TEMPLE

March 2006

Assessment of the Problem of Light Pollution from Security and Decorative Light

Published Guidance/Standards on Obtrusive Light

A report by Temple (assisted by NEP Lighting Consultancy) to the Department for Environment, Food and Rural Affairs

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1.0 INTRODUCTION

1.1 Aims

The main aims of the project were:

To carry out some primary research in gathering information, mainly from Local Planning Authorities (LPAs), on the extent to which light pollution is a nuisance and to determine what percentage is due to domestic security and decorative garden lighting, and to detail the technical aspects of this obtrusive lighting.

To examine the ways in which obtrusive light can be controlled and how relevant the existing guidance on the subject is to the current planning system.

To lay this out in a report and as a practical tool for use by LPAs in assessing such potential nuisance, and to produce a simple guide that will help the public understand the problems inherent with domestic security lighting and how they can be best avoided.

1.2 Objectives

The main objectives of the study are:

- To review the scale of the problem of nuisance from light pollution.
- To summarise the current UK and EC legislation/guidance.
- To provide details of the security and permanent garden lighting that is reported to cause a nuisance to neighbours, and the reasons for this.
- To suggest simple, low-cost, practical solutions to reduce the potential for nuisance, and comment upon their likely effectiveness.
- To consider possible methods by which a local authority may assess whether a nuisance is occurring, both subjective and objective.
- To provide a draft final report and then a final report detailing the work carried out and the results of the study.
- To provide a guide, both outlining the problem of nuisance from security and permanent garden lighting and offering advice on the means of reducing the potential for problems to arise, suitable for publication on the Department's web site.

Accordingly, the following chapters detail the study which has been carried out and our conclusions.

2.0 PUBLISHED STANDARDS/GUIDANCE ON OBTRUSIVE LIGHT

2.1 UK Guidance

2.1.1 Guidance Notes for the Reduction of Obtrusive Light Institution of Lighting Engineers (ILE) 2005 (4 pages – b/w)

These Guidance Notes were initially produced in 1992 and have since been systematically undated. Since 1994, the Institution of Lighting Engineers have suggested the use of night-time environmental zones and a number of limiting technical criteria to be measured or calculated for each zone. Since then, the ILE have closely followed the international work being carried out by the International Commission on Illumination (CIE). Following the final publication of CIE Publication 150 in 2003, the 2005 revision of the ILE Guidance Notes have been brought in line with this document.

Within the UK the ILE Guidance Notes have been the first publication to specify the four Environmental Zones E1 to E4 and the criteria for limiting upward light, light trespass into windows, source intensity (glare), building brightness, and from 2005, Threshold Increment (a measure of glare to road users).

This document has become widely used and is often referred to in planning applications and other legalised circles.

2.1.2 Road Lighting and the Environment Department of Transport 1993 [14 Pages - colour]

This document was produced in 1993 by the HM Department of Transport, which was at that time directly responsible for the design and installation of road lighting on the UK's motorways and other major trunk roads. It is well illustrated and was well ahead of its time in bringing attention to both the day-time and night-time visual impact that road lighting can have within the environment.

Having first introduced the concept of limiting the effects of road lighting and which are the most environmentally sensitive areas, it then expands on how its appearance by day can be best reduced and be made as "inconspicuous as possible". The following section on its appearance at night is shorter, but equally informative although with little technical details. Finally the document recommends a procedural framework and form of record keeping that has hopefully been followed up and adhered to by the later "Highways Agency" and current "Department for Transport".

2.1.3 Lighten our Darkness Royal Fine Arts Commission 1994 [51 Pages – colour}

This booklet published by the predecessors of CABE (The Commission for Architecture and the Built Environment), is basically a call to improve the quality of the night-time visual scene of our Towns and Cities.

Its message was that the urban night-time environment was a disgrace and required a planned strategy to improve it.

2.1.4 Lighting the Environment – A Guide to Good Urban Lighting Chartered Institution of Building Services Engineers, (CIBSE) and Institution of Lighting Engineers (ILE) 1995 [42 Pages - Colour]

This document, a joint publication by the UK's two professional lighting bodies, puts the substance into the call by the RFAC's "Lighten our Darkness" mentioned above.

It describes how a "Lighting Strategy" should be put together that links to both the commercial and aesthetic needs of the area, and how this should not lead to light pollution but quality lighting that people are attracted out to appreciate and enjoy. It underlines good quality lighting design with an understanding that decorative building lighting needs to be balanced, without any one section being overlit and some deliberately not lit at all.

In building luminance (i.e. brightness) terms, it makes reference to the aforementioned ILE Environmental Zones together with that document's suggested limiting values.

2.1.5 Lighting in the Countryside – Towards Good Practice Department of Environment / Countryside Commission 1997 [80 Pages – Colour]

This document was the first major attempt by government to provide practical advice on the prevention and control of lighting in the countryside.

It is split into three parts the first of which, on the principles and effects of light and lighting on people and the environment, is as relevant to urban as it is to rural locations.

Part 2, on how to prepare, plan, design and assess a lighting scheme, is more specific to UK local planning in the countryside while Part 3 – Towards good practice, suggests how this framework should be put into place by Local Planning Authorities and the other interested parties.

It covers all forms of exterior lighting from road lighting to sports lighting and has suggested flow charts for design and examples of good practice.

2.1.6 Light Pollution – Supplementary Planning Guidance South Northamptonshire Council, 1998 [17 pages – b/w]

This, believed to be the first SPG of any substance to be produced by a local planning authority, is a good introduction to the subject with reference to planning issues. It uses diagrams similar to those published by the ILE and draws attention to the Authorities planning policy on Light pollution.

2.1.7 Starry, Starry Night British Astronomical Association (BAA) and Campaign for the Protection of Rural England (CPRE) 2000 [4 Pages – Colour]

This leaflet, first produced in 1993 is a simple call to protect the environment and particularly the night sky, from "light pollution". It emphasises how most of this light is wasted light shining up into the sky where it is of use to no one. It is therefore a waste of light and of energy and calls on all those responsible for lighting to address the matter.

2.1.8 Domestic Security Lighting, Friend or Foe
Institution of Lighting Engineers (ILE) 2001 [2 Page – b/w]

This leaflet is a simple guide on domestic security lighting emphasising that the brightest is not always the best and that glare can help the criminal rather than distract from his pursuits him. It contains a number of simple diagrams on how best to position and aim security lights.

2.1.9 Light Pollution - Responses and Remedies
Bob Mizon, Springer Books, (Patrick Moore' Practical Astronomy Series) 2002 [216 Pages – colour]

This, the first complete book on the subject is written by one of the leaders of the *UK Campaign for Dark Skies,* and is therefore mainly concerned with "Sky glow" and the loss of the stars for our children and the amateur astronomer. It uses a number of illustrations from the *International Dark Skies Association (IDA)* as well as recommending the *ILE Guidance Notes* and the use of their Environmental Zones in helping to reduce the problem.

2.1.10 Low Energy Domestic Lighting
Energy Saving Trust 2002 [6 Pages – Colour]

This leaflet while primarily concerned with promoting the use of compact fluorescent lamps has a small section on external lighting in which good design in minimising spill light and hence energy waste is promoted.

2.1.11 Environmental Considerations for Exterior Lighting [Factfile No. 7]
Chartered Institution of Building Services Engineers (CIBSE) 2003 [7 Pages b/w]

This helpful document suggested the considerations that need to be taken into effect when planning and/or designing exterior lighting. It summarises many of the issues raised in *Lighting in the Countryside* and the *CIE Publication 150:2003*, and has useful sections on specific lighting applications such as building lighting, road lighting, sports lighting, parks and gardens and signs and advertisements. However, it does not suggest limiting parameters unlike the *ILE Guidance Notes* or *CIE 150.*

2.1.12 Night Blight!
Campaign to Protect Rural England (CPRE) 2003 [31 Pages – colour]

This report is a background document to a new joint campaign by the CPRE and BAA against light pollution. It discusses the sources, the impacts and why they are important, and how the problem is getting worse – with figures to prove it.

It also discusses the relationships of lighting on road safety and crime issues and how the problem can be reduced. It calls for the Government to make light pollution a statutory nuisance.

2.1.13 Light Pollution and Astronomy
Seventh Report of Session 2002-03 Volume 1, House of Commons Science & Technology Committee 2003 [69 Pages – colour]

This Report discusses the issues of light pollution and concludes that it is an issue of concern and that Members of Parliament have up to now not taken the matter seriously enough. It calls for "Lighting in the Countryside" to be updated and extended to urban areas and that parliamentary planning guidance should direct people to the ILE Guidance Notes. It also suggests that light pollution be made a statutory nuisance.

Government Response to above Report

The Government noted the findings and agrees that "Lighting in the Countryside" should be updated. It is unclear on the statutory nuisance issue but suggests that a new annex to PPS 23 should deal specifically with Light Pollution.

2.1.14 BS 5489-1:2003 Code of Practice for the Design of Road Lighting – Part 1: Lighting of Roads and Public Amenity Areas

This major revision of BS 5489 has been carried out following the publication of BS EN 13201 (see 2.2.1). It contains guidance and recommendations that are intended to support BS EN 13201 and to enable designers of lighting systems to comply with that standard. It has two parts, the second part dealing with tunnel lighting.

Section 5.3 deals specifically with the minimization of obtrusive light and users are directed to the ILE Guidance Notes (see 2.1.1) for further reference.

2.2 EU Guidance / Proposed Standards

2.2.1 BS EN 13201: 2003, Road Lighting, Part 2: Performance Requirements

The main importance of this new document with respect to the minimization of obtrusive light is its wide range (over 20) of classified lighting levels for different roadway, pathway and conflict areas. For the first time these are linked to traffic volumes and opens up the possibilities for reducing lighting levels on roads when traffic flows are reduced, such as in the middle of the night.

2.2.2 PrEN 12464-2, Lighting of Work Places – Part 2: Outdoor Work Places

This document, currently in draft format (April 2004), will lay down the lighting requirements for various outdoor workplaces ranging from power stations to railway yards in terms of lighting levels and uniformities. A further chapter on "Obtrusive Light" will highlight the CIE/ILE recommendations for limiting light pollution with reference to one of four Environmental Zones as described in those documents.

2.3 International Guidance Published by the International Commission on Illumination (CIE)

2.3.1 Pub. No 1 1980 Guidelines for Minimizing Urban Sky Glow near Astronomical Observations with the International Astronomical Union

This was the first publication to draw attention to the concern of astronomers over light pollution. Its aim was to give astronomers a way of calculating the likely impact of urban settlements on the world's most important observatories, and where new ones should be located.

2.3.2 Pub. No 126: 1997 Guidelines for Minimising Sky Glow

This document, while specifically concerned with sky glow and how to measure it, updates the above document and introduces the concept of environmental zones relevant to an observatory. It also published the 1994 version of the ILE Guidance Notes as an Appendix.

2.3.3 Pub. No. 150:2003 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations

This is currently the most comprehensive technical document on the effects of obtrusive light and how to control it. Its major use in the UK is that it gives the technical methodology for calculating and measuring the various technical parameters used in its own and the ILE Guidance Notes. It also has the authority and respect of the international lighting community.

2.4 Legislation

The Clean Neighbourhoods and Environment Act 2005 amended section 79(1) of the Environmental Protection Act 1990 to include under the statutory nuisance regime (in England and Wales) "artificial light emitted from premises so as to be prejudicial to health or a nuisance" (commenced on 6 April 2006). Light is also one of the physical factors which may be taken into account in determining compensation for the physical effects of roads on the value of property under Part 1 of the Land Compensation Act 1973.

There is no all-embracing definition of what constitutes a nuisance. However, the emphasis is on invasion of interest and unreasonable interference with use to which land is put. The test is whether a hypothetical reasonable person would be discomfited by the adverse state of affairs in question, so the courts look at adverse state of affairs through the eyes of the claimant. There is a wide variety of different circumstances capable of ranking as a nuisance, though no hierarchy of pollutants.

There is little case law on the subject of light nuisance, with most case law deriving from either the USA or the Commonwealth. In one case, illumination from a sign was held to constitute a nuisance (Shelburne v Crossan 122 A- 749 [1923]). In another case the court accepted the action for injunction to restrain the use of property for night baseball arguing that light can constitute a nuisance (Hansen v Independent School District 98 P-2d 959 [1939]). In the case of Noyes v Huron and Erie Mortgage Co. ([1932] 3 DLR 143) floodlighting of a building interfered with the illuminated advertising signs of the Plaintiff. The court found that a nuisance existed and stated that 'It is not every slight interference that constitutes a nuisance but it must be of a sensible and material nature.'

More recently in the New Zealand case of Bank of New Zealand v Greenwood ([1984] 1 NZLR 525) the Defendant built a glass veranda which deflected sunlight from its natural course onto the Plaintiff's property. The court found that this did constitute a nuisance. In the Australian case of Abbott v Arcus ([1948] 50 WALR 41) the Defendant constructed tennis courts on land adjoining the Plaintiff's house with powerful electric lighting. The court found that an injunction should be issued against the use of the court for play at any time between sunset and 7AM in the morning.

In the United Kingdom there is little case law on nuisance lighting. In the case of Stonehaven and District Angling Association v Stonehaven Recreation Ground Trustees ([1997] 60 SPEL 36) the interference by artificial light from a tennis club was ranked as a nuisance in law and the Sheriff granted an interdict against the club.

There are two factors which a court takes into account while determining if the state of affairs constitutes a nuisance:

- Social utility of Defendant's conduct - The more socially useful the Defendant's conduct the less likely it will rank as a nuisance in law. However, this is poorly articulated by way of any judicial decision. It is probably true to say that light from factories less likely to rank as a nuisance than, say, light from advertisements.
- Motive of Defendant - If the defender acts out of spite the court will incline to the view that the state of affairs ranks as a nuisance. (Christie v Davie [1893] 1 Ch. 316)

The tort of private nuisance protects landowners and tenants from interference with their enjoyment of the ownership or occupation of their property. The courts have recognised such nuisances as taking many different forms, for example the smell from a pig farm interfering with its neighbours' enjoyment of their property. If a nuisance can be established, damages may be awarded if a loss can be demonstrated. If damages will not be an adequate remedy, the court may award an injunction restraining the actions of the creator of the nuisance.

While light nuisance has been recognised as a private nuisance in other Commonwealth jurisdictions for some time, the English courts have been slower to accept this.

It was not until 2000 and the case of Bonwick v Brighton and Hove Council that the English courts recognised light as a potential source of nuisance. In this case the council had erected powerful security lights which shone onto Mr Bonwick's property. Complaints to the council were ignored so a claim was brought in the County Court for nuisance. The council was ordered to extinguish the lights until they had been repositioned in such a way that they did not affect Mr Bonwick's property as well as being ordered to pay Mr Bonwick costs and damages.

Statutory provisions of the Town and Country Planning Act can be used to control lighting from new development and National Planning Policy Guidance on Planning and Pollution Control 1994 (PPG23 – now Planning Policy Statement 23) recommended that LPAs should take account of lighting and light issues in preparing Local Plan policies:

"the possible impact of potentially polluting development on land use, including the effects on health, the natural environment, or general amenity, resulting from releases from water, land or air, or on noise, dust, vibration, light or heat"

Appendix A of Planning Policy Statement 23, published in 2004, states that when considering development plans and individual planning applications, LPAs should take into account:

"the need to limit and, where possible, reduce the adverse impact of light pollution, e.g. on local amenity, rural tranquillity and nature conservation"

A third Annex on Planning and Light Pollution under PPS 23 will be prepared for public consultation in due course.

