HOARE LEA

Manor Road / Richmond

Lighting Design Strategy

Hoare Lea

July 2020

Audit sheet.

Rev	Date	Description	Prepared	Verified
01	20/08/2018	Preliminary Issue	MC	CF
02	14/12/2018	Draft Issue	JB	CF
03	04/01/2018	Updated draft for final comment	BJ	JF
04	16/01/2019	Final issue for planning	BJ	JF
05	25/10/2019	Revised draft issue	MC	CF
06	07/11/2019	Revised lighting strategy	MC	CF
07	18/11/2019	Draft - Scheme revision Block E	MC	CF
08	21/11/2019	Scheme revision Block E	MC	CF
09	06/02/2020	Covered bus layover illuminance levels.	MC	JF
10	14/02/2020	Bus layover lighting study	MC	JF
11	17/07/2020	Revised lighting strategy - for comment	MC	CF
12	28/07/2020	Revised for final issue	MC	DLB

1.0 Summary of changes July 2020.

Introduction

This Lighting Design Strategy has been prepared by Hoare Lea on behalf of Avanton Richmond Development Ltd ('the Applicant') following further amendments to the proposed scheme for the redevelopment of the Homebase store at 84 Manor Road, North Sheen ('the Site'). A planning application for the redevelopment of the Site was submitted to London Borough of Richmond Upon Thames (LBRuT) in February 2019 (ref. 19/0510/FUL) (the 'Original Proposed Development'), and was considered at LBRuT Planning Committee on 3 July 2019. The Planning Committee resolved that they were minded to refuse the Application, however on 29 July 2019 it was confirmed that the Mayor of London would act as the local planning authority for the purposes of determining the application.

Proposed Amendments

Following review of LBRuT's reasons for refusal and discussions with Officers at the Greater London Authority (GLA) and Transport for London (TfL), the Applicant sought to review the scheme, with the principle aim of increasing the delivery of affordable housing through additional density and addressing other issues raised in the Mayor's Stage 2 Report. Initial scheme amendments were submitted in November 2019 ('the November 2019 Amendments') and increased the overall number of units by 48, primarily through the introduction of a new residential building known as Block E.

Following further discussions with TfL and the GLA, it was subsequently agreed that further revisions should be explored in order to deliver an improved scheme, without the need for this additional block.

The proposed changes are described in detail in the accompanying Design and Access Statement Addendum, however, of particular note is the increase in residential units from 385 within the Original Proposed Development to 454 within the Amended Proposed Development. This increases the total number of affordable units by 38 to a total of 172 affordable homes (40% by habitable room taking account of grant funding, increased from 35% as originally submitted). This increase in units and the higher affordable housing provision has been principally achieved through amendments to the height and internal layout in appropriate locations across the Site.

The proposed changes necessitate an amendment to the Application's description of development. The revised description of development (hereafter referred to as the 'Amended Proposed Development') is as follows:

Demolition of existing buildings and structures and comprehensive phased residential-led redevelopment to provide 453 residential units (of which 173 units will be affordable), flexible retail, community and office uses, provision of car and cycle parking, landscaping, public and private open spaces and all other necessary enabling works.

The lighting strategy remains fundamentally unchanged since the original submission, save for coordination to the current proposal and updated to reflect current lighting design guidance on external lighting, specifically BS5489-1:2020.

2.0 Site overview.

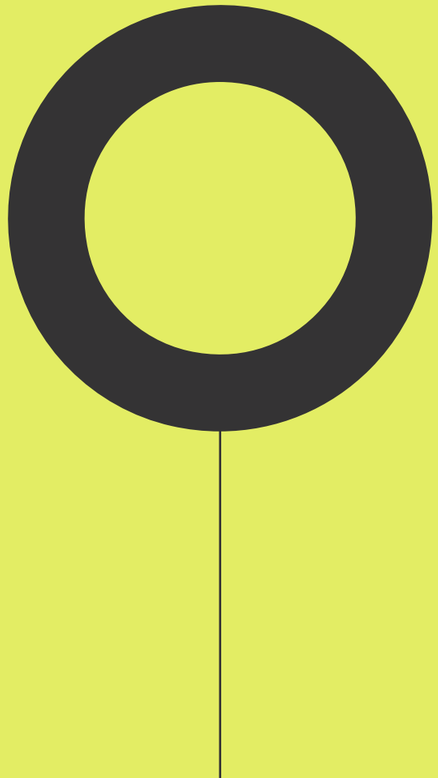
Key Areas:

- Main site entrance.
- Public squares.
- Building entrances.
- Resident courtyards.

Site interaction:

- Vehicular movement.
- Primary pedestrian movement.
- Secondary pedestrian movement.
- Site entrance
- Bus layover

Lighting design considerations.



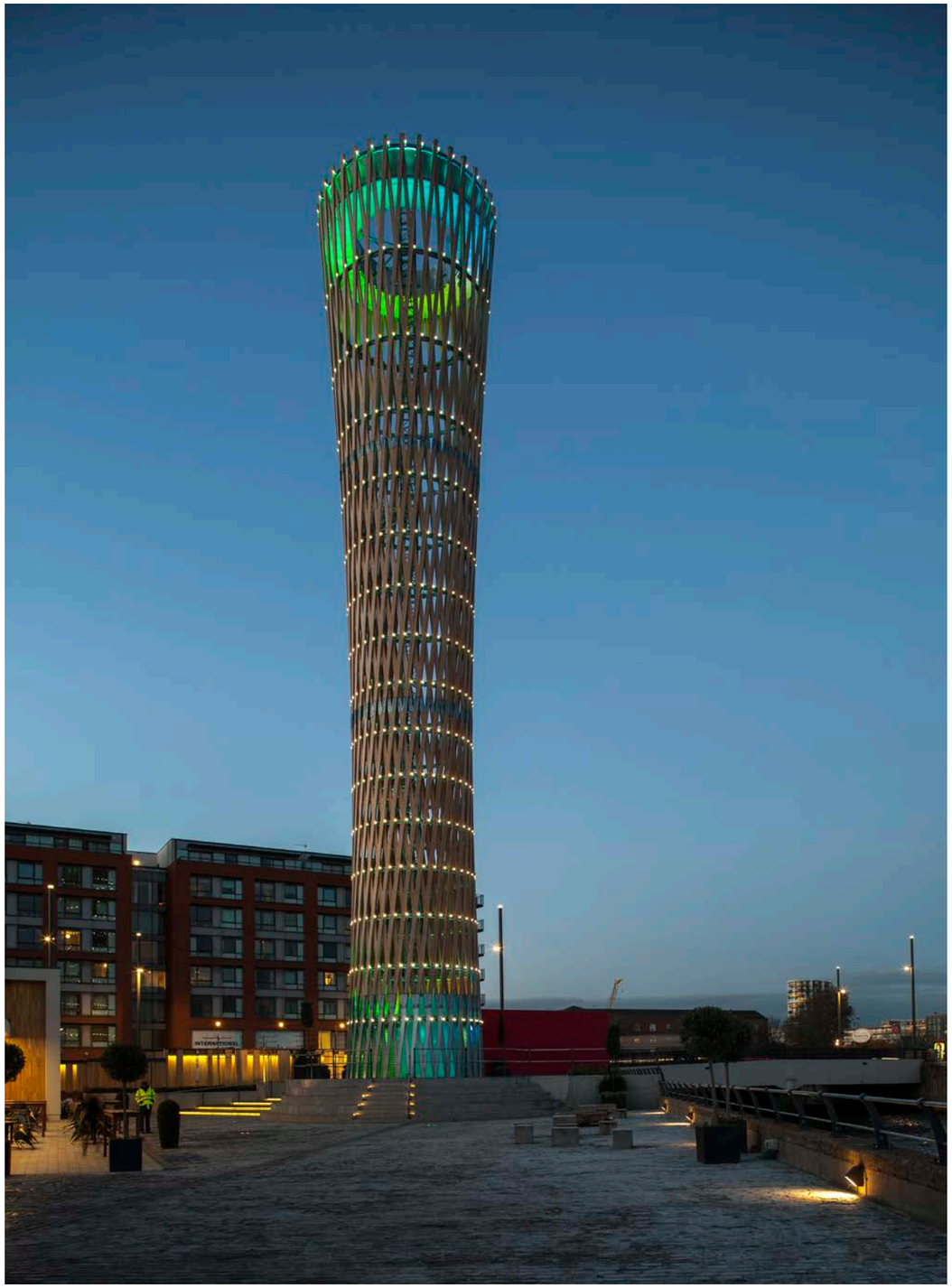
3.0 Lighting design considerations.

3.1 External lighting.

The first question people ask regarding exterior lighting is “why light at all?”. Excluding street lighting, most unplanned exterior lighting installations appear as a decorative indulgence which consume valuable energy resources and result in potential glare and light pollution.

By contrast, good exterior lighting can play a positive role in the way people feel about their environment; it can reveal and enhance our buildings aesthetically, improve our sense of local identity, safety and civic pride and make people more willing to use the streets, squares and parks after dark. Used correctly exterior lighting can thus boost an area’s night-time use and commercial viability. For all these reasons it is generally accepted that effective, varied lighting of buildings and townscapes, both public and private, is a sound investment, that well justifies the relatively small capital and energy costs involved.

A badly-designed lighting scheme distributes light where it is not wanted, causing light pollution, while wasting energy unnecessarily and creating poor visual environments. Designed lighting solutions create better exterior schemes and give a new dimension to the urban environment at night rather than, the all too often, so called ‘functional’ lighting approach which adds little to the night scene.



3.0 Lighting design considerations.

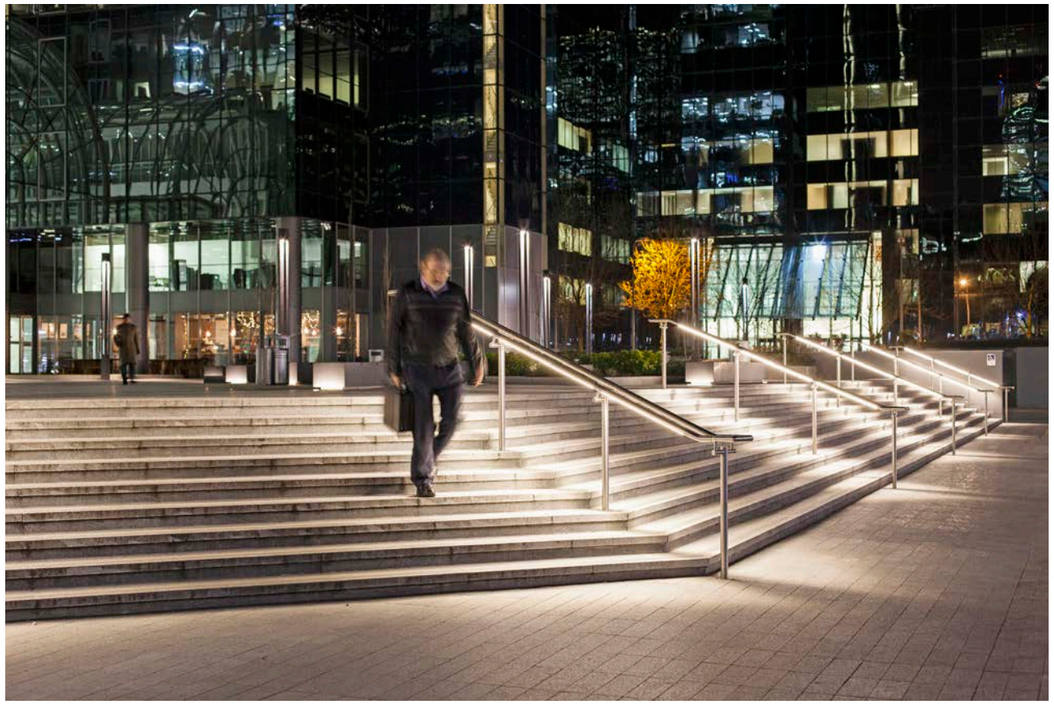
3.2 Safety & orientation.

The amount of lighting required for obstacle avoidance and visual orientation is minimal. For example, emergency lighting standards suggest a value of between 0.5 and 1 lux for a person, in a high stress situation, to safely negotiate a safe passage. Often these low levels of illumination are provided by existing light spill and moonlight alone.

In reality the purpose of urban realm pedestrian lighting is not one of obstacle avoidance, but of human subjectivity. Research has shown that the ability to read a persons facial features in external realm environments is a key function in reducing “fear of crime”.

Appropriately illuminated pedestrian areas can reduce fear of crime, which is known to encourage footfall – this in turn can increase natural and community surveillance and further deter criminal acts.

A pleasing and visually interesting exterior environment can be further enhanced by creating spaces and zones of interaction which encourage residence to utilise spaces in the evening.



