purposes of this report, the sensitive receptors are all those human communities and animal and vegetation habitats that are exposed to artificial lighting.

Sensitive receptors specific to the site are:

- 1. The residential properties adjacent the site on Trinity Road
- 2. The traveller accommodation to the northeast of the site boundary.
- 3. St Micheal Church



Figure 2.18 – Areas of sensitive receptor

The above figure 2.18 provides indication of the sensitive receptor locations identified. Appropriate lighting treatments shall be addressed to ensure minimal light spill onto these areas and avoid and direct light distribution onto areas of sensitive receptor.

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:

- Industrial and commercial security lights
- Industrial and commercial external operational lights
- External floodlit facilities
- Exterior lighting of buildings.

3.2 Planning policy

The National Planning Policy Framework (NPPF) 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

Examples of Acceptable / Unacceptable Lighting Fixtures



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.

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:

- Refer to Ecological report for identification of sensitive locations for bat habitats and roosting
- 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. In general:

- Do not directly illuminate important areas for nesting birds – probably wildlife sites

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).

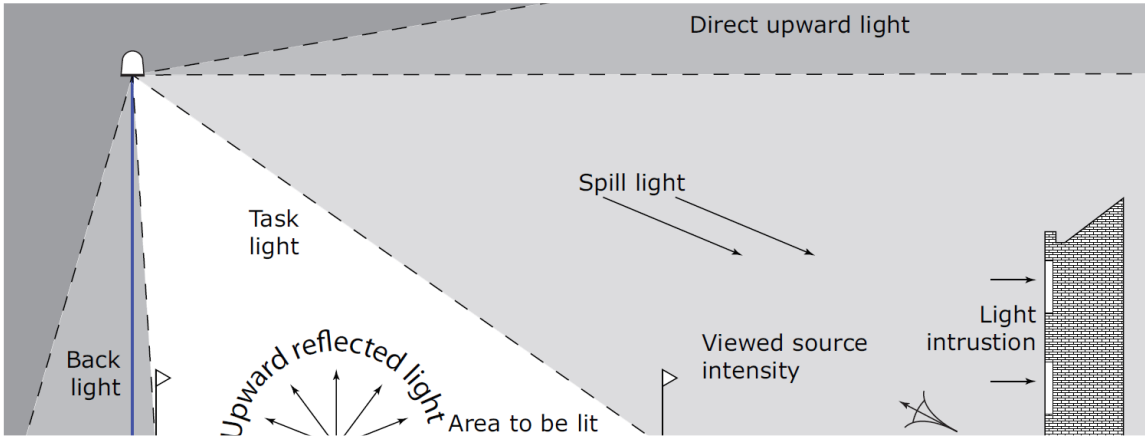


Figure 3.2 – Different types of light obstruction

The external artificial lighting for the Proposed Development shall be based on British Design Standards and the relevant guidance and codes. Please also refer to the Montagu Evans report Heritage Planning Assessment January 2019 ..

These include:

Local Policies

- London Plan (2016)
- Haringey's New Local Plan, November 2020
- Haringey Strategic Policies DPD & Haringey Development Management DPD

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 night 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 Haringey Civic Centre , **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	
Mounting height and shielding	Street lighting 6m Pedestrian lighting 1m Carpark lighting 4m and surface mounted	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 areas 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.

