



CREATING THE CANVAS FOR PUBLIC LIFE IN BATH

PATTERN BOOK : LIGHTING STRATEGY

Bath & North East
Somerset Council



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Introduction/

Historic Light

The City of Bath holds the prestigious status of being a UNESCO World Heritage Site – making it one of just two such cities in Europe.

The physical fabric of the city is listed and provides Bath with its unique and celebrated character, which not only serves as the backdrop to activities for locals but provides a major international tourist attraction.

When night falls, the interpretation of the character of the city and the hierarchy of spaces and buildings within it is heavily influenced by artificial light. Whilst the physical fabric of the architecture has remained relatively unchanged since its inception, the manner in which the buildings and spaces are lit has changed fairly dramatically. Just as the physical layers of public realm that define the historic character of the city are to be improved and restored, the ephemeral layer that helps to define the character of the city after dark – that is the quality of light – is also to be improved and restored.

This work predominantly defines the strategy for the quality of the light itself, which by default determines to some extent the generic design of the equipment that delivers it. The strategy does not propose to introduce heritage luminaires to the city so much as to restore a heritage quality of light – that is the colour appearance, colour rendering, intensity, distribution and scale of light that is cast by the light source as well as the direct appearance of that source.

Light + Darkness

Just as the strategy defines the quality and quantity of light to be employed across the site, it also defines areas where darkness is to be preserved.

Maintaining areas of darkness is important because it:

- Provides contrast against which even small amounts of natural and artificial light can be registered and appreciated.
- Minimises energy use.
- Protects ecology.
- Protects privacy.
- Enhances the atmosphere of Bath as an historic city.
- Aids legibility through creating contrast against which lit elements (landmarks, after dark leisure spaces etc.) can be easily identified.
- Promotes well-being by supporting human physiological needs.
- Draws views through to the surrounding landscape.

Privately-owned Light

The after-dark character of Bath is, like many cities, heavily influenced by the appearance of privately-owned light.

Illuminated domestic interiors become visible at night - either directly or filtered through curtains – and create a randomised pattern of softly lit windows across the cityscape.

After dark many commercial premises use artificial light both internally and externally to draw attention to their properties and to promote the image of their brand in the evenings. The appearance of commercial premises is currently not subject to the same level of control after dark as it is during daylight hours, allowing some premises to become overly dominant through over-lighting and/or through the inappropriate use of colour.

The strategy outlines recommendations for retail guidelines that will help to ensure that the character of the city is not compromised by individual commercial premises and that the hierarchy of spaces and buildings within the city remains appropriate.

Evening + Night-time Economy

The evening/night-time economy of the UK is worth approximately £66bn (2009 statistics) but Bath's is currently rather small largely due to the lack of retail, leisure and entertainment facilities staying open beyond 6pm. Whilst the aspiration may not be for Bath to become a major 24-hour city there is certainly a lot of scope to extend its economic activity into the evening not only to boost the city's economy but to provide greater amenity for those using it at night either through choice or necessity (e.g. evening and night workers).

Good lighting can greatly help to make the city accessible during the hours of darkness and help to encourage a wider demographic to feel safe using the city's facilities and visit its attractions after nightfall.

Summary of Key Strategic Moves:

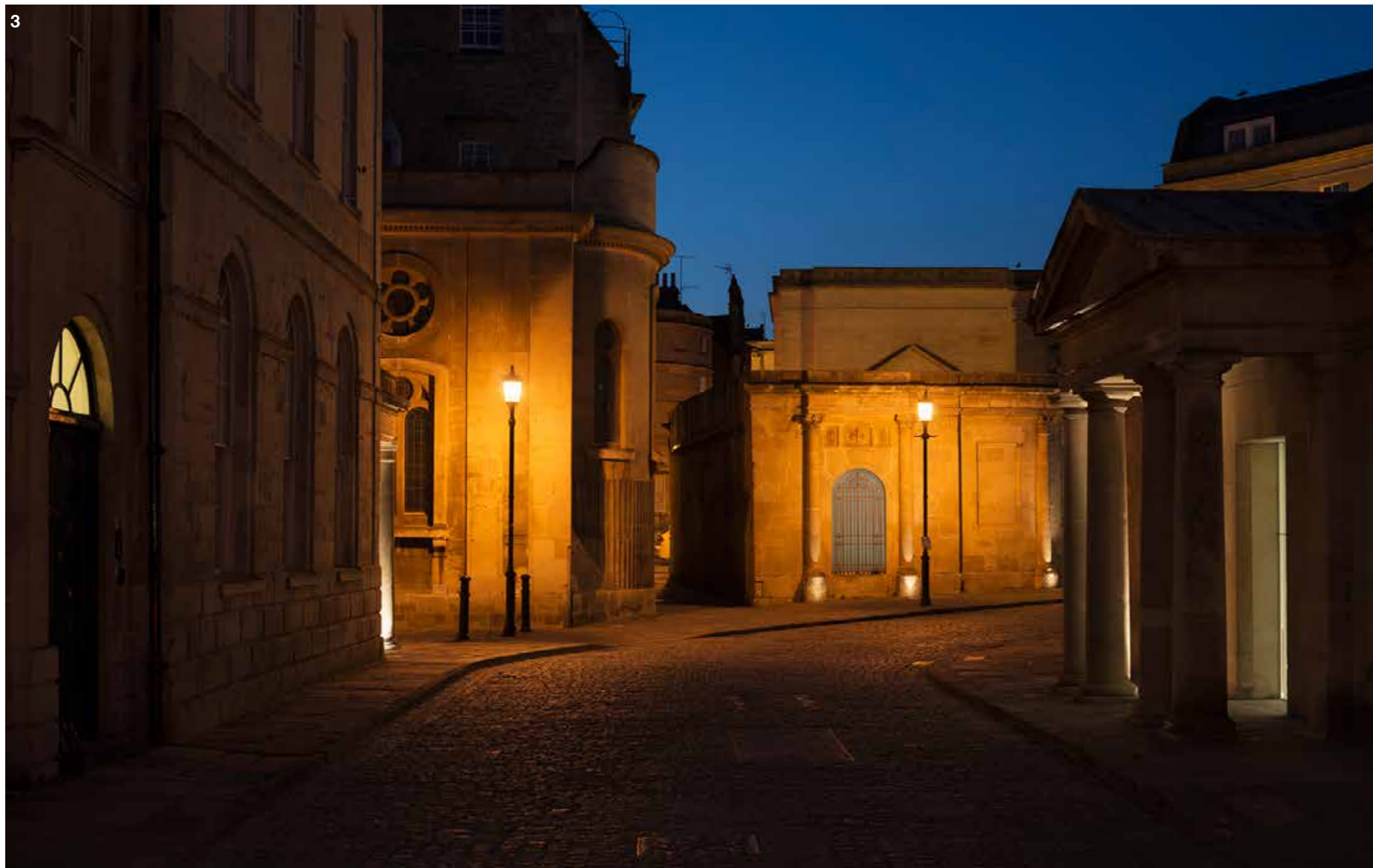
- Help boost the night-time economy by helping to make the city accessible to and enjoyable for all user groups after dark.
- Rationalise the quality of street-lighting in terms of colour, scale and distribution.
- Implement a hierarchy of lit landmarks.
- Draw up and enforce guidelines for private commercial premises.



1



The restoration and re-design of the historic public realm will be the subject of a considerable amount of care with respect to its visual appearance and legibility during the daytime. Just as much care needs to be taken in determining how the city will appear after dark, as experienced both from within the city streets as well as from its surrounding context (e.g. elevated views from surrounding hills). The physical fabric of Bath's history – its architecture and topography - is very tangible. The more ephemeral aspects of the city's history must also be enhanced and celebrated - light will be used not only to create an appropriate ambience after dark but may also be used to reveal or interpret aspects of Bath's history which have been lost or are largely hidden.



1. North Parade Passage at night
2. Long view over city at night
3. Bath Spa streetscape
4. Scope of PRMS works

3.0 Existing Lighting





3.1 Summary

Bath city centre is generally illuminated to relatively low intensities. The quality of streetlighting is predominantly warm with medium to low colour rendering (high pressure sodium), providing a soft, muted visual backdrop to activities after dark. Due to the presence of underground listed cellars the scale of lighting equipment is often much greater than is appropriate for the city's historic character and the street proportions.

1. Unlit waterfront with lit abbey in background
2. After-dark market
3. View down typical secondary street
4. Floodlighting to commercial premises
5. Spill light onto facade with harsh cut-off
6. Disproportionately tall lighting columns
7. Floodlighting to hotel with light trespass through windows
8. Uncontrolled brightness and spill light from retail premises
9. Flat quality of light
10. Brightly and coolly lit Bath Abbey



- 2200K high pressure sodium lit streets
- 2800K Cosmopolis metal halide lit streets
- 4000K LED lit streets
- Lit City Buildings
- Lit commercial facades
- Sample light meter readings



Positives

- Generally low intensity of light.
- Use of high pressure sodium, providing a muted and warm lit character.
- Successful light art festivals established.

Negatives

- Scale of lighting is often inappropriate for a pedestrian area and for the scale of surrounding architecture.
- Lit effect on facades produced by contemporary flat-glass optics is too harsh and graphic (scalops).
- Lit effect on facades (often from diffuse reflected light from streetlights) is often homogenous, creating a bland and depthless streetscape.
- Some retail premises are excessively luminous and spill light into the streetscape.
- Some commercial premises employ external floodlighting which compromises the character of the city and the skews the hierarchy of buildings.



-  Streets already upgraded to 4000K LED to be replaced with 2700K as part of PRMS work
-  Streets already upgraded to 4000K LED to be reviewed
-  Streets to be upgraded to 2700K as part of PRMS work
-  Streets outside of PRMS scope to be upgraded to 3000K

3.2 Planned Upgrades

B&NES are in the process of replacing SON streetlighting with 4000K LED lanterns in the interests of increasing levels of perceived brightness and minimising energy use. Each lantern is capable of being dimmed via a city-wide lighting control system.

The diagram opposite indicates the streets that are lit with 4000K LED lanterns at the time of writing. Those indicated in red (i.e. 4000K LED installed within the city centre) are required to be replaced with 2700K sources as part of the PRMS work.

Following a meeting on 05/11/2012 with Speirs + Major and B&NES all further streetlighting upgrades in the city centre were put on hold until the PRMS work was concluded.

4.0 Approach





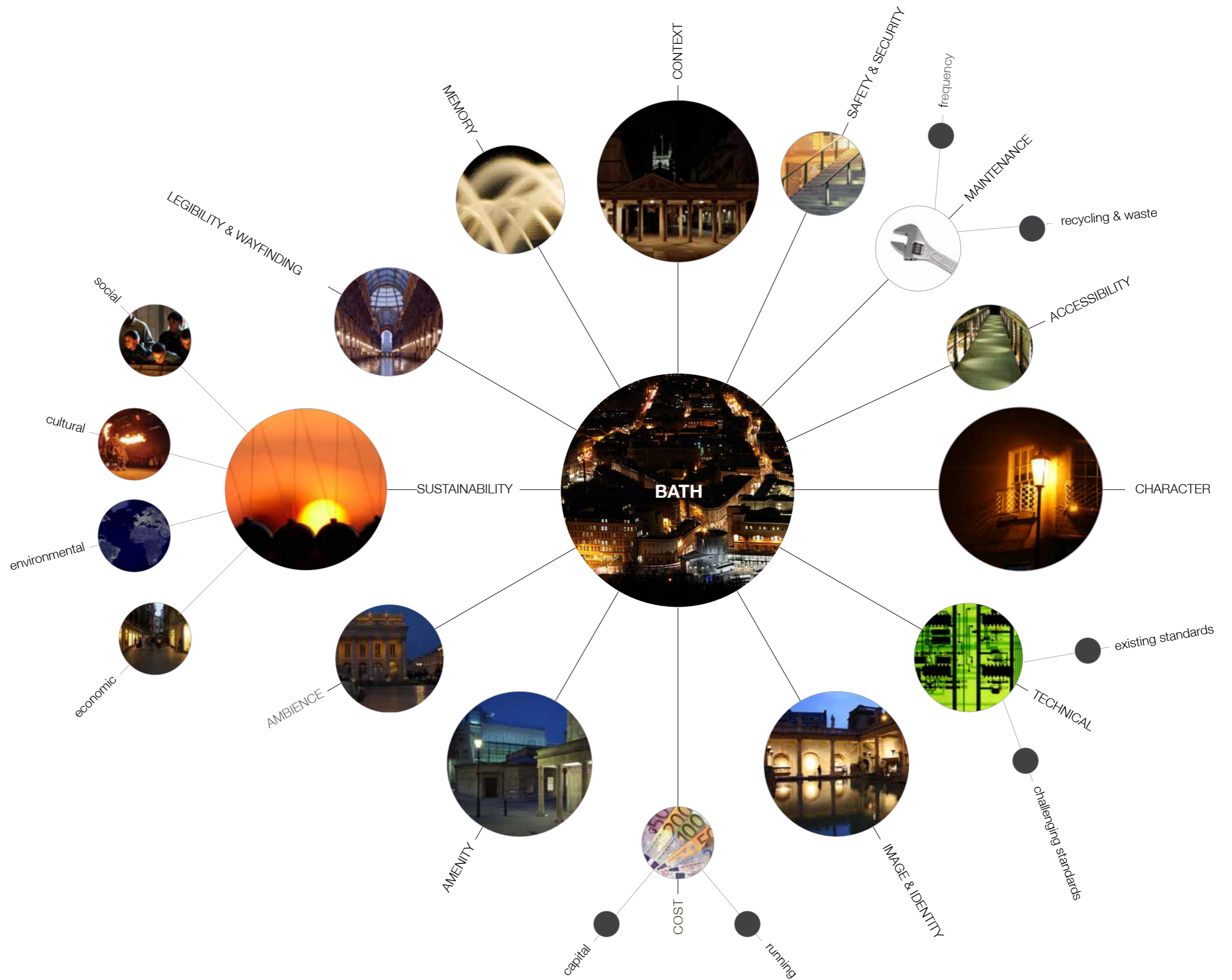
4.1 Principles

A well-lit area of a city is generally a pleasant place for people, though 'well-lit' should not be confused with 'brightly-lit'. Brightly lit areas can often create problems by making adjacencies feel dark by contrast. This leads to an escalation of light resulting in over-illumination, unnecessary energy use and light pollution.

As a first principle, the light in Bath should be designed around human perception, rather than 'engineered' for vehicles or prescribed by lighting standards alone. Whilst lighting standards can provide a useful, quantifiable basis on which lighting to the public realm can be designed and assessed, they are often over-simplified and can be misleading when determining how well a space is lit.

Our approach to urban lighting is to balance the three cornerstones of sustainable design through the careful design and management of light.

1. Light has a strong social role to play in any urban area. It helps extend the day, creating a backdrop for both work and leisure and providing a focus for the life of the community after dark. Indeed the history of public lighting in Bath shows that light was focused specifically in areas (e.g. parades) where people would go to 'see and be seen' after dark.
2. Light also plays a key role in supporting the night-time economy of an urban area. A well-lit district not only supports retail and other commercial activity but promotes it.
3. Light is a highly visible form of energy use. It is an industrial product that not only uses the earth's precious natural resources but also creates unwanted impacts such as light pollution. The amount of light, its distribution and direction and the manner in which it is delivered and controlled must all be carefully considered. Over-lighting and light pollution must be avoided.



4.2 Key Lighting Design Criteria

Context

Bath is generally lit to relatively low light levels, which provides a good basis on which to implement a new public lighting scheme that is sensitive to the historic context and which minimises energy use and environmental impact.

The inherently dark character of the river and the surrounding hills also sets the scene for a sensitive public lighting scheme.

Amenity

A primary function of the lighting will be to provide adequate levels of illumination to enable people to see in the absence of natural light. The extent to which people need to see after dark will vary from area to area, with some requiring high levels of visual acuity whilst others should enable just a basic understanding of scale and the ability to identify a safe passage through a space. The lighting designers responsible for each project must therefore gain a clear understanding of the manner in which the space that they are designing will be used after dark as well as its relationship to spaces adjoining it.

Ambience

The strategy will help to ensure that an appropriate and distinctive atmosphere is created throughout the city to create a strong sense of place and history. Psychologically, light will play a major role in influencing the manner in which people perceive and behave in the different areas of the city after dark.

Character

After dark light will help to define the overall character of the city as well as enabling distinctions to be made between different areas – e.g. new vs old areas, retail vs residential, natural landscape vs hard landscape. Whilst the range of characters within Bath will help to enrich the experience of it though providing variety and contrast, a set of principles that establish the site-wide character (intensity, scale, light source etc.) must be adhered to so that the development remains sufficiently unified and visually balanced after dark.

Legibility and Way-Finding

During daylight hours people use elements of the man-made and natural environments to build a 'mental map' of an area, helping them to orientate themselves, navigate from place to place and gain an understanding of the scale and nature of a space and its relationship to the wider context.

After dark many of these 'visual signs' disappear and it is largely left to artificial light and natural darkness to inform the interpretation of a space and its relationship to those around it. The most visible elements in an after-dark landscape can tend to take on a more dominant role in a person's 'mental map'. The most visually prominent elements are generally those that are perceived as being the brightest, although other factors such as colour, scale, animation and personal association also play important roles. Without careful planning an environment can easily be rendered 'illegible' after dark, with skewed spatial

hierarchies that can hinder people (particularly visitors) from orientating themselves and finding their way in the absence of daylight.

By developing a considered and consistent approach to the lighting (or non-lighting) of key navigational tools such as paths, nodes, edges, landmarks and gateways, light will play a crucial role in supporting legibility and accessibility and in reinforcing specific visual and physical connections across the city.

In terms of way-finding light can be used to simply illuminate 'daytime signage' or may be employed as a way-finding device in its own right, specific to the after-dark environment. Such devices can vary from graphic techniques such as illuminated night-maps to more subtle and intuitive way-finding tools such as the consistent appearance of glowing streetlighting lanterns along a path.

Image and Branding

The image of the city will be as important after dark as it is during daylight hours. The design of light for each discrete project should not only reflect its own specific character and function but must also help to create a strong and attractive overall image for Bath as a historic but progressive city after dark. The opportunity exists for Bath to set new international standards for the sustainable lighting of a UNESCO WHS – demonstrating how cutting edge technology can be utilised to create a historically sensitive public realm lighting scheme in which the light is carefully tailored to the specific context.

Memory

Light and darkness are powerful tools through which the historic character of Bath will be enhanced. Light and darkness should be carefully balanced to encourage exploration and provide memorable moments of delight and discovery. Light may also be used to reveal aspects of the 'city's memory' that are hidden or have been lost.

Accessibility

The design of artificial light must support the various needs of those visiting and inhabiting the city after dark. This includes those with special needs and the elderly. Supporting a highly accessible after-dark environment will include avoiding excessive contrasts, avoiding direct and reflected sources of glare, avoiding shiny, mirror-like surfaces at pedestrian level, controlling shadow and limiting potentially confusing upward lighting.

Safety and Security

Artificial light must be designed to assist in maintaining a safe environment at all times. This includes positively defining potential hazards such as steps and ramps and areas where pedestrians encounter moving vehicles – e.g. at pedestrian crossings. Such areas may be defined after dark through passive techniques, such as landscape materials with appropriately contrasting reflectances, as well as through active illumination - e.g. the use of focused light and increased intensity.

Light should be designed to provide an overall sense of security throughout the city, including supporting both active surveillance (e.g. CCTV) if/when required and passive

surveillance. Adequate recognition and modelling of people and surfaces should be provided where required.

It should be noted that perceptions of security are not necessarily dependant on providing high intensities of light and indeed, in some cases, low levels of light can be important in maintaining a sense of security and privacy. Creating an environment that feels secure will largely be dependent on ensuring that spaces are legible, appear well-maintained and do not inhibit adaptation of the eye through excessive contrast and glare.