Specific guidance is given on the installation of floodlights at sports and recreational facilities. PPG17 on Sport and Recreation (1991) states:

"The LPA should seek adequate information as a basis for making decisions on applications involving the installation of floodlights. It may be possible to grant permission subject to conditions, for example limiting the hours during which the lights may be switched on, or requiring the installation of some sort of shielding. In this way recreation can be encouraged wherever possible, and not stifled by lack of information about the effects of a particular development."

2.5 References

The following reference material, whilst not exhaustive, is considered to represent a comprehensive list of reference material which provides useful information about lighting, its design and aspects related to nuisance.

Title	Author	Date
Guidance Notes for the Reduction of Obtrusive Light	Institution of Lighting Engineers (ILE)	1992 [Revised: 1994, 1997, 2000 and 2005]
Road Lighting and the Environment	Department of Transport	1993
Lighten our Darkness	Royal Fine Arts Commission	1994
Lighting the Environment – A Guide to Good Urban Lighting	Ch. Inst. Building Services Eng, (CIBSE) / Institution of Lighting Engineers (ILE)	1995
Lighting in the Countryside – *Towards Good Practice*	Department of Environment / Countryside Commission	1997
Light Pollution – SPG	South Northamptonshire Council	1998
Starry, Starry Night	British Astronomical Ass. (BAA) / & CPRE.	2000
Domestic Security Lighting, Friend or Foe	Institution of Lighting Engineers (ILE)	2001

Title	Author	Date
Light Pollution - Responses and Remedies	Bob Mizon , Springer	2002
Low Energy Domestic Lighting	Energy Savings Trust	2002
Environmental Considerations for Exterior Lighting [Factfile No. 7]	Chartered Institution of Building Services Engineers (CIBSE) Revision 1	October 2003
Night Blight!	Campaign to Protect Rural England (CPRE)	2003
Light Pollution and Astronomy	H of C Science & Tech Committee	2003
BS 5489-1:2003, Code of Practice for the Design of Road Lighting, Part 1: Lighting of Roads and Public Amenity Areas		
BS/EN 13201-2 Road Lighting – Part 2: Performance Requirements		
Pren 12464-2 Lighting of Work Places – Part 2: Outdoor Work Places in Draft		
Guidelines for Minimizing Urban Sky Glow near Astronomical Observatories	International Astronomical Union (IAU) Pub. No 1	1980
Guidelines for Minimizing Sky Glow Pub. 126		1997
Guide on the Limitation of the Effects of Obtrusive Light From Outdoor Lighting Installations Pub. 150		2003

3.0 THE QUESTIONNAIRE

In order to obtain information from Local Authorities about the scale of the problem of lighting and nuisance, a questionnaire was developed to be sent to all LAs in England and Wales. The form of Questionnaire was agreed and sent out to around 360 Environmental Health Officers in July 2004. By October 2004 there had been 73 replies covering over 1050 individual complaints. It was agreed that whilst the overall reply response was relatively low, the results demonstrated a uniformity of approach within the LAs and the results could therefore be relied upon as being statistically valid.

Both a copy of the original questionnaire and the final summary results are attached to this Report (**Appendix A**) and the following is a general analysis of those results.

Question 1 was a simple Yes/No question of whether the public authority published any policy or guidance on "Light Pollution". Only 32% reported that they had.

Questions 2-5 required further details of those that had replied Yes to having policies and/or guidance in place. 18% had technical guidance, while 14% had some form of policy statement within their Local Plan. 12% had published information on their web sites, whilst 22% had published hard copy documentation.

Questions 6 & 7 asked the Environmental Health Officers whether they were aware of any guidance on the subject, whether they referred to it, or had copies of it. For specific references to technical publications (Q6), the results were also disappointing in that whilst 43% had heard of the Institution of Lighting Engineer's Guidance Notes on the subject, only 15% had heard of the Government's own "Lighting in the Countryside" document. Whilst the "Lighting in the Countryside" document was aimed more towards planners, one would have hoped that at least knowledge of it would have filtered through to those concerned with Environmental Health issues. On the more general publications (Q7), whilst up to 30% had knowledge of the BAA/CPRE publications, only 14% were aware of the House of Commons Report and the Government's response to it.

Question 8 asked for a breakdown of registered complaints regarding light pollution/obtrusive light, and whilst the majority of replies did separate these complaints out into their respective types a few did not, choosing to group all under the heading of Other. As this somewhat distorts the results it has been decided to re-classify these in the ratio of those provided within the rest of the data set; these modified results are shown below in Figures 1 to 4.

Figure 1 - Q8 Sources of Complaints (All)

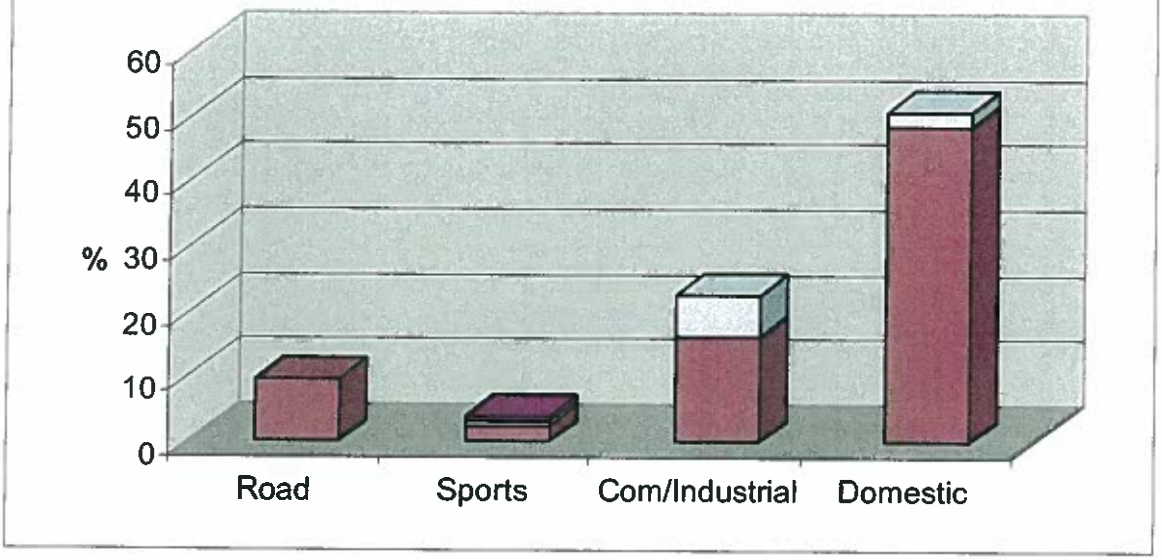


Figure 2 - Q8 Sources of Complaints (Sports)

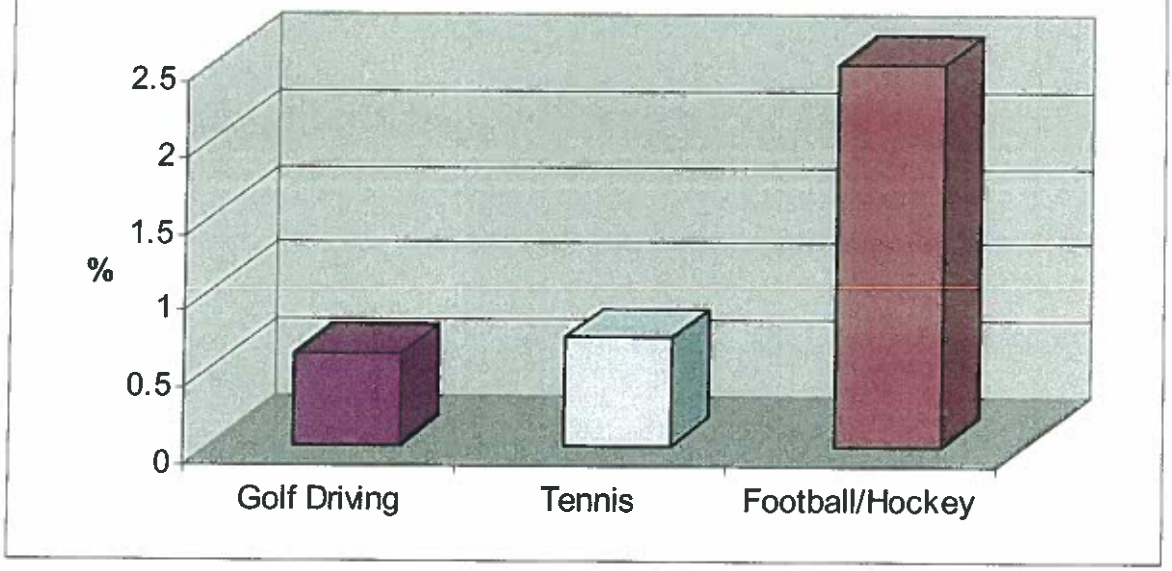


Figure 3 - Q8 Sources of Complaints (Commercial)

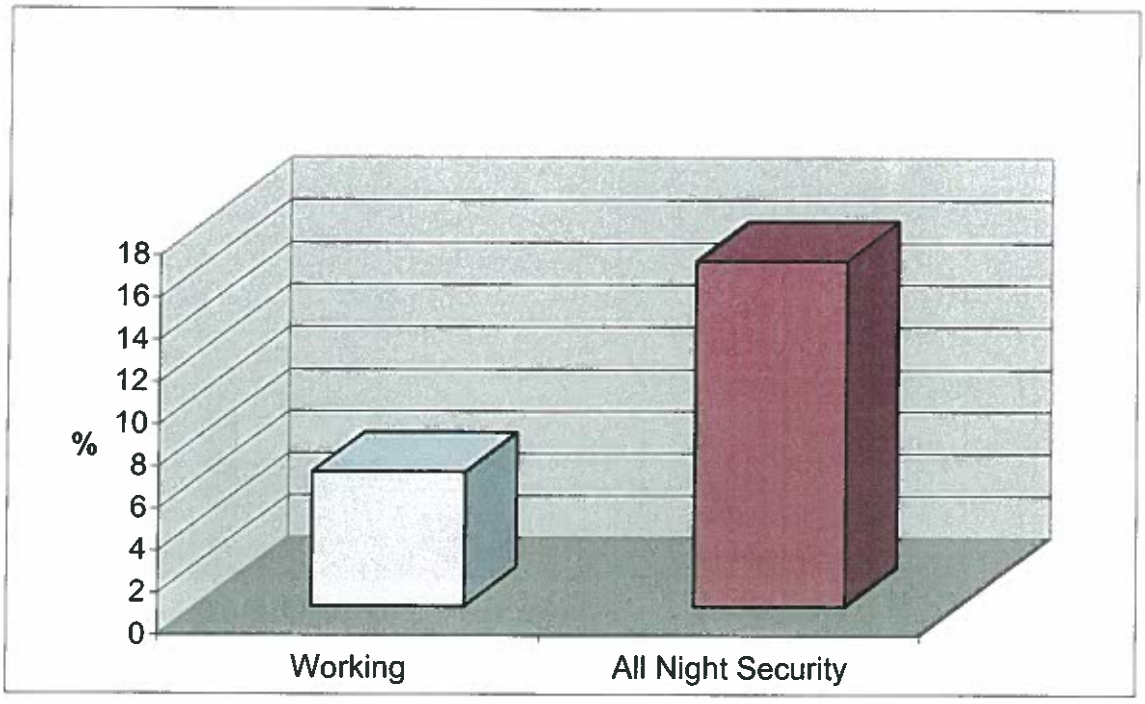
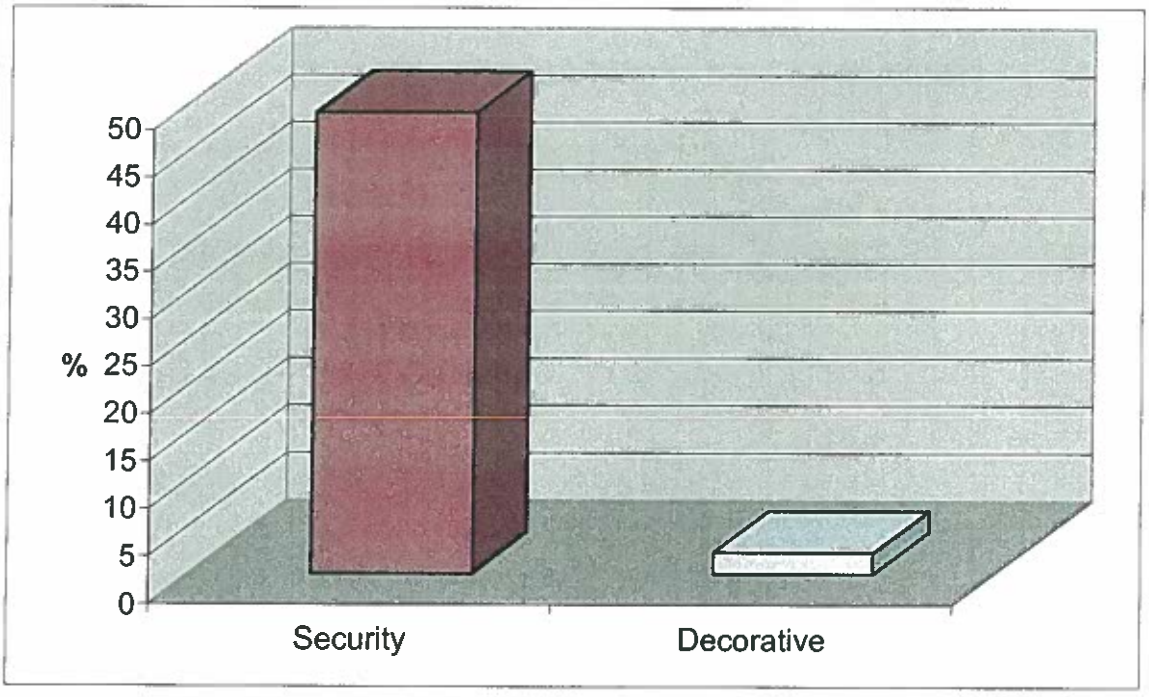


Figure 4 - Q8 Sources of Complaints (Domestic)