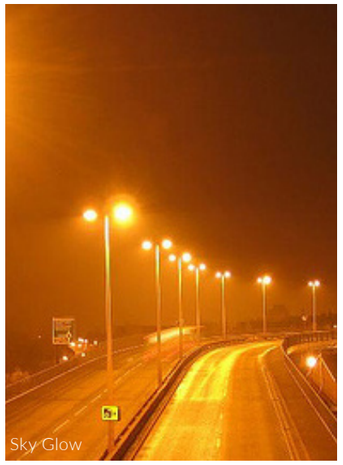
3.0 Lighting design considerations.

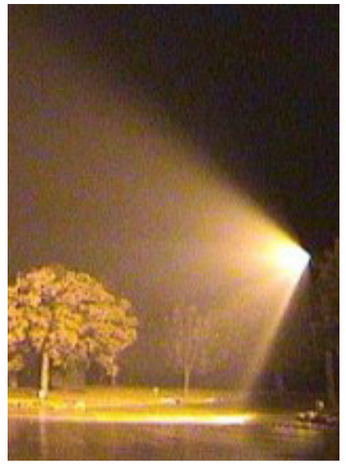
3.3 Light pollution

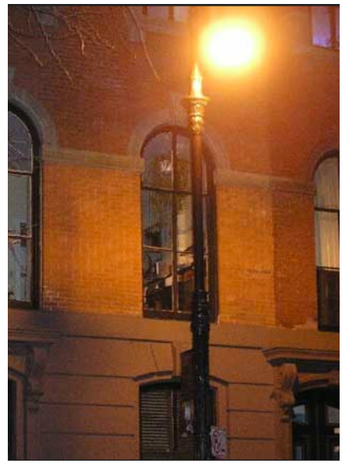
The general heading for the negative effects of light at night is Light Pollution but this heading actually covers four key factors. These are:

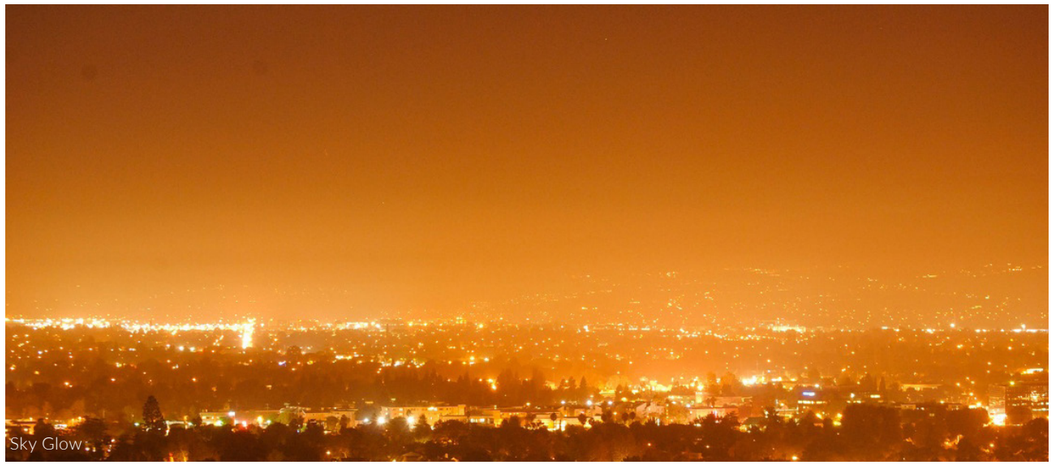
- Glare occurs when the site user sees light directly from the fixture (or lamp) and contrast ratios are high.
- Light Trespass/Encroachment: Poor outdoor lighting shines onto neighbourhood properties and into bedroom windows, reducing privacy and hindering sleep.
- Sky Glow: A large fraction of poor lighting shines directly upwards, creating the adverse sky glow above towns and cities that washes out views of the dark night sky, taking away an important natural resource.
- Energy Waste: Much outdoor lighting wastes energy because it is not well-designed with light not directed where it is required.

There is new legislation as part of the 'Clean Neighbourhoods and Environment Bill' which will covers lighting as a social nuisance, although there are many exclusions, it does start to highlight the importance of well designed external lighting as a integral part of the modern urban landscape.

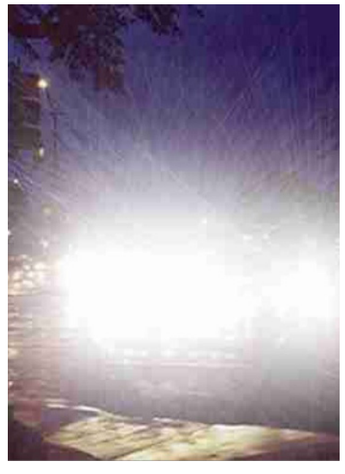

Sky Glow






Sky Glow


Glare



3.0 Lighting design considerations.

3.4 Colour temperature and colour rendering

When one considers colour in light it is important to consider the colour of white lighting. Like daylight and sunlight, the range of colours available within the white spectrum.

Changes in white colour temperature are often an intuitive experience for people, as it relates to the natural rhythms of daylight.

Different colours of white light will provide different impressions and have differing properties when it comes to rendering surface finish.

Impressions of character and impact can be expressed through the appropriate use of colour.

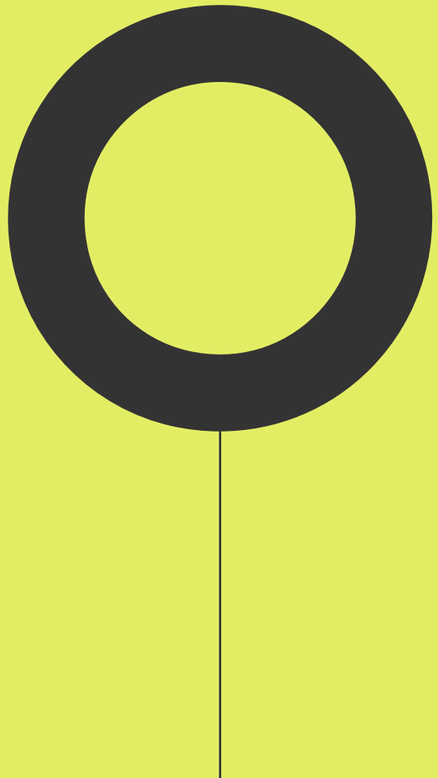
The visual impact of coloured light changes in relation to illumination levels, be that through daylight or artificial light sources.

By understanding the eye's sensitivity to colour one can utilise coloured light to create a strong visual impression that would have required a greater amount of energy to achieve in white light.

The use of warm white light of 2700K or 3000K is becoming more and more widely used across the industry. There is vast amounts of research ongoing by the industry findings, exploring the environmental impacts of cool coloured LEDs in street lighting and its effects on peoples well being and on nature. Aesthetically, the use of warm white LEDs is bridging the gap in the relationship between visual aesthetics of roadways when metal halide was used in the past.

Hoare Lea recommend using a warmer white light colour temperature of 3000K. This is to add warmth and enhance the materiality of the building. There is evidence to reflect that the future of LED street lighting will use the warmer spectrum.

Lighting criteria.



4.0 Lighting criteria.

4.1 External realm lighting

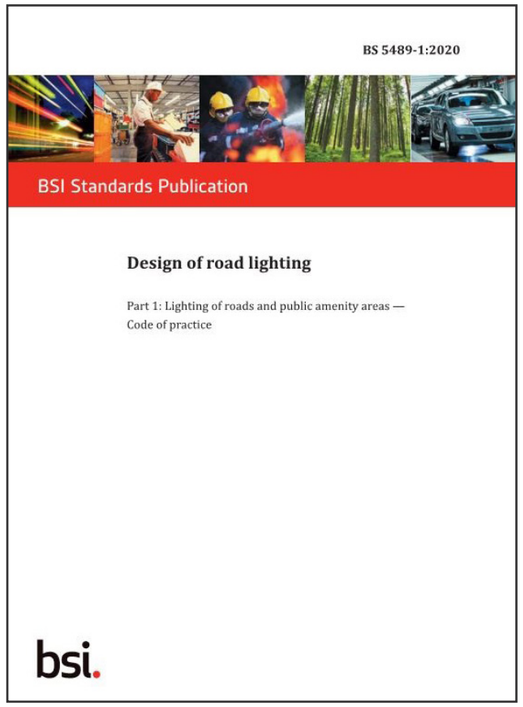
A number of documents lay down the best practise and guidance on providing sufficient and appropriate lighting for vehicular thoroughfares, pedestrians passages and visual interest.

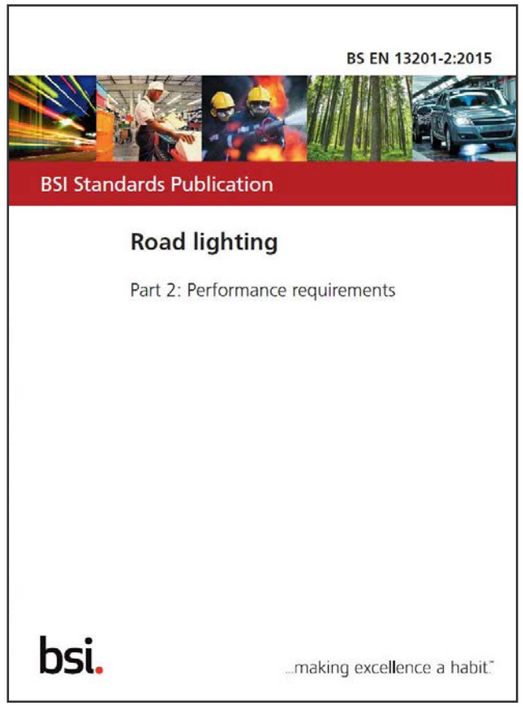
These are:

- BS 5489-1:2020
- BS EN 13201-2:2015
- CIE 136:2000

And if appropriate:

- CIBSE Lighting Guide 6: The Outdoor Environment 1992
- CIBSE Lighting the Environment: A guide to good urban design



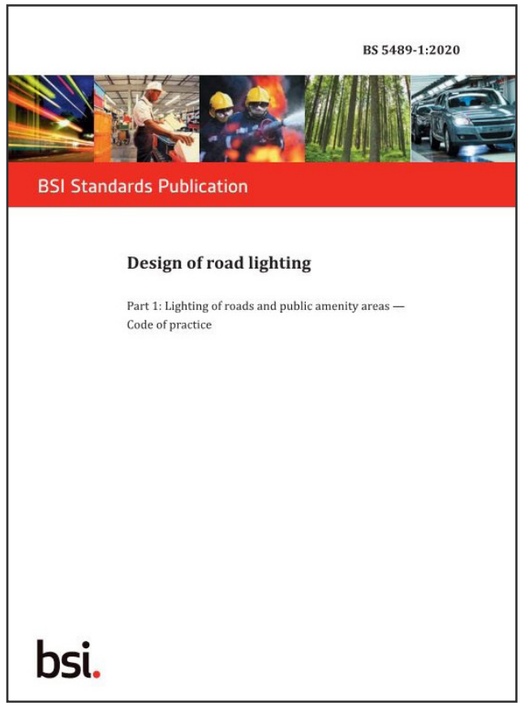


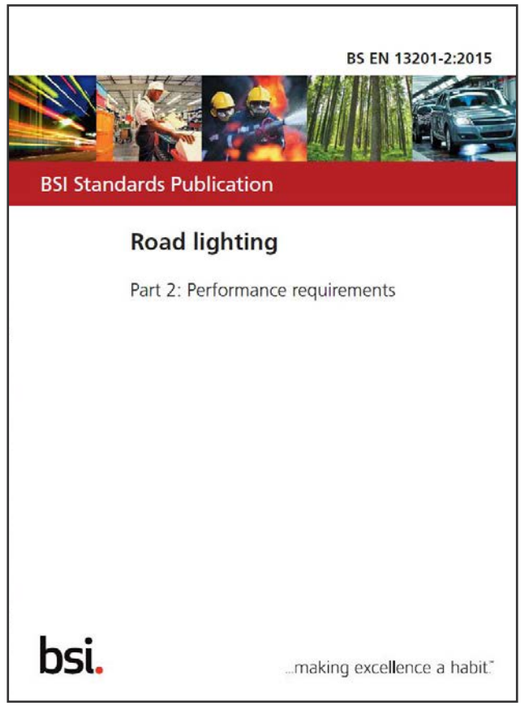
4.0 Lighting criteria.

4.2 Ecology

Section 7.8 of BS 5489-1:2020 also gives a brief insight to lighting areas around aerodromes, railways, coastal waters, harbours and inland waterways. Areas which are in the vicinity of bat roosting or foraging corridors require consideration to minimise the impact to the bats natural behaviour and maintain clear access to their roosting, mating and feeding grounds. Some useful awareness and mitigation strategies are highlighted within “Bats and Lighting in the UK” by the Bat Conservation Trust”.

