

# TECHNICAL LIGHTING DESIGN GUIDANCE

**Guidance to reduce light pollution  
and protect our dark skies.**

January 2025



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### Cotswolds National Landscape:



**Cotswolds  
National  
Landscape**

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*Darkscape Consulting does not take responsibility for the use of this guidance by planning officers in applications*



## 1 INTRODUCTION

The protection of the night sky is important. Access to a dark sky gives us the ability to personally connect with nature on a cosmological scale and enjoy a unique experience. But the loss of dark sky and the rise in artificial light at night (ALAN) reduces this experience and impacts our quality of life, wildlife and the rural and urban spaces in which we all interact. As the development pressure from towns and cities grows, we have slowly eroded the sky and lost our ability to connect to the night. Recently, many protected landscapes have begun to use their purposes and duties to conserve and enhance the night sky – The Cotswolds National Landscape (CNL) seeks to join this effort with this technical planning-based guidance.

The Cotswolds National Landscape is renowned for its tranquil landscapes, heritage and scenic beauty, but it is not just the daytime views which are an attraction. Visitors to the area can also enjoy the beauty of the night sky and a dark landscape. With villages, small towns and areas of open and relatively uninhabited countryside the landscape offers opportunities to see stars and experience nature in a way which is not possible in more brightly lit areas.

However, inappropriate lighting, bad design and incremental development from villages and towns within the Cotswolds and the surrounding cities and towns, increases light pollution and reduces our ability to appreciate and benefit from our dark skies both for people, wildlife and natural heritage. Light pollution impacts on our experience of the landscape by altering the naturally changing light levels that occur at dusk and before dawn. Furthermore, artificial light can have a subtle, cumulative effect on the special character of rural landscapes, since brightly lit skies blur the distinction between urban and rural areas.

Light pollution will also impact other issues that may have greater weight to different people and organisations. Poor lighting can cause health and wellbeing issues, degrade ecological integrity, increase energy costs and carbon emissions, and can change the way people feel safe and interact with modern and heritage spaces. Reducing artificial light and using more appropriate installations will help address these issues while protecting the

sky. This will benefit the wider area and wildlife around the CNL that also have good dark skies.

The CNL does not seek to ban or avoid any new lighting to accomplish this but rather seeks to control the impact of lighting through this guidance by following a hierarchy of general strategic objectives.

- **Avoid** lighting, unless is it necessary and justifiable
- **Reduce** existing and new light pollution by good design
- **Mitigate** any adverse impacts to the greatest reasonable extent.

Everyone can help reduce light pollution, reduce energy use and save money by improving the type of outdoor lighting they use. This can be achieved by simple voluntary steps but also through local authorities within and around the CNL that have a statutory duty to 'seek to further' the conservation and enhancement of the special properties of the landscape. In doing so lighting design can meet the advice advocated by the Institution of Lighting Professionals.

### ***the right light in the right place at the right time with the right controls***

Sometimes all it needs is turning the light off – but it will also require proactive voluntary and mandatory action to ensure effective designs. By increasing our awareness and following some simple principles, we can all help to minimise light pollution, save energy, reducing nuisance and minimise the impact of lighting on wildlife, heritage and people. It will contribute to conserving and enhancing the landscapes' special qualities, defined character and tranquillity - but also to the natural beauty of the wider area within and outside the CNL.

In meeting the objectives of avoidance, reduction and mitigation, Cotswolds National Landscape seeks to protect these skies by reducing the impact of light pollution by adopting the principle of Responsible Artificial Lighting at Night manifesto ([ROLAN](#)). These principles will support the [CNL Management Plan](#), and link to the CNL Board Position Statement on [Dark Skies and Artificial Light](#) (2019).

## 1.1 The Purpose of this Guidance

The primary purpose of this guidance is to provide technical specifications and advice for planning proposals with lighting elements within and around the CNL that may impact on the special quality of the dark sky. It is to provide the greatest opportunity to all relevant local authorities to ‘**seek to further**’ the purpose of conserving and enhancing the natural beauty – which includes the night sky - strengthened under the Levelling up and Regeneration Act 2023.

The secondary purpose is to provide general advice on how to install lighting properly and reduce and avoid light pollution for any installation.

Its aim is to foster behavioural change to reduce, avoid and mitigate light pollution by effective design using industry standard best practice.

## 1.2 Who is this guidance for?

This document provides guidance for anyone who is using, replacing, or installing new external lighting in or around the Cotswolds National Landscape; this includes householders, businesses and developers who may - or may not - require planning permission. It also is for those installing new glazing and windows to reduce internal light spill.

This guidance is primarily aimed at.

1. Planning officers who need guidance on assessing lighting and glazing designs in and around the Cotswolds National Landscape.
2. Non-domestic schemes that may need planning permission and a more thorough design led by professional principles
3. Those seeking to install minor lights or glazing for mainly domestic purposes who need general advice without a lighting designer

The guidance will also benefit.

4. Those wishing to lower and reduce their own light pollution
5. National Landscape partners and stakeholders providing advice and support for policy and framework development.

