Street Lighting Design and Materials Guide

This street lighting design and materials guide has been developed to set out the requirements for all stakeholders of Herefordshire in relation to the provision of street lighting equipment. It is designed to be a reference document and the relevant sections are set out below.

The scope of this document is for the Street Lighting Assets only. Information on the design and installation of other electrical assets can be obtained specific to the scheme proposed.

The sections below establish the procedures and minimum requirement of information that the Council expects to ensure that anyone designing and selecting materials for use in street lighting and other highway electrical furniture in Herefordshire can do so without the need for a prolonged approval process.

The guide will also support the Councils aim of reducing maintenance and the complexity of its stock to improve the efficiency of the management and maintenance operations.

Introduction

The industry standard specified in BS5489-1:2013 provides detailed guidance on the process of design and this guide does not intend to repeat that guidance, instead it shall support it with further clarification of the requirements of Herefordshire Council.

It should be born in mind that there will always be situations that may not be covered by the design guide or its requirements which may need alternative consideration.

The guide does not overrule any statutory requirements.

Should clarification be needed on any aspect of the guide a request for clarification should be made in writing to Herefordshire Council.

Within this guide the following definitions shall be used:

- **Asset;** an Asset on the highway being either an electrical or not electrical in nature. Assets for the purposes of the contract consist of Street Light Assets, wood poles, steel poles (to accommodate overhead supplies), pole brackets, wall brackets, beacons (including marker beacons, belisha beacons, etc) illuminated and non-illuminated signs (including different types such as school flashers, amber beacons associated with warning signs, etc), illuminated and non-illuminated bollards, feeder pillars (including all cabling, wiring and control associated with any of the mentioned Assets), Festive Equipment, subway lights, tunnel lights, under bridge lights, floodlights.
- **Electrical Asset;** those Assets having an electrical supply
- **Street Light Asset;** an Asset within the Site being a used for the purpose of illumination of any part of the Site within the District including wood pole, steel pole (to accommodate overhead supplies and street lights), pole brackets, wall brackets.

Policy Guidance

Design of Lighting Schemes

It is the Councils policy that in order to provide a consistent outcome on the network their preferred service provider undertakes all aspects of Electrical Asset design. For third party Electrical Asset schemes where Section 38 & 278 agreements will occur, Herefordshire Council will commission the Electrical Asset design on behalf of the developer at their expense, as set out in the Section 38/278 process guidance. This design will follow the requirements set out in this document.

The Decision to Light

In general, lighting should always be for functional purposes. For all developments in urban areas (Hereford City and Market Towns) Street Light Assets will be provided on all developments and the lighting class shall be selected from BS5489-1: 2013. For developments in rural areas the final decision regarding the street lighting shall be made in consultation with the Parish Council. Where developments occur in Parishes but are adjacent to larger urban areas, Herefordshire Council will have the final decision. In general, the Designer should try to keep new lighting to a minimum, however the designer should take into account 'secure by design' principals encouraging the use of sustainable links and the potential for light pollution in the decision to light.

The recommendation of any relevant road safety audits and anticipated vehicle flows and foot falls should be taken in to account when deciding to light.

Where a site lies beyond the limits of an existing lighting scheme, the Designer should consider the vicinity of nearby lit areas as it may be necessary for highway safety reasons for the unlit section between the two lit sections also to be lit (at the developer's expense). Where this situation may occur the designer shall liaise with the Council to determine the requirements.

Conservation Areas

Within the County there are many conservation areas. If these areas are to be lit, then they should predominantly be lit by Street Light Assets. However, should Herefordshire Council deem that ornamental lighting is necessary, then non-standard Street Light Asset equipment may be utilised. This equipment is referred to as embellished and/or ornamental in the relevant materials sections of this document.

Painted Columns

Painted lighting columns will generally not be allowed and standard hot-dip galvanised columns as detailed in this document should be utilised. However, the designer should consider the adjacent existing Street Light Assets to a proposed development. If nearby Street Light Assets are painted, and new standard Street Light Assets would look out of place, then they should propose to Herefordshire Council a deviation from standard. If during the adoption inspection it is found that new Street Light Assets are out of keeping with existing nearby columns then the Council reserves the right to carry out remedial works at the Developer's expense.

