



## **DIRECTORATE OF THE URBAN ENVIRONMENT**



## **STREET LIGHTING POLICY**

Date: Reviewed August 2011

## **SUMMARY OF RECOMMENDATIONS**

In accordance with our street lighting strategy:-

1. When considering the provision of street lighting, regard will be given to the contribution street lighting makes to the corporate goals embraced by the Community Strategy (2.1).
2. We will continue to develop and publish a list of Performance Indicators in which we propose to provide and measure the provision of our service (2.13).
3. We will continue to investigate methods of allowing flexibility in the switching of street lighting and the saving of energy, particularly the possible use of a Central Management System (3.17).
4. We will carry out a fair and balanced process to determine priorities to be observed in selecting streets to be included in lighting renewal programmes (3.18).
5. We will consider the level and type of public lighting in each geographic area. Each of these areas may have different needs and requirements which should be considered and developed to cover each road type, class and location. The provision of modern public lighting designed to the appropriate standard will be an integral part of any urban renewal (4.1).
6. We will maintain an up-to-date inventory including details of all highway electrical equipment and its maintenance (5.5).
7. We will ensure that regular night-time inspections of highway electrical equipment are carried out (5.8).
8. We have a system for the repair of faulty highway electrical equipment, defining relevant times for the repair of different types of equipment (5.11).

9. We will undertake the cyclic maintenance of highway electrical equipment to ensure the efficient and safe operation of the system. Our lamp replacement policy will ensure the optimum life of each type of lamp is achieved and that the designated lighting levels of the installation are maintained (5.14).
10. We will visually inspect all highways electrical equipment at each cyclic maintenance visit and electrically test in accordance with the requirements of the Electricity at Work Regulations. It is generally considered that this requirement can be achieved by carrying out regular testing at six yearly intervals. However, whether the equipment is subjected to misuse or prone to damage or vandalism this frequency will need to be adjusted to ensure compliance with the regulations (5.18).
11. The frequency of the visual inspections and any additional structural testing will be determined by carrying out a Risk Assessment, which takes account of the age, type, location and maintenance of the highway electrical equipment and any other potential dangers such as high vandalism area (5.27).
12. Each new lighting scheme will be assessed to ascertain its value to the community and take account of the benefits to be gained by the community from safer roads, reduced night-time crime and the improvement or regeneration of the commercial economy of the area. However, possible detrimental effects on the environment, including ecological implications will also be considered, as will the capital and maintenance costs of the scheme (6.6).
13. Where re-lighting or refurbishment of an existing lighting scheme is being considered following a request for improved lighting, each of the listed criteria will be assessed and rated to provide a consistent evaluation of the need for improved lighting (6.12).

**DUDLEY METROPOLITAN BOROUGH COUNCIL**  
**STREET LIGHTING POLICY**

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**DUDLEY METROPOLITAN BOROUGH COUNCIL**  
**STREET LIGHTING STRATEGY**

**1.0 INTRODUCTION**

- 1.1 This Policy outlines the basic principles and standards applying to the provision of street lighting in Dudley. The definition of street lighting shall encompass all items of lighting equipment (see Appendix 1) provided on the public highway.

**2.0 MAIN PRINCIPLES**

- 2.1 *When considering the provision of street lighting, regard will be given to the contribution street lighting makes to the corporate goals embraced by the Community Strategy 2005 - 2020.*

**Health and Well-being**

- 2.2 Under the priority for health and well-being, one of the Council's aims during the period 2010 - 2013 is to reduce levels of obesity among people. England is fortunate to enjoy long daylight hours in the summer for the pursuit of sport and leisure activities. However, in the winter the daylight can be as little as 7 hours per day and can significantly reduce the opportunity for outdoor sport and recreation. Street lighting and outdoor spots lighting can help allow local communities to keep fit, play recreational sport or train for local competitions that are played during the weekend and, therefore, is a direct link into the Council's aims to improve health and reduce obesity levels.

**Environment and Housing**

- 2.3 Under the theme of environment and housing, one of the aims is to ensure that people live in safe and attractive neighbourhoods that are well-designed, and are accessible to amenities, services and employment. As the existing street lighting equipment forms an important part of the look and feel of our

neighbourhoods, the future maintenance and upgrading of the lighting equipment forms an integral part of this aim, with the provision of cost effective lighting which is energy efficient and takes account of whole life costs. Appendix 10 provides details of the Council's proposed Invest to Save Programme.

- 2.4 It is essential we consider the convenience of all highway users and the enhancement of the night-time environment, with special reference to lighting in sensitive areas, minimising the effects of both day-time and night-time environmental intrusion.
- 2.5 Another aim under the environment and housing theme is to develop wider transport choices for the Borough in order to address the problems of road traffic congestion and improve air quality. This aim is targeted at greater use of public transport, cycling and walking, all of which require an improved night-time environment and the removal of the fear of crime. Street lighting makes a major contribution to each of these.

### **Community Safety**

- 2.6 Under the community safety theme, street lighting has a major contribution to make on night-time crime, particularly anti-social behaviour, violent crime and vehicle related crime. By providing a safer night-time environment the service contributes to the Council's obligation under Section 17 of the Crime and Disorder Act.
- 2.7 A number of lighting and crime evaluations have been carried out in major towns and cities in England, Scotland and Wales, one of them being carried out in Dudley. The Dudley project provided clear and reliable evidence that targeted, improved street lighting can reduce all types of crime and disorder, depending on the context into which it is introduced. A cost benefit analysis revealed that the street lighting improvements paid for themselves in one year in relation to savings in crime reduction.

- 2.8 Improved lighting will continue to play an important role in the Community Safety Strategy. Engineers can draw on their unique knowledge of the local lighting system; they will be aware of its deficiencies; will know where the really dark spots are and can use this information to link with crime information from the police or community safety officer. This will help to develop and drive the strategy.
- 2.9 Crime prevention studies have demonstrated that good colour rendering rather than the dull orange glow from low-pressure sodium lighting helps to reduce the fear of crime. Additionally the value and usefulness of CCTV can be greatly enhanced by the provision of good colour rendering lighting allowing the colour of hair, clothing and vehicles to be distinguished and recognised.
- 2.10 The siting of new or replacement street lighting columns is also an important factor for blind or visually impaired people using the footways. Lighting columns, in the past generally erected at the kerb edge, can interfere with the safe use of the highway by someone using a cane to navigate a footpath. For this reason new or replacement equipment is now located at the rear of footpaths wherever possible (see paragraph 3.11).

#### **Heritage, Culture and Leisure**

- 2.11 The theme of heritage, culture and leisure requires participation from the community in activities which are taking place during the day but also in the evening and at night. A potential for take up in utilisation of services and facilities in these areas in the evening would be far higher if the community felt more comfortable going out in the evening – walking, cycling and using public transport to get to the venues for the various events.

#### **Performance Indicators**

- 2.12 To compare our performance with that of similar authorities in terms of Best Value, a number of Local and National Performance Indicators (PIs), covering

the maintenance of our street lighting systems, are specified. Our local PIs are currently set by the Association for Public Service Excellence (APSE) and by Dudley MBC. A list of PIs pertaining to street lighting installations is given in Appendix 8.

2.13 *We will continue to develop and publish a list of Performance Indicators in which we propose to provide and measure the provision of our service.*

### **3.0 GENERAL REQUIREMENTS**

- 3.1 All new systems of street lighting provided on an adopted or potentially maintainable highway (see also 4.8) shall be selected and designed in accordance with the British and European Standards, BS 5489 and EN13201: 2003, as appropriate for the road classification or area to be lit. Guidelines to the relevant lighting levels to be provided are given in Appendix 4; however, the actual level of lighting shall be determined by the methods shown in the standard.
- 3.2 All electrical works shall fully comply with BS 7671: 2008, Requirements for Electrical Installations, IEE Wiring Regulations, Seventeenth Edition.
- 3.3 All new lighting shall be designed to minimise the effects of obtrusive light at night and to reduce its visual impact during day light.
- 3.4 In general, new systems of street lighting shall comply with the Dudley MBC Specification for Street Lighting installations, as applicable for the type of equipment in the design drawings, and any other requirements that engineering staff in Street Lighting shall decide in respect of a particular installation.
- 3.5 The development of full spectrum light sources, such as PL compact fluorescent lamps and CDM-T metal halide lamps (see Appendix 1), provide a cost effective white light source for areas of high amenity value.

- 3.6 All luminaires shall incorporate an optical system to direct the light onto the highway within the limits set by BS EN 60598-2-3: 1994, Specification for Luminaires for Road and Street Lighting. To ensure minimum environmental pollution of the “night sky” the upward light from the lantern shall be kept to a minimum. Recommendations for the restriction of glare from lighting installations are given in Part 2 of BS EN 13201: 2003; Performance Requirements and these recommendations should be followed together with any specific amendments or requirements of this document.
- 3.7 The optical control afforded by modern street lighting luminaires should be sufficient to prevent overlighting of building frontages or excessive amounts of light entering windows. If a complaint of this type occurs, surveys will be undertaken to ensure that light trespass does not exceed the limits given in the Institution of Lighting Professionals guidance document GN01: Guidance Notes for the Reduction of Obtrusive Light (ILP 2005). If the light falling on the building does not exceed the limits, the resident should be so advised. However, certain people, by reason of a pre-existing medical condition, may be sensitive to increased lighting levels even where they meet the GN01 guidance. In those cases, alterations to a luminaire will be considered if supported by evidence from a complainant’s general practitioner.
- 3.8 All lanterns should be manufactured from vandal-resistant material and have a minimum protection rating of IP6X to the lamp and optical compartment in accordance with BS EN 60529: 1992, Specification for the Degrees of Protection Provided by Enclosures (IP Code). Lanterns should provide a minimum operational life of twenty years.
- 3.9 All street lighting columns installed on the highway shall comply with BS EN 40 and the Department of Transport (DoT) Memorandum BD 94/07. Columns shall be manufactured from steel, hot dipped galvanised and factory finished to G2a in accordance with the Manual of Contract Documents for Highway Works.