Cost

Lighting schemes must be designed to optimise value with respect to both capital and running costs. Future budgets for lighting must be properly considered at an early stage of each part of the project and must be benchmarked against schemes that demonstrate the high quality and historically sensitive nature of the project. Whole life-cycle costs must be considered in relation to project life, energy costs, hours of use, labour rates and lamp and control gear replacement periods.

Maintenance

As part of the development of individual lighting schemes, consideration must be given to the types of lighting equipment selected as well as their mounting locations, materials, the longevity of their finishes and the types of light sources utilised. This will ensure minimal disruption to day and night-time activities when the installation needs maintenance or replacement. A reduced palette of luminaires and light sources will also help to simplify maintenance regimes. Maintenance issues will need to be addressed in terms of cost effectiveness and maintenance programmes. As already evidenced in Bath, lighting control systems can also be used to provide remote monitoring of individual lanterns/light sources to report lamp-life and lamp failure to further ease maintenance regimes.

Technical Criteria

The lighting must be designed to the prevailing best practice and, in general, to European Standards and Regulations. Individual lighting schemes should utilise long-life, efficient light sources and control gear. This will help to minimise long term maintenance and energy costs. In all cases the aim is to provide suitable amenity, ensure ease of adaptation, limit excessive contrast and avoid potential problems of over-lighting and glare.

The requirement for the quality and quantity of light to be sensitive to the historic context is of primary importance. A fundamental principle of the strategy is that light levels are minimised wherever and whenever practical without compromise to safety and security.

4.3 Design Considerations - Qualitative

Contrast

On a city-wide/street scale, the balance of lit and unlit surfaces will be critical in creating a legible city. On a building/detail scale, the play of light and dark will help to express form and texture to enrich the evening scene.

Texture

The way in which light falls on surfaces – the focussed or unfocussed nature of the beam and the angle at which it hits the surface – must be carefully considered with regard to both the graphic/texture created by the light as well as the texture that is revealed through lit and unlit details. Generally, textures of light will be avoided in favour of revealing the inherent texture of materials.

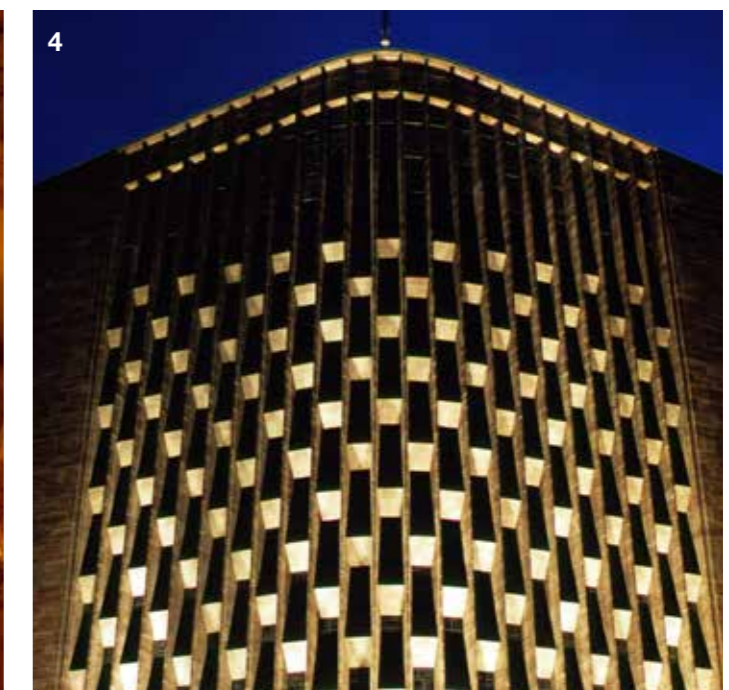
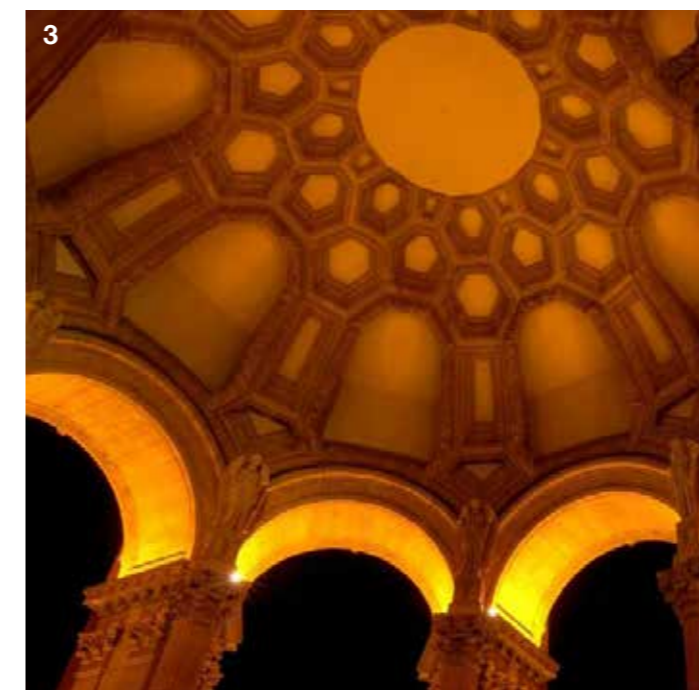
Colour

The specification of the colour of light is critical in Bath. Coloured light in the public realm would historically have been used in a very limited fashion – primarily as visual signals for navigation and to help identify particular types of amenity in the streetscape (e.g. pharmacies). Coloured light should therefore be used in a historically sensitive manner – i.e. in a limited number of specific situations. General street and architectural lighting should be used to compliment the distinctive, warm tone of stone that is so prominent in the city.

Scale

When the public realm of Bath was lit it would have been done so at a very human scale – first through windows and then through lanterns mounted at human scale to enable lighting/extinguishing of lanterns and maintenance. Over the years, due to general trends towards utilising fewer columns to light larger areas as well as Bath's own unique challenges related to underground cellars, the scale of street light has grown – often to inappropriate proportions.

The scale at which light is delivered plays a key role in determining the perception of the space. The scale of architecture and width of street in Bath is generally small - pedestrian-friendly and intimate. Whilst tall lighting columns (10m+) may be well-proportioned and add a sense of grandeur in large-scale spaces, in Bath they tend to appear physically overly dominant and the light they cast feels somewhat utilitarian and indiscriminate in terms of the surfaces that are lit.



- 1. Scale
- 2. Contrast
- 3. Colour
- 4. Texture



4.4 Design Considerations - Quantitative

Light Levels - Illuminance

Illuminance is how much luminous flux reaches a surface of measurement per unit area. Illuminance (E) is measured in Lux. Lighting Classes outlined in BS EN:13201 stipulate illuminance levels for vehicular, cycle, and pedestrian routes.

Light Levels - Luminance

The measurement of brightness is luminance. This takes into account the reflectance of the lit surface and is a measurement based on the stimulus that produces the sensation of brightness. The human eye can receive stimuli from very dark to very bright objects - indeed the brightest and darkest light that the human eye can sense are a factor of approximately one thousand million apart.

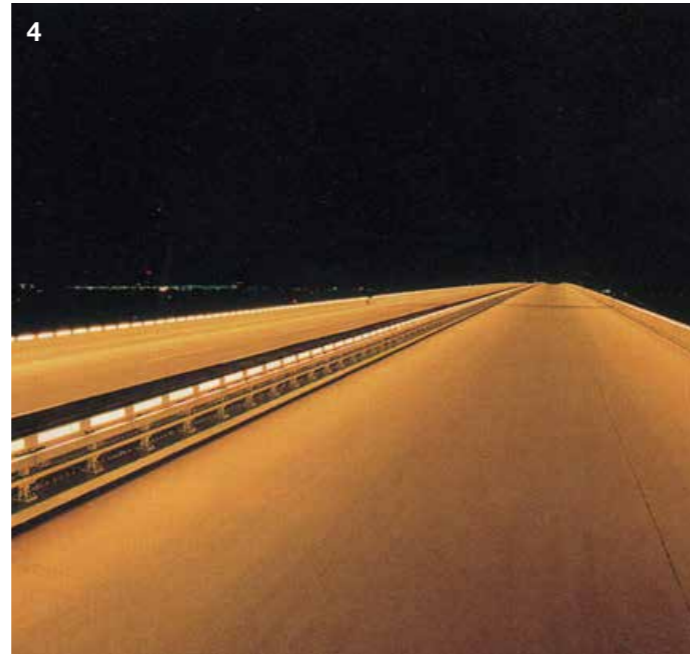
The successful balancing of the relative brightness of surfaces or light sources should be a fundamental objective of the design of all lighting schemes. The appearance of illuminated surfaces when compared with unlit or more dimly-lit surfaces can cause problems with over-brightness and glare, especially where light levels are generally low.

Apart from the purely visual implications of employing a distinct colour appearance or colour rendering, there are also historical, emotional and environmental implications that should be taken into account when considering the colour appearance and colour rendering provided by a particular light source. For example, warm colours have strong associations with traditional natural light sources such as candlelight and historic streetlighting sources such as gas. Cool colours and high colour renderings, on the other hand, generally appear visually brighter and more vibrant and are often associated with more contemporary urban developments and retail environments.

Glare

High source luminance, large source area, low background luminance and the position of a light source close to the line of sight all increase discomfort glare.

Floodlight type fittings commonly used in exterior and area lighting applications (e.g. car parks) are often the greatest offenders of glare. Their light output can be relatively uncontrolled and direct views to lamps may be allowed where luminaires are projecting light over a long distance.



Uniformity

Uniformity refers to the 'evenness' of lighting. Lighting for vehicular routes is typically designed to higher uniformity levels, in accordance with BS EN 13201-2:2003 Part 2. Areas which are predominantly pedestrian, on the other hand, can allow lower uniformity levels to create more interesting contrast and texture.

Colour appearance and colour rendering

One of the most important considerations in defining the experience of light on the site is the selection of the source(s) of light. Different light sources have different qualities in terms of their direct lit appearance and the light that they emit.

The colour appearance and colour rendering of different light sources will need careful consideration as each can heavily influence whether a place appears/feels muted and quiet or vibrant and active. Different colours and colour renderings can also be perceived significantly differently in terms of their visual brightness, with cooler colours and higher colour renderings appearing up to 75% brighter than warmer and more monochromatic colours of the same illuminance value after dark.



1. Luminosity of light surfaces vs dark surfaces
2. Glare
3. Low uniformity
4. High uniformity
5. Colour appearance and colour rendering

5.0 Legibility Analysis

- Primary Pedestrian Path
- Primary Vehicular Route
- Edge
- Primary Landmark
- Secondary Landmark
- Gateway
- Node
- Meeting Place
- Historic Node (conduit)
- View
- Vista





The legibility of a city plays an important role in the way in which people perceive and remember the city (its 'image') and how easily they can orientate themselves and find their way around it. Consequently, the legibility of an urban environment heavily influences a person's enjoyment of it and their perceptions of security within it.

During daylight hours, a city becomes legible through the recognition of familiar elements that make up the visual landscape. Architecture, landscape and natural features help us to form a 'mental map' of an area and inform the way in which we experience and remember a place.

After dark, the components of this mental map can disappear from view, leaving residents and, in particular, visitors feeling disorientated and uncomfortable in the public realm. During the evenings, nights and winter afternoons, it is largely left to artificial light and natural darkness to 'edit' the visual landscape and influence the experience, navigation and memory of a city. As such, a fundamental part of the lighting strategy for Bath is to establish a hierarchy of visual importance to ensure that the city is legible, easily navigable, enjoyable and positively memorable after dark.

5.1 Paths

Paths are considered in terms of whether they are intended for use by pedestrians, cyclists, motor vehicles or any combination of the three (i.e. 'street' scenarios).

On vehicular routes, horizontal illumination with good uniformity will be important to ensure that the road and its junction with the pavement are visible and that the lighting does not cause visual distraction.

Lighting to pedestrian paths must be designed to support human scale, aid way-finding, support safety and to promote character and a sense of security. Designing the illumination of pedestrian routes will necessitate consideration not only of horizontal surfaces but also vertical surfaces and the appearance of the light source itself.

Illumination to vertical surfaces will be crucial in helping to make routes legible and in heightening levels of perceived brightness. Positive illumination at end-views of routes will draw people through to key destinations (e.g. the 'set pieces') and help to make them feel secure walking around the city after dark.

5.2 Edges

Various 'edges' will manifest themselves through light and darkness. The River Avon will form a naturally dark but highly reflective physical edge after nightfall that will define the eastern and southern edges of the city. The river will be kept predominantly dark through controlling the scale and intensity of light employed along and adjacent to it in the interests of creating an appropriate image of the city, protecting wildlife and promoting long views across the water.

Another important edge will manifest itself specifically after dark through a shift in the colour of streetlighting applied.

The transition from neutral white light outwith the city centre to warm white light within the centre will help to signal the gateways into the heritage site.

5.3 Nodes and Meeting Places

Nodes and meeting places are strategic foci of activity into which one enters, such as public squares, bridges, major intersections, etc. in which one engages in activity or decision-making. The design of the illumination to these elements must consider the experience of dwelling in them as well as their identification from afar. This will necessitate illumination of vertical surfaces and the control/protection of view corridors towards them.

5.4 Landmarks

A limited number of buildings and structures are recommended for illumination. There is a wealth of heritage buildings and structures in Bath – some have been defined as primary landmarks, others as secondary landmarks, which should be illuminated with modest schemes. Near and distant views should be carefully considered to ensure that illuminated landmarks make positive contributions to the legibility and image of the city after dark and that the intensity of illumination is properly balanced city-wide.

5.5 Gateways

The gateways into the city will be signalled by a shift in the quality of light, announcing the arrival in the historic centre after dark. At gateways, care must be taken to promote views into the city and across to historic landmarks.

As a major pedestrian gateway, the station should be the subject of a modest lighting scheme. Similarly, bridges across the river into the site should be the subject of lighting schemes which create a subtle sense of arrival and promote views along the river and across to the city.

5.6 Views

Bath is a relatively low-rise city whose skyline is punctuated by spires. Selected spires will be illuminated to aid orientation and promote views across Bath.

As well as considering vistas, which will influence the perceived image or collective memory of the city, medium and near views must be carefully controlled to promote a legible public realm and positive character. View corridors towards key nodes, historic landmarks and edges should be controlled in terms of the intensity of light and location of lighting equipment to promote views through to important destinations and legibility features.

The lighting of buildings, landscape and routes along the waterfront must be particularly sensitive as their lit image will, in effect, be exaggerated/duplicated through the reflected image visible in the River Avon. Light levels and the scale of lighting will therefore be minimised, which will also help to draw views from the waterfront out to the surrounding hills and illuminated landmarks.

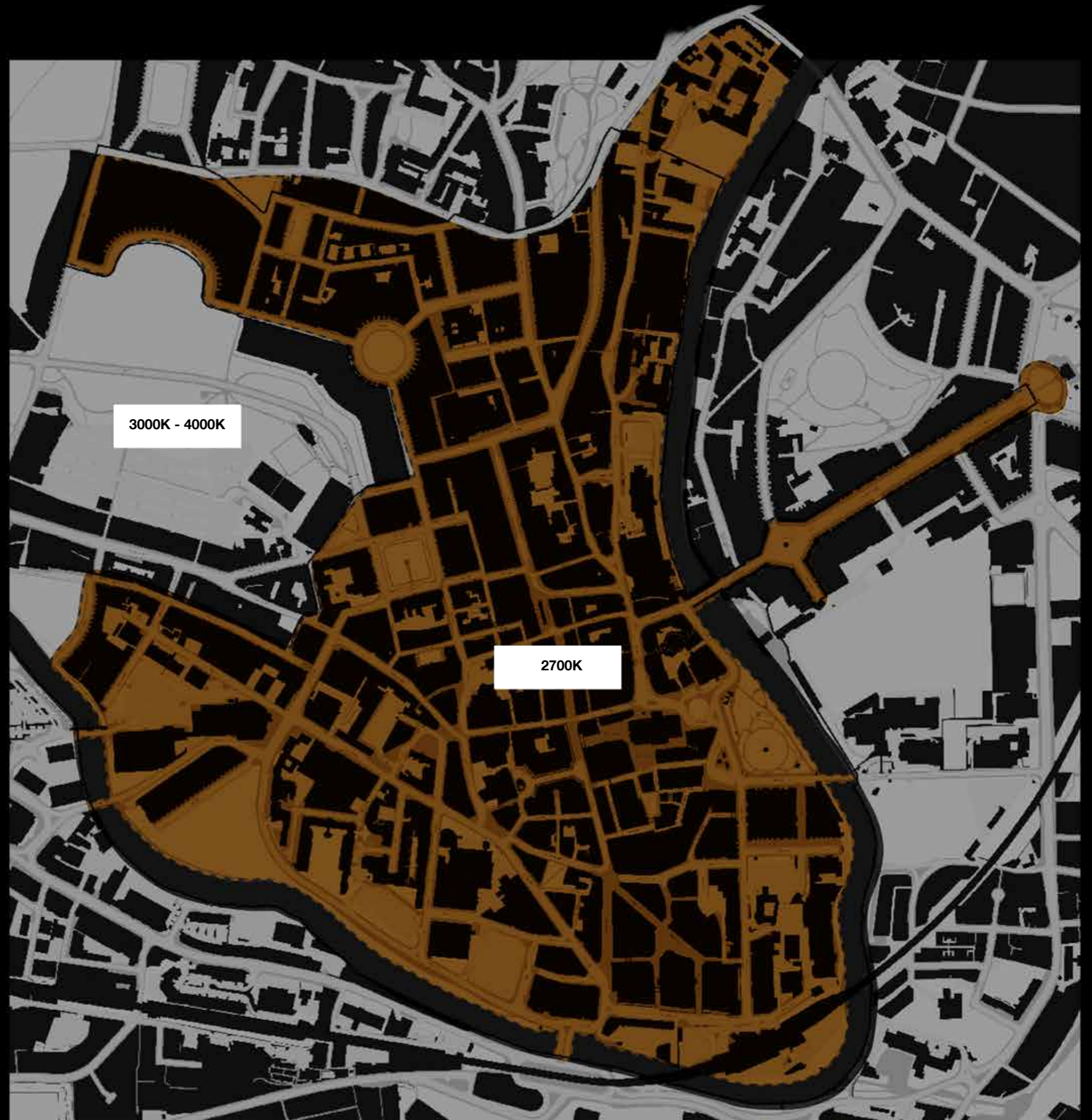
Strategy/

6.0 Network



The design of the general light to streets is one of the most critical factors in creating the desired ambience in the city after dark. The street lighting will set the background tone against which a series of distinct highlights and lowlights will be created. The light to streets, as well as enhancing the fundamental character of Bath after dark, must also serve to help people feel secure, find their way safely and manage any potential conflict between pedestrians, cyclists and motor vehicles.

6.1 Quality of Streetlight





6.1.1 Light Source

The streetscape of Bath has a very distinctive colour during daylight hours, which reveals its history and has become part of the brand of Bath.

After dark, the opportunity exists to tailor the colour of light to reveal the distinctive tone of the materials in the street. Through the use of LED technology, which allows specific wavelengths of light to be manipulated, a customised colour temperature was proposed to be created for Bath which would best enhance the colour of the stone.