For all users, the basic external lighting principles are the same; they differ only in complexity, purpose and the users who need the light.

This guidance can also be used to support the development of wider local authority and neighbourhood plans. The adoption of the ROLAN principles and the best practice advice should feature as core elements of a local plan or policy (see South Downs National Park for an example<sup>1</sup>). They are consistent with the general approach to avoid, reduce and mitigate through the 5 principles of good lighting.

## 1.3 Summary of key principles and messages

To achieve the objectives to **avoid, reduce and mitigate**, the advice in this technical guidance uses the principles the Responsible Outdoor Lighting At Night ([ROLAN](#)) manifesto. While much of the ROLAN guidance relates to lighting professionals and project management, there are five key principles that underpin good lighting design that help to reduce the main elements of light pollution, trespass, glare, sky glow and presence. These five principles (see following page) of outdoor lighting also form the fundamental requirements for [DarkSky International places](#) compliance.

These principles must work within a range of lighting environments, from dark places to urban centres. While the fundamental points universally apply, the application of the five principles within the CNL depend upon the ambient lighting levels (referred to as E-zones in professional documents); naturally dark places will be more influenced than those found in urban places. Consequently, the CNL seeks to apply the highest level of protection that it can ensure appropriate development.

**In general, E0 and E1 zone specifications should be used within a design, in all open rural spaces (without streetlights) within the Cotswolds National Landscape.**

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<sup>1</sup> An example of a strategic Dark Sky Local Plan policy can be found under section SD8 of the [South Downs Local Plan](#) (2014-33)



### The Five Key Principles of Responsible Outdoor Lighting

#### NEEDED



Lighting should be clearly justified, appropriate for the area with a clear purpose and benefit without presenting unacceptable intrusion.

#### TARGETTED



Light should be directed to where it is needed and not spill into neighbouring spaces, or in a direction that causes a nuisance to neighbours, wildlife or the night sky.

#### LOW LIGHT



Light should be no brighter than necessary and provide appropriate illuminance for the activity.

#### COLOUR



Warm colour lights should be used to reduce the impact on sky glow, wildlife and human health.

#### CONTROLLED



Lights should be shielded, dimmed or turned off when not required.

#### 1.4 Do I need Planning Permission for lighting?

A common question with lighting is whether you need planning permission. Using the guidance within the [UK Planning Portal](#), in general,

**light itself and minor domestic fittings are NOT subject to planning controls**

This means that if you need to illuminate your garden path, doorway or driveway and purchase appropriate low level off-the-shelf lights, you do not need planning permission. You can use the advice in this guidance to help you do this. However, when your lighting is part of a new development or requires additional structures or has a sufficient visual intrusion, you may need planning permission. **If in doubt – consult your local planning authority.**

Many commercial, industrial, sports and roads will need planning permission due to the use of column mounted lights and the level of material intrusion. External lights require planning permission in some circumstances:

- A lighting scheme of such nature and scale that it would represent an engineering operation, or a material change in appearance
- Lighting such as the floodlighting of sports pitches, car parking or manèges
- A lighting scheme on a listed building that would significantly affect its character.

## 1.5 Do I need a Lighting Designer?

You do not normally need a lighting designer for most minor and single use external luminaires for your homes or small business - the information in this guidance should be sufficient. A dark sky consultant could also provide assessment if needed.

A qualified lighting designer is generally needed when lighting needs are more complex, and where there is a need for a specified level of illuminance, obtrusive light, detailed specifications and plans. Qualified and competent designers will ensure that the luminaires achieve all the necessary requirements to satisfy both lighting needs and dark sky compliance.<sup>2</sup> Designers will produce a design that will contain obtrusive light calculations, plans, impacts assessments and confirm specifications against the ambient lighting environmental zone (E-zone) for the place.

If you are an employer or have the public visiting or accessing your property, you have a duty of care and should follow [Health and Safety Executive recommendations](#) and provide suitable and sufficient light. While HSE guidance refers to British Standards illuminance levels, the use of standards is not a legal requirement. However, you should ensure that you are providing appropriate light as a duty of care.

In any circumstance, you will probably need some form of lighting design if your development build is new and needs planning permission. The level of detail and inclusions within a lighting design should be proportionate to the complexity of the development - planning officers may request additional information to make a determination.

Unfortunately, there is no clear threshold to determine when a lighting designer should be used. You should think about a lighting designer if your lights are

- Not minor and require separate construction infrastructure
- Non-domestic in character, e.g. commercial, sports, amenity

- Used for providing lights for safety, workers or the public
- Used in built up areas where intrusion into other properties is likely
- Providing sports, parking, amenity or roads
- Used in shared areas where vehicles and pedestrians directly mix.
- Where specialist levels of lighting are needed for specific tasks

Lighting purposes that do not usually require a detailed design plan and can be completed by other means includes.

- Domestic lighting uses; doorways, driveways.
- Single access lighting for doorways
- Walkways separated from vehicle routes
- Small, quiet car parks
- Small private access roads

Further guidance is provided with this document to assist those seeking to plan their lighting without a lighting designer.

Section 5 provides some information on lamp types and powers for a range of uses that can be used to provide sufficient illuminance for most simple uses.