- Lighting levels; should be “as low as guidelines permit”
- Light colour temperature; Reduce UV light emission by using warmer colour temperature lighting.
- Lighting column height; should be as “short as possible” to reduce ecological impact.
- Pedestrian zones; should “take the form of low level lighting” where possible





4.0 Lighting criteria.

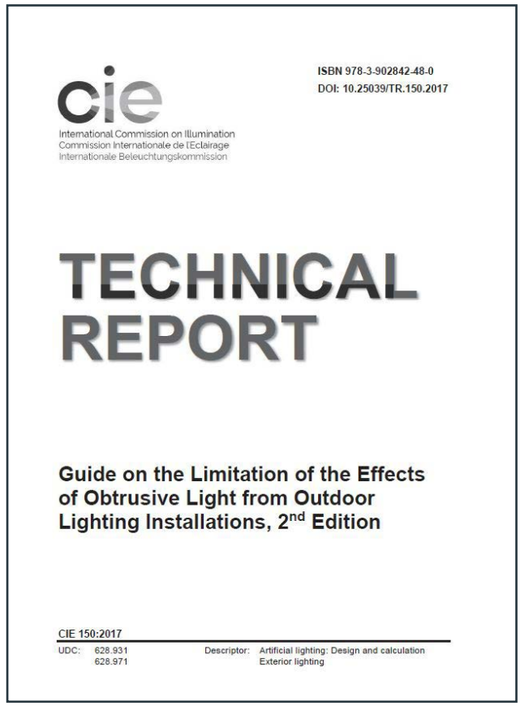
4.3 Light pollution

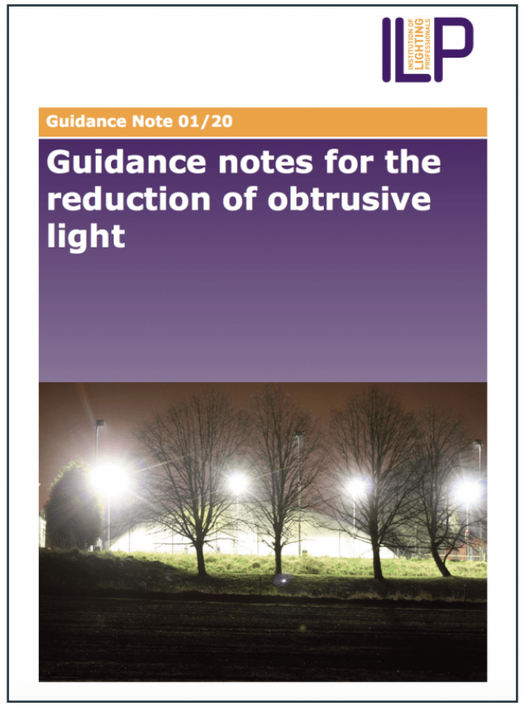
A number of documents lay down the best practise and guidance on reducing the visual and environmental impact of external lighting in relation to light pollution.

These are:

- CIE Technical Report - CIE 150: 2017
- ILE Guidance Notes for the Reduction of Obtrusive Light

The implementation of these standards is vital because of “The Clean Neighbourhoods and Environmental Act, 2005” which makes light a statutory nuisance.





4.0 Lighting criteria.

4.4 Lighting considerations adjacent to railways

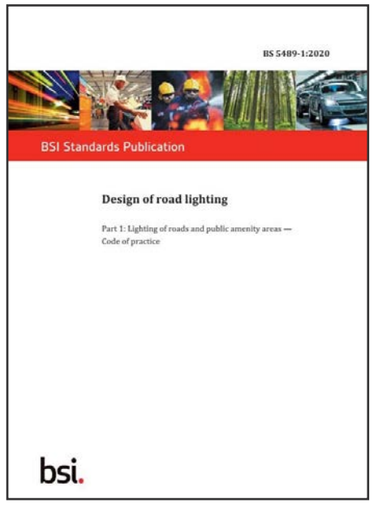
Due to the close proximity of the site to the railway, one must be mindful to not produce a lighting scheme that has a detrimental impact to the safe use of the railway - no light spill onto railway.

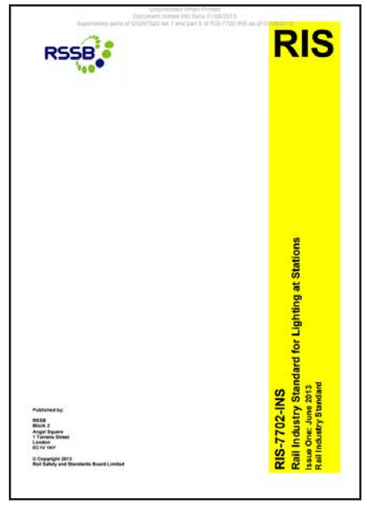
A number of standard outline guidances of what to be mindful of when designing lighting schemes adjacent to railways, these include:

- BS 5489-1:2020 (section 7.8.3)
- Rail Safety and Standards Board (RSSB)

These guidances and institutional standards should be consulted when developing the scheme design. Some of the key consideration should be paid to:

- Light trespass
- Glare
- Colours of light





7.8.3 Lighting in the vicinity of railways

NOTE 1 The area within which a road lighting scheme can affect the safe use of a railway is not defined because of the diversity of fixing locations for signals and curvature of railway lines.

Lighting close to the field of view of a train driver should be designed in such a way as to avoid compromising the visibility of signals. In particular, the following recommendations should be met.

a) Light spill should be minimized above the "limit of work" line of a railway bridge crossing/ passing above a road.

b) Columns should be placed as far away as practicable from a rail bridge or the fence line of railway track.

c) Unwanted glare should be minimized for the train driver by the use of luminaires conforming to an appropriate G* class selected from BS EN 13201-2:2015, Table A.1, or by shielding.

Where light might spill on to rail property, or luminaires might be mistaken for railway signals by train drivers, or lighting operatives risk falling on to rail property, then the rail authority should be contacted to determine the appropriate measures to be taken.

NOTE 2 Further information, related in particular to level crossings, can be found in Part 2, Section E of the HSE publication Railway safety principles and guidance [53].

Any lighting scheme should not affect track visibility for railway operatives. In addition, when planning the location of lighting columns adjacent to railways, the design should be such that any likely foreseeable collision with a lighting column by road traffic will not then lead to a hazard on the railway caused by the lighting column falling onto the railway.

Colours in a lighting scheme should not conflict or cause confusion with colours used for signal lights.

NOTE 3 Information on colours and colour classes is given in BS 1376.

4.0 Lighting criteria.

4.5 Site context - Manor Road

To select the most appropriate lighting classifications for within the site it is important to have an understanding of the surrounding road classifications. This is to ensure illuminance levels do not drop suddenly between one zone and another, creating distinct contrast and the appearance of being dark.

The following lighting classifications have been assumed based on the road characteristics in accordance with the appropriate guidances BS 5489-1:2020 & BS EN 13201-1:2015

Manor Road - Assumed lighting class (M4):

Table A.3 — *Lighting classes for traffic routes (v ≤ 40 mph)*

Traffic flow	Lighting class		
	Dual carriageway		Single carriageway
	Junction density: high	Junction density: low	
High to very high[A)]	M3	M4	M3
Low to moderate[B)]	M4	M5	M4
Very low[C)]	M5	M6	M5

NOTE 1 High junction density would be junction centres spaced < 3 km apart. A risk assessment can determine whether some of the junctions constitute conflict areas (see A.3.2).

NOTE 2 Grey highlighting indicates situations that would not usually occur in the UK.

[A)] High to very high traffic flow might be defined as either having an ADT of > 40 000, or where the flow exceeds 65% of the lane maximum capacity for dual or multi-lane carriageways or 45% for single carriageways.

[B)] Low to moderate traffic flow might be defined as either having an ADT of between 7 000 and 40 000, or where the flow is between 35% and 65% for dual or multi-lane carriageways or between 15% and 45% for single carriageways.

[C)] Very low traffic flow might be defined as either having an ADT of < 7 000, or where the flow is < 35% for dual or multi-lane carriageways or < 15% for single carriageways.

Tables extracted from 'BS5489-1:2020 | Code of practice for design of road lighting'.

Table 1 — M lighting classes

Class	Luminance of the road surface of the carriageway for the dry and wet road surface condition				Disability glare	Lighting of surroundings
	Dry conditions			Wet	Dry conditions	Dry conditions
	$\overline{L}$ [minimum maintained] cd·m²	U_o [minimum]	U_l [a] [minimum]	U_{ow} [b] [minimum]	f_{TI} [c] [maximum] %	R_{EI} [d] [minimum]
M1	2,00	0,40	0,70	0,15	10	0,35
M2	1,50	0,40	0,70	0,15	10	0,35
M3	1,00	0,40	0,60	0,15	15	0,30
M4	0,75	0,40	0,60	0,15	15	0,30
M5	0,50	0,35	0,40	0,15	15	0,30
M6	0,30	0,35	0,40	0,15	20	0,30

[a] Longitudinal uniformity (Ul) provides a measure of the conspicuity of the repeated pattern of bright and dark patches on the road surface and as such is only relevant to visual conditions on long uninterrupted sections of road and should therefore only be applied in such circumstances. The values stated in the column are the minimum recommended for the specific lighting class, however, they may be amended where specific circumstances appertaining to the road layout or use are determined by analysis or where specific national requirements appertain.

[b] This is the only criterion for wet road conditions. It may be applied in addition to criteria for the dry condition in accordance with specific national requirements. The values stated in the column may be amended where specific national requirements appertain.

[c] The values stated in the column f_{TI} are the maximum recommended for the specific lighting class, however, they may be amended where specific national requirements appertain.

[d] This criterion shall be applied only where there are no traffic areas with their own lighting requirements adjacent to the carriageway. The values shown are tentative and may be amended where specific national or individual scheme requirements are specified. Such values may be higher or lower than the values shown, however care should be taken to ensure adequate illumination of the areas is provided.

Tables extracted from 'BS EN 13201-1:2015 | Road lighting performance requirements'.

4.0 Lighting criteria.

4.6 Site thoroughfares.

The following lighting classification have been selected in accordance with appropriate guidances BS5489-1:2020.

Vehicle Access Route (P3):

7.5 lux - Maintained minimum average

1.5 lux - Minimum maintained

Primary Pedestrian Route (P5):

3.0 lux - Maintained minimum average

0.6 lux - minimum uniformity

Secondary Pedestrian Route:

Not a high use area, lighting to be provided for safe movement by highlighting change in direction and building entrances.

Social & Congregation:

Site entrance:

10 lux - Maintained minimum average

2.0 - Minimum maintained

Bus layover:

30 lux - Maintained minimum average

40% Uniformity

4.0 Lighting criteria.

4.6 Site thoroughfares

The following lighting classifications have been selected in accordance with the appropriate guidances BS 5489-1:2020, BS EN 13201-2:2015 & Gen/013 Rev A.

Due to the relatively low levels of slow moving vehicular traffic, based on the percentage of parking space for residents, it is proposed that slightly lower illuminance levels are required.

Vehicle Access Route (P3): →

7.5 lux - Maintained minimum average

1.5 lux - Minimum maintained

Primary Pedestrian Route (P5): →

3.0 lux - Maintained minimum average

0.6 lux - minimum maintained

Secondary Pedestrian Route: →

Not a high use area, lighting to be provided for safe movement by highlighting change in direction and building entrances.

Social & Congregation:

Areas that are for the use as social and congregation spaces, such as open squares gardens, should be treated as such and are not as critical to illuminate to a uniform standard. Feature lighting should be utilised to supplement ambient lighting to create a welcoming environment. As such these areas may not be lit to the BS5489 stated illuminance levels.

Site Entrance (P2):

10 lux - Maintained minimum average

2.0 lux - Minimum maintained

Maintaining comparable illuminance level as Manor Road into the site entrance.

Bus layover:

30 lux - Average.

40% Uniformity

Illuminance levels may be revised following confirmation of TFL requirements.

Lighting required for 24 hour use, PIRs should be used to control dimming settings to reduce energy consumption when not in use.

Terraces - Assumed private access only.

Table A.5 — *Lighting classes for subsidiary roads*

Traffic flow	Lighting class		
	E1 to E4[A)]	E1 to E2[A)]	E3 to E4[A)]
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy [B)]	P5	P4	P3
Normal [C)]	P5	P5	P4
Quiet [D)]	P6	P5	P4

Tables extracted from 'BS5489-1:2020 | Code of practice for design of road lighting'.

Table 3 — P lighting classes

Class	Horizontal illuminance		Additional requirement if facial recognition is necessary	
	$\bar{E}$ [a] [minimum maintained] lx	E_{min} [maintained] lx	$E_{v,min}$ [maintained] lx	$E_{sc,min}$ [maintained] lx
P1	15,0	3,00	5,0	5,0
P2	10,0	2,00	3,0	2,0
P3	7,50	1,50	2,5	1,5
P4	5,00	1,00	1,5	1,0
P5	3,00	0,60	1,0	0,6
P6	2,00	0,40	0,6	0,2
P7	performance not determined	performance not determined		

[a] To provide for uniformity, the actual value of the maintained average illuminance shall not exceed 1,5 times the minimum $\bar{E}$ value indicated for the class.

