

SPG

supplementary planning guidance

Controlling light pollution and reducing lighting energy consumption



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Supplementary planning guidance

CONTROLLING LIGHT POLLUTION (AND REDUCING LIGHTING ENERGY CONSUMPTION)

Introduction

1.1 Supplementary Planning Guidance (SPG) is produced by the council to explain how particular local plan policies should be applied in practice.

This particular guidance addresses two important environmental factors, nuisance light and energy usage.

1.2 Specifically, it seeks to encourage developers, architects and lighting designers to provide non obtrusive and energy efficient lighting designs when preparing proposals for any development which incorporates an element of out of doors artificial lighting.

1.3 This SPG relates to all exterior lighting situations regardless of the location of the lighting project or whether it is a stand alone project or part of an overall development. Potential developments and lighting situations include, but are not limited to:



- Industrial developments
- Retail developments
- Housing developments
- Transport interchanges
- Roads and footpaths (either stand alone or as part of an overall development)
- Exterior sports grounds and arenas
- Feature lighting for civic enhancement
- Illuminated advertisements
- Replacement of existing lighting installations

1.4 While this SPG is not part of the adopted West Lothian Local Plan it has been the subject of both a formal council resolution and a consultation process. It can therefore be treated as a *material planning consideration* when the council, Scottish Government and Reporters determine planning applications and appeals.

1.5 The council will seek to prevent statutory nuisances where lighting forms part of a planning permission and may seek to regulate lighting as part of planning conditions and obligations.

1.6 Pre-application discussions can be particularly useful in helping applicants and agents identify the issues to be covered and information that will be needed to support any application for planning permission, which in turn can help minimise delays later in processing the application.

1.7 To arrange an appointment or to obtain further information and advice please contact: **Planning Services, West Lothian Council, County Buildings, High Street, Linlithgow, EH49 7EZ** or telephone **01506 775222** and ask to speak to a planning officer for the area in which the site you propose to develop is located.

The policy context

2.1 Until recently there were no specific legislative controls on light nuisance in Scotland, but the Scottish Government has now added artificial light nuisance to the list of *Statutory Nuisances under Part III of the Environmental Protection Act 1990*, as introduced by the *Public Health etc (Scotland) Act 2008*, and bringing legislation into line with the situation in England and Wales. Breach of an *Abatement Notice* is a criminal offence, enabling local authorities (principally through its environmental health function) to initiate proceedings against offenders and, where appropriate, to carry out works in default of the abatement notice.

2.2 It is against this background that this SPG has been prepared and one of the key objectives has been to address the external lighting component of development proposals wherever practicable **at the planning stage**. This is widely recognised as being the ideal time to influence the design or installation of lighting schemes and can serve to pre-empt instances of light pollution or nuisance arising, potentially reducing the council's involvement in dispute resolution and enforcement at a later date.

2.3 Planning Advice Note PAN51: *Planning, Environmental Protection and Regulation* makes it clear that it is the responsibility of planning authorities and the environmental protection bodies to collaborate in the task of protecting the environment, and to apply controls so that duplication is minimised and overlap is avoided whenever possible.

2.4 Planning Advice Note PAN 77: *Designing Safer Places* addresses the contribution that lighting makes to creating safer places and reducing crime but at the same time recognises that it is important to ensure that lighting does not dazzle or create pockets of darkness.

2.5 Scottish Planning Policy SPP 11: *Open Space and Physical Activity* makes specific reference to light pollution in the context of the likely impact of locating playing fields and stadia in close proximity to residential properties.

2.6 *The Edinburgh and the Lothians Structure Plan 2015* (E&LSP) provides for the development needs of Edinburgh and the Lothians in accordance with the principle of sustainable development and the adopted *West Lothian Local Plan 2009* takes a balanced approach to accommodating development whilst protecting and enhancing the environment.

2.7 Although the adopted *West Lothian Local Plan 2009* does not have any specific policies regarding external lighting, control can be exerted by ensuring that applications are consistent with Policy HOU 9 which states that there is a general presumption in favour of new development



provided there is no adverse impact on adjacent uses. Policy HOU 7 also specifically requires developers to have regard to energy efficiency principles in proposing layouts.

2.8 It is important to be aware that when not an integral component of a development proposal, planning permission may not be required for lighting installations in commercial / industrial situations where they do not materially affect the external appearance of a building or structure.