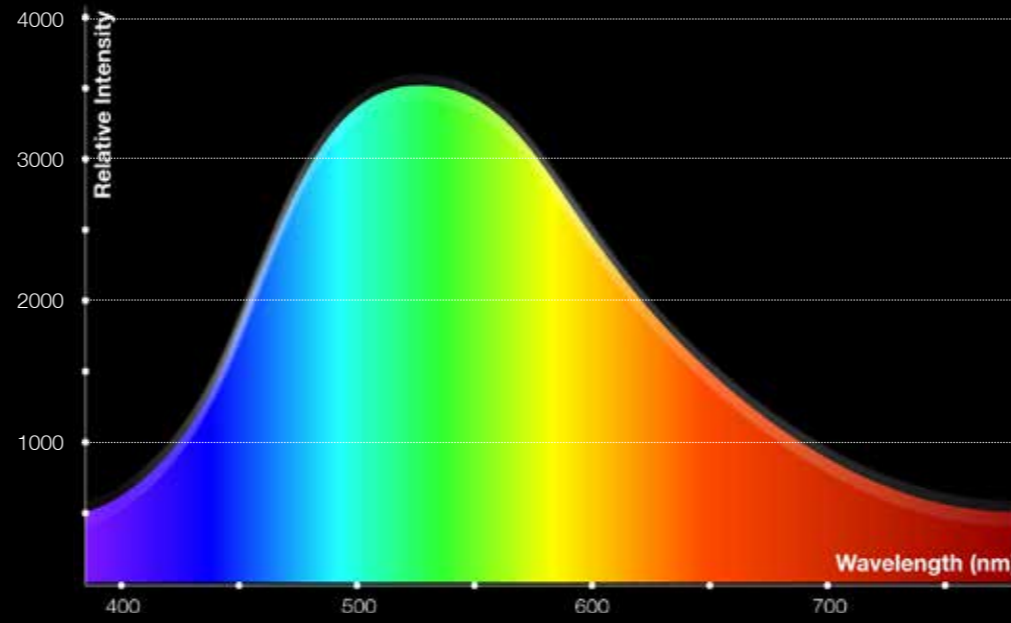
As well as fine-tuning the colour of light cast by the source, the physical appearance of the light source itself – its shape, size and colour and its positioning within the street-lighting lantern – should be carefully designed to echo the appearance of traditional light sources such as natural candle-light and gas light, both of which created a warm, soft, focal glow within street-lighting lanterns. The importance of designing the appearance of the light source itself should not be underestimated as it not only provides ‘symbolic light’ on the street (i.e. a perception of brightness and security) but also serves as a way-finding aid.

1. Stone under very warm and cool artificial light
2. Stone under warm and cool natural light
3. Appearance of light source - ‘symbolic’ light

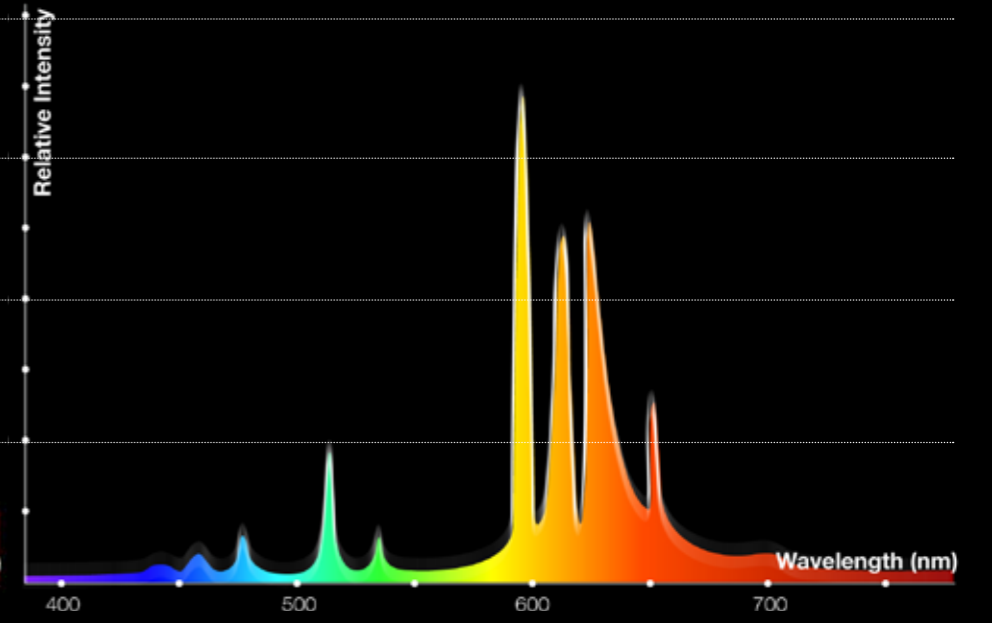
The adjacent diagrams and images illustrate the qualitative differences between different light sources. The graphs indicate the typical spectral distribution of each light source, which influences the colour appearance of that light source ('warm' or 'cold') as well as how vividly it reveals materials' colours.

The potential of creating a custom light source for Bath has been explored and a theoretical spectral curve is illustrated opposite. This source is intended to dampen the naturally cool/blue-ish quality of LED and shift its peak intensity towards the warmer end of the spectrum.

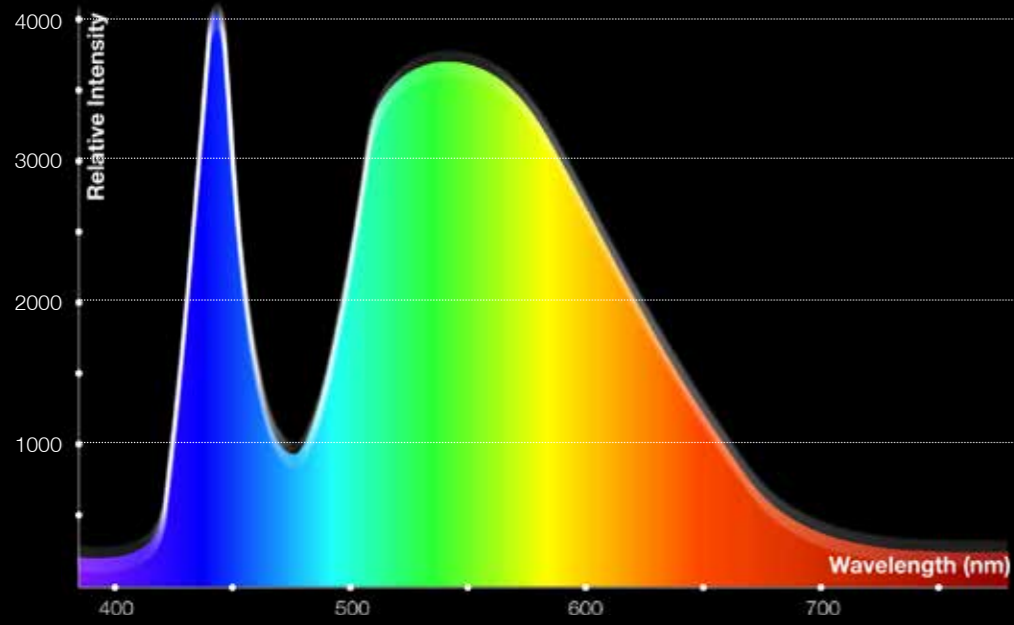
Daylight



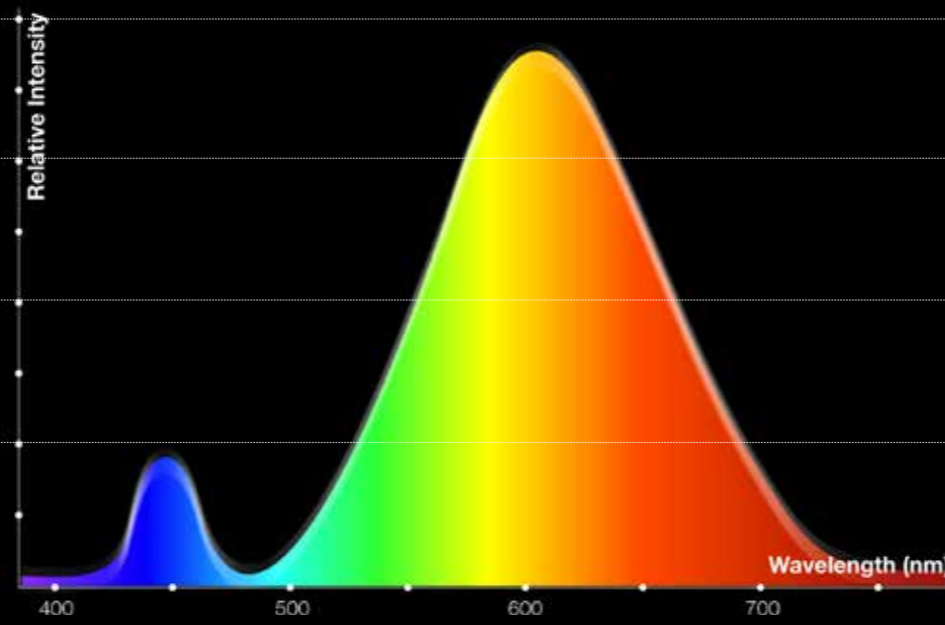
High Pressure Sodium



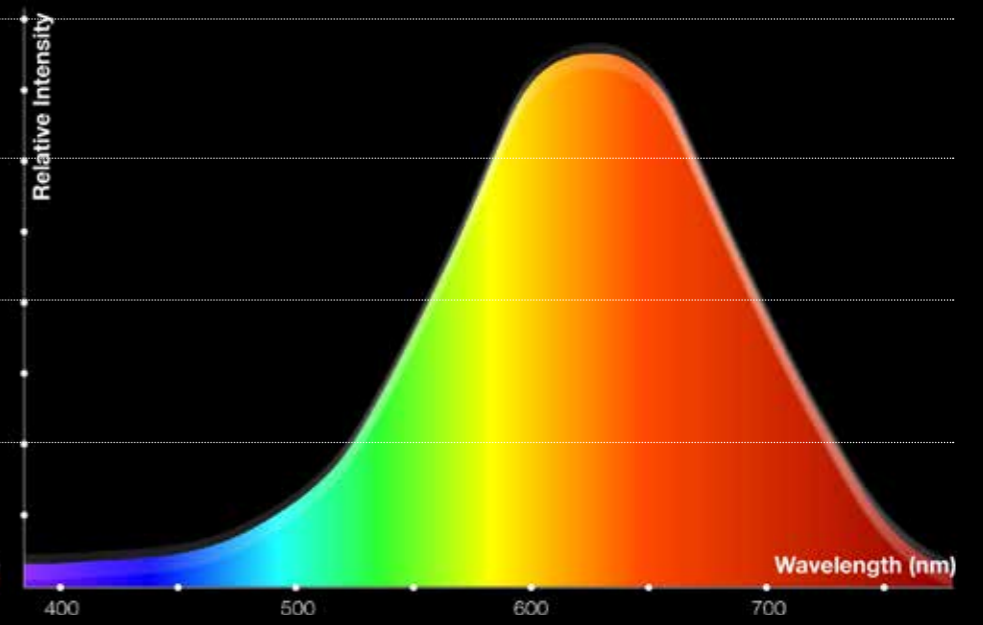
Cool White LED



Warm White LED



Potential Custom 'Bath LED'





Cosmopolis Metal Halide *



3000K LED *



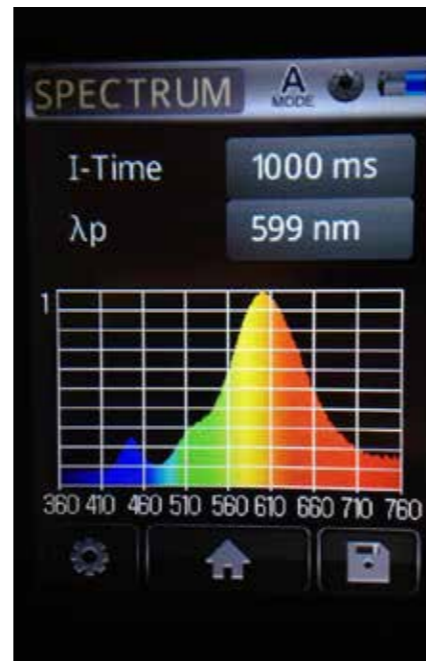
4000K LED *



6500K LED *



Approx. 2700K LED, Ra85 *



Approx. 2500K LED, Ra85 *



6.1.2 Light Source Tests

Two lighting tests were conducted in Bath in 2015. The first involved a review of various standard streetlighting light source types as follows:

- Cosmopolis Metal Halide, CCT 2800K, Ra 66
- Warm White LED, CCT 3000K, Ra 84
- Neutral White LED, CCT 4000K, Ra 76
- Cold White LED, CCT 6500K, Ra 70

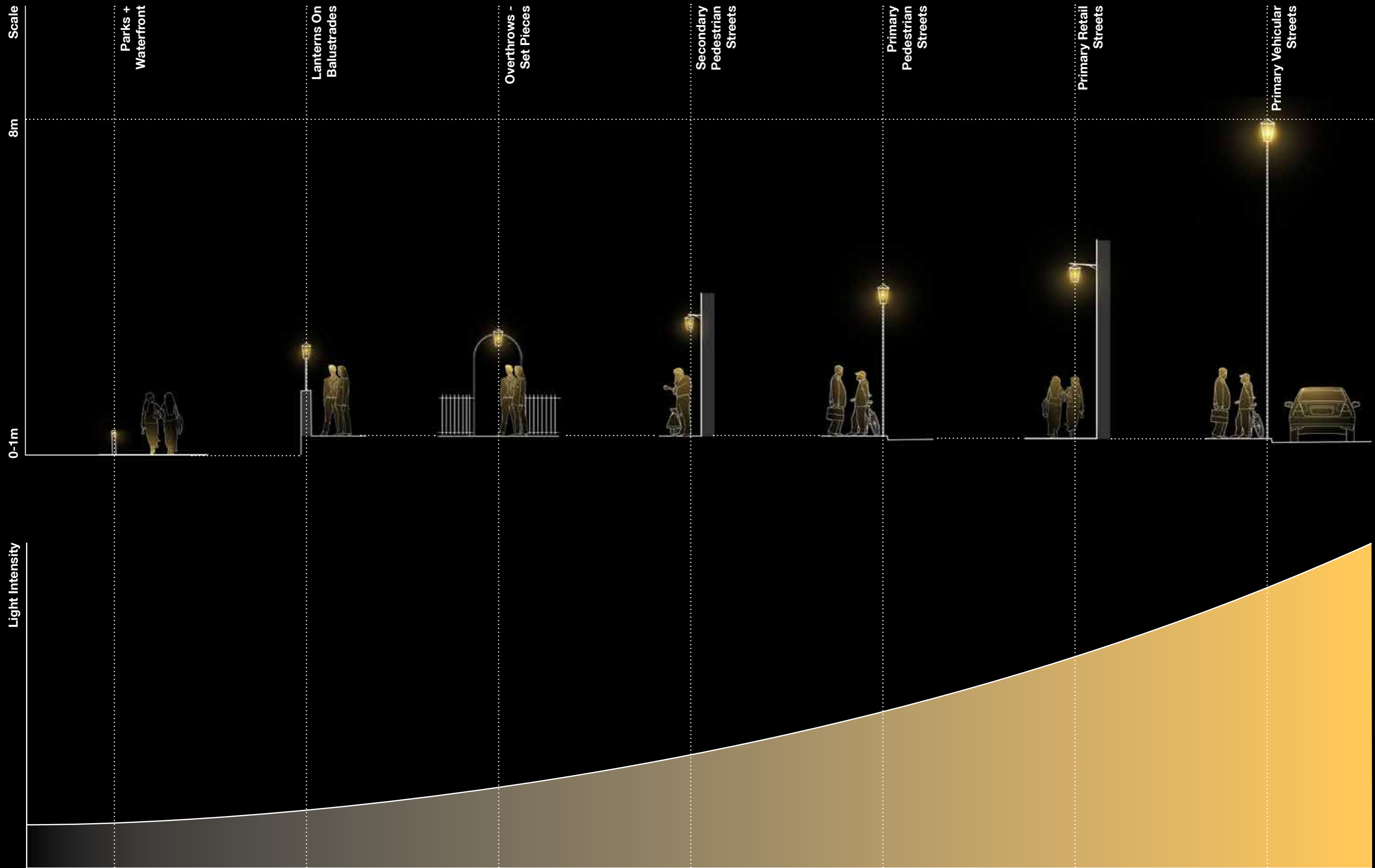
Both 4000K and 6500K LED were deemed too cold and harsh in the context of the city. 3000K LED also felt somewhat cool within the context. 2800K CPO had a pleasant warmth and softer quality, no doubt also partly due to its lower colour rendering and significantly different beam distribution - spilling light onto adjacent facades far more than the LED streetlights, with their more precise optics.

Following the preliminary site test, a further 'experimental' test was undertaken to explore the potential for a custom light colour. A colour temperature around 2500K with a CRI of 85 provided a distinctive, warm and soft quality of light. The addition of amber light to further warm up the colour lent a slightly unnatural and 'dirty' hue.

A colour temperature of 2700K was tested as it is commercially available and has been installed in the form of retro-fit lamps outside the Guildhall with great success.

The tests suggest that colour temperatures between 2500K and 2700K, with colour renderings around 85, are appropriate for use in Bath. Whilst sub 2700K colour temperatures are not widely available for streetlighting, 2700K LEDs are supplied by some streetlighting manufacturers, with a wide range of manufacturers supplying 2700K LEDs for architectural lighting purposes. This suggests that there is certainly scope in pursuing a 2700K streetlighting scheme in the city centre.

* The images shown are illustrative only - note that the colours are accurate only within the limits and variations inherent in photography and different screen displays and print settings.





6.1.3 Scale and Distribution

The issue of the scale of street lighting and the manner in which light spills onto vertical surfaces (facades) is illustrated opposite.