**If in doubt – contact a lighting designer.**

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<sup>2</sup> Lighting designers can be found on the Institution of Lighting Professionals website [Directory | Lighting Journal](#)



## 1.6 The Structure of the Guidance

As understanding lighting and dark skies can be technically difficult, this guidance has been structured to ease navigation and understanding. The guidance is split into four main sections.

### Light Pollution and Dark Skies

This section will provide brief overviews on:

- Understanding Light Pollution
- Light pollution control in the Cotswolds National Landscape
- Introducing the main principles of responsible lighting
- What is Dark Sky?
- An overview of the sky quality of the Cotswolds National Landscape

### Lighting Design Technical Content

Aimed at lighting professionals, this section will provide the main technical elements of a lighting design

- Technical elements of main principles
- Environmental zone and landscape impacts
- Planners Checklist
- What to include within a lighting design

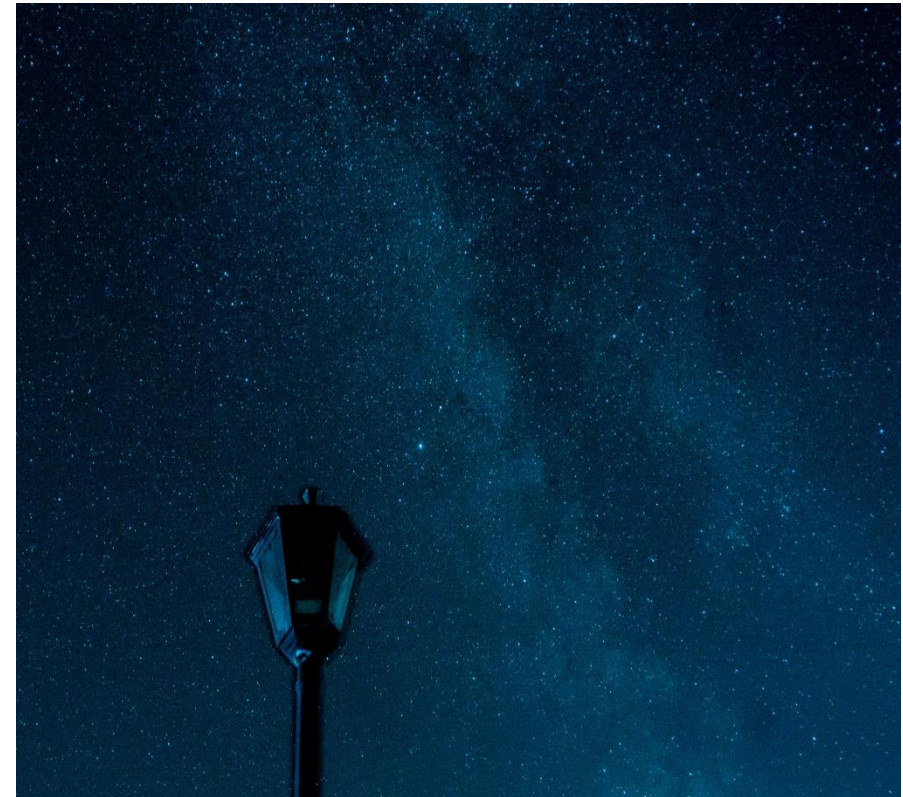
### Best Practice Lighting Advice Guides

This section provides generalised illustrations of good and bad lighting design for a number of common lighting applications and how to reduce light pollution. They are for planning purposes and general advice

### Supporting Information

This section will provide information that is useful

- Understanding light, terminology and key metrics
- Purchasing recommendations
- Further guidance material and reference



*Figure 1 - The Battle of the Photons - protecting the night sky by responsible artificial lighting at night. Credit Dan Oakley*

## 2 LIGHT POLLUTION AND DARK SKIES

### 2.1 Understanding Light Pollution

DarkSky International defines light pollution ‘the human-made alteration of outdoor light levels from those occurring naturally.’ It is recognised as having three main elements:

**Sky Glow:** This is the brightening of the night sky which can be seen emanating from the horizon, originating mostly in built-up areas. It is caused by light scattering on aerosols and particles in the air. Light that travels near the horizontal is the most damaging as it travels furthest through the lower, denser atmosphere. Sky glow is made worse by blue-white light which penetrates the air more than warmer colours.

**Glare:** This is the uncomfortable brightness of a light source when viewed against a contrasting darker background. In less densely populated rural areas, glare will seem relatively more intense than in urban areas.

**Trespass:** This is external light spilling where it is not intended or needed. Although this definition generally relates to windows and private property, the term ‘light intrusion’ also applies to natural habitats and areas of high species interest.

There is a fourth element that is relevant to protecting a dark sky landscape.

**Presence:** This is where the presence of light has an undesirable visual impact, particularly in a dark landscape. Even if a lighting scheme were designed to avoid sky glow, glare and trespass there still exists a possibility of significant impacts on dark and sensitive landscapes and wildlife due to the presence and the illuminance it provides.