2.9 In the case of listed buildings, consent is almost always required for external lighting. Unsympathetic light fittings can detract from the appearance of the listed building, both at night-time and during the day. While sensitive lighting and the appropriate choice of luminaires can benefit the historic environment, it is important that the principle of external lighting and the detailed design receives careful scrutiny. Advice should always be sought from the council.

2.10 The installation of external lighting on a domestic property is by and large *permitted development*, i.e., exempt from formal planning control, with the notable exception of properties where an Article 4 Direction Order is in force and restricts permitted development in terms of Class 1 of the Town and Country Planning (General Permitted Development) (Scotland) Order 1997.

2.11 Where there is any doubt as to whether planning permission is required for the installation of a lighting scheme, it is important that advice is sought from Planning Services.

2.12 If planning permission is not required this does not dispense with the need for developers and individuals to approach the subject of external lighting with sensitivity, consideration and due regard to reducing energy consumption.

Light pollution and saving energy

3.1 Light is a type of radiation and forms part of the electromagnetic spectrum visible to the eye. It is measured in lumens (lm). A modern electric light takes in power in watts, and its efficiency can be measured in lumens per watt (lm/w). The amount of light falling on a surface is known as the illuminance and is measured in lumens per square metre or lux. This is straightforward to calculate and measure and is therefore widely used.

3.2 Light in itself is not a pollutant. It is only when it is *obtrusive* and starts to have an adverse impact on peoples' environment and activities that it becomes problematic. If not properly designed, installed and controlled, lighting can constitute an environmental, visual and health nuisance.

3.3 Artificial lighting helps prevent road accidents by providing good definition of roads and footpaths, is widely used for security purposes, promoting access to sport and recreation facilities outwith daylight hours, for enlivening the night-time environment generally and for enhancing historic and architecturally important buildings. It has become an accepted and commonplace feature of day to day living.

3.4 It can however have a marked impact, changing the character of a locality and significantly altering wildlife habits and ecological patterns. On the widest scale, dark skies and views of the stars are now becoming a thing of the past except in the remotest of areas.

Types of light pollution

3.5 Light pollution is the term used to describe the brightening of the night sky as a result of upwardly directed light which is then reflected off dust and water droplets in the sky. It is a material planning consideration.

3.6 Light pollution can occur as:

- **Sky glow** - this is the visible orange glow, mainly seen around urban areas, which occurs when stray or poorly directed light reflects off particles in the atmosphere back toward the ground. The glow is not always localised and can be seen from many miles around, often spreading into dark rural areas. Lighting energy directed into the sky impedes astronomy and wastes energy.
- **Glare** - this is perhaps the most serious form of obtrusive light and is the result of excessive contrast between bright and dark areas in the field of view and can seriously impair vision. It can however be avoided by the use of properly controlled and directed lighting of an appropriate brightness.
- **Light trespass** - this is where light, direct or reflected, spills beyond the boundary of the intended illuminated subject area where it is not desired or required and causes annoyance. At the same time, it wastes energy and ultimately results in the unnecessary emissions of greenhouse gases.



3.7 While light pollution can be a problem in both urban and rural areas, residential amenity is most likely to be affected in an urban setting whilst sky glow may be the most significant consequence in a rural area and can lead to a suburban feel, losing the sense of distinctiveness associated with the countryside.

3.8 Lighting also need not be static to be obtrusive. The flickering of light, often used for advertising, can prove to be a distracting feature, and like glare, it can be a source of irritation and can in extreme situations be detrimental to the health of some individuals.

Common sources of light pollution

3.9 Problems associated with external lighting can arise from many different artificial light sources:

- inefficient street lighting which throws light upwards into the sky rather than downwards onto the road or pavement it is supposed to illuminate;
- proliferation of road lighting, extending further out from towns and villages into the countryside;

- all night (and sometimes daytime) floodlighting of buildings;
- illuminated shop windows and advertising signs which are switched on overnight;
- domestic security lighting which is inappropriately positioned and which intrudes on neighbouring properties and which can at the same time accentuate the darkness of surrounding areas;
- temporary lighting associated with construction and engineering projects; and
- floodlit sports facilities, such as golf driving ranges, or football pitches which bathe neighbouring land in brightness

