Lighting illuminates and enhances our experience of the built environment. It allows people to travel around their immediate neighbourhood and the wider city, providing visibility for individuals and their locality. Research into the effects of urban lighting on behaviour, environmental psychology and social interaction is developing at a rapid rate. Yet, despite the effect it has on our daily lives, the practical application of this research is a relatively untapped resource.

This book explores the needs and experiences of people at night and how these can be addressed by public lighting. It will give readers the confidence to develop more sophisticated lighting plans and add value to their projects. Case studies provide in-depth analysis of real-life projects and will help the reader to understand lighting designers’ own experiences, including post-installation observations. Written in an accessible style by an array of experts, this is an essential book for practitioners, academics and students alike, which will enable you to put the research in to practice and develop better lighting for better places.

NAVAZ DAVOUDIAN is an Honorary Senior Research Associate at UCL Institute for Environmental Design and Engineering (BDE) Light and Lighting Group.

This book offers great insights and novel approach for urban planners and designers in unlocking the potential of the urban environment after dark.

FLORENCE LAM, Global Lighting Design Leader, Arup

There are few books worldwide dedicated to urban lighting, and almost none of them are focused on people-oriented lightings. It is why this book is so important.

ROGER HARRISON, Lighting designer

This book is a must have for all designers working on urban lighting.

PETER RAYNHAM, UCL
Urban Lighting for People

EVIDENCE-BASED LIGHTING DESIGN
FOR THE BUILT ENVIRONMENT
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CHAPTER 2

URBAN LIGHTING MASTERPLAN – ORIGINS, DEFINITIONS, METHODOLOGIES AND COLLABORATIONS

DR KAROLINA M ZIELINSKA-DABKOWSKA
Cultures and climates differ all over the world, but people are the same. They’ll gather in public if you give them a good place to do it. Jan Gehl

INTRODUCTION  
Awareness of the significance and benefits of properly designed urban lighting masterplans has been growing since the early 21st century. There are many factors driving this notable change, such as developments in lighting technology, energy conservation, city branding design and economics, environmental impacts, human health and wellbeing, and people-oriented sociological aspects.

As the profession of ‘independent urban lighting designer’ is relatively new and still not fully recognised in certain parts of the world, it is essential to establish clear definitions relating to urban lighting masterplans that describe their nature, scope and meaning. In this chapter, with the help of graphics and diagrams, all the necessary steps in the design process and the methodologies used will be introduced. This will make it easier to inform clients, urban planners and other designers about the established approach, and facilitate sharing the work of projects and continuing professional development by disseminating existing research and practical knowledge in this new field.

However, none of the above can be achieved if there is no proper process of collaboration in place between stakeholders and no common aim to create a magnificent piece of the city for its users to gather in. Collaboration is necessary in order to achieve creative results as well as to help generate appropriate, original lighting solutions for urban areas outside daylight hours.

The intention of this chapter is that more and more city representatives, developers, urban planners/designers, architects, engineers and other members of the design team responsible for designing city lighting will understand that creating appropriate night-time illumination is a complex task, bringing with it enormous environmental and social responsibility. In order to come up with an approach that can minimise any negative issues and take into consideration all aspects of this multifaceted branch of design, cities must devise and fully implement urban lighting masterplans.
KEY TERMS AND DEFINITIONS

There are currently no clear and internationally accepted key terms, definitions and approaches for urban lighting masterplans. This is due to three reasons. Firstly, the field of urban lighting and lighting masterplanning is relatively new. Its origins can be traced back to the late 1980s, when the first such large-scale projects were created in France (for Lyon, Caen and Niort) and the UK (for Edinburgh). Secondly, different lighting-related professions were creating new terms, rather than building and drawing on experiences from other fields. Consequently, each lighting practice developed its own distinctive working approach, based on its professional background and unique project experience, and guarded it as intellectual property. Lastly, in each country the lighting community was establishing its own local vocabulary in its native language. Often, the meaning of a particular term varied in different languages. The language barrier often prevented sharing with designers from different countries. In order to facilitate the recognition and adoption of an urban lighting masterplan by local authorities, a proposal to standardise terminology and define the aim, structure and scope of work is proposed in this section.

An urban lighting masterplan (ULM) is a comprehensive high-level strategic planning document that consists of both a creative and a technical part (see Table 2.1 for its detailed scope). It takes into account the geographical, environmental, historical, cultural and social context of a place, as well as human needs. The intention of the plan is to enable the creation of a visually attractive, comprehensive urban environment after the sun sets, with each separately designed, distinctive space having its own identifiable quality and atmosphere. Its practical aim is to guide artificial lighting development and to organise the coordinated nocturnal vision of the urban built environment – at the level of a city, district or site – for the foreseeable future in a systematic way. This process may take up to 20 years, depending on the size of the city/district, the programme and the technology used. The creative part of the masterplan proposes a creative concept in the form of graphical representation in order to communicate lighting design ideas in an understandable way. Additionally, it creates a framework (priority hierarchies) with clearly defined flexible rules that any project of illumination in the public realm (be it an old or new development) should follow. These are formulated based on background research so that the illuminations of individual elements (for example buildings, routes, squares, etc) do not compete with each other, but are in harmony with the urban and landscape vision. The technical part of the masterplan establishes lighting standards and criteria, supplemented with various technical recommendations and guidelines and a set of goals for the forthcoming development. This document includes enough detail to describe expected results but has sufficient flexibility to permit a number of creative proposals. Once designed, the objective is that the urban lighting masterplan will be officially approved and adopted by the local authorities and used by their technical departments and services, and external architecture and town planning practices to guide development decisions for the city at night. It is implemented through projects allocated to several urban lighting designers and overseen by the urban lighting designer – the author of the plan.

