

Lighting The Outdoor Environment

Hertfordshire County Council

An information booklet on issues and good practice

22 September 2003

Notes:

1. This draft has each section of lighting on a separate page for reference purposes only. The final layout, size and booklet format will be assessed by desktop publishing experts.
2. Copyright checks required on some images / diagrams

Foreword

We need light to see and artificial lighting has become an essential part of modern life. It is provided to encourage a safe environment for a range of activities ranging from driving, cycling, walking and sporting activities. It is also used to enhance the environment by means of decorative and flood lighting of areas, features and buildings.

Whilst it is recognised that lighting needs to be provided the incorrect use of such light can become a problem, cause a nuisance and affect the environment by unwanted light intruding into properties or waste energy and therefore money. It can also have an impact on the wider environment, influencing the night sky, visual amenity and wildlife, and appropriate measures need to be taken where possible to limit the effects

The aim of every lighting installation is to ensure that sufficient light of appropriate colour characteristics coming from suitable directions falls on defined surface(s).

This booklet has been produced by the Hertfordshire County Council Lighting Topic Group as a guide to the various forms of external lighting covering techniques, installation methods and light control. It also gives guidance and contract details on what you can do should you be affected by 'poor' lighting installations.

How much light is required

The level of lighting depends upon the task to be undertaken to ensure that it can be performed safely. In general national bodies including British Standards, The Institution of Lighting Engineers (ILE) and The Chartered Institution of Building Services Engineers (CIBSE) prescribe average and minimum lighting levels.

It is also important not to over light, to control energy consumption and avoid light pollution / spill.

As a guide the following table gives examples of lighting levels:

Task undertaken	E_H (ave) Lux	E_H (min) Lux	Uniformity ratio
Residential estate access road with moderate night-time public use (road, verge & footpath).	6.0	2.5	-
CCTV coverage	20 to 25	10 to 15	-
Lawn tennis, recreational over court	180	-	0.5
5-a-side football	50	-	0.25
Car park in an urban area	30	10	-

E_H (ave) is the maintained average horizontal illuminance on the surface

E_H (min) is the maintained minimum horizontal illuminance on the surface

Uniformity ratio is the ratio of the minimum illuminance over a given area to the average illuminance

Light pollution

Light pollution is a term that describes the release of light that serves no useful purpose as it falls outside the required area this may affect your enjoyment of your property due to light through windows or reduce your view of the night sky.

- Sky glow

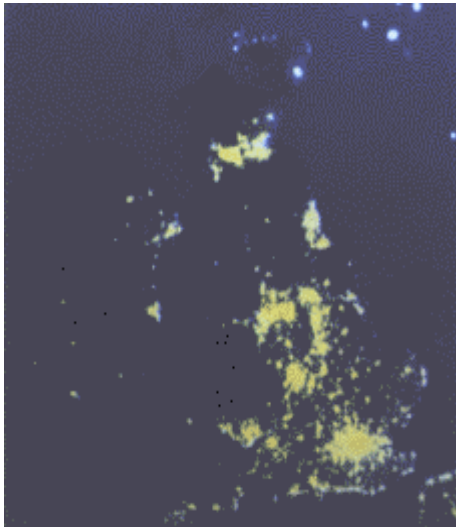
The release of light into the night sky brightening the horizon, creating what is known as sky glow (as can be seen over most towns and city's) and reduces the enjoyment of the night sky reducing the visibility of stars.

- Spill light / light trespass

Where the light falls onto adjacent property or through windows affecting the owner's enjoyment of that property.