Consequences of light pollution

3.10 The consequences of light pollution are extensive:

- in terms of sustainability, a significant amount of energy is wasted as a consequence of inappropriate lighting;
- the production of electricity using fossil fuels causes continued pollution of the atmosphere and is at odds with the Scottish Government's climate change policy of reducing the country's overall energy usage;
- when artificial lighting is used during the hours of darkness it is potentially damaging to human health in so far as it can infiltrate houses and disturb natural sleep patterns which in turn can lead to stress. Indirectly, glare can also contribute to road accidents;
- it can interfere with the way in which adjacent occupiers choose to use their property, diminishing their residential amenity;
- it is potentially disruptive to wildlife (e.g. some birds, bats, insects), affecting their established migration, feeding and breeding patterns; and
- it brightens the night sky to the extent that observation of the stars becomes difficult.



Control of light pollution

3.11 There is a growing awareness of light pollution as a phenomenon and of the negative consequences associated with it. For its part, West Lothian Council is committed to using its best endeavours to try and minimise the instances of light pollution, and by encouraging and promoting good design and ensuring the use of the correct equipment for the task, progress can also be made in tackling climate change by saving finite energy resources and ultimately helping to cut carbon emissions.

3.12 Where an external lighting component within a development site is proposed, applicants will be required to submit supplementary information with their planning application which comprehensively details the lighting scheme and satisfactorily demonstrates that the proposed scheme is appropriate in terms of its purpose and in its particular setting.

3.13 This should include:

- a statement setting out why the lighting scheme is required;
- a report prepared by a lighting engineer, setting out the details of the luminaires and columns, including their type, height and location;
- a technical specification of the luminaires, setting out what design attributes have been chosen to minimise light pollution; and
- a plan illustrating illuminance levels across the site and at the boundary of the property. Illuminance levels beyond the boundary of the site, together with the *downward light output ratio* of the lights may also be required.



3.14 In some cases the statement may be required to consider how the lighting scheme will be viewed against the wide landscape, both urban and rural and the potential role of landscaping in minimizing the day and night-time visual impact of the installation.

3.15 An *operational statement* should also be provided, the purpose of which is to ensure that the developer and the lighting designer have considered operational regimes that can provide energy savings.

3.16 ***The submission of lighting proposals will also be required in relation to temporary lighting installations, as commonly associated with construction works and development site compounds.***

3.17 It is recommended that applicants have regard to and make use of the lighting design process detailed in **Annex 1** and it is required that all lighting proposals should be submitted with a completed Lighting Design Check List as provided in **Annex B** to this SPG.

3.18 Where the council decides to grant planning permission, it may decide to impose conditions covering such matters as:

- Hours of illumination
- No distraction to the highway
- Light levels
- Levels of impact on nearby dwellings
- Column heights
- Use of demountable columns
- Specification and colour treatment for lamps and luminaries
- The need for full horizontal cut-off
- Retention of screening vegetation
- Use of planting and bunding to contain lighting effects

3.19 The council may in some circumstance seek the erection of temporary lighting or require a review of the lighting impact following completion of the scheme.

Detailed design considerations

General principles for new and existing lighting schemes

4.1 The lighting of roads, footpaths, domestic and commercial property should be an integral element of all development proposals at the outset and not, as has sometimes been the case in the past, addressed as an afterthought.



4.2 There is clearly a need to balance the provision of lighting to enhance safety, help in preventing crime and the perceived risk of crime, and to allow activities like sport and recreation to take place, whilst also respecting the amenity of neighbouring land uses, protecting the natural environment, areas of nature conservation importance and areas whose open and remote landscape qualities could be adversely affected.

4.3 When formulating proposals for an external lighting scheme or where external lighting is integral to a development proposal, the designer of the lighting scheme should have regard to the following key principles:

- The purpose of the artificial lighting should always be clearly defined and must be provided for a specific purpose, e.g., to illuminate a given area, to mark out pathways, to highlight obstacles or objects of interest within an area. Clearly, the effectiveness of the installation can only be measured after the purpose is defined, and this should be the starting point of any design.

- The object or area to be lit should not be viewed in isolation but should be seen as part of a larger area with its own individual lighting environment. The relative brightness, lighting style and prominence of surrounding lit elements should be taken into consideration as context for the proposal.