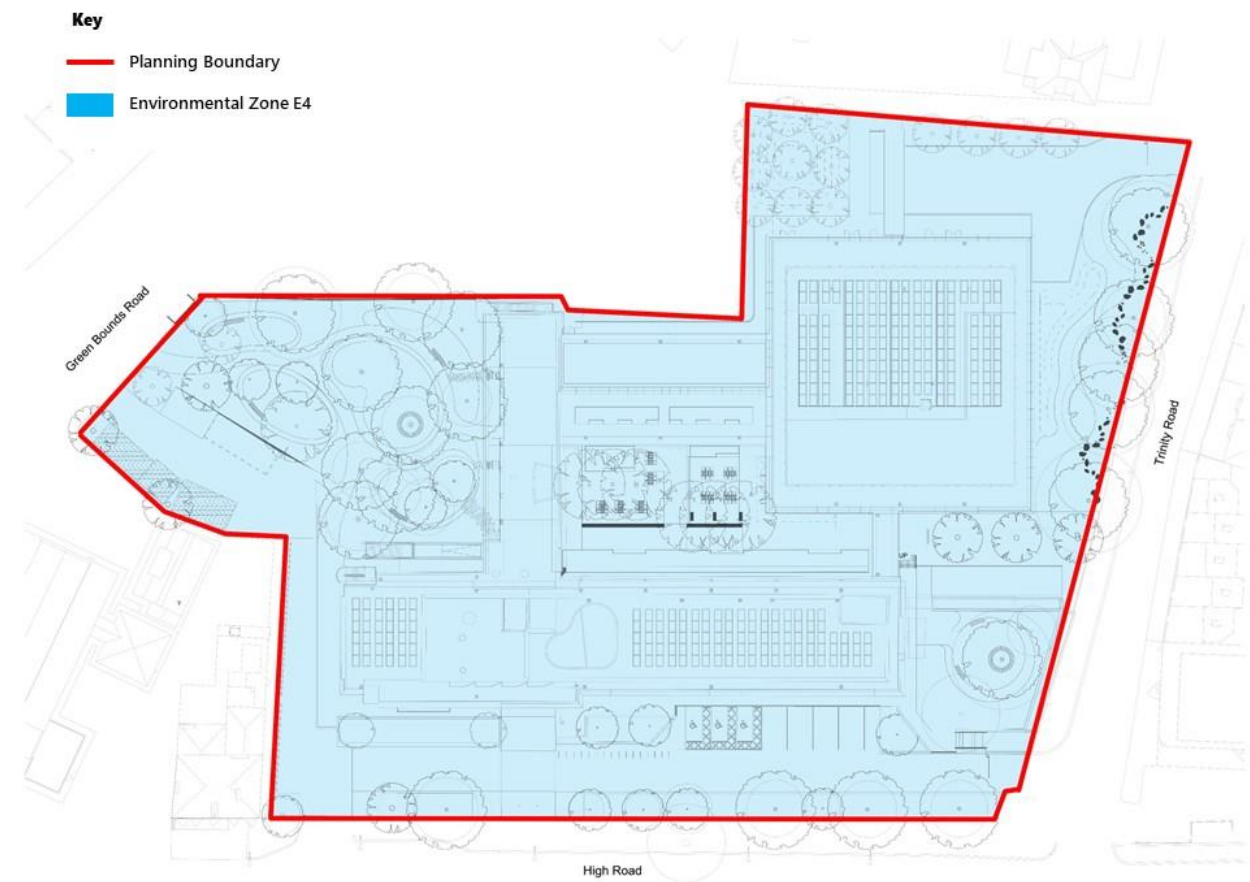


Figure 5.1 –Lighting Environmental Classification for the Proposed Development.

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 no 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.