- 3.10 Decorative cast iron or cast aluminium columns shall be subject to a separate specification, while still complying with relevant British and European Standards.
- 3.11 Columns should be positioned at the rear of the footway or in an adjacent grass strip and should be a minimum of 1.5m from the face of the kerb or edge of the carriageway. The object of this is to minimise problems caused by street furniture to people with mobility impairment.
- 3.12 Possible difficulties in the visibility of street furniture for people with visual impairments should be dealt with on a case by case basis by risk assessment.
- 3.13 In conservation areas, or other areas with high pedestrian movements, the use of wall mounted fittings should be considered.
- 3.14 Particular note should be made of the requirements of Appendix 3, where columns are used for the support of decorations, festive lighting, etc.
- 3.15 Historically, street lighting installations in the Borough are controlled by time switches which are expensive to purchase, require resetting in case of power failure, and only switch the lights on or off according to a pre-determined switching profile. The vast majority of time switches have now been replaced with photocells.
- 3.16 All new and refurbished installations will be switched by electronic photocells with greater accuracy and reduced drift, set to switch at 70 Lux on/35 Lux off 'negative ratio', these settings being chosen to mimic closely the response of time switch set for dusk to dawn operation.
- 3.17 While electronic photocells continue to be the main method of switching illuminated street furniture, recently developed technology allows for the switching and monitoring of equipment by a Central Management System (CMS). This involves a central, computerised signalling system to determine optimum switch on and switch off times, communicating this to the street light

by a variety of means (usually by radio or 'through the mains' communication) and obtaining telemetry from the street light to determine its operating health. This has been trialled in an area of the Borough and has been shown to obtain significant savings in energy and maintenance as a result, including by dimming the street lighting installation (see Appendix 4, 1.4) as well as reducing the carbon footprint of the installation. *A CMS is being considered to cover the whole of the Borough area.*

3.18 *Selection of schemes to be included in annual programmes will be on a basis of priority determined by the following:*

- The safety of the installation, in turn determined by a risk assessment process. The ILP Technical Report TR22 sets out the procedure to be adopted (see 5.19 to 5.28 inclusive).
- Crime and anti-social behaviour levels from statistics supplied by the police.
- Number of requests for improved lighting from residents. This information is held on an Improvement Requests Register on the Mayrise system.

## **4.0 SPECIFIC LIGHTING REQUIREMENTS**

### **Roads in Urban Areas**

4.1 *We will consider the level and type of public lighting in each geographic area. Each of these areas may have different needs and requirements, which should be considered and developed to cover each road type, class and location. The provision of modern public lighting designed to the appropriate standard (see 3.1 above) will be an integral part of any urban renewal.*

4.2 Urban areas are defined as those areas contained within the boundaries of towns and cities, including non-residential estates. Areas of special environmental interest within the urban area are considered separately under the category of historic and conservation areas.

- 4.3 In general all roads in urban areas will be provided with a system of street lighting as detailed under General Requirements above.

#### **Roads in Residential Areas**

- 4.4 Residential areas are defined as those areas contained within the boundaries of towns, cities and villages primarily serving residential properties. Areas of special environmental interest within the urban area are considered separately under the category of historic areas.
- 4.5 In general all roads in residential areas will be provided with a system of street lighting as detailed under General Requirements above.

#### **Roads in Historic and Conservation Areas**

- 4.6 Historic areas are defined as follows:
- Statutory conservation areas, scheduled ancient monuments, listed and registered historic parks and gardens, listed buildings and areas abutting their boundaries.
  - Non-statutory historic or heritage areas and older urban renewal areas identified by the Local Planning Authority.
  - Other Authority sponsored initiatives, such as the regeneration of older urban areas and towns' initiative programmes, which will be the subject of special treatment and funding. These will generally operate within the categories described above but some will have their own requirements.
- 4.7 Subject to ensuring the safety of the highway, the retention and enhancement of the architecture and the historic or landscape character of the area will take precedence in determining lighting requirements.

#### **Land owned by Housing Management**

- 4.8 The standards of lighting provided in these areas, where determined by the Street Lighting Section, shall be as for those on adopted highways as appropriate to the nature of the area under consideration (see 4.1 to 4.7 above). According to the service level agreement in place, public lighting on land owned by Housing Management (Directorate of Adult, Community and Housing Services) will be maintained by the Street Lighting Section, as is the case for lamps on adopted highways.

## **5.0 MAINTENANCE**

### **Statutory Requirements**

- 5.1 Dudley MBC has a duty of care to ensure highway electrical equipment is maintained in a safe condition. All systems of public lighting should be maintained to a standard that ensures their safe, economic, effective and reliable operation.
- 5.2 It is a requirement of the Electricity at Work Regulations that full details of all electrical equipment including that on the highway be recorded and made available to those operating and maintaining it. The New Road and Street Works Act further requires that all electrical equipment to the highway be geographically recorded and that such information be made available to any statutory undertaker wishing to excavate in the highway.

## **Inventories and Record Systems**

- 5.3 An up-to-date inventory of highway electrical equipment is essential to enable the satisfactory management of a maintenance process that meets legal obligations and provides information for the calculation and tendering for electrical energy.
- 5.4 All maintenance activities will be pro-actively monitored to ensure that the system is being maintained in a safe and effective manner. Monitoring of the maintenance function will allow engineers to determine the most cost effective methods and frequencies for different functions and provide valuable information on the condition of the installation. In order to achieve this, a full record of maintenance undertaken on an item of equipment will accompany the equipment record.
- 5.5 *We will maintain an up-to-date inventory including details of all highway electrical equipment and its maintenance.*

## **Fault Detection**

- 5.6 To detect lamps that are not operating correctly it is necessary to carry out periodic night-time inspections. Reliance on members of the public to report faults does not provide a sufficiently reliable method to meet duty of care obligations and to ensure that all lamps are repaired with the minimum of delay.
- 5.7 The frequency of physical inspection should be directly related to the frequency and time taken to carry out repairs.
- 5.8 *We will ensure that regular night-time inspections of highway electrical equipment are carried out.*
- 5.9 Items of highway electrical equipment are sited at the side of roads, where they are subjected to a very hostile environment and potential damage owing

to vehicle impact and vandalism.

- 5.10 Highway electrical equipment does develop faults and a reactive repair procedure should be established to ensure an efficient and speedy response to items of equipment reported as faulty and not operating correctly.
- 5.11 *We have a system for the repair of faulty highway electrical equipment, defining relevant times for the repair of different types of equipment.*

### **Cyclic Maintenance**

- 5.12 The design of modern public lighting takes account of the depreciation in the lumen output of the lamp and the accumulation of dirt on the luminaire. To maintain the satisfactory operation of the luminaire at its designed output it is therefore necessary to consider the replacement of the lamps at regular periods and the regular cleaning of the luminaire.
- 5.13 Manufacturers of discharge lamps for street lighting set out expectations for lamp survival and lumen depreciation in their published figures. The Council expects their lamp suppliers to back up these expectations by guarantee, and as such figures for minimum burning hours before extinction are stipulated in the Council's contract for lamp supply. Together with the published figures for lumen depreciation, these govern the frequency at which the Council routinely replaces its street lighting lamps.
- 5.14 *We will undertake cyclic maintenance of highway electrical equipment to ensure the efficient and safe operation of the system. This will have regard for the type of equipment installed and its lighting source. The recommendations of both professional bodies and the lamp manufacturers concerning lamp life will be taken into account when determining frequencies for the planned replacement of lamps.*

## Electrical Inspections

- 5.15 To reduce the risk to the public of electrical shock from electrical equipment, regular visual inspection of all items of highway electrical equipment will be carried out to ensure that the item is electrically safe, operating correctly and as per the recorded inventory details.
- 5.16 All electrical equipment, including that on a public highway, will be maintained in accordance with the Electricity at Work Regulations. These Regulations require that electrical equipment be regularly tested to ensure its safety and correct operation.
- 5.17 It is considered good industry practice to carry out such tests at a frequency of no greater than every six years. However, where the equipment is in a poor electrical condition and the rate of failure is higher than normal, this frequency should be reduced.
- 5.18 *We will visually inspect all highway electrical equipment at each cyclic maintenance visit and electrically test in accordance with the requirements of the Electricity at Work Regulations. It is generally considered that this requirement can be achieved by carrying out regular testing at six yearly intervals. However, where the equipment is subjected to misuse or prone to damage or vandalism this frequency will need to be adjusted to ensure compliance with the regulations.*

## Structural Inspections and Risk Assessment

- 5.19 To reduce the risk to the public from falling pieces or items of highway electrical equipment, regular visual inspection of all items of highway electrical equipment should be carried out to ensure that the item is structurally safe.
- 5.20 The frequency of structural inspections should be determined by carrying out a Risk Assessment, which takes account of the age, type, location and maintenance of the highway electrical equipment and any potential dangers

that may occur from the collapse of the lighting column or sign post. We will carry out, as a minimum, a visual inspection of the structural condition of the column or sign post at each cyclic maintenance visit.

- 5.21 Each time a lighting column is removed from service, the opportunity should be taken to inspect and analyse its condition. Whilst visual inspections provide a cost-effective means of assessing the general condition of lighting equipment, such inspections cannot guarantee to identify the extent of any internal corrosion or foundation weakness. However, this information can be used to help develop further inspection and testing programmes.
- 5.22 A Risk Assessment should also be used to determine any additional structural testing, such as dynamic testing, which may be needed to ensure the structural integrity of the lighting columns and sign posts. The Risk Assessment to be applied in Dudley, as requested by the Department of Transport, is that of the Institution of Lighting Professionals (ILP) Technical Report TR22.
- 5.23 Currently the only proven methods available for the testing of lighting columns and sign posts are for steel products. Reliance must therefore be placed upon visual inspections for other types of column, such as concrete, fibreglass and cast iron, although research is being conducted into non-destructive testing methods for these.
- 5.24 Using existing national data, the following order of priority for the testing of steel columns is being implemented:
- a) Locations where the poor condition of the columns has been established as a result of routine visual inspections or other reports
  - b) Columns of a similar design, age and location to those in a) above
  - c) Columns of 8m mounting height or greater
  - d) Other steel columns on classified roads
  - e) Steel columns on other roads, including residential streets.

- 5.25 When determining priorities in each of the above sections, the following additional details will be considered:
- a) Age of installation (provisional information indicates that non-galvanised steel columns installed between 1970 and 1980 are generally more prone to failure than older or newer lighting columns)
  - b) Columns in areas subjected to high and frequent wind exposure
  - c) Columns mounted on over-bridges or other vulnerable areas
  - d) Volume and type of traffic, particularly roads with heavy concentrations of HGV vehicles travelling at speed.
- 5.26 The above criteria should provide adequate detail on which we can prioritise the testing of steel columns. The results obtained from the testing programme will be iteratively reapplied to update and refine the process and to ensure that the most appropriate priorities are being addressed.
- 5.27 The frequency of the visual inspections and any additional structural testing will be determined by carrying out a Risk Assessment, which takes account of the age, type, location and maintenance of the highway electrical equipment and any other potential dangers such as high vandalism areas.
- 5.28 Further details on all aspects of public lighting maintenance can be obtained from the Association of Directors of Engineering, Economy, Planning and Transportation (ADEPT) and the Institution of Lighting Professionals Code of Practice in Public Lighting Operations, Fifth Edition.

## **6.0 ASSESSMENT OF PUBLIC LIGHTING SCHEMES**

- 6.1 With the limitation on the budgets available for the replacement, improvement or provision of new lighting, Engineers must prioritise these funds to ensure that priority is given to the most important schemes.
- 6.2 The system of prioritisation will differ dependent upon whether the scheme is:

- a) For the provision of new lighting or the replacement of sub-standard lighting with a new higher level of lighting; or
- b) For the replacement of lighting equipment which has reached the end of its life.

6.3 Whatever the reason for the installation of a new lighting scheme, each scheme should be assessed to ensure that Best Value is obtained.

#### **New Lighting Schemes**

6.4 Consideration will be given to the following points when prioritising new lighting schemes:

- a) Road safety
- b) Crime or anti-social behaviour prevention
- c) Environmental issues
- d) Capital and maintenance costs
- e) Commercial/economic regeneration.