Undesired Effect

The use of flat-glass optics, whilst avoiding direct upward light spill and light pollution, tends to create:

- a) A graphic scallop of light onto the adjacent façade
- b) Diffuse and flat reflected light on opposite facades

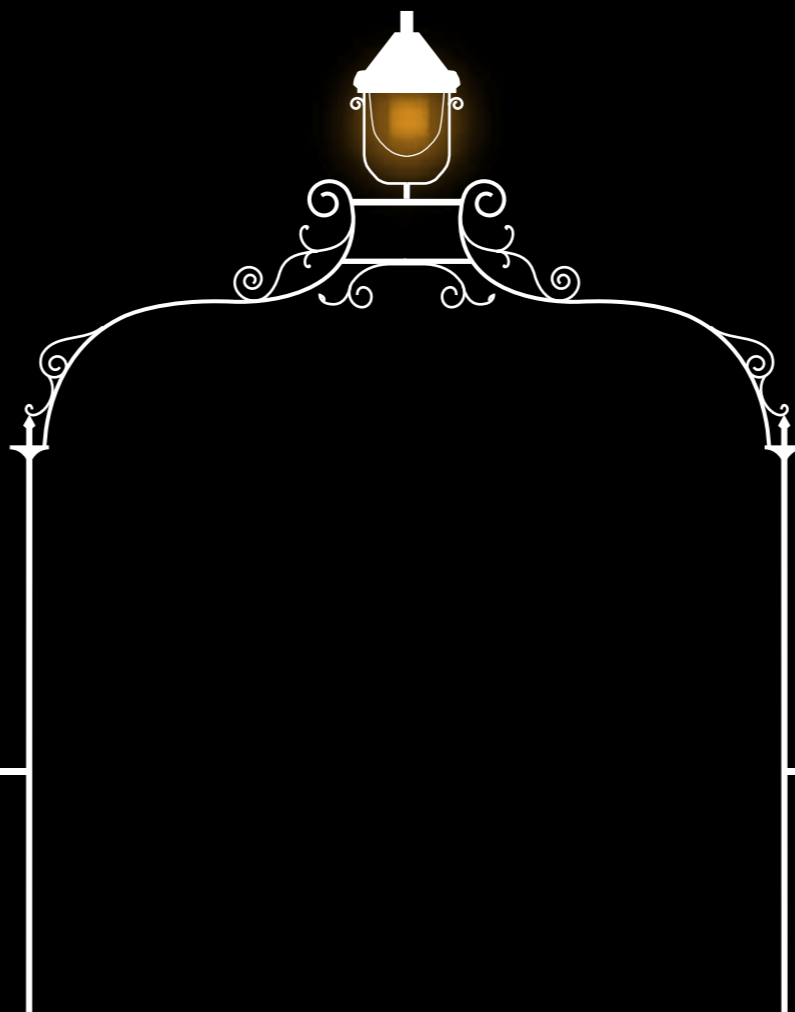
Desired Effect

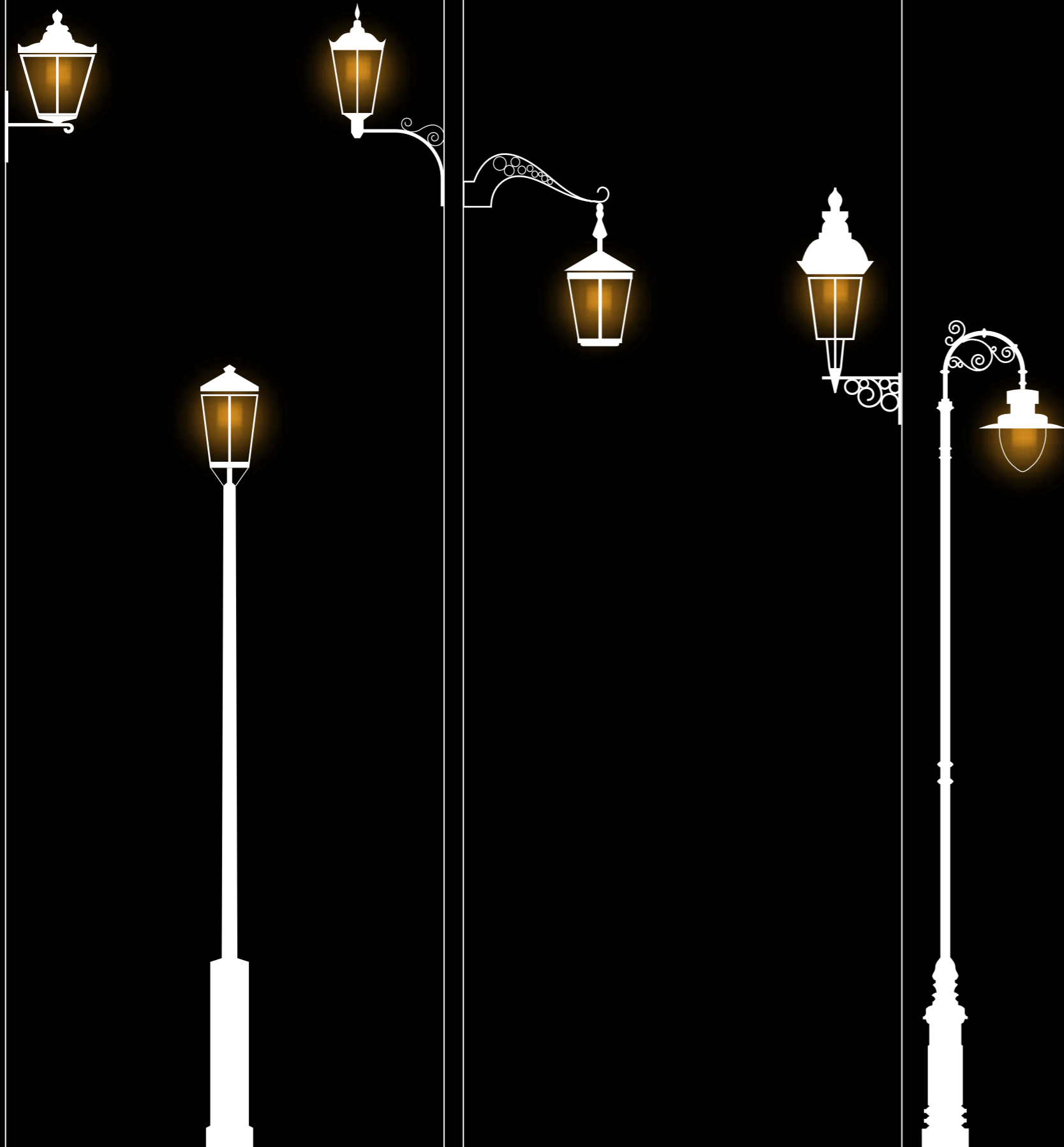
Whilst the diffuse nature of reflected light to opposite facades is difficult to control (being only really controllable in its intensity), the quality of the direct spill light onto an adjacent façade can and should be controlled through the design of the street-lighting lantern.

The street-lighting lantern should be designed such that it:

- c) Provides functional light efficiently to the ground plane
- d) Provides soft backward spill light onto the adjacent façade, creating a 'focal glow' of light onto it – i.e. a radial gradient of light from the source of light outwards. The control of backward spill and the mounting of lanterns must be designed so as to avoid light trespass through residential windows.
- e) The source of light is visible as a soft, warm glow.

- 1. Sketch of street - high mounting and scallop of light onto facade
- 2. Sketch of proposed street - low mounting height with soft radial glow to facade





6.1.4 Equipment

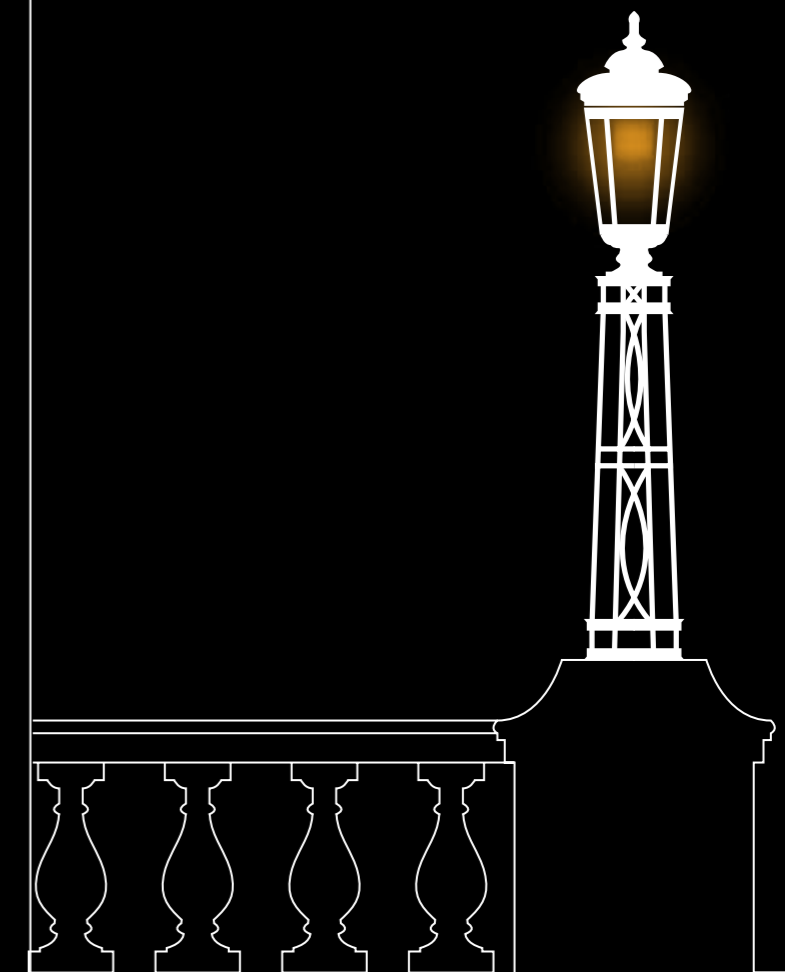
The existing palette of streetlighting furniture is made up of a mixture of various styles of fittings: heritage lanterns, reproduction heritage lanterns, contemporary roadway lanterns and some privately-owned wall-mounted lanterns. This variety of fitting styles generally helps to enrich the street scene and enhance the city's historic character - where streetlighting has been introduced gradually since 1702, each time reflecting the styles and technologies of the time.

The strategy seeks to maintain the variety of lighting equipment but to employ appropriate mounting heights and quality of light throughout. This means the omission of contemporary roadway style lanterns, which produce graphic scallops of light onto facades and conceal the light source within a reflector. This may also require the removal or re-locating of large-scale wall-mounted lanterns that are too big for mounting at the heights proposed by this strategy.

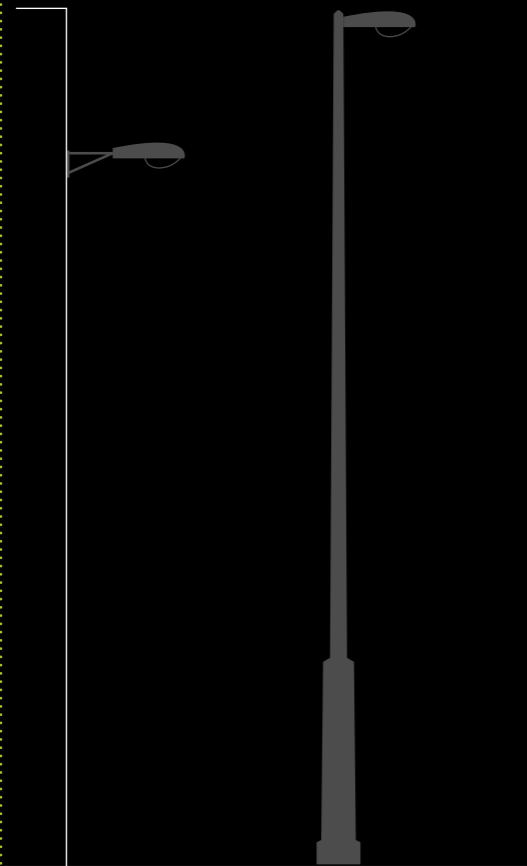
A series of bespoke new lanterns will also be designed for Bath which will further enrich the visual scene and become part of the evolving palette of lantern styles in Bath.

The process for implementing the strategy for lighting equipment is to:

1. assess existing assets and state which ones to keep.
2. assess where reproduction fixtures might be used.
3. remove those assets that are not required to be kept.
4. fill in the gaps with contemporary bespoke fixtures.



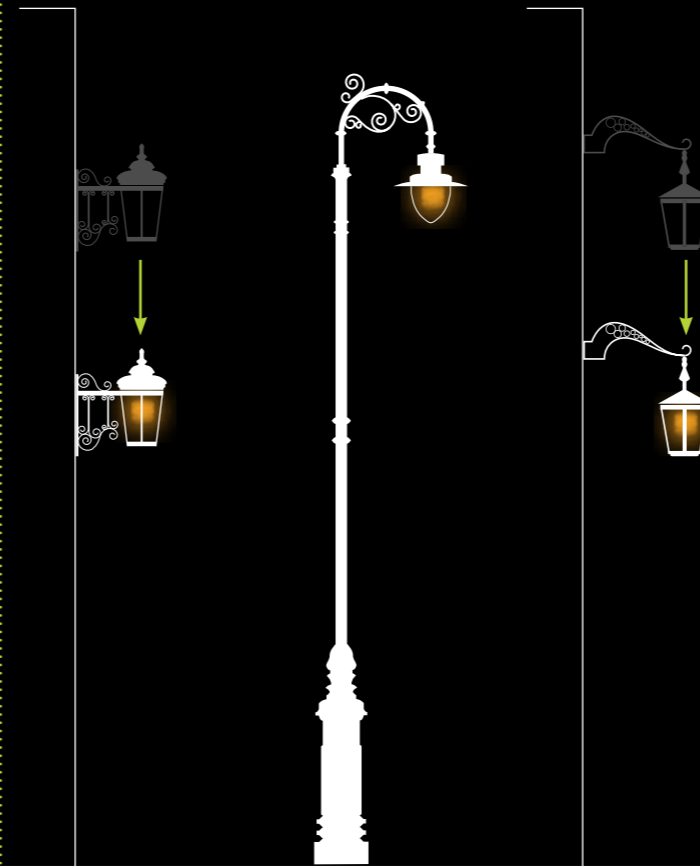
Omit



Existing Contemporary Roadway Lanterns

Existing Contemporary Roadway Columns

Assess (Reposition/Refurbish/Rescale)

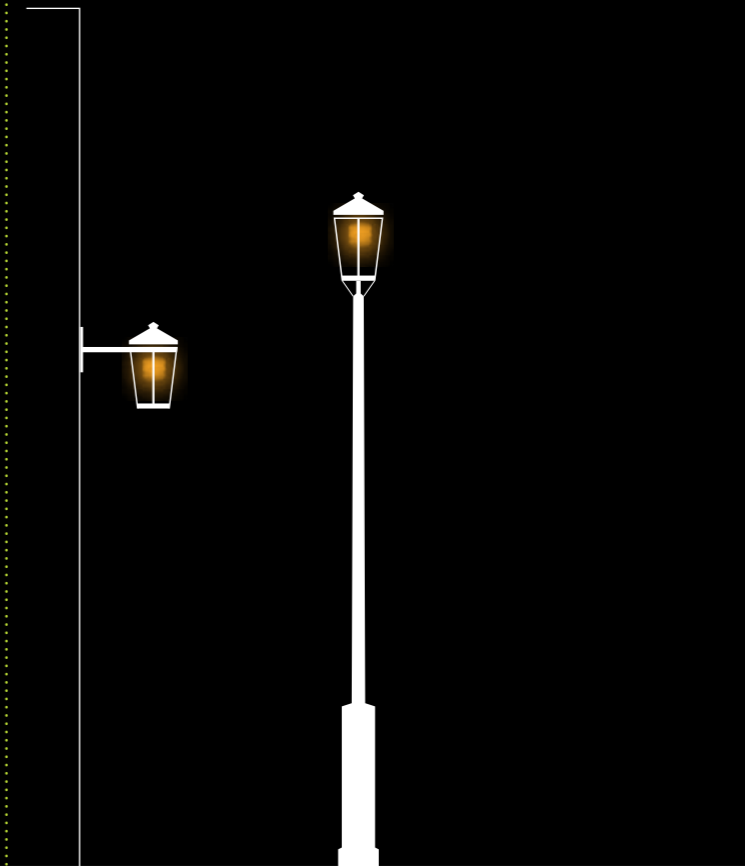


Heritage Style Street Lanterns

Heritage Style Street Columns

Private Lanterns

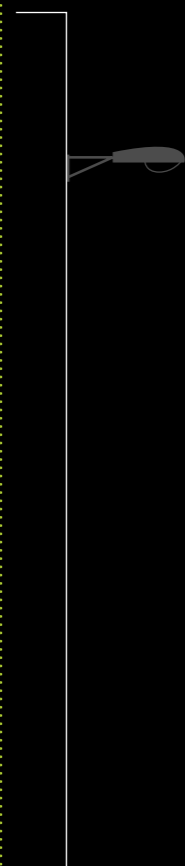
Add



Replica or Bespoke Street Lanterns

Replica or Bespoke Street Columns

Streets



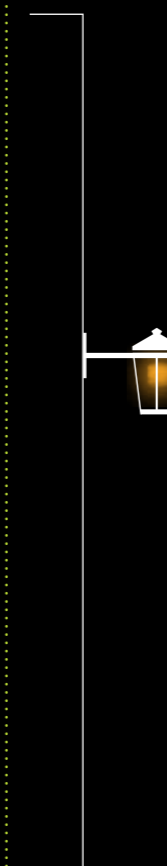
Existing Contemporary Roadway Lanterns



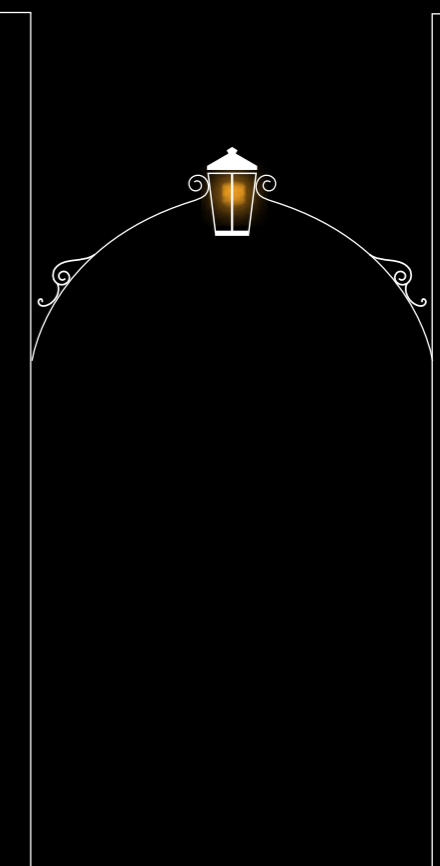
Heritage Style Street Lanterns



Private Lanterns



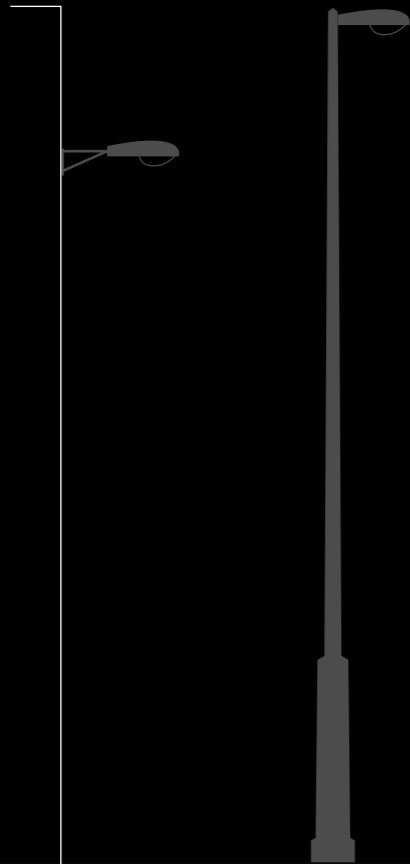
Replica or Bespoke Street Lanterns



Replica or Bespoke Threshold Overthrows

Alleys/Passages

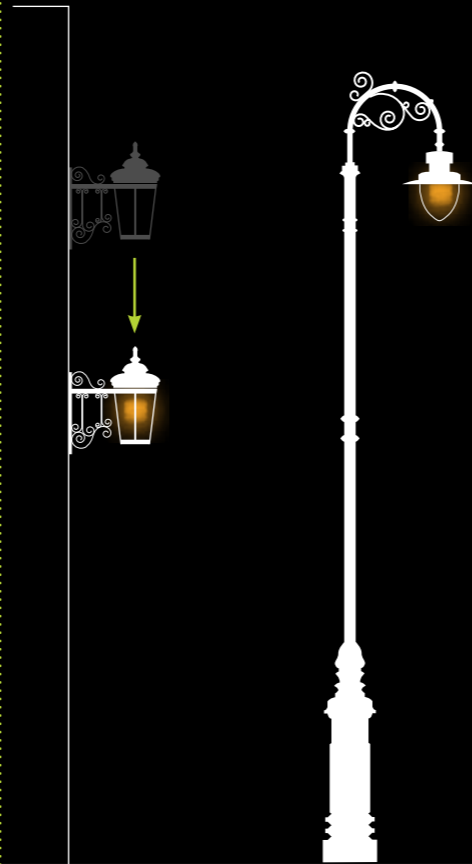
Omit



Existing Contemporary Street Lanterns

Existing Contemporary Street Columns

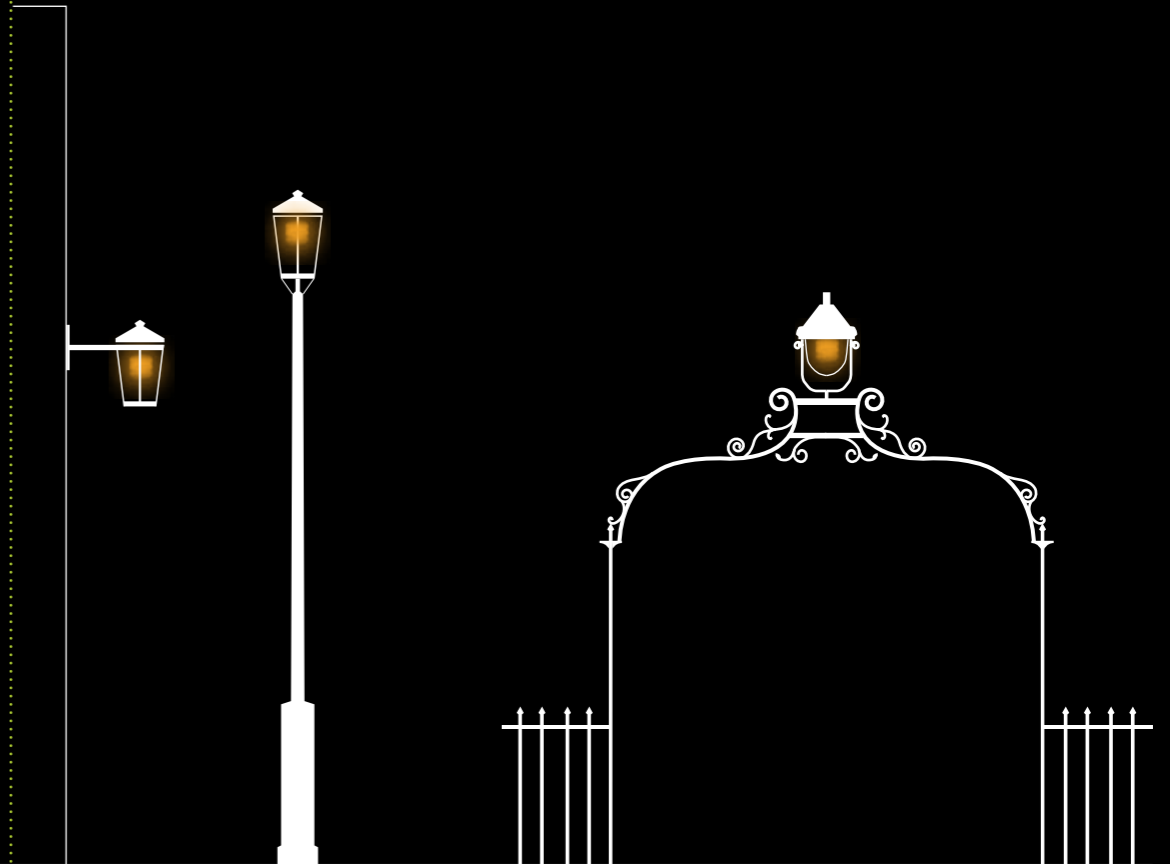
Assess (Reposition/Refurbish/Rescale)