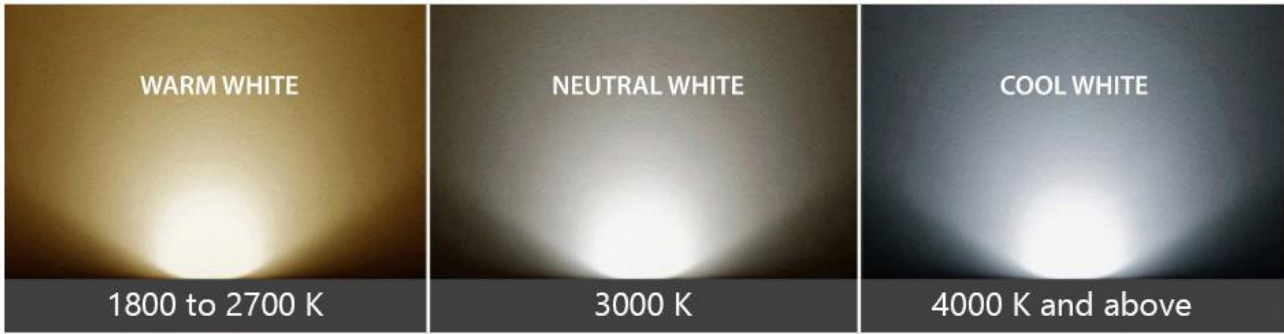


Figure 5.2 - Light colour temperature example chart

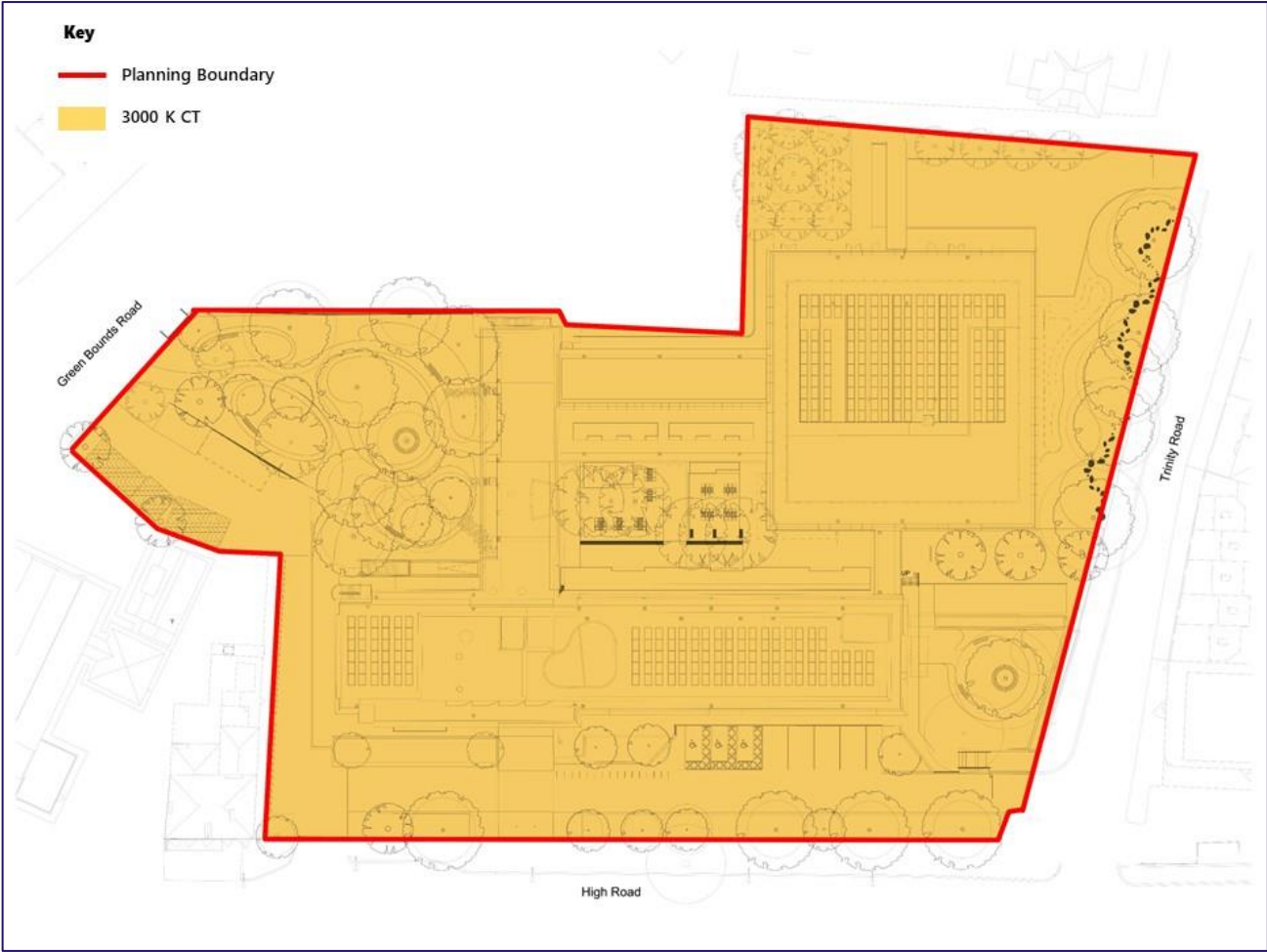


Figure 5.3 – The application of lighting colour temperature for the site.

