City of London Lighting Supplementary Planning Document

Revision: DRAFT
28/09/2022

CITY OF LONDON

Contents

Cover image
Photography by James Newton

Executive Summary

This Lighting Supplementary Planning Document (SPD) provides guidance for developers on lighting buildings and the spaces between them. It will help developers to meet the requirements of the Development Plan policies that relate to lighting. It covers the design, delivery, operation, and maintenance of artificial light in the public realm within the City of London.

This document also includes the 'Considerate Lighting Charter' which we encourage all those involved in lighting the City to commit to. The Charter sets out simple yet important steps that everyone can take to ensure the:

"... right light, in the right place at the right time, controlled by the right system."*

A commitment of the Corporation's Lighting Strategy ('Light + Darkness in the City/ A Lighting Vision for the City of London' 2018), this document builds on the implementation of its policies and principles through the planning system.

The SPD sets out the wider legislative and policy context, before making clear what applicants should submit with a planning application and what would be required post-planning permission, as part of the discharge of relevant lighting conditions.

A key aim is for City occupiers to consider and discuss lighting at an early stage of the design of any development to ensure key issues are understood and addressed from the outset.

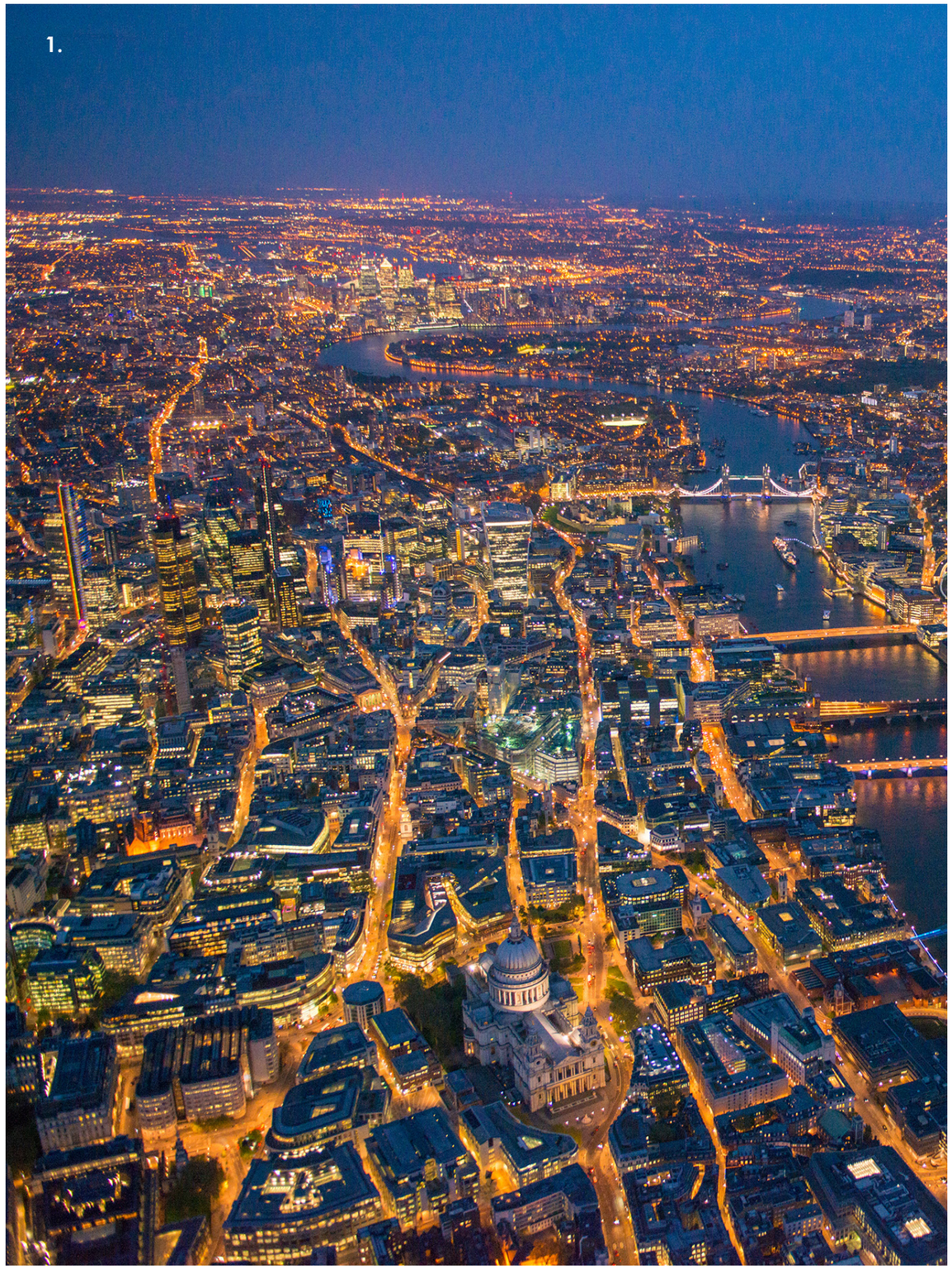
This document explains the:

- Importance of good lighting;
- Relevant policies, general guidance and legislation;
- Information to be submitted as part of the planning process;
- Lighting outcomes and general principles;
- Technical lighting requirements.

These seek to deliver on a variety of holistic planning outcomes, explained later in this document, in order to demonstrate that lighting schemes have been optimised, based on the particular site-specific circumstances.

Over time, as new developments come forward that follow and this guidance, we will transform the approach to lighting in the City; reducing energy consumption, protecting residential amenity and biodiversity, all the while making the City a safer and more attractive place to be for all its communities after dark.

The SPD has been subject to a comprehensive internal consultation process.



*ILP Guidance Note 01/21 The Reduction of Obtrusive Light

1. Bird's eye view of the City after dark. Photography by Jason Hawkes

1.0 Introduction

1.1 The City of London has become a diverse 24-hour destination – one which seeks to meet the needs of our residents, workers, and visitors by day and, increasingly so, after dark. Given the international dimension of our businesses, many operate around the clock. In addition, our night-time economy is growing in terms of leisure and hospitality. The 'Culture Mile' transformation seeks to cement the position of the City as a major cultural destination both by day and after dark. It is also a 'Destination City' for local, national, and international tourists.

1.2 The City of London is also home to a significant residential population. Achieving a vibrant and thriving City at night, which works for all its communities, will depend on lighting that is not only intelligent, functional, and safe, but also creative, sensitive, innovative, and beautiful.

1.3 Lighting also has a place in delivering on our Climate Action Strategy (2020-2027) and reducing energy consumption.

1.4 In October 2018 we adopted the most comprehensive, holistic Lighting Strategy in London ('Light + Darkness in the City/ A Lighting Vision for the City of London'). This provides the roadmap to the City of the future which sees lighting contributing to our three overarching aims: A flourishing society, a thriving economy and shaping outstanding environments. This SPD should be read in conjunction with that document.

1.5 The Lighting Strategy made the following recommendations related to planning:

- Promote best practice on lighting around design and environmental considerations;
- Require lighting strategies to be provided as part of the pre-application process where appropriate;
- Improve communication between key stakeholders regarding function and aesthetic outcomes;
- Publish detailed planning guidance as to the use of lighting within the City of London to support and enhance the implementation of policy.

1.6 This SPD also builds on our Corporate Strategy and policies in the Development Plan, detailing how we will deliver on the Lighting Strategy through the planning system.

1.7 Whether it is a proposal for a new building, the alteration of an existing one or new or upgraded public realm, these all have an impact on the character of the City after dark. Artificial light can provide positive benefits, not only on how public and private space is used and how safe it feels, but also how attractive it is. It can also have a negative impact on the ability of residents to enjoy their homes due to obtrusive light, can cause highway safety and accessibility issues and create environmental damage, including harm to local biodiversity.

1.8 The aim of this SPD is to ensure that these opportunities and constraints are identified and addressed. It seeks to consider light as a valuable commodity to be managed in an intelligent, sensitive, and innovative way and provide the guidance needed to ensure that the lighting approach to any development meets specific requirements. It aims to provide support in the preparation of lighting information as part of the pre-application process or for an application submission.

1.9 Owners, occupiers and managers of existing buildings will be encouraged to adopt the principles set out in this guidance by signing up to the 'Considerate Lighting Charter'. A copy of the Charter is included in Appendix A of this document.

1.10 A key aim of the SPD is for City occupiers to consider and discuss lighting at an early stage to ensure issues are understood from the start.

1. View of the Eastern cluster after dark
Photography by Marc Kleen

2.0 Policy, legislation, standards, and guidance

Policy

2.1 There are national and local planning policies and guidance that are relevant to lighting.

National

2.2 The National Planning Policy Framework (NPPF) comprises Government planning policy for England. The Planning Practice Guidance (PPG) provides further guidance on the policies in the NPPF. The NPPF states that planning policies and decisions should ensure that development "limits the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation". The PPG contains further guidance on light pollution. Whilst acknowledging the wider benefits of artificial light, it recognises that it is not always necessary, and has the potential to contribute to 'light pollution' and 'obtrusive light'. For maximum benefit it recognises that "it is important to get the 'right light, in the right place and for it to be used at the right time''. The PPG also recognises that since it can be costly and difficult to change lighting installations, getting the design correct at the planning stage is important.

2.3 The National Design Guide, updated in January 2021, seeks to ensure new development contains street and building lighting of an appropriate and attractive appearance.

London

2.4 The London Plan was adopted in March 2021 and provides planning policy for Greater London. It comprises part of the City of London Development Plan, on which decisions on planning applications are made. Although there is no specific policy on lighting in the London Plan, lighting is referenced throughout the Plan including within the Public Realm policy (D8) which states that lighting should be carefully considered and well-designed in order to minimise intrusive lighting infrastructure and reduce light pollution.

City of London

2.5 The City of London Local Plan was adopted in January 2015. It contains a number of relevant policies with respect to lighting, including details on the internal and external illumination of buildings and the contribution that lighting makes to the character and townscape of the City after dark, and seeks to reduce energy use and limit light pollution.

2.6 The City of London has prepared a draft plan, the City Plan 2036, which was published for Regulation 19 consultation in early 2021. Work is continuing on the Plan, and it remains a material consideration in the determination of applications alongside the adopted City of London Local Plan 2015 and the London Plan 2021. The Plan contains a dedicated Lighting Policy which draws on the adopted Lighting Strategy.

Legislation

Environmental

2.7 There are number of areas of legislation that are relevant to lighting within the City of London. These relate to both environmental law and listed buildings.

2.8 Lighting can be controlled under non-planning legislation and so to avoid conflict in the future, it is pertinent to consider the potential for new development to cause statutory nuisance so as to design it out. Section 102 of the Clean Neighbourhoods and Environment Act 2005 and sections 79, 80 and 82 of the Environmental Protection Act 1990 (as amended) extend the statutory nuisance regime to include the new statutory nuisances from '(fb) artificial light emitted from premises so as to be prejudicial to health or a nuisance'. Exclusions are in place for developments used for transport purposes and other premises where high levels of light are required for safety and security reasons, such as bus stations, railway stations, harbours, and good or public service vehicle centres. At a local level, the 'City of London Various Powers Act' gives the City Corporation the power to affix lighting infrastructure to any building which fronts City Walkway without prior consent. In practice the City Corporation would discuss with the landowner any proposed change and when the opportunities arise through development, is willing to discuss how the lighting can be altered to meet the objectives of the Lighting Strategy and this SPD.

Listed Building

2.9 There is a separate legislative regime when it comes to the protection of listed buildings, of which there are many in the City. Section 16 of the Planning (Listed Buildings and Conservation Areas) Act 1990, requires applications for listed building consent for any works, which could include external and internal lighting installation and associated infrastructure, to have special regard for preserving the special architectural or historic interest of the structure/building and its setting.

2.10 For example, the following would likely require listed building consent:

- External decorative and/or functional lighting.
- Illuminated signage or advertising.
- New internal lighting which would affect the special interest of the listed building.

2.11 Any proposal would be assessed to ensure it is appropriate and sensitive to the character and appearance of the building. In some instances, the works might also require planning permission. There is an additional requirement, under Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990, to have special regard for the listed building and its setting when assessing a lighting scheme which requires planning permission.

Standards and guidance

2.12 There are a number of recognised standards and guidance with respect to external lighting in the UK, many of which are produced by independent professional bodies such as the British Standards Institute (BSI), the Chartered institute of Building Services Engineers (CIBSE), the Institution of Lighting Professionals (ILP), and Historic England. These bodies make general recommendations regarding the quality, quantity, distribution and delivery of light and the many technical considerations associated with the illumination of the built environment. A list of useful standards and guidelines can be found in Appendix B of this document.

2.13 Whilst the specific guidance in this document shall take precedence, all lighting installations in the City of London, including during construction, should generally conform to the recommendations of the Institution of Lighting Professionals (ILP) 'Guidance Notes for the Reduction of Obtrusive Light 2020' as a minimum good practice requirement.

2.14 All lighting schemes should also refer to, and where possible improve upon, best practice including British and European Standards, CIBSE Code for Exterior Lighting and other recognised guidance. Designers are also expected to follow the Mayor of London's Supplementary Planning Guidance 'Sustainable Design and Construction' April 2014.

2.15 All lighting equipment used should also meet the highest standards of energy efficiency at the time of installation and provide the most efficient use of light, taking into account lumen output, colour rendering and colour appearance and the purpose of the lighting scheme. Embodied energy, circularity of design and manufacturing, recycling and disposal should all be considered.