6.5 Each of the above points will be assessed against a series of predefined and approved criteria, which have been developed and ranked in order of priority and importance. By this means the relative importance of each proposed scheme can be assessed and rated.

6.6 *Each new lighting scheme will be assessed to ascertain its value to the community and take account of the benefits to be gained by the community from safer roads, reduced night-time crime and the improvement or regeneration of the commercial economy of the area. However, possible detrimental effects on the environment, including ecological implications, will also be considered, as will the capital and maintenance costs of the scheme.*

#### **Improvement Schemes**

- 6.7 Improvement schemes (schemes where the existing lighting is sub-standard but the equipment is structurally and electrically safe) will be treated in a similar way to new lighting schemes, with each of the following points being prioritised and assessed:
- a) Road safety
  - b) Crime or anti-social behaviour prevention
  - c) Environmental issues
  - d) Condition of existing equipment
  - e) New capital and maintenance costs
  - f) Commercial/economic regeneration.
- 6.8 Improvement schemes will generally view with new lighting schemes for capital funding and will have to be assessed for best value against new lighting schemes to determine which should be prioritised for installation. The structural and electrical condition of the existing lighting equipment will also be accounted for when making this decision.

#### **Replacement/Refurbishment of Existing Lighting**

- 6.9 Existing lighting schemes will be assessed to prioritise which schemes will be carried out first to ensure that limited funds are spent in a cost effective manner. The need for the replacement or refurbishment of existing lighting will be brought about by a number of criteria, the major ones being:
- a) The poor structural or electrical condition of the existing lighting
  - b) The poor standard of the existing lighting
  - c) A desire to reduce energy and/or maintenance costs
  - d) A demand for better lighting.
- 6.10 Each of these criteria will have to be assessed and rated for each scheme and then assessed and rated against the other schemes. In many cases the criteria will be inter-related, for instance, the replacement of an existing system of lighting in a poor state of repair will most likely result in better

lighting, a reduction of maintenance cost and a possible reduction of energy cost. Appendix 10 provides details of the Council's proposed Invest to Save Programme.

6.11 Where existing lighting is being assessed for replacement or refurbishment, the actual condition of the equipment will be the major factor determining the priority for replacement. However, consideration will also be given to the following factors when assessing the replacement or refurbishment of a lighting scheme if Best Value is to be achieved:

- a) Night-time personal injury accidents. Compare with daylight accident rate
- b) Recorded crime statistics or police intelligence information
- c) Condition and standard of existing lighting
- d) At risk population
- e) Residents' details (high proportion of older people or children)
- f) Transport facilities, predominant use of public or private transport
- g) Public centres, shops, colleges, sports centre, community centre, health centre, etc.
- h) Maintenance problems and vandalism, high maintenance/energy costs or high rates of vandalism
- i) Traffic flows.

6.12 *Where relighting or refurbishment of an existing lighting scheme is being considered following a request for improved lighting, each of the listed criteria will be assessed and rated to provide a consistent evaluation of the need for improved lighting.*

## **APPENDIX 1**

### **LIST OF DEFINITIONS, REFERENCES AND REGULATIONS**

#### **DEFINITIONS**

##### **Highway Authority**

In England and Wales means:

- a) In relation to a road for which the Secretary of State is the highway authority within the meaning of the Highways Act 1980, and
- b) in relation to any other road the Council of a county, metropolitan district or London Borough or the Common Council or the City of London as the case may be.

For the purpose of this Policy the Highway Authority is Dudley Metropolitan Borough Council.

##### **Lighting Equipment**

Lighting Equipment includes Road Lighting, Footway Lighting, internally lit traffic signs, traffic bollards and externally lit traffic signs, in which the lighting is an integral part of the sign. For large advanced direction sign illuminated by a free standing lighting unit physically separate from the sign and its supports, only the free standing lighting unit would be covered, the actual sign and its mountings would not.

<b>SOX Lamp</b>	Low Pressure Sodium discharge lamp (orange coloured light)
<b>SON Lamp</b>	High Pressure Sodium discharge lamp (gold coloured light)
<b>PL Lamp</b>	Compact Fluorescent Lamp (white coloured light)
<b>CDO-T Lamp</b>	Ceramic Discharge Tube Metal Halide Lamp (white coloured light)
<b>RCD</b>	Residual Current Device

**Developer** A company or other such body constructing or improving a highway for eventual adoption by the Highway Authority under the provisions of Section 38, 106 or 278 of the Highways Act 1980.

**Public Electricity Supply**

The system of mains electricity cables owned by, or having their point of utilisation in equipment owned by, the electricity District Network Operator (DNO).

**PRINCIPAL REFERENCES, CURRENT REGULATIONS**

- Health and Safety at Work Act, 1974
- Electricity at Work Regulations, 1989
- BS 5489-1: 2003 (amended 2008), Selection of road lighting
- BS EN 13201: 2003, Parts 2 – 4, Standards for road lighting design
- BS EN 40-1: 1992, Definitions and terms
- BS EN 40-2: 2004, Lighting columns – general requirements and dimensions
- BS EN 40-5: 2002, Requirements for steel lighting columns
- BS 7671: 2008, Requirements for electrical installations, IEE Wiring Regulations, Seventeenth Edition
- BS EN 60529: 1992, Specifications for the degrees of protection provided by enclosures (IP code)
- BS EN 60598-1:2008, General requirements and tests
- BS EN 60598-2-3: 2003, Luminaires for road and street lighting
- Department for Transport Design Standards for Roads and Bridges: BD 94/07, Design of Minor Structures
- Department for Transport Design Standards for Roads and Bridges: TA 49/07, Appraisal of new and replacement lighting on the strategic motorway and all purpose trunk road network
- Traffic Signs Regulations and General Directions, 2002
- Disability Discrimination Act, 1995
- Highways (Road Humps) Regulations, 1996

- Electricity Safety, Quality and Continuity Regulations, 2002 (SI 2002/2665).

## **APPENDIX 2**

### **ADOPTION OF NEW LIGHTING SYSTEMS**

#### **1. Section 38, 106 and 278 Adoption Procedures**

- 1.1 Where the proposed Section 38 or 278 lies within the designated areas for lighting described in this Document, then street lighting and illuminated signs shall be provided as a specific part of any agreement between Dudley MBC and the Developer.
- 1.2 The design and specification of the proposed lighting shall be in accordance with the specifications laid down in this document and the Dudley Metropolitan Borough Council Standard Specification for Street Lighting Installations (the Standard Specification) in force at the time of design.

#### **2. Lighting Standards**

- 2.1 For each development the standard of lighting shall be agreed by The Authority, but shall, other than in exceptional circumstances, be selected in accordance with BS 5489 Part 1 and designed to the standards set out in BS EN 13201.
- 2.2 Designs for new Lighting Equipment shall ordinarily be undertaken by the Street Lighting Section of Dudley MBC but, at the Developer's discretion, may be undertaken by others provided that the finished design is subject to audit by the Street Lighting Section.

#### **3. Lighting Equipment Inventory**

- 3.1 Once connected, even before formal adoption of the highway, Lighting Equipment on roads subject to a Section 38, 106 and 278 agreement will be considered 'prospectively maintainable'.

- 3.2 The ongoing maintenance of Lighting Equipment before formal adoption relates only to that work which is required to keep the installation in lighting. Other works that may be required to bring the installation up to the standards set out in the Standard Specification shall remain the responsibility of the Developer.
- 3.3 When notified of adoption of the highway, the Street Lighting Section shall ensure that lighting systems connected to the Public Electricity Supply are added to the Dudley MBC Road Lighting and Illuminated Traffic Sign Inventory at the earliest opportunity.

## **APPENDIX 3**

### **SEASONAL DECORATIONS ON OR ABOVE THE HIGHWAY**

#### **1. General**

- 1.1 The erection of seasonal decorations on or above the highway shall only be carried out with the prior written approval of the Highway Authority.
- 1.2 All works associated with the provision of seasonal decorations shall be carried out in accordance with the requirements of the Institution of Lighting Engineers/County Surveyors' Society Code of Practice for the Installation, Operation and Removal of Seasonal Decorations (Second Edition, 2005; referred to in the remainder of this Appendix as the Code).
- 1.3 Seasonal decorations may be attached to existing Lighting Equipment but it is preferred that such decoration be attached to or supported from buildings adjacent to the highway.
- 1.4 Seasonal decorations shall be deemed to include decorations erected for:
  - Christmas and other religious celebrations
  - Festivals and other celebrations
  - Flower decoration including attached and hanging baskets
  - Flags and banners
  - Advertisements.
- 1.5 The capital cost of purchasing festive decorations and the cost of the infrastructure changes required, may be met from a number of sources, but the revenue cost of their erection, operation and removal is required to be met by the provision of private finance – the Council no longer has a budget for this purpose. This has led to a number of opportunities for traders and other enterprises to sponsor decorations, and details of the sponsorship packages

available can be obtained from the Council's Marketing and Communications Section.

## **2. Seasonal Decorations Supported from Adjacent Buildings or Free Standing in the Highway**

2.1 All seasonal decorations mounted above, or free standing in the highway shall:

- Be in accordance with the Code, as modified by this Paragraph, in respect of all requirements for permissions, licences, insurances, traffic management, supplies and energy, electrical and structural design, testing and maintenance
- Have the minimum level of insurance indemnification called for by Paragraph 5.14 of the Code and shall be not less than five million pounds (£5m)
- Shall, before the commencement of works, have the Licence called for by Paragraph 5.16 of the Code which shall be for a period not exceeding 35 calendar days, unless planning permission has been granted for a longer period
- Shall be calculated and installed in accordance with the Code in respect of all fixings, catenaries, festoons and other decorations equipment. The height above sea level within the Dudley borough boundaries varies from 55m to 307m, so care must be taken in establishing the effective height of the decorations site and selecting the correct fixing/catenary/festoon sizes and other parameters of the decorations installation.

2.2 No Seasonal Decorations shall conflict with any adjacent traffic signal systems.

### **3. Festive Decorations and similar attachments to illuminated street furniture**

3.1 In general, street lighting columns are not designed for the significant additional loads imposed by the attachment of seasonal decoration. Therefore the size and number of seasonal decorations that can be attached to a lighting column is limited. However, the erection of such decorations and fittings will be permitted provided the following additional conditions are met.

3.2 New or replacement lighting systems:

- In locations where it is expected that seasonal decorations will be required, the lighting columns shall be manufactured and installed to support the additional loads imposed by weight and wind and a certificate of compliance lodged with the Highway Authority. The additional cost of such columns will be rechargeable to the organisation wishing to install the seasonal decorations.

3.3 Existing lighting systems:

- Any street lighting apparatus used to support festive decorations shall be visually inspected by Street Lighting staff before decorations installation. If, following a visual inspection, there is sufficient doubt about its ability to support a decorations installation, the decorations installation shall not proceed until permission is given by an officer of the Street Lighting Section. If necessary, a full structural inspection by a qualified structural engineer may be required and any costs deriving from this shall be borne by the decorations provider.