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

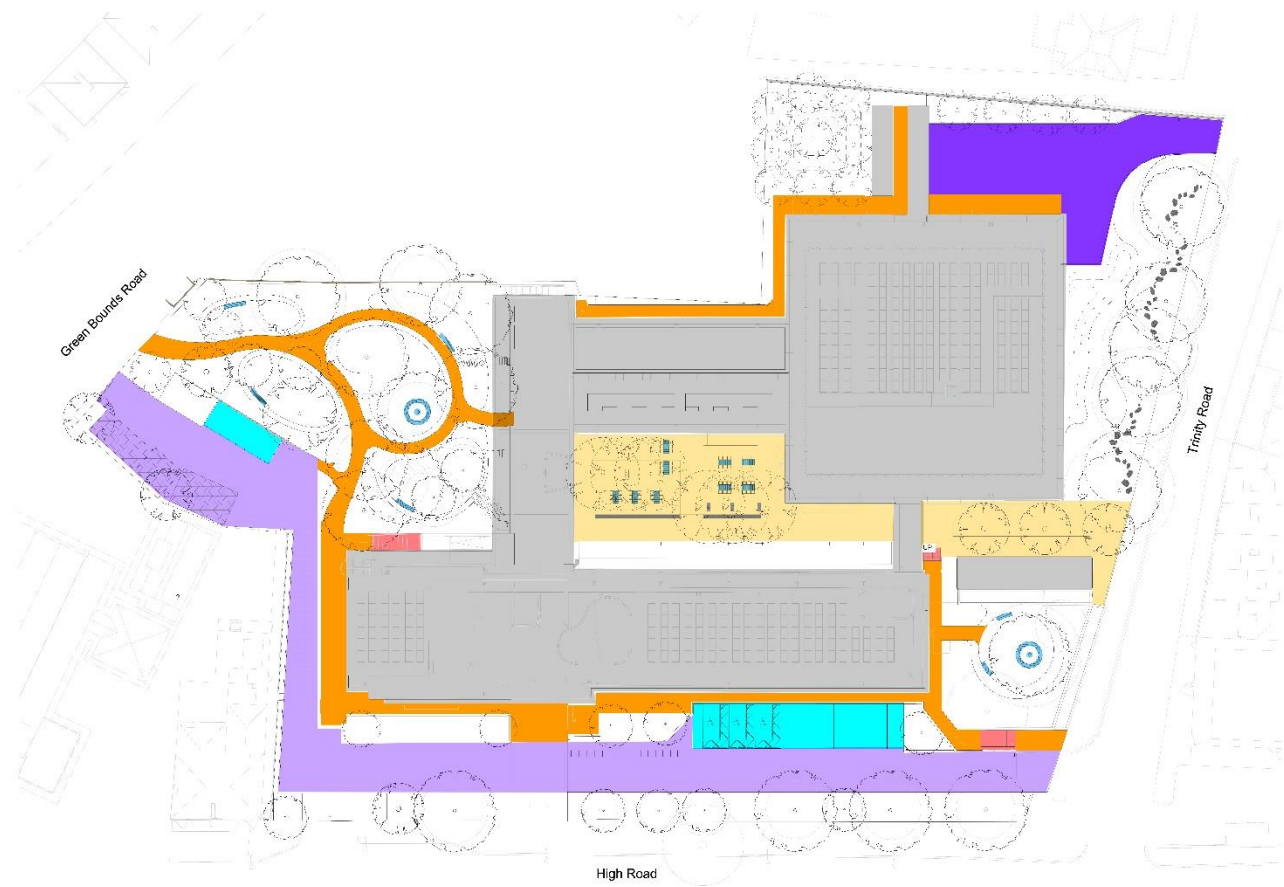


Figure 5.5- Lighting classification

Figure 5.5 illustrates the various lighting classifications applicable to the exterior areas within the site boundary. Table 5.3 denotes the lighting performance criteria applicable for each area.

Table 5.3 – Lighting classification

Basis of Design - Lighting Design Criteria								
Area	Environmental Zone	Reference Document	Lighting Class	Illuminance (av)	Uniformity (Uo)	Reference Plane	Colour Temperature	Light Source Mounting Height
Access Routes (High Road and Bounds Green Rd sides)	E4	BS EN 12464-2:2014	P3	10 lux	0.4	Horizontal ground plane	3000 K	4m AFFL (column mounted luminaires)
Loading Area	E4	BS EN 12464-2:2014	P4	20 lux	0.25	Horizontal ground plane	3000 K	4m AFFL (column mounted luminaires)
Parking Bays	E4	BS 5489-1:2020 - Section 7,4,8,3	n/a	10 lux	0.25	Horizontal ground plane	3000 K	4m AFFL (column mounted luminaires)
Pedestrian Path	E4	BS EN 12464-2:2014	P5	5 lux	0.25	Horizontal ground plane	3000 K	0.55 m AFFL
Steps	E4	BS 5489-1:2020	-	20 lux	Continuous band of light needed	Horizontal ground plane	3000 K	0 - 0.95 m AFFL
Plaza	E4	BS EN 12464-2 (no specific criteria for open spaces)	n/a	5-10 lux	0.25	Horizontal ground plane	3000 K	0.55 m AFFL
Hard Landscape (Feature lighting)	E4	Minimal low level lighting for feature accent purposes only			n/a	Horizontal ground plane	3000 K	0 - 0.45 m AFFL

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.