Light Intrusion and the Limitation of Upward Light

Herefordshire's street lighting shall be provided by LED luminaires. These luminaires when selected to comply with this document shall address nuisance light, in particular upward light. The designer should be mindful of the need to apply the correct environmental zone when selecting the lighting class.

It is not the norm for light baffles to be fitted to luminaires to reduce nuisance light. Only where calculated values or measured values identify lighting which exceed the pre and post curfew levels described in the ILP publication ‘Guidance Notes for the Reduction of Obtrusive Light’ shall baffles be considered.

Illuminated Signs and Bollards

Illuminated signs and bollards should be avoided where possible and shall only be illuminated where required under the Traffic Signs Regulations and General Directions.

Lighting Design

Pre-Design Checks

When installing new Street Light Assets on an existing carriageway the specifics of the site can only be properly taken in to account by carrying out a thorough site survey. The site survey should be detailed enough to fully consider the effect of the design and future works on the existing conditions. The survey should identify as a minimum:

- Existing Assets and any attachments
- Existing illuminated signs
- Existing illuminated and non-illuminated bollards
- Supply types and isolation points
- Road lining (especially when determining the number of lanes to be incorporated in to luminance calculations)
- Embankments which may affect Asset foundation design
- Trees and tree canopies
- Entrances and drop kerbs
- The pavement types
- Potential areas where glare could be a significant factor
- Overhead lines
- Gas marker posts
- Structures

Lighting Design - General

Lighting Design shall comply with the requirements of BS5489-1:2013, BS5489-2:2016, BS13201-2:2015, BS13201-3:2015 and BS13201-4:2015 and all relevant Institution of Lighting Professionals General Publications and Technical Reports.

Tables A.2, A.3, A5 and A.6 from BS5489-1:2013 are key to the lighting class selection. Table A.2 is suitable for traffic routes where the vehicle speed limit is in excess of 40mph and Table A.3 is suitable for traffic routes where the vehicle speed limit is 40mph or less. To facilitate lighting class selection for the above tables the Annual Average Daily Traffic flows can be found at http://www.dft.gov.uk/traffic-counts/cp.php?la=Herefordshire%2C+County+of . Where traffic routes are incorporated in the design which do not have Annual Average Daily Traffic flows shown at the above link the designer shall, as necessary, agree the most appropriate lighting class in conjunction with Herefordshire Council.

The risk assessment process of paragraph A.3.3.2 in BS5489-1:2013 should not be ignored. In particular, crime and complexity of task should be considered and if appropriate the lighting class should be increased. For example, a high crime area may warrant an increase in lighting by one level. Also, complexity of task could be increased at some locations where children may be playing near parked cars.

Whilst road humps do not require any specific design consideration over and above the normal road lighting, it should be noted that they would only be considered in areas that are lit.

Conflict Areas are any area where pedestrians are encouraged to cross (excluding crossings controlled by traffic lights), roundabouts, junctions or intersections where two or more routes meet where each traffic route is within one lighting class of the other, e.g. M3 and M4.

Where existing positive contrast is provided to a pedestrian crossing, new positive contrast lighting shall be designed in accordance with ILP Technical Report 12. If positive contrast is not relied upon at present or the crossing is not a zebra crossing negative contrast shall be adopted. Zebra crossings shall always be lit by way of positive contrast designed in accordance with ILP Technical Report 12.

There are no specific requirements for traffic-controlled crossings.

Routes shall be designed in accordance with the lighting class requirements of BS5489-1:2013. The use of Table A.1 of BS5489-1:2013 for alternative lighting classes is generally not permitted without good reason. It is acceptable on traffic routes whose calculation grid width varies to the extent that luminance calculations would be unrepresentative.

Where calculation grids are used a lighting calculation shall be provided for each change in dimension 0.5m or greater or the relevant calculation area, e.g. the carriageway or setback dimension for M class calculations and the carriageway + footpath or outreach dimension for P class calculations.

For C and P classes, threshold increment is applicable.

The presence of foliage should always be taken in to account by the designer and the effect of blocking should be designed out as far as reasonably practicable.

