5.12 ~ Design & Specification of Luminaires and Equipment...

This section provides guidance and technical information to enable design work to be undertaken in line with the lighting strategy. In the winter months many people will spend in excess of two thirds of their waking hours under artificial light. It is therefore important that lighting in public spaces is of the highest possible quality. Cheshire West and Chester Council aims to set high standards of quality design within public realm lighting, encouraging developers and building owners / operators to share this aspiration and treat lighting as an important and integral part of the design process for projects within the city.

Only the highest quality lighting design will be acceptable within Chester. The guidance provided in this section will enable designers to apply best practice and ensure that an integrated approach to sustainable public realm design is attained.

Standards & References

All lighting within the public realm should be designed in accordance with the following standards and documents:

- BS5489:2003 Code of Practice for the Design of Road Lighting - This document includes requirements for lighting traffic routes, public and amenity spaces and residential streets and parks.
- Society of Light and Lighting SLL LG6: The Outdoor Environment
- Institute of Lighting Engineers (ILE) Publication GP09 Lighting the Environment (1995)
- ILE Guidance Notes on the Reduction of Obtrusive Light
- ILE Technical Report TR5 - Brightness of Illuminated Advertisements (2001)
- English Heritage Guidance - 'External Lighting for Historic Buildings'

Additional information is available from:

- English Heritage – 'Streets for All' – London (2000)
- International Commission on Illumination CIE 136-2000 Guide to the Lighting of Urban Areas
- Royal Fine Arts Commission (RFAC), 1994, 'Lighten our Darkness' (lighting in urban environments)
- ILE Technical Report TR 29 - White Light
- ILE Technical Report TR22 - Managing a Vital Asset: Lighting Supports
- ILE Publication GP07 - Lighting and Crime (1999)
- Other ILE standards and publications as applicable.

Approvals and Consents

Technical Approval

The design, specification and proposed equipment of all lighting schemes will need the approval of Cheshire West and Chester Council Lighting Department.

Cheshire West and Chester Council will need to see evidence that designs have been undertaken in accordance with this guidance document.

Lighting Classes & Lighting Levels

- BS 5489 offers guidance on the selection of lighting classes (the applicable standard of lighting to be applied to a specific road or area - light levels and uniformity), however the final decision as to which class is to be applied is the responsibility of Cheshire West and Chester Council. Designers must gain agreement from Cheshire West and Chester Council as to which class is applicable prior to undertaking their design.

- Design Calculations and design data is to be submitted to Cheshire West and Chester Council for approval prior to installation.

- The BS allows for a reduction in lighting class and subsequent reduction in light levels when white light is used. This is to allow for the improvement in the perception of safety under white light and consequent potential energy savings. Although the academic research showing the improvement in the perception of public safety is unchallenged, there is much anecdotal evidence that when this reduction is applied the perception of light levels is negative and spaces can appear gloomy and under lit.

White lighting scheme at Chevasse Park, Liverpool

This reduction must therefore not be applied as a matter of course and the wider implications that reducing the lighting class may have on the public realm must be considered. It is often not appropriate to reduce levels in public spaces where an overriding requirement to create a vibrant and dynamic atmosphere may take precedence. Other areas such as residential streets may also not benefit from this reduction in lighting class and in principle it should only be applied with the express agreement of Cheshire West and Chester Council who will consider each scheme on its own merits..

- The BS allows for some leeway with regard to the design of lighting in public spaces. Similarly, this design guidance is not prescriptive and should be applied in a flexible way to promote creativity. In particular, contrast must be considered very carefully. Uniformity demonstrates a level of lighting quality, however very uniform schemes can take the drama and excitement out of public spaces. This can be reintroduced through the use of building or feature lighting and careful control of varying light levels across a space can also provide visual interest.

- Care must be taken when relighting existing spaces as an over lit scheme in the context of the lighting of surrounding spaces and streets can have a negative impact. A bright new scheme can work well on its own but if the transitions into those spaces around are not considered, adjacent areas previously well lit can appear under lit and gloomy.

- The use of high contrast can be disabling to blind and partially sighted people and care must be taken to avoid this situation arising.

Archaeology

Beneath the streets of Chester are some of the most important archaeological remains in the country, consisting of earlier road surfaces (including the Roman street network), historic drains/sewers, building foundations, pits and artefacts. The whole city centre is designated as a statutory Area of Archaeological Importance under the 1979 Ancient Monuments and Archaeological Areas Act.

Any works involving ground disturbance, including resurfacing, installation of street furniture, planting, landscaping, services and ducting may affect archaeological remains. At an early stage in the planning for any such works please contact the City Archaeologist to discuss the implications. A location plan and an indication of the extent and depth of works will enable more focussed advice to be given.

In cases where archaeology might be affected, a mitigation programme will need to be agreed. This may entail the modification of the proposals or, where appropriate, archaeological investigation before or during the works. As any investigation may require an archaeological contractor to be commissioned, project managers should ensure that adequate provision and contingency has been made in their budget and programme. The City Archaeologist will assist the project manager in commissioning any works and will advise on all procedures and processes.

An example of archaeological discoveries made during street works include a substantial stone-lined Roman sewer containing an intact Roman pot found during the resurfacing of Watergate Street. Also, at least two major hoards of nationally important Saxon coins have been found during the excavation of service trenches.

Planning and Conservation

As well as unique archaeology Chester has a great number of historic buildings and monuments. Listed building consent will be required for any work on listed buildings or scheduled monuments.