Heritage Style Street Lanterns

Heritage Style Street Columns

Add

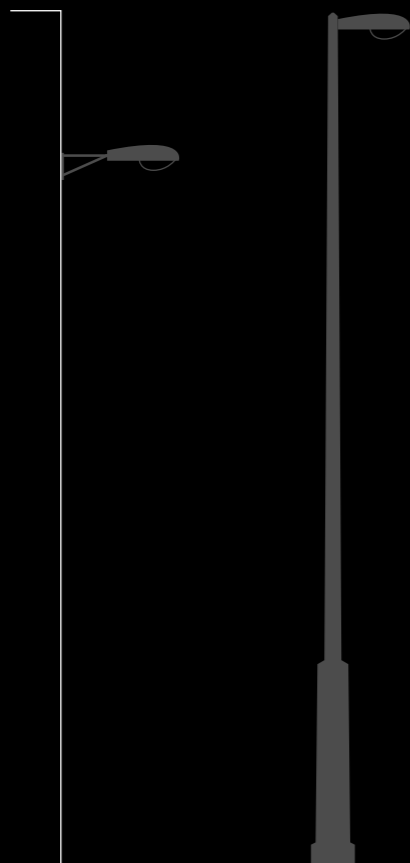


Replica or Bespoke Street Lanterns

Replica or Bespoke Street Columns

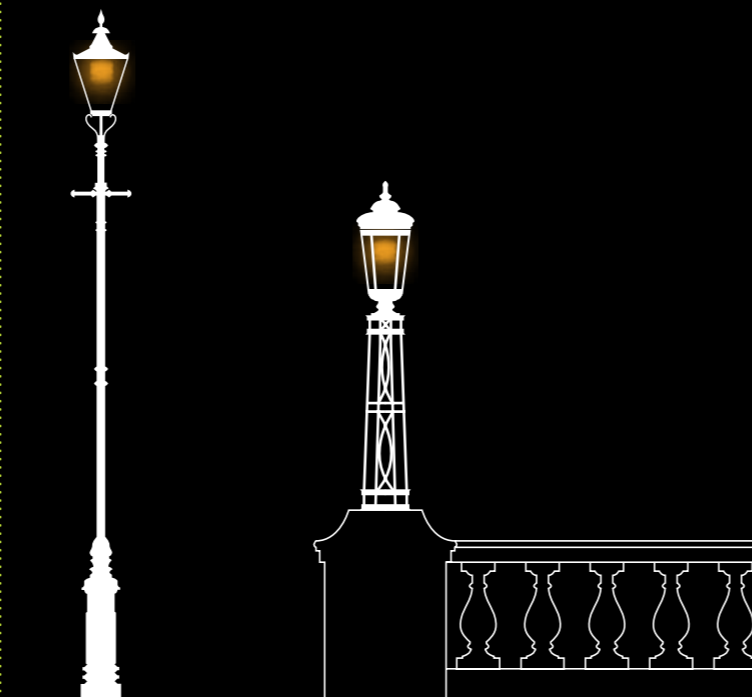
Replica or Bespoke Entrance Overthrows & Railing Mounted Lanterns

City Places/
Parades



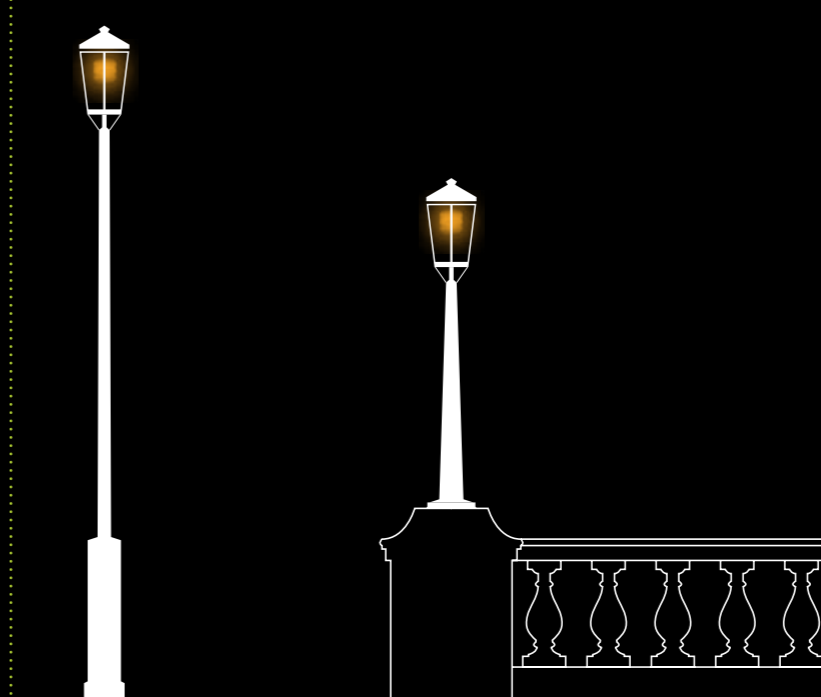
Existing Contemporary Street Lanterns

Existing Contemporary Street Columns



Heritage Style Street Columns

Heritage Style Parapet Lanterns



Replica or Bespoke Street Columns

Replica or Bespoke Parapet Lanterns

Waterfront/
Double-level
Street

6.2 Light Levels

- **Medium brightness, uniform vehicular street:**
 ME3c: L_{ave} 1cd/m², U_o 0.4
- **High brightness (relative) pedestrian street:**
 S2: E_{ave} 10 lux, E_{min} 2 lux
 P2: S/P ratio to be applied as supplied by manufacturer
 A1: E_{hs} 5 lux, U_o 0.15
- **Medium brightness (relative) pedestrian street:**
 S3: E_{ave} 7.5 lux, E_{min} 1.5 lux
 P2: S/P ratio to be applied as supplied by manufacturer
 A2: E_{hs} 3 lux, U_o 0.15
- **Low brightness (relative) pedestrian street:**
 S4: E_{ave} 5 lux, E_{min} 1 lux
 P2: S/P ratio to be applied as supplied by manufacturer
 A3: E_{hs} 3 lux, U_o 0.15
- **Low brightness, ecologically sensitive riverside:**
 S7: performance not determined

Note on Uniformity

Given the generally low intensities of light to be implemented throughout the city centre, a uniformity of 0.25 for 'S' and 'P' classes (i.e. slightly above the uniformity recommended in the standards) should be targetted where possible.



| Class | Horizontal illuminance based on S/P ratio = 1.2 | |
|-------|--|---------------------------------|
| | E in lx ^a (ave. min. maintained) | E_{min} in lx (maintained) |
| P1 | 13.4 | 2.7 |
| P2 | 8.6 | 1.7 |
| P3 | 6.3 | 1.3 |
| P4 | 4.0 | 0.8 |
| P5 | 2.2 | 0.4 |
| P6 | 1.4 | 0.4 |
| P7 | performance not determined | |

British Lighting Standards

| Class | Hemispherical illuminance | |
|-------|--|-----------------|
| | E_{hs} in lx (ave. min. maintained) | U_o (min.) |
| A1 | 5 | 0.15 |
| A2 | 3 | 0.15 |
| A3 | 2 | 0.15 |
| A4 | 1.5 | 0.15 |
| A5 | 1 | 0.15 |
| A6 | performance not determined | |

European Lighting Standards applicable to pedestrian and pedal cyclist routes

| Class | Luminance of roadway (dry condition) | | | Disability glare TI in % ^a (max.) | Lighting of surroundings SR^{2b} (min.) |
|-------|--------------------------------------|-----------------|-----------------|--|---|
| | L in lx (ave. min. maintained) | U_o (min.) | U_l (min.) | | |
| ME3c | 1.0 | 0.4 | 0.7 | 15 | 0.5 |

European Lighting Standards applicable to selected vehicular routes

Hierarchy of light levels

The success the public realm after dark will rely heavily on striking the correct balance between light and dark between the various elements of the visual landscape.

As a first step towards determining appropriate light intensities for Bath, an 'Environmental Zone' (as defined by the Institute of Lighting Engineers' publication, "Guidance Notes for the Reduction of Light Pollution") has been selected. This categorisation system represents current best practice in Europe and aims to ensure that the relative brightness of the site with respect to its environmental context is appropriate.

Environmental Zones have been selected from the following categories:

- E1: Intrinsically dark landscapes (national parks, areas of outstanding natural beauty, etc).
- E2: Low district brightness areas (rural, small village, or relatively dark urban locations)
- E3: Medium district brightness areas (small town centres or urban locations)
- E4: High district brightness areas (town/city centres with high levels of night-time activity)

It has been assumed that the city centre falls under the categories E2/E3 and that the riverside falls under categories E1/E2.

Perceived Brightness

The sensitivity of the human eye changes with both luminance and the spectral distribution of a light source. Photopic vision (typically day-time vision, enabled by the eye's cone photo-receptors) occurs in levels above 10 cd/sqm and scotopic vision (typically night-time vision, enabled by rod photo-receptors) occurs in levels below 0.01 cd/sqm. Mesopic vision (enabled by a combination of both rod and cone photo-receptors) occurs in levels between 10 and 0.01 cd/sqm. The properties of all light sources are currently quantified based on human visual response under photopic conditions. External public realm lighting, however, generally falls in the mesopic range and so data relating to sources is inherently flawed and misleading when it comes to assessing them in an external, after-dark environment. The human eye is at peak sensitivity at 555 nm (towards red/orange) in photopic conditions but this sensitivity-peak shifts towards shorter wavelengths as luminance levels decrease in mesopic and scotopic conditions. In other words, the human eye becomes more sensitive to light towards the blue/green end of the spectrum after dark. Light sources towards the blue/green end of the spectrum (e.g. cool white/cool blue metal halide, fluorescent and LED) will therefore appear disproportionately brighter than their lumen output would suggest. This is recognised in the current British Standard, BS5489:2013, which introduces 'P' Lighting Classes that include a Scotopic/Photopic correction factor to account for the varying perceived brightnesses of different light sources.

Horizontal Illumination

As part of the strategy, lighting classes have been determined. These classes will predominantly be applied to roadways, pedestrian and cycle paths and some open spaces (e.g. car parks) and will be drawn from current British and European and Lighting Standards, including PD CEN/TR 13201-1:2004, BS EN 13201-2:2003 and BS EN 12464-2:2007 and BS5489:2013 ('P' classes to be applied instead of 'S' classes where possible).

The recommendations illustrated opposite act as guidelines only.

Vertical Illumination

Whilst horizontal illumination levels will be recommended and will play an important role in enhancing safety, it is well established in the field of urban lighting that solely fulfilling requirements for prescribed horizontal illuminance levels will not necessarily lead to a satisfactory lighting solution. A purely functional, quantitative approach to lighting can lead to a design that is bland and overly utilitarian, placing the emphasis firmly on the immediate visual task and relegating spatial experience and sensitivity to specific contexts (e.g. a WHS) to a secondary consideration.

Creating an after-dark environment that enhances safety, security and accessibility does not necessitate high light intensities and strong horizontal illuminance, but rather the selective illumination of key surfaces, forms and details. The illumination of vertical surfaces, whether they be natural (e.g. trees) or man-made (e.g. architectural and landscape features) will be critical in revealing the proportions and boundaries of spaces after dark. Even soft lighting to vertical surfaces can greatly increase the legibility and perceived brightness of a space, whilst providing visual interest and creating character. Lighting to vertical surfaces can also help to provide diffuse reflected light to peoples' faces, helping to aid facial recognition and further heighten perceptions of security.

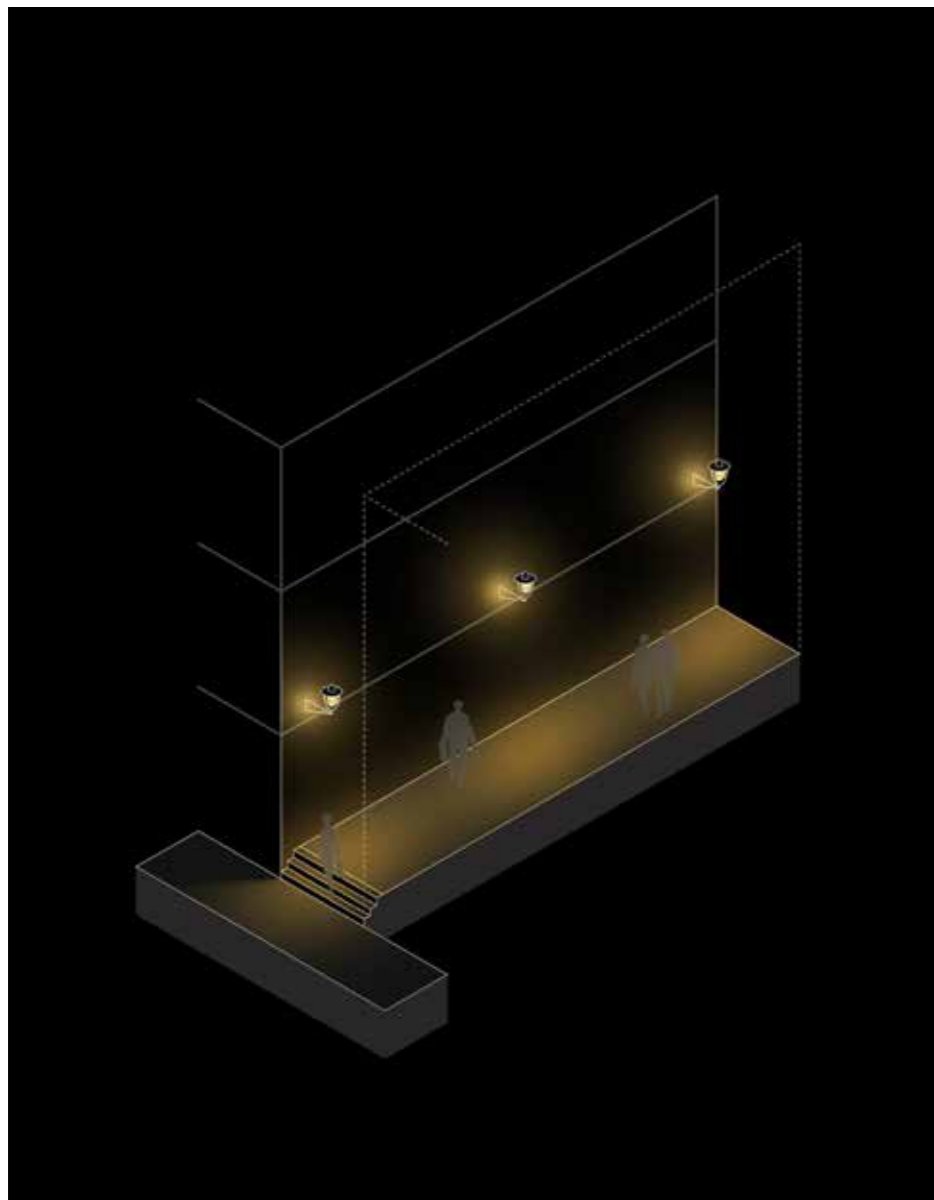
Hemispherical Illumination

On pedestrian paths, hemispherical illuminance 'A-' classes will be recommend as alternatives to horizontal illuminance 'S-' and 'P-' classes, in accordance with the European Lighting Standards PD CEN/TR 13201-1:2004 (Table 4).

Hemispherical illuminance calculations consider the mount of light falling onto (and modelling) objects in space. They provide an indication of the amount of light falling onto 3-dimensional objects and people and so can provide a clearer understanding of the way in which an object can be seen and understood after dark. As such, hemispherical illuminance criteria are deemed an appropriate option for pedestrian areas, where the illumination and uniformity levels applied to objects in space can be more critical than those on the ground plane alone. Hemispherical illuminance classes are particularly usefully applied in situations where luminaire mounting heights are very low.

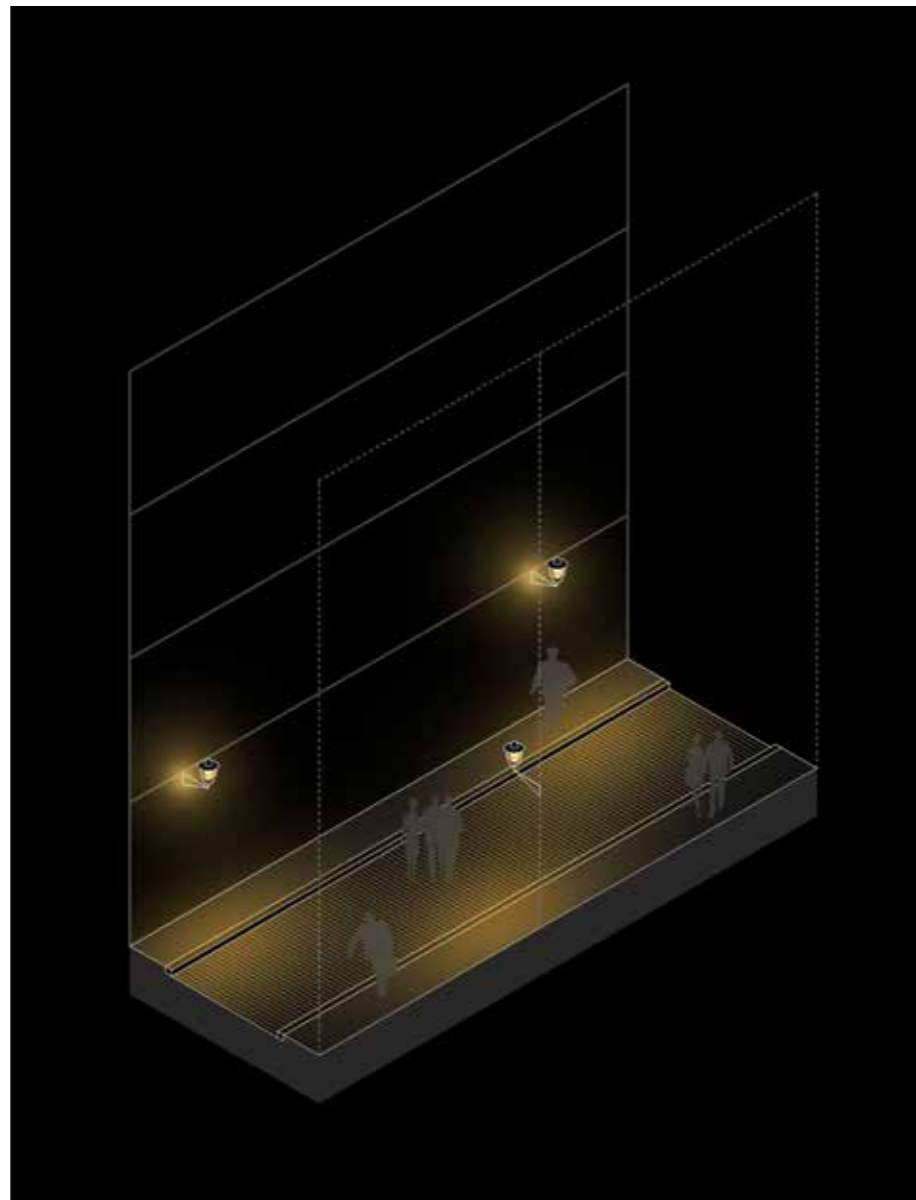
6.3 Street Typologies

The diagrams opposite provide guidelines for the lighting of each street typology with regards to luminaire mountings and arrangements as well as the quality and quantity of light to be applied.