- Glare

Another form of pollution is glare, where the brightness presented to viewers is a visual distraction and may present a hazard



Starlight view of the UK by night

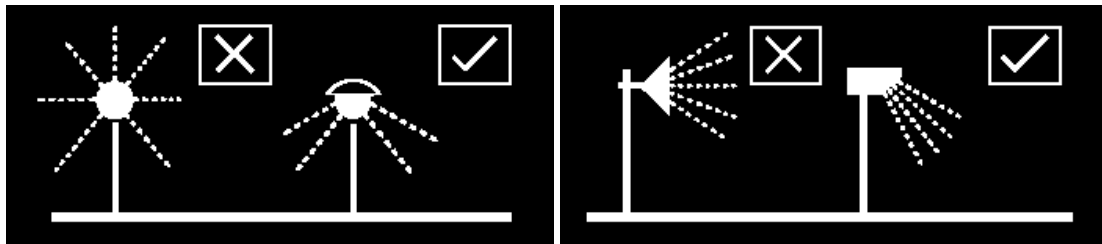


Sky glow

Preventing light pollution

Careful consideration at the design / planning stage can ensure that the task that requires lighting can be achieved whilst controlling light pollution and the first question has to be “do I need to light it?” If this is the case then the design must ensure that only the right amount of light is provided for the required task and that this is controlled to avoid light pollution.

Use of specifically designed equipment to maximise the light where it is required whilst minimising it to all other areas.



- National guidance

The Institution of Lighting Engineers have published a document “Guidance notes for the reduction of light pollution”, this establishes four Environmental Zones, each of which has a different approach to the provision of external lighting. These zones establish ‘Obtrusive Lighting Limitations for External Lighting Installations’ and include the effects of ‘Sky Glow’ and light into windows. The document also includes ‘source intensity’, the potentially obtrusive direction of light outside the area being lit.

The four environmental zones are defined as follows: -

- E1 “National parks”, “areas of outstanding beauty” or other “dark landscapes”
- E2 Areas of “low district brightness” (e.g. in a rural location but outside a zone E1);
- E3 Areas of “medium district brightness” (e.g. in an urban locations);
- E4 Areas of “high district brightness” (e.g. in an urban centre with high night-time activity).

Light pollution is not a new occurrence, but it is a growing concern. Hertfordshire County Council appreciate that there are many bad examples of lighting installations with poor optical control. However it is recognised that where this relates to highways that this lighting was installed sometime ago. Most highway lighting units currently being specified and installed have improved design and optics to reduce light pollution. It will however take some time to address the old installations and therefore reduce the sky glow seen over many towns.

Lighting and crime reduction

Crime and disorder inhibits user confidence resulting in apprehension, often generating fear. It is now recognised by the Home Office that good lighting does reduce street crime. Its greatest benefit is in reducing the fear of crime. The British Journal of Criminology lists lighting as a cost effective means of reducing crime.

It is known that the majority of crime is undertaken on the assumption that the offender will go unobserved and darkness provides the criminal with the cover required. Good lighting deters criminals, because the possibility that others will observe them is increased. In addition good lighting attracts people out after dark, further increasing the criminal's risk of being observed.

Crime undermines the quality of life and adds to the decline and mistrust in communities. People either tend to move away from areas or retreat into the privacy of their own homes. This leads to:

- Streets that are empty of people as people imposing their own curfew;
- Withdrawal from communal activities;
- A reduction in informal social control and surveillance.

Lighting works most effectively in conjunction with other crime prevention strategies and has some advantages over others:

- it is a visible and obvious improvement to an area that once installed it requires minimum resources to sustain;
- communities experiencing crime and disorder require proof that an area is improving and lighting is a noticeable investment;
- it can increase night time street usage generating a feeling of well being;
- it benefits the most vulnerable sections of the population whose fears are highest.

CCTV

Closed circuit television plays an increasing role in the drive to reduce crime. The effectiveness of any CCTV installation is not only dependent upon the specification of the camera equipment, but also upon the lighting. A CCTV installation requires good and uniform lighting levels in order to operate effectively with images of a quality suitable for prosecution.

Home Office studies have shown that CCTV is less effective than good lighting in the reduction of crime and only effective where it is installed with good lighting.