3.4 The following conditions shall apply to any decorations installation:

- Festive decorations shall not hinder the normal operation or maintenance of the street lighting installation, the highway or any part thereof.
- No banners, flags or catenary wires shall be erected between two or more items of street furniture, or between one item of street furniture and an adjacent building, unless the street furniture has been designed and manufactured specifically for that purpose or the street furniture has been declared suitable for the purpose by report of a qualified structural engineer (see 3.3 above).
- Any fixings of decorations equipment to street furniture shall be non corrosive and of a type that does not cause damage to the protective system (e.g. paint) of any item of street furniture. If damage is caused, the cost of making good any such damage shall be borne by the decorations provider.
- Power supplies to festive decorations attached to illuminated street furniture shall not be obtained from an adjacent building. Adaptation to street furniture to allow for decorations connection may be provided, on request, by the Street Lighting Section, the cost of which shall be borne by the decorations provider.
- Where remote power supplies are used to supply electricity to festive decorations, the decorations and any supply wiring shall be labelled with the location of the isolation point at regular and appropriate positions.
- As illuminated street furniture is unmetered, if supplies for illuminated decorations are derived from such street furniture the decorations provider is expected to undertake an unmetered supply agreement with the Distribution Network Operator and an electricity supply agreement with a supplier. To this end the decorations provider shall supply details of the connected load, the dates of connection and disconnection and any switching of the decorations to the Distribution Network Operator and obtain a Meter Point Administration Number (MPAN) from them. The MPAN shall be declared to the electricity supplier and also to the Street Lighting Section prior to connection of

the decorations installation. The Team Manager (Street Lighting) can advise on the process to be followed and may be contacted on 01384 814502.

**4. Other Fixtures and Attachments to Street Lighting Columns (Permanent or Temporary)**

- 4.1 In general all new street lighting columns, except cast iron or cast aluminium decorative columns, shall be designed to comply with the Department of Transport Memorandum BD 94/07. Therefore, the erection of sign plates or other attachments such as flower baskets of greater than 0.3m<sup>2</sup> in area, whether permanent or temporary, is not permitted unless the column has been specifically designed to carry the additional weight and wind loads.
- 4.2 Existing Lighting Equipment due to its design, construction or structural condition may not be structurally adequate to support the additional weight and wind loads imposed by the erection of a sign or other attachment.
- 4.3 Lighting columns should not be used as an additional support of a sign of area greater than 0.6m<sup>2</sup> requiring a second or additional post, unless the lighting column has been specifically designed for this purpose. Experience has shown that the use of lighting columns in this manner can cause premature failure.
- 4.4 Street lighting columns shall not be used as supports for advertising signs of any kind, except where recognised organisations (i.e. Automobile Association or Royal Automobile Club) have been granted permission by the Highway Authority. When fixed such signs should not obscure the unit's maintenance number, hinder maintenance or affect the light output of the equipment.
- 4.5 Street lighting columns may be used as supports for temporary security cameras owned or operated by the West Midlands Police or Fire and Rescue Service, but shall be subject to inspection (which may or may not include a structural inspection) by the Street Lighting Section before such equipment may be deployed. Deployment may only take place with the express

permission of the Street Lighting Section.

- 4.6 The provisions of paragraph 3.4 above shall apply equally to any temporary signs or similar equipment designed to be connected to the electricity supply.

## APPENDIX 4

### SELECTION OF THE LIGHTING LEVEL TO BE PROVIDED ON A PUBLIC HIGHWAY

#### 1. General

1.1 The following details provide an aid to the selection of the correct level of lighting to be provided on an adopted highway. However, the actual level of lighting shall be determined by the methods shown in the British Standard BS 5489: 2003, Part 1, Selection of Lighting Classes.

1.2 The Institution of Lighting Professionals 'Guidance Notes for the Reduction of Obtrusive Light, GN01 (2005)' provides a recognised means of zoning areas for environmental purposes when assessing lighting requirements. The four zones classified in the document are as follows:

- Zone E1: National Parks, Areas of Outstanding Natural Beauty, Sites of Special Scientific Importance and other dark areas. For the purpose of this Policy Document this can be discounted as there are no areas of this type within the Borough.
- Zone E2: Areas of Low District Brightness – rural areas outside of Zone E1. There are at present no roads of this type within the Borough that require lighting, hence can be discounted for the purpose of this Policy Document. If such a request were to arise, then consideration would be taken of the road's position within the road hierarchy (see 2. Highway Network Hierarchy) and the recommended lighting class (see 3. Recommended Minimum Lighting Levels).
- Zone E3: Areas of Medium District Brightness (Urban location).
- Zone E4: Areas of High District Brightness (Urban centres with high night time usage).

Carriageways and footpaths within the latter two Zones would generally be

lit in accordance with their place within the road hierarchy (see 2. Highway Network Hierarchy) and the recommended lighting class (see 3. Recommended Minimum Lighting Levels).

1.3 While the foregoing gives the general approach to be taken when lighting the highway, some locations require to be considered for special treatment.

These are:

- Cycle tracks and footpaths – Where a cycle track or footpath is to be considered for lighting, particularly if remote from an adjacent highway or properties, a safety audit should be carried out as to illuminate would be to indicate its safety in use during darkness hours. See also the advice in the Institution of Lighting Professionals Technical Report TR23, Lighting of Cycle Tracks (1998). Where cycle tracks and footpaths cross roadways, irrespective of whether or not the crossing is light controlled, it should be treated as a conflict area (see 4. Conflict Areas).
- Roundabouts and junctions are known conflict areas and the appropriate CE categorisation (see 4. Conflict Areas) should be applied.
- Pedestrian crossings – the principles of the Institution of Lighting Professionals Technical Report TR12, Lighting of Pedestrian Crossings (2007) should be employed.
- Road humps and other traffic calming measures – before designing lighting of any carriageway with features designed to reduce the road speed of traffic, or re-examining the lighting of a road where such measures are to be installed, the Road Hump Regulations (1996) should be consulted as it contains advice on the necessity of the modification of lighting schemes.

1.4 The British Standard Code of Practice BS 5489-1:2003 (Code of practice for the design of road lighting), and accompanying British and European Standard BS EN 13201, set out the lighting classes and methods of calculation for the different types of road (see 3. Recommended Minimum Lighting Levels). One principle introduced by EN13201 is the reduction of

lighting levels where allowed owing to the use of white light or, for roads lit in accordance with S and ME classes (see BS 5489-1: 2003 and BS EN 13201-2: 2003), a reduction in the amount of traffic using the road. This allows for differential lighting levels according to the type of light and the traffic levels at various times of day.

While determination of reduced lighting levels using white light is carried out when designing the lighting, the technology exists to allow variation of lighting levels by traffic (or, by extension, time of day) in a street light. This allows for a system of street lighting to be dimmed, thereby reducing energy consumed and its carbon footprint. This technology has been trialled with some success within Dudley Borough and while obviously for a given road this will depend upon the local conditions being appropriate, consideration is being given to a more widespread introduction of the principle.

- 1.5 One common cause for complaint with regard to new street lighting installation is not particularly the position of the street light or its alignment, but the visual impact of the new lighting units – the luminaires. The optical efficiency of modern street lighting is greater because the types of light source used today are better controlled by the combination of refractor and/or reflector within the luminaire, but this can in turn lead to an increased conspicuity of the street light – it ‘looks brighter’. This conspicuity can be lessened or removed by selecting luminaires of a luminous intensity more in accordance with the lighting zone (see 1.2 above). This is denoted by a glare classification required by BS EN 13201, and declared by the manufacturer of the luminaire. We have determined that, for all practical applications, minimum standard G2/3 luminaires should be provided, but where practicable these should be class G3/4. Installations in Zone E2, should they ever become necessary, should attract a glare classification G6.

## **2. Highway Network Hierarchy**

- 2.1 The routes, which form the Highway Network, have different roles depending on levels of traffic flow and their relative importance as communication links. A Road Hierarchy has been defined which classifies each link in the Highway Network according to its function. The classes in the Hierarchy are as given in paragraph 3.3 below.
- 2.2 The Hierarchy will be formally reviewed at regular intervals to take into account changes in the road network and traffic patterns. However, interim changes will be made where new construction or re-classification has taken place, or when changes in traffic flows or developments make it appropriate.

## **3. Recommended Minimum Lighting Levels**

- 3.1 The following lighting levels are the minimum recommended for the specific traffic group, footway or cycleway. Rural locations have not been considered as they are few in number compared to urban locations in the Dudley Borough, but if rural roads in Road Classes 3b or 4a are encountered, the variations in EN13201-2: 2003 to the lighting classes given below should be applied.
- 3.2 The denotation of a lighting level against a particular traffic group, footway or cycleway does not indicate or confer a need to provide lighting on a specific road, footway or cycleway. The decision to light or otherwise can only be taken after careful consideration of all factors including environmental and financial.
- 3.3 The lighting levels shown in the table below are the minimum recommended. The actual lighting level for a specific road, footway or cycleway should be determined in accordance with the procedure set out in the British and European Standard BS EN 13201: 2003, Parts 2 to 4.

<u>Road Hierarchy Classification</u>	<u>Description</u>	<u>Lighting class</u>
2	Strategic Route	ME2/ME3a
3a	Main Distributor	ME2/ME3a
3b	Secondary Distributor	ME3b/ME3c
4a	Link Road	ME4b/S1/S2
4b	Other roads	S2/S3/S4

For all except Road Class 4b, the traffic level (average in 24 hour) should be determined and the lighting class to be applied related to the road in question by reference to EN13201. The lighting class to be selected for a road of Class 4b will generally be determined by the lighting class on the adjoining roads, particularly feeder roads, by reducing the lighting class by a single class from that higher classified feeder road – but see 3.4 below.

- 3.4 When selecting a lighting class from the selection of classes in the roads hierarchy, due regard is to be given to estimated pedestrian density and after dark crime rates. Records of the latter are retained within the Lighting Section and each road given a ‘crime score’ relating to its comparative position in the table:

<u>Crime Score</u>	<u>Designation</u>
0 or 1	Low crime
2 or 3	Medium crime
4 or 5	High crime

Where the situation calls for it, a higher class within the range of those indicated above for a given road hierarchy may be selected.

#### 4. Conflict Areas

4.1 Roads demarcating conflict areas, such as junctions and roundabouts, should be lit according to the table above and an appropriate CE class applied to the installation within the conflict area as in the table below (source data from EN13201:2003):

<u>Lighting Class</u>	<u>Conflict Area Class</u>
ME2	CE1
ME3	CE2
ME4, S1	CE3
S2	CE4
S3	CE5
S4	Not applicable

4.2 Any conflict areas where the junction/roundabout is formed by roads lit to two different classes should take the Conflict Area Class of the road having the higher lighting class.