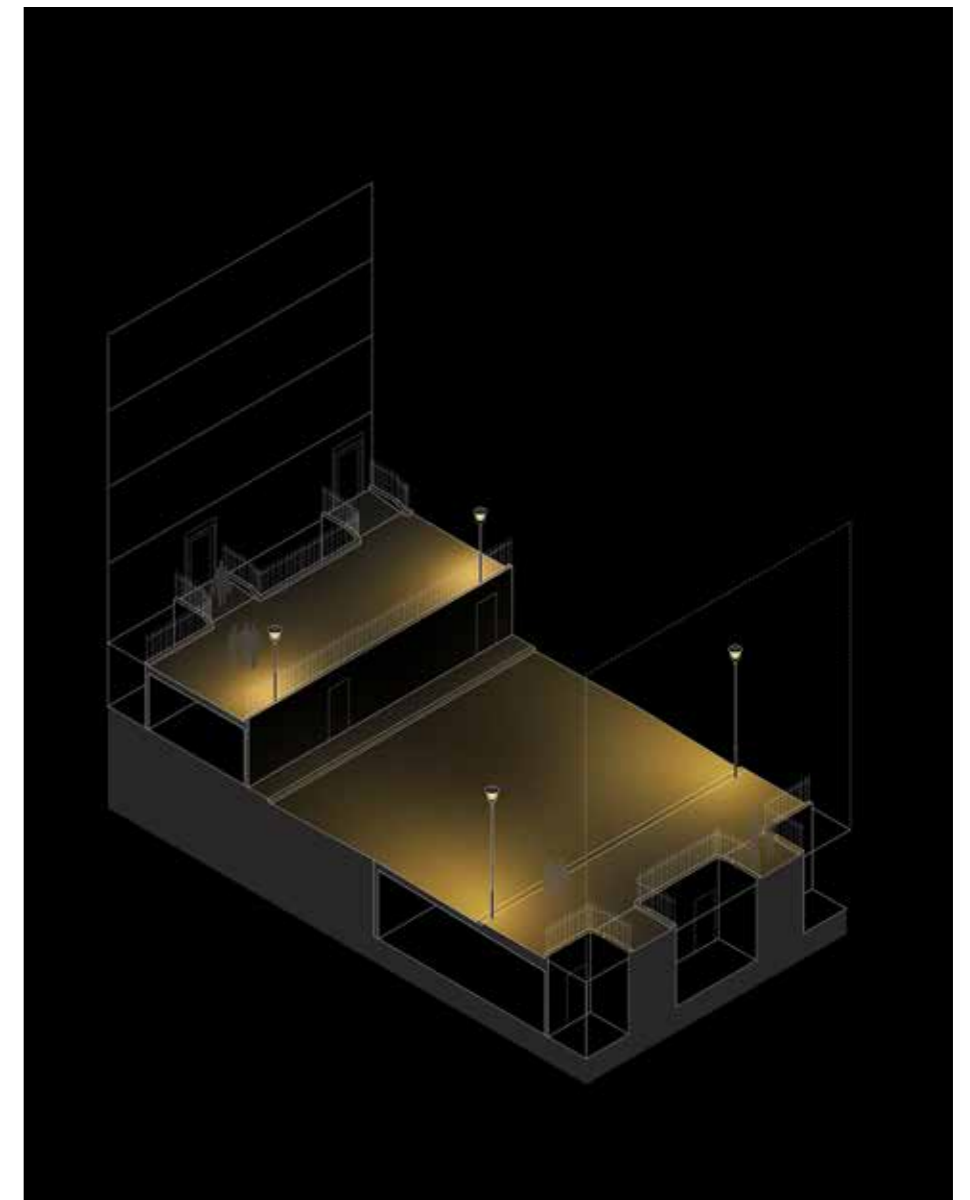
Alley/Passage

| | |
|--------------------|------------------------------|
| Lighting Class | S4 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Wall |
| Mounting Height | 1st fl. level (approx. 4-6m) |



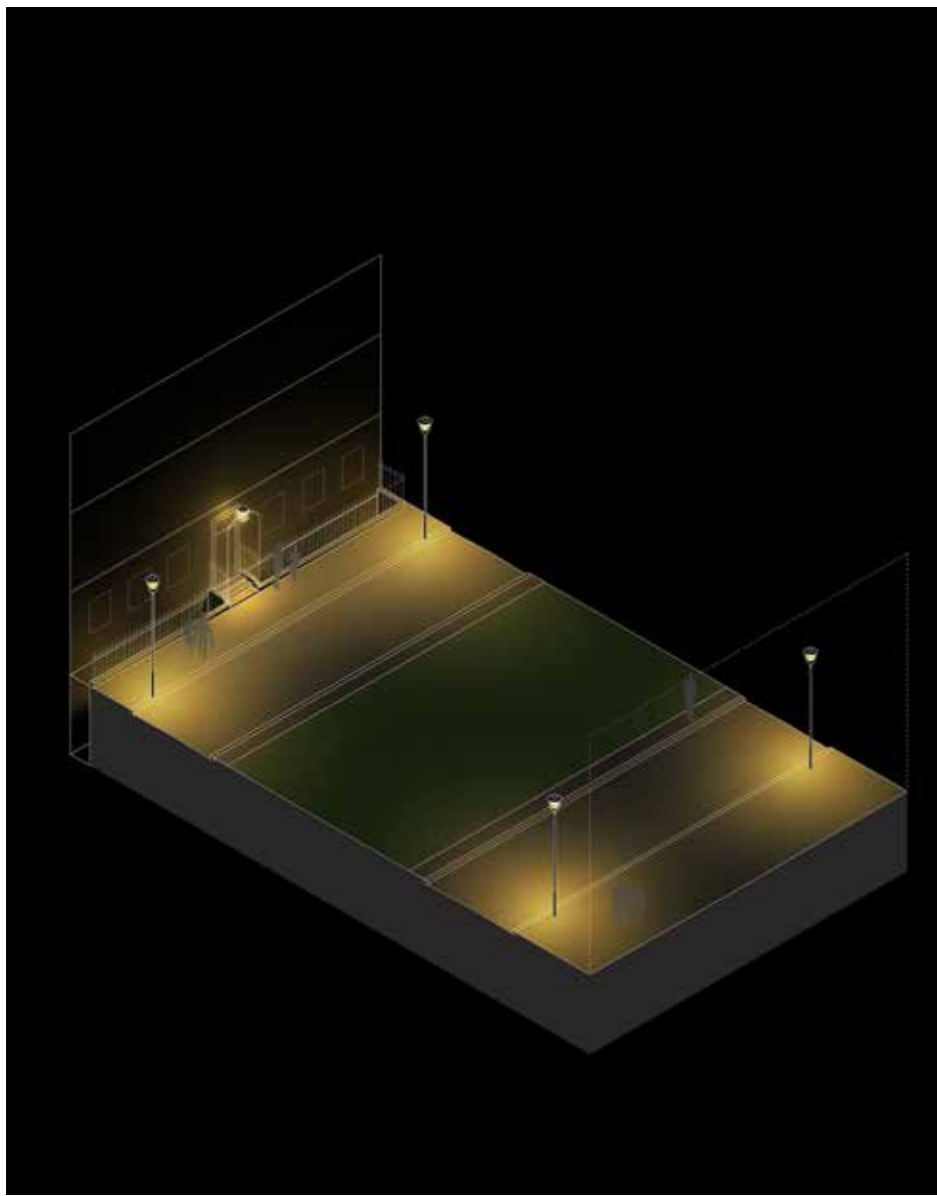
Single Level Narrow Street

| | |
|--------------------|------------------------------|
| Lighting Class | S2-S4 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Wall |
| Mounting Height | 1st fl. level (approx. 4-6m) |



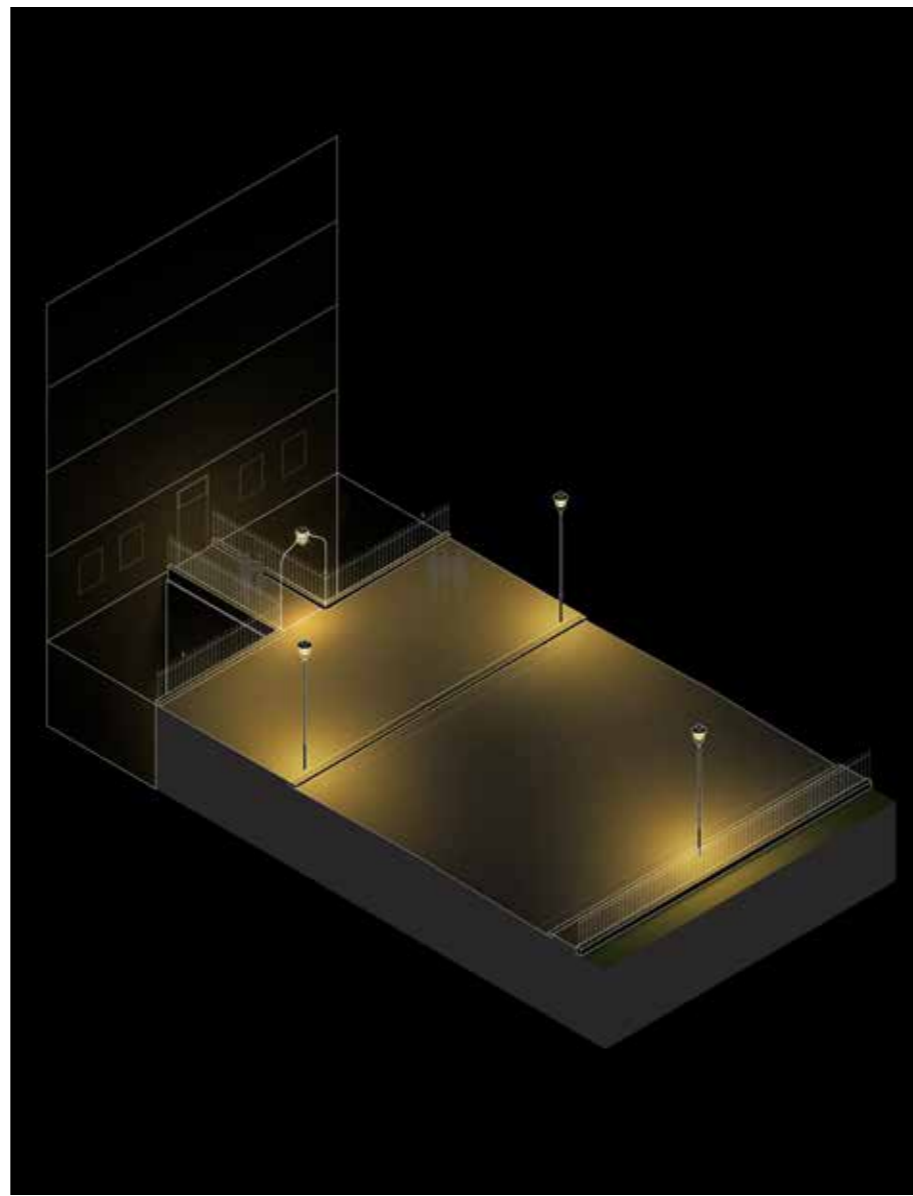
Double Level Street

| | |
|--------------------|--|
| Lighting Class | S2-S3 (lower level) S3-S4 (upper level) |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Post + Balustrade |
| Mounting Height | 6m (post) 3m (balustrade) |



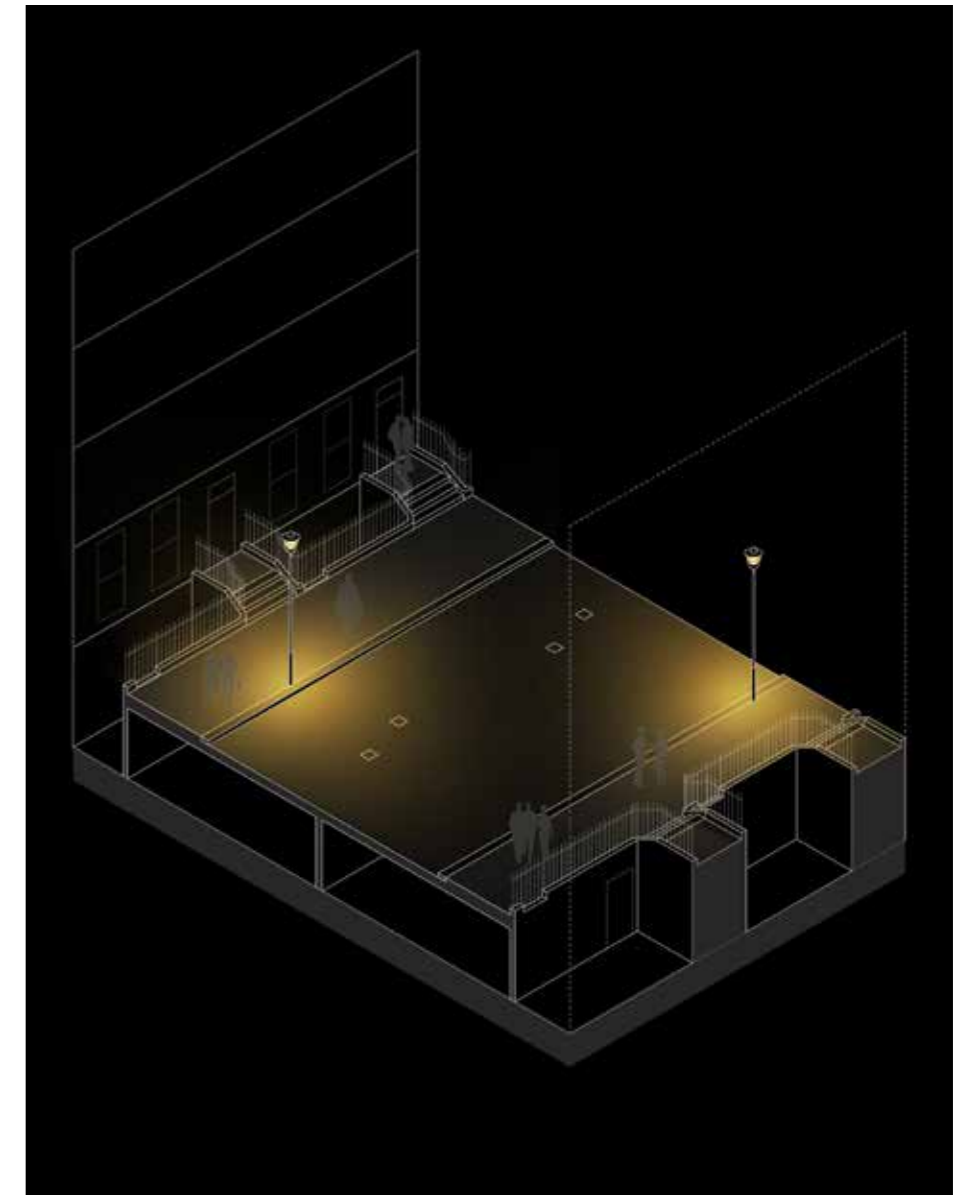
Place

| | |
|--------------------|-------|
| Lighting Class | S2-S4 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Post |
| Mounting Height | 6m |



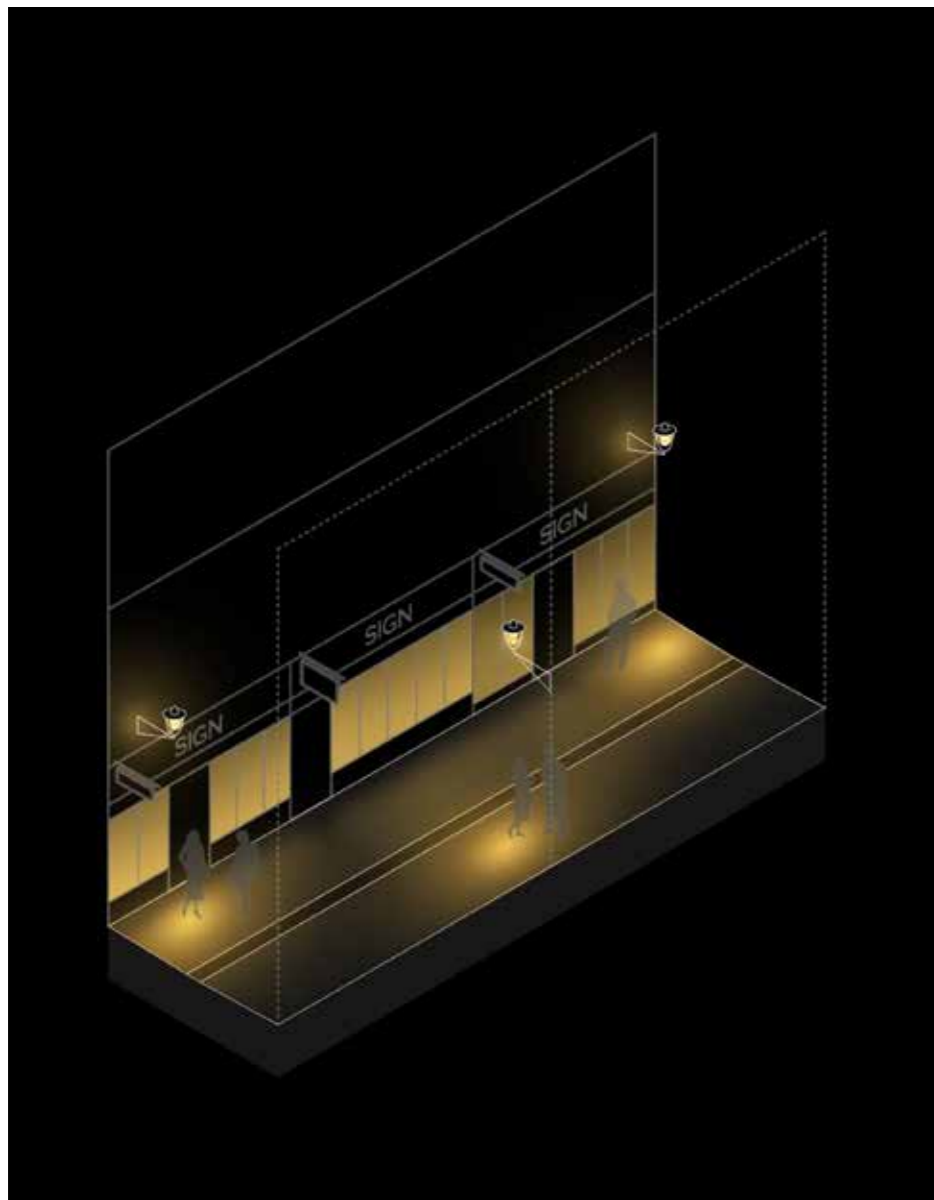
Parade

| | |
|--------------------|---------------------------------|
| Lighting Class | S2-S4 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Post + Overthrow |
| Mounting Height | 4-6m (post) 2.5m (overthrow) |