Colour temperature for all light sources shall be:

- 5700k when being installed within an existing Urbis Ampera layout already being 5700k (the Council will be able to confirm this)
- 4000k when a significant proportion of lighting is being replaced within an existing Urbis Ampera layout already being 5700k
- 3000k when being part of the new development or highway

Columns shall be positioned to minimise the effect on surrounding properties and at the back of footways.

Below the specifics of residential areas and traffic routes are discussed. Within each section is a breakdown of the preferred maximum and minimum column heights and spacing's. The design guide is written in a way that will allow the designer to deviate from these maximum column heights if necessary as one rule never fits all circumstances. However, it is the designer's responsibility to provide an efficient solution in terms of capital expenditure, future revenue and taking in to account the surroundings.

Traffic Routes

The edge illuminance ratio for M class routes shall be reduced in width to cover the footpath or other adopted area present on site, i.e. not including areas beyond the adoptable boundary.

It should be noted that due to the nature of the County of Herefordshire many locations are considered to be low or very low ambient luminance. With this in mind the designer should carry out the risk assessment process in paragraph A.3.1.3 of BS5489-1:2013 taking in to account the ambient luminance and, where applicable, the lighting on adjoining roads. If adjoining M class routes makes reducing lighting difficult due to a large disparity of lighting classes (changes by 2 or more lighting classes) the designer should consider transition stages. These transition stages would light a certain distance away from the adjoining areas and reduce the light to a level which takes in to account the ambient luminance. The transition stages should not be less than four column spacing's.

Generally, column heights should be restricted in accordance with the following table whilst taking in to account the preferred maximum and minimum spacing's.

Lighting Class	Preferred Max Column Height	Preferred min/max
M5	8m	35m to 50m
M4	10m	35m to 50m
M3	10m	40m to 50m
M2	12m	40m to 55m

Residential Areas

Table A.5 of BS5489:2013 is suitable for subsidiary roads with a typical user speed of less than or equal to 30mph. This table should be typically used where vehicle speeds would likely be 30mph instead of being broadly applied to all subsidiary roads.

Table A.6 of BS5489:2013 is suitable for subsidiary roads with mainly slow-moving vehicles, cyclist and pedestrians. This would typically be reserved for roads where vehicle speeds are unlikely to reach 30mph due to the nature of the route, i.e. cul-de-sacs, back streets and routes not having a through route and thus having a particularly low traffic flow. It should also be used for footpaths. At present P6 is only accepted for footpath lighting and shouldn't be used for any other scenario, e.g. cycle tracks, shared paths, roads.

For S and P class routes the designer can choose either the calculation grids as set out in BS EN 13201-3 or use area grids – whichever is most appropriate to the area in question.

Generally, column heights should be restricted in accordance with the following table whilst taking in to account the preferred maximum and minimum spacing.

Lighting Class	Preferred Max Column Height	Preferred min/max
P2, P3	8m	30m to 45m
P4, P5, P6	6m	30m to 45m

Bollard lighting and wall mounted lighting is not permitted. Should these be desired then this should be referred with Herefordshire Council who would need to give their express permission.

Where wall mounted lighting is to be used the pre-adoption inspection process shall only be instigated after the wayleave agreements have been received by Herefordshire Council.

Electrical Design

On new housing developments and existing routes having DNO cables all proposed street lighting and illuminated signs should be supplied direct from the DNO network (excluding passive systems and any equipment located on islands and central reserves).

On new housing developments having an IDNO power supply street lighting and illuminated signs should be supplied direct from the IDNO network (excluding passive systems and any equipment located on islands and central reserves). the Council require specific IDNO information for the street lighting inventory which is identified later in this document.

Passive systems, equipment located on islands and central reserves and illuminated bollards should be supplied by a private cable network. It is preferred for minor private cable networks to emanate from a street light or illuminated sign with a DNO supply as opposed to increasing the number of electrical assets by the addition of a feeder pillar. However, it is accepted that in some installations this may not be practicable.

All Electrical Assets and their supplies shall comply with the current version of BS7671.