Urban lighting masterplan (ULM)

\[ \text{creational part (CP)} + \text{technical part (TP)} \]
METHODOLOGY AND CONCEPTUAL APPROACH

As we saw earlier in the chapter, there are no established rules or guidelines governing how to design the creative part of an urban lighting masterplan. Each urban lighting designer or practice seems to come up with their own methodology and conceptual approach. The methods discussed below were identified and developed by the author and are presented in a more or less chronological order.

With the development of the automobile industry after the First World War, towns and cities changed. The approach towards urban planning employed by the modernists made cars superior to pedestrians, who were forced to use pavements and crossings. Strategies, standards and laws were employed, designed specifically for car users.3

The forerunners of urban lighting masterplans were designed in France around 1965, based on functional requirements for vehicles and different route types. They used horizontal illuminance (a measure in photometry of how much the incident light illuminates the horizontal surface of a street) to differentiate route types. These were categorised in standards according to their traffic flow. The aesthetics of lighting columns (shape, mounting and height) formed the other key variable. These proposals were typically designed by electrical engineers.4

Heritage lighting and nocturnal city beautification

Slowly, in the early 1990s, the approach to public lighting progressed from functional to cultural. French lighting designers, members of the Association des Concepteurs Lumière et Éclairagistes (ACE), contributed greatly to the establishment and acknowledgment of the importance of outdoor and urban lighting. One of the first public urban lighting masterplans taking into consideration heritage elements of the city is attributed to Lyon, in France. By the end of the 1980s, the city was looking to redefine its image and when its old town, with its historical and architectural landmarks, was named a UNESCO World Heritage Site, historical tourism became its agenda by day and night. The urban lighting masterplan was designed in 1989 by Alain Guilhot, who proposed horizontal and vertical illuminance and different colour temperatures to enhance the routes, historic buildings, monuments and public spaces.5 This method allowed for the rediscovery of the city’s urban structure and its morphology and, at the same time, made it possible to re-establish its heritage and cultural legacy by city beautification with light.

With time, this approach of using a huge amount of light to highlight heritage buildings and structures seemed to be slowly dying out. A new more refined approach was emerging, which formed hierarchies between all the key elements in the city, allowing people to better navigate at night and generating a strong identity of the place.

Light + dark = legibility6

Kevin Lynch’s urban design theory of legibility, presented in the book The Image of the City,7 has become in recent years the starting point for many contemporary night-time illumination projects. The theory identifies important urban spatial elements that affect the way a city is perceived during the day. People need to be able to identify visually and organise these urban spatial elements into a logical pattern (a so-called ‘mental map’), which makes the surroundings familiar and easy to navigate. According to Lynch, ‘Nothing is experienced by itself, but always in relation to its surroundings.’8

When designing night-time illumination, according to Lynch’s theory, such elements of space management as edges, nodes, paths, landmarks and districts have to be taken into consideration. The illumination of all these components after dark affects the perception of urban space, as well as the atmosphere and quality of life of the inhabitants of modern metropolises. These changes in the way of understanding the city space initiated in the 1960s have been crucial for today’s concept of an urban lighting masterplan. In the early 1990s, lighting practices in the UK began to adopt Lynch’s theories to help create urban lighting masterplans, which included enhancing the principles with additional elements like gateways and distant, mid and close views.9

Hierarchy of different colour temperatures and brightness

Developments in lighting technology triggered by the energy crises in 1973 and 1979 – including new, smaller light sources with different colour temperatures and various new optical light distributions of luminaires – gave European lighting designers new tools to enhance their design and push imagination towards new heights. Around 1994, a new approach for the lighting masterplan for the
# Background Research

## Site Analysis (to understand the site context):
- Photographic documentation of experience on site by day and night (legibility, atmosphere, etc)
- Photographic documentation of existing lighting equipment (bad and good lighting examples) to help with a global audit
- Measurement of existing illuminance and luminance levels
- Identification of existing and future journeys towards and inside the site on foot, by vehicle and other means of transport
- Identification of night-time patterns of activity for residents, visitors and tourists
- Identification of existing key elements of the space (gateways into the city, boundaries and bridges, views and vistas, panoramas/skylines, meeting places, landmarks, routes)

## Consultation and Feedback:
- With the general public and public authorities, such as the local council, police, safety and accessibility groups, etc
- With core design team members
- With other experts, such as biodiversity consultants, ecologists, historians, site security and maintenance staff

# Design (Qualitative)

## Creative Part (refers to the creative concept):
- Initial key ideas (high-level design)
- Site-wide lighting-approach proposals for: pedestrian, cycling and vehicular routes, buildings and structures, squares and meeting places, landscape (hard and soft), the family of luminaires used throughout the site, the upgrading of existing lighting adjacent to the site, construction and security lighting, etc

## Delivery Format:
- Multimedia visual presentation, presentation boards, hard-copy booklet, etc (varies according to project size and contract agreement)

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Table 2.1 Scope of the urban lighting masterplan (ULM) – overview
## APPROACH