Security and safety lighting

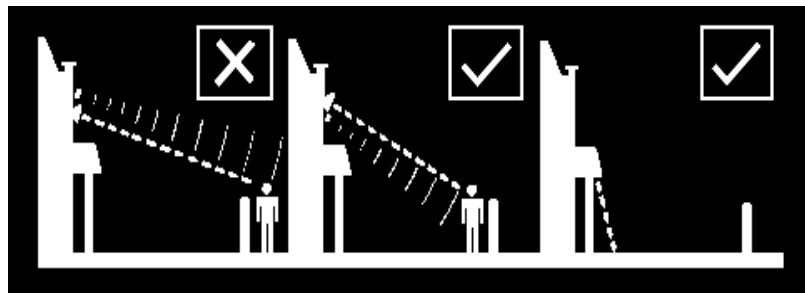
Residents and businesses are all concerned about the security of their homes/properties. As such they tend to fit security lights to the outside of their homes/properties to deter burglars.

Unfortunately these lights often cause annoyance to others who live close by, and in some cases, cause a hazard to motorists as they can 'blind' the motorist if they are incorrectly set up and point along a highway.

It is not the case that a higher wattage lamp deters burglars. Too fierce a glare or poor siting can create dark areas which will provide additional cover for intruders, while too high a wattage results in colours being washed out and loss of detail for CCTV coverage'

More often than not an inappropriate lamp is fitted within these units (in general a 500 Watt lamp rather than a 150 Watt). It is not the case that a higher wattage lamp deters burglars, in some cases too high a wattage results in colours being washed out and details can not be easily identified.

The security light should be mounted sufficiently high enough to illuminate the appropriate area and to be safe from tampering. A minimum of 2.4 metres is recommended. The area illuminated by the light should be the area required to be lit and no more. This should be checked at night and the lantern adjusted accordingly. Light should not spill onto neighbouring property or onto the highway.



Sensors operate most security lighting and should preferably be separate to the lamp. The sensor should be mounted and adjusted to cover the area required and not operate if a person walks along an adjoining footpath.



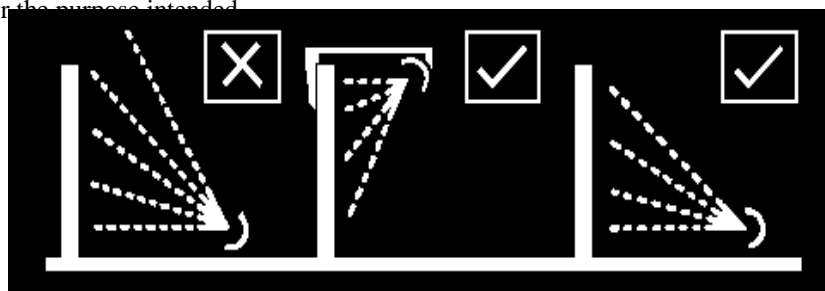
from to



Lighting of building

The good lighting of buildings or monuments provides a focal point at night and can enhance an area. There are no defined lighting levels for this type of lighting as it depends upon the feature being lit, flood lighting locations and the colour and reflectivity of the materials it is made of, although guidance on maximum and average values based upon environmental zones is published. The levels are therefore subjective but need to depend upon the relative brightness of the surrounding area. The darker the surrounding area the less light is required to adequately illuminate the feature.

Floodlighting shall be designed to achieve its purpose ensuring that the light falls only on the required surfaces and not elsewhere. Good design should seek to achieve the minimum illumination levels necessary for the purpose intended.



Feature lighting

Lighting may not only be used to define safe routes through areas but can also be used judiciously to illuminate other features such as trees, building facades and landscaping where it can transform a two-dimensional surface into a three dimensional space. This should be achieved with discretion, preferably involving an specialist landscape or lighting consultant where necessary.



Memory Wall, Watford



Town Hall, Berkhamsted

Affects on wildlife

It has been shown that artificial lighting does have an effect on wildlife and can cause a significant impact on the behavioural patterns and ecology of mammals, birds, insects and other animals and plants. In contrast to temperature, the natural photoperiod is a constant factor and always the same each year for a given season and latitude. It has long been known that it is the length of night - the period of uninterrupted darkness rather than day length - that governs many biological rhythms. Consequently flowering, feeding, breeding and migration can be driven in part by light and artificial disruption of this can induce unnatural activity in plants and animals.