3.0 Planning Process

3.1 This section sets out how lighting should be addressed through the planning process.

3.2 The following is required:

1. **All major developments should be accompanied by a Lighting Strategy (see Table 2) outlining the approach to lighting at pre-application stage.**
2. **This should be re-submitted at application stage together with a more detailed Lighting Concept (see Table 3).**
3. **A full and final Technical Lighting Design (see Table 4) shall be reserved for condition.**
4. **All other applications, whether that be refurbishment alteration, extension or new build, should address how lighting has been considered as part of the Design and Access Statement (in line with SPD).**

Pre-planning submission

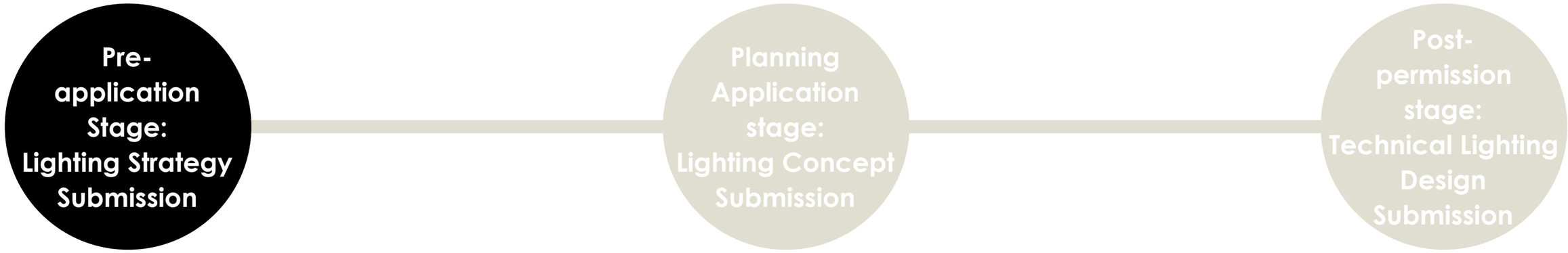
3.3 Appropriate expertise about lighting should be sought from the start. It may be necessary to employ an experienced and suitably qualified professional lighting designer or illumination engineer, usually a corporate member of the International Association of Lighting Designers (IALD), Institute of Lighting Professionals (ILP), Chartered Institute of Building Services Engineers (CIBSE) or other similar independent professional organisation.

3.4 The information as indicated in **'Table 1: Design Process for Lighting Development'** should be submitted at each stage, commensurate to the scale of development, addressing the guidance in this document. This process is broadly based on the Royal Institute of British Architects (RIBA) Plan of Work 2020.

Table 1: Design Process for Lighting Development

RIBA Stage	Actions	Notes
0 – Strategic Definition	No action required.	n/a
1 – Preparation and Briefing	Consider the lit context of and potential impact of the lighting. Develop the lighting brief.	Ensure initial brief to design team and incorporates lighting as a key planning requirement. Consider the early appointment of a lighting design professional.
2 – Concept Design	**Submit Lighting Strategy** (See Table 2 for requirements)	Consider requirements for safety, security, accessibility, inclusion, character, identity, and legibility after dark. Include the strategy for illuminance levels, colour temperature and scale. Define parameters for reduction of obtrusive light and mitigation of impacts on residential amenity and biodiversity both with respect to the design of the building and its external and internal lighting. Set out sustainable lighting criteria.
3 – Spatial Coordination	**Submit Lighting Concept** (See Table 3 for requirements)	Build upon the Lighting Strategy, developing and clearly communicating the overall lighting design intent.
4 – Technical Design	**Submit Technical Lighting Design** (See Table 4 for requirements)	Develop the technical response based on the Lighting Strategy, Lighting Concept and any related conditions and/or reserved matters.
5 – Manufacturing and Construction	Comply with any Planning Conditions with respect to lighting as required prior to Practical Completion.	Ensure all conditions with respect to both the Technical Lighting Design and Construction Lighting are met particularly agreed timings in respect of pre-curfew and post-curfew lighting requirements.
6 – Handover	Comply with any Planning Conditions with respect to lighting prior to Final Completion.	Ensure all conditions with respect to balancing and dimming and/or switching of public realm and building lighting are met particularly agreed timings in respect of pre-curfew and post-curfew lighting requirements.
7 – Use	Comply with any Planning Conditions with respect to lighting as required following Final Completion and for the life of the development.	Ensure all conditions with respect to balancing and dimming and/or switching of public realm and building lighting are met particularly agreed timings in respect of pre-curfew and post-curfew lighting requirements.

3.0 Planning Process



3.5 The following information as indicated in **'Table 2: Lighting Strategy Submission Requirements'** should be submitted as part of the development of a 'Lighting Strategy':

Pre-application Stage
Table 2: Lighting Strategy Submission Requirements

Requirement	Description	Note
A. Vision	Illustrated and written description of the high-level creative approach for all external lighting and, where relevant, internal lighting.	To have consideration for the City Corporation's Lighting Strategy (2018).
B. Analysis	Assessment of issues including context, character, safety, security, legibility, accessibility, and sustainability.	To investigate and communicate key design criteria.
C. Approach	Illustrated and written description of the general lighting approach for all external lighting including street and amenity lighting, illuminated signage and media, building and landscape lighting and the illumination of art.	To include night-time sketch visuals.
D. Technical	Strategic diagrams showing proposed average levels of illuminance and uniformity requirements, colour temperature, and scale/ heights of fixtures.	May be based on classes as per BS5489 or other recognised guidance. Should refer to the City Corporation's Lighting Strategy (2018).
E. Residential Amenity	Details of the approach to the reduction of any impact created by the internal lighting related to obtrusive light, such as glare, excessive visual brightness, light spill, and light intrusion, detailing potential mitigation measures.	Important where the development is highly glazed and has the potential to affect sensitive environmental receptors, such as local residences.
F. Environmental Impact	Statements regarding proposed energy use, obtrusive light such as sky glow, glare, excessive visual brightness, light spill, and light nuisance and any potential impacts on local biodiversity should be included along with a commitment to long term maintenance, management, and the reduction in waste, embodied and operational carbon.	Important where the development is highly glazed and has the potential to affect sensitive environmental receptors, such as intrinsically dark spaces, for example, parks, gardens, churchyards or the River Thames.

3.0 Planning Process

3.6 The following information as indicated in **'Table 3: Lighting Concept Submission Requirements'** should be submitted as part of the development of a 'Lighting Concept':

Planning Application Stage
Table 3: Lighting Concept Submission Requirements

Requirement	Description	Note
A. Concept	Illustrated and written description of the detailed Lighting Concept for all external lighting including street and amenity lighting, illuminated signage and media, building and landscape lighting and the illumination of art and, where relevant, internal lighting.	Visual material that clearly explains and illustrates the lighting intent including rendered plans, sections, and elevations, digital models (where relevant) and night-time visuals including CGIs.
B. Technical	Modelling of typical areas of public realm showing illuminance levels and uniformity and of any lighting to façades showing luminance levels.	May be provided as extracts from Relux, Dialux, AGI or other proprietary light modelling software.

3.0 Planning Process

3.7 The following information as indicated in **'Table 4: Technical Lighting Design Submission Requirements'** should be submitted as part of the development of a 'Technical Lighting Design':

Post-Permission Stage
Table 4: Technical Lighting Design Submission Requirements

Requirement	Description	Note
A. Lighting Layouts	Plans, sections, and elevations as required to indicate the proposed position of all external luminaires.	Luminaires to be referenced to Lighting Equipment Schedule.
B. Lighting Equipment Schedule	Detailed schedule providing the specification for sources, luminaires and accessories (see Table 6 for details for Technical Requirements).	To include description, type, output, power, mounting, driver, size, weight and all accessories and associated columns/bracketry. May specify final recommended manufacturer.
C. Lighting Details	Drawings showing typical details indicating methods of locating/fixing luminaires and associated equipment within the public realm and/or on the building/s .	To show relationship of luminaires to landscape and/or building fabric and should provide drawings at an appropriate scale.
D. Control Methodology	Details of approach to the provision of lighting control including dimming and/or switching to include proposed method of control and level of automation together with proposals for management of the system, lighting scenes and their timings.	Should reference the use of timeclocks, PIRs and other similar devices that may trigger on/ off or other lighting states.
E. Technical Information	Details showing lighting calculations indicating illuminance and/or luminance, uniformity, colour temperature and colour rendering criteria for typical areas of public realm and/or building facades. To include details of total installed energy load of all external lighting.	As may be reasonably requested to support any evaluation of the lighting proposals, particularly to demonstrate mitigation of obtrusive light such as sky glow, glare, excessive visual brightness, light spill, and light intrusion.
F. Operation and Maintenance Information	Details of operational requirements for lighting including details of times at which lighting will be switched on and off and/or dimmed together with anticipated timescales and access methods for the cleaning, repair, upgrading and replacement of all lighting and control systems. To include details of proposed recycling and disposal of lighting equipment at end of life.	As may be reasonably required to demonstrate the duration of any impact of the lighting proposals and to confirm that operation and maintenance has been properly considered as part of the design.

4.0 Lighting Guidance

Lighting Outcomes

4.1 This section of the SPD provides general guidance and sets out technical requirements for lighting scheme that forms part of a new development. It allows applicants to address City Corporation lighting policy in their planning application. The guidance will be a material consideration when reviewing a lighting scheme submitted as part of a planning application. Schemes that deviate from this guidance and its technical requirements should provide a clear explanation as to the reasons and offer any mitigation as may be required.

4.2 Artificial light is an important aspect of 'place-making' and should be carefully managed to address competing demands to achieve the right outcomes. The planning process within the City of London demands that an appropriate approach is taken to the design, deliver, installation and maintenance of all exterior lighting, and interior lighting visible from within the public realm. This is with the view to ensuring that the lighting makes a positive contribution to the cityscape whilst limiting potential adverse impacts and obtrusive light, particularly in respect of residential amenity and biodiversity.

4.3 **'Table 5: Lighting Outcomes'** summarises the key outcomes from any lighting scheme that is submitted as part of a planning application:

Table 5: Lighting Outcomes

Topic	Outcomes
A. Sustainability and climate change	• Minimise embodied energy to help reduce carbon emissions. • Minimise operational energy use to help reduce carbon emissions. • Employ circularity through design and specification to help reduce material waste. • Minimise obtrusive light such as sky glow, glare, excessive visual brightness, light spill and light intrusion that adversely impacts biodiversity, particularly within green spaces and adjacent to or within the river.
B. Residential amenity	• Minimise obtrusive light that adversely impacts local residents created by permanently installed interior, street, amenity, architectural, and landscape lighting and illuminated signs and media. • Minimise obtrusive light that adversely impacts local residents created by temporary construction lighting.
C. Public realm	• Employ lighting to help create an attractive, legible, safe and secure public realm after dark. • Employ lighting to help promote mobility, sustainable travel and support wayfinding, and accessibility. • Employ lighting to help promote culture and the arts.
D. Architecture, heritage, and public art	• Employ lighting to enhance and preserve the City of London's architectural heritage and historic places. • Employ lighting to enhance new architecture, but only where justified. • Employ lighting to enhance public art.
E. Safe and inclusive design	• Employ lighting to ensure that public places and buildings are accessible for everyone. • Employ lighting to help promote inclusion and diversity, and create places where everyone feels safe. • Employ lighting to support and promote walking, cycling and the use of public transport.
F. Temporary lighting	• Consider the opportunity for the inclusion of infrastructure to support temporary lighting for festivals and events. • Minimise construction lighting to that required to meet safety and security requirements only.

4.0 Lighting Guidance

4.4 This section provides the general principles that apply to lighting development, where relevant. Each principle includes guidelines related to the topics outlined in '**Table 5: Lighting Outcomes**'.

Topic A: Sustainability and climate change

4.5 There are many things to think about when considering the use of artificial light in the City of London, whether it is illuminating an open space or landscaped area or highlighting a building. Even the impact of the interior lighting of a building needs to be considered as it can create unwanted impacts on people and the environment. Lighting schemes should aim to carefully balance the social and economic benefits that lighting brings to a development whilst mitigating the environmental consequences. The following general principles can assist in creating sustainable and responsible lighting solutions that minimise their impact on the planet:

Minimising energy Use

4.6 Electric light uses energy. In so doing it can create carbon emissions and uses valuable resources, contributing to climate change. The following general principles aim to help reduce energy used by lighting schemes:

a. Artificial light is a precious commodity and should not be taken for granted. It should be used in a way that minimises waste and promotes moderation. Where artificial light is introduced to a development, it should be done so for a reason, with clear justification, whether functional, aesthetic or both.

b. Developments should seek to minimise the use of artificial lighting in interior spaces during daylight hours through the provision of natural light as an integral part of the building design. This particularly applies to deep plan office and retail spaces where optimisation of daylight should adhere to best practice.

c. Buildings should seek to achieve the maximum number of credits for lighting in the BREEAM Assessment (or similar schemes), using the most energy efficient lighting possible.

d. Lighting schemes should be designed to contribute to the well-being of building occupants through measures such as the WELL standard (or similar schemes).

e. All developments should ensure all external and internal lighting is automatically turned off when not needed using PIRs and/or timeclocks or other automated control devices to help reduce energy use and waste.

f. Any architectural lighting, or lighting without an essential function, should be switched off between the agreed 'lighting curfew' and dawn.

g. Lighting schemes should ensure as much of the energy demand as possible is met through on-site renewable or other forms of renewable energy provision.

h. Lighting schemes should seek to exploit innovative procurement strategies such as lux-lease arrangements, whereby building owners or tenants lease the luminaires on a pay as you use basis, incentivising efficiency and reducing waste.

Obtrusive Light

4.7 Obtrusive light is a growing problem in urban centres including the City of London. It includes sky glow, glare, excessive visual brightness, light spill, and light intrusion. Sources of obtrusive light can include street and amenity lighting, security lighting, the exterior and interior lighting of buildings, and illuminated advertising amongst other examples.

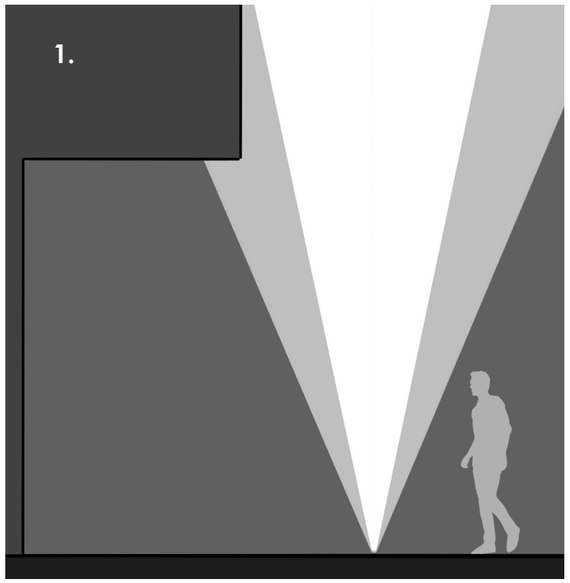
a. The City Corporation's Lighting Strategy (2018) seeks the active reduction of all forms of obtrusive light including sky glow, light spill, glare, excessive visual brightness, and light intrusion.

b. All developments within the City of London should take measures to limit all aspects of obtrusive light in accordance with the recommendations of this SPD and best practice.