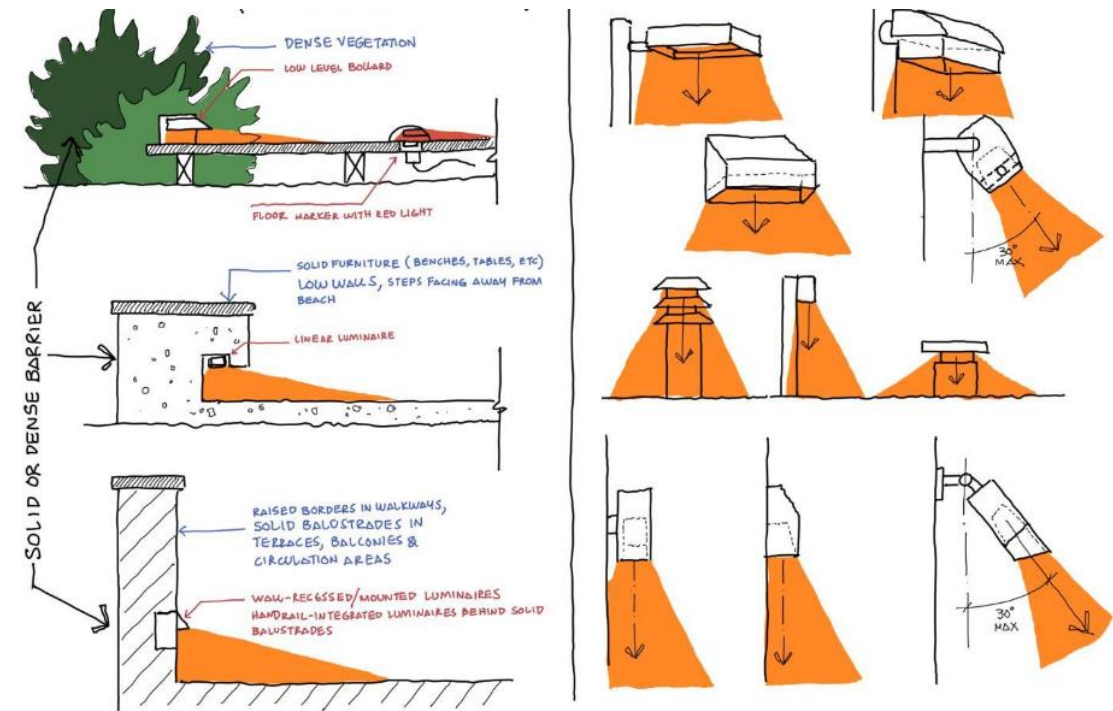


Figure 5.6 – Integrated and external shielding methods

Figure 5.6 - 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.

5.7.3 Exterior Lighting Applications

The following provide the proposed lighting scheme for the exterior areas within the site. Please refer to drawings HCC-BHE-GF-E-500000 and Luminaire Schedule HCC-BHE-XX-XX-SH-YX-001_Luminaire Schedule for further details.



Figure 5.7 – Typical example for lighting columns with rear shield deflector to avoid backward light distribution.

Figure 5.7 illustrates the use of integrated rear light shields, which shall be utilised for the lighting columns where located in close proximity to sensitive receptors, with the direction of light distribution to be facing away from the areas of sensitive receptor and the rear light shield limiting the spill of light to the rear of the lighting columns.

5.8 Lighting Applications

The illumination vehicular access roads within the site shall be addressed with the use of 4 metre high LED street lighting columns.



Figure 5.8 – Typical Street lighting columns

Figure 5.8 provide typical application of street lighting columns from manufactures DW Windsor and Thorn, those with IDA approval limit the extent of light distributed towards the sky to maintain dark skies and limit light pollution onto the sky. The above illustrations are of the Thorn 'Isaro' ranges of luminaires and DW Windsor 'Daytona' range.



Figure 5.9 - Precedent images for low level luminaires. Bollards and handrail integrated luminaires

The dedicated pedestrian access routes shall generally be addressed with the use of low level lighting bollards to illuminate the areas of pathway and avoid any undue light spill onto adjacent areas. Low level bollards with 180 degrees light distribution towards the pathway shall generally be utilised.

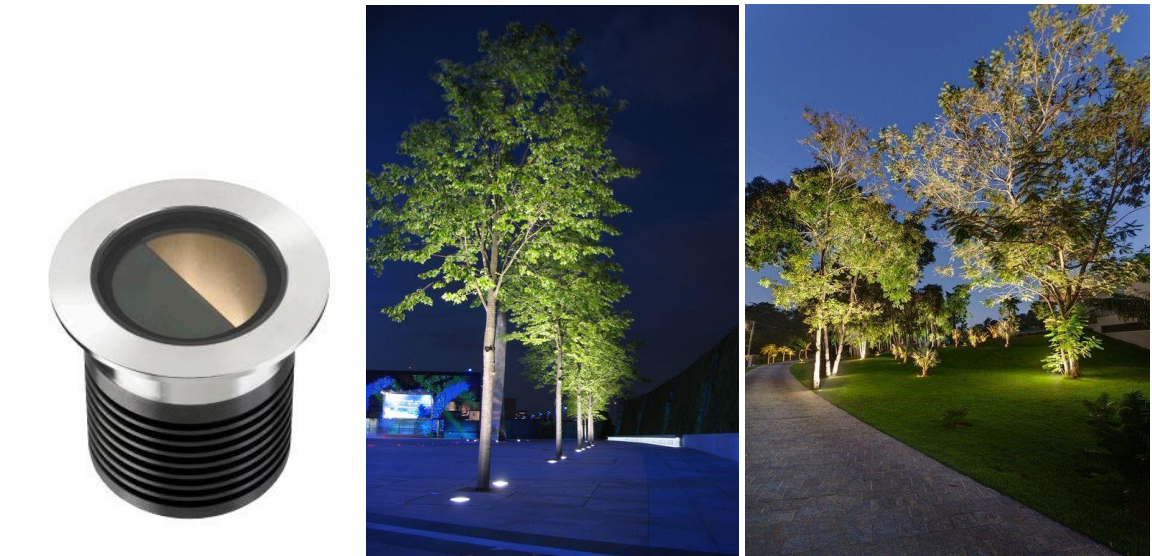


Figure 5.10 – Up-lighting of selected trees to create placemaking

The illumination of tree are 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.