As Chester city centre is in a conservation area, new lighting schemes may require a planning application and the local planning officer should be consulted for clarification. New schemes may also require building control approval.

Scheduled Monument Consent would be required for work on scheduled monuments.

Sustainability and the Environment

A statement on sustainability has been included in the Lighting Strategy section. This requires information to be submitted to Cheshire West and Chester Council as part of the technical approval / planning process.

Disability Discrimination Act (DDA)

In some circumstances poor lighting can make a partially sighted person effectively blind. Peripheral glare and high contrast can have a severe disabling effect for those with certain visual impairments. Good lighting can help not just those with visual impairments but also those with hearing impairments who may need to lip read.

All designers should review their schemes to ensure compliance with the DDA. Particular consideration should be given to the following:

- Control of glare from all luminaires but in particular in ground fittings. All luminaires mounted in locations where they may cause direct or significant peripheral glare should be fitted with louvres or cowls.
- Stairs and access ramps should be lit in accordance with best practice, providing high levels of illumination at the top and bottom and good contrast between treads and risers.
- Good vertical illumination to light faces.
- Minimisation of street clutter to ensure access without obstacles impeding routes.
- High frequency electronic gear to minimise flickering

Events, Public Art and Festive Lighting

All new schemes should consider the opportunities available to integrate illuminated public art and the potential to provide infrastructure for temporary art installations, events or festive lighting.

Where appropriate, new schemes should include the infrastructure required for the installation of festive lighting. The renewal or upgrade of existing schemes that have these facilities must ensure they are retained in new designs. Cheshire West and Chester Council should be consulted to ensure appropriate facilities for the provision of power and the hanging of decorations is provided. The installation of any such facility should be compact and discreet to minimise visual impact when not in use.

Illuminated Signage

Within the core retail area illuminated signage provides a dynamic and colourful nightscape to what is predominantly a commercial environment. However, it is essential that illuminated signage is not allowed to take precedence over the aesthetic quality of the city's architecture and therefore approval will be required by the Conservation Officer for inclusion of illuminated signage.

It is important that light levels are controlled to ensure that any signage lighting is subtle and is not excessively bright. The control of levels should be determined by the context of the signage on the basis of contrast with the ambient lighting in the vicinity of the sign and the proximity of other signs. ILE Technical Report 'TR5 - Brightness of Illuminated Advertisements' should be referred to and applied.

Management and Responsibilities

It is important to ensure public investment is protected and that the aspiration for a coordinated approach to lighting in Chester city centre, as set out in this strategy, is fulfilled. In order to achieve this, a strategy for the management of lighting of both public and private areas needs to be prepared and implemented.

Exchange Flags, Liverpool. Lighting of civic buildings and monuments can contribute to our civic pride and aid engagement with history as well as enjoyment of our public spaces.

Lamps, Luminaires and Equipment

Lamps, Sources, Control Gear and Controls

Typical lamp data comparison:

Lamp Type	Colour Temperature	Efficacy	Colour Rendering	Service Life 80%	Notes
SON	2000K	68 – 120 lm / W	CRI > 20	20,000 Hrs	High pressure sodium for traffic routes
SON Comfort	2150K	83 -93 lm / W	CRI > 60	10,000 Hrs	High colour rendering version of the SON – note low efficacy and lamp life. Also limited wattages available.
Cosmopolis white	2700K	120 lm / W	CRI > 65	12,000 Hrs	Favoured for white light street lighting
Ceramic Metal Halide	3000K 4200K	90 lm / W	CRI > 90	9,000 Hrs	High quality white light source for highest quality public areas and feature lighting schemes.
Fluorescent T5	2700K 3000K 3500K 4000K 6500K	96 – 104 lm / W	CRI > 80	24,000 Hrs	Typical figures for T5 tubes. A wide range of compact fluorescent are available with differing specifications. Long life and low temperature versions available e.g. Aura Light. Generally suitable for feature lighting.

LED Lamps

A range of products are available with varying colour temperature, efficacy and service life. Care should be taken in selecting the correct product suitable for the individual application. Colour temperatures range from about 3100K up to 6000K, with efficacy at about 80 lm / w for the most efficient products. Life is quoted at about 50,000hrs although the drivers are generally rated at no more than 20,000Hrs.

LEDs can be problematic and further advice is provided in the strategy section.

The following lamps should not be used for the reasons stated:

- HPI – Standard metal halide - Poor colour consistency, can have green cast
- SOX – Low pressure sodium – Monochromatic very poor colour rendering
- White SON – Low efficacy, poor service life
- Halogen / Incandescent – Low efficacy, very low service life

Control Gear
The most efficient control gear should be used, for example, high frequency electronic gear for fluorescent lamps and electronic gear for discharge sources.

Controls
All schemes should consider the potential for timed systems to reduce loads at times of low usage to minimise energy use. This must be balanced with the need to provide a safe environment which must be maintained at all times.

All architectural schemes must incorporate controls to facilitate the switching off of the scheme at a predetermined time, so it cannot run all night. A photocell or solar time switch must be provided to ensure day time running is also not possible.

Smart meters must be fitted to all new supplies in line with Cheshire West and Chester Council's policy on sustainability. Feature lighting associated with public spaces cannot normally be connected to the unmetered street lighting supply and therefore separate supplies and meters will be required. Cheshire West and Chester Council's lighting engineers can advise on specific technical requirements.