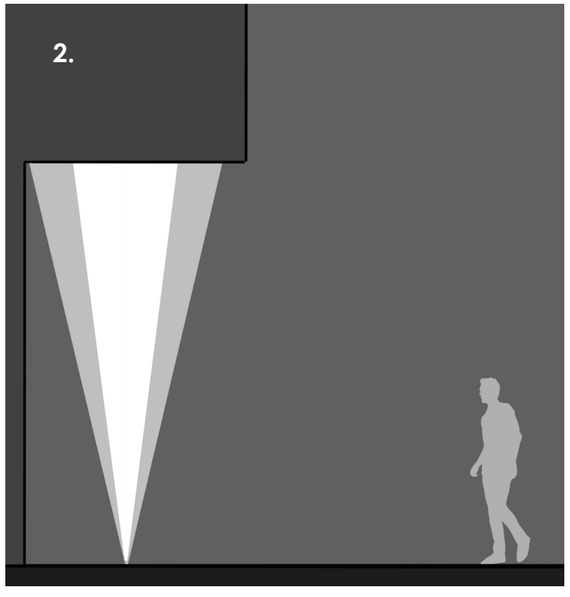
c. All developments should ensure all external and internal lighting is turned off when not needed to help reduce obtrusive pollution.

d. All external lighting schemes should avoid directly uplighting the sky and ensure that any light distributed above the horizontal is directly targeted at the surface to be lit and demonstrate this through the planning application details.

e. All exterior fixtures should be fitted with louvres, snoots, cowls or other accessories that help limit obtrusive light, specifically light spill, glare, and sky glow.



1. Schemes should avoid directly uplighting into the sky.



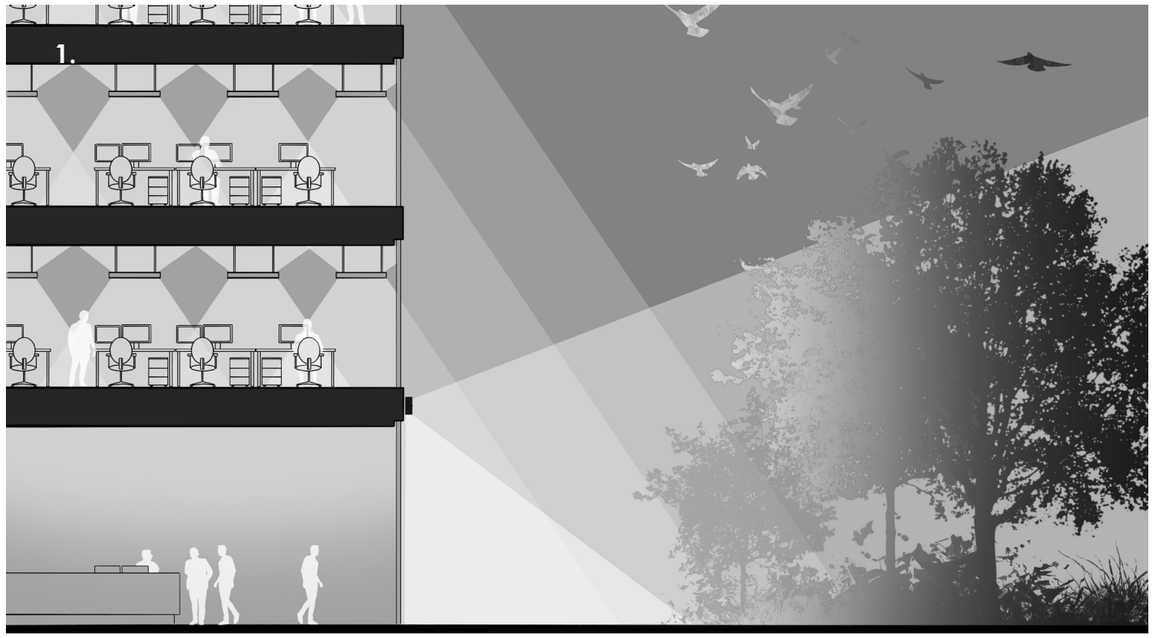
2. Schemes should ensure that any light distributed above the horizontal is directly targeted at the surfaces to be lit without spilling light into the sky.

4.0 Lighting Guidance

Biodiversity

4.8 Exposure to artificial light at night (ALAN) has the potential to have a negative impact on a wide range of wildlife, from birds, bats, and fish to plant life, insects and other flora and fauna. The impact of artificial lighting on biodiversity is known to be complex and varies with species. It can either attract or repel certain species, interfering with natural feeding, breeding and migration patterns. Particular importance is given to avoiding the lighting of water habitats in relation to bats and fish and the mitigation of light spill from tall, highly glazed buildings with respect to bird strike and interference with patterns of migration. This SPD makes the following general recommendations:

a. All developments should ensure natural darkness is retained in green areas / corridors at night. Natural darkness is defined as the general condition at night without the addition of artificial light from any development. Where not practical to do so specific 'dark nights' are encouraged during which time lighting is turned off.
b. Lighting should encourage, or not discourage, biodiversity in green areas / corridors.
c. Lighting levels should generally be kept as low as possible with light focused only where it is needed in green areas / corridors.
d. The direct illumination and highlighting of green landscape, including the uplighting of trees and other planting, is discouraged other than where it can be justified in terms of helping to create a more legible environment that directly support inclusion and accessibility.
e. New developments should prevent light intrusion into green areas / corridors through the detailed design of glazing and by using hoods, cowls, louvres and shields on external lighting.
f. All lighting next to the River Thames and the riverside should avoid excessive illumination and any spillage into the water which could have detrimental impacts on biodiversity including bird, bat and fish populations and other river species.
g. All lighting should closely observe and not interfere with established bat corridors.
h. All lighting near planted areas and hedgerows, should be sensitive to bats, birds, insects and other flora and fauna.
i. Highly glazed tall buildings should take any necessary mitigation measures to reduce the risk of bird strike due to external and internal lighting.
j. All major developments, particularly those located adjacent to green space such as gardens, parks, churchyards or the river are advised to take advice from a specialist environmental consultant and/or ecologist who has local knowledge.
k. All developments should ensure all external and internal lighting is turned off when not needed to protect biodiversity.
l. Developments should follow the data on species and Sites of Importance for Nature Conservation (SINCs) from Greenspace Information for Greater London (GiGL).



1. Glazed façades without treatment and external lighting with insufficient optical control can cause light trespass intrusion into green areas spaces and potentially create bird strike.

2. Strategically located internal illumination, carefully detailed glazing facades and good optical control on for external lighting can help prevent light trespass intrusion into green areas spaces and birdstrike.

4.0 Lighting Guidance

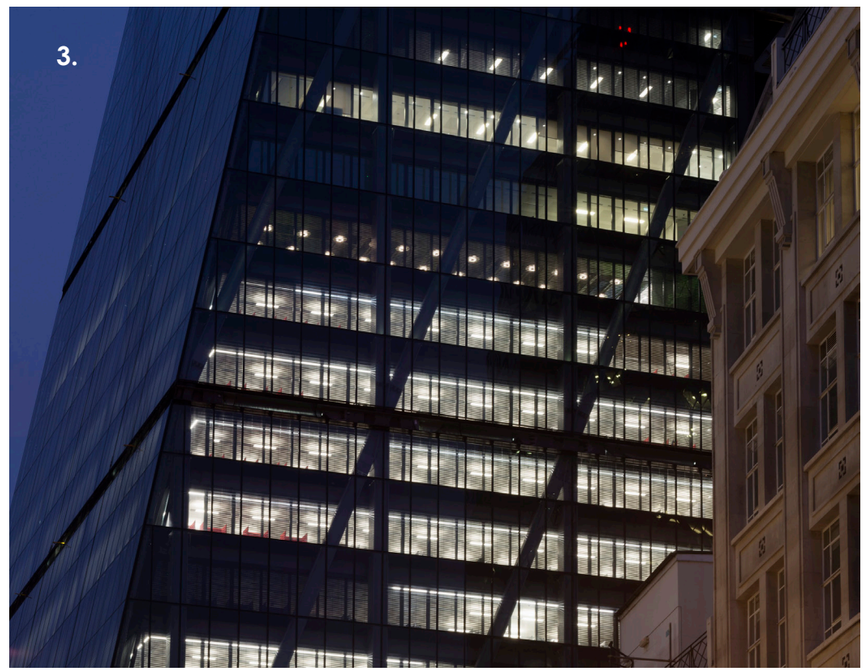
Topic B: Residential amenity

4.9 Lighting can adversely impact residents' quiet enjoyment of their properties after dark. Consideration should also be given to temporary residents including workers who live in apartments during the week and tourists who stay in hotels and rented apartments, particularly at the weekend. Light spill through windows, even those fitted with blinds and curtains and the direct view of bright external and internal lighting schemes and light sources can not only cause a nuisance but also contribute to health issues including anxiety and sleep deprivation through the disruption of circadian rhythms. The following general principles should be observed:

a. Minimise and mitigate the visual brightness of interior lighting, particularly of highly glazed buildings, when seen from residential properties including the visibility of light fittings and their sources. This includes distant, mid and near views.
b. Use good optical control and/or baffles to light fixtures to help reduce glare from interior lighting.
c. Include well-designed presence detection systems to reduce lighting accidentally being left on as well as saving energy.
d. Consider the solid to void ratio of facades or the use of blinds for developments directly impacting residential areas to help reduce the visibility of interior lighting at night.
e. Put robust management protocols into place that seek to reduce over-lighting and waste.
f. Developments should ensure all external lighting is managed in accordance with the Lighting Curfew Times, and all non-essential lighting turned off after 2300h if near to residential properties.
g. Newly installed street lighting, where visible from residential properties nearby, should be provided with a shield/louver or similar to protect against glare.

1. Bright internal lighting schemes and highly visible light sources can not only cause a cause a visual nuisance but also contribute to health issues.

2. Blinds, coatings, fritt patterns and other façade design techniques can help reduce the visibility of interior lighting at night while occupants can still perform their tasks. All developments should switch off the internal lighting when the building is not occupied.



3. Good optical control and baffles to light fixtures can help reduce glare from interior lighting.
Photography by James Newton.

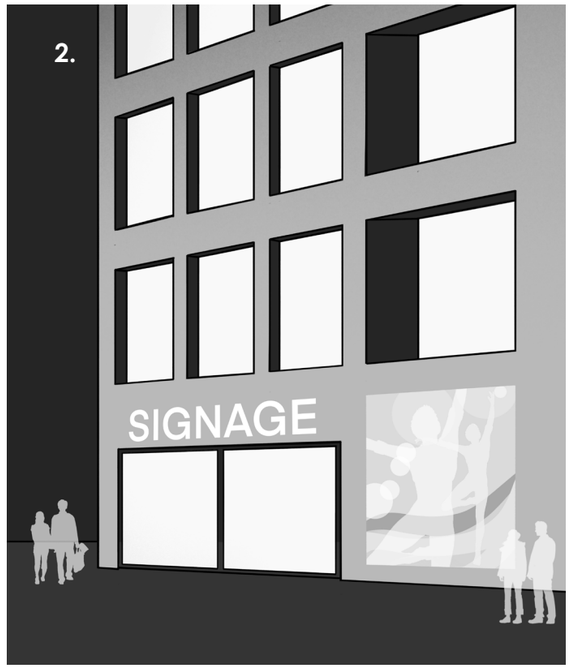
4.0 Lighting Guidance

Topic C: Public realm

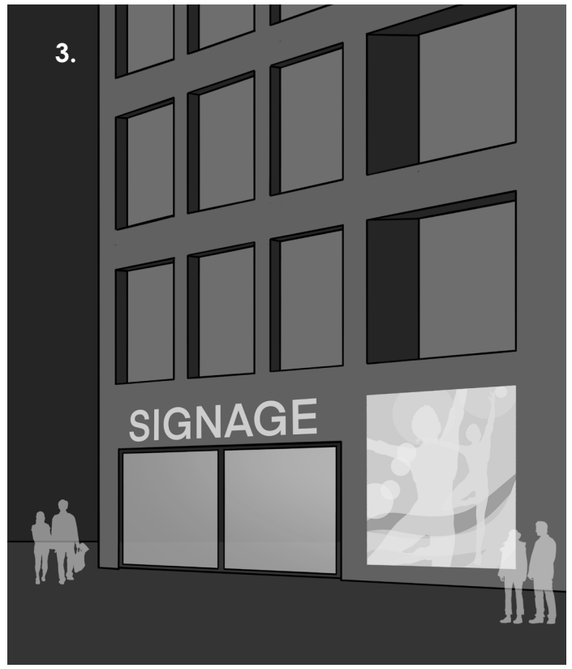
4.10 Lighting directly contributes to the character of the City of London after dark. This can range from the experience of pedestrians at street level to an appreciation of the skyline and key landmarks such as St. Paul's Cathedral when seen from a distance. The lighting of all developments should seek to make a positive contribution to the experience of the public realm after dark. Lighting schemes within the public realm should observe the following general principles:

a. All developments should consider how architectural and public realm lighting can contribute to place-making, character, and ambience to ensure attractive and safe places after dark.
b. All developments should consider the accommodation of street and amenity lighting from early in the design a process from both a functional and urban design perspective.
c. All new developments should determine the requirement to fix City of London street and amenity lighting to their facades if required to do so early in the design process.
d. Where new developments are providing street or amenity lighting illuminance levels, colour temperature and mounting heights should be in strict accordance with the City Corporation's Lighting Strategy (2018) unless otherwise agreed.
e. Public realm lighting should seek to create a legible environment that reveals key vertical as well as horizontal surfaces but without recourse to creating obtrusive light or glare.
f. The illumination of all areas of hard and soft landscape should balance the requirements for safety and security after dark with any potential impact on residential amenity and biodiversity.
g. All public realm lighting should have the provision to be dimmed and controlled to help manage and balance visual brightness.
h. The requirements for lighting to support CCTV should not over-ride aesthetic and environmental considerations.
i. Key soft landscape features may be highlighted, but only where appropriate to do so.
j. Schemes should retain natural darkness in green areas / corridors where safe to do so. Natural darkness is defined as the general condition without the addition of artificial light from any development.
k. Colour rendering and colour appearance should be carefully considered such that materials and their surface textures, where illuminated, are well lit. Well-lit does not necessarily mean brightly lit.
l. Consideration should be given to the appearance of any exterior lighting equipment and its associated architectural and electrical infrastructure by day.
m. Illuminated signage and advertisements, including media screens, should be lit in line with the requirements of Advertising Consent.
n. The lighting of signs, and external and internal media screens (where visible from the public realm) should be fully dimmable and controllable to help manage visual brightness.
o. There is a general presumption against the use of non-white spectrum coloured lighting, unless there is a strong justification in the wider public interest.