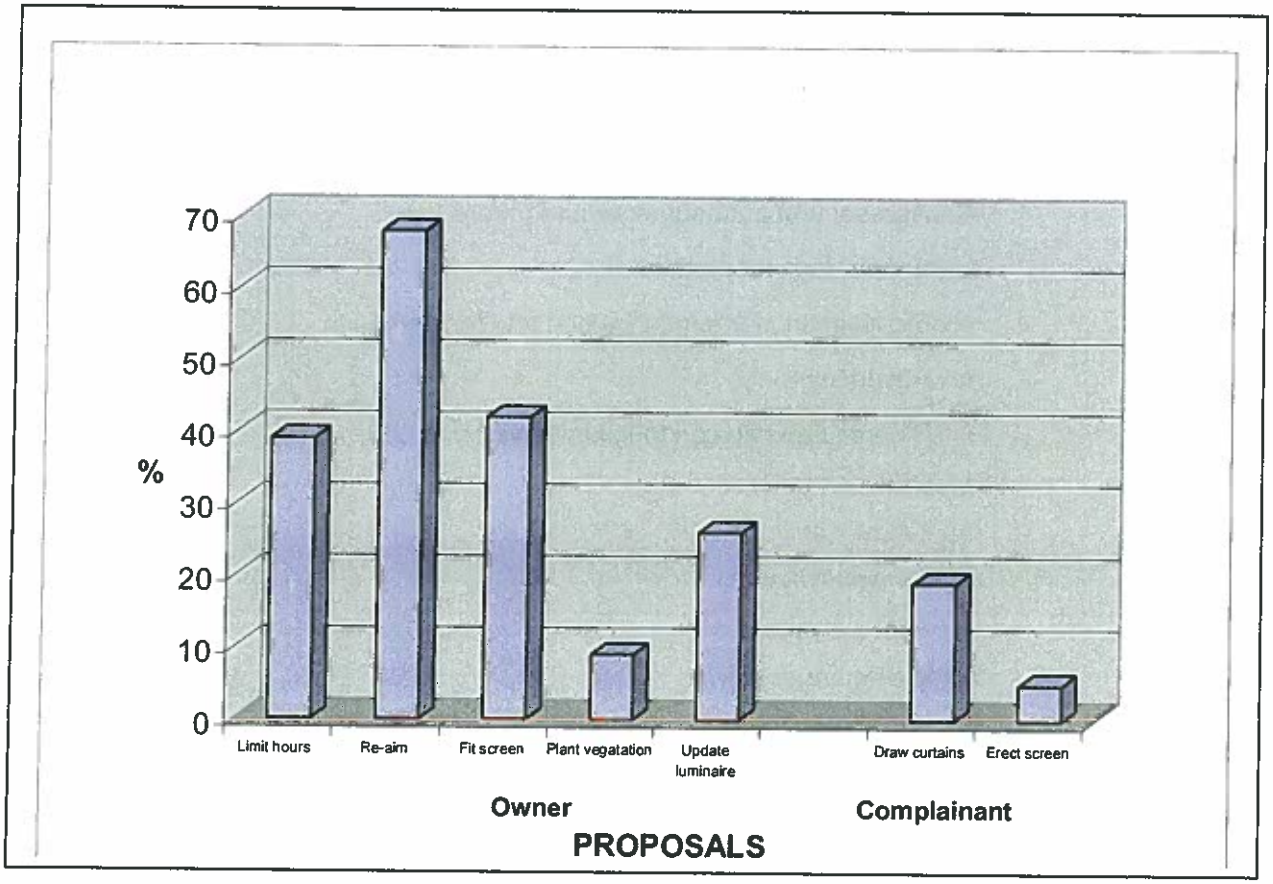
Question 9 confirmed that no more than 1% of Environmental Health Officers had carried out any measurements of any form of obtrusive light and none (Q15) had any type of light meter available to carry out light measurements.

Question 10 queried the competency of officers examining such complaints, and whilst 18% had training programmes and 9% passed the complaint on to other either internal or external consultants, the majority, over 56%, would leave it to the officer's "general knowledge".

Questions 11-14 concerned the ILE Guidance notes of which 43% had accepted knowledge of in Q6. Of these, 14% had adopted them and all of these had found their tabulated lighting levels to be fair and reasonable. However, no one had yet designated any of the "Environmental Zones" in any Council Plans.

Question 16 proposed a number of possible mitigation measures that were answered as shown in **Figure 5**:

Figure 5 - Q16 Mitigation



The remaining questions asked views as to whether "Obtrusive Light" should become a "Statutory Nuisance" to which the majority (53%) said they would welcome it becoming a statutory nuisance (30% did not). 97% of those respondents who responded positively indicated that workshops to explain the technical points of lighting would be helpful.

4.0 CURRENT PRACTICE

4.1 Overview

Most local authorities attempt to tackle lighting issues at the planning stage. 11 of the 72 local authorities that responded to the survey have adopted planning policies to address obtrusive light from new developments. The policies mostly adopt the general form of policies to protect amenity on neighbouring property from such emissions of noise, vibration, fumes, smells, smoke and other forms of pollution. Lighting is specified as a form of pollution, as well as other emissions. A few local authorities, such as Dacorum D.C, L.B Ealing, East Hampshire D.C. and L.B. Merton, have adopted or are about to adopt specific policies within their Local Plans, to protect amenity and natural habitats, landscape and townscape, strategic views and the night sky (see Appendix B). The policy of the LB of Ealing, which was driven, in the most part, by the Local Agenda 21 Group, also covers sustainable energy use as well as the protection of amenity and habitats and the protection and enhancement of buildings, the townscape, landscape, canals and strategic views.

4.2 South Northamptonshire Council

South Northamptonshire has adopted a SPG on light pollution which includes specific policies on obtrusive light. The SPG also provides guidance on:

- Assessment and information requirements,
- Safety and crime prevention,
- Floodlighting for sports pitches and tennis courts,
- Advertisements,
- Planning and design of lighting systems:

1. Direction of light,
2. Amount of light,
3. Sensor switches,
4. Types of lamps,
5. Wasted energy, and
6. Alternative lighting schemes for lighting rural streets and footpaths.

4.3 Dacorum District Council

Dacorum has adopted relatively detailed policies within the UDP to protect areas of countryside and 'Areas of Outstanding Natural Beauty' and has zoned different areas within the district using the four Environmental Zones (E1 to E4) for 'Obtrusive Light Limitations for Exterior Light Installations', recommended by the ILE. The zones establish "*a strategic and consistent hierarchal approach to new lighting based on location. They clarify what level of new lighting will be generally acceptable. The zones represent a progressive way of differentiating between brighter urban areas and the dark landscapes of the rural environments in the Borough.*".

Most forms of lighting are permitted in built-up town areas. Different levels of control are then applied outside the built-up areas:

1. Strict control over any new lighting will be applied in smaller settlements and will exclude the introduction of new sports floodlit facilities;
2. Exceptional circumstances will need to justify exterior lighting permissions in areas beyond the urban fringe of towns in the district, and
3. Apply strict control over outdoor lighting to maintain the dark landscapes of the open countryside and 'Areas of Outstanding Natural Beauty'.

The Local Plan also provides a checklist of factors that must be considered as part of the application. The Council generally requires full details of all aspects of the installation and a lighting statement by a qualified engineer/consultant. Guidance is also given on the types of conditions and restrictions which may be used to control light pollution as well as design elements that can be used to minimise light pollution.

4.4 Other Councils

East Hampshire District Council provides an information leaflet on the practical measures that can be used to prevent or minimise light pollution. The leaflet identifies the steps that can be taken, including mediation, for complainants who are bothered by light pollution. The information given in the leaflet is mostly drawn from the NSCA booklet on obtrusive lighting. Other local authorities try to mitigate light pollution problems and there are other examples of advice provided by local authorities on tackling light pollution. Arun District Council, for example, provides information on its web-site about legal provisions and ways of dealing with existing problems.

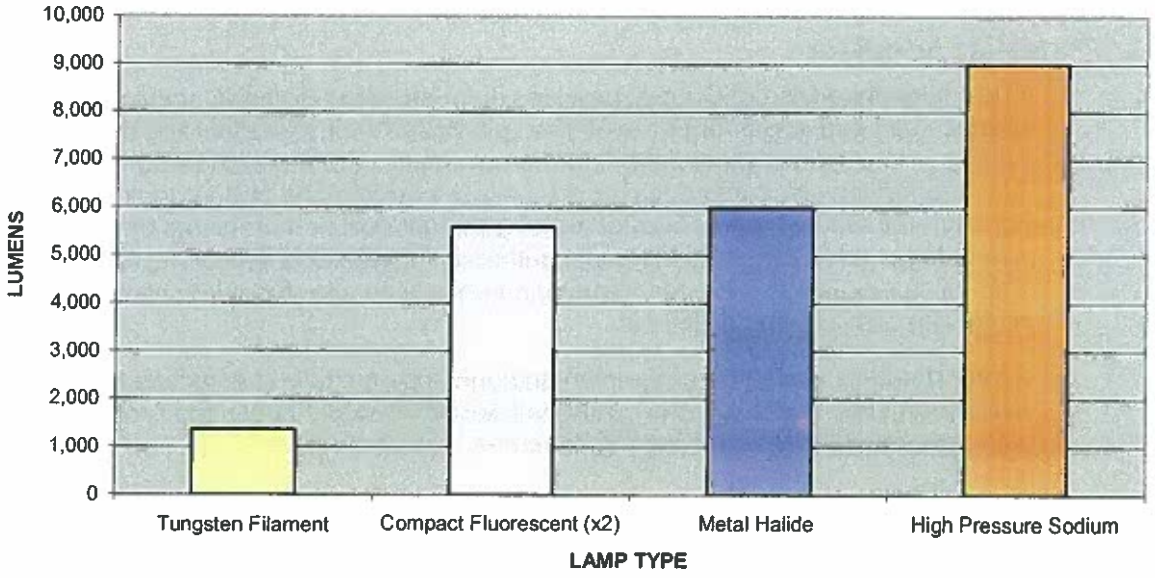
Appendix B details some of the planning guidance provided by various local authorities and in particular demonstrates a range of policies which address the problems associated with new development and lighting schemes.

5.0 SOLUTIONS

The cause of most obtrusive light is bad design, inappropriate equipment and/or poor installation or maintenance. The best way to improve matters therefore is by education and good example.

A fundamental example of this is that LIGHT is measured in "lumens" and depending on how efficiently it is produced the power input will vary. This can be shown by the comparisons in Figure 6 that show a range of available light sources (i.e. lamps) for which the power input is constant at around 100w. The range of "lumen" outputs is very large and lamps are widely available that emit anything from 10 lumens or below up to 220,000 lumens – examples of the latter being used in major sports lighting installations.

Figure 6 - Light Output for 100w



5.1 Education – The Role of the Lighting Industry

The lighting industry, like all others, produces both good and not so good items of equipment, usually dependant on price. However, it is not always easy for the respective purchaser or installer to tell the difference between them, and here the lighting Industry itself could help by the better labelling of products.

As part of this research project, a meeting was held in Central London on the 1st September 2004 to which representatives of the following organisations were invited:

From the two main professional lighting bodies:

- The Institution of Lighting Engineers (ILE)
- The Society of Light and Lighting (SLL) – part of CIBSE

- From Industry:
- The Lighting Industry Federation (LIF)
- The Lighting Association (LA)
- The Electrical Contractors Association (ECA)
- The Electrical Distributors Association (EWA)

From Energy Conservation circles:

- The Carbon Trust
- The Energy Saving Trust

Other interested parties

- Chartered Institute of Environmental Health (CIEH)
- A Local Authority Planning Department – representing RTPI

Those who attended the meeting are listed below:

Present:	
Howard Price	CIEH
Mike Turner	ECA
David Coatham	ILE
Francesca Markland	LIF
Nigel Gibbs	Dacorum D.C. (RTPI)
Jonathan David	SLL
Plus organisers:	
Nigel Pollard	NEP
Graham Parry	TEC
Apologies	
Kevin Verdun	LA

Neither the Carbon Trust nor the Energy Savings Trust attended and they intimated that the issues of "Light Pollution" were less relevant to them than was the case with the Electrical Distributors Association. The Lighting Association indicated that they were very interested, but could not attend on the day.

As suggested in the initial tender brief an experienced eye looking around the UK is aware of a great deal of "obtrusive light" that is simply due to ignorance and/or bad practice, which the lighting industry should be able to act on itself and help reduce.

It was therefore suggested to the meeting that two key elements in this aspect were:

(i) The education of those buying and installing lighting equipment; and

(ii) The assistance through clearer labelling of lamps and luminaires by the lighting industry.

5.2 Actions – Suggested Industry Leads

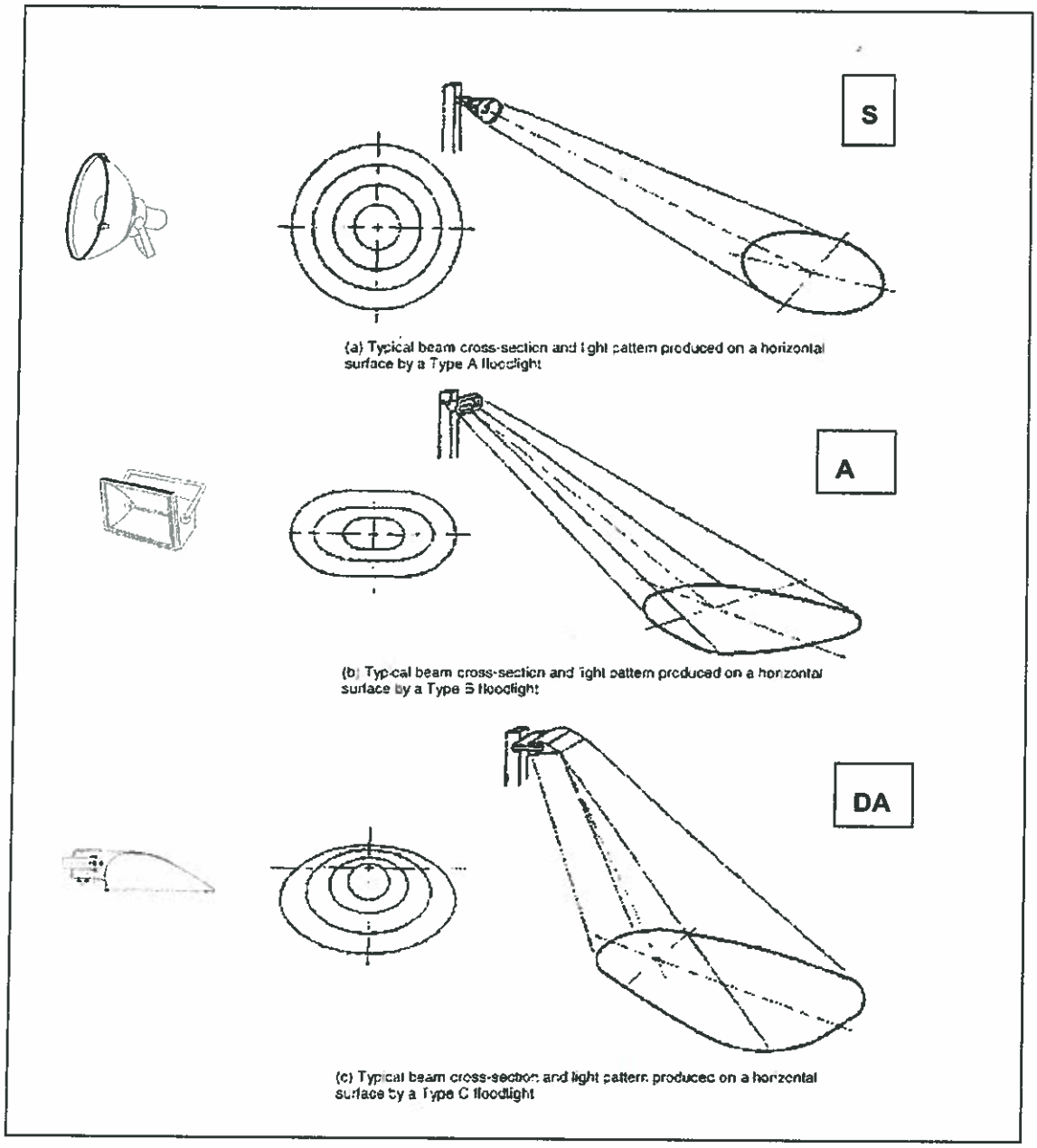
5.2.1 Lamp Light Output

One of the fundamental issues discussed was the well established tradition of referring to the power of a light source (i.e. lamps) not by their light output - as would seem logical, but by their electrical input. As lamp technology has developed this has resulted in lamps being sold with widely differing light output as 1,350 lumens and 9,000 lumens both rated at 100 watts as shown in Figure **6**. As the industry puts more and more emphasis into more efficient light sources, particularly LED's, the problem will become exacerbated. Furthermore, the industry itself needs to start using the lumen value as the default, rather than the wattage value, for light sources generally. The lamp industry is progressing on listing lumen values and more lamp packaging does now give the lamp light output in lumens marked on it. However, those products listing lumens is still too small and it therefore needs to be given a higher importance. Whilst the larger, international lamp manufacturers are all now based overseas, there are some smaller, specialist manufacturers within the UK who could possibly lead the way in this respect.