Table A.1 — *Lighting classes of comparable level*

M class	C class	P class
—	C0	—
M1	C1	—
M2	C2	—
M3	C3	P1
M4	C4	P2
M5	C5	P3
M6	—	P4
—	—	P5
—	—	P6

NOTE The data in this table are extrapolated from PD CEN/TR 13201-1:2014.

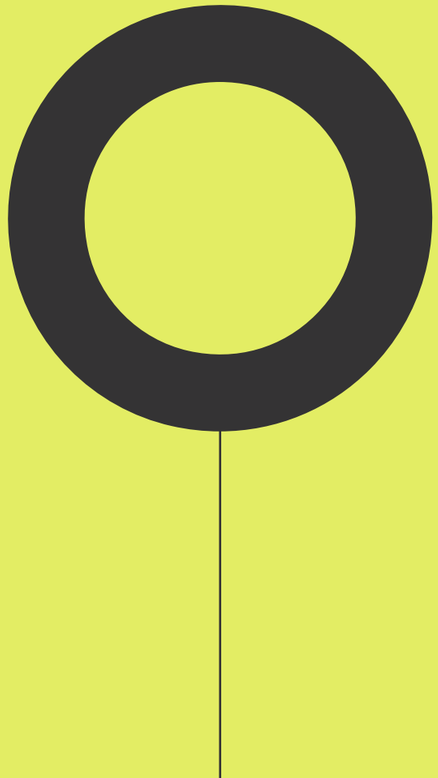
Tables extracted from 'BS EN 13201-1:2015 | Road lighting performance requirements'.

Driver Only Bus Stand

General Concourse	30 lux average	40% Uniformity
Pedestrian Crossing	50 lux average*	40% Uniformity
General Footpath	30 lux average	40% Uniformity

Table extracted from 'Gen/013 Rev A | London buses External Lighting Design Guide for Bus Facilities'.

Ambient lighting strategy.



5.0 Ambient lighting strategy.

5.1 Vehicular routes.

Purpose of lighting:

- Illuminated to the required illuminance levels.
- Safe movement of vehicles and pedestrians.

Type of lighting:

- Amenity lighting columns.
- 4m in height.
- Downlights within under canopy areas.
- 3000K warm white colour temperature.
- Good optical control.
- Range of anti glare accessories.
- Colour rendering of 80+ CRI.
- Dimmable
- 0% upward light ratio.

5.0 Ambient lighting strategy.

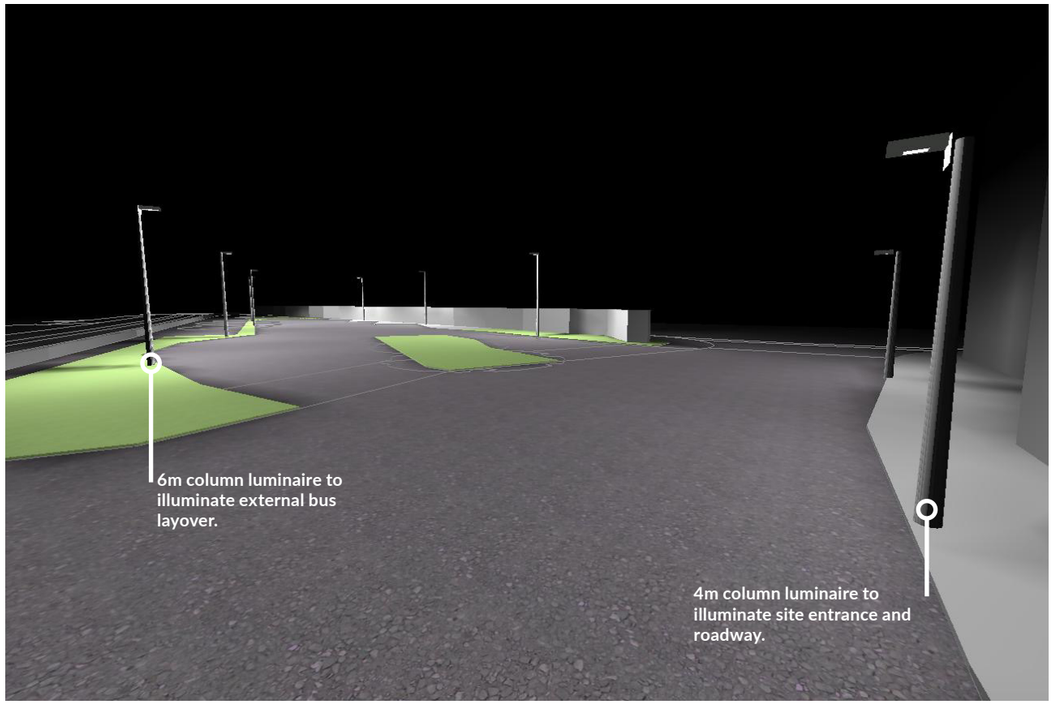
5.2 Bus layover.

Purpose of lighting:

- Illuminated to the required illuminance levels.
- Safe movement of vehicles and pedestrians.

Type of lighting:

- Ceiling recessed medium beam down-lights.
- Amenity lighting columns.
- 6m lighting column.
- 0% upward light ratio.
- 3000K warm white colour temperature.
- Good optical control.
- Range of anti glare and shielding accessories e.g. back plate.
- Colour rendering of 80+ CRI.
- Dimmable



5.0 Ambient lighting strategy.

5.2 Bus layover & site entrance.

Proposed luminaires:

- Amenity lighting columns.
- 4m - 6m lighting column.
- 0% upward light ratio.
- 3000K warm white colour temperature.
- Good optical control.
- Range of anti glare and shielding accessories.
- Colour rendering of 80+ CRI.
- Dimmable

Column luminaire:

Manufacturer: WEEF Lighting

Product name: VFL540 LED

Description: Column mounted luminaire @ 6m

Optical distribution: Asymmetric forward throw

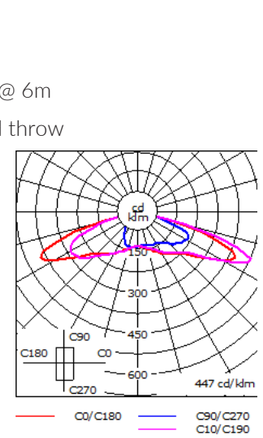
Wattage: 122W

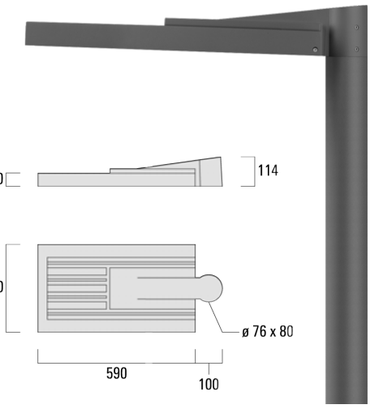
Luminaire lumen output: 11835.8lm

Efficacy: 97 luminaire lm/W

Accessories: Anti glare/back shield.

Product Code: 108-1864





Column luminaire:

Manufacturer: WEEF Lighting

Product name: VFL520 LED

Description: Column mounted luminaire @ 4m

Optical distribution: Asymmetric forward throw

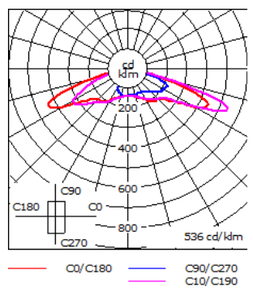
Wattage: 28W

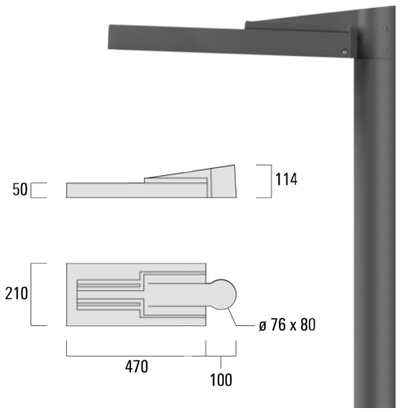
Luminaire lumen output: 2555.3lm

Efficacy: 91 luminaire lm/W

Accessories: Anti glare/back shield.

Product Code: 108-1494





5.0 Ambient lighting strategy.

5.2 Bus layover.

Lighting guidance: and levels achieved:
TFL lighting standard (Gen/013 Rev A) refers only to external lighting guidance for bus facilities.

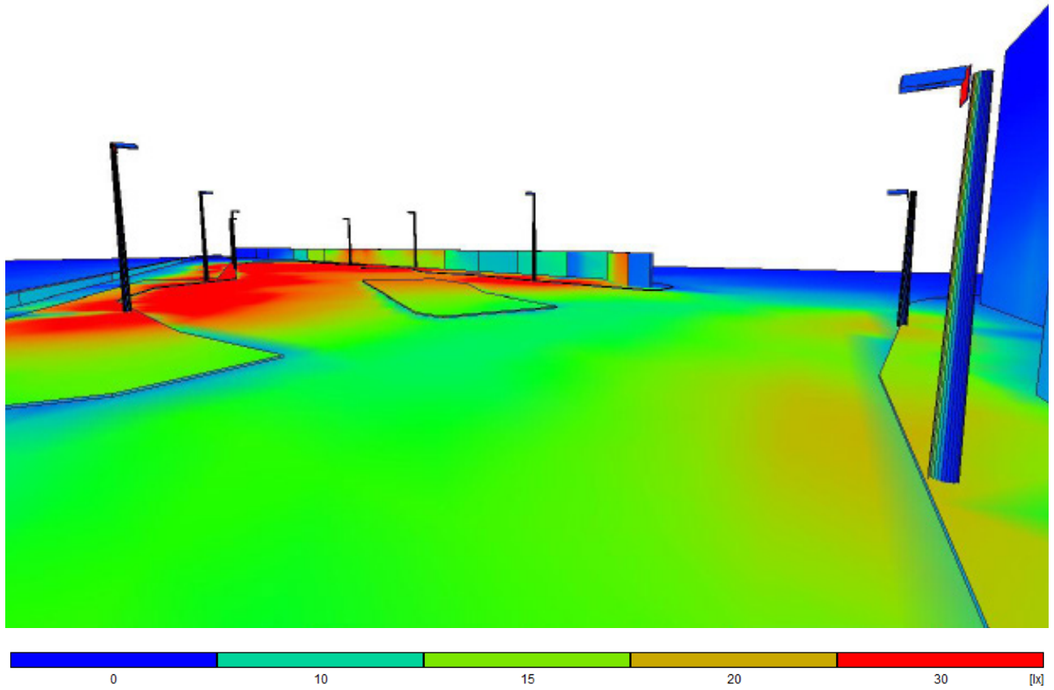
Uncovered bus layover:

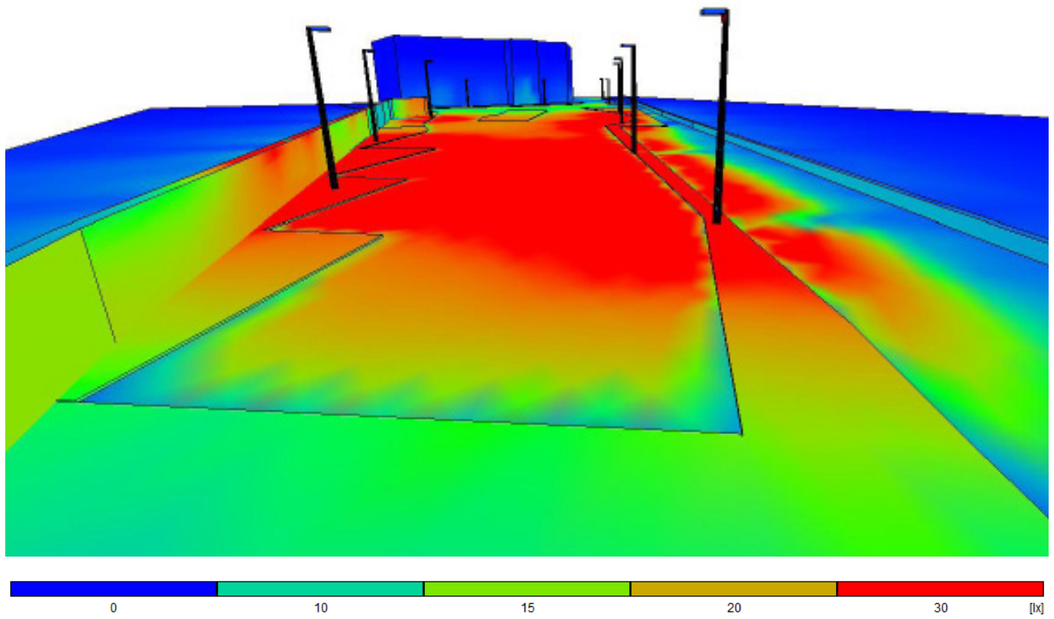
- Based on section 2.4 Driver Only Bus Stands - Gen/013 Rev A
- 30 lux average
- 40% uniformity

Achieved lighting levels:
Uncovered bus layover:

- 34.4 lux average
- 46% uniformity

Lighting Control:
FL lighting standard (Gen/013 Rev A) states that “Driver only bus stands and bus depots where proximity sensors could be considered in these locations after 11pm” therefore it is recommended that proximity sensors are used to reduce illuminance levels to 50% and once a bus or driver is detected then levels raise to 100%.