The re-use of existing private cable networks is only acceptable where it is supplying replacement Electrical Assets unless the cable network is less than 10 years old. However, the designer must always bear in mind that regardless of how much existing cable network is re-used it must still pass a full Inspection and Test on completion of the works. This inspection and test should take the same format as that of new systems – a Period Inspection and Test is not acceptable.

Where Section 278 works include any new or alterations to existing Street Light Assets, Herefordshire Council will pay the energy for those assets on the Adopted Highway throughout the works.

For Section 38 agreements, where new installations occur on un-adopted roads, the Developer must supply their own MPAN. It is the Developer's responsibility to ensure that the MPAN is closed down following adoption.

Passive Installations

The use of passive installations is only required where the route in question has road geometry with changes of direction which generally require the driver to travel at half the speed limit. Following this assessment, if a passive installation is required the designer shall then instigate the risk assessment process in the *Institution of Lighting Professionals Technical Report No 30; Guidance on the Implementation of Passively Safe Lighting Columns and Sign Posts* including the risk assessment process.

Street Light Assets Requirements on Routes not accessible to Vehicles

Street Light Assets on routes that are not accessible by vehicles are to be mid-hinged / raise and lower type to enable future maintenance to be carried out at ground level and avoid the need to work at height.

Design Submissions

The Designs shall be the full complete solution to enable works to commence and be completed. The Designs shall consist of, as a minimum:

- Site clearance drawings detailing Assets and equipment to remain and to be removed, including any work to affected sign plates, private underground and over ground cabling, DNO underground and over ground cabling, illuminated bollards, pruning/limbing required to facilitate works.
- Proposed ducting layouts detailing proposed duct routes and chamber locations.
- Proposed lighting and electrical layout detailing proposed works and any work to affected sign plates, private underground and over ground cabling, DNO underground and over ground cabling, installation of non-illuminated and/or illuminated bollards, pruning/liming required to facilitate the works.
- Electrical detail drawings showing cabling and wiring schematics (which include identification of asset refs, fusing, cabling type and size, earth rods, joints, passive equipment connections), internal feeder pillar layouts (both new and refurbished) plus any other aspect of electrical, ducting or lighting equipment.

- Cable calculations for underground and over-ground cabling. Worst case calculations can be agreed with the Council to reduce the number of calculations required.
- Lighting calculations – the cover of each lighting calculation shall identify which Street Light Asset numbers the lighting calculation is applicable to and the process which has resulted in the lighting class selection.
- Sign relocation schedule.
- Assets under overhead lines shall be checked for clearance with the DNO and National grid. The guidance within the Institution of Lighting Professionals General Publication GP10; Safety During the Installation and Removal of Lighting Columns and Similar Street Furniture in Proximity to High Voltage Overhead Lines should be considered.
- The Contractor may elect to combine site clearance, ducting layouts and proposed lighting and electrical layouts into fewer drawings where there is reduced detail needed for the Design.

Adoption

Inspection

When requesting adoption, the developer/contractor shall submit NICEIC compliant BS7671 Electrical Inspection and Test Certificates to prove that the Initial Verification has taken place. Once these have been submitted and accepted by the Council, the Council shall inspect the site to check:

- that the Assets have been installed in accordance with the Design
- that the Assets have been installed in accordance with the manufacturer's instructions
- that the installation complies with this guidance
- that the installation is compliant to BS7671, the Manual of Contract Documents for Highway Works and industry good practice.

Any remedials shall be issued to developer/contractor requesting adoption. When these remedials have been notified back to the Council as complete the Council shall re-inspect the site. The initial inspection and the second inspection shall not be charged. The Council reserves the right to charge the developer for any additional visits required.

Certification

Upon completion of the inspection process the NICEIC compliant BS7671 Electrical Inspection and Test Certificates must be no older than 12 months old from the date of the Initial Verification. If they exceed 12 months old the developer shall re-inspect/test the Assets to be able to furnish the Council with date complaint certificates.

Along with the certification the Contractor shall provide the Council with inventory data for the Assets identifying the information contained in the table below.