SKY GLOW



TRESPASS



GLARE



PRESENCE





## 2.2 Light pollution in context

The three main elements of sky glow, trespass and glare will typically combine to present challenges to a lighting design and its assessment. Provided that some simple principles are followed then impacts can be reduced. Reducing light pollution has wider impacts as shown below.

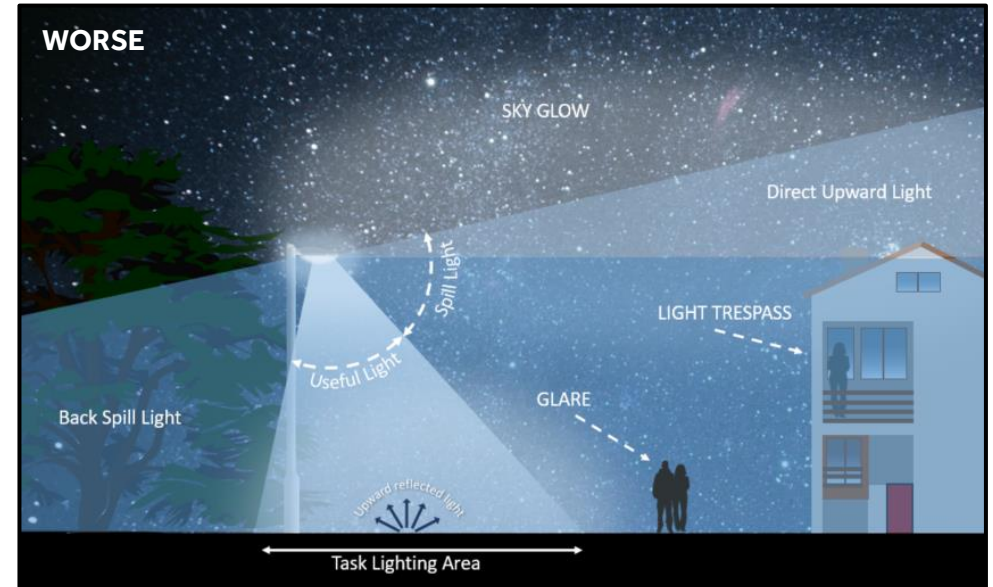


Figure 2 - Light Pollution. Sky Glow, Light Trespass and Glare.

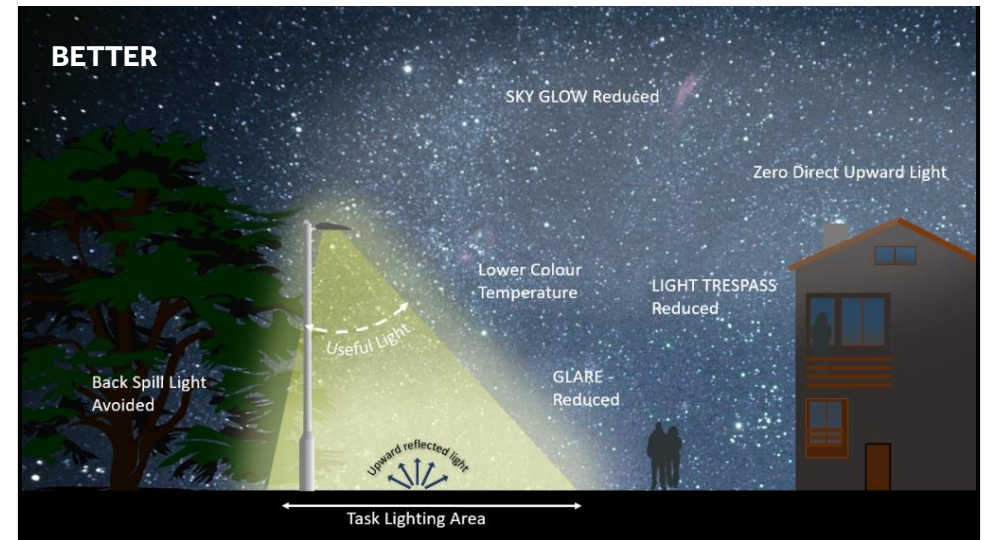


Figure 3 - Reduced sources of Light Pollution. The presence impact remains

### 2.2.1 Health and Wellbeing

It has long been known that light pollution can disrupt the circadian rhythms (body clocks) of people. While the impact of lights that shine directly into windows can be immediately understood, the general brightening of the sky can lead to further health issues. Blue-rich lighting (i.e. over 3000K) suppresses production of the hormone melatonin, de-regulating the sleep-wake cycle and thus the body's important repair mechanisms. Poor quality sleep can also lead to loss of attention and increased stress and fatigue. Indeed, the impact on wellbeing from dark skies at night has been observed: a recent study 'Wellbeing and community on the dark island of Sark' showed that wellbeing is intrinsically linked to the ability to see a full starry sky<sup>3</sup>.

### 2.2.2 Heritage and Historic Assets

The setting of heritage assets can be impacted by light pollution. Poorly placed lights both on and around heritage assets can significantly alter the character of sites or permanently damage them. Many of the heritage assets in and around the Cotswolds National Landscape were built long before recent light pollution began to erode the night sky and degrade these assets. They would have existed under much darker intrinsic skies and seen within their historical time frame, have only recently been affected by the recent rise in light pollution and spreading development pressure. Typically, older sites would have benefited from much dark skies than more recent heritage assets.