5.2.2 Luminaire Distributions

Luminaires have many different optical systems that have been designed to suit the lighting tasks required of them. However, these are often not clearly understood, and more needs to be done in defining these in simple terms. Both of the professional lighting bodies present ran training courses and it was suggested that the above actions be introduced somewhere within their current training programmes. The way forward in this respect was the suggestion of a simple labelling system based initially on the three basic luminaire floodlight beam patterns identified by the CIE and shown in **Figure 7** below. These are: Symmetrical, Asymmetrical and Double-Asymmetrical, and would be indicated by the letters S, A, and DA.

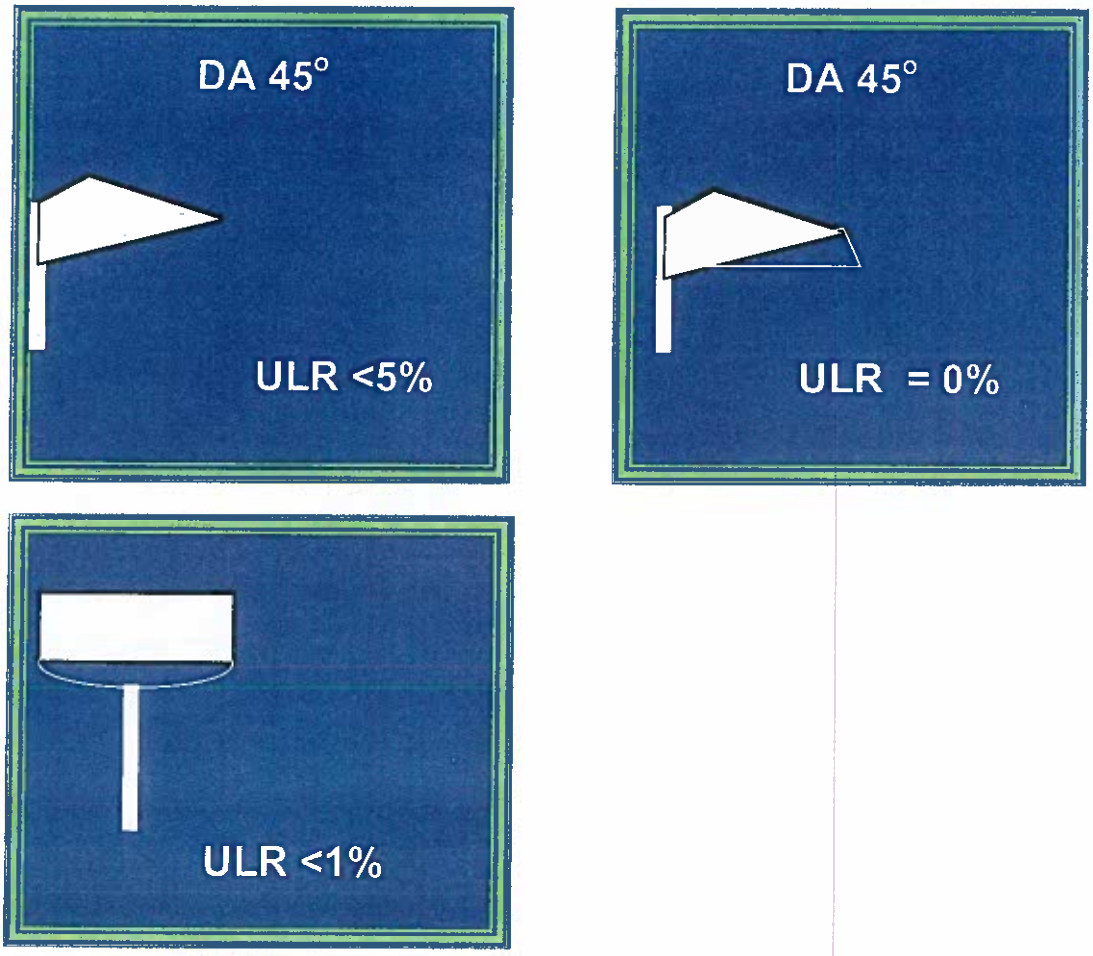
Figure 7 - Luminaire 'Floodlight' Types



Those marked DA would be further identified by the angle, normal to the front glazing from which the main beam was emitted. e.g. DA 45°.

Finally, the Upward Light Ratio (ULR) would be stated in line with the recommendations of CIE Publication 150:2003, - for variable aim luminaires, standardised at 70°. (See **Figure 8**)

Figure 8 - Suggested Luminaire Labelling System



5.3 Education – Local Authority Personnel & the General Public

5.3.1 Local Authority Personnel

It is suggested that the education of local authority personnel in both general lighting matters and the above specific information could be carried out by their respective professional bodies (CIEH, RTPI) in co-operation with the two professional lighting institutions - The Institution of Lighting Engineers (ILE) and the Society of Light and Lighting (SLL).

Appendix C gives an example of a model Lighting Policy document that LA's may also consider adopting or amending to suit the personal circumstances and requirements of their authority.

Detailed guidance for Local Authority personnel on all the most important aspects of Obtrusive Light can be found in the documents listed below that the Authority is advised to obtain from the bodies concerned.

- Guidance Notes for the Reduction of Obtrusive Light

  Institution of Lighting Engineers (ILE) 2005

  [www.ile.co.uk]

- Lighting in the Countryside – *Towards good practice*

  Department of Environment / Countryside Commission 1997

  [www.odpm.gov.uk]

- CIE Pub. No. 150:2003 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations

  Published by the "International Commission on illumination (CIE)

  [www.cie.co.at]

Specific information of particular relevance taken from the above publications is reproduced on the following pages for convenience, but should be referred to in context with them.

From ILE Guidance Notes: (Page 3)

ENVIRONMENTAL ZONES:
It is recommended that Local Planning Authorities specify the following environmental zones for exterior lighting control within their Development Plans.

Category	Examples	
E1:	Intrinsically dark landscapes	National Parks, Areas of Outstanding Natural Beauty, etc
E2:	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3:	Medium district brightness areas	Small town centres or urban locations
E4:	High district brightness areas	Town/city centres with high levels of night-time activity

Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

DESIGN GUIDANCE
The following limitations may be supplemented or replaced by a LPA's own planning guidance for exterior lighting installations. As lighting design is not as simple as it may seem, you are advised to consult and/or work with a professional lighting designer before installing any exterior lighting.

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	Average, L [cd/m2]
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

ULR = 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 - 23.00hrs is suggested.
* = From Public road lighting installations only

(1) Upward Light Ratio – 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 endeavour 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 achieve.

(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 used to light an adjacent area.

From 'Lighting in the Countryside' Chapter 5, Box 5

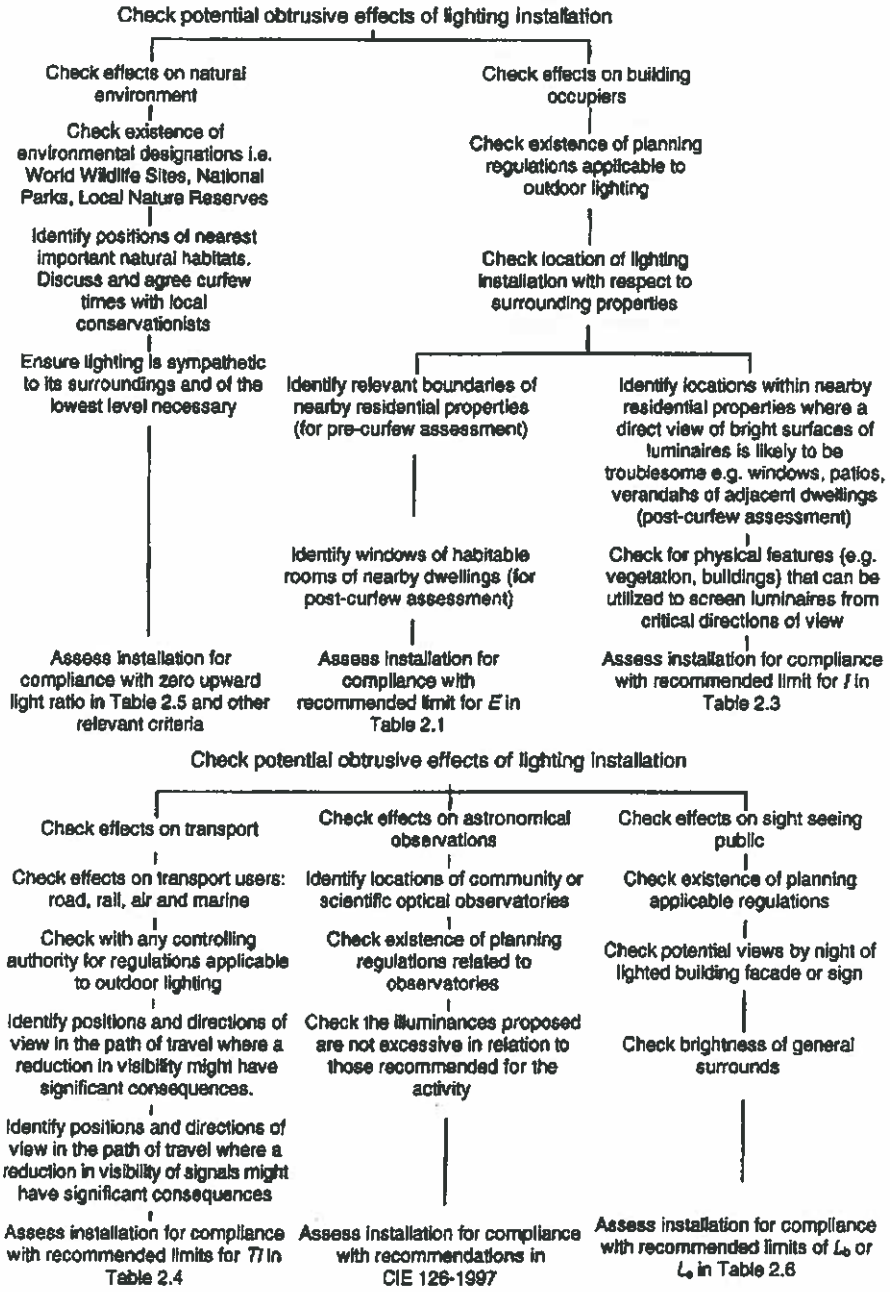
Box 5 Information That May Be Requested In Support Of Planning Applications Involving Lighting Schemes

- a statement of why the lighting is required, the proposed frequency of use, and the hours of illumination;
- a site plan showing the area to be lit relative to the surrounding area, indicating parking or access arrangements where appropriate, and highlighting any significant existing or proposed landscape or boundary features;
- details of the number, location and height of the proposed lighting columns or other fixtures;
- the type, number, mounting height and alignment of the luminaires;
- the beam angles and upward waste light ratio for each light;
- an isolux diagram showing the predicted illuminance levels at critical locations on the boundary of the site and where the site abuts residential properties or the public highway; and
- where necessary, the percentage increase in luminance and the predicted illuminance in the vertical plane (in lux) at key points.

From CIE Publication 150:2003

Figure 3.1 Checks of potential obtrusiveness which should be undertaken in the design of outdoor lighting.

CIE 150:2003



NOTE: All of the actions listed will not necessarily apply to every installation. Additional checks may need to be undertaken for unique situations.

Table 3.1 Possible effects on spill light from changes to the installation parameters.

Parameter	Dimension	Advantages	Disadvantages	Influence on design	Comments
Mounting height	Greater	-Less spill light -Simplified shielding -Less glare from luminaires (see comment)	-More conspicuous by day	-Narrower beams -Tighter beam control -More downward aiming	-Higher mounting implies more conspicuity but allows better control of spill light - Mounting height may be determined by lighting requirements, e.g. in relevant Standards, or vertical illuminance component required for the application -The listed advantages and disadvantages are reversed for Type C cut-off floodlights that incorporate a pre-set aiming angle, i.e. with no means of adjusting the beam
	Smaller	Less conspicuous by day	-More spill light -More difficult to shield -More glare from luminaires (see comment)	-Smaller lamps -Wider beams -More upward aiming	
Set back	Greater		-More spill light -More difficult to shield	-Narrower beams -More outward or higher aiming	Set back may be determined by physical constraints, requirements for unobstructed views, safety to users
	Smaller	-Less spill light -Simplified shielding		-Wider beams -More inward or lower aiming	
Luminous flux output (per luminaire)	Greater	-Greater efficiency	-More spill light	-Requires higher mounting or set back -Fewer luminaires -Reduces control	Flux output should be selected to match beam distribution availability to allow efficient and controlled design
	Smaller		-Less efficiency	-More luminaires -Increases control	
Beam type and distribution	Controlled (narrow beam or sharp cut-off)	-Controls spill light -Reduces need for shielding	-May need more luminaires to light the area	-Permits light to be well directed	Beam classification does not necessarily determine spill light control or shielding of high lamp luminances
	Uncontrolled (wide beam)		-Reduces light containment -Difficult to shield	-Limited directional control of light	
Distance to adjoining property	Greater	-Reduces effect of spill light -Simplifies shielding -Isolates installation from adjoining properties		-Less effect on adjoining property	Greater distances from lighted area to property line simplifies containment of spill light
	Smaller		-Increases spill light -Makes shielding more difficult	-Increases need for good light control	
Vertical aiming angle	High		-More spill light -Lamp more visible -Difficult to shield	-High vertical illuminance contribution	High aiming angles generally not recommended due to difficulty in controlling spill light
	Low	-Less spill light -Lamp less visible -Simplified shielding		-High horizontal illuminances -Low vertical illuminances -Simplifies control of spill light	

NOTE In this table consideration is generally given to the effect of changing one parameter at a time. In practice, it is possible to compensate for the variation of one parameter by changing another simultaneously. For example by increasing set back and mounting height together, aiming angles may be kept constant.

There is a very strong likelihood that many of these officers charged with determining whether a statutory nuisance exists from obtrusive lighting will have had little or no training in the subject and may not be aware of the guidance available on the subject.

In our research we were unable to identify specific LA sites where obtrusive lighting was alleged to exist and where we could obtain quantitative measurements. However, in previous studies the authors had encountered locations where lighting was assessed as a nuisance. Quantitative measurements of light were obtained for those sites and the results are shown in Table 1 below:

Table 1 - Obtrusive Light Measurements

Levels of vertical illuminance (in LUX) on residential windows: NEP Jobs

Location	Source of light	Ev at window
Hove	Sports Dome	<0.5
Henfield	Industrial	1.5
Hockley	Housing	2.0
Bexhill	Sports	5-8
Wells	Sports	5-10
Street	Sports	8-9

It should also be recognised that not only the absolute levels of lighting may result in a nuisance, but also the change that occurs over pre-existing ambient lighting levels. There are reports that a change from 0 Lux to 0.2 Lux can result in annoyance particularly where it is intermittent.