Designers should consult Cheshire West and Chester Council regarding the possible requirement to provide monitoring on all public schemes. This is not a requirement at the time this document was written, but may potentially be introduced in the future.

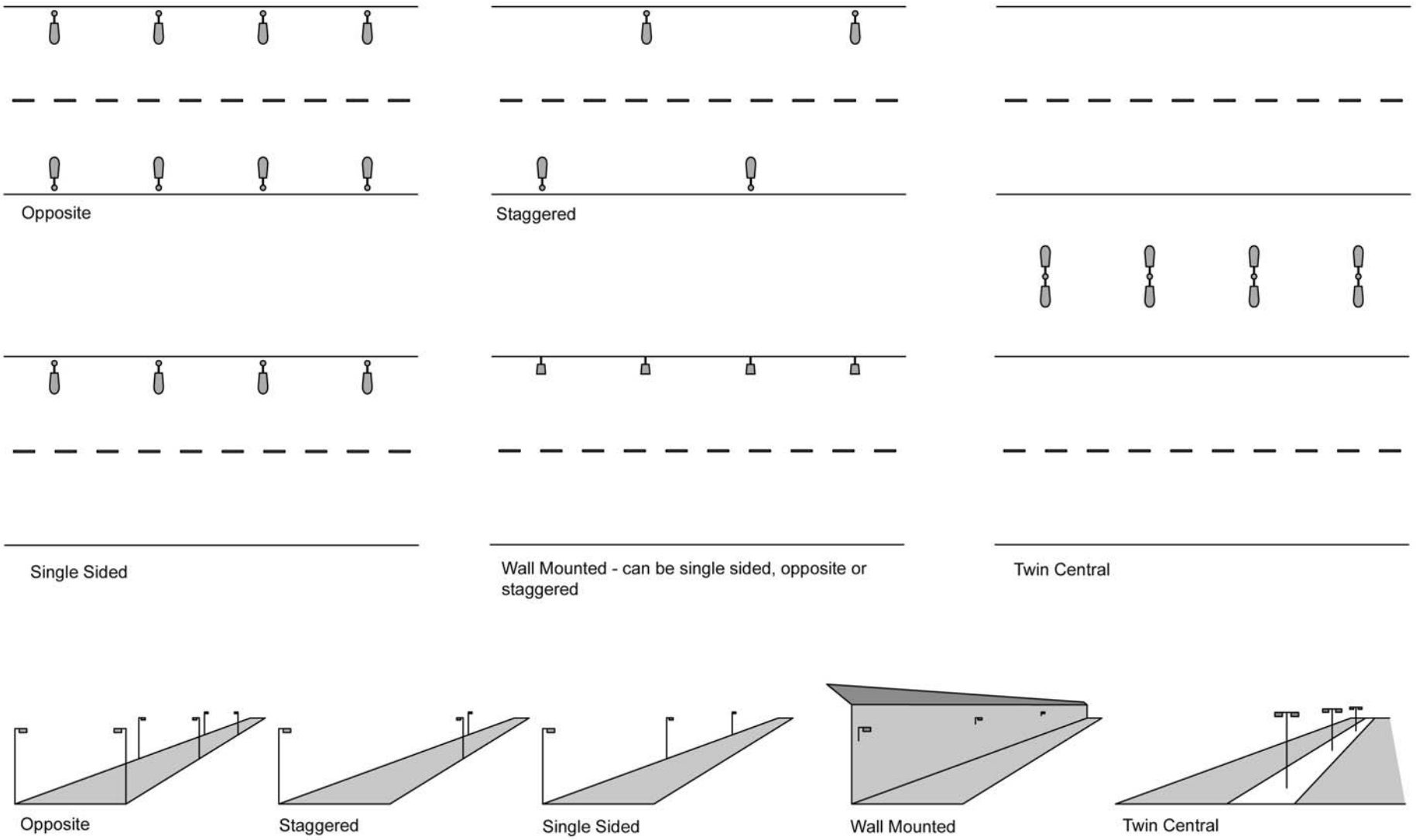
Street Lighting

Street Lighting Positions
Columns installed on pavements should be located towards the back of the pavement to reduce street clutter. However in some instances this may cause practical issues with the operation of an adjacent building or be incongruous with the architecture or view of the building. Each location must be considered independently to ensure the right approach is taken and that the position is coordinated with other elements of public realm design.

The method of locating columns must also be consistent to ensure that when installed in a row, columns do not 'snake' inappropriately. In some instances there may be technical reasons for locating columns on the road side of a pavement, for example to get suitable coverage on the road or in the case of a wide pavement to enable an additional luminaire to be mounted off the rear of the column for lighting of the pavement. Where columns are mounted on the road side of the pavement they must be located to ensure safe movement of pushchairs and wheelchairs around them. Figure 5.5 overleaf shows a series of typical street lighting layouts.