1. Key landmarks such as St. Paul's Cathedral are part of the character of the City of London skyline after dark.
Photography by James Newton



2. The high brightness of signs and media screens can negatively impact the public realm experience.



3. Controlled signs and media screens can enhance the public realm experience.

4.0 Lighting Guidance

Topic D: Architecture, heritage and art

4.11 The lighting of architecture, including key details and parts of buildings, can make a valuable contribution to the overall experience of the City after dark and directly contribute to its cultural, social and economic life. Whilst the City Corporation encourages the creative and sensitive use of architectural lighting to help enhance its rich heritage not all new developments should necessarily be externally lit. Whilst external lighting that is used to enhance contemporary architecture should therefore generally be minimised, proper consideration should be given to the identity of all developments after dark including the external appearance of the internal lighting. Subject to the agreement of the artist, public art should generally be lit. The following general principles must be observed:

a. All new developments should consider whether the addition of exterior architectural lighting is desirable. Not all buildings should necessarily have lighting treatments. The inclusion of exterior lighting to buildings that form part of a development should therefore be fully justified as part of any application, particularly in relation to any adjacent heritage, residential or environmentally sensitive site.
b. The lighting of heritage assets should be undertaken with great care, and be compatible with their conservation and enhancement, but not all heritage assets should be lit, and this will require strong justification.
c. Where facades are highly glazed to new or refurbished developments, particularly retail frontages and office floor plates, careful consideration should be given to the impact of the interior lighting on the external identity of the development after dark.
d. Colour rendering and colour appearance of all external and internal lighting should be carefully considered such that materials and their surface textures, if highlighted at all, are well lit. Well-lit does not necessarily mean brightly lit.
e. In some cases, particularly with tall towers, the impact of the building on the skyline and strategic townscape heritage should also be considered.
f. Consideration should also be given to the appearance of any exterior lighting equipment by day.
g. The inclusion of lighting to reveal public art after dark should be carefully considered in terms of brightness, colour and scale such that is provides visual benefit after dark as well as by day subject to the requirements of the artist.
h. Where 'light art' is employed brightness, colour, scale, and glare should be fully dimmable and controllable.

1. Example of good lighting of an internal office floorplates that positively contributes to the building's external identity after dark.
Bloomberg European HQ – Lighting design by Tillotson Design and Foster + Partners
Photography by James Newton.

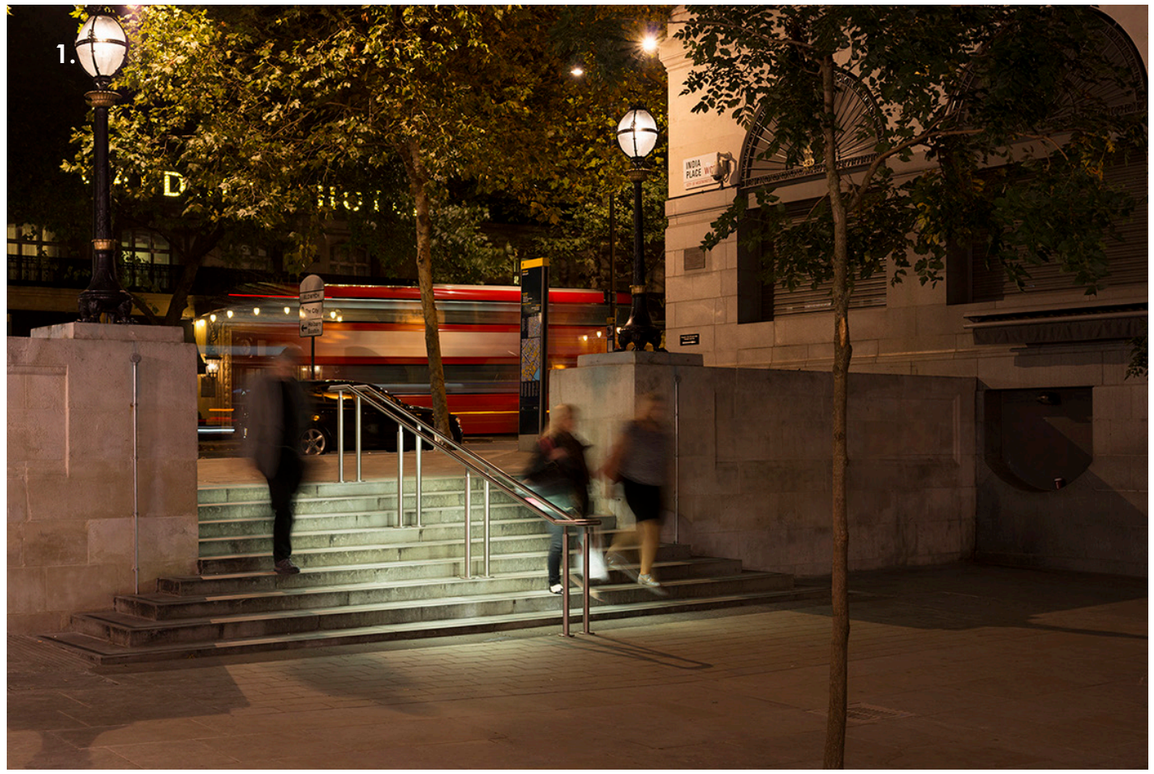
2. Considered illumination of heritage structures makes a valuable contribution to the overall experience of the City after dark.
London Wall Place – Lighting design by Studio Fractal
Photography by James Newton.

4.0 Lighting Guidance

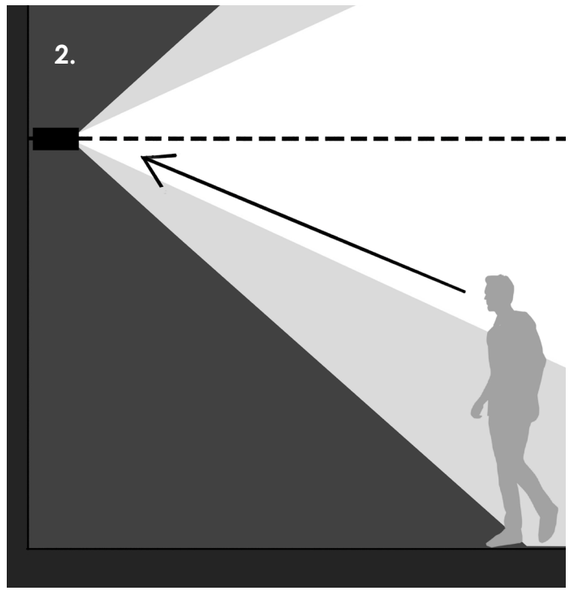
Topic E: Safe and inclusive design

4.12 Lighting should be used to help create safe, inclusive environments for everyone. Lighting design should reinforce the City Corporation's and Mayor's Transport Strategies including the 'Healthy Streets Approach', which seeks to create a public realm that helps improve people's health and their experience of using streets. The following general principles should be observed:

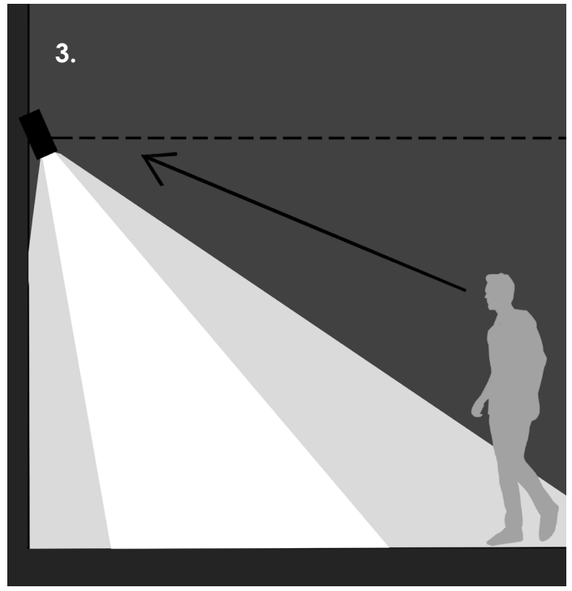
a. Lighting should be used to create an accessible public realm and public spaces for everyone, particularly after dark. Lighting should be designed to meet the needs of different people, including those with reduced mobility, visual impairments, people who are neuro-divergent, older people, and children.
b. Lighting design should prioritise the creation of safe and attractive spaces and routes for people walking, cycling and using public transport.
c. Lighting design should be used to create a safe public realm and public spaces, recognising that softer, warmer, more ambient lighting can help create safer-feeling places than harsh, bright, cooler light. Also, that the lit context, reflections, contrast, glare, spectrum and layering can all influence the sense of safety and security.
d. In designing for safety and security, lighting design should factor in the experience of different groups, including women and girls, LGBTQ+ people, disabled people and those who are likely to experience hate crime on the basis of their race or religion.
e. Lighting should be used to celebrate the diversity of the people who live, work and visit the City of London, for example through highlighting public art, commemorative statues, and religious buildings or through temporary, creative lighting installations that celebrate events and festivals for particular communities.
f. Lighting should be used to enhance the experience of people arriving by public transport including through ambient and creative lighting at a human scale.
g. New developments should consider how lighting can be provided which encourages vehicles to behave safely, whilst allowing safe passage for pedestrians and cyclists.
h. Lighting should be designed to reduce the amount of distracting and even disorientating light so as to prevent accidents and assist with the prevention and fear of crime.



1. Ambient and creative lighting on a human scale can encourage people to use public spaces after dark.
Photography by James Newton.



2. Glare caused by luminaires can disorient and distract people, especially people those with visual impairments.



3. The appropriate careful direction of light fixtures can help reduce glare and help people better orient themselves.

4.0 Lighting Guidance

Topic F: Temporary lighting

4.13 Whilst this SPD is concerned with the design, detailing, delivery, operation, and maintenance of permanent lighting installations, there are two types of temporary lighting which should be considered as part of the planning process where relevant: festive lighting, and construction lighting.

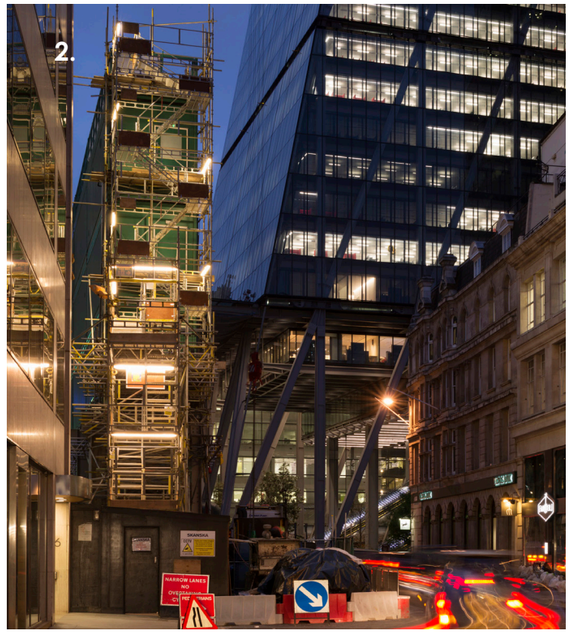
4.14 Temporary festive and event lighting can make a positive contribution to the social, economic, and cultural life of the City. Whilst the installation of permanent dynamic lighting schemes are not encouraged i.e. lighting installations that randomly change colour with no clear design purpose or create a visual distraction or nuisance to local residents, it welcomes the provision of infrastructure for the occasional use of dynamic coloured lighting, projections and other forms of artistic night-time intervention as part of national or local celebrations, public and religious holidays and support for causes.

4.15 Construction lighting can be in place for many years. Whilst this is essential to the safety and security of construction sites, particularly during the winter months, it is recognised it can have a highly detrimental impact on both residential amenity and biodiversity due to the techniques that are often employed such as area floodlighting.