**TECHNICAL PART (refers to various technical aspects):**

- establishing ULM project phases and future development zones
- defining references to lighting policies, standards, procedures and guidelines
- defining the lighting design process based on country-specific architectural project stages (inception and feasibility, concept design, design development, detailed design and production, construction, focusing and programming)
- defining the proposal for the family of luminaires to be used throughout the site
- defining the lighting technique based on the direction of the light source
- defining the lighting technique based on the integration of lighting equipment
- defining light source types based on their technology
- defining luminaire types and their accessories
- defining technical criteria based on lighting standards and regulations in the specific country – horizontal and vertical illuminance, luminance (brightness), uniformity, colour temperature, colour rendering, glare, equipment location, equipment layouts and heights, maintenance (replacement and cleaning)
- defining environmental zones related to the site
- creating lighting guidelines for tenants, retail, commerce, illuminated signs and advertising/media facades, people with disabilities (inclusive design), sustainability and energy consumption, environment and ecology

**DELIVERY FORMAT:**

Hard-copy documentation booklet with tables, diagrams, etc
Civic District of Singapore was developed in France, using a combination of illuminance and colour temperature (defined in Kelvin) for streets, pedestrian paths, buildings, structures, parks, open spaces and landscaping, in order to highlight the identity of the area and establish a visual hierarchy. The concept for colour temperature and brightness rose from low-level, very warm white lighting of 2,200K to warm white lighting of 2,500K and 3,200K, medium brightness to cool white light from 4,000K to 5,000K and high brightness. Additionally, vehicular and pedestrian routes received different street lighting luminaires with regard to height, form and lighting distribution/optics based on their importance, location and character. Also, modern high-rise buildings and bridges were lit with cool white bright lighting of 5,000K, whereas traditional historical low-rise buildings were illuminated with warm white, gold and orange lighting of 2,200K. Typically, green areas were highlighted with cool white lighting of 4,000K to emphasise their green colour. The main objective of this new approach was to enhance the architectural and landscape elements of this part of the city with the use of artificial lighting at night. This determined and promoted the district’s night-time identity in a way previously unheard of in Asia.

Designing with shadow and colour

Up until the beginning of the 21st century, urban lighting in Southeast Asia was influenced mostly by a western design approach whereby elements of the urban realm were emphasised with light, but the approach had very little to do with the location of the city, its climate or culture. Therefore, when a local approach to the urban lighting masterplan – which looked at the colour temperature and shadow scheme based on a tropical climate – was proposed in 2006 for Singapore City Centre, it was welcomed as something local people could relate to. As the city lies along the equator, there is a lot of heat, intense sunlight and humidity during the day. In this hot climate people tend to spend time outside in the evenings and late at night; therefore, tropical greenery was enhanced by means of light. The psychological effect of cool white and bluish light was proposed to create pleasant, refreshing evenings and nights. Also, as there is a lot of direct sunlight during the day, people tend to rest under the trees, which create an ever-changing pattern of shadows. This observation was applied to the urban lighting scheme, where rhythmical patterns of shadows to generate excitement and contrast were created by the use of gobo projectors.

It is noticeable how different Asian cities look at night in terms of coloured, dynamic and bright light compared to European cities, with their low-level, static urban lighting. In many Asian cities, a signature skyline and waterfront, including interactive lighting and new technology, has been proposed. In Singapore the colour temperature concept relates to building height, with all buildings having warm white lighting at the building perimeter and street level, and cool white light starting from 4,500K to up to 6,000K at the crown of the building, from 150 metres onwards.

Journey through the site

In the early 21st century, another methodology emerged, known as ‘journey through the site’, where the urban lighting designer looks at different users and their movements through the public realm and visually connected places, then uses light to enhance the experience of moving from place to place after dark. This approach was also employed for the case study presented later in this chapter, the King’s Cross Central urban lighting masterplan, where light was used to enhance the experience of moving from place to place. Proposed Journey No. 1 in the King’s Cross Central scheme can be taken by visitors from Station Square to Granary Square via the Boulevard (today’s King’s Boulevard) and Canal Square, Journey No. 2 from Maiden Lane Bridge to the Gasholders via the canal towpath, and lastly Journey No. 3 can be experienced from York Way to Canal Street via Goods Street and Lewis Cubitt Park.

Dark infrastructure

Around 2010, the new ‘dark infrastructure’ methodology emerged. This approach was influenced by two main factors – firstly, the newly available technology, such as LED light sources and lighting control systems, which made it possible to control and dim urban lighting; secondly, awareness of the negative impact of artificial lighting on the natural environment, with darkness becoming something that needed to be protected. The idea was to create a new type of masterplan, similar to an urban lighting masterplan but this time with the use of darkness, bringing night and darkness back to the city and safeguarding nocturnal biodiversity. The idea behind it is ‘to understand the scale of a city where darkness should be observed, which zones
should be kept in darkness because they are natural areas, where darkness should be arranged or modified, and where lighting should be done in a proper way, i.e. where people live, and residential areas.

A number of lighting layouts show how darkness could evolve during the night, over the territory and according to the time of day. One could follow any of the approaches presented above but the question is: which one would be the most appropriate for our times and the most relevant from a human perspective? In my opinion, the most essential approach is place-making for people and inclusion of local context, but first, as Jan Gehl once advised, one has to "go out there and see what works and what doesn’t work, and learn from reality. Look out of your windows, spend time in the streets and squares and see how people actually use spaces, learn from that, and use it." Additionally, we need to move what Kaoru Mendes has described as "the extravagant energy waste and unnecessary light that characterized twentieth-century lighting environments" in order to remind ourselves what the starry night looked like when we were children.

THE ‘THREE MUSKETEERS’ OF URBAN LIGHTING

The future urban lighting scenario envisages three professionals sharing responsibilities with each other (see Figure 2.1). Each possesses a unique combination of lighting skills and/or project knowledge that enhances the possibility of delivering successful solutions on different levels of responsibility for a public realm in the city.