Street lighting positions, George Street, St Helens

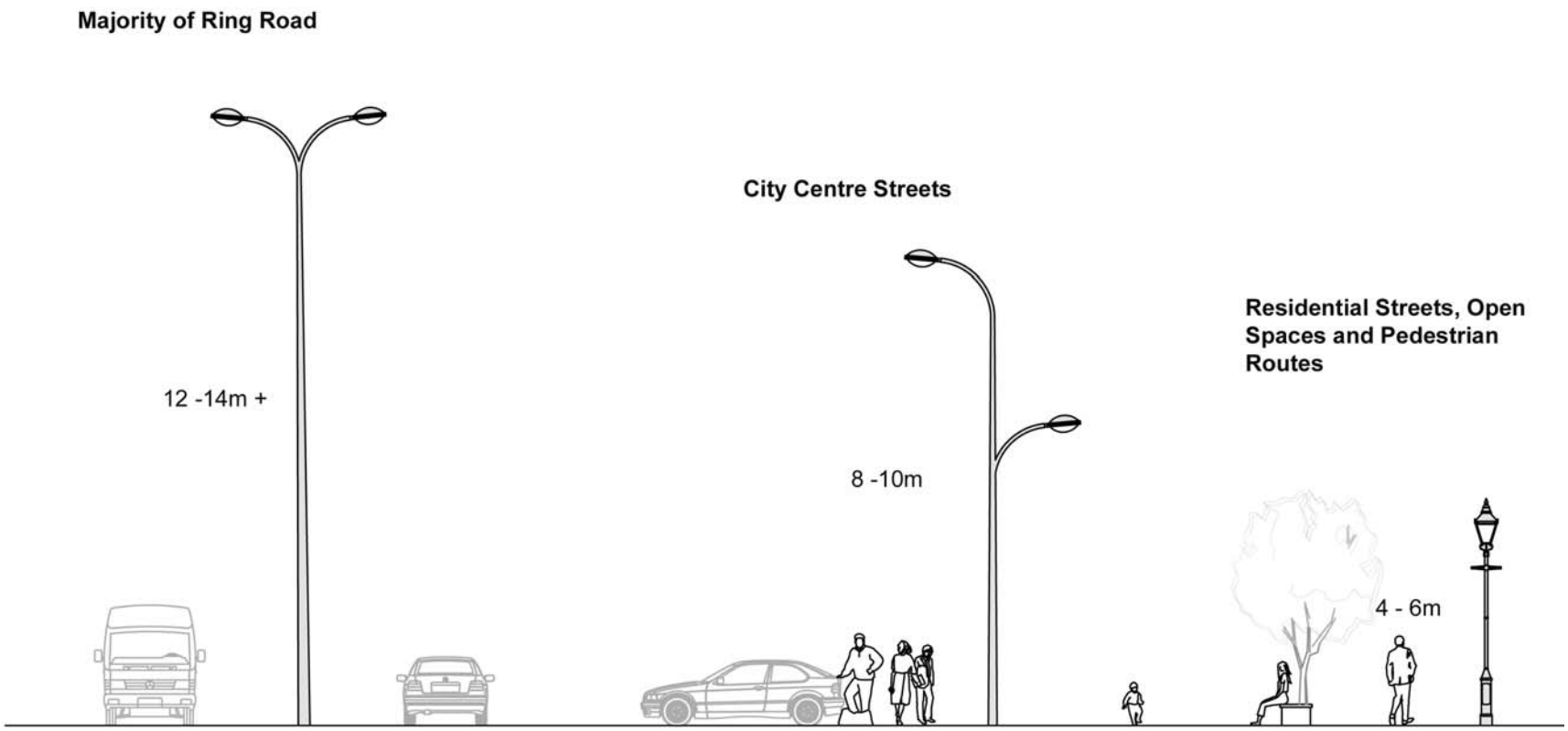
Figure 5.5 – Guidance on Street Lighting Layout Arrangements



Mounting Heights

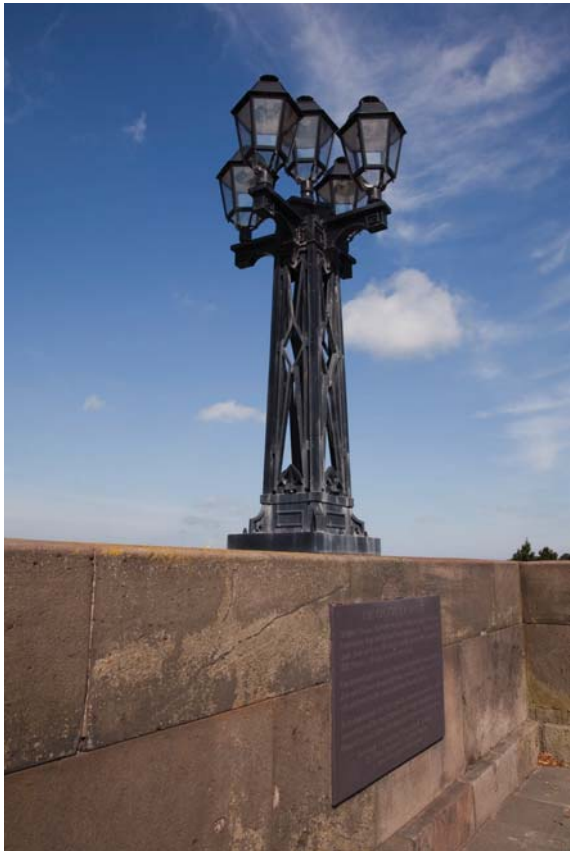
Figure 5.6 shows indicative street lighting mounting heights that should be employed in the city centre.

Figure 5.6 – Guidance on Street Light Mounting Heights



Typical Street Lighting Luminaires

A style and preferred mounting arrangement for street lighting luminaires is identified in this section for individual areas within the city centre. This is intended to ensure consistency in visual design and quality throughout the city centre. Some areas may need to vary for technical reasons and others, such as the public spaces for creative ones. However, as a general principle the following zones have been identified within which specific types of luminaries and columns should be used.