- The power consumption and output of a lighting scheme should be an integral part of the design process and must relate to the ambient night-time levels surrounding the site to be illuminated. The lighting scheme must not exceed that which is required for the satisfactory undertaking of the task involved. This will help to ensure there is not a sharp contrast between illuminated subjects.

- The level of illuminance should be appropriate to the character of the surrounding area as a whole. Four environmental zones are internationally recognised, see below, and the design will require to show that control of overspill light is limited to the level required by the particular environmental setting. The corresponding **obtrusive light limitation values** are produced as **Annex 3**.

Category	Examples
E1	Intrinsically dark landscapes (national parks, areas of outstanding natural beauty)
E2	Low district brightness areas (rural, small villages 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)

- The unit into which the lamp is fitted is called a luminaire and all luminaires are required to comply with the relevant European standards. The proposed lighting equipment should comply with current standards and to the greatest extent possible,

the luminaries and their settings should be optically set to direct light only to where it is required and to minimise obtrusive effects. Where necessary louvres and reflectors should ensure no light spill beyond the object or area to be lit. Glare and spillage must be minimised, particularly in areas of open countryside, on the edge of settlements, adjacent to roads or in other environmentally sensitive settings.

- In general, the closer the light appearance is to white light then the greater is the energy required to provide the same light output (lumen). However, the whiter the light the greater the visual recognition, and this can result in lower quantities of light being necessary to provide the same task illumination.
- The daytime appearance of light fittings and cabling can have a negative effect on the appearance of streets and individual buildings, particularly if listed or of historic interest, and wherever possible must be located so that, as far as is practicable, they are concealed from view. Fittings should also be positioned to minimise street clutter, and so that they are not likely to attract vandalism or accidental damage that alters the focus of the lighting, thus contributing to light pollution.
- Where possible, consideration should be given to switching off lighting when it is not required. Time clocks, photoelectric controls and curfews should be used to ensure that the lighting is not in operation during daylight and to ensure that lighting schemes are not operated during those darkness hours when they serve no useful function.

Lighting schemes for specific situations

Lighting for security

4.4 Domestic and commercial security lighting is usually installed with the best of intentions but often fails to meet its basic objective of providing or enhancing security. It is often assumed that a generous use of artificial lighting, whether it be street lighting or domestic security lighting, reduces the risk of crime. However, it has been shown that



whilst lighting can reduce the fear of crime, poorly positioned, misdirected lights or over bright lighting can deter or hamper observation and can actually assist would-be burglars to find easy access points and can create deeply shadowed areas for concealment. In addition the types of lighting installed often consumes excessive amounts of electrical energy, causes glare and contributes to light pollution.

4.5 It is therefore particularly important that care is taken to ensure that the intensity and focus of security lighting, whether domestic or commercial, respects the amenity of others. At the same time, the most efficient available lamps should be employed for street lighting, to help reduce maintenance and energy costs. For most domestic security lighting a 150W (2000 lumen) tungsten halogen lamp is adequate. High power

lamps (300/500W) create too much glare, reducing security. A compact fluorescent porch light of 9W (600 lumen) is adequate for all-night lighting in most domestic situations.

4.7 Commercial premises are more likely than domestic premises to use lighting which makes a material change to the external appearance of the building and is therefore more likely to require planning permission, particularly when introduced post construction.

Floodlighting for sports pitches

4.8 In an attempt to increase the viability of facilities, to enable more people to participate and give more choice and flexibility of playing time, it is increasingly common for sports clubs and schools to want to install external floodlighting. Although the apparatus associated with floodlighting is often more readily assimilated in urban areas, and the wider impact of the light generated less intrusive, particular problems can occur in respect of residential amenity. The proximity of housing and the way in which the floodlighting and use of the site impacts on the amenities enjoyed by the occupiers will be an important factor in determining the acceptability of proposals.

4.9 It is therefore a requirement that applicants commission the preparation of light scatter diagrams that will accurately predict the performance of the scheme, both inside and outside the pitch areas.

4.10 Generally speaking, the taller the mast the greater the scope for directing the light downwards, thereby controlling *light spillage*. The main beam angle of lights should not exceed 70° from the vertical. Light shields should be fitted to avoid both upward glare and the direct illumination of areas beyond a distance of 10 m from the pitch. The power of each lamp should normally be limited to 1kw with internal louvres fitted and asymmetric beams utilised that permit the front glazing of the unit to be kept at or near parallel to the surface being lit.