An urban lighting designer (ULD) is an independent professional who works in the field of urban design at city level, focusing on the link between buildings and the spaces created in between. They have knowledge of urban spatial structure and physical design and the way in which cities work, knowledge of plan-making and project evaluation, and an understanding of local, state and government programmes, processes and regulations. In their work, while developing the overall urban lighting masterplan, or specific urban lighting project, the ULD, besides the creative aspect, must also consider a wide range of often conflicting issues, such as sustainability, light pollution, lighting technology, human health and wellbeing, environmental aspects, energy codes, legislation and zoning codes. In contrast, an architectural lighting designer (ALD) is an independent professional who is concerned with the design of lighting systems at building level, including natural light and/or electric light, internally and externally, to serve human needs. Both the ULD and the ALD are characterised by full independence regarding the choice of products for a given project, including luminaires, light sources and lighting control, in order to come up with the most appropriate solution and tools. When joining the International Association of Lighting Designers (IALD) – the oldest internationally recognised organisation dedicated solely to the concerns of independent, professional lighting designers – practitioners are obliged to state in writing that they will not derive financial benefits in any form other than the remuneration provided for in the contract with the investor/client. They must not receive any reward from lighting manufacturers in exchange for bringing a specific lighting manufacturer’s products into the final design specifications. The final team player – the urban lighting planner (ULP) – works for an institution (such as the planning department in local government) or a planning organisation (such as a government-funded local Development Agency) and is responsible for policy-making at a high level, considering the regulatory framework that controls relations
between public and private space. Ideally, they bring to the project considerable knowledge of the theory, principles and techniques of the planning profession and development process, as well as an understanding of state and local laws, and ordinances and codes pertaining to a wide variety of planning topics. They also evaluate planning-related legislation and are responsible for approving planning applications for urban and architectural outdoor lighting projects.

**MEET YOUR COLLABORATORS**

Urban development projects are currently being led by large design teams and construction companies. As technologies become more complex across all industries and various disciplines, a project’s scope has been divided into narrower specialities. Consequently, design teams are expanding to include specialised designers and consultants/experts whose professional profiles did not even exist several decades ago. Such an example is the involvement of a professional, independent urban lighting designer (ULD).

The research conducted by the author, as well as her professional experience in the lighting field, made it possible to develop an organisation chart of the project team for urban lighting as a design discipline (see Figure 2.2). The aim of this schematic diagram is to demonstrate the principles of collaboration for the proper development of urban lighting projects.

It should be emphasised that all the members of the design process have different competencies, so the urban lighting designer should be a professional who is able to cross the boundaries of their own subject area according to current needs. As a specialist, they can develop an optimal solution for external illumination only if they work closely with other participants in the design process. Thanks to the use of innovative lighting technologies and their interdisciplinary knowledge, the urban lighting designer can support the artistic design visions of the urban planner, landscaper designer or architect and, at the same time, participate professionally in the project planning from inception to its final stage.

![Figure 2.2 An organisation chart of the project team for an urban lighting project](image)
The purpose of this case study is to position an urban lighting masterplan project into the context of a place and to show how it works in a real world situation, as opposed to presenting only its theoretical approach. The case study should also assist the reader with understanding what was accomplished within the design timeline and when, why and how this was done, together with providing insight into the services that were performed by lighting consultants, as multiple parties collaborated to create the end result.

King’s Cross is a city regeneration development in the north-east of central London comprising approximately 27 ha of former railway land and industrial facilities. When it is fully completed after 2020, it will be one of the largest urban redevelopment schemes in Europe. It consists of both historic areas that are being redeveloped and also areas of new build. The space is adjacent to an urban nature reserve, Camley Street Natural Park, and Regent’s Canal runs through the middle of the site. This is also a communication hub, with national mainline train stations, an international high-speed rail connection to Paris and six Tube lines (see Figure 2.3).

During the Victorian era, this place was an important railway goods yard, but it fell into decline in the 1970s. Before its recent redevelopment, which began in 2007, it was a dark area of London, both literally and metaphorically, with crime, antisocial behaviour, drug use and prostitution on the increase. However, at the same time, there was a romantic atmosphere thanks to the canal, the gasholders and the historic railway buildings. From very early on, the developer and client were aware of the exceptional value of the land, buildings and structures and wanted to ensure that the new development did not lose the unique character of the area. The developer sought to create distinct public areas, each with its own atmosphere and sense of place, that would be animated throughout the day and into the evening.
The importance of public spaces for people

Nowadays there are changes in the design approach for urban areas, with the aim being to move away from the ‘car city’ towards the ‘pedestrian city’ – people want to have everything close by, since time is of prime importance. They prefer to walk, ride a bike or use public transport instead of sitting in traffic jams and trying to find somewhere to park. The King’s Cross developer understood this need to design public places for people and this approach was wisely adopted by the development. The developer put people before traffic, with an emphasis on walking and cycling. Car usage was minimised by various means, for example by establishing links with public transport (trains, the Tube, buses), and there is only one essential road that cuts through the whole site in front of the Granary Building. There are some roads in the northern part of the development, but most of the rest of the site is a pedestrian area and the presence of cars is minimal. This is what makes the development unique and encourages pedestrians to spend time there. It takes about 15 minutes to walk from the south end of the site to the north. The developer also understood the newest tendencies in urban planning and the idea of creating a city for people’s enjoyment by addressing the matter of regenerating public life in public spaces. The developer has reported spending a lot of time thinking about the spaces in between buildings and, about how people would use these spaces. Consequently, it was decided that nearly 40% of the completed site would be public realm, with 10 new public squares.