For example, the Rollright Stones (see front cover) are a heritage asset containing Neolithic and Bronze Age monuments near the village of Long Compton. A truly natural and unpolluted dark sky would have been a defining quality of this place, but as the front cover image shows, light pollution from the surrounding area has eroded the sky and adversely impacted the original character and setting. It is important that lighting installations have regard for the setting of heritage assets both in the direct spill of light on their boundaries and structures, but also in the cumulative erosion within the wider

setting. The Historic England Good practice advice in Planning note 3 (2<sup>nd</sup> edition) on [the Setting of Heritage Assets](#) provides some guidance on this.

In addition to these impacts, the physical installation of lighting on existing structures can have a detrimental impact. Often, the illuminance of heritage assets is crude with very little regard for historic design. For example, the illumination of churches is difficult to achieve due to the siting of fixtures that do not present a visual intrusion or have the potential to damage the exterior. (See figure 13 on page 37. Alternative poor lighting choices often have a high landscape impact and degrade the character and natural integrity of these assets. Further guidance on the external lighting of historic buildings can be found on the [Historic England](#) website.

There is a separate legislative regime when it comes to the protection of listed buildings. [Planning \(Listed Buildings and Conservation Areas\) Act 1990](#) requires applications for listed building consent for any works, which could include external and internal lighting installations and associated infrastructure, to have special regard for preserving the special architectural or historic interest of the structure/building and its setting. Developments within and in the setting of Bath should reference use the Bath [World Heritage Site Management Plan](#) and the [Pattern Book Lighting Strategy](#) which provides specifications for lighting within this UNESCO World Heritage Site.

### 2.2.3 Enjoyment and Understanding of Astronomical Experiences

Accessing and observing the stars can be a truly transformative experience. Being able to enjoy and absorb a cosmological canvas under a dark sky was once accessible to all – but the pressure of light pollution has eroded this experience. Under such a sky a full range of astronomical objects can be seen; from the constellations and planets to the river of light of the Milky Way to more distant objects such as nebulae and our nearby galactic neighbours in the Andromeda Galaxy.

As a key special quality of the Cotswolds National Landscape, it is important that people have access to quality astronomical viewing sites and a landscape

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<sup>3</sup> Ada Blair: Wellbeing and Community on the Dark Sky Island of Sark 2016: B0955WHFJ8

with few light sources. While the landscape has good access to view dark skies, there are two [Dark Discovery Sites](#). These are places designated to promote viewing in safe places. The two sites are the Rollright Stones Ancient Monuments and Aunt Phoebe's Recreation ground in the village of Long Compton.

The second statutory purpose of the Cotswolds National Landscape Board is to increase the understanding and enjoyment of the special qualities of the Cotswold landscape. By reducing the impact of new and existing lighting through this technical guidance the greater the understanding and enjoyment opportunities become.

#### 2.2.4 Wildlife and Dark Skies

As well as the dark skies contributing to the sense of remoteness and peacefulness in the area, a number of prioritised nocturnal species for nature recovery within the Cotswolds are dependent on dark skies for feeding, including a variety of bat species, numerous species of night-flying moths (which are UK BAP Priority species), dormice, and glow-worms.

The impact of artificial light on wildlife is a growing area of research. The evidence is that light can be very disruptive to many different species, not just by disrupting their circadian body clocks, but also by acting as a barrier to migration and movement, so compromising ecosystem integrity. Research shows that artificial light causes negative physiological adaptations in many species and disrupts the movement of species in an otherwise dark habitat. For example, glare from artificial lights can impact wetland habitats that are home to amphibians such as frogs and toads. Their nighttime croaking is part of the breeding ritual. Artificial light disrupts this nocturnal activity, interfering with reproduction and reducing populations<sup>4</sup>. Any lighting plan should appraise the impact of the installation on wildlife. While any light will have some impact on all

species and habitats in the Cotswolds, there are a few notable varieties that should be especially considered:

##### 2.2.4.1 Bats<sup>5</sup>

As nocturnal specialists, all bat species are susceptible to artificial light. Due to the decline in numbers, all are protected by the Wildlife & Countryside Act (1981). This makes it illegal to kill, capture or disturb bats, obstruct access to roosts or damage/destroy roosts. Lighting in the vicinity of bat roosts causing disturbance could constitute an offence. For planning applications:

- Survey area for bat species
- Do not directly illuminate bat roosts
- Avoid illuminating foraging areas and routes

Refer to the [ILP GN08/23 Guidance Note 8: Bats and Artificial Lighting](#) for specific case studies (e.g. Worcester City lesser horseshoe dark city way marker project) and recommendations for luminaires.