In general the 'whiter' the light the greater the potential effect it has, but all external lighting will create artificial conditions which can introduce an additional environmental pressure on the local ecology. However the issue is extremely complex; some species can be attracted to artificial light - where they

can in turn provide an unnaturally high concentration of food for predators – while others can be deterred from foraging or resting in traditional areas affected by such lighting.

Consequently a precautionary approach is needed when dealing with external lighting which affects ecologically sensitive areas and sites, or features such as buildings, bridges and trees. Where lighting requires planning approval, consideration need to be given to location, type of light, minimum levels, days and hours of use, with appropriate controls to achieve this where possible.

Advertising signs

Planning Authorities in England and Wales have powers to control advertisements under the Town and County Planning (Control of Advertisements) regulations 1992 and subsequent amendments.

Regulation 6 of Schedule 3 of the Town and County Planning (Control of Advertisements) regulations, Schedule 3 (Part 1) specifically details advertisements which may be given deemed consent and therefore do not require local planning permission including some that may be illuminated. All other illuminated advertisements require the consent of the local planning authorities.

The main requirements for an illuminated signs relates to luminance and brightness. It is a requirement that the sign be uniformly illuminated across the whole area and colours and that the luminance relate to the background and the surrounds against which the sign is viewed. In an urban area the sign will need a higher level of lighting to be visible than in a less well lit rural area, where it may be viewed against a dark background. This in part depends upon where the observer is standing and hence the surrounding back ground the sign is viewed against.

The Institution of Lighting Engineers technical report number 5 - 'Brightness of Illuminated Advertisements' details specific requirements for illuminated signs in different environments.

If you have a problem contact your local Council.

Roads

Road lighting assists mobility during hours of darkness for pedestrians, cyclists and vehicles, it reduces the risks of accidents and deters vandalism and crime.

British Standard BS 5489 gives the design objectives for planning effective road lighting on all roads. Safety at night for both motorists and pedestrians is the main consideration when designing road lighting schemes ensuring sufficient visual information for their safe movement. Major traffic routes are lit for highway safety with residential areas being lit for the safety of all users be they motorists, cyclists or pedestrians.

There are various environmental aspects that need to be taken into account when considering the installation of street and other exterior lighting. These are the direct energy usage, the visual impact of the lighting equipment during the day, the effect of light spillage on surrounding areas, the spill of light into the night sky, the effects on animal and plant life.

These factors vary depending upon the location of the proposed lighting installation and a balance must be struck between them to provide the optimal design.

Aesthetic appearance from a daytime perspective is also an important consideration within the design process. Some areas (such as Conservation areas) may have specific requirements for the aesthetic appearance and type of the equipment used. In addition the mounting heights of lanterns and protective finish to the columns chosen need to be such that the columns do not dominate the landscape and in so far as is possible are not taller than the adjacent properties.



Highway signs

Not all highway and advertisement signs need to be lit. Under current regulations certain highway route signs no longer require electric lighting due to the use of highly reflective materials. This reduces energy use and the effect on the night-time environment.

Lighting outages and faults with Hertfordshire should be reported to

01438 737320

01923 471320

or go to www.hertsdirect.org/highwayfaults

Footpaths and cycleways

Footpaths and cycleways provide a means of access both alongside and away from roads.

The British Standard for Road Lighting BS5489 provides guidance on the required lighting levels for these routes and also requires pedestrian safety to be considered. The requirement being 'to provide a sense of security it should be possible to recognise, in time to make an appropriate response, whether another person is likely to be friendly, indifferent or aggressive.'

Hertfordshire County Council pays particular attention to these routes promoting usage and especially concentrating on routes to and from schools under their safe routes to school policy.

Subways

A pedestrian subway is provided to allow people to move safely under a road which otherwise would be hazardous to cross. Many people are concerned about entering subways especially at night and it is therefore important they should be well lit both internally and externally. British Standard for Road Lighting BS5489 provides guidance on the required lighting levels to be used. It is mainly the fear of crime that drives this concern.

A bright appearance of the interior of the subway and balanced with a bright exterior (ramps, stairs and approaches) encourages confident use and vandalism is deterred. Daytime interior lighting is also provided to avoid the casting of shadows within the subway.