It is therefore important for those charged with determining whether a statutory nuisance exists to obtain as much relevant data as possible. Accordingly, Appendix E details guidance for Environmental Health Officers.

6.0 LIGHTING AND STATUTORY NUISANCE

As of 6 April 2006, local authorities in England and Wales will have a duty to inspect their area from time to time for instances of artificial light nuisance from premises, and to take reasonably practicable steps to investigate complaints of such nuisance and serve an abatement notice under section 80 of the Environmental Protection Act 1990 where a statutory nuisance is occurring or is likely to occur. This follows amendments made to section 79 of the Environmental Protection Act 1990 by section 102 of the Clean Neighbourhoods and Environment Act 2005.

Light pollution can be defined as "the projection of light onto a surface or space to which it is not intended, causing an unwanted effect to persons and/or environments exposed." Until recently, the scale of the problem has not warranted as much attention as other problems, and occurs "where lighting systems are badly installed or poorly designed." However, even though the number of complaints over the last ten years have been relatively small (EHJ, October 1998, page 276), indications are that inappropriate and intrusive lighting could pose a more serious problem in the future, particularly when it impinges on other areas of environmental health.

The explosion of lighting in the domestic sector is not confined merely to security, however. Particularly in affluent areas, there are signs of an increasing trend towards "24-hour daylight" (the extensive use of artificial light throughout the night) as residents extend lighting into the garden, especially during the summer months. This can partially be attributed to the trend for "outdoor living space", where people are spending more time outdoors entertaining (barbecues, parties etc). There could also be a knock on effect on noise levels and other environmental concerns, such as food safety.

Despite the fact that there has been no (until 6 April 2006) legal framework for Environmental Health Officers to adhere to, many authorities are still attempting to tackle the problem. Generally speaking, this has tended to be through issuing letters to businesses or residents to try and persuade them to alter the position and angle of the light source. (The best position to direct lights is downwards with the beam angled below 70°). As has been pointed out: "Often the person being complained about is unaware of the problems they are causing and when the situation is explained to them, they are happy to rectify the problem". In fact one of the key roles Environmental Health Officers can play is a preventative one, through raising awareness of the intrusion of unnecessary lighting before it has been installed.

Many of the LAs surveyed indicated that making obtrusive lighting a statutory nuisance would provide Environmental Health Officers with appropriate powers to control lighting such that the resulting impacts due to obtrusive lighting and nuisance could be mitigated. It was therefore recommended that the Government should explore the ways in which obtrusive lighting could be brought forward in legislation as a statutory nuisance, as it was under the Clean Neighbourhoods and Environment Act 2005.

6.1 Determining Whether a Statutory Nuisance from Lighting Exists

As is the case with many other pollutants the determination of statutory nuisance is often subjective although backed up with quantitative measures and reference to various guidance materials.

There is a very strong likelihood that many of these officers charged with determining whether a statutory nuisance exists from obtrusive lighting will have had little or no training in the subject and may not be aware of the guidance available on the subject.

In our research we were unable to identify specific LA sites where obtrusive lighting was alleged to exist and where we could obtain quantitative measurements. However, in previous studies the authors had encountered locations where lighting was assessed as a nuisance. Quantitative measurements of light were obtained for those sites and the results are shown in Table 1 below:

Table 1 - Obtrusive Light Measurements

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Wells	Sports	5-10
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It should also be recognised that not only the absolute levels of lighting may result in a nuisance, but also the change that occurs over pre-existing ambient lighting levels. There are reports that a change from 0 Lux to 0.2 Lux can result in annoyance particularly where it is intermittent.

It is therefore important for those charged with determining whether a statutory nuisance exists to obtain as much relevant data as possible. Accordingly, Appendix E details guidance for Environmental Health Officers.

APPENDIX A
Questionnaire and Summary of Results

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73			
1	In addressing matters of light pollution does your Authority have any policy/guidance documents that authorised officers are expected to comply with?	Yes	23	31.5%	No	50	68.5%
2	If yes, which of the following applies?	Council Policy e.g. within Local Plan	10	13.7%	Departmental Policy	4	5.5%
		Planning Guidance	2	2.7%	Technical Guidance	13	17.8%
3	Which, if any, of the above have been approved by Members?	Council Policy	7	9.6%	Department Policy	1	1.4%
		Planning Guidance	2	2.7%	Technical Guidance	0	0.0%
4	Which of these documents are available to the general public	Council Policy	9	12.3%	Department Policy	2	2.7%
		Planning Guidance	2	2.7%	Technical Guidance	11	15.1%
5	If yes, how are these documents made available?	LA website	9	12.3%	Published	16	21.9%

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73					
6	Which of the following technical publications are known of, held and/or referred to within your Department?		Known of:			Referred to:		Have copy:	
		CIE Pub. 150 Guide on effects of Obtrusive Light 2003	15	20.5%		4	5.5%	1	1.4%
		CIBSE Factfile No 7 Environmental Considerations for Exterior Lighting 2003	11	15.1%		4	5.5%	2	2.7%
		ILE Guidance Notes for the Reduction of Light Pollution 2000	32	43.8%		25	34.2%	19	26.0 %
		DoE/CC Lighting in the Countryside- Towards good practice 1997	11	15.1%		5	6.8%	3	4.1%
		CIBSE/ILE Lighting the Environment A guide to good urban lighting 1995	12	16.4%		4	5.5%	4	5.5%
		DoT Road Lighting and the Environment 1993	11	15.1%		2	2.7%	1	1.4%

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73			
7	Which of the following general publications are known of, or held and/or referred to within your Department?		Known of:			Have copy:	
		BAA Starry, Starry Night 2000	15	20.5%		6	8.2%
		CPRE Night Blight 2003	22	30.1%		8	11.0%
		House of Commons S&T Committee Report on Light Pollution and Astronomy	10	13.7%		3	4.1%
		Government Response to above	8	11.0%		3	4.1%

NO	QUESTION	RESPONSES		NUMBER OF RESPONSES	73		
8	What levels of Public Complaints have been received over the last 5 years with regard to the following possible sources of obtrusive Light?				No of Complaints		%
		Street Lighting			108		10.1%
		Sports Lighting					
		of which -	Golf Driving Ranges		6		0.6%
	(If numbers not known please estimate percentages)		Tennis Courts		7		0.7%
			Football/ Hockey Pitches		26		2.4%
	[Please sub divide if possible]		Other		28		2.6%
				Total	**72**	**Total**	**6.7%**

NO	QUESTION	RESPONSES		NUMBER OF RESPONSES	73	
		Commercial Lighting				
		of which-	working lights	69		6.4%
			all night security lights	178		16.6%
			Other	37		3.5%
			Total	**304**	**Total**	**28.4%**
		Domestic Security Lighting		565		52.7%
		Domestic Decorative garden Lighting		23		2.1%
		Other (please specify)		-		-
			GRAND TOTAL	**1072**	**Total (100%)**	**100.0%**

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73			
9	Have you carried out any quantifiable measurements of intrusive light installations that you would be prepared to discuss and/or allow us to use as case studies?	Yes	1	1.4%	No	72	98.6%
10	How do you ensure the competency of officers for examinations of complaints?	General Knowledge	41	56.2%	In-house training	9	12.3 %
		Use Authorities Highway Lighting Engineer	6	8.2%	External Training Course	4	5.5%
		Employ outside Consultant	1	1.4%			
11	Has your Authority adopted the ILE Guidance?	Yes	10	13.7%	No	59	80.8%
12	If yes, have you found the lighting levels given to be fair and reasonable?	Yes	11	15.1%	No	0	0.0%

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73			
13	If yes, has your Authority designated any of the 'Environmental Zones' that are outlined in that document on any of the Council plans?	Yes	0	0.0%	No	20	27.4%
14	What percentage of your Authority area would you estimate falls into each of the ILE Environmental Zones?	E1 - Intrinsically dark areas (e.g. National Parks, ANOBs) E2- Low district brightness areas (e.g. Rural or small village locations) E3 - Medium district brightness areas (e.g. Small town centres or urban locations) E4 - High district brightness areas (e.g. Town/City centres with high levels of night-time activity)			**Total (100%)**		

NO	QUESTION	RESPONSES		NUMBER OF RESPONSES	73
15	What, if any, light measurement equipment is available to your Authority?	Illuminance (LU1) meter	Type		
		Luminance (Cd/m^2) meter	Type		
16	Assuming you have dealt with problems of Obtrusive Light, which of the following mitigation measures would you have used or suggested?	Limit hours of use (i.e. Set curfew)		28	38.4%
		Have existing luminaires re-aimed		50	68.5%
		Request owner to fit screening to existing luminaires		30	41.1%
		Request owner to erect /plant landscape screen		7	9.6%
		Request owner to replace existing luminaires with better design		19	26.0%
		Suggest complainant draws curtains and/or fits blinds		14	19.2%

NO	QUESTION	RESPONSES	NUMBER OF RESPONSES	73						
		Suggest complainant erects /plants landscape screen	4	5.5%						
17	Would you welcome 'Obtrusive Light' as a statutory nuisance, as currently being examined by HM Government?	Yes	39	53.4%	No	22	30.1%	Undecided	11	15.1 %
18	If 'Obtrusive Light' were to become a Statutory Nuisance would it be helpful if workshops were provided to explain the technicalities of light and how it can be measured and controlled?	Yes	71	97.3%	No	0	0.0%			
19	Is there anything else you would like to raise in the context of obtrusive light in respect to your Authority or your own experience?									

APPENDIX B
Planning Guidance

East Hampshire District Council

Second review of the local plan

Light Pollution

P5. Development which includes a lighting scheme will not be permitted unless the minimum amount of lighting necessary to achieve its purpose is proposed so that glare and light spillage from the site is minimised. In determining an application, consideration will be given to the aesthetic effect of the light produced and to its effect on local residents, vehicle users, pedestrians and the visibility of the night sky.

4.73 Details of any external lighting scheme required as part of any new development should be submitted as part of the planning application. In order to minimise light pollution and increase energy efficiency, the District Council will need to be satisfied that the lighting scheme proposed is the minimum required for security and working purposes and that it minimises potential pollution from glow and spillage. On the edge of settlements and in rural locations, landscaping measures should be provided to screen the lighting installation from view. **Light pollution can be particularly intrusive in rural areas and can harm the character of the countryside**. Conditions will be attached to any floodlighting approvals given for evening usage of sport facilities and community buildings to control light intensity, light spillage and hours of use. The Observatory at Clanfield is particularly sensitive to excessive light pollution.

Dacorum Borough Council

POLICY 113 EXTERIOR LIGHTING Adopted Plan April 2004

Proposals for new exterior lighting will be permitted provided it can be demonstrated to the satisfaction of the local planning authority that there is no significant (or material) adverse impact upon important features of the urban and rural areas including:

(a) the amenity of residential areas; and

(b) the visual character and the natural and historic environment.

Assessment will be based upon the suitability of exterior lighting in a defined location and the type of lighting, and will include consideration of highway safety, crime prevention and access for people with disabilities. All lighting schemes must:

(a) avoid dazzle and disturbance of drivers;

(b) minimise glare and light spillage; and

(c) create uniformity to avoid shadowed areas

In the Chilterns Area of Outstanding Natural Beauty, rural areas and other parts of the countryside (including the urban fringe) provision of new exterior lighting will be minimised.

Further advice on Exterior Lighting and its environmental impact is contained within Appendix 8 of the Plan.

Reasons

113.1 Exterior lighting is important in promoting safety and security, for recreation and leisure, and other evening activities. Therefore a degree of lighting is required in most environments. However if poorly designed or installed, artificial light can have a detrimental effect including to wildlife and therefore needs to be controlled. Light pollution needs to be kept to a minimum to avoid a detrimental effect on rural and urban views and the character of the countryside.

Background

113.2 Appendix 8 gives further detailed guidance as to appropriate levels of lighting in different locations. Generally urban areas with high levels of night time activity are more appropriate locations for higher degrees of lighting. More sensitive rural locations and the smaller settlements in the Borough require careful control in order to maintain their character and amenity.

A local Plan Inquiry examined the policies on exterior lighting and the Inspector recommended:

20.14. Exterior Lighting

Objections

Rep No Name Rep No Name

641* HCC Environment Department 4796 The National Trust-Thames/Chiltern Region

1469 Tring Rugby Union Football Club

Supports

1648 Flaunden Parish Council 5207 Herts & Middlesex Wildlife Trust

500L English Nature

Support for pre-inquiry change

For pre-inquiry change 286

5575PC CPRE - The Hertfordshire Society

Key Issues

(a) Are the guidelines unduly prescriptive in relation to existing sports and recreation facilities in urban fringe locations? (1469)

(b) Are the Guidelines sufficiently strict to maintain dark landscapes in open countryside? (4796)

(c) Should paragraph 4.5 (1) of the Guidelines be amended to refer to restriction in frequency of use. (641)

Inspector's Conclusions

(a) Sports Facilities in Urban Fringe Locations

20.14.1. The objector raises a number of issues, including the negative wording of the policy approach, the manner in which the 'environmental zones' methodology would be applied to urban fringe locations, and the restrictive approach to lighting of existing grass pitches set out in section 3.2. Dealing firstly with the policy issue, I agree with the objector that it would be preferable for the policy to be phrased in a more positive way, and to be based on assessment criteria. However, I have a more fundamental concern about the place of a policy such as this, irrespective of how it is phrased, within the Environmental Guidelines. It appears that the policy is intended to be used in the determination of planning applications, and consequently I believe that it should be included within one of the main chapters in Part 3 of the Plan, probably the Environment chapter. The policy would then be supplemented by the remainder of the Guidelines, which would be appropriate as SPG. 20.14.2. I also question the use of the phrase no adverse impact upon…in the policy, for I suspect that in most situations which involve external lighting it is possible to argue that some adverse impact occurs. In my view the test would be more appropriately expressed as no significant (or material) adverse impact upon….

20.14.3. The objector opposes the way in which the Guidelines apply the Institution of Lighting Engineers 'Environmental Zones' to urban fringe locations, particularly insofar as it affects the TRUFC site at Cow Lane, Tring. It is argued that the presumption against sports pitch lighting ignores the fact that many such facilities are in urban fringe locations. Moreover, PPG17 acknowledges that the demand for recreation can be met in the countryside, including areas of designated landscape importance. The objector believes that the Environmental Zone approach should not be determinative, and considers instead that the criteria in the Guidelines provide a more appropriate basis for assessment. It is also felt to be unduly restrictive to limit the use of lighting, which is acceptable, to match days.

Dacorum Borough Local Plan Inquiry Inspector's Report August 2002

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20.14.4. The Council recognises the prevalence of sports pitches on the edge of the main settlements, and points out that many of these have longstanding floodlights. Because it has taken a positive approach to the floodlighting of facilities within the urban areas, it argues that a more restrictive approach to new floodlighting proposals in Green Belt urban fringe locations is appropriate. I see no reason to question the Environmental Zone approach, for it is clear that it based on a well-researched analysis which seeks to provide a balance between the demand for floodlit sports facilities and the protection of the countryside. Furthermore it is pertinent, in my view, that Sport England has not objected to the Guidelines. I note that the Table of Environmental Zones is proposed to be replaced (FC168) by an up-dated version from the Institution of Lighting Engineers, and I accept that consistency with this external source document should be maintained.