## **APPENDIX 5**

### **ROADS IN HISTORIC AND CONSERVATION AREAS**

#### **1. General**

- 1.1 All historic and conservation areas have unique character and it is important that any lighting arrangements are tailored accordingly to enhance the area rather than being “standardised”.
- 1.2 Lighting improvements should form an integral part of all environmental enhancement schemes.
- 1.3 In order to identify opportunities and constraints specific to the site under consideration, a detailed design brief shall be prepared jointly in conjunction with the appropriate Planning Officers.
- 1.4 The brief should take into account the view of interested outside bodies (e.g. historical societies) to ensure that the appropriate environmental and lighting design solutions are achieved.
- 1.5 Full compliance to the agreed brief will be required before the Authority adopts any lighting.
- 1.6 Every opportunity should be taken for considering lighting arrangements in environmental enhancement schemes. Lighting of areas with a high activity level after dark, together with improving the perception of hazards, e.g. level changes, changes in direction and road crossings, should form an integral part of any proposals.
- 1.7 Authority enhancement programmes provide the opportunity for exploring the appropriateness of different lighting levels in a variety of historic areas. Every opportunity should be taken to improve lighting in such schemes.

## **2. Design of Historic and Conservation Schemes**

- 2.1 Recommended minimum lighting levels are set out in Appendix 4 above. However, for the purposes of this policy, these should be regarded as target lighting levels. Lower levels may be permitted where a balance between environmental and safety consideration is appropriate.
- 2.2 New or replacement lighting shall be of a full spectrum light source type, i.e. white light.
- 2.3 Areas of high pedestrian activity may however benefit from a higher level of lighting than the general surroundings, e.g. adjacent areas of entertainment, school entrances and their routes to bus stops.
- 2.4 All new lighting in sensitive areas should be appropriate, particularly in relation to conservation or other historic areas in small towns or villages whose tradition lies in a quiet atmosphere and where stark, night illumination can create an entirely alien environmental quality.
- 2.5 There may be situations in popular locations heavily used at night, where tourist and visitor needs indicate a higher level of illumination. The Authority must be involved in the consultation process at an early stage, where higher levels of lighting are thought necessary for highways and personal safety reasons.
- 2.6 Street Lighting studies tend to indicate reductions in crimes against the person and property following improvements to the street lighting and an increased perception of feeling safer, particularly for women and the elderly.
- 2.7 The Authority will consult with all relevant parties to ensure that historical styling and/or location of equipment is correct. In special or particularly sensitive locations it may be advisable to arrange for trial installations.

2.8 In determining levels of illumination, lighting positions and styles, the Lighting Design Brief will consider pedestrian and vehicular uses/needs in relation to the following identified matters:

- Areas of activity, theatres, shops, school entrances, bus stops, libraries, highways, paths etc., and areas of conflict
- Listed buildings and historic qualities of the area
- Building heights
- Street features – crossing points, sitting areas, tree planting, traffic calming, materials/colours, etc.
- Existing lighting – positions, styles, heights, lighting levels, lighting type, lighting from shops, floodlights, etc. In assessing appropriate levels of illumination the existing and ambient lighting, e.g. from shops, floodlighting schemes etc., shall be taken into account. While such lighting adds to the ambience of the area, it should be recognised that the continued operation of ambient or privately owned lighting sources cannot be guaranteed for the life of the scheme
- Uneven surfaces (important to those with physical disabilities and visual impairments), hazards, etc.
- Local knowledge, incidence of vandalism, accident blackspots, etc.

2.9 The floodlighting of landmarks and historic buildings together with the design and installation of special or temporary lighting shall be in accordance with EN13201: 2003.

### **3. Lighting Equipment**

3.1 All lighting equipment shall complement and enhance the appearance of the area and every opportunity should be taken to extend the range of acceptable equipment available through discussion with suppliers.

3.2 Conservation area status does not establish a pre-requisite for period style lighting – good functional modern designs may be more appropriate and

suitable. However, the particular character of an historic area may demand an unconventional approach or a blend of various lighting sources.

- 3.3 The retention of existing columns/lanterns, where these are of local historical importance is desirable, particularly where they form a feature of the locality. The Authority encourages the retention and storage of salvageable materials and units.
- 3.4 The restoration of existing cast-iron and ornamental columns or lanterns, which are of architectural merit, will be encouraged but the electrical safety requirements must be considered paramount when deciding whether to reuse units.
- 3.5 Where modern equipment cannot be accommodated within such columns, then measures to supply a carefully sited, separate free standing unit may be an acceptable alternative to the loss of such features, always provided that electrical safety and isolation can be achieved. New lanterns for such existing columns must be appropriate to the period of the column.
- 3.6 Decorative fittings, which do not form part of the main lighting system and are installed or retained purely for decorative effect, may not be adopted by the Authority. In such instances their operation, maintenance and energy cost will be the responsibility of the installer.
- 3.7 If “period style” lanterns are used, care should be taken to match historical periods for which consultation with the Local Planning Authority is essential.
- 3.8 Where a modern style of fitting is proposed this, together with its control gear, must be recessive in design and colour and be sited so as to be “invisible” as far as possible during the daytime. This is of particular importance in areas where buildings are of diverse historical and architectural character. Such fittings should be simple and of appropriate shape, colour and scale to the architectural setting.

- 3.9 Wherever possible/appropriate, lanterns should be affixed to buildings, particularly where footways are narrow and subject to high pedestrian traffic. The associated work in achieving wayleave agreements and listed building consents for such fittings must be taken into account when programming schemes which include lighting improvements. Such work can require periods of six to eight months. The siting of fixings and all attendant equipment on building should be taken into account, as should the quality and elevation features of the individual buildings on which they are to be affixed.
- 3.10 Brackets can be of architectural interest in their own right. Restoration of such features is encouraged, where possible, in order to retain the individuality of the location. Where new fittings require brackets, then fixings must take into account the nature and integrity of the building; more than two fixing points should be provided, especially for buildings with timber frame, lime mortar or soft brick construction.
- 3.11 Modern interpretations of historic brackets may be appropriate in order to satisfy the need for cable ducting and load bearing requirements. The colour, weight and proportion of the bracket must be complementary to the lantern. Galvanised steel, primed and painted, should be used for new brackets, or other approved materials used, e.g. cast iron.
- 3.12 The scale of mounting height must be appropriate to the scale of the setting in the street scene. As a general rule, fittings should not be mounted so as to be seen in silhouette against the sky in urban locations. Heights may need to vary to blend in with the scale of the surrounding area. In urban areas, a 4 metre (13 foot) minimum height clearance over footways is normally required. However, 5 metre columns are generally considered as the lowest practical mounting height for lighting equipment.
- 3.13 The proportion of light column to lantern for ornamental fittings must be carefully considered. As a general rule, the human “head to body” proportions are considered to be inherently attractive.

- 3.14 Where lighting columns have to be used, they should be sited to avoid obstruction to the footway (particularly for the disabled). However, where this means that columns would be provided at the back of footways, adjacent to buildings, every effort must be made to install wall mounted fittings in lieu of columns.
- 3.15 As a general rule, the colour of lighting columns should be in accordance with BS.5489: 2003, Part 1. Generally in the Council's area columns are painted to BS4800, colour 10C21 (Lizard Green), although factors such as conservation area status, corporate colours for nominated town centre areas and visibility to people with visual impairments should be taken into account in deciding upon the colour to be used.

## APPENDIX 6

### LIGHTING OF PEDESTRIAN SUBWAYS

#### 1. General

- 1.1 Subways are provided as a safe route for pedestrians and cyclists to cross busy traffic routes. This provision should be maintained in a safe and usable condition at all times if the facility is to be used.
- 1.2 Subways and the approaches to them can be intimidating at night if they are not carefully designed and provided with good street lighting. Lighting should be designed and installed in accordance with BS5489: 2003 Part 1.
- 1.3 Subways should be bright and attractive to encourage their use. The walls should be treated or tiled to allow easy cleaning and removal of graffiti and of a light colour to reflect light.
- 1.4 Subways should be designed to allow flexible switching arrangements, providing different levels of illumination during the day and night to cope with extremes of daylight from a very bright sunlit day to a dark overcast night. Contrary to normal street lighting practices, high levels of illumination have to be provided in subways during daylight if users are to feel safe entering and passing through the subway.
- 1.5 However, levels of up to 350 Lux as recommended in the BS for daylight usage can cause a “reverse black hole effect” when leaving a brightly lit subway on a dark night.
- 1.6 To reduce the reverse black hole effect and make the entrance and exit of subways more attractive and inviting, attention should be paid to the approach lighting to the subways with particular attention being given to gradual reduction in lighting levels from those inside the subway to normal street

lighting levels outside. Sudden transitions in lighting levels could cause distress and anxiety to users.

- 1.7 Due to their remote location, many subways are subjected to heavy vandalism, with consequent increases in the cost of maintenance. The possible high levels of vandalism suffered by subways should be considered when selecting lighting equipment and particular attention should be given to its design, strength and ease of maintenance.
- 1.8 Special consideration should be given to the standard of maintenance and the frequency of night-time inspections in order to keep the systems operational. The use of remote monitoring equipment may provide a cost-effective means of monitoring the operation of the lighting equipment in a subway, particularly in areas remote from vehicular access.

## **APPENDIX 7**

### **PRIVATE OFF-HIGHWAY LIGHTING**

#### **1. General**

- 1.1 Although there are cases where planning permission is not necessary for exterior lighting, private lighting systems adjacent to lit or unlit sections of highway can cause distraction and danger to the motorist due to the level, intensity and direction of the illumination if adequate precautions are not taken during the design and installation of the system.
- 1.2 Intense lighting can be highly intrusive, cause damage to fauna and flora and cause pollution of the night sky. In determining planning applications relating to exterior lighting, we will ensure, as far as possible, that all private lighting schemes are designed to minimise light spill, night sky pollution and that the hours of operation and highway safety are considered.
- 1.3 Developments in rural and urban locations, which should be carefully monitored at the planning stage include:
  - Public houses, restaurants and other entertainment centres.
  - Petrol filling stations.
  - Car park lighting – particularly out of town shopping and commercial developments.
  - Industrial security lighting.
  - Lighting for sports stadia, playing fields and golf driving ranges.

#### **2. Illuminated Advertisements**

- 2.1 In general, lighting to illuminated advertisements should be provided in accordance with the Environmental Zone in which the installation is situated

and with the recommendations contained within The Institution of Lighting Engineers Technical Report No. 5 “Brightness of Illuminated Advertisements”.

- 2.2 Lighting to illuminated advertisements should where possible be restricted to the “down lighter” types of luminaire fitted with a flat glass (i.e. no bowl) and mounted so that the glass is horizontal or angled towards the advertisement to reduce the spill of light on to surrounding areas and distracting glare.
- 2.3 The Institution of Lighting Engineers’ ‘Guidance Notes for the Reduction of Light Pollution’ provides additional information and advice on the aiming and screening of luminaires.
- 2.4 It is not always possible to illuminate advertisements by this method, for instance internally illuminated advertisements, and signs constructed from exposed cold cathode tube, however, careful design and installation can minimise any spill or obtrusive light.
- 2.5 Illuminated advertisements should only be operated during the period the facility they are advertising is open. Once the facility has closed, the advertisement should be switched off. This should be made a condition of advertisement consent.

### **3. Car Park Lighting**

- 3.1 Car park lighting should be installed to the minimum level defined for the particular Environmental Zone in EN13201 Part 2.
- 3.2 The type and design of the lighting system and the equipment to be used should be in keeping with the development. Luminaires should be provided with an optical system, which minimises upward light and can be adjusted to reduce light spill outside the development. The use of uncontrolled sphere type luminaires should be strongly resisted.