Traditional lantern on Grosvenor Bridge

Street Lighting Zones

The city has been divided into two zones:

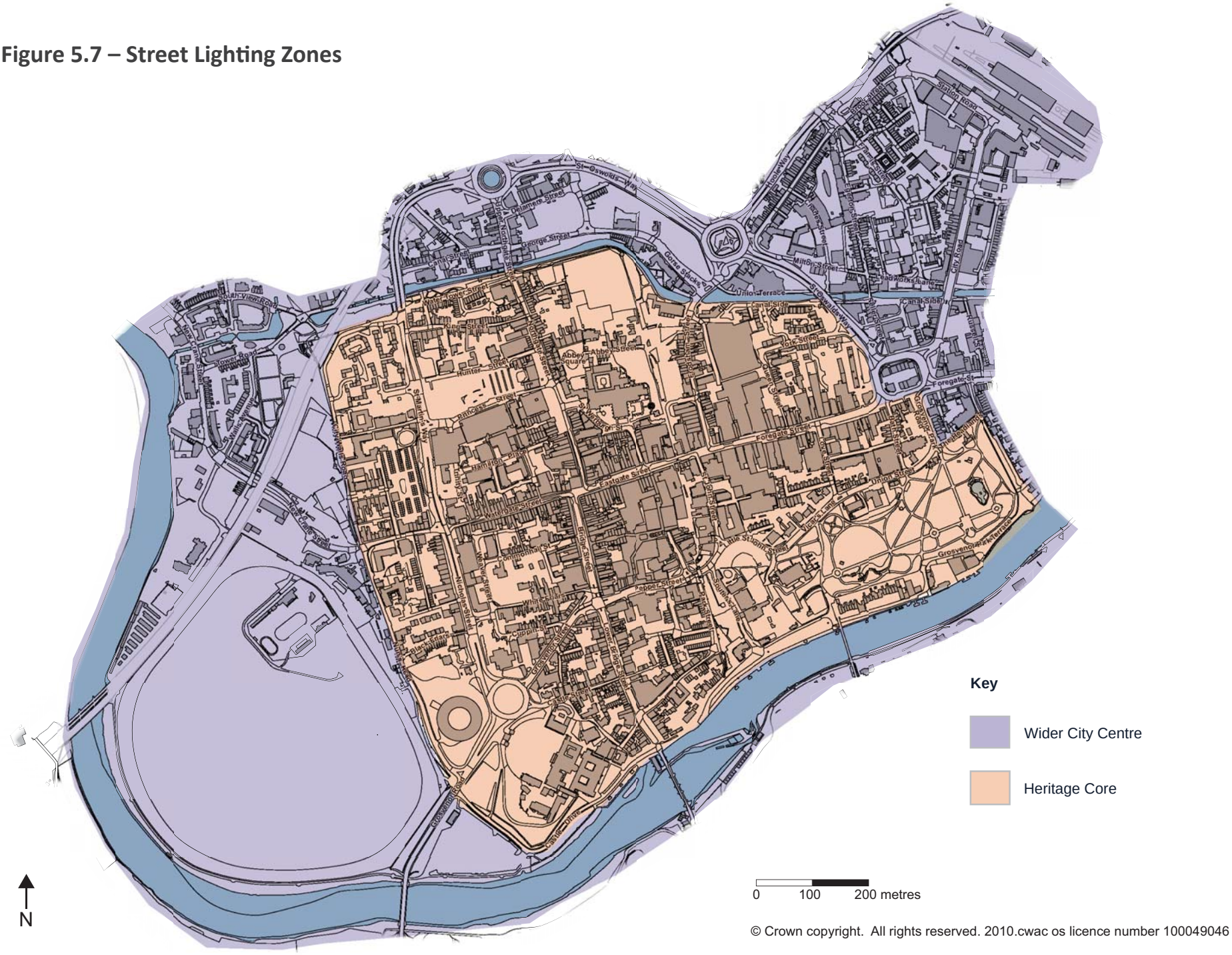
- The inner city centre heritage core which is the area within the city walls and adjacent streets and areas.
- The wider areas outside of the heritage core - in particular to the north of the city including the railway station.

The following Figure 5.7 identifies these zones.

The boundaries between these zones are not hard and fast and an individual approach will be needed to assess each project. For example, St Martin's Way crosses between zones and so a consistent approach may need to be determined for this route.

General guidance is provided within this section on the choice of luminaires and equipment. Details of Specific Cheshire West and Chester standard specifications are provided at the end of this section.

Figure 5.7 – Street Lighting Zones



Zone 1 Heritage Core

Primary Pedestrian Priority Streets within Heritage Core

The primary pedestrian friendly streets within the heritage core of the city should preferably use wall mounted heritage lanterns in line with the current arrangements (as shown in the photograph below).

Existing wall mounted heritage lantern

Traffic Routes within the Walled City

Traffic routes within the walled city should use column mounted heritage lanterns, again in line with current arrangements. These should also be used where there are practical concerns that preclude the use of wall mounted equipment, or the buildings are architecturally unsuitable for this type of lantern.

General Guidance

- On heritage columns the embellishments and scroll work should match the existing columns, including the existing heritage column brackets. Scroll work in particular should match existing cast fabrications.
- Bent flat steel designs should not be used. Columns should be galvanised, stainless steel or cast as appropriate.
- Column doors, earthing and cut outs will be to a standard, as advised by Cheshire West and Chester Council.