##### 2.2.4.2 Birds

Evidence shows<sup>6</sup> that artificial light can reduce sleep in birds, which disrupts the long-term circadian rhythm that dictates the onset of breeding. Birds are likely to be disrupted by changes to insect behaviour due to artificial lights. In general:

- Do not directly illuminate areas with nesting birds

##### 2.2.4.3 Invertebrates

Moths attracted to lights are a familiar sight. Artificial light, particularly blue UV rich, significantly impacts invertebrates, disturbing feeding, breeding and movement which may reduce and fragment populations. It is estimated that a third of insects that are attracted to lights will die as a result of their encounter<sup>7</sup>. Evidence also shows that pollination rates in illuminated plants can be reduced by 62%<sup>8</sup>. Ensure to:

- Avoid illuminating water or reflective surfaces
- Do not illuminate ecologically sensitive areas

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<sup>4</sup> Mazelka et al: Artificial lighting at night alters aquatic-riparian invertebrate food webs. Ecological Applications. Volume 29, issue 1. Jan 2019

<sup>5</sup> [Guidance Note 8 Bats and artificial lighting | Institution of Lighting Professionals](#)

<sup>6</sup> Aulsebrook et al: White and Amber light at night disrupts sleep physiology in birds. Volume 30 Current Biology, issue 18. 21 September 2020

<sup>7</sup> Owens et al. Light pollution is a driver of insect declines. Biological conservation Vol 241, Jan 2020, 108259

<sup>8</sup> (Knop et al 2017. Nature 548)



- Use colour temperature, CCTs of less than 3000K, ideally 2200K which is the least impactful for invertebrates<sup>9</sup>
- Use narrow band minimal UV sources

### 2.3 What is a Dark Sky?

A dark sky is a place where the night sky is relatively free of interference from artificial light. Under these conditions you should be able to see the Milky Way overhead and other astronomical features such as the Andromeda Galaxy with the naked eye. Light domes from sky glow are small and confined to the horizon and the landscape is continuous in darkness with few light sources.

Sky quality is usually expressed on the '[Bortle Scale](#)', (Figure 4) which shows the level of stellar visibility measured using naked-eye limiting magnitude (NELM). Under darker skies the Milky Way will be clearly visible, whereas a suburban sky in the UK will just be dark enough to see the Milky Way.

As everyone's eyes are a little different and as we get older our sight fades, we cannot depend on our own perception of sky quality. To improve the consistency of experience between all places worldwide, sky quality is normally measured using a hand-held Sky Quality Meter (SQM) which is a standardised requirement of a [Dark Sky International](#) place application.

The SQM will return a value of the brightness (magnitudes) of an area (arcsecond<sup>2</sup>) of the sky expressed as a number from 0 to 22 – the higher the number, the darker the sky. To see the Milky Way, a sky measuring 20.5 and above is needed. Measurements of 21 and above are rare in the UK.

A sky quality meter (SQM) does have limitations. As it has a small 10-degree point-of-view it can often omit the light pollution sources at the horizon which usually define the overall visual perception of a place. To overcome this, places can use other sources of evidence to describe sky quality.

Panoramic and fisheye photography is used to show the location and impact of places within a landscape, but overhead satellite data which measures Visual Infra-red Radiometer (VIIRS) can be used. In the UK, the [CPRE Night](#)

[Blight](#) dataset is often used and measures the luminance of the ground measured in Nano Watts per cm<sup>2</sup> per steradian. While there is no standard conversion between SQM and satellite data (one is measuring the sky brightness and the other ground brightness) there is good agreement between the two. Areas of darkness in satellites will probably measure dark SQM values.