In order to create a vibrant and successful urban quarter and boost the number of people using the development during the day, at night and during the weekend, an increase in mixed-use development was promoted. This included commercial office spaces and other workspaces, housing (high- and mid-range residential alongside social housing and student accommodation), retail and leisure spaces, and hotel and educational facilities. Additionally, as the work on the project progressed, the client came up with a very unusual vision – introducing the University of the Arts London into the middle of this massive development. Putting an art school in the heart of the commercial development was vital in defining its lively and creative vibe. It would bring culture, young people, education, excitement and new life with it. From the client’s point of view, it was a clever strategy, which created an excellent opportunity for potential tenants. With this additional vibrancy and stream of young people, new tenants followed. Most probably this was one of the reasons why Google decided to build its European headquarters here, attracted to the quirky style and atmosphere of the new site.

Already, the southern part of the site is busy with people, with many interesting temporary events to experience. If one goes there and walks around, there is always something going on in the realm of art and culture.

In all the events and activities designed around the different user groups that took place during and after the construction phase, one could hear the echo of the words of Jan Gehl: ‘A good city is like a good party. People stay longer than really necessary because they are enjoying themselves.’

These events obviously help to make the development an exciting destination and attract people. The aim is to ‘provide activities that are unusual and aren’t being done elsewhere in London’. Another notable aspect of the development is the fact that it is creating an active night-time economy, as well as a daytime destination. What helps is the transport hub at King’s Cross, in the heart of the development, and bars and restaurants that are open until late. The vision is reflected in the urban lighting proposal.

Appointment of the urban lighting designer (ULD)

Mark Major, an urban lighting designer on the project and principal of Speirs + Major has spoken about the lighting practice’s approach and experience prior to appointment. Collaboration and consultation is an important part of the process, where the designer should work with local authorities, police, safety and accessibility groups, as well as the many other stakeholders involved in these types of projects. Major explained:

Each time you develop an urban lighting masterplan for an area you learn something new. As a result, the next one you are involved in is different. There is no strict formula for designing these projects, because otherwise nothing ever progresses. But there are certain common principles, common approaches that in a way are the same for all cities or their parts and they can be applied.
The urban lighting masterplan came in two phases: firstly, the Lighting Vision was prepared in the form of a document and a multimedia presentation. It consisted of a specific high-level approach for key urban elements identified on the site: transition (quality of street lighting inside and outside the development), heritage, bridges and tunnels, water, landscape, streets and places (see Figure 2.4). Those working on the project also recognised that they needed to start to develop various technical aspects of this; to translate them into design codes, where they become much more specific but without designing actual lighting – like a guide, but not the final design. Consequently, a more detailed Technical Appendix was later developed, encompassing design codes for each of the different streets and types of spaces, explaining the more technical criteria for the realisation of the lighting.

Together with this, they also provided guidelines for retail and commerce, and such issues as accessibility for people with disabilities and environmental guidance in terms of light spills, light pollution and ecology. All these more serious technical and scientific issues were also considered as part of the lighting masterplan.

What was important in the King’s Cross project was the evolution of an urban lighting masterplan over a longer period of time with a greater degree of collaboration and an understanding that the design was an ongoing process. The lighting designers were brought in relatively early – the projects were beginning to be formulated, but the design company’s work was completed prior to the other design proposals. Another element that was different for this particular development was the fact that the design company presented its proposals directly to the decision makers at all times, which made it possible to receive immediate feedback and facilitated discussion.

When it comes to creating an urban lighting masterplan, it is a much more complex undertaking than a single outdoor lighting design project. You have to understand the context, consult...
Consultation and feedback – engaging the community
The client saw this development as a ‘human city’. As a result, they set consultations at the centre of the project by putting in place a clear step-by-step process, taking both the method and its findings seriously. Between July 2001 and December 2002 they spoke to and presented the development and its design to more than 4,000 people, including representatives of more than 150 communities, businesses and other organisations in order to form consent with regard to developing design proposals and ideas. These included the London boroughs of Camden and Islington, English Heritage, the Commission for Architecture and the Built Environment (CABE) and the Greater London Authority (GLA), to name just a few.

With the help of specialists, the client conducted interviews, questionnaires, exercises and workshops, and collected emails and feedback from its dedicated website. Typical questions included: ‘Which three words or phrases sum up the kind of place you would like King’s Cross to be?’, ‘Changing King’s Cross will take a long time. What do you think should happen first?’, ‘What are your social and economic priorities for this development?’ and ‘What are your environmental priorities for this development?’

They also actively engaged with children and young people, giving them a sense of belonging, as they may live or work in the development well into the future.

By involving local residents in the planning process, they were able to avoid overlooking significant aspects that are of importance to the local communities, such as new routes and spaces to enhance the public realms. These are often overlooked as planners and designers do not usually live in the areas they design. They analysed an enormous amount of information and feedback and passed this information to the design team. From the point of view of urban lighting designers, consultations and presenting project ideas by doing mock-ups and/or demonstrating the effects of artificial lighting to a larger group of people are essential for the success of any development at night-time.