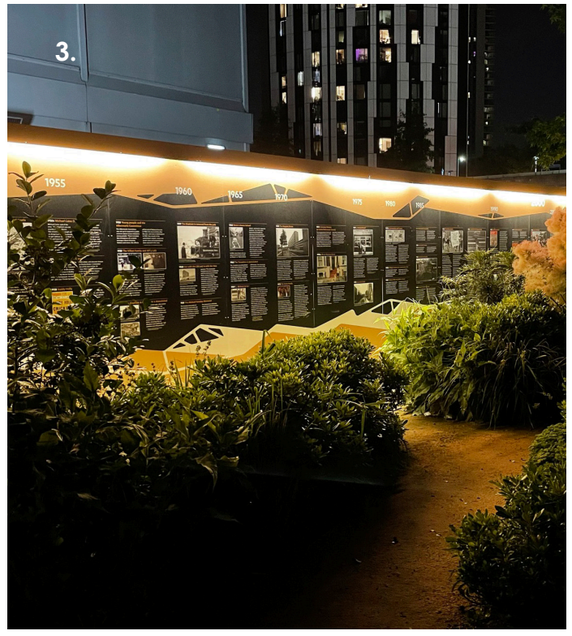
4.16 The following general principles should be observed with respect to both of these forms of lighting which may be subject to planning conditions as part of the approval process:

a. The provision of temporary festive lighting both within the public realm and where mounted on or from the building should be considered early in the design where applicable.
b. Where temporary festive lighting is to be employed consideration should be given to the provision of supporting electrical and mechanical infrastructure including externally exposed cabling, sockets, cleats, hooks, eyes and other fixings as part of the façade design.
c. The provision of temporary construction lighting adjacent to or running through a development site, and the illumination of the site itself for safety and security purposes including the lighting of cranes should all be carefully considered as a holistic design.
d. The temporary lighting of construction sites should be designed to minimise obtrusive light including sky glow, glare, light spill, visual brightness, and light intrusion, and avoid creating adverse ecological impacts particularly with respect to residential amenity.
e. Consideration should be given as to how the temporary lighting of construction sites might make a positive contribution to the character and ambience of the local area after dark for the duration of the works.

1.Provision of infrastructure for the occasional and appropriate use of dynamic coloured lighting, projections and other forms of artistic night-time intervention can enhance the public realm after dark.
Photography by James Newton.



2. Temporary construction lighting can cause glare, light spill and light pollution.
Photography by James Newton.



3. Temporary lighting of construction hoarding can make a positive contribution to the character and ambience of the local area and minimise the impact on the ecology.

5.0 Technical Requirements

Technical Requirements

5.1 This final section sets out the technical requirements with which all lighting schemes within the City of London for new developments are expected to comply. Where deviation occurs applicants should explain their reasons and justify their design decisions including providing mitigation where needed.

5.2 The information as indicated in '**Table 6: Technical Lighting Requirements**' should be submitted as part of the Lighting Equipment Schedule as indicated in '**Table 4: Technical Lighting Design Submission Requirements**':

Table 6: Technical Lighting Requirements

Item	Requirement
Type of source	To be light emitting diode (LED) unless otherwise stated. Where not LED please detail the source and justify its use.
Colour appearance of the source	All exterior and interior light sources (where visible to the public realm) should be in the range of 2300K – 4000K. Where sources are not within this range, or are coloured, please clearly explain the reason.
Colour rendering of the source	All exterior light sources should have a CRI of ≥80. Where sources are not within this range, please clearly explain the reason.
Construction of the luminaire	Details should be provided as to the materials and general construction of the luminaire, its IP and IK rating (where relevant) and its compliance with relevant British Standards, Electrical Regulations and Codes of Practice.
Efficiency of the luminaire	All exterior lighting equipment should achieve an efficiency of ≥ 70 lm/circuit watt. Where equipment does not achieve this efficiency, please clearly explain the reason.
Optical design and aiming of the luminaire	All exterior luminaires should be directed at the target surface and aimed so as not to create obtrusive light such as sky glow, glare, excessive visual brightness, light spill or light intrusion. Where the risk of obtrusive light exists luminaires should be fitted with louvres, cowls or shields. Where no accessories are fitted, please clearly indicate how the design minimises glare.
Mounting methodology	Please indicate the method by which any lighting equipment is fixed within the public realm or to a building and the means by which it is secured to prevent it falling. Where equipment is at low level and/or can be touched by a member of the public details should be provided as to the measures taken to secure the fitting and prevent injury by sharp edges, heat, or electric shock. Details should also be provided as to any measures taken to counter vandalism.
Dimensions and weight	Please state the overall dimensions and weight of each item of lighting equipment.
Lifetime, upgrading and disposal	Details should be provided as to the anticipated lifetime of all exterior lighting equipment, any warranty period provided by its manufacturer and the method by which it will be upgraded to extend its life and/or disposed of at end of life. It is recommended that all luminaires have a warranty of not less than 5 years.
Origin of manufacture and support	Details should be provided as to the origin of manufacture of all exterior lighting equipment and the means by which technical support will be provided during its lifetime.

5.0 Technical Requirements

Obtrusive Light

5.3 One of the primary goals of this SPD is to help reduce the environmental impact created by lighting schemes for new developments to protect both residential amenity and biodiversity, whilst at the same time promoting the creation of rich, diverse and visually interesting public realm experience after dark. To do so it has drawn upon general guidance and best practice. This includes 'Guidance Note 01/21 for the reduction of Obtrusive Light 2021' published by the Institution of Lighting Professionals (ILP), which in itself is based on international guidance on obtrusive light as detailed in 'CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations'.

5.4 Whilst obtrusive light is also referred to as light pollution, for the purposes of this document it includes sky glow, glare, excessive visual brightness, light spill, and light intrusion that can cause a nuisance or create an adverse impact on both people and biodiversity.

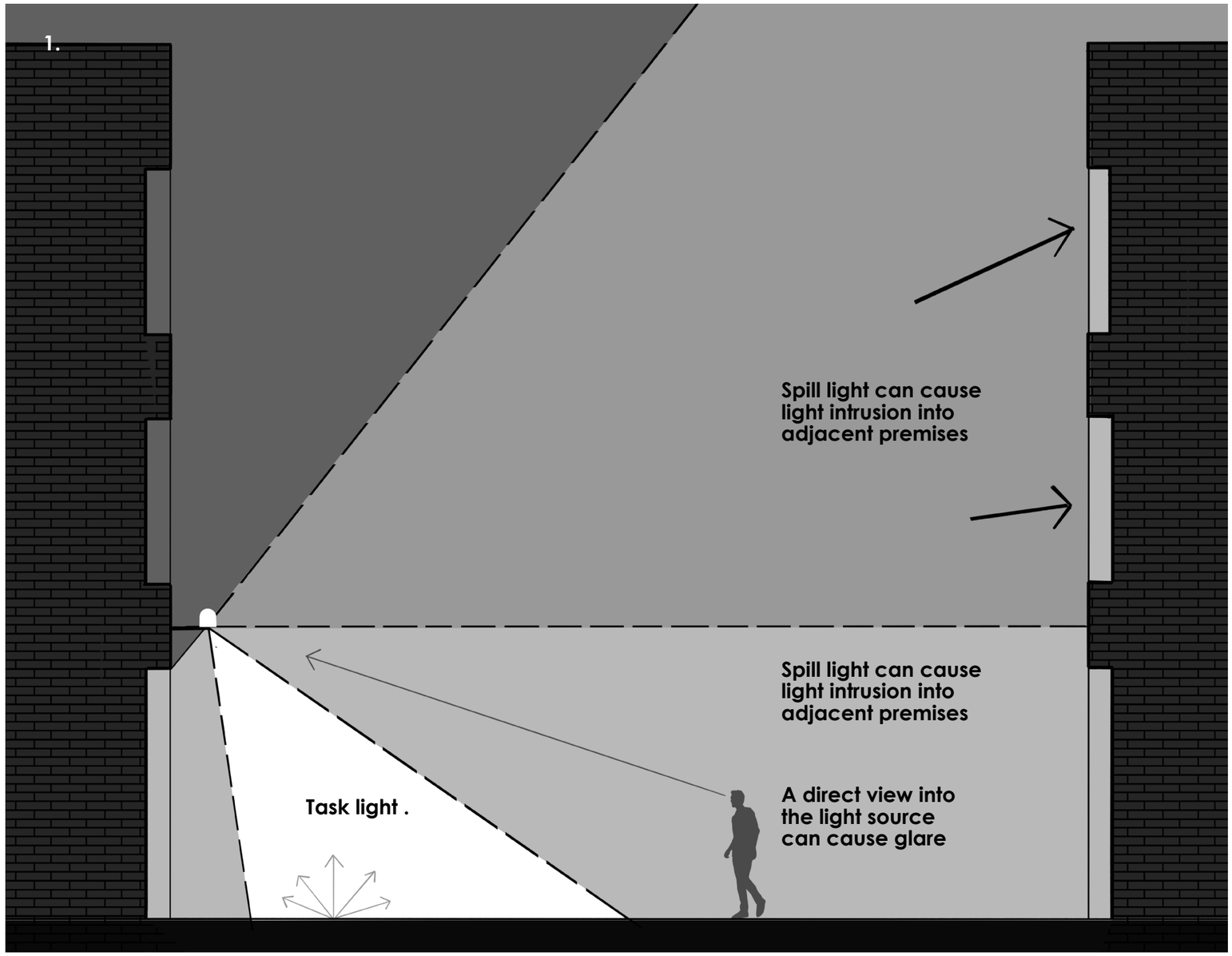
5.5 Four things are required to be considered to help minimise obtrusive light created by a lighting scheme whether that is external to the building or internal but visible from outside: The brightness of the light sources, the optical design and distribution of the luminaires, the positioning and mounting of the luminaires, and how they are controlled.

5.6 Lighting schemes designed as part of new developments should meet the requirements and provide the information set out in '**Table 7: Environmental Lighting Standards**'. Where deviation from such standards occur applicants should explain their reasons and justify their design decisions including providing mitigation where required.

Table 7: Environmental Lighting Standards

Issue	Requirement	Reason
Sky glow	Provide details of any mitigation measures taken as part of the design and management of the exterior and interior lighting to reduce the risk of contributing to sky glow such as aiming fixtures above the horizontal, their optical design, the inclusion of accessories such louvres, snoots and cowls and the use of lighting control.	To contribute to the reduction of obtrusive light.
Glare	Provide details to demonstrate how glare will be controlled including confirmation that the main beam angle of all light fixtures when directed towards an observer is no more than 45° from the vertical. If aiming angles of luminaires exceed this requirement, clearly explain the reasoning and any mitigation measures that may be taken .	To contribute to the reduction of obtrusive light.
Visual brightness	Provide details, including luminance plots, to demonstrate that the visual brightness of a façade, or illuminated media complies with the requirements of this document (see Tables 9-13) If the visual brightness exceeds these clearly explain the reasoning and any mitigation measures that may be taken.	To contribute to the reduction of obtrusive light.
Light spill	Provide details, including illuminance plots, to demonstrate that light spill from the development complies with the requirements of this document (see Tables 9-13), excluding street and amenity lighting. If the light spill exceeds these, clearly explain the reasoning and any mitigation measures that may be taken.	To contribute to the reduction of obtrusive light.
Light intrusion	Provide details of any mitigation measures taken as part of the design and management of the exterior and interior lighting to reduce the risk of light intrusion into adjoining or neighbouring properties such as blinds, lighting control, etc.	To contribute to the reduction of obtrusive light.
Curfew	Provide details of which luminaires are required to be maintained from dusk to dawn for essential lighting to support safety and security and which luminaires are non-essential and may therefore be switched off at the appointed curfew time (see Table 9).	To contribute to saving energy and reducing obtrusive light.
Energy consumption	State the total energy consumption of the external and internal lighting installation and detail what measures are being taken to minimise energy use.	To show how the development may directly contribute to the City of London's strategy for the reduction of CO2 emissions.

5.0 Technical Requirements



1. Types of obtrusive light.

2. If the visual brightness of signage is too high, it contributes to obtrusive light.

3. If the visual brightness is ≤ 200 cd/m² and well balanced, the façade and signage are more legible.

5.0 Technical Requirements

5.7 Alongside the requirements set out in '**Table 7: Environmental Lighting Standards**' the following Tables 9-12 indicate the general technical standards that lighting should be designed to for all new developments, particularly with respect to light spill and visual brightness.

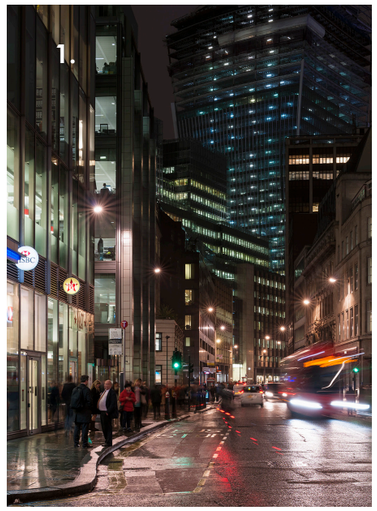
5.8 The City Corporation's Lighting Strategy (2018) describes a variety of different character zones. It is recognised that these different areas of the City are brighter or darker depending on the nature of the activity taking place i.e. commercial office, retail, residential, historic, cultural or mixed use. '**Table 8: District Brightness Zones (DBZ)**' indicates the classification of different areas of the City of London into areas of district brightness. Applicants should establish which zone/s applies to their development through consultation with a City of London Planning Officer.

5.9 For the avoidance of doubt where a development lies at the boundary of two District Brightness Zones the design should comply with the requirements of the lower brightness zone unless otherwise agreed with the City Corporation. It may also be that different facades of a development may be required to meet the standards of different District Brightness Zones.

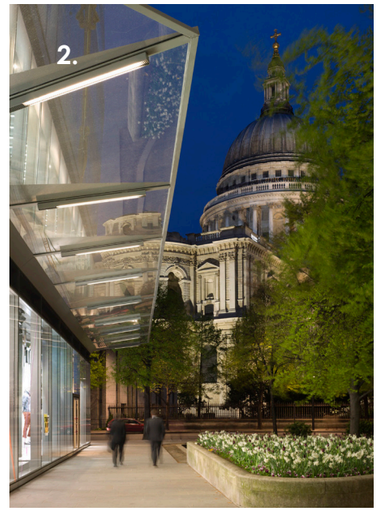
5.10 Having established the relevant District Brightness Zone/s (DBZ) with the City Corporation that applies to a lighting scheme, the applicant should consult '**Table 9: Lighting Curfew Times**' which clarifies the times at which all external lighting, except that specifically required for safety and crime prevention such as street and amenity lighting, should automatically switch off, or dimmed down to pre-agreed levels, unless activated by a passive infrared (PIR) detector or similar presence detector or sensor.

5.11 Having established the District Brightness Zone (DBZ) and the Lighting Curfew Times the external lighting, or the internal lighting visible from the public realm, should be designed to meet the criteria stated in '**Table 10: Light Spill – Maximum value for vertical illuminance spilling from a façade**' as measured on a vertical plane at a 5m offset from the site boundary of any development. Evidence of compliance with these requirements should be provided through outputs from light modelling studies.