5.0 Ambient lighting strategy.

5.2 Bus layover - Light spill to apartments.

With the inclusion of the bus layover an assessment was undertaken to evaluate its light disturbance and trespass on the Block D residents.

The lighting for this assessment had been designed with luminaires with good optical control and 100% downward distribution with a cut-off point of 70 degrees. Site entrance lighting closest to the apartments are column mounted luminaires are mounted at a 4m height, therefore will not produce direct light tress-pass into the first floor windows.

Within the bus layover adjacent to the apartments is illuminated with column mounted luminaires are mounted at a 6m height. On this basis the both ground floor and first floor apartments of block D adjacent to the bus layover will be assessed.

The false colour illumination visuals shown here compares two models:

- The first shows the bus layover only without the surrounding street lighting to illuminate the entrance and roadway into the site.
- The second shows the bus layover with the inclusion of the required street lighting.

This assessment concludes that with the correct luminaire selection the bus layover will not produce significant direct light tress-pass into the ground level apartments. However the street lights in front of Block D do produce a degree of light back spill that could enter the apartment windows. Although these levels are quite low, if required this can be mitigated through the use of shields or baffles that would reduce the back spill.

Further consideration should be given to the surface finish of the bus layover to mitigate luminance impact, darker surface finish should be considered.

There is potential for reflected light glare from vehicles parked within the bus layover. On this basis it is advised that within not operational hours the lighting is dimmed to 50% to mitigate disturbance to residents.

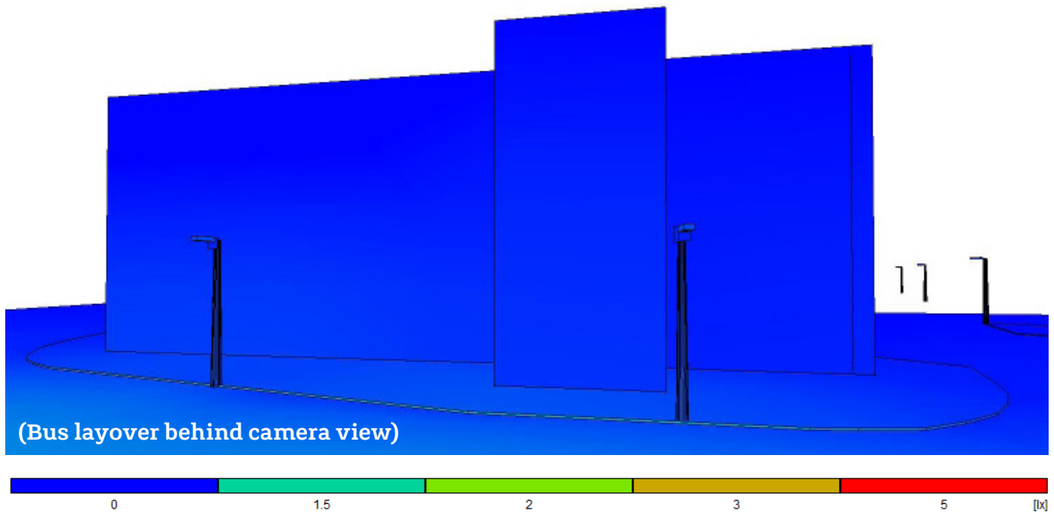
Calculation results - Bus layover lighting only.

Ground Floor Apartment:

- Average illuminance: 0.65 lux
- Minimum illuminance: 0.06 lux
- Maximum illuminance: 1.56 lux

First Floor Apartment:

- Average illuminance: 0.05 lux
- Minimum illuminance: 0.0 lux
- Maximum illuminance: 0.16 lux



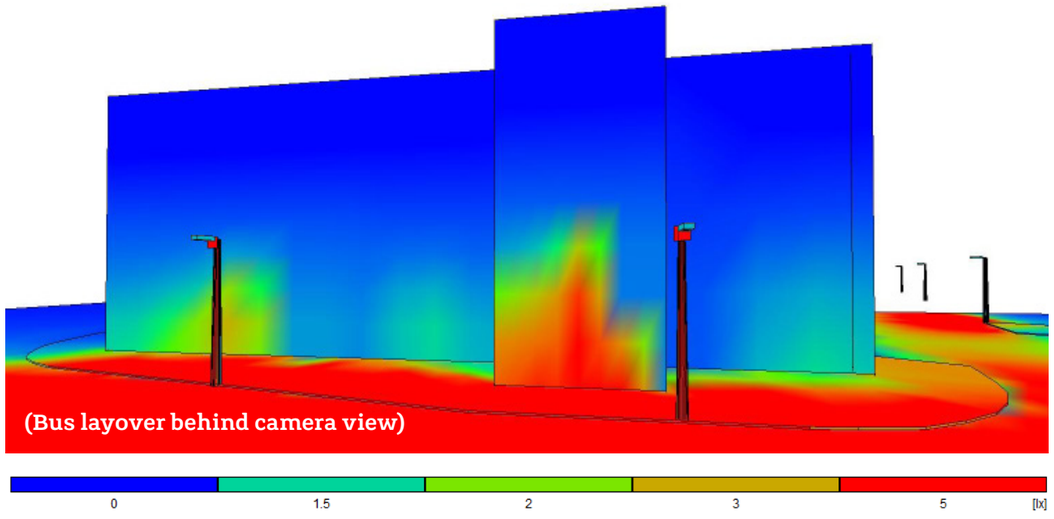
Calculation results - Bus layover & street lighting.

Ground Floor Apartment:

- Average illuminance: 1.25 lux
- Minimum illuminance: 0.07 lux
- Maximum illuminance: 4.39 lux

First Floor Apartment:

- Average illuminance: 0.05 lux
- Minimum illuminance: 0.0 lux
- Maximum illuminance: 0.21 lux



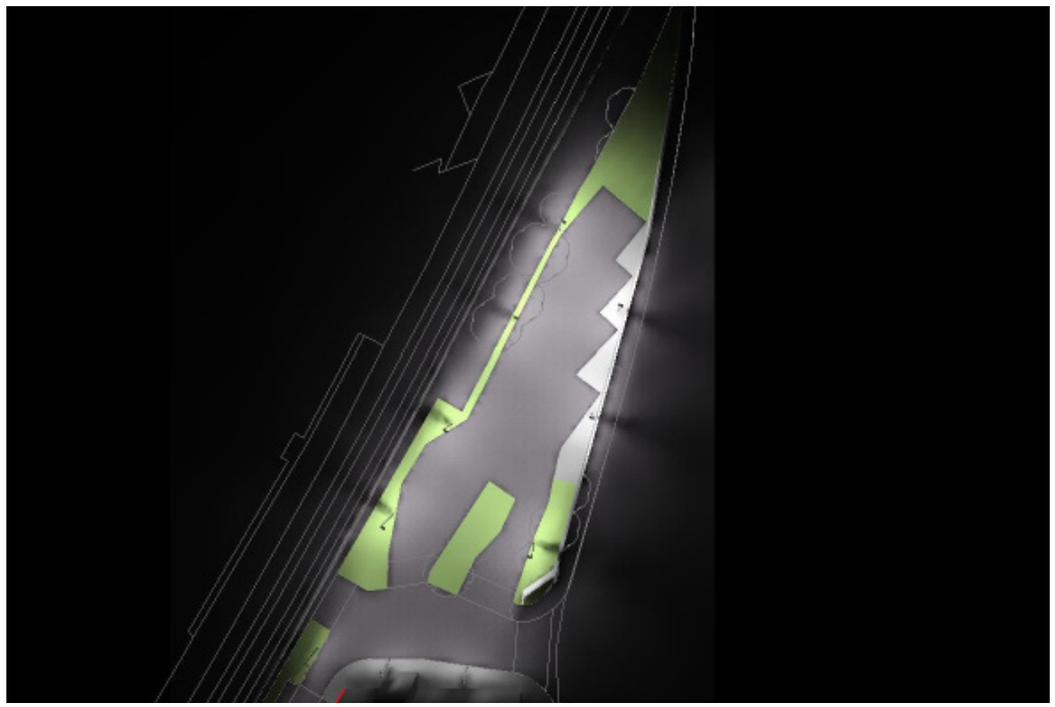
5.0 Ambient lighting strategy.

5.2 Bus layover - Light spill to railway.
The design must produce no lightspill onto or view of light sources from the railway tracks (National Rail requirements).

The bus layover, which backs directly onto the railway is illuminated with 6m column mounted luminaires to achieve the required illuminance levels.

The luminaires used are to have good optical control and 100% downward distribution with a cut-off point of 70 degrees. Glare shields will be required to minimise backwards light and views of the light source from the rear.

To ensure requirements of glare and light trespass are met, a thorough technical exercise must be undertaken to assess if further measures are required e.g. solid fence.



A. Typical Column Mounted Luminaire
Asymmetric street optic. Product and optic may vary across scheme.
3000K.

B. Typical Large Column Mounted Luminaire
Asymmetric forward throw optic. Glare accessories required.
3000K.

5.0 Ambient lighting strategy.

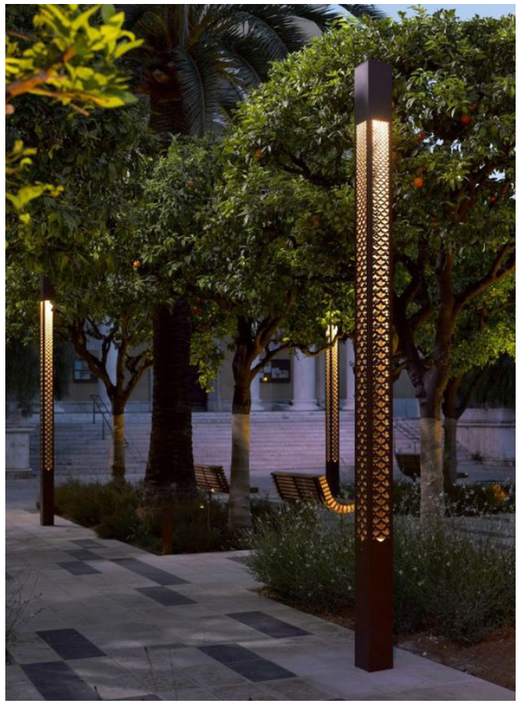
5.3 Primary pedestrian routes.

Purpose for lighting:

- To guide users through the space.
- Safety and security.
  - Illuminate paving and level changes to avoid trips and falls
  - Good facial recognition to increase the appearance of safety.