20.14.5. I do not believe that there is a conflict with the objectives of PPG17, for the tension between recreation provision and the conservation of natural beauty is recognised in the national guidance. Indeed, in the case of objector's site, which is located within the AONB,

PPG17 makes it clear that the conservation objective must prevail. I conclude that the approach to floodlighting of sports pitches in urban fringe locations that is set out in the Environmental Guidelines is appropriate. Other than the modifications to the policy aspect of the Guidelines that I outline above, and the change resulting from FC168, I recommend no further amendment in response to this objection.

(b) Maintenance of Dark Landscapes in Countryside

20.14.6. The National Trust urges strict control over exterior lighting in open countryside so as to maintain dark landscapes, both for visual amenity reasons and for the impact that such lighting has on wildlife. I consider that the restricted approach to lighting in rural areas promoted in the Guidelines satisfies this objection.

(c) Restriction in Frequency of Use

20.14.7. The County Council's suggestion that conditions can be used to restrict both the hours and frequency of use of external lighting is addressed by PIC286, which I support.

Recommendation

20.14.8. The Guidelines be modified in accordance with PIC286 and FC168, and as follows:

(a) the policy at part 1 of the Exterior Lighting Guideline be deleted and transferred to Part 3 of the Plan;

(b) the policy be re-worded in recognition of the fact that all external lighting could be argued to have some adverse impact;

(c) consideration be given to rephrasing the policy in a more positive manner.

London Borough of Merton

Merton's Adopted UDP 2003

POLICY PE.3: LIGHT POLLUTION

Developments that would have a significantly adverse effect on the amenities of nearby occupiers by reason of light emissions will not be permitted unless the effect can be overcome by mitigating measures. Such measures will be sought by the use of conditions or planning obligation.**Justification**

4.123 Floodlighting and other light forms can be beneficial. Lighting can contribute towards improving the safety and security of areas. The Local Agenda 21 Action Plan supports the provision of lighting as a means of improving personal and community safety. Lighting can extend the hours of use of outdoor sporting facilities, especially in the winter months, and can be used to advertise or to exhibit particular buildings, landscapes or features. The proposed Supplementary Planning Guidance on reducing pollution will include advice on lux levels.

4.124 However, inappropriate and unnecessary lighting or lighting which is insensitively used can adversely affect amenity in terms of light pollution to neighbouring occupiers and to the night sky. The Council will therefore, when considering lighting proposals, seek to ensure

that unacceptable levels of illumination are controlled by conditions or, where this is not possible, that unacceptable proposals are refused planning permission.

4.125 Common situations where this policy may be applied are floodlighting of recreation areas and the internal and external illumination of advertisements. It may sometimes be considered that the lighting structures themselves may be visually intrusive. This aspect of lighting would be controlled by means of policies in the Built Environment Section of this Plan.

Canterbury District Council

Canterbury District Local Plan

First Review

Proposed Changes to the Revised Deposit Draft, To be submitted to the Local Plan Inquiry on 23rd March 2004

Policy R4 amend as follows:

The City Council will permit the erection of new buildings that will diversify the rural economy or an existing farm business provided:

(a) The proposal is appropriate in scale, siting and design with the rural surroundings and the site retains its character; and

(b) Access and parking provisions are acceptable and the use does not significantly increase traffic to the detriment of the area or highway safety; and

(c) The proposed re-use use does not lead to dispersal of activity detrimental to village vitality; and

(d) There is no detrimental impact on landscape interests, protected species, sites or features of nature conservation interest or on sites of architectural or historic importance; and

(e) There is no detrimental impact on residential amenity; and

(f) The use of the land surrounding the building, for activities such as parking, storage, lighting, or advertisements are not intrusive nor detrimental to the character and appearance of the locality; and

(g) appropriate landscaping and screening is provided where necessary; and

(h) There is no overriding conflict with other policies in the plan. New buildings not associated with an existing farm business should be well related to an existing settlement and accessible by a range of transport modes.

London Borough of Newham

Newham Unitary Development Plan June 2001

Pollution

3.119 Whether in the form of noise, unpleasant smells, unclean air or contaminated land, pollution is a growing concern. It comes from a number of sources, industry and traffic being the most common causes. Planning has a major role to play by separating conflicting land uses, for instance, by locating housing away from industry and roads and away from sensitive nature areas. In circumstances where pollution emissions arising from new development can be feasibly treated, conditions will be attached to a planning consent to ensure compliance and reduce pollution to acceptable levels. Where this is not feasible, planning permission will be refused.

3.120 Light from floodlights or other illuminations and dust or particulates is a direct result of, or incidental to, many retail and industrial developments. It is therefore desirable that the Council should seek to control their occurrence, as individually or combined they lead to environmental degradation and a reduction in the quality of life. Spillage of light from artificial sources has two main drawbacks. Firstly, it is an inefficient use of energy, directing light into areas which do not need to be illuminated; secondly, it also intrusive and offensive to nearby residential properties.

Policy EQ45: planning permission for any development, including a change of use, will be resisted where it would involve unacceptable levels of generation beyond the boundary of the site of one or more of the following:

A) vibration;

B) smell;

C) fumes;

D) dust;

E) grit;

F) air and water pollutants (please refer to policy eq46);

G) noise (please refer to policies eq47-eq48)

H) vehicular or pedestrian traffic;

I) ground/soil pollutants (please refer to policy eq49) and

J) light spillage.

London Borough of Waltham Forest

Unliterary Development Plan

Env1 The council will seek to ensure that all developments (including alterations, extensions and changes of use) are of a high standard by applying the following criteria:

i) the appearance, character, and density of new development should be compatible with the character of the surrounding area; it should not prejudice the amenity of the occupiers of adjacent property nor adversely affect the street scene and neighbours by reason of its scale, height, layout, elevational treatment, materials, excessive hard standing and parking areas, or excessive intensity of development;

ii) new development should allow for adequate sunlight and daylight to reach adjoining properties;

iii) new development should not have adverse effects on neighbouring areas in terms of lighting, noise, vibration, fumes, smells, smoke, ash, dust, soot, grit, hours of operation, or other forms of pollution;

iv) proposals should, where appropriate, make provision for suitable planting and landscaping schemes at the outset. In particular, they should wherever possible retain or replace existing features such as trees, hedges, ponds, watercourses, meadows and other habitats;

v) new development, by virtue of its layout, lighting and landscaping should create an attractive, safe, secure and usable indoor and outdoor environment;

vi) new development to which the public has access (including work places) should be designed to be accessible, so that everyone, including people with disabilities, can conveniently reach and use it (see the council's supplementary planning guidance "access for all design guidelines"). Where appropriate and practical, the council will promote and encourage the provision of amenities and facilities for people with disabilities;

vii) proposals should respect the visual quality of the area utilising existing and/or adding new decorative features. Where appropriate, the council will encourage the incorporation of public art into the design of new development;

viii) the placing and grouping of buildings in relation to the street scene should be convenient and attractive to both users of the development and passers by;

ix) traffic generated by new development should not prejudice the free and safe movement of traffic on roads nearby, nor should it have an adverse effect on neighbouring uses;

x) commercial development should provide adequate off-street servicing which is away from public view;

xi) development should provide for sufficient off-street car parking, in accordance with appendix 1 of this plan;

xii) where appropriate, developments should take into account the land-use needs of both children and carers;

xiii) wherever possible new development should provide positive benefits for landscape and nature conservation.

2.34 One of the Council's main aims is to protect and enhance the environment of Waltham Forest for its residents, businesses, and visitors. To help do this, specific standards will be applied to all developments within the Borough, and these are set out in the above policy.

2.39 Proposals which are likely to result in a loss of amenity by reason of noise, smell, dust, etc (see iii) above), should include details of how their effects will be kept to a minimum. Noise levels, for example, can be reduced by including sound-proofing measures as part of the development's design and layout.

London Borough of Ealing

Ealing's New Plan for the Environment - Chapter Four - 4.12 Light Pollution

The Council will consider applications for floodlighting and illumination in the context of their effect on the quality of life of residents in the locality, and on the following:

i) the minimisation of possible disturbance of natural habitats for wild life especially defined sites, areas and protected species;

ii) the protection or enhancement of buildings of architectural or historic interest, the townscape, landscape, canals and preservation of local and strategic views,

iii) sustainable energy use -The design should focus light where it is specifically needed by the proposal or to enhance architectural features without damaging listed buildings; and lighting installations should be as unobtrusive as possible and avoid upward spillage into the night sky.

Lighting can disturb people and wildlife. If open space that is normally dark in the evening is lit, a considerable increase in disturbance and intrusion can result or the area can attract a major increase in the number of users of the facility who add to this disturbance. The illumination of buildings can be an attractive amenity and can improve security and personal safety; but the levels should not intrude on living or working space nor should it draw individuals into areas that they would otherwise not walk on their own. Illumination should be subtle and limited in brightness and time of use to avoid schemes vying with each other, polluting the night sky or lighting empty spaces. It should have relatively low levels of brightness to conserve energy, and should not distract car drivers. The lighting of sports pitches or car parks needs careful design to avoid overspill.

APPENDIX C
Proposed Model Lighting Policy Document

1. INTRODUCTION

The problems and issues associated with the provision of outdoor lighting are becoming more recognized as a source of pollution. Obtrusive light can be detrimental to health in causing sleep deprivation as well as damaging to the environment. Whilst the importance of artificial lighting for security, pedestrian and traffic safety and, in promoting access to sport and recreation and for enhancing historic and architecturally important buildings is recognised, lighting does undoubtedly have a marked impact on the night time scene. It can significantly change the character of the locality, altering wildlife and ecological patterns and on the wider scale, dark skies and views of the stars become more difficult to appreciate, except in the remotest of areas.

As a result of the prevalence of lighting issues affecting the wider community, it is becoming more important to ensure that lighting is affectively addressed in the preparation and review of planning applications. Currently, national planning guidance does not adequately address lighting issues. Therefore, this Supplementary Planning Guidance has been prepared in order to guide all those involved in the planning process to the issues of exterior lighting.

2 THE PROBLEMS OF LIGHT POLLUTION

Light pollution can occur in three ways:

- sky glow, which is the glow around urban areas resulting from the scattering of artificial light by dust particles and water droplets in the sky;
- glare, the uncomfortable brightness of a light source when viewed directly; and
- light trespass, light spillage beyond the boundary of the property on which a light is located.

Problems are generally associated with the levels of light produced, poor aiming luminaires and excessive hours of use. Poorly angled domestic security lights are the main contributors and causes of complaint together with over or badly designed sports and other forms of commercial or industrial lighting installation. An increasing amount of exterior lighting is being allowed to shine above the horizontal, and a significant proportion of this artificial light ends up in the sky where it does nothing to increase vision or security, but wastes electricity, money and finite resources.

3 NATIONAL PLANNING POLICY GUIDANCE

With the exception of PPG17 *'Planning for Sport Open Space and Recreation'*, which encourages planning authorities to take into account the floodlighting of sports developments, there is no specific national planning guidance regarding lighting. However, *Planning and Pollution Control 1994* (PPG23) encourages local planning authorities to incorporate policies regarding lighting within their local plans. Paragraph 2.18 states that planning authorities should take account of, in preparing Local Plan policies, *"... the possible impact of potentially polluting development on land use, including the effects on health, the natural environment, or general amenity, resulting from releases from water, land or air, or on noise, dust, vibration, light or heat ..."* Recent research suggests that in reality, less than 20% of local authorities have taken lighting issues into account in the policies and local plans.

4 ASSESSMENT OF NEW PROPOSALS

Details of any external lighting scheme required as part of any new development should be submitted as part of the planning application. In order to minimise light pollution and increase energy efficiency, the Council will need to be satisfied that the lighting scheme proposed is the minimum required for security and working purposes and that it minimises potential visual impact. This relates to both the day and night time effects of the proposed lighting.

4.1 Exterior Lighting Checklist

To enable the Council to assess a scheme fully, the application submission should include a consideration of the appropriate factors listed below:

(1) Full details (with drawings) of all aspects of the installation, including specific luminaire and lamp type, beam control, wattage, the use of baffles, louvres, cowls (including colouring), illuminance (lux)contours, luminaire intensity distribution diagrams and column type and colour.

(2) A lighting statement by a qualified engineer/consultant clarifying the precise lighting impact in relation to the range of criteria listed below. This will be in the context of the need to light and whether the level of lighting is appropriate for the specific task. Wasteful over-lighting should be avoided.

(3) The lighting statement should include consideration of:

(a) the 'E' zone and how the installation minimises light pollution in relation to the control criteria specified by the Institution of Lighting Engineers' 'Guidance Notes for the Reduction of Light Pollution' (see below for details of 'E' zones);

(b) impact upon any nearby housing – this should be in relation to light pollution criteria and substantiated by reference to vertical illuminance values: referenced to a unity maintenance factor

(c) the effects of any external/physical features, e.g. existing planting/buildings, the position of the lighting in relation to surrounding land (contours, levels) and fencing and reflectance from the surface to be lit;

(d) how the lighting installation will be viewed in relation to the wider urban and rural landscape – this should include the role of any screening;

(e) how the scheme may be adjusted, or modified, in the future;

(f) a maintenance programme (after-care);

(g) hours of use and limiting energy consumption;

(h) justification of the level and type of lighting – the objective should question whether it is the most environmentally sensitive scheme;

(i) the role of landscaping in assisting in the day and night time visual assimilation of the installation;

(j) relationships of interior lighting to the proposal – to address whether there is a need for much external lighting in respect of buildings;

(k) the possibility of upgrading or removing existing lighting to reduce the potential cumulative effects; and

(l) impact upon highway safety.

4.2 Assessment of the Lighting Aspects of a Planning Application

Assessment of the lighting aspects of a planning application will depend firstly upon the location of the site in relation to the 'E' zone. However, if it is established that there is no objection in principle to the installation of exterior lighting, a range of day and night time site specific factors need to be addressed relating to the impact upon:

(1) the overall character and appearance of the area/surroundings – will it be visually intrusive or visually compatible?

(2) the residential amenity of nearby houses – will there be pollution to adjoining properties? Will the columns appear incongruous by day?

(3) local habitats – will the type of lighting and level of use disrupt local ecology?

(4) crime prevention

(5) disabled access.

Even if convincing 'on paper', the test of the environmental success of a lighting scheme is dependent upon how the scheme is installed and thereafter maintained. Planning conditions can be imposed to address this. They are seen as critical in respect of high-powered sports floodlighting, when close to housing and nearby roads. Full installation checks (i.e. before the first full use) need to be carried out. This is to ensure consistency between the 'on paper' and 'on the ground' situations, while allowing for the maintenance factor. At this stage adjustments to the lighting installation can be carried out which can make a difference to the final effect.

Other conditions depend upon the type of lighting. These can include:

(1) restriction of the hours and frequency of use:

(a) the Institution of Lighting Engineers' Guidance Notes recommend limitations upon illuminated advertisements, e.g. between 12.00 and 7.00 hours.

(b) no late night use of floodlit sports facilities.

(2) specification of the precise details of the type of floodlighting and lux levels - no changes to level of approved lighting by changing the luminaires, unless otherwise agreed by the local planning authority;

(3) permanent retention of cowls or louvres;

(4) removing or improving older existing exterior lighting at the site in the interests of minimising the cumulative effects of light pollution;

(5) permanent physical screens to the site. e.g. enclosing open floodlit sports courts to contain the wider effects of the 'box of light' – mesh fencing can be fitted with thick

plastic sheeting to ensure containment of the light. Unless an historic environment, such screens can normally be installed without harm;

(6) planting - i.e. retention of existing planting and new landscaping;

(7) painting of columns and the luminaire, housing/cowling in order to mitigate against the daytime visual impact – black painted inner surfaces painting cowling will also assist in reducing light pollution;

(8) lowering of lighting columns when not in use in sensitive locations.