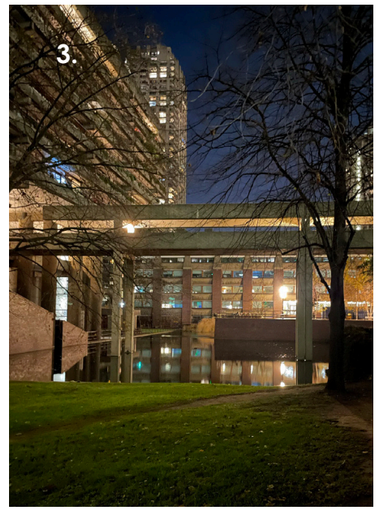
5.12 Having established the District Brightness Zone (DBZ) and the Lighting Curfew Times the external lighting, or the internal lighting visible from the public realm, should be designed to meet the criteria stated in '**Table 11: Light Spill – Maximum value for horizontal illuminance spilling from a façade**' as measured on a vertical plane at a 5m offset from the site boundary of any development. Where the offset to neighbouring buildings or open spaces is less than 5m the criteria apply to that boundary. Evidence of compliance with these requirements should



1. Example of a District Brightness Zone 1. Photography by James Newton.



2. Example of a District Brightness Zone 2. Photography by James Newton.



3. Example of a District Brightness Zone 3.

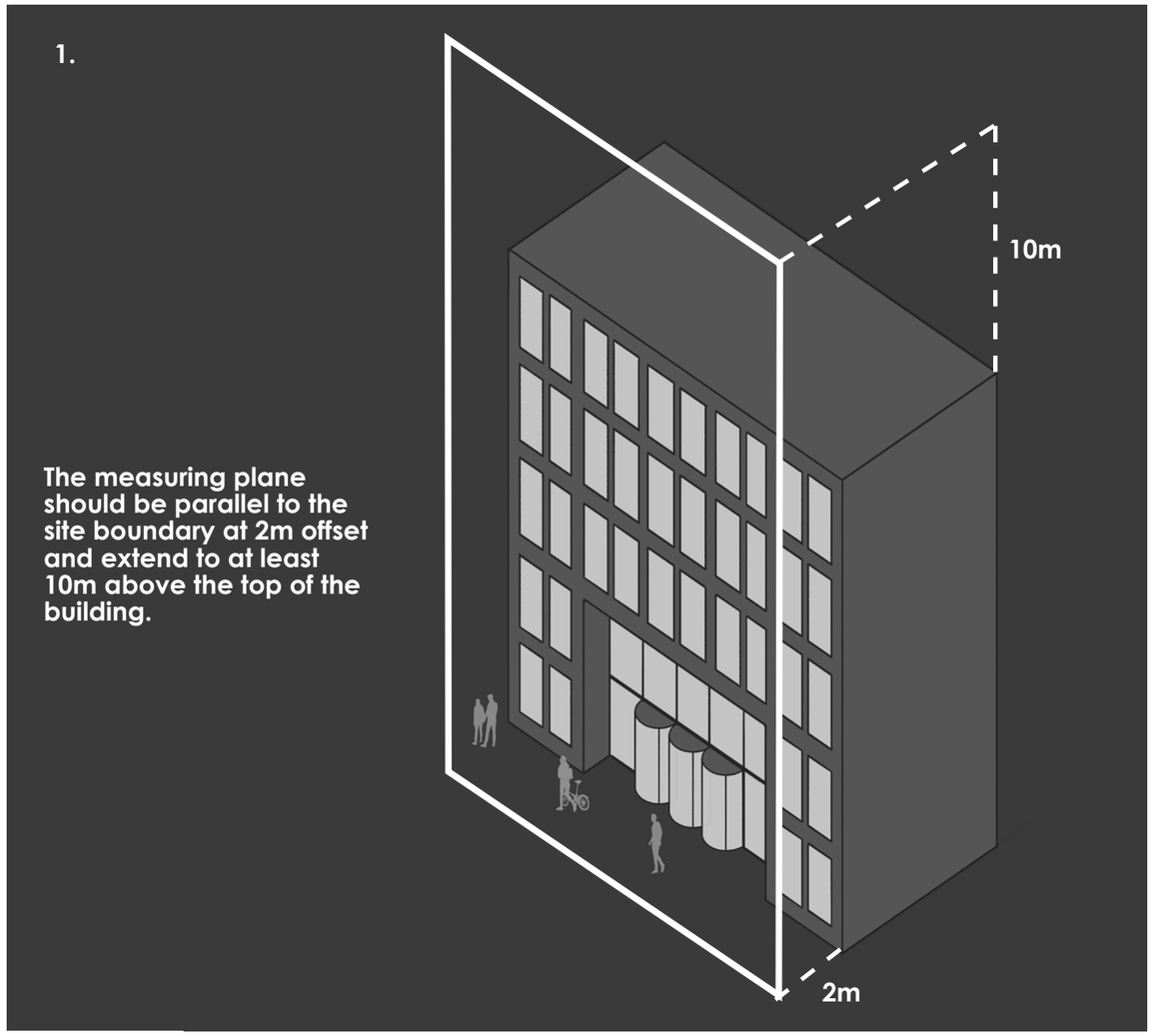
Table 8: District Brightness Zones (DBZ)

DBZ	Class	Area
DBZ1	High	Commercial, retail and transport terminals and other defined high district brightness areas.
DBZ2	Medium	Cultural, tourist and heritage and other defined medium district brightness areas.
DBZ3	Low	Residential, special heritage, landscaped and other defined low district brightness areas.

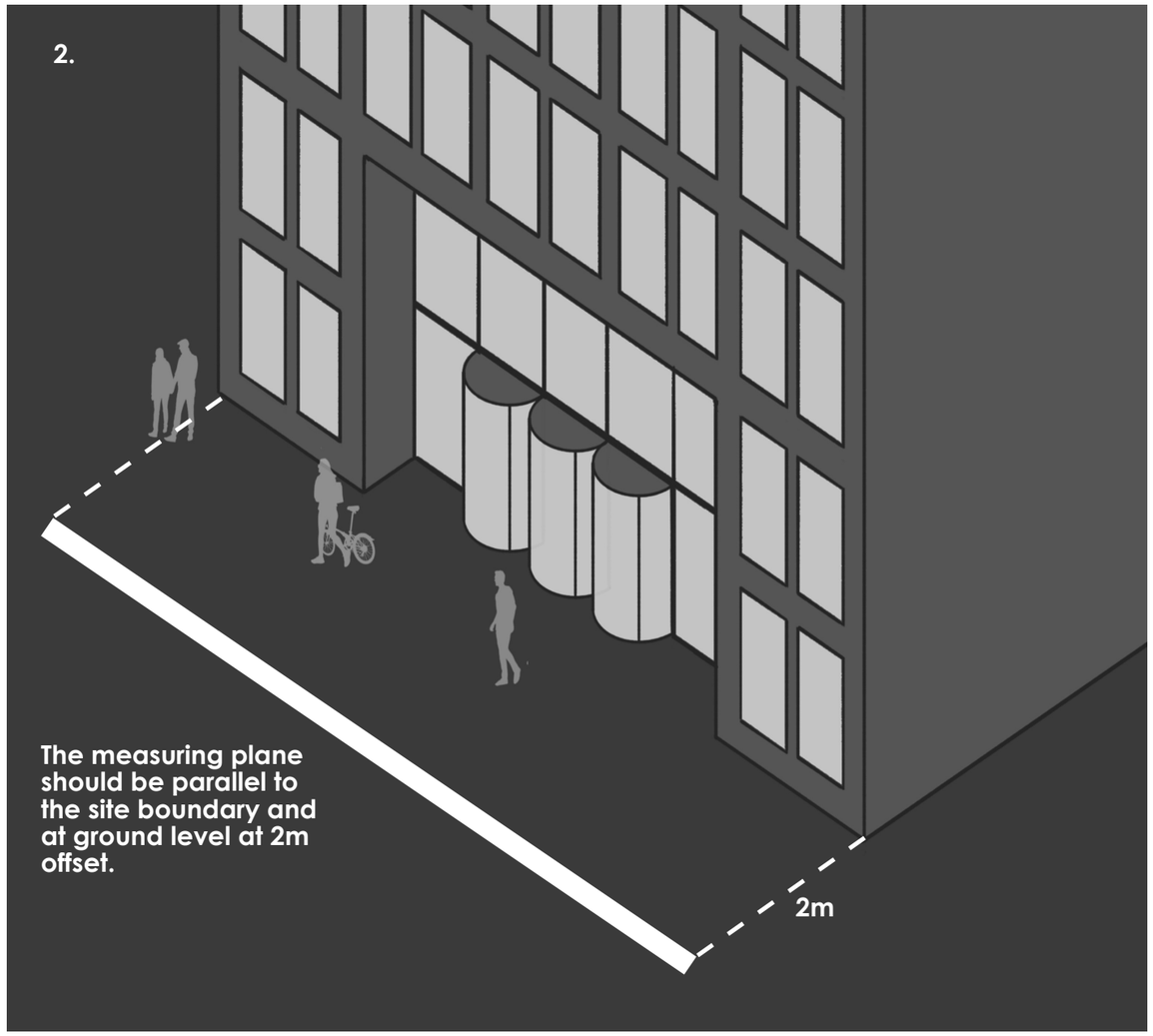
Table 9: Lighting Curfew Times

DBZ	Class	Pre-Curfew	Post-Curfew
DBZ1	High	Sunset to midnight	Midnight to sunrise
DBZ2	Medium	Sunset to 23.00	23.00 to sunrise
DBZ3	Low	Sunset to 22.00	22.00 to sunrise

5.0 Technical Requirements



1. Diagram explaining measuring plane for vertical illuminance.



2. Diagram explaining measuring plane for horizontal illuminance

Table 10: Light Spill – Maximum Vertical Illuminance

DBZ	Class	Pre-Curfew	Post-Curfew
DBZ1	High	15 lux	3 lux
DBZ2	Medium	5 lux	1 lux
DBZ3	Low	1 lux	0.1 lux

Note: The measuring plane should be parallel to the site boundary and extend to at least 10m above the top of the building.

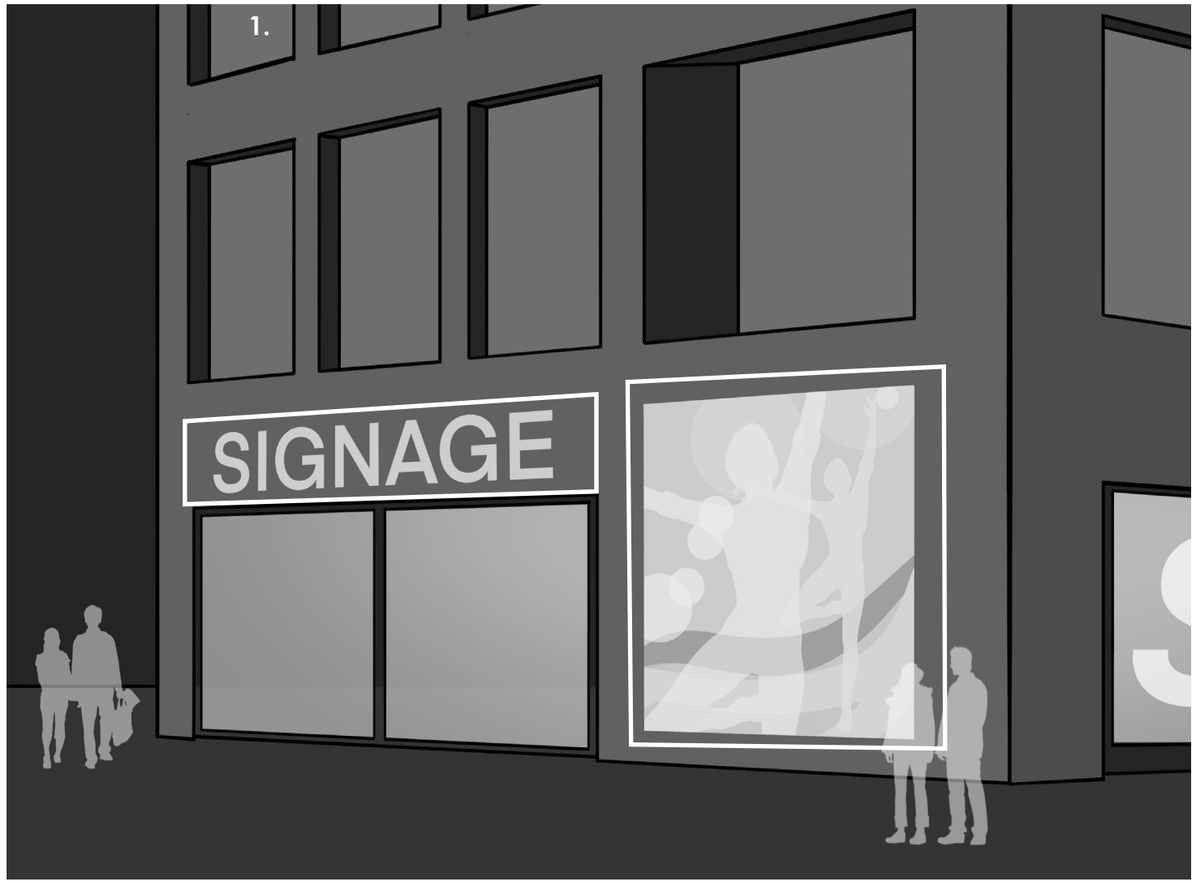
Table 11: Light Spill – Maximum Horizontal Illuminance

DBZ	Class	Pre-Curfew	Post-Curfew
DBZ1	High	15 lux	3 lux
DBZ2	Medium	5 lux	1 lux
DBZ3	Low	1 lux	0.1 lux

Note: The measuring plane should be parallel to the site boundary and at ground level.