- 3.3 Car park lighting should be operated for the full period over which the facility will be used. However, if the car park is locked and barred after a certain time of night, is it necessary to keep the installation operational or can the lighting be switched off or dimmed. When making this decision consideration should be given to the need to protect cars and vehicles left overnight.
- 3.4 It may be possible to restrict overnight parking to a separate section of the car park which can be kept fully lit and protected whilst the remainder of the car park is left in darkness or with a reduced level of lighting.

#### **4. Sports Stadium and Other Sports Lighting**

- 4.1 Sports stadium lighting and other sports lighting should be designed to the minimum standard recommended by the appropriate sports governing body or as set out in the CIBSE Lighting Guide LG4: Sport.
- 4.2 The lighting for multi-purpose sports fields and hard courts should be designed to provide flexibility in the levels of lighting provided to suit the particular standards and types of sport being played. The levels of illumination required for sports such as tennis, hockey and cricket which use a small ball travelling at high speed are generally higher than for other sports such as football or rugby which use a large ball travelling at slow speeds. Similarly high levels of illumination are generally required for higher levels of competition, i.e. full international standard requires higher levels of illumination than national level which requires higher levels than club level, etc.
- 4.3 Every effort should be made by the playing field/stadium management to ensure that the correct level of lighting applicable to the standard and type of sport is used. This will reduce the night-time visual intrusion of the installation and also will reduce energy consumption conserving scarce resources and saving the committee/company money.

- 4.4 Light spillage should be kept to the minimum by the correct design, installation and maintenance of the lighting system and by the attachment of louvres and screens where applicable.
- 4.5 The operational hours of sports lighting should be strictly controlled by the imposition of a curfew, if one is imposed as a condition of planning approval.
- 4.6 Any curfew should be carefully set to reflect the use of the facilities but should also take account of the surrounding area and the effect of the floodlighting on the area's residents. In locations close to housing and sites of nature conservation value, an earlier curfew time than 10.00 pm may be considered more appropriate by the Local Planning Authority to restrict the disturbance and disruption to the local residents. However, recognition of the high cost of providing, operating and maintaining floodlighting installations should be taken into account when deciding on the curfew time.
- 4.7 Many sports clubs also have catering and bar facilities that operate after the sporting activities have finished. In such situations it may be necessary to have a staggered curfew under which the playing area lighting is switched off at one time, followed by the car park lighting at a later time leaving no lighting or only minimal security lighting burning for the remainder of the night.

## **5. Security Lighting**

- 5.1 Industrial and commercial security lighting should be designed in accordance with the recommendations of the CIBSE Lighting Code.
- 5.2 As most security lighting will be operated all night, particular attention should be given to the problems of spill light and light trespass into nearby properties, especially into bedrooms.
- 5.3 The hours of operation of security lighting should be kept to the minimum possible and all unnecessary lighting switched off. Security lighting and task lighting are often provided by the same system of lighting. However, with

careful thought and consideration, task lighting could be partially switched or dimmed when work has been completed leaving a reduced or lower level of lighting for security purposes.

## **6. Domestic Security Lighting**

- 6.1 Domestic security lighting presents many problems due to the intensity, direction and method of operation. Unfortunately, in many cases there are no statutory powers that can be used to control such lights or the effect of the light on other people or their property.
- 6.2 The current perceived wisdom is that this issue can be controlled and reduced by better information and education on the problems of obtrusive light and the means by which it can be controlled and rectified.

## APPENDIX 8

### PERFORMANCE INDICATORS APPLICABLE TO STREET LIGHTING

<b>Key Performance Indicators</b>	
01a	Average cost of maintaining street lights (including bulk column replacement)
01b	Average cost of maintaining street lights (excluding bulk column replacement)
02	Percentage of street lights not working as planned
03	Percentage of lamps restored to working condition within 7 days
04	Average time to repair lamps (Authority only)
06a	Total energy cost per lamp or illuminated sign
06b	Total energy cost per street lamp only
11	Staff absence (Front line staff)
12	Staff absence (All staff)
13	QA and community consultation
14	Human Resources and People Management

<b>Secondary Performance Indicators</b>	
05	Average time to repair lamps (Electricity Supplier)
15	Staff absence excluding long term (Front line)
16	Staff absence excluding long term (All staff)
18	Average lamp circuit wattage
20	Average time to repair lamps (all faults)
21	Percentage faults repaired by electricity supplier
22	Percentage faults repaired by electricity supplier within SLA target
23	Percentage works orders* completed by electricity supplier
24	Percentage works orders* completed by electricity supplier within SLA target
25	Number of accidents reported to HSE per 10 FTE employees
27	Public telephone calls/contacts as a percentage of faults
28	Public telephone calls/contacts as a percentage of street lights
29	Faults as a percentage of street lighting stock
30	Percentage of columns over 30 years old
31	Percentage of columns structurally tested
32	Percentage of columns electrically tested
33	Average cost of repairing routine faults
34	Individual cost of night inspecting a street light

\* Works Orders for new connection, reconnection or disconnection works

## **APPENDIX 9**

### **SECURITY & LIGHTING POLICY FOR PARKS IN DUDLEY**

**Policy:** Security & Lighting Policy for Parks in Dudley MBC

**Date of Policy:** February 2005

**Responsible Officer:** Head of Arts, Heritage and Parks

**Policy author(s):** Liveability Programme Co-ordinator

#### **Strategic Context**

This policy is intended to provide detailed policy guidance in support of the Council's Green Space Strategy. It is not, however, formulated as a basis for assessing planning applications but aims for consistency to link in with the Council's Community Safety Supplementary Planning Guidance as well as the Council's Unitary Development Plan (UDP) Revised Deposit Plan February 2002 'Policy EP6' on light pollution.

#### **Policy Scope**

This policy is intended to be applied to parks and open spaces as defined in the Urban Development Plan (Feb 2002) showing local and town parks. It will also provide useful guidance for other areas of green space excluding nature reserves.

#### **1. Policy Background**

As part of the renewal process for parks in Dudley MBC, it is expected that decision guidance will be required in respect of the provision of security and lighting in the parks in the borough. This policy sets out guidelines for designers and maintenance organisations on the requirements to be considered as part of the design process and maintenance requirements.

## 2. General Policy Objectives

The following policy objectives are relevant to inform the more specific policy areas that follow:

- Security measures and the provision of lighting are important aspects in encouraging appropriate use of parks. Designs should endeavour to achieve the following general objectives in the use of security measures and lighting:
  - Give users and residents an enhanced feeling of safety and security in and around the park
  - Encourage appropriate use of the park and discourage inappropriate use
  - Discourage vandalism and other anti-social activities.
- Consider maintenance arrangements for security and lighting at the outset
- Consider physical security of car parks as part of the siting considerations
- Be guided by the principles as set out in 'Secure by Design Principles' when siting of any facility in parks or open spaces.

## Crime Prevention

A key concern relating to the use of parks is crime prevention. DMBC policy in this respect is to tackle crime prevention by:

- Encouraging more people to use the parks
- To make specific provision within the parks for children and young people
- To work with other organisations in the provision of diversionary activities to reduce crime potential
- To use specific measures against persistent crime problems or matters which present a Health and Safety risk to the public.

## 3. Design Policies

## **3.1 Security Design Policies**

### **3.1.1 Buildings**

- 3.1.1.1 Buildings and car parks clearly need to be sited with security considerations in mind from the outset. Where possible these should be sited at the edge of parks to allow increased natural surveillance from surrounding area and overspill lighting from street lights. Siting in such locations also removes the need for long access routes with associated security issues. The advice contained in 'Secure by Design Principles' should be applied to the siting of buildings or features in parks and open spaces.
- 3.1.1.2 If it is considered necessary to include a defensible zone around buildings, this should be defined by the use of fencing and lit with permanent lighting rather than heat sensitive lighting for surveillance of the area by others. If deemed necessary, CCTV could also be used in the defensible zones. Heat sensitive lighting may be applicable when lighting a defensible zone of an existing building located in the middle of the park.
- 3.1.1.3 Siting of toilet blocks is particularly critical. They should be sited so as to maximise natural visual surveillance and they should be available for park users whenever the park is open. This will include being open during the evening if the park is in use during these times. Anti-social or illegal behaviour by a small minority of people in toilets is not, of itself, a reason not to provide toilets for use by law abiding park users.

### **3.1.2 Car parks in association with buildings**

3.1.2.1 For car parks the design standards of the Park Mark scheme should be employed as a minimum standard. If car parks are to be used regularly after dark for attending activities in associated buildings they should be lit. Use of a timer for control of the lighting should be considered depending on the likely pattern of use of the car park, building or structure.

### **3.1.3 Vehicle Access to Buildings**

3.1.3.1 Where vehicle access is required to buildings it may be appropriate to light access routes but consideration should be given to the likely use of the building after dark i.e. community centre. In such circumstances use of lighting on a timer may be appropriate.

### **3.1.4 Youth Shelters**

3.1.4.1 Youth shelters will generally be used at night and therefore after dark in the winter. As a result, it will be appropriate to light these features as an exception to the general principle of not lighting facilities.

3.1.4.2 Features such as youth shelters should be sited on the edge of parks if possible to promote security.

3.1.4.3 Consideration should be given to the lighting of access routes to these facilities.

### **3.1.5 Bandstands / Play areas**

3.1.5.1 It is considered best not to light these as this will attract youths and lead to possible misuse of the area.

## **3.2 Cycle ways, Footpaths and Public Rights of Way**

### **3.2.1 Cycle Ways**

- 3.2.1.1 Security on these routes is important and consideration should be given to enhancing this in the design of them.
- 3.2.1.2 Planting around cycleways should be designed so as not to create screened off areas which may create potential hiding areas for muggers.
- 3.2.1.3 Lighting should be provided on cycle ways as they are often used at night and cyclists travel at speed. Exceptions to this would be if routes are situated near or through woodland or an ecological site of importance.

### **3.2.2 Footpaths & Public Rights of Way**

- 3.2.2.1 As a general principle, the Council does not support the lighting of footpaths in parks. This is based on advice contained within the Home Office document, 'The Influence of Street Lighting on Crime and the Fear of Crime'. The general presumption is that parks and open spaces are not intended for use at night time and that therefore lighting is inappropriate.
- 3.2.2.2 Footpaths and PROWs should not be lit for the following reasons:
  - Provision of lighting may make it easier for any potential attacker to spot a potential victim
  - Provision of lighting may promote misuse of semi lit areas.
- 3.2.2.3 Planting around footpaths should be carefully designed so as not to create potential hiding areas for muggers.
- 3.2.2.4 Public Rights of Way currently fall within the Highway category. Where local petitions for lighting may be forthcoming the above criteria should still be applied,

though a user survey may be helpful in determining precise local requirements.