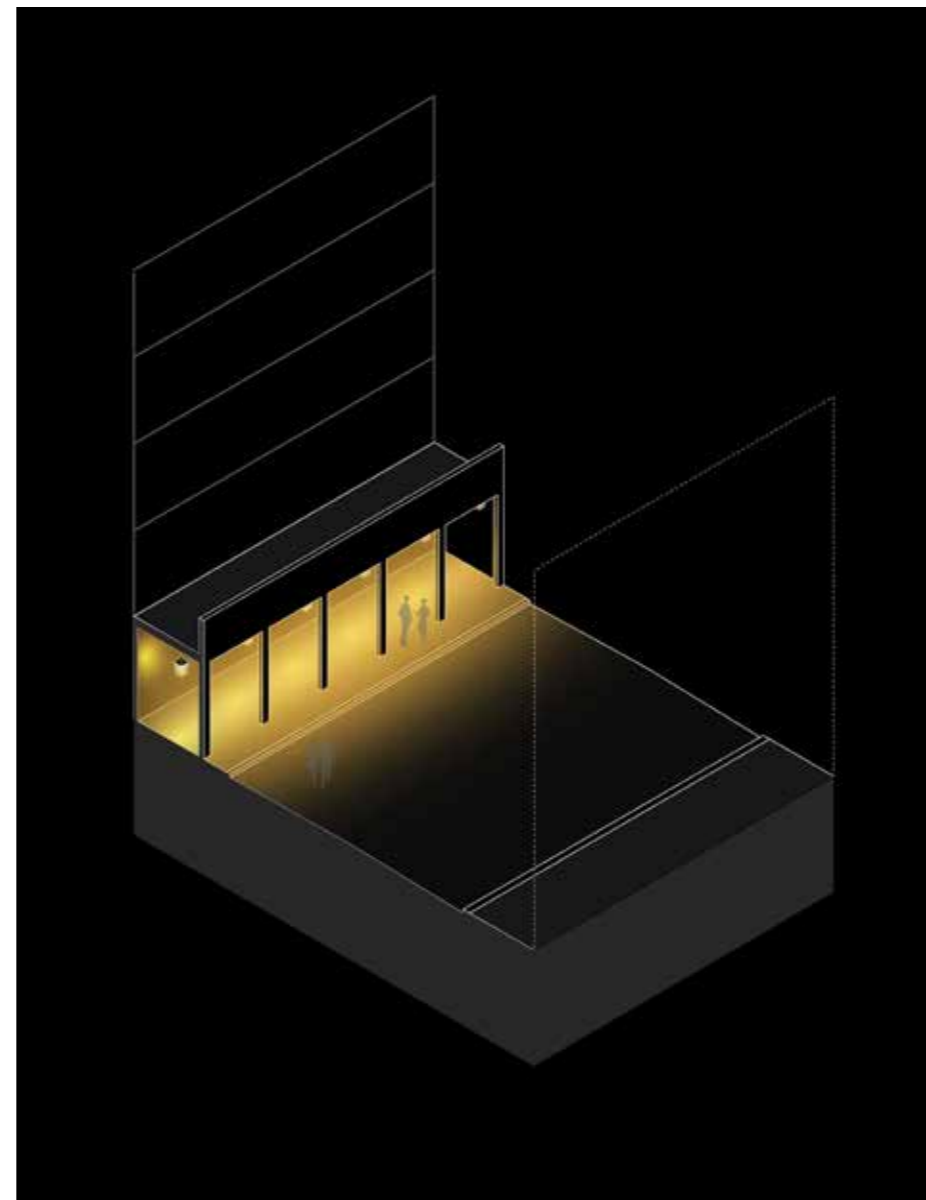
Single Level Wide Street

| | |
|--------------------|-------|
| Lighting Class | S2-S4 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Post |
| Mounting Height | 6m |



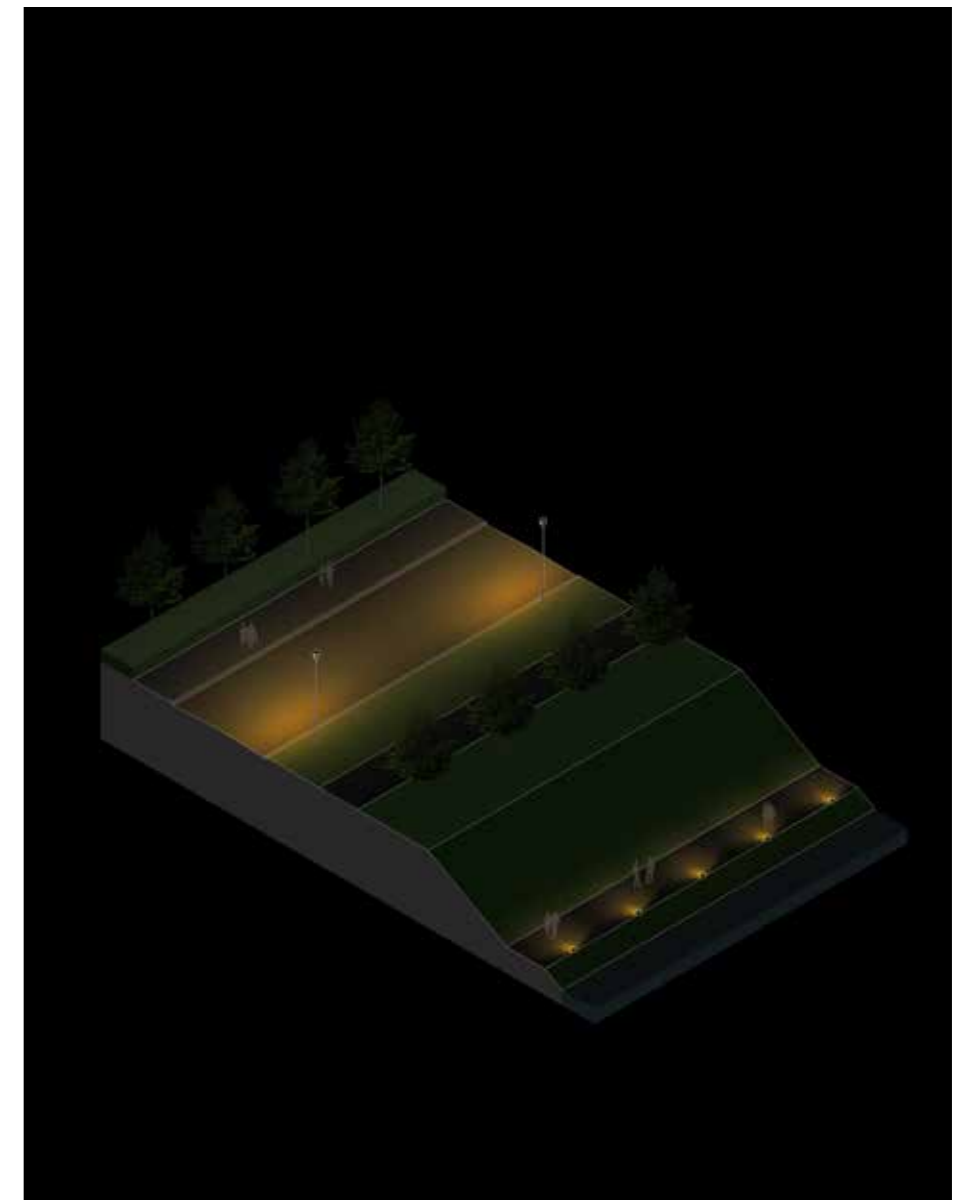
Retail Street

| | |
|--------------------|------------------------------|
| Lighting Class | S2-S3 |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Wall |
| Mounting Height | 1st fl. level (approx. 4-6m) |



Street with Arcade

| | |
|--------------------|-------------------------------------|
| Lighting Class | S2-S4 (under & within 3m of arcade) |
| Light Source | LED |
| Colour Temperature | 2700K |
| Colour Rendering | Ra85 |
| Lantern Mounting | Arcade soffit |
| Mounting Height | Approx. 4m |



Waterfront Route

| | |
|--------------------|-------------------------------------|
| Lighting Class | S2-S4 (road) S7 (waterside path) |
| Light Source | LED |
| Colour Temperature | 2700K and warmer |
| Colour Rendering | Ra60+ |
| Lantern Mounting | Post + Bollard |
| Mounting Height | 6-8m (post) 0-1.5m (bollard) |

7.0 Network Backdrop



- 1. Excessively bright retail frontages
- 2. No external light to retail premises (Venice)
- 3. Floodlit commercial facade
- 4. Low light
- 5. Coloured floodlighting to commercial facade



The backdrop to the network is largely provided by privately-owned commercial premises. The impact of lighting schemes associated with these premises on the after-dark cityscape is currently very significant and, in many cases, highly detrimental to the character and legibility of the city.

The illumination of shopfronts heavily influences the street level experience. Individual tenants are encouraged to implement high quality illuminated shop windows where the balance and composition of light serves to enrich the visual scene and improve perceptions of passive surveillance on streets.

Diversity is encouraged amongst the shop window designs, however several technical parameters are set out below to help ensure that no one shopfront compromises the lit character of the historic city:

Retail Lighting Guidelines

- No lighting should be applied externally unless otherwise agreed with planning authorities.
- Interior spaces visible externally through glazing should appear warm and inviting, with warm white 3000K max. light used.
- Light pollution in the form of unwanted light trespass and glare must be avoided - many windows above ground floor level are those of residences.
- Reflected/indirect sources of glare (e.g. glare reflected from very light coloured or specular surfaces) must be avoided.
- Spotlight and downlight luminaires must be directed downwards and inwards (towards the interior) where possible to minimise light pollution.
- Direct views of light sources (including luminaires diffusers) should be avoided as far as possible. Luminaires that are visible externally must be low-glare, e.g. fitted with louvres/cowls, utilising darklight reflectors etc.
- Spill light onto the pavement should not extend beyond 1m of the store front.
- Spill light onto the pavement within 1m of the shopfront glazing should not exceed 20 lux.
- All shop window lighting must be dimmable and must have adjustable focus and/or light cut-off accessories such as snoots or barn doors.

1. Sketch of current typical shopping street
2. Sketch of proposed typical shopping street



Lighting to both hard and soft landscape features can enhance the character of after-dark meeting spaces. As well as helping to create a sense of place, lighting to landscape features can help to reinforce human scale. Both factors can contribute towards heightening perceptions of security. Light that is applied to vertical surfaces (including trees), in particular, helps to heighten levels of perceived brightness and improve the legibility of a space.

Illumination levels/lighting standards should generally not be applied to entire open spaces but only to primary pedestrian paths through them. The designs of lighting schemes for open spaces must consider vertical illumination as an important design factor to enable horizontal illumination levels to be minimised whilst still maintaining high levels of perceived brightness and security.

In all cases, high-power floodlighting should be avoided in favour of the selective illumination of paths and landscape and architectural features.

8.1 Passive

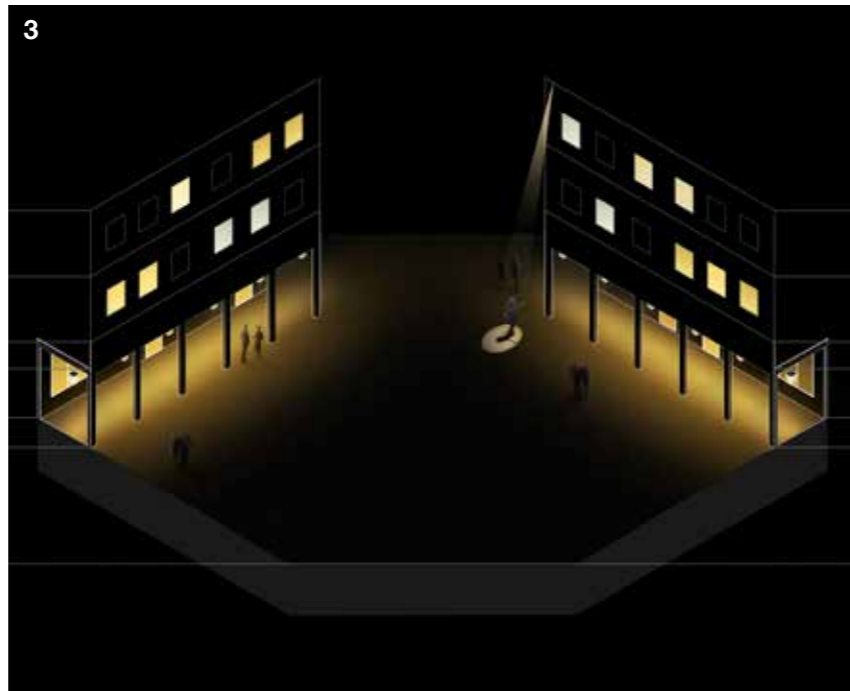
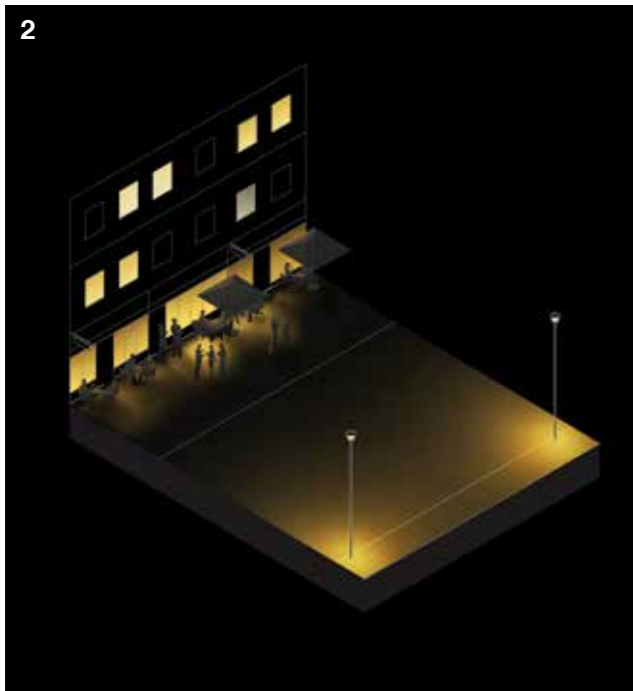
Green places used for passive activities should be predominantly unlit, with illumination only applied to primary pedestrian paths, entrances into the space and centre-pieces such as obelisks or specimen trees. Amenity lighting should be in warm white (bespoke LED colour), with landscape or sculptural features illuminated in a colour temperature of white light that best brings out the natural colours of the illuminated object.

8.2 Active

The general approach to the lighting of active hard landscaped meeting places is to frame the space with a positively lit perimeter and allow the centre to be darker. Illuminated paths around the perimeter will provide safe passage. Lit vertical surfaces at human scale should be provided by retail frontages, arcades, streetlighting lanterns or street-scale architectural lighting, allowing the centre to remain free from the clutter of lighting columns. In all cases light should be warm, to match the quality of the surrounding streetlighting.

8.3 Performance

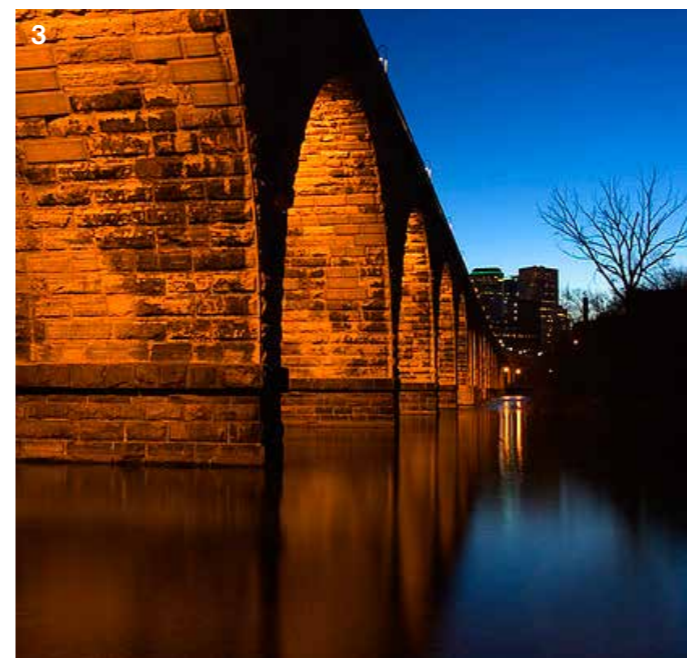
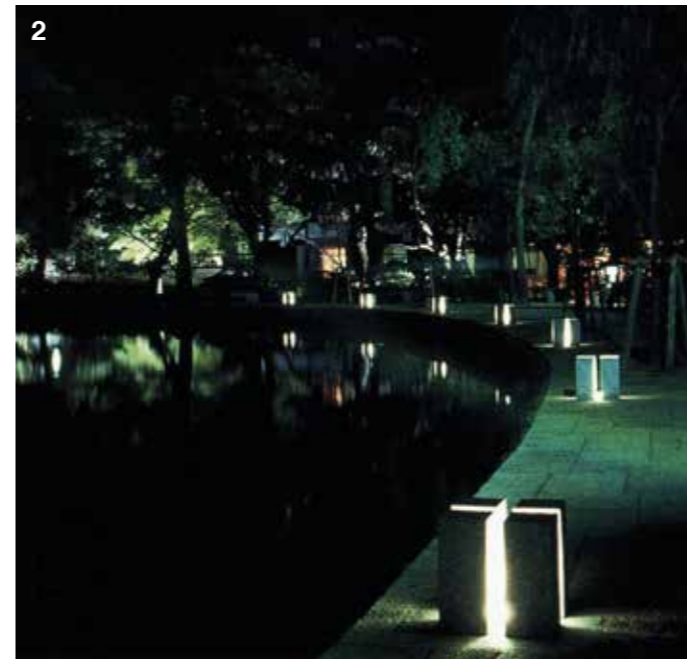
Places used for events and performances should have a positively lit perimeter is street scale, as in active places. Refer to section 11.0 for information on lighting to events within spaces.



1. Passive Place - lit centre piece and primary path
2. Active Place - lit perimeter frontage
3. Performance Place - lit perimeter and temporary theatrical lighting

9.0 The River





The riverfront is a major public amenity which is currently under-used at night, largely due to perceptions of it being unsafe. It is currently lit very poorly, with some areas completely dark whilst others are lit very brightly by glary luminaires. When looking down to the waterfront from elevated positions at the edge of the city centre, no identifiable routes or meetings places/nodes are visible, making the waterfront very uninviting.