5.0 Technical Requirements

5.13 Having established the District Brightness Zone (DBZ) and the Lighting Curfew Times the external lighting, or the internal lighting visible from the public realm, should be designed to meet the criteria stated in '**Table 12 : Visual Brightness – Maximum values of average surface luminance of illuminated media**' as measured at the face of the sign/ media screen. Evidence of compliance with these requirements should be provided through outputs from light modelling studies.



1. The measuring plane is the face of the sign/media screen.

Table 12: Visual Brightness – Maximum values of average surface luminance of illuminated media

DBZ	Class	Pre-Curfew	Post-Curfew
DBZ1	High	500 cd/m²	250 cd/m²
DBZ2	Medium	200 cd/m²	100 cd/m²
DBZ3	Low	100 cd/m²	50 cd/m²

Note: The measuring plane is the face of the sign/media screen.

5.0 Technical Requirements

Operation and Maintenance

5.14 Notwithstanding the quality of the lighting design for any development and its compliance with the general principles and technical requirements of this SPD, the way in which the lighting performs after dark each night will be reliant on the manner in which it is operated and maintained. '**Table 4: Technical Lighting Design Submission Requirements**' requires applicants to submit full details of their intended operational and maintenance requirements for the exterior lighting and any interior lighting visible from the public realm. Such details should include the information and details as outlined in '**Table 13 – Requirements for the Operation and Maintenance of Lighting**' as follows:

Table 13: Requirements for the Operation and Maintenance of Lighting

Item	Requirement
Control Methodology	General summary of anticipated methodology for the control of all external lighting and all internal lighting visible from the public realm.
Control System	Details of exterior and interior control systems including general type, control protocol, confirmation of degree to which lighting is dimmable and details of operational interfaces that control the timing of the external lighting and internal lighting visible from the public realm including PIRs, photocells, programmable and astronomic timeclocks.
Operational Times	Details of operational timings and approximate lighting levels as a percentage of full brightness for all external lighting and internal lighting visible from the public realm to demonstrate compliance with pre-curfew and post-curfew lighting requirements as stated in this guidance including details of different lighting moods or scenes.
Maintenance of Lighting Equipment	General method statement for the maintenance of all lighting equipment providing the external lighting and internal lighting visible from the public realm including intervals for inspection and cleaning of lighting equipment including details of access requirements and timings.
Replacement of Lighting Equipment	General statement for the anticipated upgrading and/or replacement of all lighting equipment providing the external lighting and internal lighting visible from the public realm including LED chips, luminaires, accessories and drivers together with details of how such equipment will be recycled or disposed.

Appendices

Appendix A:
Considerate Lighting Charter
City of London Corporation

The City of London Corporation's Considerate Lighting Charter is a set of actions that will help to ensure that buildings and public spaces in the Square Mile achieve the right light, in the right place, at the right time.

Building owners, managers and occupiers in the Square Mile are encouraged to sign up to the Charter. By doing so, they commit to the principles and actions of the Charter, and commit their organisations to minimising the amount of artificial lighting they use.

These 13 actions are the minimum required to comply with the Considerate Lighting Charter. For further guidance, look at the City of London Corporation's Lighting SPD.

Well-managed lighting

1. **Review your lighting system** – Carry out an initial review and update it regularly, with the aim of minimising light spill, reducing energy consumption and improving sustainability.
2. **Consult neighbouring properties** – Particularly residents and other sensitive receptors, as part of the review. Keep neighbouring properties informed about changes to your lighting system.
3. **Detection systems** – Install passive infrared detectors (PIR) or similar detection systems as part of a 'smart' lighting system designed in a way that minimises the amount of light used.
4. **Management** – Embed good lighting practice in your facilities management teams and undertake training for staff on how lighting systems should be operated.
5. **Turn lights off** – Do not leave the lights on in unoccupied interior spaces, particularly commercial spaces and ensure external lighting accords with curfew times in the Lighting SPD.

Comfortable lighting

6. **Glare** – Install low-glare downlighting and louvres to minimise glare and the visibility of lights from outside the building.
7. **Light spill** – Remove or reduce any lighting that is within two metres of a window. Install blinds to minimise light spill outside the building.
8. **Colour temperature** – Do not use lighting that is cooler than 3,000 Kelvin for outside the building, or cooler than 4,000 Kelvin for inside the building, after dark.
9. **Illuminance and brightness** – Put limits on external lights and internal lights that are visible from outside, taking account of the time of day and character of the area. (Tables 10 -12 of the Lighting SPD set out the limits to follow).

Sustainable lighting

10. **Energy waste** – Only use light where deemed absolutely necessary and ensure it is on only when needed.
11. **Reduce carbon impacts** – Procure light fittings that have the minimum embodied carbon and lowest operational energy, and can be easily repaired, replaced and recycled. Consider 'lux leasing' and other circular economy approaches.
12. **Efficiency** – All exterior lighting equipment should achieve an efficiency of more than 70 lumens per circuit watt.
13. **Biodiversity** – Identify local context and design your lighting to limit any impacts on biodiversity.

Appendix B:
Supporting legislation, standards

There are numerous recognised standards and guidelines with respect to external lighting the UK. These make general recommendations regarding the quality, quantity, distribution, and delivery of light and the many technical considerations associated with the illumination of the built environment. Whilst too numerous to cite within this document, the following are recommended for further background information in support of this SPD:

- BS5489-1 2020: Design of road lighting. Lighting of roads and public amenity areas. Code of practice;
- CIBSE/SLL Code for Lighting;
- CIBSE/SLL Lighting Guide LG06/16: The Exterior Environment;
- CIBSE/SLL LGLOL Guide to limiting obtrusive light;
- CIE 115:2010 Lighting of roads for motor and pedestrian traffic;
- CIE 126:1997 Guidelines for minimising sky glow;
- CIE 136:2000 Guide to the lighting of urban areas;
- CIE 150:2017 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations;
- ILP GN 01/20: Guidance note for the reduction of obtrusive light;
- ILP PLG04 Guidance on undertaking environmental lighting impact assessments;
- ILP PLG05 The brightness of illuminated advertisements;
- ILP PLG06 Guidance on installation and maintenance of seasonal decorations and lighting column attachment;
- Historic England: Streets for All Advice for Highway and Public Realm Works in Historic Places;
- Historic England: External Lighting of Historic Buildings;
- Information from the Bat Conservation Trust on artificial lighting, and Eurobats guidelines for consideration of bats in lighting projects.

It should be noted that the above list is not exhaustive. It also relates to good practice guidance not regulation. The advice given by the Institution of Lighting Professionals in relation to their guidance may be seen as applicable to all: "Lighting is a complex subject with both subjective and objective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting, where the various and maybe conflicting visual requirements need to be balanced.

Appendix C:
Construction Lighting

Whilst temporary construction lighting for construction sites after dark is essential to maintaining safety and security on construction sites it can also be a blight creating light spill, glare, light intrusion and other unwanted impacts, particularly with respect to local residents and biodiversity. In some cases temporary construction light may stay in place for many years. It also often changes and develops over time, including the re-positioning of lighting associated with hoardings, scaffolding, site access for vehicles and personnel, site accommodation, open working areas, cranes, concrete batching plants and other construction areas. The following guidance is recommended for all construction sites within the City of London with respect to lighting:

1.0 Introduction

The following guidelines have been prepared to assist with the design, development, delivery, operation, and maintenance of 'Exterior Site Lighting' within the City of London. They aim to provide 'best practice' guidance to principal contractors, their sub-contractors, and other key stakeholders as to the use of artificial light in the external realm in association with construction sites and their immediate curtilage.

2.0 Background

Lighting plays a key role on construction sites, particularly during the winter months when work may be taking place during the hours of darkness. Lighting is used to provide a safe and secure environment for all those that work on, or visit the construction site itself, and for members of the public who are driving, cycling or walking around the perimeter. Whilst the role of such lighting is critical it should be recognised that it also creates several unwanted environmental impacts including:

- Energy use
- Obtrusive light
- Light Pollution
- Waste

This document aims to provide advice as how to improve the balance between the requirement to provide a well-lit working environment and reducing the environmental impact of Exterior Site Lighting to create a sustainable response. This is particularly important as construction sites within the City of London, and their temporary lighting arrangements, will be in place for long periods – often several years. It is therefore important to reduce the impact of such lighting for local residents, biodiversity, and to protect the night sky but without compromise to safety and security.

3.0 Standards

Whilst there are no apparent statutory requirements for Exterior Site Lighting within the UK, it is a requirement of the Health and Safety Executive to safely illuminate construction sites. Guidance is available on the HSE website. This includes links to HSG38 'Lighting at Work'. Whilst this document deals more broadly with health and safety issues around lighting in a range of different workplaces including offices, factories, etc., it also refers to construction sites. It should be noted however, that HSG38 was first published in 1987, and last updated in 1997, since when many changes in lighting technology and the understanding of both the benefits and impacts of artificial lighting on human health and the wider environment have substantively changed. The baseline information from HSE regarding Site Lighting is currently limited to the provision of light but does not include any comment regarding the potential environmental impact or nuisance it can cause. Many other standards exist with respect to the design of exterior lighting which are noted in the appendix to this document. Whilst such guidance refers generally to more permanent schemes, much of the advice can equally apply to temporary conditions, particularly where lighting is to be installed and operated for many years. The most relevant document that provides guidance in respective light pollution, light spill, over-illumination and other environmental factors with respect to the use of artificial light at night (ALAN) is 'ILP GN 01/20: Guidance note for the reduction of obtrusive light' published by the Institution of Lighting Professionals.

4.0 Principles

The key lighting requirement for all Exterior Site Lighting is providing the right amount of light, of the right type in the right place, and at the right time.

Quantity

Whilst HSE guidance on technology as outlined in HSG38 is outdated, many of its key recommendations remain relevant. The guidance states: "Lighting at work is very important to the health and safety of everyone using the workplace. The quicker and easier it is to see a hazard, the more easily it is avoided. The types of hazard present at work therefore determine the lighting requirements for safe operation." It is therefore essential that the right amount of light for the visual task is determined in each area of the site. This should generally be determined based on carrying out a risk assessment and/or using the CIBSE Code for Exterior Lighting or similar best practice guidance. Whilst the amount of light (illuminance measured in lux) may be expressed as an average across the task plane its uniformity (evenness of the lighting) is critical. Extremes of contrast should be avoided wherever safety is a key consideration. The more uniform the lighting the better the eye can see and therefore the lower the light level can be. This point is important where measures are being taken to minimise the environmental impact of the lighting including the avoidance of over-illumination and over-specification. The less light that is used the less impact is created.

In the absence of any other guidance the following may be used subject to a proper assessment of risk:

Task (rough construction work)	Average Illuminance (lux)	Minimum Illuminance (lux)	Uniformity (UF)
Areas involving the movement of people and vehicles such as lorry parking or circulation areas	30	5	0.2
Areas involving the movement of people, vehicles and/or machinery such as clearance, excavation and soil work	50	20	0.4

Whilst the background level of illumination as stated this table should be sufficient for many activities, where more detailed tasks are being carried out, or there is a high risk of personal injury, higher levels of illumination may be required. In such cases consideration might be given to the local lighting of such tasks rather than illuminating large areas of the site to a higher level. An alternative may be to raise the level of light across the wider area but only when such tasks are being carried out.

Quality

As important as the quantity of light is its quality. This can be expressed both in terms of colour appearance and colour rendering.

Colour appearance is the colour of the light itself i.e. warm, neutral or cool, which is measured as correlated colour temperature (CCT) expressed in Kelvin (K). Whilst not critical to the visual task consideration might be given to the CCT of any exterior lighting in relationship to the site context. By example, warmer light (2700K-3000K) might be employed in a residential area.

Colour rendering is a measure of the ability of a light source and its spectrum to reveal colours accurately and is measured through a 'colour rendering index' (CRI) expressed in Ra. Ra100 is identical to the spectrum of daylight which reveals colours accurately. The better the quality of light in terms of its spectral distribution, the higher the CRI and the easier it is to recognise colours. High CRI (>Ra 80) can allow lighting levels to be slightly lowered when compared with sources with a lower CRI.

It should be noted that the prevailing source technology, light emitting diodes (LED) generally have a very high CRI. They render colours better than many of the more traditional sources of light such as fluorescent and metal halide around which many lighting standards were originally determined.

Another important qualitative issue is glare. There are two types: The first is 'disability glare' which is produced directly or by reflection and which impairs the visibility of objects. The second is 'discomfort glare' which causes actual visual discomfort. Glare should be avoided as it can cause a wide variety of problems including hampering people's ability to easily adapt to the dark. With exterior lighting the eye will always adapt to the brightest object in the field of vision which in turn will create problems with the visibility of the surrounding area. Glare can therefore be hazardous in complex and potentially dangerous working environments such as construction sites.

Place

Another critical factor is the manner in which light is distributed to meet the requirements of the visual task within any place. Aside from the distribution of the light having the potential to create issues such as glare it will also impact uniformity and create shadows. By example a focussed light source will create extremely sharp and deep shadow, but the visual brightness of the fitting can be better controlled. An unfocussed or diffused light source will produce a softer flatter light with less harsh shadows but can create more glare.

LEDs themselves are generally bright, glary and highly focussed light sources by their very nature so good optical control is always recommended. This can also greatly enhance the efficiency of the fixture and its source as well as helping to control glare.

Lighting can also be regarded as a 'place-making' tool. Whilst Exterior Site Lighting is less likely to be concerned with character or identity it should be recognised that the overall appearance of a construction site after dark can positively contribute to the brand values and image of the client, the wider development and the construction team, both as responsible 'good neighbours' to local communities and in respect off sustainability and environmental impact.

Duration

One of the easiest ways to save energy and reduce unwanted environmental impacts is to use less light. This can not only be achieved through designing for lower light levels but also by ensuring that lighting is turned off, or at least right dimmed down, when there is no human presence. The duration of any lighting can be controlled by photocells, timeclocks or presence detection. These can either control light fittings either individually or as a network.

Photocells can be used to raise or lower, turn off and turn on light sources related to the availability of daylight i.e. at dusk or dawn.

Timeclocks can provide simple pre-programmed on/off instructions. Astronomic timeclocks are pre-programmed to control lighting in relation to the daily change to sunset and sunrise times.