The Chester column by DW Windsor (Column mounted heritage lantern)

- Heritage columns and brackets should be finished in black powder coat or similar finish to the satisfaction of Cheshire West and Chester Council.

- Where existing columns are to be reused or retained they should be inspected and if necessary tested for structural integrity by a competent person, in line with the requirements of ILE Technical Report TR22, to the satisfaction of Cheshire West and Chester Council.

Outer Areas within Walled City

The outer areas within the walled city consist of a range of differing uses and styles, including residential streets with Georgian and Victorian buildings, through to commercial businesses and council offices occupying 70's office buildings.

The residential streets are currently lit using heritage lanterns, either wall mounted or on columns. Again this is an approach that works and should be continued. It is very important that the quality of manufacture is maintained as these are mounted at heights where they can easily be scrutinised and where the difference between a well made reproduction and a cheaper product will be visible.

It is not necessarily desirable to use road lighting optics in these lanterns. However, if the lamp is exposed as shown below then it is important that a glare control is used, for example a diffuser around the lamp or lightly shot blasted glass on the lantern.

Examples of existing wall and post mounted heritage lanterns

It would also be appropriate to use this style of lantern in some of the public spaces, although a road lighting optic may be appropriate in these instances to ensure good distribution without having to use too many columns.

Heritage lanterns are available from a number of suppliers, such as DW Windsor or Metcraft. Lanterns should be lacquered if copper and powder coated if steel using a finish to the satisfaction of Cheshire West and Chester Council.

The Grosvenor lantern from Sugg

Contemporary Streets and Spaces

It would not be appropriate to use heritage lanterns in the more contemporary streets and spaces. These are currently lit with a range of different equipment with ages spanning several decades. It would be good to standardise equipment and use a more modern design of lantern and column. A simple road lantern but one which is discreet yet elegant should be used (see We-ef examples below).

Two examples of contemporary styled lanterns from We-ef lighting

General Guidance

- Flat glass should be used to minimise visual impact of the luminaire at night, glare and light pollution / trespass.
- Colour of both lantern and column should be metallic grey / aluminium RAL 9007 or similar. These colours tend to have less visual impact by day, blending with the colours of buildings and the sky making the lighting installation less obtrusive.
- Columns should be tubular galvanised steel or stainless steel and conform to BSEN 40 or BD26/04. Powder coated or similar finish to the satisfaction of Cheshire West and Chester Council. See paint specification at the end of this section.
- Lighting columns 6m or lower (unless reproduction heritage) should be stainless steel
- Columns above this can be galvanised or stainless steel but must be approved by Cheshire West and Chester Council.
- Column doors, earthing and cut outs will be to a standard as advised by Cheshire West and Chester Council.
- Where existing columns are to be reused or retained they should be inspected and if necessary tested for structural integrity (in line with the requirements of ILE Technical Report TR22) by a competent person to the satisfaction of Cheshire West and Chester Council.

Zone 2 – The Wider City Centre

Most of the streets in the wider city areas of the city centre consist mainly of contemporary buildings. The use of heritage lanterns and columns is not appropriate in these areas. A mixture of contemporary styled lanterns along with more standard road lighting equipment is proposed for this area.

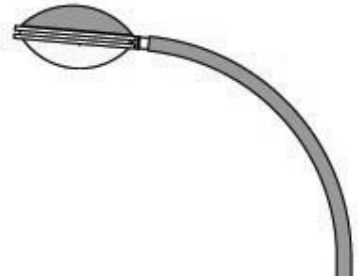
Traffic Routes

On traffic routes such as City Road, Brook Street and the ring road road lanterns with a simple clean design are suggested (see product examples below).

Urbis Sapphire for use on traffic routes

WRTL Arc for use on traffic routes

As City Road and Brook Street are important routes into the city from the station and the aspiration is that the public realm along these routes should be improved, a more architectural approach in the visual design could be taken. Either the Aquila Design Miera shown below on a simple sweeping bracket or either of the two WE-EF luminaires previously shown (on page 212) would be suitable. Flat glass versions would be preferred.



Aquila Design Miera for use on railway station approaches

Residential Streets

The same approach can be taken here as in the outer areas of the heritage core, but using contemporary style lanterns. In the vicinity of the station, residential streets have been lit using lanterns similar to the DW Windsor luminaire shown below. The extended use of this style of lantern would also be acceptable.

The advice on column selection remains the same as in previous paragraphs for the heritage core.

DW Windsor luminaire for use on residential streets

LED Road Lighting

LED offers advantages in terms of reduced power consumption, control capabilities and longevity. The increased capital cost can be offset by reductions in maintenance costs.

Road lighting luminaires are starting to become available that make LED a practical option. Although they are not yet able to provide a satisfactory solution for all but low level applications, it is very likely that LED will become the light source of choice during the lifetime of this document.

As a new technology, LEDs should be treated carefully as at present reliability is still unproven.

General Guidance

When selecting LED luminaires particular consideration needs to be taken regarding the following:

- Colour spectrum, which is different to conventional light sources
- Colour consistency between luminaries
- Glare, which can be intense in less well designed luminaires and maintainability. Some luminaires are designed for field repairs and others are not.
- The design of LED luminaires must exhibit good heat management as over heating has been shown to be a major cause of premature failure in LEDs.

Two LED road lighting luminaires that are currently available and perform reasonably well in terms of both output and glare are shown below.