Inventory field	Typical example of data
Column manufacturer	e.g. CU Phosco, Stainton, etc.
Column material	e.g. Steel
Column protection	e.g. Galvanised
Column profile	e.g. Tubular
Column foundation	e.g. Planted, flange plated, etc
Foundation protection	e.g. G1, G2a, etc
Luminaire manufacturer	e.g. TRT, Urbis, Philips, etc
Luminaire model	e.g. Optio, Ampera, Luma, etc
Luminaire UMSUG code	Elexon approved UMSUG code
Luminaire wattage	Elexon approved wattage
Luminaire inclination	e.g. 5 degrees
Luminaire mounting type	e.g. post top
PECU manufacturer	e.g. Urbis, Philips, etc
PECU model	e.g. Ampera, Luma, etc
PECU UMSUG code	Elexon approved UMSUG code
PECU wattage	Elexon approved wattage
Street name	e.g. Hereford Close

Inventory field	Typical example of data
Locality	e.g. Ross-on-Wye
Easting	6 digits plus one decimal place
Northing	6 digits plus one decimal place
Installation date	Date columns installed
Inspection and test date	Last inspection and test date
Supply type	e.g. DNO, private
IDNO MPAN	The MPAN for the street lighting on the IDNO network
IDNO Name	The name of the IDNO
IDNO Address	The registered address of the IDNO
IDNO emergency call out number	The call out number for the IDNO in the event of an emergency or dangerous occurrence.
Adoption date	Mutually agreeable between the Contractor and the Council
Route of supply cabling, ducting and chambers	e.g. Map/drawing

Any remedials in inventory field data shall be issued to the developer/contractor requesting adoption. When these remedials have been corrected and returned to the Council the Council shall re-inspect the information. The initial data check and the second check shall not be charged. Any future checks shall be charged. It should be noted that a period of 3 months shall be permitted between the check date and the completion of remedial works. Exceeding this period may result in further charges being incurred.

The Contractor shall also submit confirmation from the manufacturer of all products used that the appropriate guarantee shall be passed on to Herefordshire Council for the appropriate period. For the avoidance of doubt, the guarantee periods shall be the full periods quoted in this guide from the date of adoption, not the date of installation. In the first instance of any warranty claim it will be the developer's responsibility to replace the failed equipment, only if the developer is no longer trading will the Council make contact with the relevant manufacturer to obtain replacement equipment.

Equipment Requirements

The requirements for equipment excluding luminaries and Photoelectric Control Units (PECU's) are shown in Appendix A. For columns, to try ease future maintenance and compatibility with the existing stock, Designers should try to utilise columns that are already in common use on the network. Subsequently, Designers should utilise columns by CU Phosco or equivalent, unless otherwise approved.

In some road environments the use of passively safe columns may be required. The requirement for this will be identified at the design stage and appropriate columns selected through this process.

Luminaires

Luminaires for standard lighting columns, wall and pole brackets and fixtures and passively safe columns will generally be either TRT Optio Micro for columns up to 6m and the TRT Aspect for columns which exceed 6m. The design process will identify any variation to this. This approach ensures compatibility with our current street lighting management and maintenance regimes.

The light temperature is to have a maximum of 3000k, although the temperature will be specified in the design.

In some areas illuminated sign lighting units are required. These will be specified from the Lumino City range, determined from the overall sign size and other relevant design considerations.

For areas where ornamental lights are required the luminaries will be specified as part of the design process on a site-by-site basis, having regard to the overall objectives of the scheme.

The colour of the exterior of the luminaires is to be dark grey to ensure visual consistency across the asset group.

Photoelectric Control Unit (PECU)

PECUs shall:

- Be fully electronic.
- Switch on/off at 20/20 lux.
- Consume no more than a continuous maximum of 0.25w.
- Be guaranteed for 6 years from the date of installation (or Commission date when incorporated into new luminaires).
- NEMA mounted PECUs shall fit in a 7 pin ANSI socket.
- Have surge protection to prevent damage in the event of spikes in the network voltage.
- Have a canopy, which is self-cleaning and UV stabilised.

Identification Numbers

Identification numbers for each item of Asset will be established by the street lighting team to ensure smooth running of the maintenance regime. Each Asset shall be marked with its own identifier by Herefordshire Council upon adoption. This provides positive identification of any Asset for ease of fault reporting by members of the public or the Councils inspectors.