Typically for private developments, social consultations with residents do not take place while the urban lighting masterplan is being designed, but the lighting consultants for King’s Cross were part of this consultation as they talked to focus groups. In terms of individual involvement and consultation for King’s Cross, the lighting design company talked with Camden Council about the lighting of routes and open spaces, with representatives from the Canal and Riverside Trust in relation to Regent’s Canal, and with the people responsible for Camley Street Natural Park. Even though the latter is not part of the urban scheme, the lighting consultants believed it was important to take on board their feedback on the proposed urban lighting masterplan. They also had discussions with different groups, such as Broadgate Estates, who manage King’s Cross security and maintenance, even walking around the estate with them in the evening on a few occasions. They looked at the state of the functional and decorative lighting as it was installed and explained why certain things were being done in a certain way, thus starting a successful process of dialogue. Mark Major explains, ‘In the future, more engagement and consultation with the people who are going to manage the site will be important. A lot of the success of complex cities like London, Berlin, etc depends on if they are well managed or not.’ According to Major, ‘There are two levels of looking at the city: the hardware (the buildings, the landscape, monuments, the art, etc) and the software (wayfinding, lighting, the information system). The things there are like a network of visual information that allows the city to work. Light is visual information; therefore, it affects every part of the city.’

Safety and security
Urban spaces at night can appear very different than during the daytime.
Often three-dimensional cues are lacking and people feel disorientated and ill at ease while walking. After the public consultations, it was clear that safety was one of the key priorities for the majority of local people.\textsuperscript{26} Urban lighting designers also need to respect lighting regulations and they should discuss these with the local authority, the police and other parties involved. In the King’s Cross development, they looked more at vertical luminance (surface brightness) rather than solely at horizontal illuminance (the amount of light falling onto a surface), the latter being prescribed by lighting standards. The reason for this is that humans perceive the external environment as a three-dimensional space, and the way they navigate it is by being visually attracted towards the brightest vertical surface in their surroundings. So providing enough light on the pavement would not necessarily encourage a person walking along that pavement to feel secure, as they might not be able to recognise the facial expressions, and therefore intentions, of passers-by.

The urban lighting designer should try to explain to their clients, other consultants and the general public what is meant by the word ‘safety’ in urban lighting (it is to do with people not being run over, falling down steps or having an accident, etc) and ‘security’ (this is about everything from fear of crime, to cameras, to measures that are taken with lighting for security purposes).

The proposed approach at King’s Cross was to light everything safely and securely but to maintain a balance and not over light it so that it lost its original character. King’s Cross has a very particular feel at night – it does not feel dangerous, it feels interesting.

Also, one of the key aspects was to keep the development ‘alive’ with no dead, dark zones of activity when workers and commuters leave. Therefore, none of the units at ground level were leased to commercial offices. The lighting design company created a special set of flexible, non-prescriptive retail lighting guidelines to ensure that lighting designed by or on behalf of owners and tenants, will make a positive contribution towards the overall development.

Methodology
Legibility and the mental mapping approach, as expounded by Kevin Lynch in The Image of the City,\textsuperscript{27} with journeys through the site, were important parts of the methodology. Also vital was consideration of a matrix of 13 ‘Lighting design criteria’ – amenity, ambience, legibility, image, accessibility, safety, security, cost, buildability, maintenance, environmental impacts, energy and sustainability. According to Major, ‘As a lighting designer you need to look into all of the above things and try to arrive at a balance. And it’s important that everybody involved in these elements is still considered.’\textsuperscript{28}

With the urban lighting masterplan for King’s Cross, we have been given a powerful tool for guiding decision-making concerning the night-time built environment. It delivers vision, advice, references and the qualitative and quantitative tools for future urban city life. These contributions allow other lighting designers to devise lighting proposals that react to recognised social needs and enable them to make good decisions and design options, so that urban lighting projects can be continuously visualised and conveyed.

Relationship with the client and other team members
In the King’s Cross project, as is the case with many projects, the lighting design company was directly appointed by the client, rather than the architect, urban masterplanner and/or landscape architect. This independence makes it possible to work together with other team members to come up with a unique solution. Sometimes the design team consists of a collection of different disciplines that do not relate to each other, whereas in other design teams the working relationships are very close. This is down to the client as they put the design team together and lead it. The behaviour of the person leading the team makes a huge difference to the culture of the project.

Current and future role of the urban lighting designer
If there are questions from the lighting designers involved with projects on site, then the developer may suggest that they talk to the lighting design company to make sure the urban lighting masterplan is referred to. The lighting consultants monitor the contractors’ technical submissions for various projects – though not all – and ensure that both the overall Lighting Vision and the detail of the various lighting schemes are correctly implemented. The urban lighting masterplan is about coming up with design principles, and that is when one will really end up with a lot of different lighting designers being involved in this complex lighting scheme.

In the case of King’s Cross, the lighting design company established lighting strategies for individual project areas they were involved in, each with
its own character and sense of place that would be animated by day and into the evening. As is the case with most urban lighting masterplans, this development is ongoing.

Granary Square – towards more humanistic urban lighting design

The urban lighting masterplan for the King’s Cross development follows the idea of squares forming focal points and gathering places throughout the site (see Figure 2.5). They act as small local neighbourhoods with a concentration of people and diverse activities within them. Appropriately designed, welcoming lighting for residents and visitors makes a direct contribution to the character of these key urban spaces.

Granary Square (see also chapter 6) is the most important of the public spaces on the site of the King’s Cross development. It is adjacent to the Granary Building designed by Lewis Cubitt in 1852. Formerly it was a canal basin used by barges to moor and to unload their goods. After refurbishment, the Granary Building now hosts the University of the Arts London, Central Saint Martins. By looking at the transformation of Granary Square, one can see how a gloomy, abandoned, lifeless place can be brought back to life at night-time (see Figure 2.6). Today, this urban square at the heart of King’s Cross Central is one of London’s most significant and celebrated new public spaces (see Figure 2.7). It is a vibrant
destination that plays host to a wide range of cultural events.