Presence detection will raise or lower, switch on or off light fittings when triggered by the presence of a person or vehicle.

It is recommended that these various forms of control are used to manage energy and mitigate environmental impacts through regulating the use and amount of light at a different times for different purposes, including dimming lighting down to a security setting or switching it off altogether at an agreed 'curfew' time.

5.0 Environmental Impact

As previously stated, Exterior Site Lighting can directly contribute to environmental impact that can cause harm to people, flora and fauna, and the planet. Such impacts are created in several ways:

Energy Use: Light is a highly visible form of energy use. The less light we use the more we reduce the carbon footprint of any site which in turn reduces the depletion of the earth's natural resources in the form of valuable fossil fuels. Whilst solid state lighting technology such as LED and control systems can help reduce energy use through achieving greater efficiencies energy use can be further reduced and better managed through good design.

Light Pollution: Artificial light is an industrial product that can create pollution. Light pollution not only conceals our view of the stars on a clear night but can also harm local ecologies, particularly bird, bat and insect populations. Light pollution is not only caused by direct upward light but also reflected light from brightly illuminated horizontal or vertical surfaces. Security lighting is recognised as one of the major contributors to light pollution.

Light Intrusion: Light intrusion (also called Light Spill) is a form of light pollution. In the context of this guidance, it refers to light that strays over the site boundary into neighbouring areas. This is known as light trespass. Uncontrolled light spill can cause problems for people and biodiversity. Light spilling through bedroom windows of residences local to a site can create problems with sleep patterns leading to health issues. Light spilling into ecologically sensitive zones can harm both flora and fauna upsetting the natural balance, impacting the migration patterns of birds, attracting insects that change the feeding patterns of predators and causing stress to plants, trees and other flora.

Over-Illumination: The use of higher levels of light than are needed or maintaining illumination when not required, can be referred to as over-illumination. Over-illumination is often created by the over-specification of light sources and lighting equipment. With well-designed lighting 'brightest is not always best' and 'less can often be more'. Whilst safety and security is of paramount importance this should not be achieved through the careless use of more light than is required to achieve such objectives.

Waste: As well as wasted energy and wasted light, lighting can also create waste through the redundancy of lighting equipment and supporting electrical infrastructure. This is particularly the case with temporary lighting where fittings are sometimes discarded rather than being re-used or re-purposed. Low cost fixtures often break or LED sources fail prematurely. They are also often unable to be upgraded, repaired or even recycled. Every effort should be made to reduce unnecessary waste and to re-use site lighting. Consideration should be given to the whole-life cost, circularity, embodied energy, ability to be repaired, upgraded and/or recycled for each component within the systems that deliver the Exterior Site Lighting.

6.0 Recommendations

Exterior Site Lighting is often designed to spill high levels of light into the environs of a construction site using bright and uncontrolled fittings such as floodlights mounted on hoardings, site offices, gantries, towers and cranes. Such lighting is often over-specified, over-bright, glary and light polluting spilling light well outside the boundary of the site itself.

Whilst 'temporary' in nature Exterior Site Lighting can often be in place for many years creating visual problems for local residents, office workers and members of the public who pass by, overlook or otherwise engage with the site.

It is the recommendation of this report that all Exterior Site Lighting is designed, developed, specified, procured, delivered, controlled and maintained to reduce unwanted and unnecessary environmental impacts as far as it is reasonably possible. If carefully and professionally designed, this can be achieved without compromise to health and safety and security.

Beyond the general recommendations already made in this guidance the Exterior Site Lighting to all construction sites within the City of London should adhere to the following specific recommendations:

- The quantity of light used should not exceed the recommendations of the CIBSE Code for Exterior Lighting and/or HSE Guide HSG38. Wherever possible consideration should be given to further reducing light levels, particularly where overlooked by, or in close proximity to residences or areas of ecological importance.
- The correlated colour temperature of the light (CCT) should be no greater than 4000K (neutral white). Where the site is local to residential areas consideration should be given to using 3000K or less (warm white).
- All light sources shall produce white light in the range of 4000K-2700K and the use of coloured lighting should be avoided unless otherwise agreed.
- The colour rendering of all light sources should not be less than Ra80 to aid recognition.
- A 'lighting curfew' time should be agreed after which all exterior lighting is switched off or dimmed down to 10% of its designed level.
- Whilst lighting should be designed to support CCTV arrangements this should not be to the detriment of the local environment. CCTV cameras should be specified or switched to low light level mode post-lighting curfew.
- All light sources should be directed at the ground or onto vertical surfaces such that light does not spill into the sky or beyond the site boundary.
- All light sources should be fixed or tilted such that they light above the horizontal.
- All light sources should be fully or partially shielded to prevent a direct view of the light sources.
- All area floodlights or similar wide-beam luminaires should be fitted with louvres, snoots, shields and/or hoods to help reduce glare, light spill, and light pollution.
- All bulkheads should be shielded such that upward light spill is avoided, particularly where fitted to public hoardings.
- All continuous or discontinuous linear light sources, especially those fixed to hoardings, should be concealed behind shields or pelmets to avoid direct views of the source.
- All illuminated signage, graphics and/or media screens should be controlled such that they do not become a glare source or a visual nuisance.
- Consideration should be given to the use of blinds in windows of all site accommodation where interior lighting levels are in excess of 200 lux and/or unshielded ceiling mounted light sources are visible from outside, particularly where the site is in close proximity to residences or sensitive ecological areas.
- Tower cranes should not be lit other than with specific task lighting for safe access and/or operation.
- All lighting should be fully dimmable or capable of being switched down in increments of 25%.
- All lighting systems and lighting equipment should be controlled by either a centralised or localised system of photocells, timeclocks or presence detectors to allow the lighting to be fully controlled according to an agreed series of times.
- Lighting should be controlled across the site such that three lighting 'scenes' can be created and managed as follows:
  - Early evening: The brightest scene, particularly in the winter months, to support an active site. Lighting levels to different areas and tasks to comply with the recommendations of this report.
  - Late evening: A reduced lighting scene where areas with no activity have the lighting switched off or dimmed down to a security level of 10% of full output.
  - Post-lighting curfew: The lowest lighting scene where all lighting on the site is either switched off or reduced to 10% of full output.
- The addition of electrical infrastructure to support the temporary creative illumination of events and holidays such as Christmas should be considered as part of community outreach.

Appendix D: Glossary

The following is a glossary of terms to help the reader understand some of the more technical terminology used within this document. It is adapted from a full and more detailed glossary published as part of the SLL Lighting Handbook. Further information is also available through many of the standards, codes and guides that are listed in Appendix B.

Adaptation
Adaptation is the ability of the human eye to adjust to various levels of light.

Astronomical time clock
A timing device or software function designed to switch lighting on at dusk and off at dawn in relation to the day of the year at a given geographical location.

Average illuminance
(See illuminance). Illuminance averaged over the specified surface area measured in lux. In practice this can be derived either from the total luminous flux falling on the surface divided by the total area of the surface or, alternatively, from an average of the illuminances at a representative number of points on the surface.

Average luminance
(See luminance). Luminance averaged over the specified surface measured in candela per square meters (cd/m²). In practice, this may be approximated by an average of the luminance at a representative number of point on the surface.

Brightness
Attribute of a visual perception according to which an area appears to emit (or reflect) more or less light.

Brightness contrast
Subjective assessment of the difference in brightness between two or more surfaces seen simultaneously or successively.

Colour contrast
Subjective assessment of the difference in colour between two or more surfaces seen simultaneously or successively.

Correlated colour temperature (CCT)
The Correlated Colour Temperature of a lamp refers to the chromaticity of the light emitted. CCT is measured in degrees Kelvin (K). The warmer the appearance of the light source, the lower the degrees of Kelvin.

Colour rendering (CRI)
Colour rendering is the ability of a light source to reproduce surface colours as faithfully as possible compared to a reference light source (e.g. daylight). It is identified by the colour rendering index (CRI). The highest colour rendering is Ra = 100.

Colour consistency
Colour consistency refers to the average amount of variation in chromaticity among a batch of supposedly identical lamp samples. To limit this variation, the lighting industry uses a colour consistency system based on MacAdam ellipses.

Cowl
Shaped semi-cylindrical device fitted to the front of a luminaire that restricts the view of the light source.

Curfew
Time period during which stricter requirements (for the control of obtrusive light) will apply. Note: it is often a condition of use of lighting applied by a government controlling authority, usually the local government.

Cut-off
Technique used for concealing lamps and surfaces of high luminance from direct view to reduce glare.

Diffused lighting
Lighting in which the light on the working plane or on an object is not incident predominantly from a particular direction.

Direct lighting
Lighting by means of luminaires having a distribution of luminous intensity such that the fraction of the emitted luminous flux directly reaching the working plane, assumed to be of infinite extent, is 90% to 100%.

Directional lighting
Lighting in which the light on a plane or on an object is predominantly from a particular direction.

Disability glare
Glare that impairs the vision of objects without necessarily causing discomfort. Disability glare can be produced directly or by reflection.

Discomfort glare
Glare that causes discomfort without necessarily impairing the vision of objects. Discomfort glare can be produced directly or by reflection.

Driver
Device connected between the supply and one or more LED lamps which serves mainly to limit the current and/or regulate the voltage to the lamp(s) to the required value.

Efficacy
Luminous efficacy of luminaires corresponds to the ratio between the light output (lm) and the input power (W). Luminous efficacy is measured in lm/W.

Emergency lighting
Lighting provided automatically for use when the supply to the normal lighting fails.

Flicker
Impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

Floodlighting
Lighting of a scene or object, usually by projectors, in order to increase considerably its illuminance relative to its surroundings.

General lighting
Substantially uniform lighting of an area without provision for special local requirements.

Glare
Glare is the sensation produced by bright areas within the field of view and may be experienced either as discomfort glare or disability glare. Discomfort glare arises from light sources or luminaires whose luminance is greater than the eye can adapt to. Disability glare impairs the vision of objects without necessarily causing discomfort. See also disability glare and discomfort glare.

Illuminance
Illuminance describes the quantity of light emitted by a light source falling on a surface, and it is measured in lux. Illuminance (lx) = luminous flux (lm) / area (m2).

Indirect lighting
Lighting created by reflecting light off a surface.

Ingress Protection (IP) ratings
Numerical index used to define levels of sealing effectiveness of electrical enclosures, including luminaires, against intrusion from foreign bodies (tools, dirt etc) and moisture.

Integral lighting
Lighting system consisting of lamp(s), luminaire(s) and associated mechanical and electrical control devices which forms a permanent part of the built environment.

Intensity
See luminous intensity.

IK rating
Numerical index used to define the degrees of protection provided by electrical enclosures (including luminaires) against external mechanical impacts.

Lamp
Light source made in order to produce an optical radiation, usually visible.

LED (light emitting diode)
Solid state device emitting optical radiation (light) when excited by an electric current.

Life of lighting installation
Period after which the installation cannot be restored to satisfy the required performance because of nonrecoverable deteriorations.

Light Trespass
Light Trespass occurs when poorly shielded or poorly aimed fixtures cast light into unwanted areas, such as buildings, neighbouring property, and homes. This negative effect of outdoor lighting crosses property lines and detracts from property values and our quality of life - often affecting our ability to sleep and maintain good health.

Local lighting
Lighting for a specific visual task, additional to and controlled separately from the general lighting.

Louvres
Fixed or adjustable blades or baffles on windows to restrict daylight and/or preclude sunlight or to restrict or reflect some portion of the light from the lamp or light source associated with a luminaire.

Luminaire
Another term for a light fitting.

Luminance
Luminance is a measure of the luminous intensity per unit area of light travelling in a given direction measured in candelas per square metre (cd/m^2). It describes the amount of light that passes through, is emitted or reflected from a particular area, and falls within a given solid angle. Luminance distribution in the visual field controls the adaptation level of the eyes which affects task visibility and visual comfort. Too high luminances can give rise to glare and too high luminance contrasts can cause fatigue from constant re-adaptation of the eyes.

Luminance meter
Instrument for measuring luminance.

Luminous environment
Lighting considered in relation to its physiological and psychological effects.

Maintained emergency luminaire
Luminaire in which emergency light sources are operating at all times when normal lighting or emergency lighting is required.

Maintained illuminance
Value below which the average illuminance on the specified area should not fall.

Maintained luminance
Value below which the average luminance on the specified area should not (unit: cd·m–2).

Maintenance cycle
Repetition of lamp replacement, lamp/luminaire cleaning and room surface cleaning intervals.

Maintenance factor
Ratio of illuminance produced by the lighting installation after a certain period to the illuminance produced by the installation when new.

Obtrusive light
Spill light which because of quantitative, directional or spectral attributes in a given context gives rise to annoyance, discomfort, distraction or reduction in the ability to see essential information.

PIR (passive infrared)
Movement detector used as part of a presence or absence detection system.

Presence detection
The automatic detection of presence in a space in order to switch the luminaires on during space occupancy.

Reflectance
Ratio of the reflected radiant or luminous flux to the incident flux in the given conditions.

Reflections
See veiling reflections.

Scene setting
A software function or manually via a scene setting switch in order to select the available lighting scenes in a space.

Snoot
Cylindrical device fitted to front of luminaire to restrict the view of the light source.

Sky Glow
Sky Glow is a result of light fixtures that emit a portion of their light directly upward into the sky where light scatters, creating a diffuse glow above a city or town.

Spacing
Distance between the light centres of adjacent luminaires of the installation.

Spacing to height ratio
Ratio of spacing to the height of the geometric centres of the luminaires above the reference plane.

Spill light
Light emitted by a lighting installation which falls outside the boundaries of the area for which the lighting installation is designed.

Uniformity
Uniformity is the ratio between the lowest illuminance level and the average illuminance, measured in an illuminated area. Uo = Emin / Eav.upward flux ratio.

Veiling reflections
Specular reflections that appear on the object viewed and that partially or wholly obscure the details by reducing contrast.

Visual comfort
Subjective condition of visual wellbeing induced by the visual environment.

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CITY OF LONDON