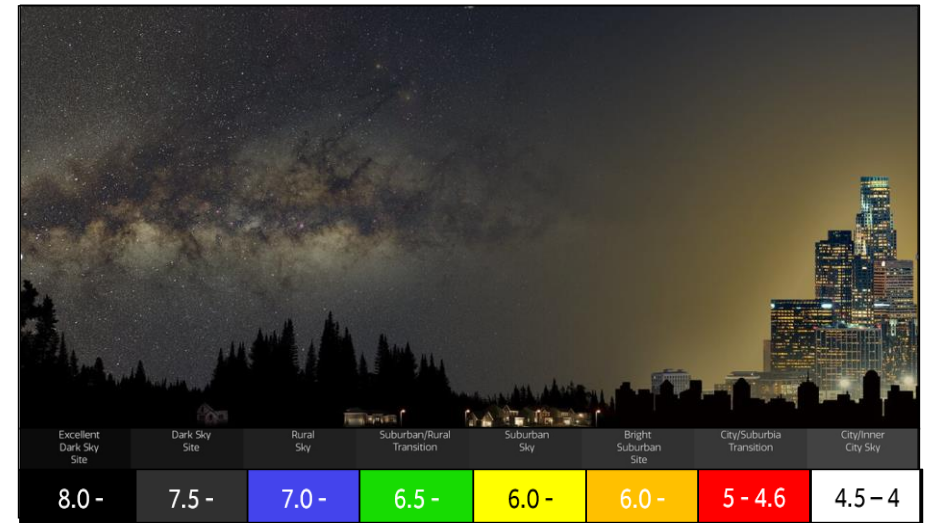


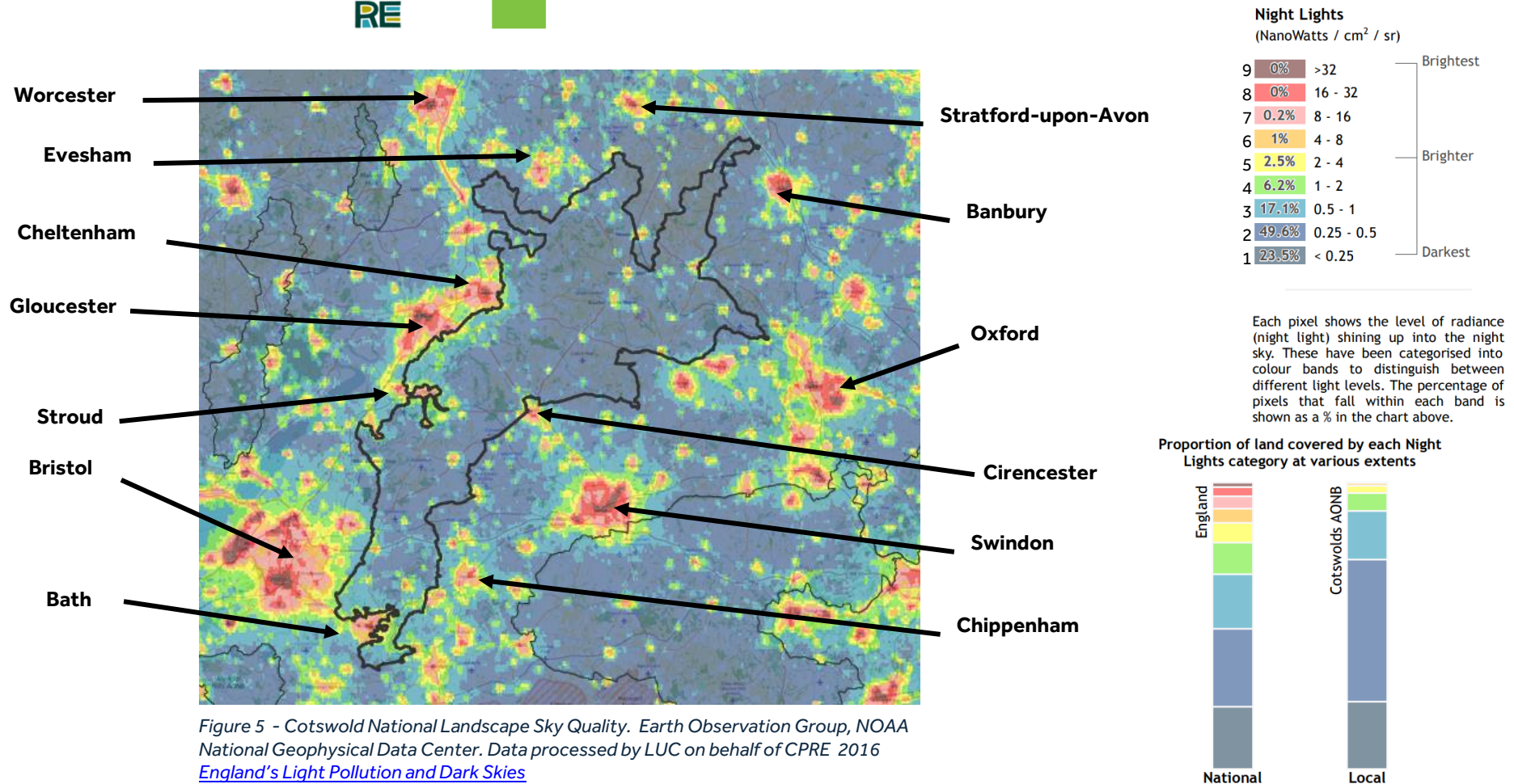
Figure 4 - Credit: [NOIRLab/NSF/AURA](#), P. Marenfeld. Global sky conditions from city to the best dark sky sites. Bortle scale expressed in naked eye limiting magnitude has been added. Note that the Milky Way will start to become visible in the suburban sky, 20.5+

<sup>9</sup> Buglife: [Buglife - Bug-friendly Lighting Sheet](#)



## 2.4 Dark Skies In the Cotswolds National Landscape

The following data from the Countryside Charity CPRE/Land Use Consultants (LUC) datasets use VIIRS data to measure sky quality in the landscape. The maps measure the radiance emanating from the ground and is expressed in NanoWatts/cm<sup>2</sup>/steradian – which is a metric that describes the radiant energy flux (Watts) emanating from a luminous area of the ground (m<sup>2</sup>) in the direction of an observer (sr). The maps show that there are areas of good sky quality across the Cotswold National Landscape (and wider) where the Milky Way is visible. The Cotswolds National Landscape ranks 24<sup>th</sup> nationally (13<sup>th</sup> England) within the National Landscapes. The Milky Way is likely to be observable in areas coloured dark blue and black. The total area that records the top two highest levels (<0.5 and above) measures 1,490km<sup>2</sup>, 73% of the CNL.