### **3.2.3 CCTV**

- 3.2.3.1 In general DMBC does not support the provision of CCTV for parks and open spaces despite CCTV often perceived by local residents as an important security feature. In exceptional circumstances it may be of value in scanning a particular part of a park or in the apprehension of villains. The following considerations must be taken into account in assessing the suitability of provision of CCTV in any area.
- 3.2.3.2 CCTV is only workable at night where there is a high level of lighting and where there are unobstructed views.
- 3.2.3.3 Provision of CCTV requires the transmission of images to a control room or recording facility which in itself must be secure.
- 3.2.3.4 As a result CCTV is, in general, only suitable for use around buildings and in particular those with a well lit defensible zone.

### **3.2.4 Boundaries**

- 3.2.4.1 Although some existing parks may have boundary fencing, the Council only has an obligation to define the boundary of a park, not necessarily to provide fencing, railing or planting. Where fencing has been provided it has generally been for aesthetic reasons or to define the boundary.
- Decorative fencing or railing along a boundary may be provided as long as the requirement to keep gates open at all times is maintained
  - Good quality, attractive boundary treatment and gated entrances should allow for more transparency of enclosure to ensure views inside and out of the site whilst providing a positive image through quality of materials and design

- Public Rights of Way must be kept open at all times
- If for aesthetic reasons planting is provided along a boundary with residential back gardens, careful selection of suitable plants for that location should be made. Emphasis should be given to prickly or spiny thicket forming plants when security is important. However trees should not be planted where they may become climbing aids into properties.

3.2.4.2 Police preference is for parks to be kept open at all times.

3.2.4.3 Whilst gates may be provided at the entrances of parks, it is best that these are kept open at all times so as to prevent people becoming locked in and to allow unfettered access for emergency services if necessary.

3.2.4.4 Gates / entrance features should also act as a visible aid for people to find a quick exit point from the park if required.

### **3.2.5 Panic Buttons**

3.2.5.1 These are not considered to be appropriate or useful due to:

- Potential misuse.
- Lack of clarity on who would respond to them.
- Difficulties in defining the best sites for them.
- Ready availability of mobile phones as a more useful and appropriate means of summoning aid if necessary.

## **3.3 Additional Lighting Policies**

### **3.3.1 General Considerations**

3.3.1.1 In general the presumption will be that it is not desirable to light parks and open spaces at night. The exceptions to this general principle are:

- Security - defensible zone around building.
- Where a facility within the park or open space is intended to be used at night; e.g. community centre / carpark & access road / youth shelter.
- Sports lighting.

3.3.1.2 All lighting in parks should be off by 10:00pm.

3.3.1.3 Security lighting policy has been covered within the security policy section above and these policies should be taken into account in the provision of any security lighting associated with buildings, car parks and access routes.

3.3.1.4 In general, accent or decorative lighting is discouraged as it may have the effect of attracting people into the park after dark where this type of usage is not to be encouraged. Exception to this general principle will tend to be in relation to the lighting of an historic building. In this circumstance lighting should only be provided within the defensible zone of the building.

3.3.1.5 Sports lighting is ideally only provided where the sports activities in question are backed up by some organisation or sports development officer providing supervision.

3.3.1.6 Where sports lighting is provided, the lighting needs to be controlled so that it is only on for as long as the facility is in use. DMBC policy is that sports lighting should not be used after 10:00pm. Any access route to the sports facility should also be lit by lights attached to a timer.

3.3.1.7 Technical advice on types of lighting and lux levels should be obtained from the Engineer's Department.

3.3.1.8 The maintenance cost implications of the provision of any lighting must be taken into account at the design stage. This should include running costs, maintenance and repair costs.

- 3.3.1.9 Consideration must also be given to the adverse impact of lighting on some wildlife e.g. some species of bats may be discouraged from using wildflower areas as feeding grounds by the provision of lighting.
- 3.3.1.10 Consultation on wildlife impact should be undertaken with appropriate relevant bodies or experts. Any lighting provided in parks and open spaces must comply with 'The Dudley Borough Unitary Development Plan (UDP) – revised deposit Plan February 2002' – Policy EP6 'light pollution'

#### **4. Maintenance Policies**

- 4.1 The costs of maintaining any security or lighting features should be ascertained as part of the design process and the affordability of the costs taken into account in decisions on their provision.
- 4.2 Maintenance costs associated with footpaths, roads etc are generally paid from the DUE Parks Capital & Revenue Fund as would maintenance costs for lighting and other security measures.

#### **5. Implementation of Policy**

- 5.1 Responsibility for implementation of the design policies within this document rest with the head of the design team of the delivery organisation.
- 5.2 Responsibility for the implementation of maintenance policies lie with the head of the maintenance organisation.

## APPENDIX 10

### REPORT ON THE RESULTS OF THE DUDLEY LIGHTING SHOWCASE: THE PROPOSED INVEST TO SAVE PROGRAMME (June 2010)

#### 1. Background - history

- 1.1. Electric street lighting first started to be installed in the late 1940s, the first examples of the electric street light being converted gas lights, and were relatively few in number. When the post war housing boom occurred the roads on which the new homes were built were routinely lit and the numbers of street lights increased exponentially. Although the housing boom reached its zenith in the 1960s, the lighting stock has continued to grow as standards of road lighting increased and new developments continued to be built. At the time of writing Dudley has approximately 32,000 street lighting columns.
- 1.2. In the intervening period, as well as the standards of lighting having changed, the sources of light – the lamps – have developed and as newer and more efficient light sources emerged the Council's specifications have changed to accommodate them. At the same time, as older light sources became obsolete they were replaced by newer ones, mostly on the existing lighting column supports with modification where necessary. More recently this process has been exacerbated by the European Energy Using Products Directive of 2007, which particularly affects this Council as it seeks to sweep away the High Pressure Mercury (MBF) light source by 2015. We have sought to replace these units as funds allow, but as MBF lamps were being installed as new fitments as late as 1990 in Dudley, we still have upwards of 4,000 units still extant. Revenue funding of a total of £600k has been allocated for the purpose of their replacement from 2011 to 2014.
- 1.3. There has been a corresponding problem with the supports for the luminaires, the lighting columns. Owing to a very large number of lamps having been installed in a relatively short timescale because of the housing boom, and the poor corrosion protection employed at the time of manufacture of the lighting columns used, they have been showing marked signs of structural deterioration or even failure from the

mid 1990s onward. This was addressed by reports to the Cabinet in 2004 and 2007 and from 2006 to date a total of £6.45m has been either employed or allocated, utilising Prudential Borrowing, for the purpose of replacing deteriorated lighting columns. The new units have and continue to be fitted with the High Pressure Sodium (SON) light source which was established as our then new standard in 1990, but as well as the residue of MBF units there are a number of other light sources introduced in the interim that are still extant, and often a mixture of these sources are employed to light the road.

- 1.4. However, since 1990 there have been major changes in lighting technology, both in lighting and control, as well as recent legislative changes. Given the major investment in street lighting that the Council is about to undertake these developments should now be considered when fixing our lighting specification – both for the major programme works and for maintenance replacements.

## **2. Background – legislative changes**

- 2.1. The Climate Change Act of 2008 was introduced as the main United Kingdom response to the Kyoto Protocol. The main provisions of the Act are to enforce the reduction of carbon emissions, caused by power generation or other sources, by 80% of their 1990 levels by 2050 and with an intermediate reduction by 34% by 2020. Hard on the heels of the Act, the Government announced the Carbon Reduction Commitment Energy Efficiency Scheme (CRCEE) which introduced the principle of carbon trading to the UK economy.
- 2.2. All bodies, both private and public sector, with an annual energy consumption of 6000 MWh or more qualifies for CRCEE (as does Dudley). While there was at first an element of uncertainty as to whether or not a local authority's street lighting installation would be counted part of CRCEE, it looks increasingly likely that all street lighting will eventually be included and not just that on a dynamic half hourly (HH) pseudo meter as at present. The likelihood also being that any street lighting installation not on HH metering will eventually be penalised by an additional 10% of its total load, we decided to adopt HH in January 2010 and this has been operating since April.

- 2.3. The total load figure calculated will be used under the CRCEE to calculate carbon credits to be purchased by qualifying bodies. The sale will initially be at a fixed price of £12 per tonne of CO<sub>2</sub> for a limited period, but the price will eventually be fixed by auction and hence subject to market forces. In the initial period Dudley's street lighting load will attract a requirement to purchase approximately £110k of carbon credits in April 2011. In October 2011 a proportion of this could be refunded; this depends on our position in a league table which is determined by 'early action metric' – in other words, how much of our energy consumption is subject to automatic metering compared to others – and the best performers will get back up to 90% of their purchase price. There are also penalties for the worst performers, so it is important to achieve as good a result as possible. Our decision to subject street lighting to HH pseudo metering will therefore count in our favour, when early action metric is the defining factor in league table position, but in later years measurement will be based on other measures such as the relative decline in total energy load.
- 2.4. It is therefore critical to show that progress is being made to reduce our energy consumption, and as Dudley's street lighting accounts for approximately 18% of the Council's total energy (40% of electricity consumption) it has a large part to play in our performance under the CRCEE.
- 2.5. In another, relatively minor, development there are revisions to the Traffic Signs Regulations and General Directions expected in 2012 which are anticipated to amend the requirement for illumination of traffic bollards. As the Council has approximately 1,100 bollards currently installed, and the cost of their energy and maintenance is currently about £40k per year, their replacement with non illuminated units could have a marked effect on revenue budgets.

### **3. Developments in light sources**

- 3.1. Since our luminaire standard was fixed on the High Pressure Sodium (SON) light unit in 1990, there have been a number of developments, chief among which was the adoption by street lighting manufacturers of the research of Johannes Evangelists Purkinje, a Czech neuroscientist of the late 19<sup>th</sup> century, who determined that the human eye responded better to white light in lower light conditions. Companies such as Philips experimented with, and later mass produced, white light lamps that were of relatively low power and, although they were short lived and expensive to begin with, their lamp life and overall maintenance cost have now become comparable with SON.
- 3.2. Because of the Purkinje research, a case was made for giving white light luminaires a more favourable treatment and this was enshrined in the revision of BS EN 13201, which sets the standards for road and street lighting, by allowing a reduction of one lighting class from that determined by the standard when using white light. As a consequence, certainly in the case of residential road lighting and given the cost reductions mentioned above, a white light scheme became economically more viable.
- 3.3. The last couple of years have seen the development of a practical street lighting luminaire utilising white light emitting diodes (LEDs). LEDs have been around since the 1970s – originally, as low cost displays in goods like digital watches – but only recently have researchers been able to manufacture them in the light colour and output that makes them desirable as street lighting devices. They are more expensive than their discharge lamp equivalents – at the time of writing, of the order of approximately four times the price – but they will reduce in price as manufacture quantities increase. They also have a claimed service life of up to 20 years with the only service input being a replacement of the driver pack at about half that. This brings about the possibility of zero maintenance of the street light except for periodic repainting of the column, safety inspections of the circuit wiring and of the column structure.