Lighting design for the square provides the high level of flexibility required for these events, together with an elegant architectural and landscape scheme for the intervening periods (see Figure 2.8). By introducing elements into the space such as lighting integrated into trees, water features, cafes and restaurants with alfresco dining, and artwork – it was possible to encourage people to stay in the square and its surroundings. To define the space and provide a backdrop for activities, the square was framed with light. The ‘frame’ consists of the soft illumination of the imposing Granary Building facade along one side, the illumination of a grid of pleached trees at one end, and the light emanating from the lantern-like Pavilion Building at the other end. The general illumination of the square is provided by an indirect lighting technique so that the lighting is diffuse and its source does not cause uncomfortable and distracting glare. Lighting columns in the square itself are avoided so as not to detract from the landscaping, the Granary Building’s facade and any event-related features installed in the square. The fixtures and reflectors are clustered onto two 15-metre masts, which are carefully positioned to ensure an unobstructed view of the Granary Building. During events, the light levels can be raised when required to support the safe movement of thousands of people. Feeder pillars have also been erected.

Figure 2.6 Granary Square, with the grade II listed Granary Building, showing its distinct identity at night
to provide power and data to cater for temporary event lighting on an impressive scale; these retract into the ground when not in use. When not occupied by an event, the square is filled by four rectangular water features. These can be left static and dark, reflecting the Granary Building and creating a quiet, contemplative space. When activated, hundreds of individually controlled and illuminated fountain jets provide an ever-changing spectacle and a focal point for the area. The grade II listed Granary Building forms a backdrop for the square. The lighting concentrates on the loading door bays, where narrow-beam uplighters throw light up the full height of the building. The light diminishes on the vertical surfaces towards the top of the building, but picks up strongly on ground-facing horizontal surfaces.
The lighting for The Grade II listed Granary Building concentrates on the loading door bays, where narrow beam uplights throw light up the full height of the building. The remaining illumination is confined to the base of the building, helping to visually ground it.

When not occupied by an event, the square is filled by static, dark water pools, reflecting the building and creating contemplative space. During events hundreds of individually controlled and illuminated fountain jets provide a focal point for the area.

Inground uplights provide soft illumination of a grid of pleached trees and encourage people to stay in the square in the evening.

The general lighting to the square is provided by secondary reflector systems mounted onto the column.

Figure 2.8 The lighting layout overview, highlighting the different lit elements in Granary Square.
Figure 2.9 Gasholder No. 8 contains a new pocket park and event space used by local families, visitors, students and office workers during the day.
Figure 2.10 Gasholder No. 8 has been redesigned as a public space, utilising the existing structure.
such as the loading door lintels and the cornices. The window bays are also uplit. The remaining illumination is confined to the base of the building, helping to visually ground it. Warm white colour temperature has been used to emphasise the higher red content in the brick. Since the square opened in June 2012, it has become a popular new destination for London, winning a Camden Design Award in 2013 for best new public space, due to its safe, comfortable, barrier-free spaces designed for use by all age groups day and night.

**Gasholder Park**
To highlight the identity of the development, the Lighting Vision proposed the illumination of selected important heritage buildings and structures (including the iconic gasholders) throughout the site. Gasholder No. 8 once dominated the horizon at King’s Cross. This magnificent historic structure (classical cast-iron columns connected by iron lattice girders) has undergone a major offsite restoration and been repurposed as the frame to contain a new public pocket park and event space. During the day the park is used for relaxation and watching the narrow boats at St Pancras Lock (see Figures 2.9 and 2.10).

The circular lawn is also a popular recreational space for local families, visitors, students and office workers during their lunchtime. Mark Major explained the concept of the project: “The lighting design focused on making the most of the juxtaposition of the gasholder and the concentric mirror-polished canopy set within it (see Figure 2.11). Inspired by the idea of a solar eclipse, the park is turned into a beautiful night-time landmark, as well as an enlivening immersive experience.” In an eclipse, the form of the moon is revealed by a soft corona of light, which shifts in intensity and position as the sun and moon move relative to each other. To create a glowing ‘corona effect’, each of the new canopy uprights are uplit, the cool white light enforcing the architectural rhythm and reflecting from the canopy roof back onto the path. The gasholder frame itself is also uplit with cool white light from the inside, creating a highly legible silhouette and reinforcing the special sense of enclosure with the illusion that all light is emanating from the canopy ‘corona’. Twenty-minute ‘eclipse’ cycles begin with all of the lights on, followed by cross-fading from east to west over three minutes, a pause of two minutes in darkness (full eclipse) and then a slow east-to-west cross fade back up to full brightness. This apparent movement of the light creates fabulous shifts in the shadows and interreflections from the polished surfaces, gently animating the environment.

**A visionary result**
King’s Cross is a successful benchmark for future urban redevelopment schemes. Its safe, unique, environmentally friendly after-dark places are full of character and identity and are easy to understand and navigate. It demonstrates the importance of vision and consistency in decision-making at various levels throughout the whole development in bringing cities to life, with urban lighting playing a vital part in the project’s overall success.