Type of lighting:

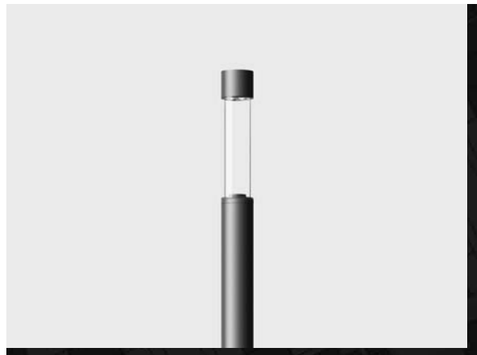
- Low hight, human scale, feature columns
  - Provide both ambient and feature lighting to avoid a uniform flat light pattern.
- 3000K warm white colour temperature.
- Good optical control.
  - Downward directional optic
  - No indirect lighting component to minimise light pollution.
- Colour rendering of 80+ CRI.
- Dimmable



5.0 Ambient lighting strategy.

5.4. Event space - ambient lighting.
6-8m multi-optic lighting columns to provide a flexible lighting solution to cater various events

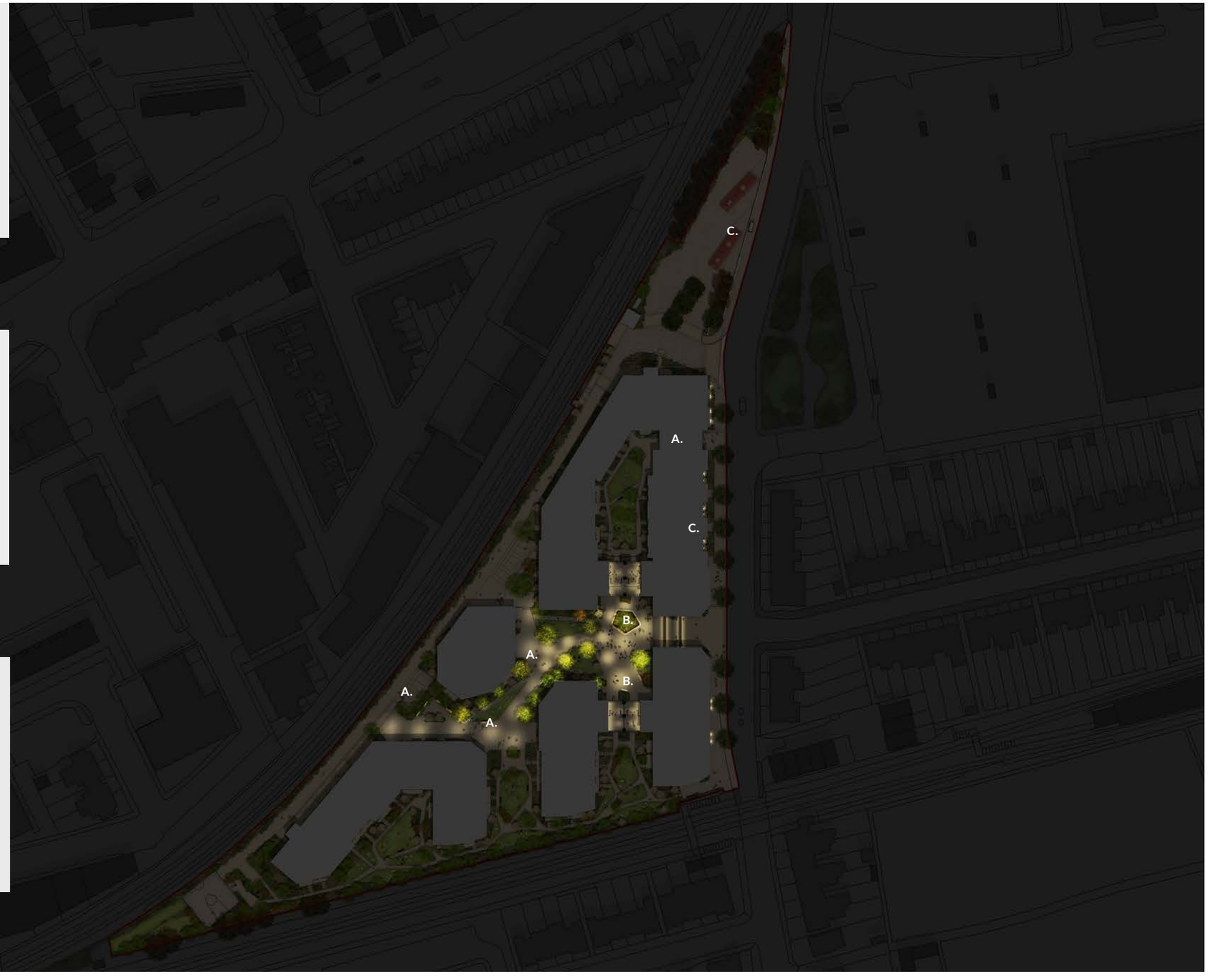
Applicable lighting column:
- Column selection could provide and integrate the following non lighting related elements:
- Security
- Speakers
- Wifi
- Power for market stalls



A. Typical Column
Asymmetric street optic. Product and optic may vary across scheme.
3000K.

B. Typical Column for event space.
Adjustable Multi-optic.
3000K.
Additional integration of media / security / electrical provisions.

C. Wall mounted external luminaire.
To provide quality diffuse illumination to entrances
High Ip and IK rating required
3000K.



5.0 Ambient lighting strategy.

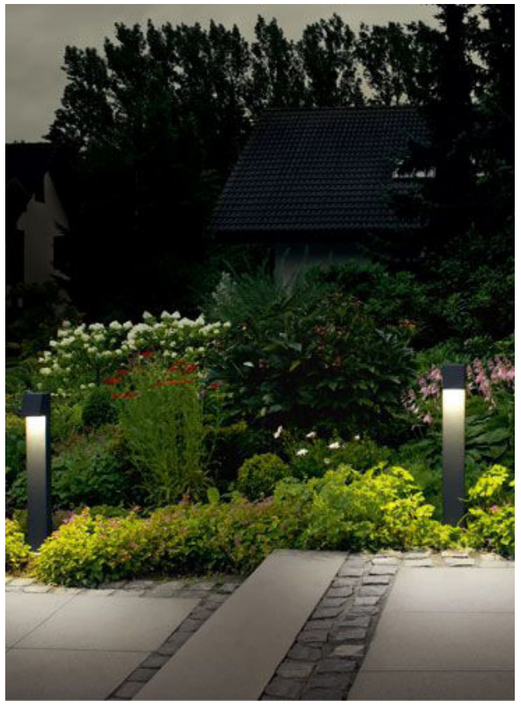
5.5 Secondary pedestrian routes.

Purpose of lighting:

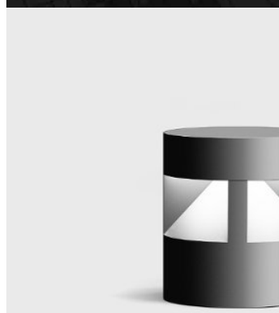
- Creating a relaxing atmosphere to promote use of the space after dark.
- Safety and security.
  - Illuminate paving and level changes to avoid trips and falls.
  - Good facial recognition to increase the appearance of safety.

Lighting characteristics:

- Low level lighting.
- Integrated lighting within landscape features (where possible).
  - Minimise requirement for additional lighting elements.
- 3000K warm white colour temperature.
- Good optical control.
  - Downward directional optic.
  - No indirect lighting component to minimise light pollution.
- Colour rendering of 80+ CRI.
- Dimmable.



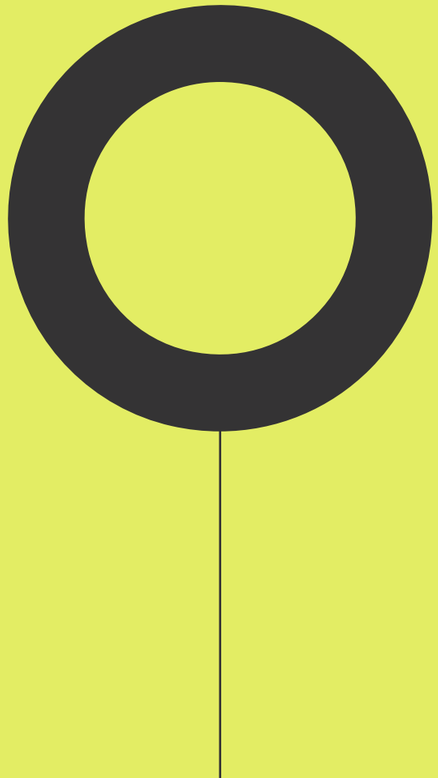
A. Low Level ambient lighting bollard
360 degree illuminated bollard to provide quality illumination to pathways
3000K.



B. Low level feature bollard.
Symmetric 360 degree optic.
3000K.

C. Wall mounted external luminaire.
To provide quality diffuse illumination to entrances
High Ip and IK rating required
3000K.

Feature lighting.

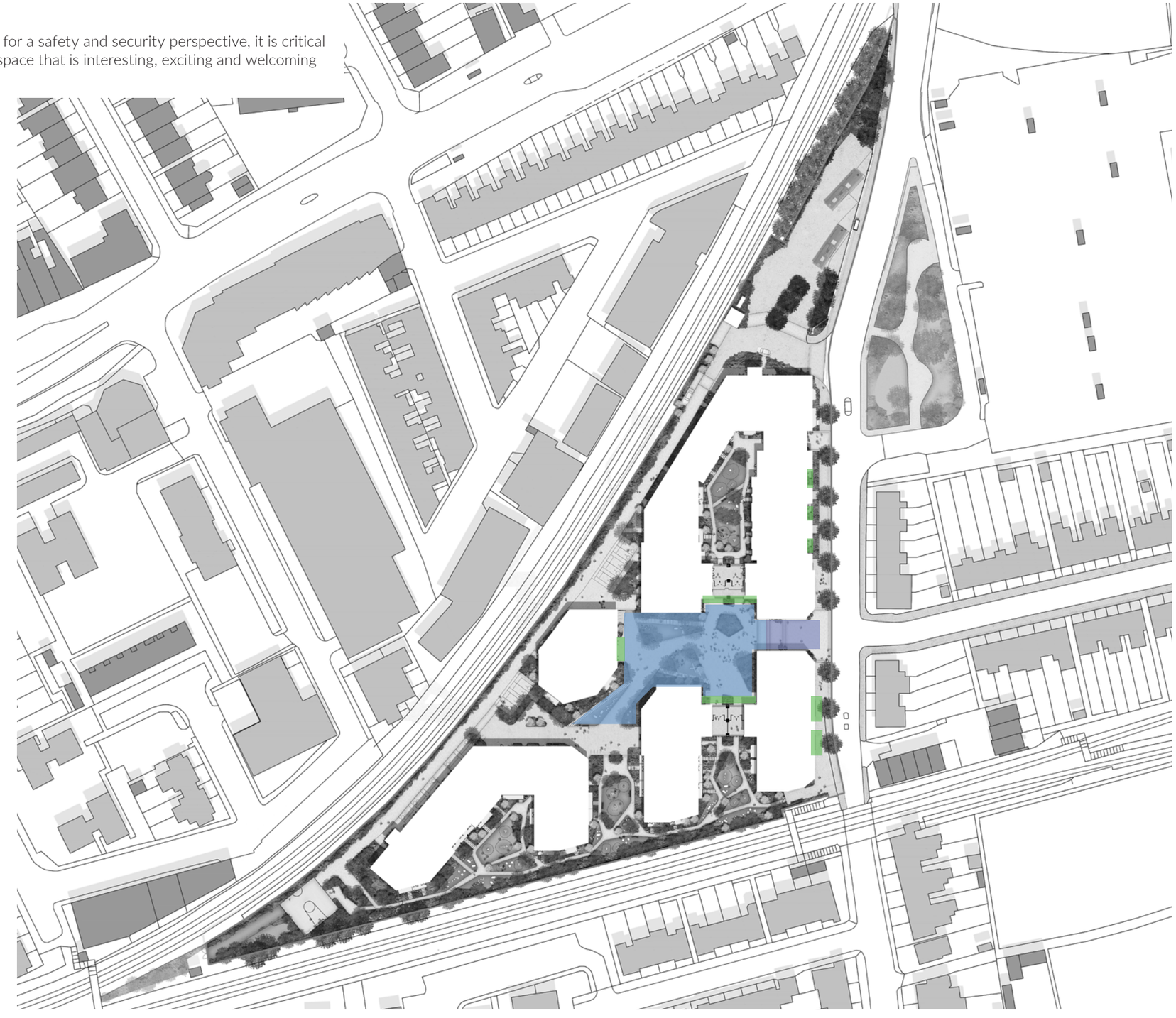


6.0 Feature lighting.

Although the lighting to the site thoroughfares is important for a safety and security perspective, it is critical to consider the feature lighting opportunities to produce a space that is interesting, exciting and welcoming atmosphere.

Key areas for consideration:

- Main site entrance.
- Public squares.
- Building entrances.



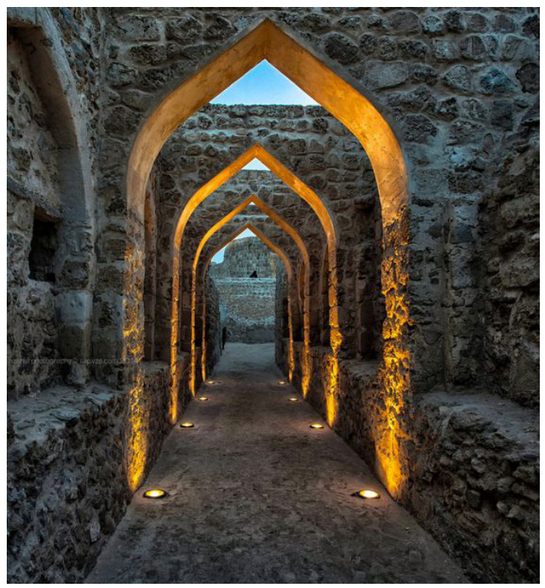
6.0 Feature lighting.