It will only be in very exceptional circumstances when a temporary planning permission is granted for exterior lighting. This is in cases where 'on paper' a scheme can be supported but due to the relationship with its environment (e.g. housing) and physical conditions, it is necessary to review the effects.

4.3 The Institution of Lighting Engineers' 'E' zones

The Institution of Lighting Engineers publication "Reduction of Light Pollution (2nd Revision)" establishes four Environmental Zones ('E' zones). Within each a different approach to provision of external lighting should be taken. These zones establish 'Obtrusive Light Limitations for Exterior Light Installations' and include the effects of 'Sky Glow' and "Light into Windows". The publication also addresses 'Source Intensity' (the potentially obtrusive direction of lighting outside the area being lit). This is a key document in ensuring a high degree of consistency in the approach towards proposals for exterior lighting. It is particularly useful in its differentiation between urban and rural environments as set out below:

Zone	Description	Sky Glow [ULR] (Lux)	Light into Windows (Lux)		Building Average Luminance (Lux)
			Before Curfew	After Curfew	Average Before Curfew
E1	**Intrinsically Dark Areas** (e.g. National Parks, Areas of Outstanding Natural Beauty, Other Dark Landscapes)	0	2	1*	0
E2	**Areas of Low District Brightness** (e.g.: In a rural location or small village locations but outside Zone E1)	2.5	5	1	5
E3	**Areas of Medium District Brightness** (e.g.: small town centres or urban location)	5	10	2	10

E4	**Areas of High District Brightness** (e.g.: Town Centres with high levels of night time-activity)	15	25	5	25

Notes:

(a) ULR: i.e. Upward Light Ratio - this means the maximum permitted percentage of luminaire flux for the total installation which is directed into the sky.

(b) Curfew – a locally defined time differentiating between social and unsocial hours for night time lighting (e.g. sports lighting not being used after 10.00 pm; advertising and decorative lighting key switched off between 11.00 pm and dawn).

(c) Building luminance – the reflected light arising from the surface of the building material, (e.g. white wall cladding will be highly reflective).

(d) * Acceptable from public road lighting installations only.

The comparatively recent but growing concern expressed about the adverse effects of outdoor lighting recognises that there are many bad examples of over-lighting in sensitive rural/countryside environments. Many of these have been there many years and are beyond control. However the situation should not be allowed to worsen. A high level of existing lighting in a rural location should not justify an increase nearby. For example, a long established petrol filling station in an 'E1 Zone' with a well lit underside canopy and its associated lighting, should not be used to justify the introduction of more lighting at a site close by within such an 'E1 Zone'.

The application of zones is not intended to be totally prescriptive. There is a need for some flexibility. There will be cases where, despite the location of the zone, it is justifiable to provide an increased level of lighting. Examples of the exceptions in Zones E1 and E2 may involve the exterior lighting of an isolated church or listed building and discreet security lighting for community buildings: e.g. a village hall car park.

5 GUIDANCE ON PROPER DESIGN AND PLANNING

The following section outlines good practise in terms of exterior lighting design and is intended to aid those planning lighting schemes. This advice is as applicable to householders with individual security lights as it is to those planning large developments with a large number of exterior lights.

It is possible to reduce many of the negative effects of lighting through proper design and planning, using lighting only where and when necessary, using an appropriate power of light and adjusting luminaires to direct the light to where it is required. Illuminance 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 minimizes the spread of light above the horizontal.

5.1 Direction of Light

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.

To keep glare to a minimum, ensure that the main beam of all lights directed towards any potential observer is kept below70°. 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.

5.2 Amount of Light

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

5.3 Sensor Switches

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.

5.4 Types of Luminaires

Low pressure sodium (LPS) luminaires 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) luminaires, although these are more expensive to install. Full cut-off luminaires prevent any light from being emitted above the horizontal and the HPS creates a bright pinkish white light. In a recent survey, 85% of drivers stated that they prefer the light from HPS lamps.

5.5 Wasted Energy

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.

5.6 Alternative Lighting Schemes

Local light schemes are an imaginative alternative to the installation of conventional roadway and footway lighting in rural areas. Where there is an accepted need for village lighting, occupiers in houses facing streets are encouraged to mount low-level lights on their own property. The costs of light fittings, bulbs and installation could either be met by the local parish council or perhaps grants could be given to occupiers to purchase and

install their own lighting. The costs to the Parish Council could be offset against those which would have been incurred if a traditional public lighting system had been installed and maintained. Grants are available from the Councils' Heritage Unit for certain types of environmental enhancement schemes. Street lighting can be included in these schemes. By correctly fitting energy-efficient lights of an appropriate strength, for example, above a front door, footways can be lit with minimal glare and light trespass into neighbours' properties, and with far less visual intrusion than if public lighting were used. There could be less light pollution, disturbance to neighbours and an overall saving in energy.

6 GUIDANCE SPECIFICALLY FOR LISTED BUILDINGS

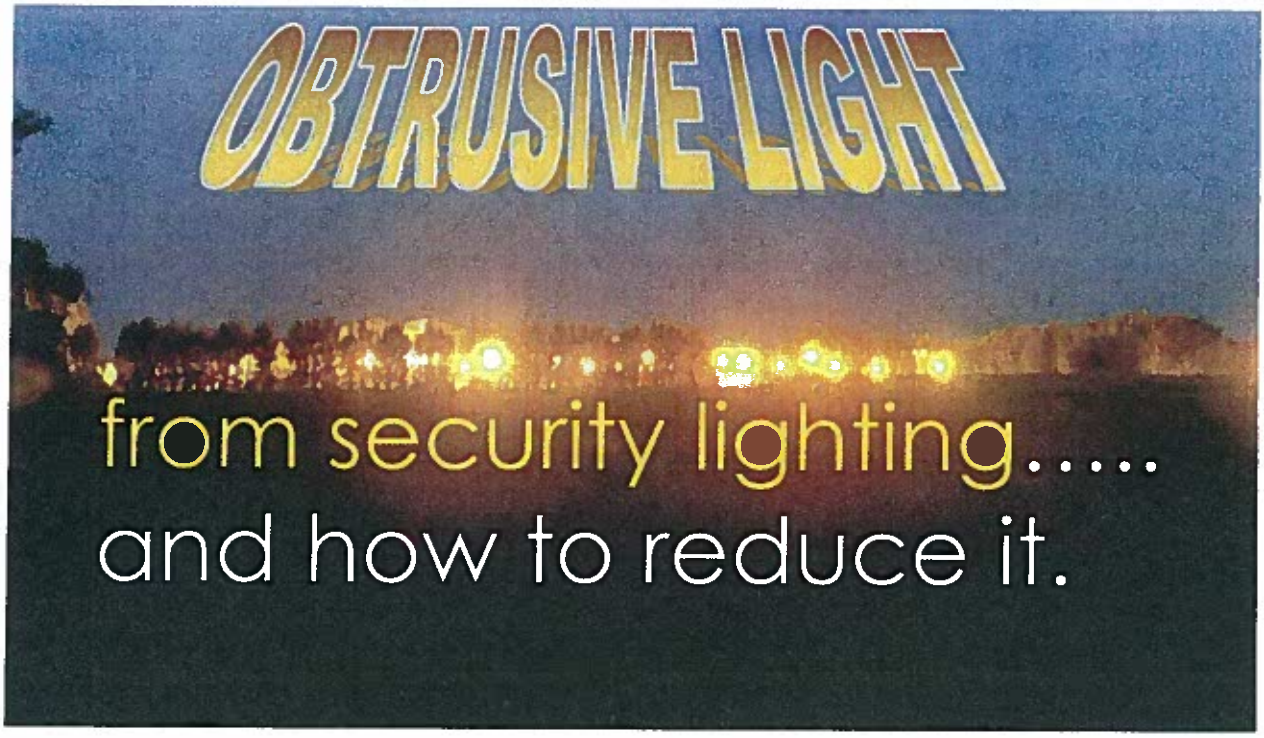
Listed buildings are particularly sensitive. Unsympathetic modern luminaires in prominent positions can detract from their appearance during the day, while high powered lamps can have a severe detrimental impact at night. In contrast, the sensitive choice of unobtrusive luminaires and a subtle light can strongly benefit the historic environment. Lit buildings can individually and cumulatively enliven historic environments. The ubiquitous use of heritage style lanterns needs careful consideration: these can create a "catalogue townscape" which dilutes the individual identity of a particular area.

An important design consideration is whether the lighting of one listed building will be to the detriment of others within the wider street scene. Despite the overall strict approach to new lighting in a rural environment, exceptionally the introduction of new exterior lighting to a historic setting may be supported. Even if the principle is acceptable, the detailed design will require full scrutiny.

Note:

This draft SPG has mainly been adapted from the planning guidance of Dacorum District Council and South Northamptonshire District Council, as well as extracts from guidance published by the London Borough of Ealing and East Hampshire District Council.

APPENDIX D
Proposed Public Information Leaflet



Well designed, installed and maintained security lights bring comfort and well being to our lives, providing us with a sense of security in our homes.

However, much security lighting is installed without due consideration of its suitability for the task and its effect on neighbours and the environment. Domestic security lights should provide the minimum level of illumination necessary to light a property. Whilst you may be happy with a light that illuminates half the street your neighbours may not.

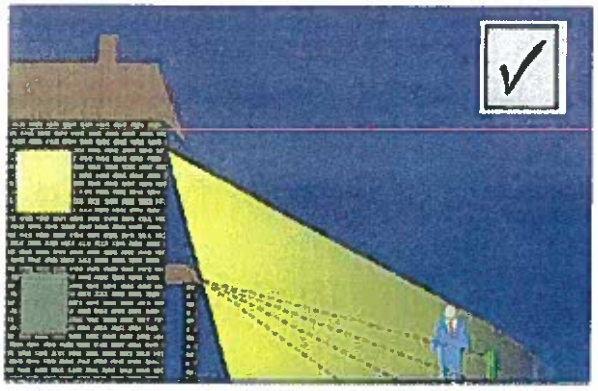
With the need for instant illumination and low initial cost, many people install tungsten halogen floodlights. While these luminaires can provide satisfactory security lighting if correctly installed and aimed, they are usually sold with relatively high-powered 9,500 lumen (500w) lamps that are rarely necessary in the domestic situation where a lamp of 1000 lumens (150W) should be adequate.

The use of a too high a power not only wastes energy and money but also causes more glare and darker shadows. Glare also affects our ability to see and the dark shadows offer a convenient hiding place for criminals.

Some luminaires are fitted with special optics that also help reduce light pollution. Called "double asymmetric" they can be aimed facing downwards while still spreading light over a wide distance.

They can normally be identified where the lamp is fitted not in the middle of the unit, but closer to the back edge as shown here: -

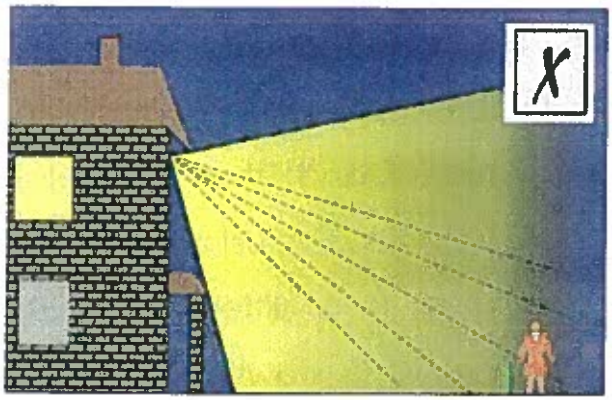
Many of these luminaires are fitted with integral



switching detectors to sense the movement of intruders.

However, if possible use a separate detector that can be sited in a more ideal position where it is most

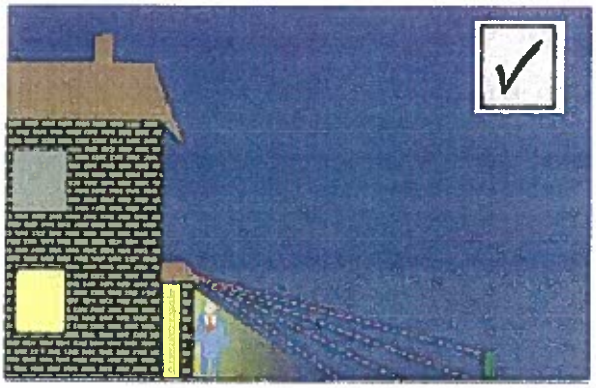
likely to detect intruders into your property, rather than neighbours taking the dog for a walk or small animals roaming around the garden causing the light to switch on and off throughout the night.



Movement detectors can be useful if they are correctly installed and aimed. Unfortunately, many systems do not allow the detector to be separately aimed from the luminaire.

Remember, when buying such equipment check to see if the detector can be separately aimed, or better still purchase a separate detector, which can be installed in the best position and correctly aimed to minimise unnecessary switching.

Luminaires and detectors should be aimed to only detect and



light people on your property. They should not detect a person or animals walking down the street. If the detector is fitted with a timer, this should be adjusted to the minimum to reduce the operation of the light. When aiming floodlights

make sure you **only** light the area that needs lighting. The aim of the floodlight can easily be checked at night when you can see the actual area being lit. Be careful not to put light onto other people's properties or into windows, as this can be very upsetting and a constant source of complaint.

For many properties, a better solution for security lighting is to use a bulkhead or porch light fitted with a low power 600-900 lumens (9/11 w) compact fluorescent lamp.

These units can also be left lit all night, providing all night security, for only a few pounds of electricity per year.

Besides being cheap to run, this type of luminaire is kinder to the environment providing a gentle wash of light with reduced glare. Bulkhead and porch lights cast fewer shadows reducing the hiding places for criminals. Such luminaires can also be fitted with a movement detector if required and are generally mounted lower, and are therefore less susceptible to nuisance switching and complaints from neighbours.

If a neighbour does approach you about your security light listen carefully and try to understand their complaint. If you can, adjust the luminaire to shine in a different direction or angle it down to reduce the light onto or into their property. Tell them that is what you will do and when you will do the work. If after adjusting the angle and aim of a floodlight it is still causing annoyance, then consider fitting some sort of

hood or louvre to shield the light from where it is not wanted.