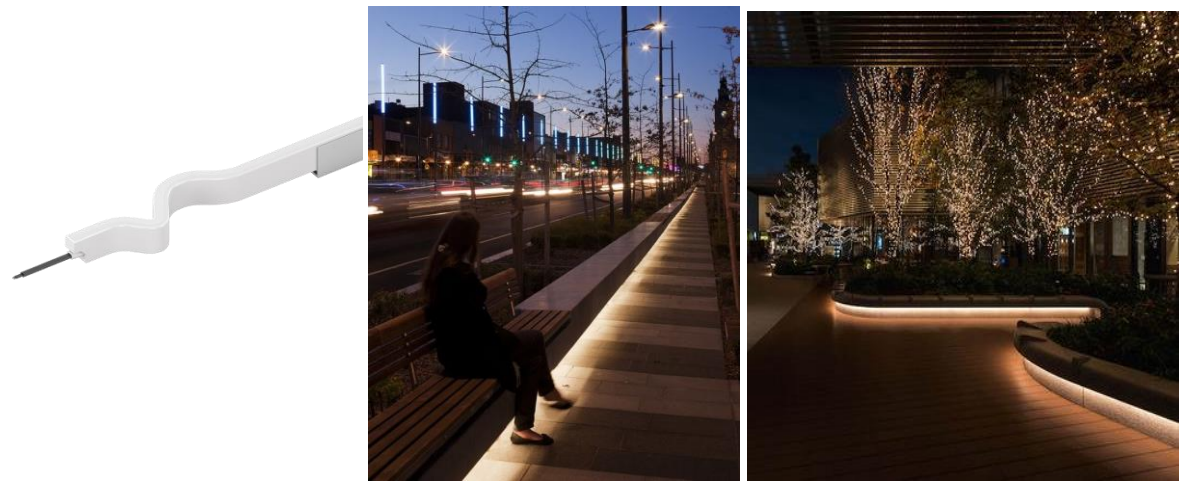


Figure 5.11 – Integrated seat lighting within landscape areas.

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.