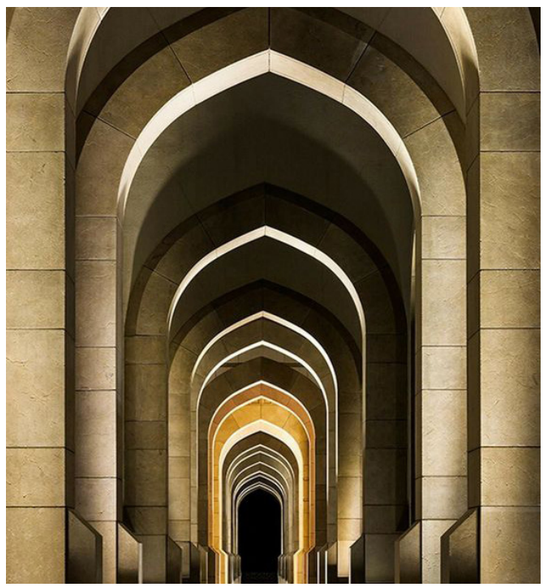
6.1 Site entrance/feature archways

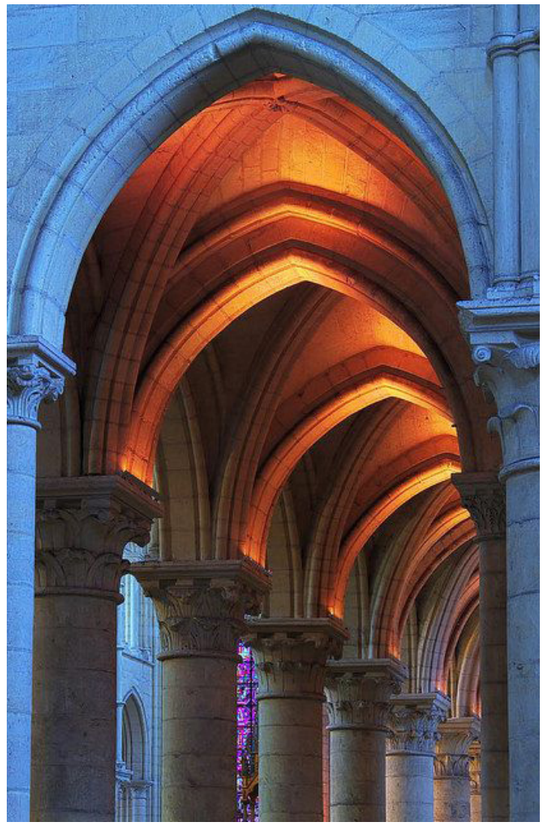
Purpose of lighting:
- Creating an introductory focal point.
- Inviting users through into the main site areas.

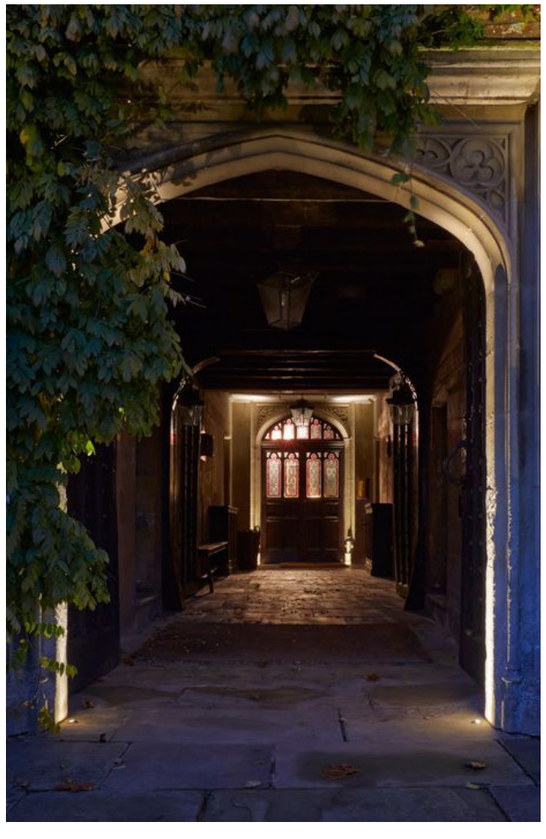
Revealing structuring in positive :
- Lighting the brick finish of the archways.
- Accentuating texture and material quality.

Luminaire characteristics:
- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.









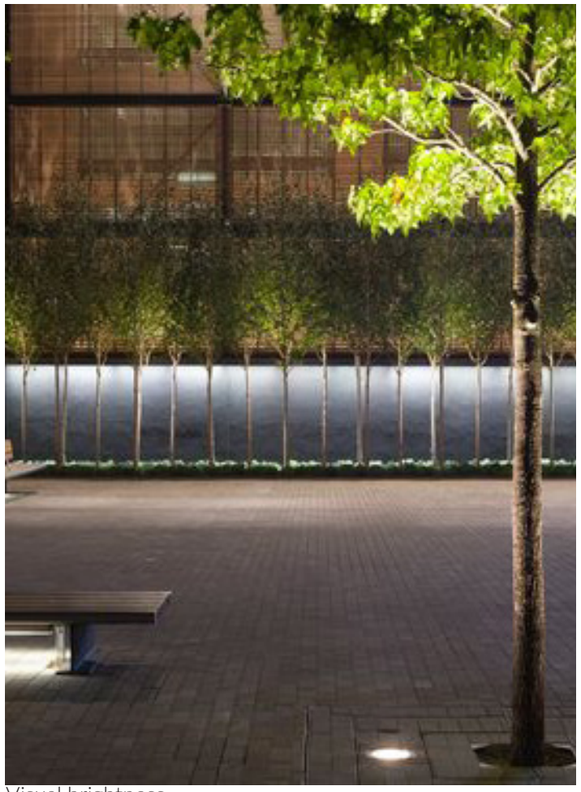
6.0 Feature lighting.

6.2 Public open squares.

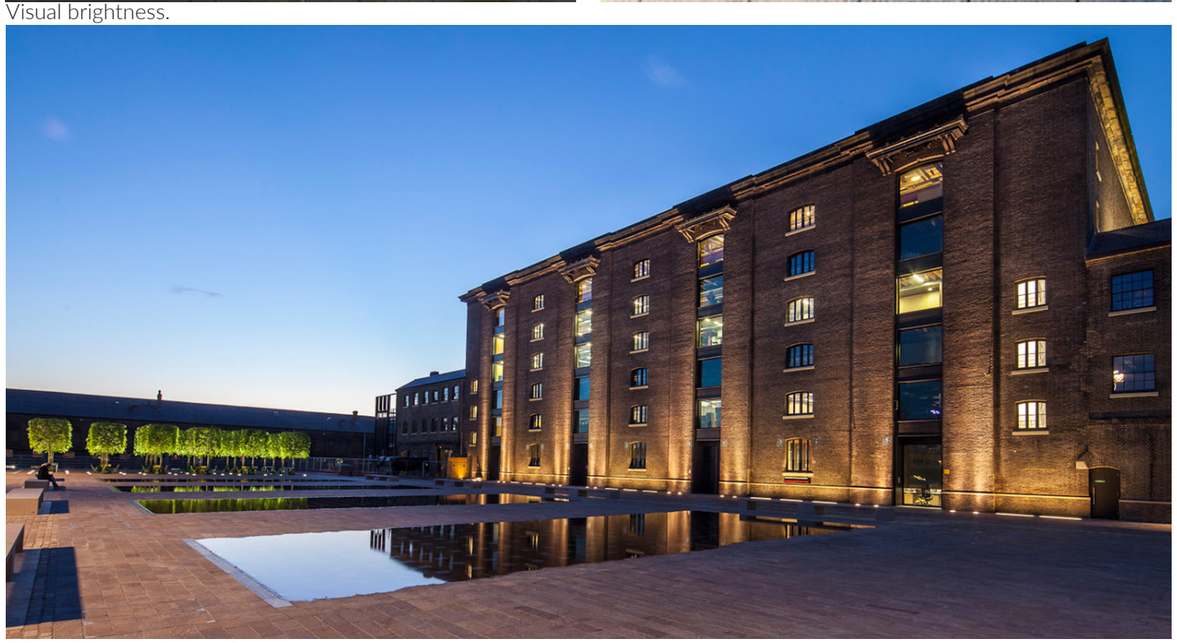
Purpose of lighting:
- Creating an inviting atmosphere.
- Promoting use after dark.
- Accentuating architectural and landscape features.

Types of lighting:
- Lighting vertical surfaces.
- Integrated lighting to landscape features.
- Accentuation colour and texture of natural features.
- Event space to have flexible lighting through the inclusion of multi optic lighting columns.

Luminaire characteristics:
- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.



Visual brightness.



Highlighting vertical surfaces.

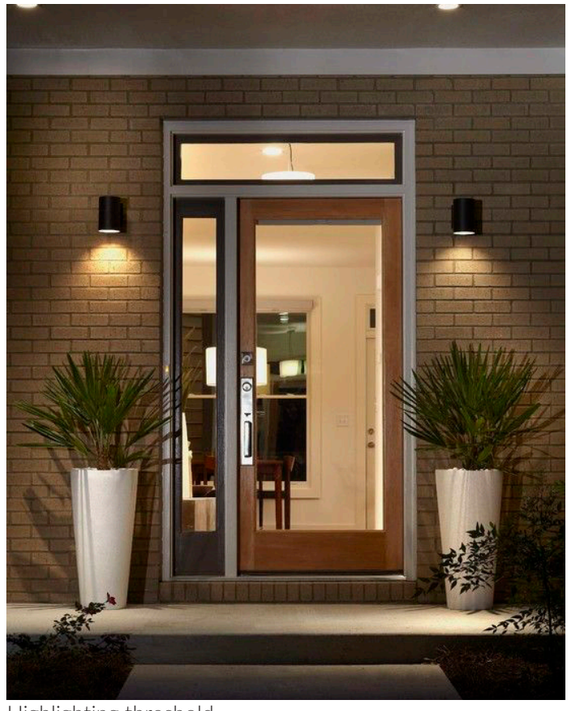
6.0 Feature lighting.

6.4 Building entrances.

Purpose of lighting:
- Highlight building entrances.
  - Photo-tropic way-finding dictating visual hierarchy
- Creating bright threshold to the building.

Types of lighting:
- Wall mounted lighting.
- Integrated concealed lighting

Luminaire characteristics:
- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.



Highlighting threshold.

Bright vertical surfaces.

Illuminated internal walkways

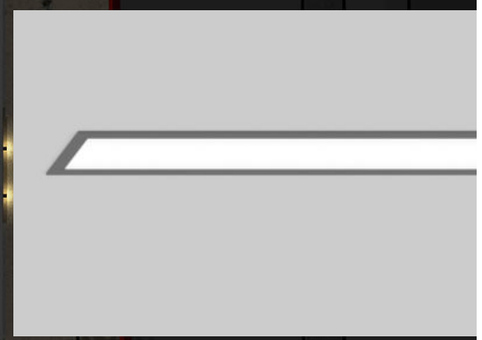
A. In-ground uplights focused towards feature arches
Narrow to wide beam recommended interchangeable optics to be provided.
Adjustable.
3000K.

B. Typical Column for event space.
Adjustable Multi-optic.
3000K.
Additional integration of media / security / electrical provisions.

C. In-ground uplights focused towards underside of tree canopies
Narrow to wide beam recommended interchangeable optics to be provided.
Adjustable.
3000K.

D. Homogeneous Linear LED to be concealed within landscape elements
High IP and IK rating required.
3000K.

E. Recessed downlighter
Recessed downlighter to provide illumination to floor
Glare control/visual comfort required.
3000K.



F. Recessed linear luminaire
To provide vertical illumination to key surfaces
High quality front face diffuser required
3000K.

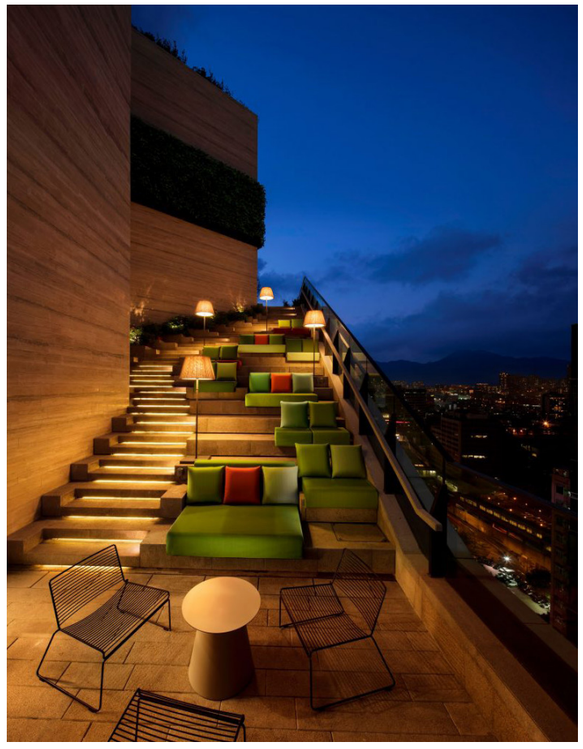
6.0 Feature lighting.