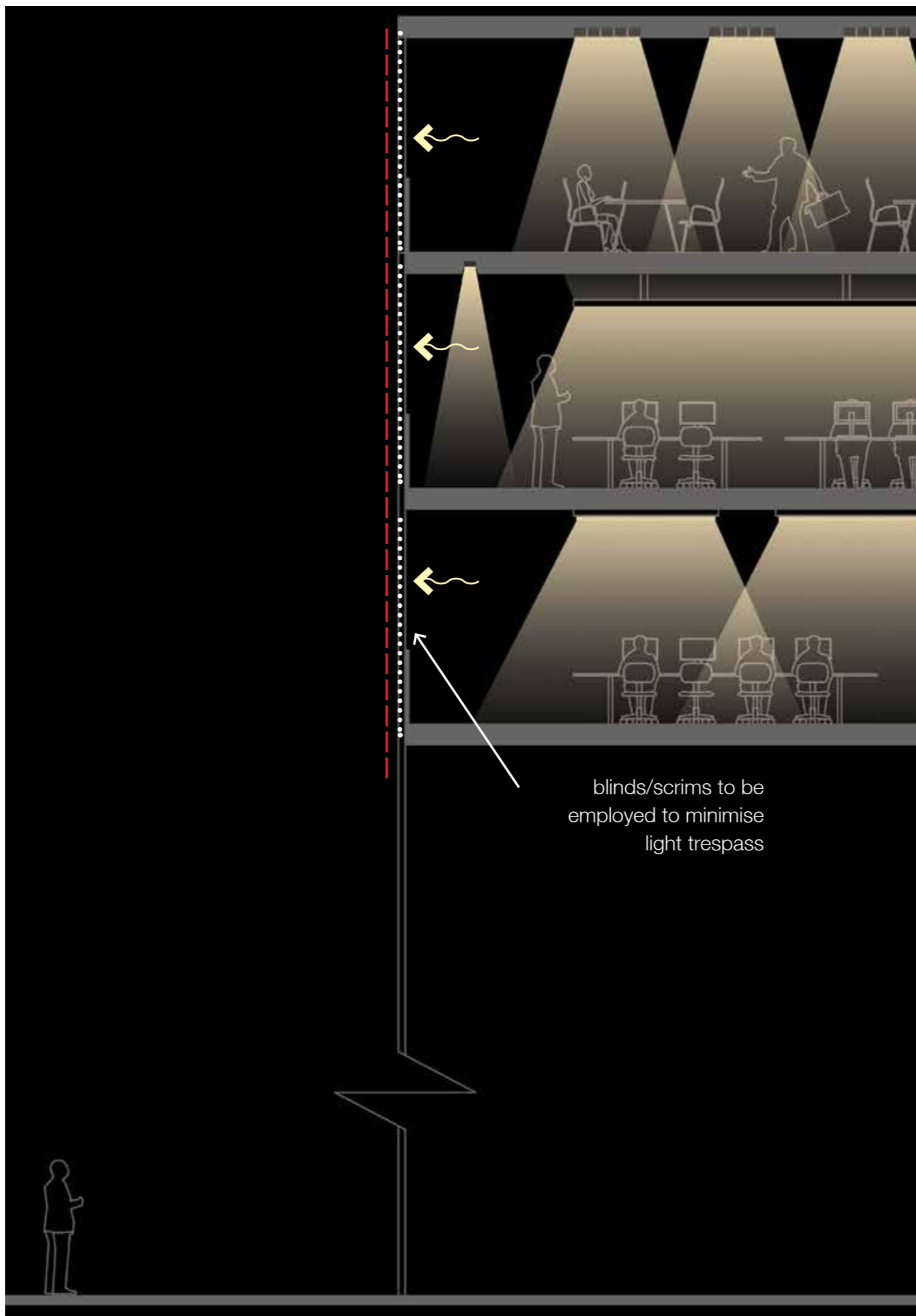
The future waterfront spaces and routes should be illuminated to encourage their use. However, they should be illuminated in a very muted manner so as to protect the natural darkness of the waterway and its ecology as well as to promote views into and out of the city.

The River Avon is important for Bath's biodiversity. 'Ecological light pollution' is a term coined by Travis Longcore and Catherine Rich in 2004 to describe light that is chronically or periodically increased, unexpectedly changed or that causes direct glare. All of these can have detrimental effects on biodiversity by impacting upon critical animal behaviours such as migration, orientation, foraging, reproduction and communication.

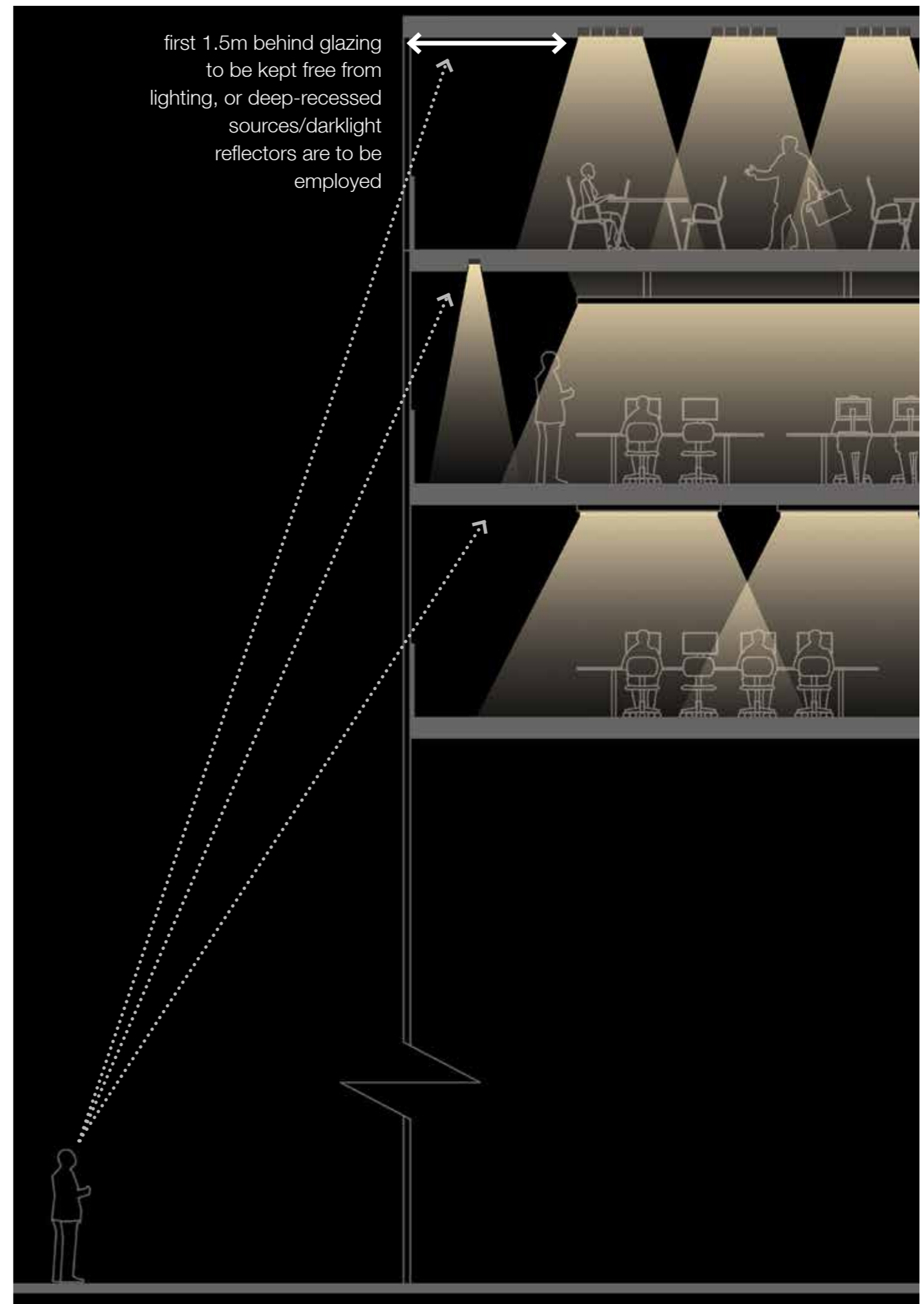
Plant life can also be adversely affected by artificial light. Plants measure and react to patterns of light and darkness (day and night) as well as seasonal alterations and therefore can have their natural rhythms of flowering and dormancy disrupted by artificial light. This not only impacts upon the life of the plant, but can also have detrimental knock-on effects on animals that use the plants for feeding or nesting. The effects of artificial light on different species are still relatively unexplored and the sensitivity to artificial light varies from species to species and from wavelength to wavelength. Indeed, some species react to wavelengths of light that are not visible to humans.

Before implementing new lighting projects along the riverside where rare and protected species are known to exist, research should be undertaken to establish whether the intensity of artificial light or certain wavelengths of light should be tightly controlled generally or at specific times of the evening/year to help protect specific species. It should be noted that sky glow can not only affect local biodiversity but can also disrupt distant ecosystems.

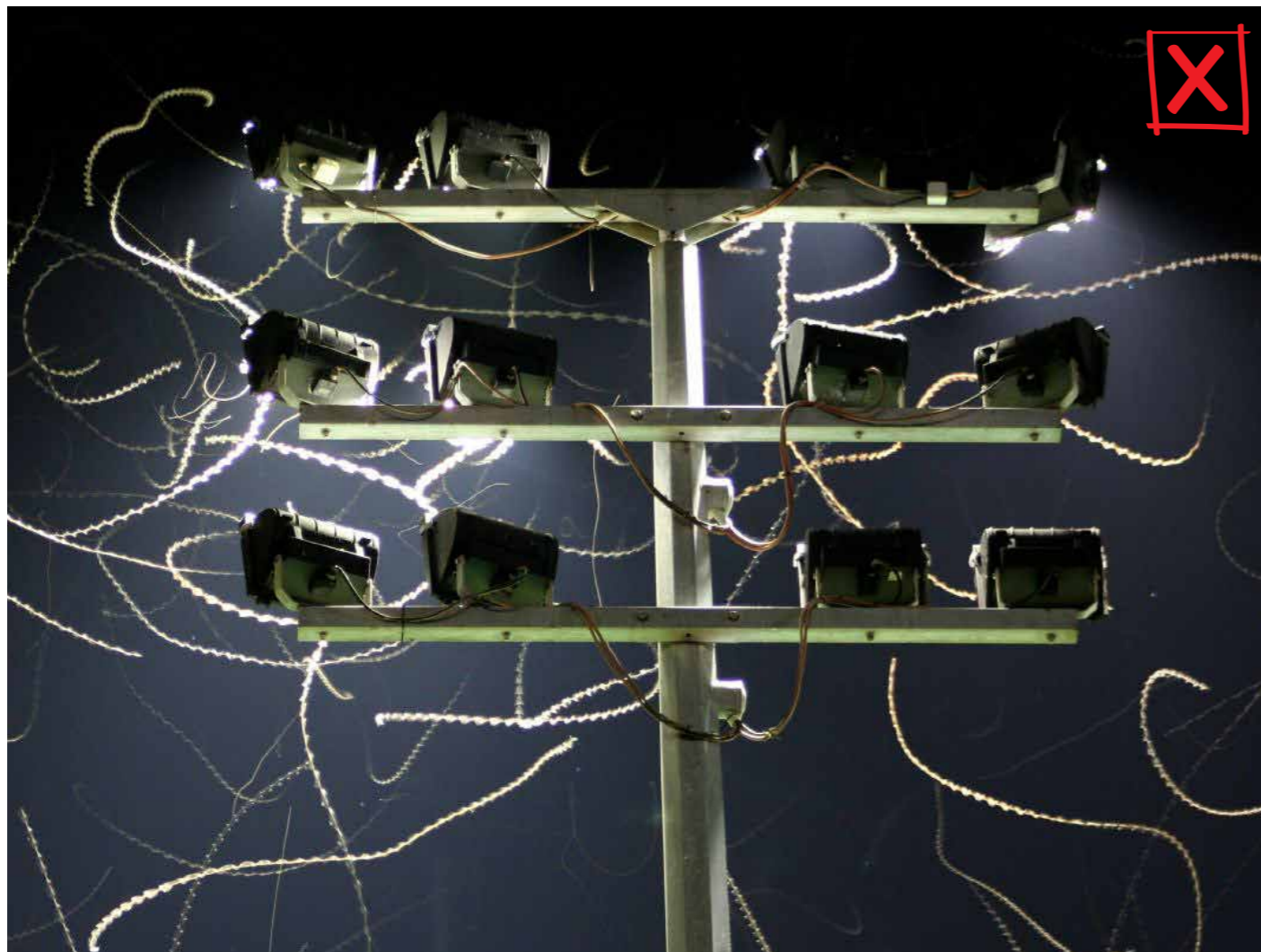
1. Lit trees and reflections
2. Low level lighting and reflections
3. Lit bridges and reflections



Limiting light spill from buildings



Reducing luminosity and glare from interior luminaires visible externally



Rare bats are known to use the River Avon as a foraging route and the bridge undersides for nesting. All British bats are included on Schedule 5 of the 1981 Wildlife and Countryside Act as well as on Schedule 2 of the Conservation (Natural Habitats) Regulations 1994.

Research by bat biologists suggests that vision is very important for bat navigation and feeding. Certain species of bats are generally very sensitive to light and artificial lighting can potentially cause a number of problems for bats:

1. Light falling on a roost access point can delay bats from emerging, which shortens the amount of time available for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed.
2. Many night flying species of insect are attracted to artificial lighting, and with many species of bats being sensitive to light, it makes feeding difficult for some bats. It also means that the number of insects in adjacent darker areas is reduced.
3. Artificial lighting is thought to increase the chance of bats being preyed upon by avian predators such as kestrels.
4. Artificial lighting disrupts the normal 24 hour pattern of light and dark which is likely to have an impact on the natural behaviour of bats.

Source:

'Bats and Lighting in the UK: Bats and the Built Environment Series' (2008) by Bat Conservation Trust

'Bats and Lighting' (2006) by Alson Fure, The London Naturalist No.85

Various studies by bat biologists suggest that bats are particularly sensitive to UV and the shorter wavelengths of the visible spectrum (i.e. towards blue light), and that they are generally more tolerant towards longer wavelengths (i.e. red light).

The street and route lighting principles of the city's lighting strategy encourage:

- light intensities to be minimised
- dimmable sources to be employed where possible
- light sources with low blue and low UV content to be employed.

These principles will all help to minimise negative impacts on bats whilst enhancing the historic character of the city centre.

Furthermore, the following principles should be adhered to along the riverside:

- mounting heights to be minimised.
- light spill into the river to be minimised as far as possible through careful specification of optics and light shielding/shaping accessories.
- lighting control (dimming) to be employed to allow light levels to be reduced at specific times when bat activity is at its peak.
- The river wall, balustrades and planting should be considered as methods of shielding light spill into the river.

Lighting to interior spaces overlooking the river will also require careful control to minimise undesired light spill towards the river. The following consideration should be taken into account:

- Tight optical control is required for luminaires mounted at the perimeter of interior spaces beside windows that overlook the river to reduce their visibility from the river and reduce light spill through the windows towards the river.
- Separate dimming circuits should be considered for interior lighting that is visible from the riverfront to enable it to be dimmed separately during particular times.
- The luminance of interior finishes visible from the river should also be considered to ensure that interior spaces do not appear overly bright from the river.
- Window blinds should be employed on windows facing the river to help minimise light spill and visual brightness of interior spaces.



10.0 Hidden City

- Warm water conduits
- Cold water natural springhead
- Cold water conduits





Water has always played an important role in the history of Bath but remains curiously inconspicuous in the streetscape. The opportunity exists to use light to reveal an additional layer of the history of the city centre after dark. Light could be used to reveal the historic locations where hot and cold water was brought into the public realm and created a focus for social activity.



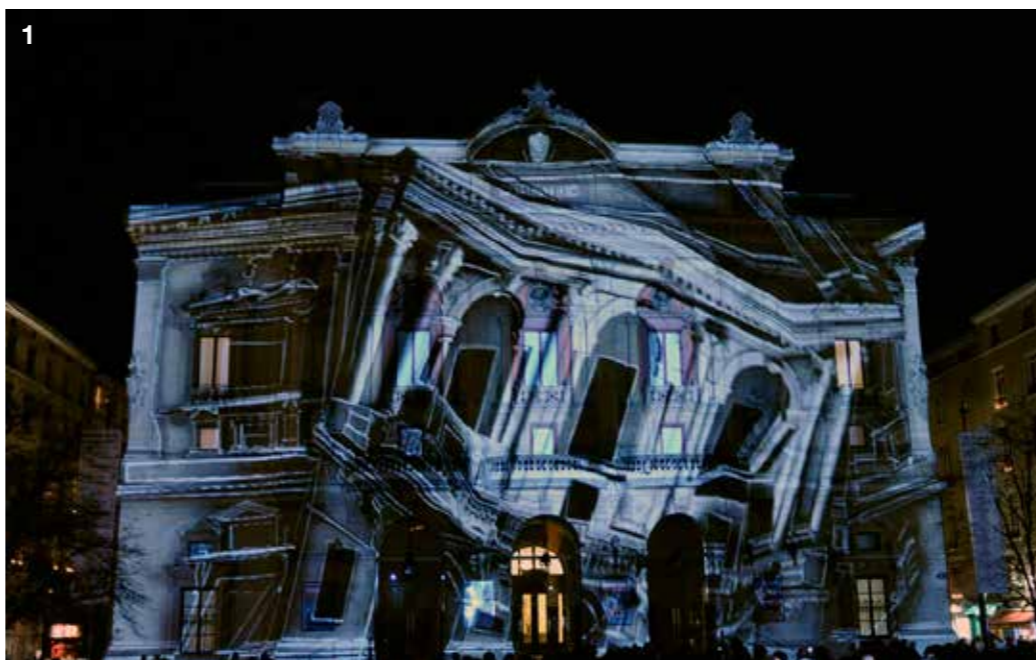
1. Lighting details in paving
2. Lit water feature
3. Passive lighting details in paving
4. Interaction and education





Artistic interventions and events using the medium of light can make valuable contributions to the city after dark - acting as attractors, enriching the experience of the public realm and presenting additional layers of meaning and interpretation of the city and its history.

As part of the design of new lighting schemes for public open spaces, an infrastructure for events lighting should be considered. This may include the introduction of power supplies, data points and luminaire mounting locations. Where possible, infrastructure for events should be concealed from view as far as possible and integrated with existing structures to minimise clutter. In some cases, especially in spaces with infrequent events, a temporary infrastructure may be more appropriate.



1. Projection onto architecture
2. Projection onto streets
3. Christmas lighting
4. Light art festivals
5. Traditional light sources

12.0 City Buildings



1. Bath Abbey
2. St. Micheal's Church
3. St. John the Evangalist Church
4. Assembly Rooms
5. Theatre Royal
6. Pulteney Bridge
7. Bath Spa
8. Roman Baths
9. Bath Spa Railway Station
10. Guildhall
11. Green Park Station
12. St. Swithin's Church
13. The Holburne Museum



Landmarks

Selected historic buildings are recommended for illumination to aid orientation and provide a striking image of the city after dark.

Two tiers of landmarks are defined: primary landmarks, which should be illuminated at street and at high level and secondary landmarks, which should be the subject of more modest lighting schemes – e.g. just to entrances or selected details.

In all cases, the aim should not be to floodlight the building in its entirety, but to create a good balance of lit and unlit/ silhouetted elements to create a sense of form and depth. The colour of light should be selected to compliment the natural colours of the architectural materials and lighting equipment should be concealed from view as far as possible.


Residential Buildings


Although many residential buildings are important features of Bath's heritage (e.g. The Crescent and Circle) they will not be the subjects of architectural illumination to maintain their residential character and to protect the privacy and well-being of residents. Definition may be given to the residential set pieces through a unified approach to the lighting of the foreground - e.g. through overthrows - but floodlighting and feature lighting to residential facades (including hotel facades) must be avoided.

1. Lit and silhouetted surfaces
2. Warm light to stone
3. Modelling and depth
4. Unlit residential facade

13.0 Evening + Night-time Economies



 Current extent of evening & night-time economy

 Aspired extension of evening & night-time economy



The night-time economy of the UK is worth approximately £66bn (2009 statistics) but Bath's is currently rather small largely due to the lack of retail, leisure and entertainment facilities staying open beyond 6pm. Whilst the aspiration may not be for Bath to become a major 24-hour city there is certainly a lot of scope to extend its economic activity into the evening not only to boost the city's economy but to provide greater amenity for those using it at night either through choice or necessity (e.g. evening and night workers).

Good lighting can greatly help to make the city accessible during the hours of darkness and help to encourage people to use its facilities and visit its attractions after nightfall. Good lighting will assist in making the city attractive and accessible not only to young and able-bodied people but also to the elderly and those with disabilities.



14.0 Composite Strategy