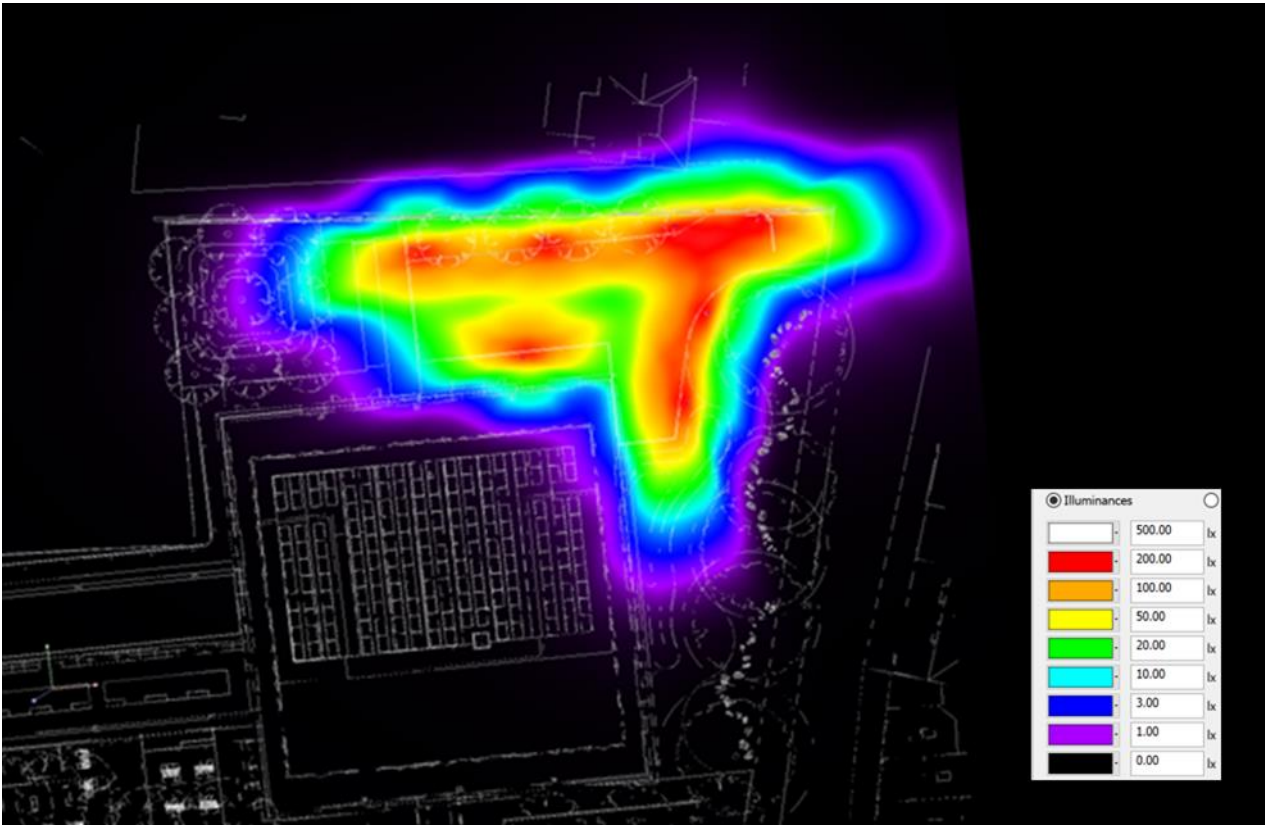


Figure 5.12 – Illumination lux contours for the loading bay adjacent Trinity Road

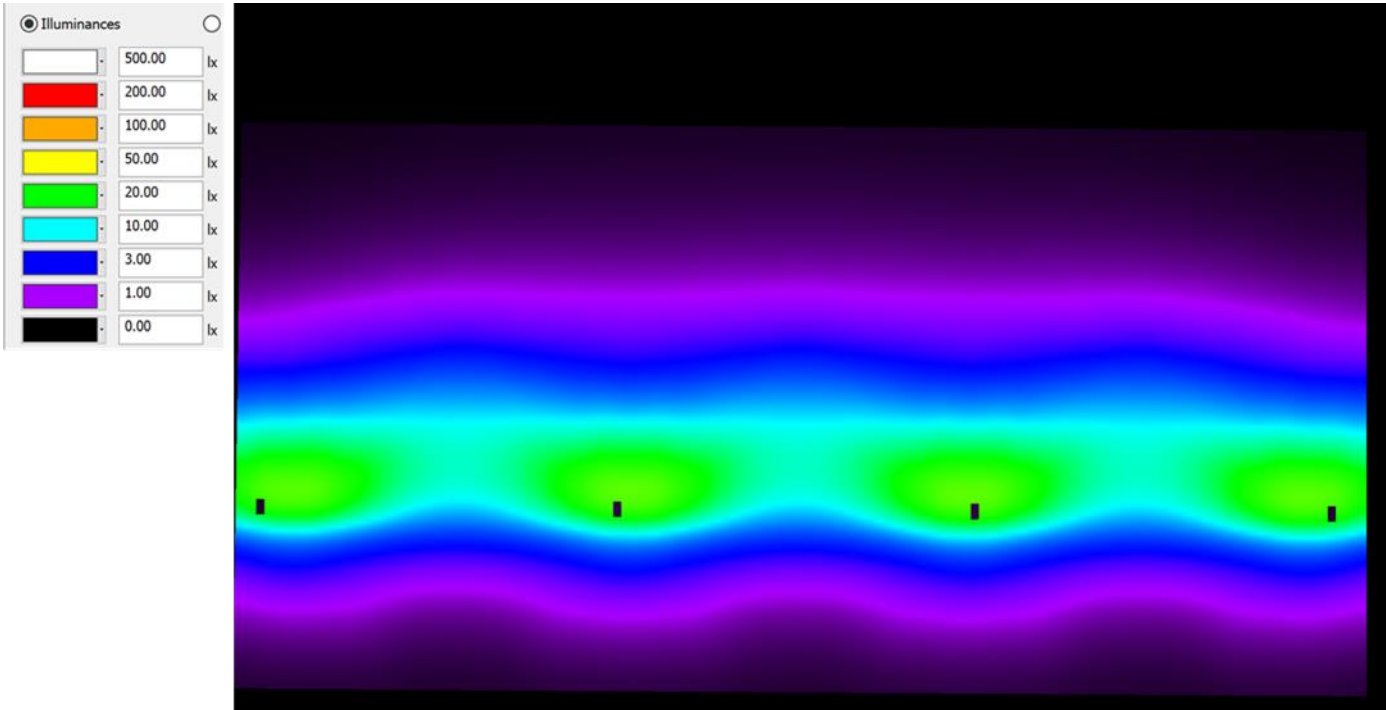


Figure 5.13 – Illumination lux contours for the front access route and parking bays.