4.11 Strong floodlighting used for sport pitches can create a genuine disturbance to neighbours and therefore it will generally be the case that floodlights will not be used between the hours of 10.00 p.m. and 9.00 a.m.

Illuminated advertisements

4.12 The two forms of advertisement that have the potential to cause problems in lighting terms are illuminated poster advertisements and internally or externally illuminated shop fascias. Most illuminated signs require express consent under the Town and Country Planning (Control of Advertisements) 1992 (Amended 1994) Regulations.

4.13 As a general rule large poster advertisements, where illuminated, should be lit from the top down using a lighting system that ensures no light spill beyond the extent of the

advertisement. Shop fascias should not be significantly brighter than those of neighbouring shops. Shopfront and fascia lighting should not contribute to light pollution and sharp contrasts caused by overbright shopfronts should be avoided. Care must be taken to ensure that they are not positioned where they may affect the clarity of traffic signs or disturb those living close by. In commercial areas generally, advertisements and lighting should not be used simply or primarily to create a *presence* at night.

4.14 As the requirements for obtaining planning permission and/or advertisement consent for illuminated advertisements can be complex it is strongly suggested that developers obtain written confirmation from the council before such signs are commissioned.

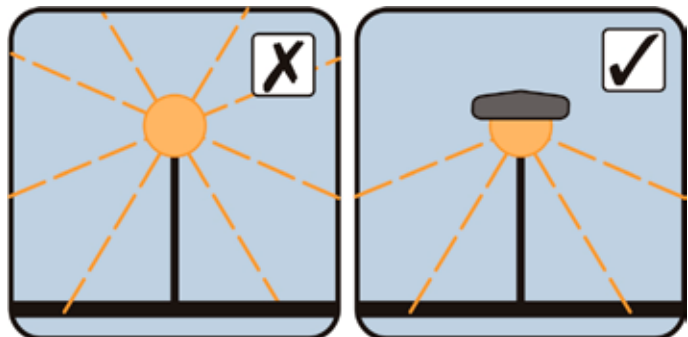
Common lighting design problems

4.15 A light fitting will deliver light where it is needed, but will potentially also give four areas of unwanted, and wasted, light:

- Spill light - falls outside the area where it is needed, it can be avoided by pointing the light in the right direction.
- Upward light - this is wasted light shining above a light fitting, it is entirely avoidable by the use of the correct light fitting. Direct the light downwards wherever possible (this can also reduce glare).
- Upward reflected light - this is unavoidable and dependant on the reflectances of the surfaces below the light fitting, (dry tarmac will commonly reflect 7%, grass about 20-25%). This is another source of **sky glow**. Remedies are to use only as much light on the surface as is really needed, and to try to select a surface which minimises reflectance.
- Direct glare – this is the result of seeing the bright filament of an unshielded light, troublesome and dangerous unshielded bright lighting. Direct glare is more wasted light and can be a major problem.

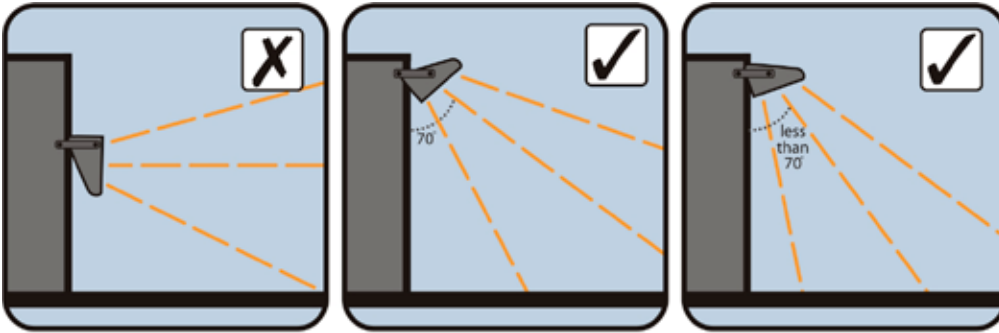
Careful design and planning

4.16 It is possible to reduce many of the negative effects of lighting through careful design and planning, using lighting only where and when necessary, using an appropriate strength of light and adjusting light fittings to direct the light to where it is required. Illumination should be appropriate to the surroundings and character of the area as a whole. Avoid *over lighting* and use shields, reflectors and baffles to help reduce light spill to a minimum. Use specifically designed equipment that, once installed, minimises the spread of light above the horizontal.