The WE-EF RLF 500 Series – Excellent glare control, modular design for maintainability and part of a family of luminaires that also take conventional sources.

The Canal Side

The canal side walk does not fit into either of the zones and needs an individual approach.

Due to the low levels of UV emitted by LED and the low light levels required in these areas, LED luminaires should be considered as a bat friendly option. The canal is an industrial site and although of historic context, lighting has never traditionally been provided on a canal tow path. The contemporary and slightly industrial looking design of the luminaires above would be appropriate in this context. The WE-EF luminaire would be most appropriate due to its superior glare control.

Cheshire West and Chester Standard Equipment as at April 2010

Reproduction Heritage Columns and Luminaires
In general standard lighting columns are used in Chester and are fitted with embellishment kits;

Columns - Tubular galvanised steel post with Metcraft Gainsborough embellishment kit (see below for paint specification). Black RAL 9005 or similar to match lantern.

Luminaires – Metcraft Deva Victoria – Black RAL 9005 or similar
Metcraft Wellington – Black RAL 9005 or similar

Contemporary Equipment
Columns – 5 – 6m Stainless steel columns including mid hinged raise and lower columns
8 – 12m Tubular galvanised steel columns (see below for paint specification).

Luminaires - Urbis Saphire – RAL 9007 or similar
WRTL Arc - RAL 9007 or similar

Lighting Column Paint Specification
i. Wash down new galvanising
ii. 1 coat amercoat 57, steel bond 2136
iii. 1 coat amercoat 57, 4130 - colour as above.

All columns will need to be approved by Cheshire West and Chester Council
Cheshire West and Chester Council will consider other equipment if appropriate to the scheme

Guidance on Feature lighting

Feature lighting can take several forms:

- Façade lighting or the selective lighting of architectural elements of a building

.

- Lighting of landscape features such as tree up lights or lighting integrated into street furniture.

Also included in this section are elements of public lighting, such as illuminated bollards and luminaires recessed into vertical surfaces. Sometimes these will be primary sources of light or sometimes they will be used purely for visual effect.

Buildings
Offset lighting:
In general, due to the nature of the buildings in Chester most façade lighting schemes are likely to require the luminaires to be mounted on the building itself. In order to keep installations discreet, luminaires should not protrude very far from the façade. This is known as close offset lighting

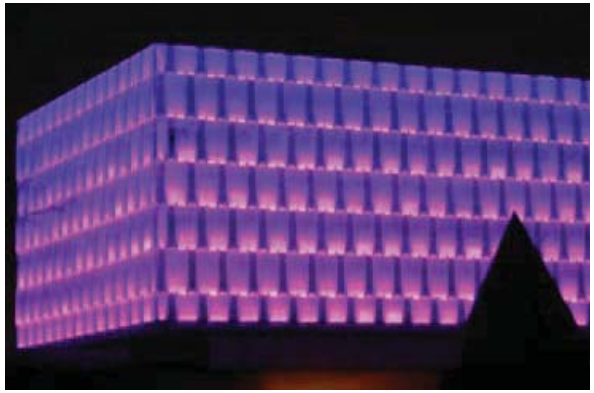
Close offset lighting

Floodlighting:
Some buildings sit in their own grounds where there is space to install luminaires set away from the building and in some instances luminaires may be mounted on adjacent or opposite buildings. This is known as floodlighting.

Floodlit building facade

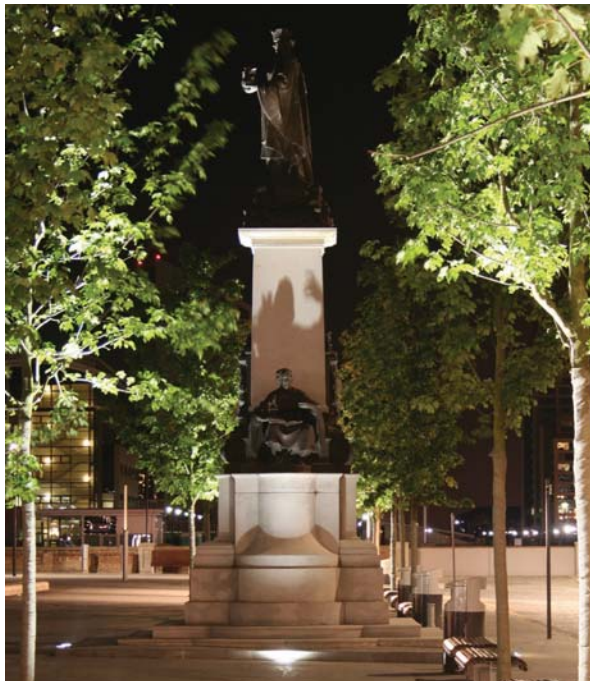
Other lighting techniques:
Another technique involves mounting luminaires within a building and illuminating windows or spaces within. As the examples below show, this could simply be a shop window or could be a more ambitious and dynamic design.

Examples of window illumination



Example of a dynamic lighting scheme

Landscape Features
The following photographs provide examples of lighting to landscape features.



Up-lighting of trees and monuments

Illuminated street furniture

Historic Buildings

Lighting to historic buildings requires a high degree of sensitivity both in terms of the lighting and in terms of the impact the installation has on the building, visually and physically.

Careful design can ensure good lighting by night and virtually no visual impact by day as shown by the examples below.