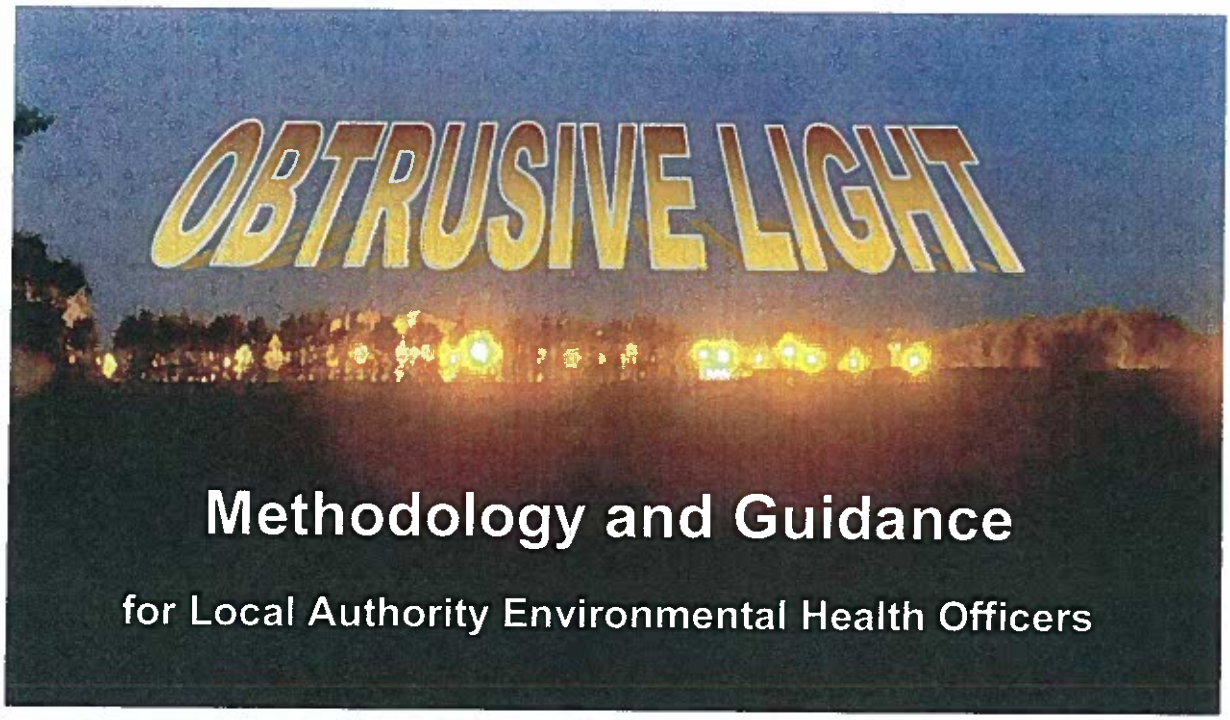
Remember:

- Don't automatically choose the most powerful lamp – the added contrast and darker shadows can help hid the criminal rather than expose them.

  Note: LIGHT output is measured in "lumens" not in "watts" which is the energy input – read the label carefully.

- Position and aim any floodlights with care so as to illuminate only your own property. Put the light where it will do most good – not where it will do most harm.
- If planning to use an IR detector for switching, consider the benefits of being able to position and aim it independently of the luminaire and if so, buy accordingly.
- Switch off any unnecessary lights - it is a waste of the world's resources and of your money.

APPENDIX E
Guidance for Environmental Health Officers



The following is a simplified guide to assessing obtrusive light nuisance, which should be read in conjunction with the more detailed guidance to be found in the documents listed below. It is advised that the Authority obtain these from the bodies concerned. They are:

- **Guidance Notes for the Reduction of Obtrusive Light**

  Institution of Lighting Engineers (ILE) 2005
  [www.ile.org.uk]

- **Lighting in the Countryside – *Towards good practice***

  Department of Environment / Countryside Commission 1997

  - NB: To be revised [www.odpm]

- **CIE Pub. No. 150:2003 Guide on the limitation of the effects of obtrusive light from outdoor lighting installations**
  Published by the "International Commission on illumination (CIE)

  [www.cie.co.at]

Figures of particular relevance taken from the above publications are reproduced in the Annex to this document.

Methodology and Guidance for Examining Complaints Regarding Obtrusive Light

1. VISIT THE SITE

NB: Always try to view the site during daylight hours, before a night time appraisal – it will help you to understand the layout of the situation better.

Daytime:

Try to view source of obtrusive light from complainants' viewpoint and assess:

- What is its function and whether it would appear to be fulfilling this?
- What type of luminaire is it? If possible draw or photograph it for future identification.
- What is its mounting height and does it appear to be correctly aimed?
- Note the time of year and whether any natural vegetation would help screen the light at any other time of year.
- Try to visit the owner(s) of the obtrusive light to ascertain their requirements for the lighting, the lighting standards they are working to, and hours of operation. If possible acquire details of the lamps and luminaires together with their mounting height.

Night-time:

- Assess which Environmental Zone you are in by looking all around you before entering any properties.
- Try to view source of obtrusive light from complainants' viewpoint and assess:
- What is the exact problem:
  (i) Intensity/glare from source(s) when looked at?
  (ii) Levels of light trespass though windows?
  (iii) Frequency of switching?
  (iv) Other
- Make a note of the exact number and location of the light sources that appear to be the problem. Note their colour: deep orange, light orange, yellowy white or cool white. Do you see it as a problem? If one of source brightness, is your eye drawn towards it?
- Assuming you have an illuminance meter, place the receptor flat on and at the centre of the window, or other appropriate surface if this is not possible, and note the reading. [NB Expect a value between 1- 25 LUX unless it appears very bright]
- Examine in your own mind whether a re-aiming and/or fitting of some sort of shield or baffles to the luminaire(s) - could alleviate the problem, or maybe a fence or some vegetation.

2. PLANNING STATUS	Confirm the status of the lighting installation with your Planning Department. If it has been granted permission check whether… • the layout • mounting heights • number and types of luminaires • required mitigation agree with what you have seen on site and/or have obtained from the owner of the installation. If the lights were dark orange they were "low pressure sodium SOX" lamps used mainly for highway and low level security lighting. If the lights were light orange they were "high pressure sodium – SON" lamps used for all types of lighting. If the lights were yellowy white (like an ordinary household bulb) and light up instantly, they were probably "tungsten halogen - TH" lamps used mainly for domestic security lighting. If the lights were cool white they were probably "metal halide – MH" lamps used mainly for sports lighting.
3. OBTRUSIVE LIGHT GUIDELINES [e.g. ILE, CIE]	Having assessed which Environmental Zone the installation / complainant is in … Do the luminaires at their installed aiming angles appear to be within the "upward light ratio" (ULR) required? The owner of the lights should be able to confirm the exact value from a computer design programme. How do any vertical light trespass measurements you have made compare with those given in the tables? (NB. Those before curfew apply for any lighting installations that have a defined early switch off. Those after curfew for those installations that are on all night) How is the glare problem? The owner of the lights should be able to confirm the maximum intensity value from a computer design programme. If not, the degree of light trespass can be an indication of whether the glare is excessive or not. Looking back on your own visual assessment, do you agree with the suggested nuisance?
4. MITIGATION	If it is decided that there is a nuisance issue to address, there are a number of mitigation measures that can be suggested: Switching off – Does it need to be functioning all the time or could a carefully located presence detector be used? If this is already the case, can the detector be better located so as to reduce nuisance switching?

	Could the hours of illumination be further limited by agreement between the parties? Could the luminaire(s) be better aimed on to the task and away from complainant(s)? Could there be a reduction of light level to an agreed standard by dimming or replacing the existing lamps with lower powered ones? Fitting of shields or baffles on problem luminaire(s) Replacement of obsolete luminaires with those of better optical design. Design and planting of landscape screening or fencing.
5. FURTHER ASSISSTANCE	If you, or your Authority's highway lighting engineer feel unable to properly assess the situation a list of suitably qualified independent lighting engineers can be obtained through the websites of either the Institution of Lighting Engineers (ILE) - www.ile.org.uk or the Society of Light and Lighting (SLL) - www.cibse.org

ANNEX

A From ILE Guidance Notes: (Page 3)

ENVIRONMENTAL ZONES:
It is recommended that Local Planning Authorities specify the following environmental zones for exterior lighting control within their Development Plans.

Category	Examples	
E1:	Intrinsically dark landscapes	National Parks, Areas of Outstanding Natural Beauty, etc
E2:	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3:	Medium district brightness areas	Small town centres or urban locations
E4:	High district brightness areas	Town/city centres with high levels of night-time activity

Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

DESIGN GUIDANCE
The following limitations may be supplemented or replaced by a LPA's own planning guidance for exterior lighting installations. As lighting design is not as simple as it may seem, you are advised to consult and/or work with a professional lighting designer before installing any exterior lighting.

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	Average, L [cd/m2]
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

ULR = 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 - 23.00hrs is suggested.
* = From Public road lighting installations only

(1) Upward Light Ratio – 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 endeavour 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 achieve.

(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 used to light an adjacent area.

B From CIE Publication 150:2003

CIE 150:2003

Table 3.1 Possible effects on spill light from changes to the installation parameters.

Parameter	Dimension	Advantages	Disadvantages	Influence on design	Comments
Mounting height	Greater	-Less spill light -Simplified shielding -Less glare from luminaires (see comment)	-More conspicuous by day	-Narrower beams -Tighter beam control -More downward aiming	-Higher mounting implies more conspicuity but allows better control of spill light - Mounting height may be determined by lighting requirements, e.g. in relevant Standards, or vertical illuminance component required for the application -The listed advantages and disadvantages are reversed for Type C cut-off floodlights that incorporate a pre-set aiming angle, i.e. with no means of adjusting the beam
	Smaller	Less conspicuous by day	-More spill light -More difficult to shield -More glare from luminaires (see comment)	-Smaller lamps -Wider beams -More upward aiming	
Set back	Greater		-More spill light -More difficult to shield	-Narrower beams -More outward or higher aiming	Set back may be determined by physical constraints, requirements for unobstructed views, safety to users
	Smaller	-Less spill light -Simplified shielding		-Wider beams -More inward or lower aiming	
Luminous flux output (per luminaire)	Greater	-Greater efficiency	-More spill light	-Requires higher mounting or set back -Fewer luminaires -Reduces control	Flux output should be selected to match beam distribution availability to allow efficient and controlled design
	Smaller		-Less efficiency	-More luminaires -Increases control	
Beam type and distribution	Controlled (narrow beam or sharp cut-off)	-Controls spill light -Reduces need for shielding	-May need more luminaires to light the area	-Permits light to be well directed	Beam classification does not necessarily determine spill light control or shielding of high lamp luminances
	Uncontrolled (wide beam)		-Reduces light containment -Difficult to shield	-Limited directional control of light	
Distance to adjoining property	Greater	-Reduces effect of spill light -Simplifies shielding -Isolates installation from adjoining properties		-Less effect on adjoining property	Greater distances from lighted area to property line simplifies containment of spill light
	Smaller		-Increases spill light -Makes shielding more difficult	-Increases need for good light control	
Vertical aiming angle	High		-More spill light -Lamp more visible -Difficult to shield	-High vertical illuminance contribution	High aiming angles generally not recommended due to difficulty in controlling spill light
	Low	-Less spill light -Lamp less visible -Simplified shielding		-High horizontal illuminances -Low vertical illuminances -Simplifies control of spill light	

NOTE In this table consideration is generally given to the effect of changing one parameter at a time. In practice, it is possible to compensate for the variation of one parameter by changing another simultaneously. For example by increasing set back and mounting height together, aiming angles may be kept constant.

Illustration of Floodlight Classification
[From CIE Document 150:2003]

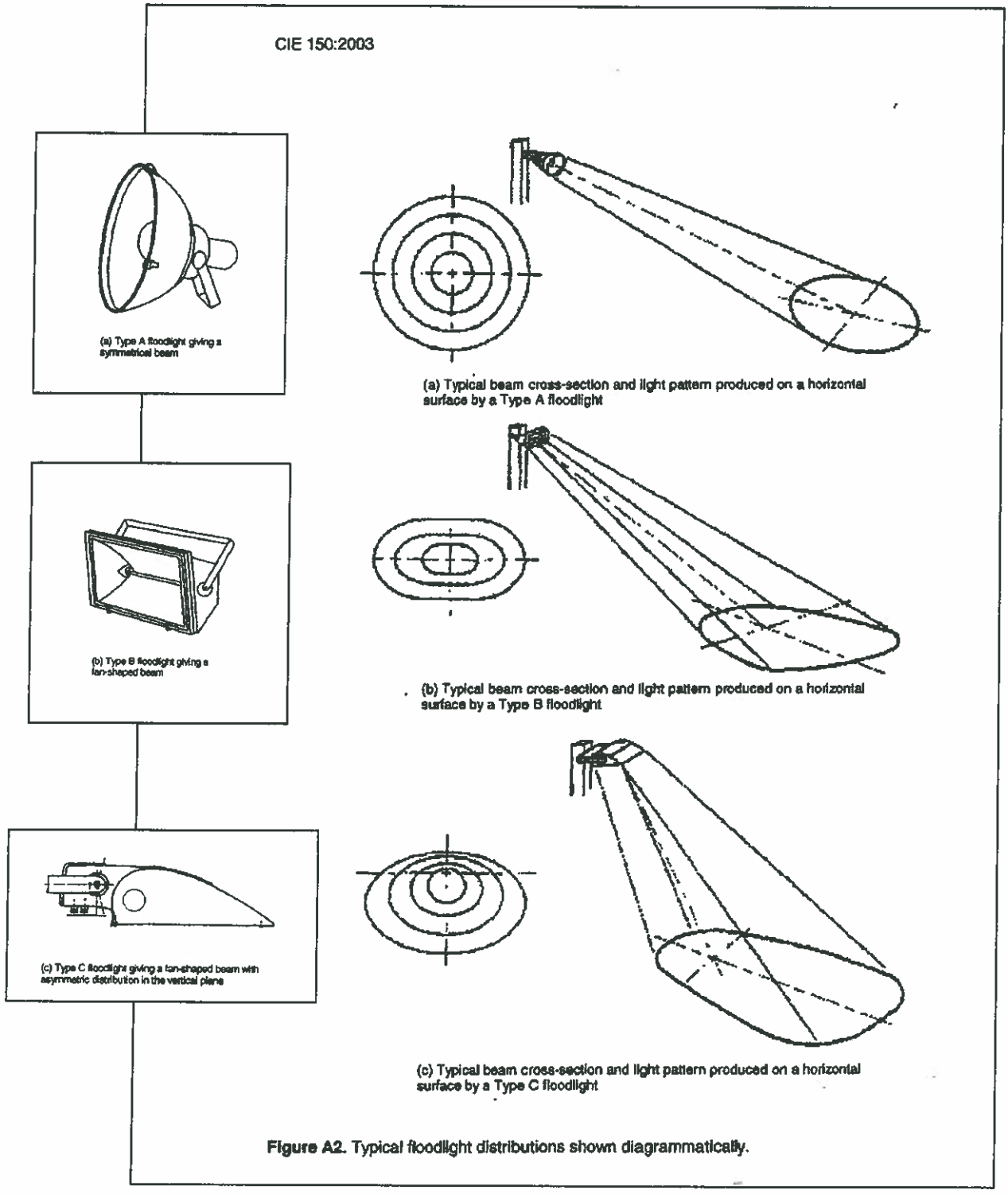


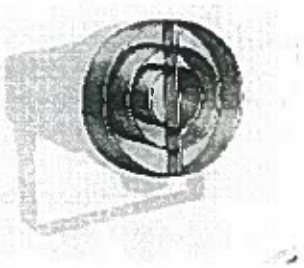
Figure A2. Typical floodlight distributions shown diagrammatically.

APPENDIX B. ILLUSTRATIONS OF LUMINAIRE ACCESSORIES FOR LIMITING OBTRUSIVE LIGHT

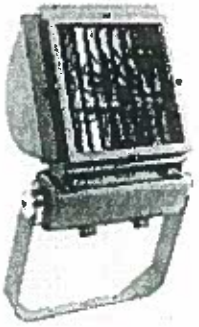
Figure B1. Internal BAFFLE

Figure B2. COWL (or Hood)

Figure B3. SHIELD 'Barn Doors'



(a) Circular



(b) Straight

Figure B4. External LOUVRES

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