6.5 Rooftop terraces

Purpose of lighting:
- Creating a relaxing atmosphere to promote use of the space after dark.
- Creating vertical illumination for visual brightness.
- Accentuating texture and surface finish.
- Using light pattern to aid exploration
- Promotion of vistas and views

Types of lighting:
- Spot lighting / feature lighting to planting
- Integrated lighting within landscape features (where possible)

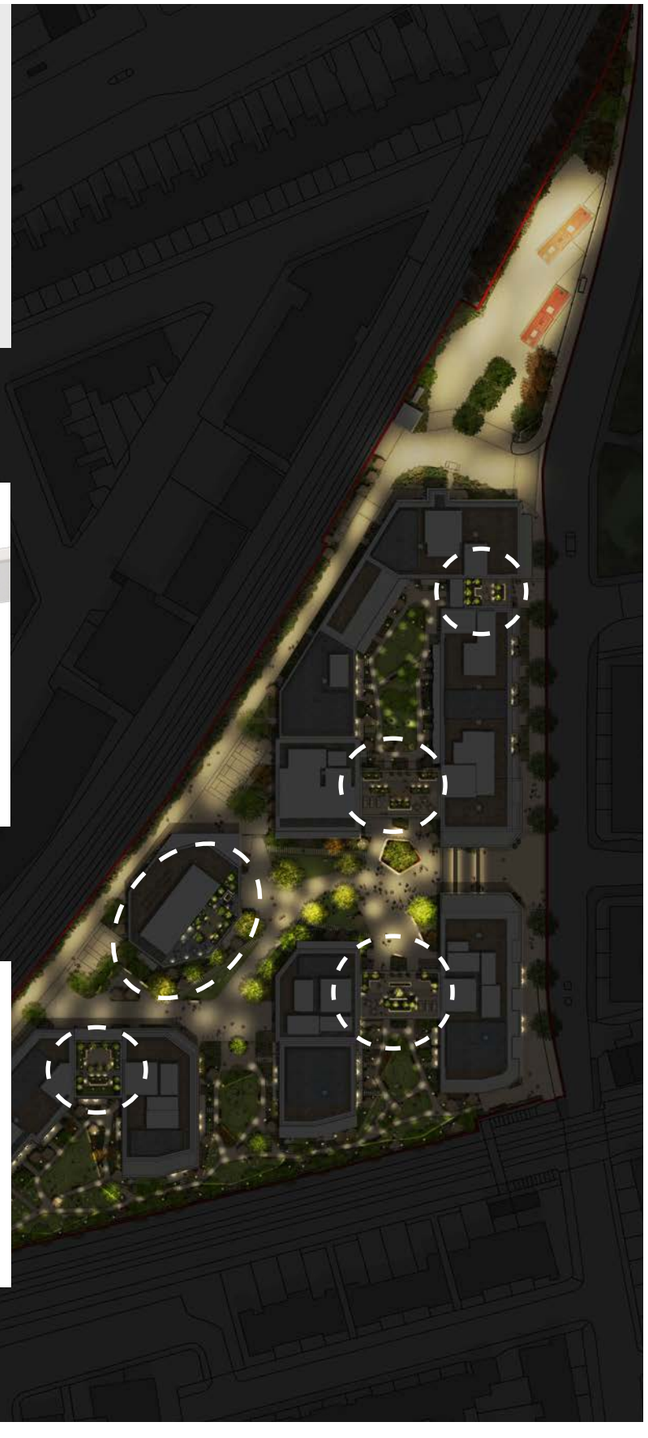
Luminaire characteristics:
- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.

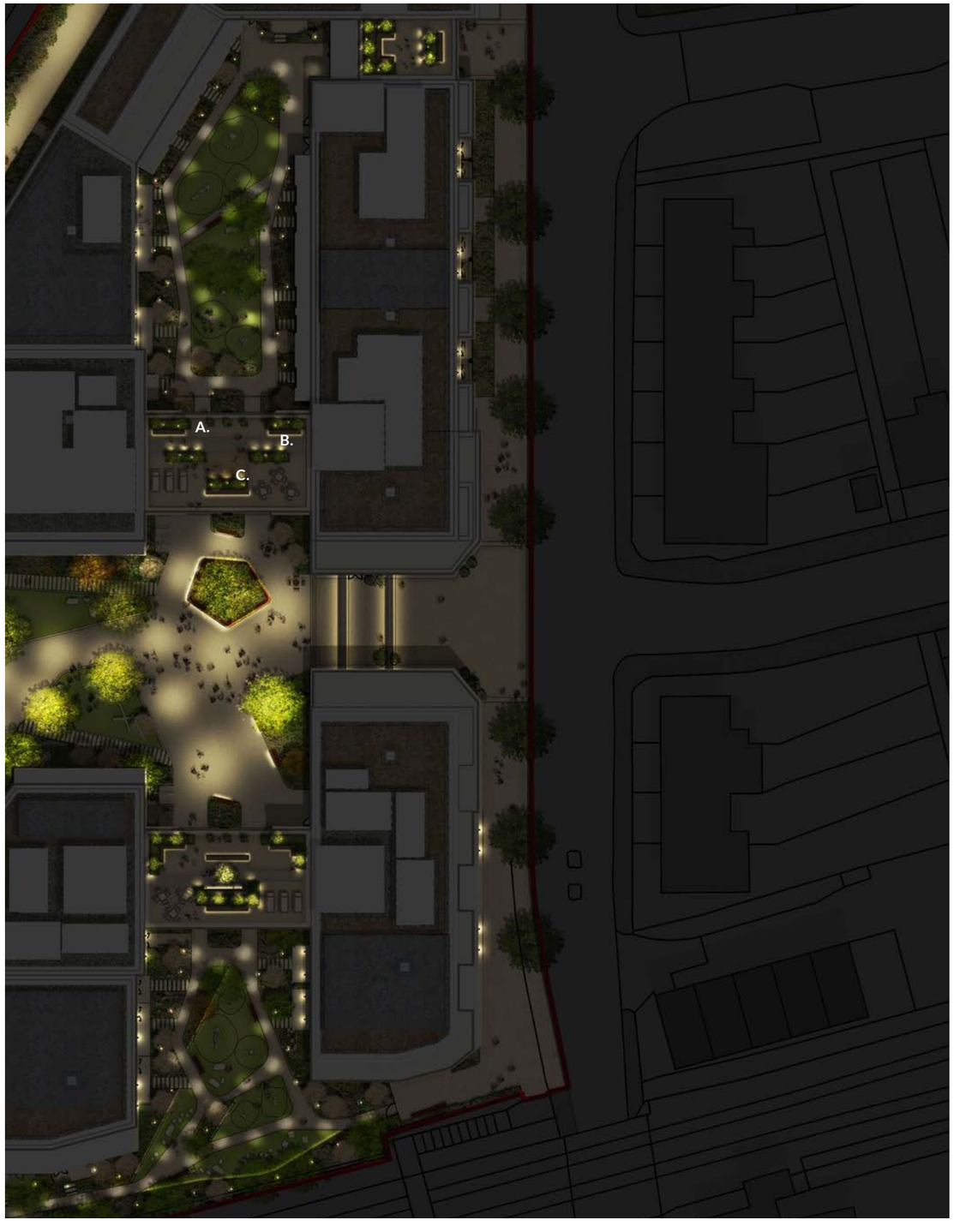


A. Low Level ambient lighting bollard or Wall light
180 degree illuminated bollard to provide quality illumination to pathways
3000K.

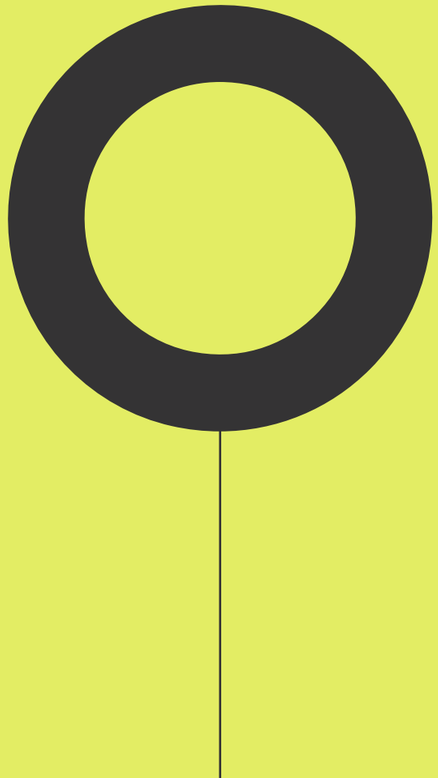
B. Homogeneous Linear LED to be concealed within landscape elements
High IP and IK rating required.
3000K.

C. In-ground uplights focused towards underside of tree canopies
Narrow to wide beam recommended interchangeable optics to be provided.
Adjustable.
3000K.

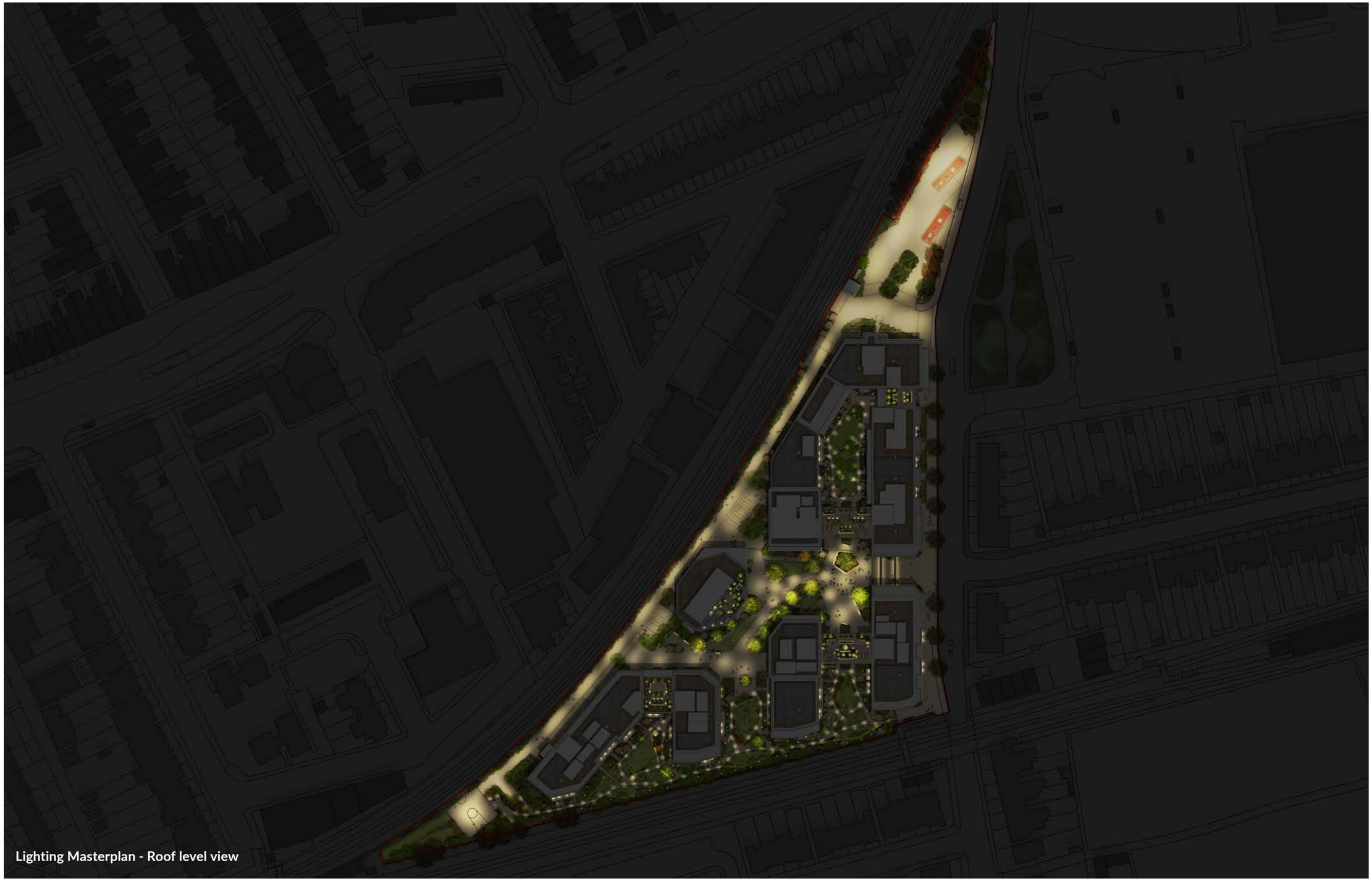




Lighting masterplan visuals.



Lighting Masterplan - Ground level view



Lighting Masterplan - Roof level view

HOARE LEA

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LIGHTING DESIGN

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