*Figure 2.11* Gasholder No. 8 was once part of the largest gasworks in London; today it has been adapted into a new park and event space, with illumination subtly highlighting its features of historical importance.
CONCLUSION

Demand for suitable, high-quality illumination in urban night-time environments will unquestionably continue to rise in the future as people realise the way in which it enriches the appearance of the public realm. The shift from the industry-driven car city to the human-centric pedestrian city directly impacts both urban lighting designers (with regard to their night-time concepts and implementation) and the end user (residents, visitors, tourists) and is one of the main driving forces behind the creation of an attractive social life after dark.

This chapter has illustrated how the lighting design for a whole city or part of it, such as an urban district, can be approached in a coordinated manner based on an urban lighting masterplan created by an independent urban lighting designer. The design task involved in creating such a masterplan involves complex activity on various levels and therefore needs to be undertaken by consultants who are experienced in all the matters and requirements discussed in this chapter. The creative part of the masterplan is quite flexible in its approach. There are certain physical, spatial, built-environment elements, such as routes, buildings, squares, landscape, which should be addressed, but the high-level symbolic and poetic ideas and the methodology used vary depending on the experience of the urban lighting design team, the context of the place, its geographical location and climate and cultural aspects. The technical part is more structured and should address all the necessary themes presented earlier in the chapter. Only a combination of the two parts – creative and technical – can ensure uniqueness for a specific city, neighbourhood or town by creating its own individual night-time identity. Residents and tourists do not want all cities to be illuminated in the same manner, as this would take away the whole point of night-time tourism and new city experience. In the whole concept, pockets of light but also pockets of darkness must be allowed. Uniformly illuminated cities or districts, for example not only add to over lighting, increased energy use and light pollution but also lose the visual hierarchy and clues that are so important for orientation in cities when darkness falls.

<table>
<thead>
<tr>
<th>STATUS</th>
<th>CATEGORY</th>
</tr>
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<tbody>
<tr>
<td>Existing</td>
<td>LIGHTING GUIDELINES</td>
</tr>
<tr>
<td></td>
<td>General rules, principles or advice regarding lighting matters, which are part of the ULM</td>
</tr>
<tr>
<td>Recommended</td>
<td>LIGHTING PROCEDURES (How do I do this?)</td>
</tr>
<tr>
<td></td>
<td>An established or official method for preparing the ULM</td>
</tr>
<tr>
<td>Existing</td>
<td>LIGHTING STANDARDS (What is required?)</td>
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<tr>
<td></td>
<td>A required or agreed level of lighting quality to be adhered to in the ULM</td>
</tr>
<tr>
<td>Recommended</td>
<td>LIGHTING POLICY (Why do I need to do it?)</td>
</tr>
<tr>
<td></td>
<td>A course or principle of action adopted or proposed by an organisation (government, local council, etc) related to the ULM</td>
</tr>
</tbody>
</table>

Table 2.2 Existing and recommended regulatory frameworks for an urban lighting masterplan (ULM)
People want beautifully designed places in which they can gather in the public realm after dark. It is clear that the objective of creating such spaces cannot always be met through the planning of an urban lighting masterplan alone; this is especially true for public clients with a lot of contradictory interests. Recommendations based on current guidelines and codes of practice are a well-intentioned quality benchmark but they are, in most cases, neither required nor evaluated in practice by towns or local authorities. Also, of crucial importance is the fact that today the lighting manufacturing industry is strongly promoting smart city technology. Consequently, a new legislative framework is recommended to add to the existing framework (see Table 2.2) which would allow lighting issues to be dealt with on a comprehensive basis and could be incorporated into the city and town planning system. In the future, any urban lighting proposal related to an urban lighting masterplan should require planning permission from the local authority and be classed as development.

Such an approach would enhance the night-time urban environment and allow better control over both existing and new illumination of our towns and cities.

**KEY LEARNING POINTS**

1. Urban lighting designers (ULDs) should start project collaboration early, preferably at the feasibility and concept design stages of the project.

2. Visit the site by day and night to understand the character of the space.

3. Find a theme, tell a story with light and make it interesting.

4. Always keep in mind that good design is human and environmentally friendly and respect the environment by minimising the negative impact of light on flora, fauna and humans.

5. Talk to residents and future project users about their expectations and what they think needs to be improved.

6. Be a member of an interdisciplinary team, as this has the best chance of creating unique spaces, and listen to other people: clients, planners, architects, engineers and other consultants.

7. Read and research – do not follow a routine path in design.

8. Work on the scheme from start to completion to ensure ideas are fully realised.

9. Speak the language of your collaborators – understand the norms and regulations.

10. Create robust solutions for outdoor applications – recommend appropriate equipment and foresee the maintenance cost and time.
NOTES

Introduction


9. D Owen, Y Bentley, D Richardson et al, 'Informed Curriculum Design for a Master’s-Level Program'.


Chapter 1


Chapter 2


2. See, for example, KM Zielinska-Dabkowska, ‘Night in a big city: Light festivals as a creative medium used at night and their impact on the authority, significance and prestige of a city’ in The Role of Cultural Institutions and Events in Marketing of Cities and Region, T Doñarski (ed), Lodz University Press, Lodz, 2016. Jon Dawson Associates, Feature Lighting in Liverpool. An Impact Assessment


17. Ibid, p 5.


21. Ibid.


Chapter 3


23. RL Davis, BA Therrien and BT West, ‘Cue conditions and wayfinding in older and younger women’, Research in gerontological nursing 1, 2008, pp 252-263.


Chapter 4


Chapter 5


7. MA Foltz, ‘Designing navigable information


17. Ibid.

Chapter 6


6. Ibid.


Chapter 7