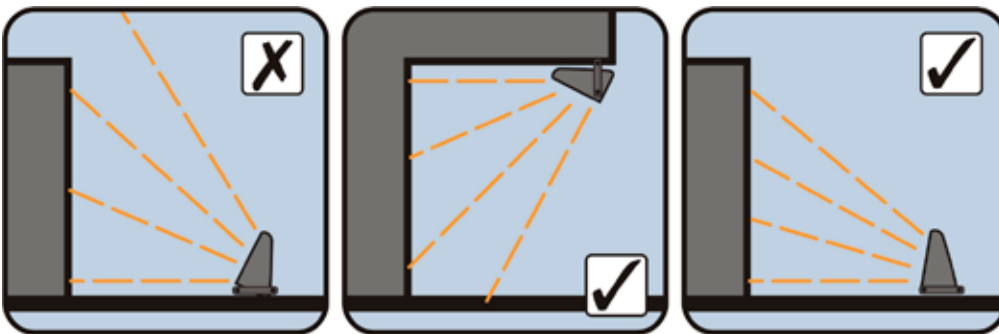
Direction of light

4.17 Direct light downwards wherever possible to illuminate its target, not upwards. Many floodlit buildings are lit from the ground with the beams pointing into the sky. This often leads to columns of stray light pointing up into the sky creating vast amounts of light pollution and wasting energy. Provide lighting that does not glare on approach and which places light onto the ground and not into the sky where it is wasted. In other cases, simply lowering the angle of the beam will stop light from overshooting the building into the sky.



Keep floodlighting beam below 70° of verticle

4.18 To keep glare to a minimum, ensure that the main beam of all lights directed towards any potential observer is kept below 70°. It should be noted that the higher the mounting height, the lower the main beam angle can be. In places with low ambient light, glare can be very obtrusive and extra care should be taken in positioning and aiming. Wherever possible use floodlights with asymmetric beams that permit the front glazing to be kept at or near parallel to the surface being lit.



Keep floodlighting beam within target or use downlighters



Use sensor controlled lights (PIR) with the beam directed close to the property, or a low porch light

Amount of light

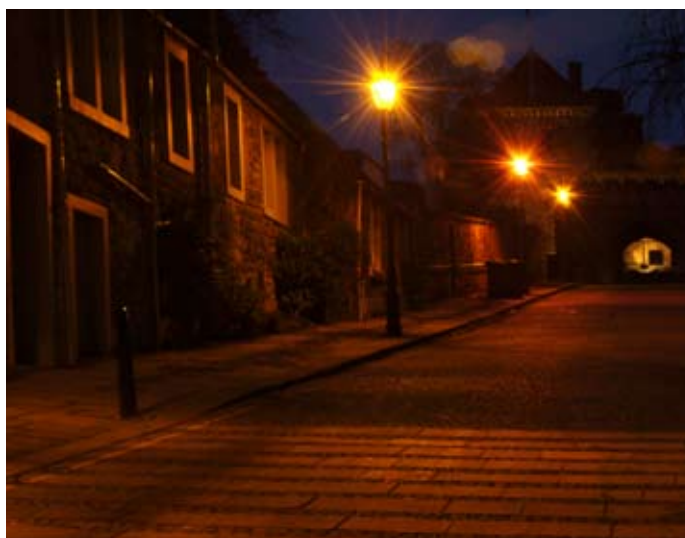
4.19 Rural lighting should be kept to a minimum necessary for safety. The council will be encouraged to apply this principle if building new roads in the countryside or upgrading existing installations with the use of low energy, light efficient fittings. Care should be taken where and when they are lit.

Sensor switches

4.20 For domestic and small scale security lighting there are two options. The use of *Passive Infra Red Sensors* (PIR) or all-night lighting at low brightness. If correctly aligned and installed, a PIR Sensor that switches on lighting when an intruder is detected, often acts as a greater deterrent than permanently floodlit areas, which also allow the potential intruder to look for weaknesses in security i.e. open windows etc.