By day

By night

By day

By night

- Close offset lighting can be almost invisible if luminaires are discreet, concealed or painted to match the façade.

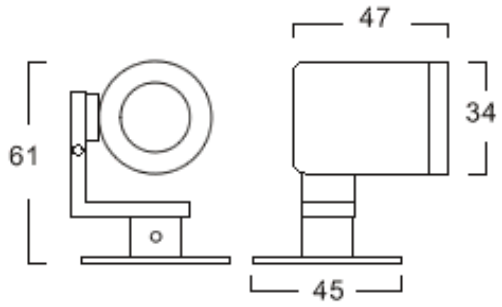
- The design of the installation must also ensure there is no permanent impact caused to the fabric of the building.

- Techniques such as fixing into mortar joints and the use of special brackets to avoid the need for fixings should be employed.

Examples of Suitable Luminaires

The following section provides examples of typical luminaires that can successfully employed on historic buildings or within the public realm.

LED Luminaires
LED luminaires can be very small and discreet.



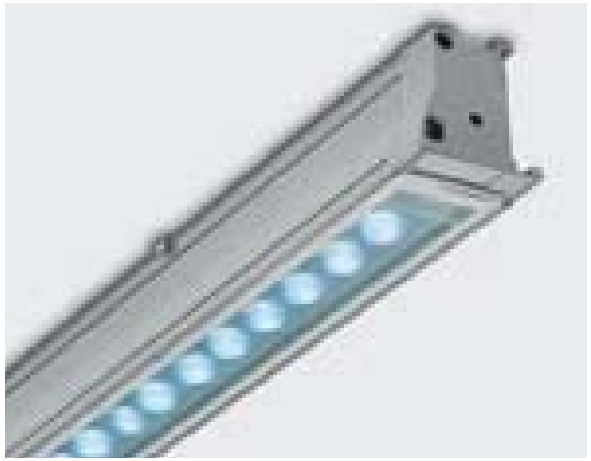
Compact LED by Mike Stoane Lighting

Metal Halide Spot and Floodlights
Metal Halide spots and floods can be compact and discreetly designed. Architectural ranges such as Meyer by Commercial Lighting come with glare control accessories which are essential.

Meyer Metal Halide Spots and Floods by Commercial Lighting

Specialist Luminaires
Specialist luminaires are available for specialist applications.

iGuzzini Radius



Linear LED - iGuzzini

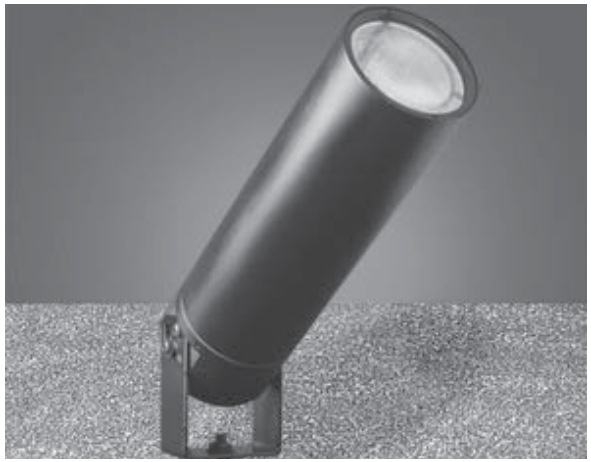
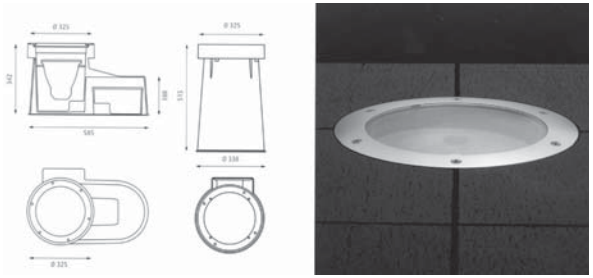


Image projector – Light Projects

In-ground Luminaires

- In-ground luminaires are especially vulnerable to vandalism or damage caused by poor installation or maintenance.
- Only the most robust luminaires should be used that provide the highest rating of protection against impact.
- If possible all separate components should be protected from water ingress if the top glass is broken.
- The Targetti Poulsen IPR range includes luminaires with separate IP rated lamp housings and gear boxes. It is also available with radial louvres to prevent glare and a radial anti slip glass which reduces trip hazard without altering the photometric performance of the luminaire.
- It is essential whatever luminaire is used that the contractor follows the installation instructions precisely to ensure problems are not experienced in the future.



Targetti Poulsen IPR range

- All luminaires should be fabricated to BS EN60598 – 1 – 2004.
- Only luminaires of an appropriate IP rating should be used depending on the application for which they are required.
- Typically IP65 for exterior luminaires and IP67 / 68 for anything mounted in the ground or where there is a danger of prolonged immersion in water.
- In general, it is not recommended that anti vandal luminaires are used in the public realm. The design of these fittings is such that they can actually provoke attack by their appearance and their performance is often compromised by their design. High quality sensible design is the best guard to protect against vandalism. Using unattractive luminaires penalises the majority for the actions of a small minority.

Lighting designers will design schemes using specific equipment chosen for its photometric performance, visual appearance and build quality. Contractors should not be able to substitute alternative equipment unless they can prove to the client that the equipment is equal or better in specification and this should be to the satisfaction of the lighting designer.

Lighting can be used to highlight architectural details that would otherwise be missed by many of us, and to add drama to our public spaces.