### **4. Developments in switching**

- 4.1. The 1980s and 1990s saw the gradual replacement of timeswitches, expensive to replace (and to reset after power failures) with photo electric cells, which utilise a photodiode to switch the lights on automatically when it becomes dark and off again when it becomes light. They're relatively cheap, mostly reliable in operation and the more recent cells have improved still further by setting the 'switch off' function earlier than the 'switch on', hence saving electricity.
- 4.2. There is, however, an inherent problem with the photocell – it will only switch on and off at preset light levels. If we want to, for example, switch off earlier than at dawn (thereby making them 'part night', as we did more recently at Tenscore car park, Sedgley) we at present still have to incorporate a timeswitch in the operating circuit, making such a modification expensive. It therefore follows that if any desired changes to switching patterns emerge, like switching on later and off earlier, this will require additional capital expenditure. 'Part Night' switching may not be desirable in urban areas owing to safety concerns – apart from defined areas such as Tenscore car park – but other changes, made possible by new technology, could be undertaken.
- 4.3. More recently practical Central Management Systems (CMS) have been developed. The early systems, dating from the 1980s, required 'through the mains' signalling on self contained cable networks, making them unsuitable for street lighting systems (like our own) that rely on electricity companies' cable networks for their connections. Recent systems employ either UHF radio or GSM digital signalling to communicate between a base transmitter/receiver and the telecell on the individual lighting column. The base dictates when switch on/off takes place, either by programmed times or by a centrally located photocell using programmed switch on/off levels. In addition, CMS systems also transmit telemetry from each street light, most significantly detecting faults within the luminaire, but also electrical parameters such as voltage, current, power consumed and power factor (the last named being particularly of interest to electricity companies as it has an impact on their 'system losses' and bad power factor installations cause them to lose money on electricity supplied). It can also indicate the health of the luminaire components and inform maintenance policy.

- 4.4. Another recent development in luminaire design has been to allow dimming of street lights. The standard BS EN 13201 allows for a further reduction in lighting class if traffic levels, either vehicle or pedestrian, fall below certain levels and this allows us to reduce the amount of light on the road by dimming the light. The technology exists to do this; dimming is achieved by installing a dimming control unit in the luminaire which then signals electronic control gear in the luminaire to reduce light output.
- 4.5. There are, however, two competing methods of controlling dimming. The first is entirely self contained; the unit is programmed by setting an internal clock, setting its dimming start and finish times and dimming level at installation. This has the drawback of being unable to be reprogrammed or switched out without on-site intervention. The other is by using a dimming unit that interacts with a CMS telecell and can therefore have their dimming functions programmed remotely by the CMS. The benefit of this is that no site attendance is necessary when performing reprogramming, reducing the cost of such reprogramming. The capital cost of the CMS equipment is greater than that for a self contained dimmer but more flexible in operation.
- 4.6. There may, however, be difficulties presented to the emergency services by dimming the street lights as it may impair their operations in the early hours. Following guidance from ADEPT, we consult all three emergency services for their attitude to the principle of dimming. So far the West Midlands Ambulance Service have said that they would not have a problem; replies are awaited from the police and fire service. Any objections would restrict our ability to dim utilising self contained dimming devices but, if a CMS is employed, there is the possibility of offering each emergency service an override facility which they could then use to bring the lights in a particular road or area up to full brightness if needed.
- 4.7. Another possible way of restricting burning hours is the principle of trimming. Typically, street lights switch on when the ambient illuminance has fallen to 70 lux and switch off when it has risen to 35 lux. However, the average illuminance provided by street lighting is invariably lower than this and, while allowing for 'run

up' times to full brightness when the street lights are switched on, the lights could be switched on later and off earlier without any detrimental effect on the lighting of the road. The time saved is small – roughly about ten minutes per day – but cumulatively, in the course of a year across the whole lighting installation, the savings made could be significant.

- 4.8. Photo electric cells that operate at 'trimmed' lux levels are available but are generally more costly. Also, bearing in mind that illumination standards are different for different types of road, the cells used on a particular road would have to be suited to the design class of street lighting. Given that there are a number of design classes employed on our roads, this would mean a number of different types of cell being available, and both stocking and control of equipment on site would be difficult. On the other hand, if a CMS is employed, the trimmed level could be programmed on a 'per road' basis and trimming would then depend upon programming alone, while any necessary changes to the trimmed level (for example, following reclassification of a road) could be made by reprogramming the CMS.
- 4.9. Generally, therefore, if we are to take advantage of dimming and trimming the more favourable method of doing this would be by acquisition of a CMS. To this end, when planning the Lighting Showcase we acquired a CMS from Telensa Ltd. to prove the concept of dimming, trimming and the CMS itself and to obtain telemetry for use in the comparative trial of the various types of luminaire. In providing figures for the cost benefit analysis undertaken, the cost of providing a Borough wide CMS is based on figures supplied by Telensa, although in practice if we were to procure a CMS this would be by open tender using an output specification.

## 5. Results of the Lighting Showcase Project

- 5.1 The full list of those roads involved in the Lighting Showcase, and the equipment trialled on those roads, is appended to this report at Appendix A.
- 5.2 Although all of the equipment analysed showed an energy saving over the course of the trial, the greatest savings were demonstrated by the LED units, which consumed up to roughly half of the electricity of the original installations. Against this has to be offset the greater capital cost of the luminaire. The actual energy savings are based on assessed wattage, the criterion on which electricity is billed, but which was demonstrated reasonably accurate in analysis by the CMS. They were:

Original installation		Replacement installation		Savings	
Type	Assessed watts	Type	Assessed watts	Watts	Percentage
135 SOX	159	74 LED	74	85	53.46%
70 SON-T	90	36 LED	36	54	48.6%
70 SON-T	90	45 CPO	48	42	46.66%
70 SON-T	90	52 LED	52	38	42.22%
70 SON-T	90	55 LED	55	35	38.89%
70 SON-T	90	57 LED	57	33	36.67%
70 SON-T	90	57 PL	65	25	27.78%
70 SON-T	90	66 LED	66	24	26.67%
70 SON-T	90	60 CPO	68	22	24.44%
70 SON-T	90	70 CDO	86	4	4.44%

Of these, in the canvass of residents carried out in conjunction with the Showcase there was a negative reaction to the 45w CPO unit as 'too dim', along with an LED unit which was subsequently removed and replaced by the 57w LED unit in the table. All other units received a favourable rating; although canvass returns were not obtained for all of the units trialled (as some of them were installed after the canvassing was concluded) there have been no negative responses.

5.3 The principles of dimming and trimming were also trialled in the Lighting Showcase. This was achieved by taking one of the Showcase installations, 15 units of 60w CPO lamp type, and first measuring their power consumption at 70lux on/35 off, at full power and 100% brightness over a 30 day period.\* Then the units were reprogrammed using the CMS to make five of the units dimmed only to 70% of power between 0100 and 0500, and at full brightness before and after the dimmed hours; five units trimmed to 20 lux on/10 off; and five units both dimmed and trimmed. The results were:

<b>Operation</b>	<b>Power consumption (per unit) – watts</b>	<b>Percentage</b>
Full brightness	19843	100%
Trimmed only	18978	95.6%
Dimmed only	17172	86.5%
Dimmed and trimmed	16571	83.5%

\* The 30 day periods chosen were of equivalent burning hours in autumn and spring respectively.

The conclusion reached was that the maximum benefit could be derived by both dimming and trimming, followed by dimming alone.

## 6. Conclusions

6.1 Given the reduced operating cost of luminaires and the relatively short payback time, it appears that the case is made for the acquisition of a CMS and that an output specification should be created for an open tender process. Although the initial capital cost is high, the CMS could be 'rolled out' in stages by installing the base stations first (at an approximate cost of £80k) and installing the telecells later. Although this would mean that the projected savings would not be achieved immediately, it would help spread the cost of implementation. However, 'trimming' only could be achieved on any unit – not just those with newer luminaires – that was CMS fitted and this should be considered to reduce electricity consumption.

- 6.2 The case is also made for a change in luminaire specification. If CMS is implemented, and dimming/trimming is made possible, best value is presently obtained by the CPO and PL light units. However, as in the trial it was difficult to reach the appropriate lighting standard using PL luminaires, the CPO would appear to be favourite at present, although the application of the 45w unit would have to be carefully managed and restricted to low crime areas owing to the negative comments received during the trial. However, LED luminaires should not be ruled out entirely; their capital cost will undoubtedly reduce as manufacturing output increases and they could become competitive with CPO in the near future. The advantage gained by CPO over LED is marginal where dimming and trimming is not applied, as the discharge source suffers from its routine maintenance cost, but in order to take advantage of the reduced electricity and CO<sub>2</sub> consumption this would not appear to be an option. As an interim measure, given the saving in running costs demonstrated, in addition consideration could be given to replacement of 70w SON-T lamps with their 70w CDO-TT equivalents in luminaires capable of accepting them – mainly those installed during the last four years as their lamp circuit ignitors are capable of the change.
- 6.3 Finally, the financial case is made for a phased replacement of illuminated bollards with their non illuminated equivalents. This could be achieved by replacing 'plain face' units as they become life expired – as they have no signface, there is no statutory requirement for their illumination – and, if the revised Traffic Signs Regulations allow, extending this to other bollard types at a later date. As this would also require a Traffic policy decision, however, consultation should be made with them before embarking on this course of action.

## Appendix A

Invest to Save Programme – Trial Sites – Residential Roads								
Road Name	Position	Column Type	Old AW	New AW	Existing fitment	Quantity	Chosen lantern	Level
Bluebell Road	R	6m steel	90	68	70w SON-T 2600	15	Thorn Oracle 1C 60w CPO	S4
Cedar Road	R	mostly 6m steel	90	65	2600 & Arc	12	Holophane Syracuse 57w CFL	S4
Hazel Road	R	8m concrete	159	74	old GEC 90w	7	WRTL Stela Wide 70w 52 LED	S3
Laburnum Road	R	6m steel	90	65	70w SON-T 2600	4	Thorn Civic 1 Residential 57w CFL	S5
Lavender Road	R	6m steel	90	48	70w SON-T 2600	5	Philips Iridium SGS252 45w CPO	S4
Lilac Road	R	6m steel	90	86	70w SON-T 2600	7	WRTL Arc 70w CDO-TT	S4
Limes Road	F	6m steel/ext. steel/sleeved con	90	68	mostly 2600 & Arc	14	Holophane Syracuse 60w CPO	S4
Maple Road	F	6m sleeved concrete	90	48	70w SON-T 2600	21	Urbis Evolo 45w CPO	S4
Poplar Crescent	F	5m mixed steel/concrete, some sleeved	90	57	Arc, 2600 & 80w TE	6	DW Windsor Monaro 57w LED	S4
Priory Close Pts. 9 - 13	F	5m steel	90	52	80w MBF	5	WRTL Stela Wide 52w 36 LED	S4
<b>Sites not on Telensa CMS at showcase:</b>								
Priory Close Pts. 1 - 8	F	mostly 6m steel	90	68	70w SON-T 2600	8	Kingfisher Kaos 60w CPO	S4
Chestnut Avenue (part, 1-5)	R	6m steel	90	36	70w SON-T 2600	5	Kingfisher LEDin 36w LED	S4
Chestnut Avenue (part, 6-13)	R	6m steel	90	55	70w SON-T 2600	8	Philips CitySoul 55w 42 LED	S4
Oak Road	R	6m steel	90	66	70w SON-T 2600	7	E-On/Applied LEDs Marlin 66w LED	S4