Types of lamps

4.21 Low pressure sodium (LPS) street lamps which scatter their orange light all around, including skywards, are a common sight along many streets and in residential areas. An increasingly popular alternative, however, is the full cut-off, high pressure sodium (HPS) lamp, although these are more expensive to install. Full cut-off lamps prevent any light from being emitted above the horizontal and the HPS creates a bright pinkish white light which is carefully directed to avoid light trespass. In a recent survey, 85% of drivers stated that they prefer the light from HPS lamps. HPS lamps are the preference for lighting sports pitches for the same reasons.



Wasted energy

4.22 Switch off lights when not required for safety or security. Much energy is consumed and vast amounts of greenhouse gases are produced due to the wastefulness of all night shop advertising and display lighting, building illumination, upward floodlighting and permanent domestic and industrial security lights. Consideration should also be given to the energy efficiency of fittings and a strong management policy to reduce running costs and promote sustainability. Installing well designed lighting systems saves money and conserves energy.

Further guidance

The Scottish Government has produced a guidance note entitled *Controlling Light Pollution and Reducing Lighting Energy Consumption* (March 2007) which is downloadable at:

<http://www.scotland.gov.uk/Publications/2007/03/14164512/13>

Further technical advice regarding external lighting can be obtained from:

**West Lothian Council
Environmental Health
& Trading Standards**
County Buildings
High Street
Linlithgow
EH49 7EZ

**West Lothian Council
Roads Operations (Street Lighting)**
Whitehill House
7 Whitestone Place
Whitehill Industrial Estate
Bathgate
EH48 2HA

The Institute of Lighting Engineers
Lennox House
9 Lawford Road
Rugby
Warwickshire CV21 2DZ

**The Chartered Institute of
Building Services Engineers**
Delta house
222 Balham High Road
London
SW12 9BS

Campaign for Dark Skies (CfDS)
British Astronomical Association
Burlington House
Piccadilly
London W1V 9A

**British Astronomical Association
& Campaign for Dark Skies (CfDS)**
Burlington House
Piccadilly
London
W1J 0DU

**Environmental Protection UK
(formerly NSCA)**
44 Grand Parade
Brighton
BN2 9QA

ANNEX 1

Suggested lighting design process

Stage	Requirement	Stage Name
1	Essential	Statement of client needs/operational statement
2	Essential	Site survey
3	Essential	Critical viewpoints
4	Desirable	Existing lighting conditions
5	Desirable	Baseline conditons
6	Essential	Task analysis
7	Essential	Establishment environmental setting
8	Essential	Lighting design objectives
9	Essential	Lighting design methodology
10	Essential	Calculated predictions
11	Essential	Obtrusive light calculation
12	Essential	Comparing design with baseline values
13	Desirable	Designers critique
14	Desirable	Viewpoiont visualisation
15	Desirable	Virtual walkthrough
16	Desirable	Surface colour schedule
17	Essential	Luminaire schedule
18	Essential	Energy usage
19	Essential	Schedule of luminaire profiles
20	Essential	Layout plan

ANNEX 2

Lighting design checklist

Lighting design stages	Required by local authority	Provided by proposal designer	Designer / developer notes
Statement of interested parties' comments	✓		
Survey of surrounding night environment	✓		
Identification of critical viewpoints	✓		
Establishment and calculation of existing lighting conditions	✓		
Summary of baseline measurements and/or calculations	✓		
Analysis of task lighting level recommendations	✓		
Establishment of environmental light control limits	✓		
Statement of new lighting design quality objectives	✓		
Outline of iterative lighting design methodology	✓		
Calculated measurement of task working area(s)	✓		
Overspill area(s)	✓		
Obtrusive light calculation of property intrusion	✓		
Viewed source intensities	✓		
Nominal glare assessment	✓		
Direct upward light ratio	✓		
Building luminance	✓		
Combined upward illuminance grid	✓		
Compare design achievement with baseline values	✓		
Designer's critique of final design constraints	✓		
Viewpoint visualisation	✓		
Virtual walkthrough of illuminated site	✓		
Schedule of model reflection factors	✓		
Schedule of luminaire types, mounting height and aiming angles	✓		
Schedule of energy usage and distribution	✓		
Schedule of luminaire profiles	✓		
Layout plan with beam orientation indication	✓		