Gunnelswood Road, Stevenage



Lytton Way, Stevenage

Car parks

Drivers need to be able to safely navigate around car parks being fully aware of the movements of other vehicles and pedestrian's. Pedestrian's need to be able to identify where they are going, identify their car and car park exits and be aware of motorists movements. In addition it is important to allay users fear of crime so they feel happy using the car park. The lighting of these is covered by BS 5489 Part 9: Code of practice for lighting urban centres and public amenity.

Car parks are not always used all night and it may be possible to reduce the level of lighting after a certain time to a security level rather than an 'operational' one. This particularity relates to business and retail car parks, which tend to be large and only used whilst the premises are open.



Sports lighting

Sports and area lighting should be designed to achieve the lighting levels required relevant to the standard of play for the particular sport whilst achieving the requirements laid down in section 3 of this Policy. In general the smaller and faster the ball the higher the required lighting levels. In general a curfew will be imposed, the sports areas are not required all night and can training sessions be set to finish at set agreed times.

Modern demands for other sport and leisure use, such as lighting golf driving ranges, tennis courts and horse maneges can also affect increasingly rural areas. Where permission is needed, each proposal will require particularly sensitive approach and be considered by the Local Planning Authority on its own merits.

It may be appropriate to consider the use of fold-down or collapsible masts or towers, such that these features can be removed from the day time landscape view when not in use.

Photo's to be sourced

What can I do if I have a concern over a lighting installation?

- The Law – there is no specific legislation that covers light pollution
- Speak to the owner as they may not be aware and a simple solution may be possible.
- Be considerate in your own design

Contacts:

Highway lighting outages and faults with Hertfordshire should be reported to Hertfordshire Highways on:

01438 737320

01923 471320

or go to www.hertsdirect.org/highwayfaults

Definitions

Luminous flux	Light emitted by a source or received by a surface
Lumen	Rate of flow of luminous energy
Illuminance	Density of luminous flux at a surface (Lux)
Luminance	Measure of brightness, luminous intensity of light reflected from a surface (candelas per square metre cd/m ²)
Average luminance	The average luminance over a defined area or surface viewed from a specified observer position.
E _H (ave)	The maintained average horizontal illuminance on the surface
E _H (min)	The maintained minimum horizontal illuminance on the surface
Uniformity ratio	The ratio of the minimum illuminance over a given area to the average illuminance
ILE	Institution of Lighting Engineers
CIBSE	Chartered Institution of Building Services Engineers

Further information / reference documents

Organisations

- Institution of Lighting Engineers (ILE), Regent House, Regent Place, Rugby CV21 2PN
www.ile.org.uk
- British Astronomical Association (BAA), Campaign for dark skies, Burlington House, Piccadilly, London W1V 9AG www.dark-skies.org
- Chartered Institution of Building Services Engineers (CIBSE), Delta House, 222 Balham High Road, London SW12 9BS
- CPRE (Campaign to Protect Rural England), 128 Southwark Street, London SE1 0SW
www.cpre.org.uk

Documents

- ILE 'Guidance notes for the reduction of light pollution' - available from the ILE web site
- ILE 'Domestic Security Lighting – Friend or Foe'
- ILE technical reports, Brightness of illuminated advertisements, Lighting of traffic calming features, Lighting of cycle tracks, Lighting of pedestrian crossings.
- British Standards, BS5489 Road Lighting
- CIBSE Lighting Guides – Sports / The outdoor environment & The industrial environment
- Department of the Environment, Lighting in the Countryside: Towards good practice
- Planning in Hertfordshire
- Town and County Planning (Control of Advertisements) regulations 1992 (Statutory Instrument 1992 No.: 666) as amended by the Town and County Planning (Control of Advertisements)(Amendment) Regulations 1994 and Town and Planning (Control of Advertisements)(Amendment) Regulations 1999 (SI 1810).
- HBRC 1998, The Possible Ecological Implications of Artificial Lighting
- Imperial College Press 2002. Wildlife and Roads - The Ecological Impact