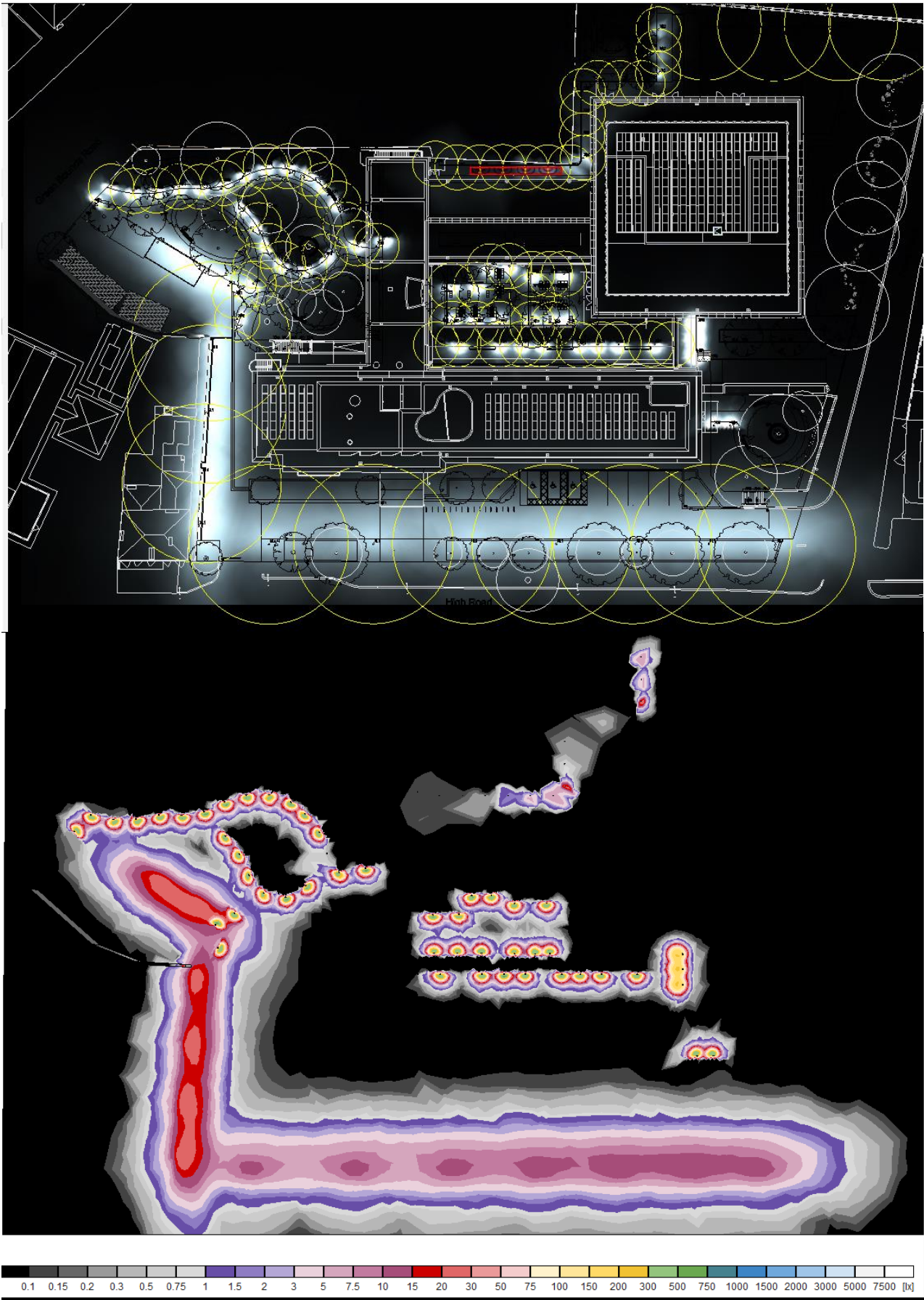


Figure 5.14 – Glow Plan and Illumination lux contours of pedestrian access routes and courtyard.

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 Civic Centre 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 proposed development for the refurbishment of the existing Civic Centre and new Annex Building are assessed to have negligible impact to the existing lighting conditions and environment.

The inclusion of the annex would be a change to the existing exterior car park and therefore be of visual impact, however the internal lighting shall comply with the recommendation 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 provide 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 illumination of the vehicular access roads is generally addressed via lighting columns which are positioned to avoid any undue light spill outside the developments red line boundary. Pedestrian pathways, access routes and general public spaces are generally addressed via low level lighting bollards to avoid any upward light distribution or undue light spill outside the areas being illuminated. Specific shielding is recommended for the carpark area to avoid light spill towards Trinity Road’s residential properties, and the traveller accommodation. St Michaels Church is generally shield from the light sources proposed for the development and any impact is deemed to be negligible.

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 Civic Centres exterior lighting had been in full operation. In areas such as the access road to the car park (adjacent Bounds Green Road) would be improved from those of the existing treatment with better control of the light distribution and colour temperature and mitigation of light spill which looks to be prevalent from the existing lighting columns.

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