ANNEX 3

Obtrusive light limitation values

Table 1 - obtrusive light limitations for exterior lighting installations

Environmental zone	Sky glow ULR (max%) ⁽¹⁾	Light trespass (into windows) Ev (Lux) ⁽²⁾		Source intensity I(kcd) ⁽³⁾		Building luminance pre-curfew ⁽⁴⁾
		pre-curfew	post-curfew	pre-curfew	post-curfew	
E1	0	2	1*	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

URL Upward light ratio of the installation is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky

Ev Vertical illuminance in Lux and is measured flat on the glazing at the centre of the window

I Light intensity in Cd

L Luminance in Cd/m²

Curfew The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the local planning authority. If not otherwise stated: 23.00 hrs is suggested.

* From public road lighting installations only

(1) Upward light ration: some lighting schemes will require the deliberate and careful use of upward light - e.g. ground recessed luminaires, ground mounted floodlights, festive lighting - to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.

(2) Light trespass (into windows): these values are suggested maxima and need to take account of existing light trespass at the point of measurement. In the case of road lighting on public highways where building facades are adjacent to the lit highway, these levels may not be obtainable. In such cases where a specific complaint has been received, the Highway Authority should endeavor to reduce the light trespass into the window down to the after curfew value by fitting a shield, replacing the luminaire, or by varying the lighting level.

(3) Source intensity: this applies to each source in the potentially obtrusive direction, outside of the area being lit. The figures given are for general guidance only and for some sports lighting applications with limited mounting heights, may be difficult to archive

(4) building luminance: this should be limited to avoid over lighting, and related to the general district brightness. In this reference building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but not used to light an adjacent area.

NB These notes are intended as guidance only and the application of the values given in tables 1 & 2 should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting, where the various and maybe conflicting visual requirements need to be balanced.

ANNEX 4

Model lighting planning condition

Prior to the start of development on the site, an external lighting scheme shall be submitted for the consideration and written approval of West Lothian Council as planning authority.

The scheme shall take into account all of the lighting needs associated with the development during operational hours and shall be the minimum required to perform the relevant lighting task. It shall be specifically designed to minimise the risk of light spillage beyond the development site boundary and into the sky and to avoid dazzle or distract drivers on nearby roads.



The scheme shall include:

- A statement setting out and justifying why the lighting scheme is required.
- A report, prepared by a lighting engineer, setting out the technical details of the luminaires and columns, including their location, type, shape, dimensions and, expected luminance output and specifically explaining what design attributes have been chosen to minimise light pollution.
- A plan illustrating illuminance levels across the development site and at the boundary of the site. The level of illuminance should be appropriate to the character of the surrounding area as a whole. Four environmental zones are internationally recognised, and the design will require to show that control of overspill light is limited to the level required by the particular environmental setting. The *obtrusive light limitation values* are produced as **Annex 3** of West Lothian Council's Supplementary Planning Guidance (SPG) – *Controlling light pollution and reducing light energy consumption*.

- A plan illustrating illuminance levels beyond the boundary of the site, together with the downward light output ratio of the lights.
- A statement which demonstrates how the lighting scheme will be viewed against the wider landscape and, where appropriate, the potential role of landscaping in minimizing the day and night-time visual impact of the installation.
- An *operational statement*, the purpose of which is to ensure that the developer and the lighting designer have considered operational regimes that can provide energy savings.
- Details of the proposed hours of operation. (Unless explicitly agreed in writing, all external lighting luminaries shall be turned off during daylight hours and when not actively required.

Applicants should have regard to and make use of the lighting design process detailed in **Annex 1** of West Lothian Council's Supplementary Planning Guidance (SPG) – *Controlling light pollution and reducing light energy consumption*. It is further required that all lighting proposals should be submitted with a completed *lighting design check list* as provided in **Annex B** to the SPG.

Once approved in writing, the lighting scheme shall be implemented [**APPROPRIATE TIME TO BE INSERTED**] and thereafter operated in accordance with the approved details. The council reserves the right to require periodic testing to be conducted on the lighting installations and if it is confirmed that approved levels are being exceeded the operator of the lighting scheme will be required to implement the necessary works to bring it back within compliance within a specified time period.

Reason: to ensure that the council retains control over these matters, to ensure the proper implementation of the lighting proposals in the interests of the amenity of the site and the area as a whole, to prevent light pollution and to minimize energy use.



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