## 2.5 Environmental Ambient Lighting Zones

The CNL seeks to manage light pollution by limiting the introduction and spread of lighting installations that present a significant threat to sky quality. The use of established ambient lighting environment zones (E-zones 0-4) with the baseline CPRE datasets, allows the CNL to define different areas, (Figure 6 following page), within the landscape with corresponding lighting specification requirements and landscape assessments [Institution of Lighting Professionals guidance on the reduction of obtrusive light \(GN01 ILP: 2021\)](#). By doing so, inappropriate lighting can be controlled and limited where there is a risk to dark sky quality and landscape character. In general, the CNL seeks to avoid and limit inappropriate and bright installations in the rural landscape, such as sports lighting, larger commercial and residential developments and amenity lighting that could negatively impact quality and character. A greater weight of protection is applied in darker areas.

Applications should ensure that the correct E-zone is determined, which can be confirmed at the site scale using the CPRE Night Blight Maps.

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark	Relatively uninhabited rural areas, National Parks, <b>Areas of Outstanding Natural Beauty</b> , DarkSky International buffer zones
E2	Rural	Low District Brightness	Sparsely inhabited rural areas, villages or relatively dark outer suburban locations
E3	Suburban	Medium District Brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High District Brightness	Town / City centres with high levels of nighttime activity

Table 1 - E-zones from GN01 ILP 2021 showing levels of ambient quality and zone numbers.

<sup>10</sup> The 2km buffer zone was determined from the South Down National Park Reserve and based upon ground-based sky quality measurements from an E3 zone to values of 20.5.

### 2.5.1 Zoning in the CNL

As a principle, the CNL seeks to limit the spread of lighting development by using GN01 ILP: 2021 guidance to inform appropriate lighting types and offer the highest protection to the landscape. This is to ensure that development proposals are not solely justified under the influence of ambient lighting levels from surrounding lit settlements but rather from development character.

**E0:** Dark Sky Zone: Dark Sky zones are areas requiring the highest levels of protection and opportunity for enhancement. These are:

- All areas within the highest category on the CPRE Night Blight maps, from <0.25 radiance plus a 500m buffer, and
- All areas in the CNL that are 2km<sup>10</sup> or more from the nearest street-lit town settlement edge as there is a high chance that dark sky conditions will begin to emerge.

Sky quality values of 20.5 and above are generally expected in these areas throughout the night, due to the low population density and distance from lit settlements. The Milky Way will be likely be observable in these areas-

**E1:** These are areas outside E0 and E2, E3 zones within the second and third category of the CPRE Night Blight, 0.25 to 1 radiance outside of E0 zones defined above. These areas will include the transitional areas from settlement edges to the darkest skies in the rural areas of the CNL.

**E2:** These areas are within the larger street lit villages and towns of the CNL that correspond to fourth to sixth categories of the CPRE Night Blight, 1 to 8 radiances (green, yellow to orange). These areas will have lower levels of local sky quality due to the lit environment. See the table 2 below for settlements within this zone.

Expected lighting presence will include amenity (e.g. car parks, footpaths), road lighting and sports. E2 zones are clipped to the edges of the settlement

boundaries - where the E1 zones will start. Lit settlements that cross or are externally adjacent to the CNL boundary should use E2 throughout.

**E3:** These areas are limited to larger town centres, commercial and industrial areas within settlement boundaries corresponding to the seventh pink category on the CPRE Night Blight maps, 8-16 radiance. These areas will be heavily influenced by lighting and sky glow, where the Milky Way will not be observable. Some larger towns and villages within the CNL such as Stow-on-the-Wold and Morton-in-Marsh, show as having 8-16 radiance on the CPRE Night Blight map but this likely to be due to poor lighting design and not reflect the level of lighting required, therefore E2 criteria apply.

**E4:** There are no E4 classifications within the CNL

**Adjacent Zones:** In accordance with GN01 ILP table 2 Note 1: where an area to be lit lies close to or astride the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

It is expected that all areas outside the Cotswolds National Landscape that are immediately adjacent to the E1 zone should use the following design parameters:

- Lit settlements should use E2 criteria in all adjacent villages, towns.
- An E3 zone outside the CNL should use an E2 zone between it and the E1 boundary of the CNL
- For unlit areas in open rural areas, CPRE Night Blight radiance should dictate the appropriate level of design criteria:
  - E0 for highest quality
  - E1 for second and third category

**Settlements zoning.**

The following table lists the larger settlement areas within the Cotswolds National Landscape boundary. Settlements not included in this table should use either E1 or E0 specifications depending on the zoning shown on the map below (figure 6)

E2 Zone	
Andoversford	Milton-under-Wychwood
Bourton-on-the-Water	Minchinhampton
Box, Wiltshire	Moreton-Marsh
Broadway	Northleach
Burford	Sherston
Bussage	Shipton-under-Wychwood
Charlbury/Bussage	Stow-on-the-Wold
Chipping Campden	Tetbury
Chipping Norton	Upper Rissington
Colerne	Winchcombe
	Wooton-under-Edge

Table 2 - larger settlements in the CNL. Zones should use settlement boundary edges

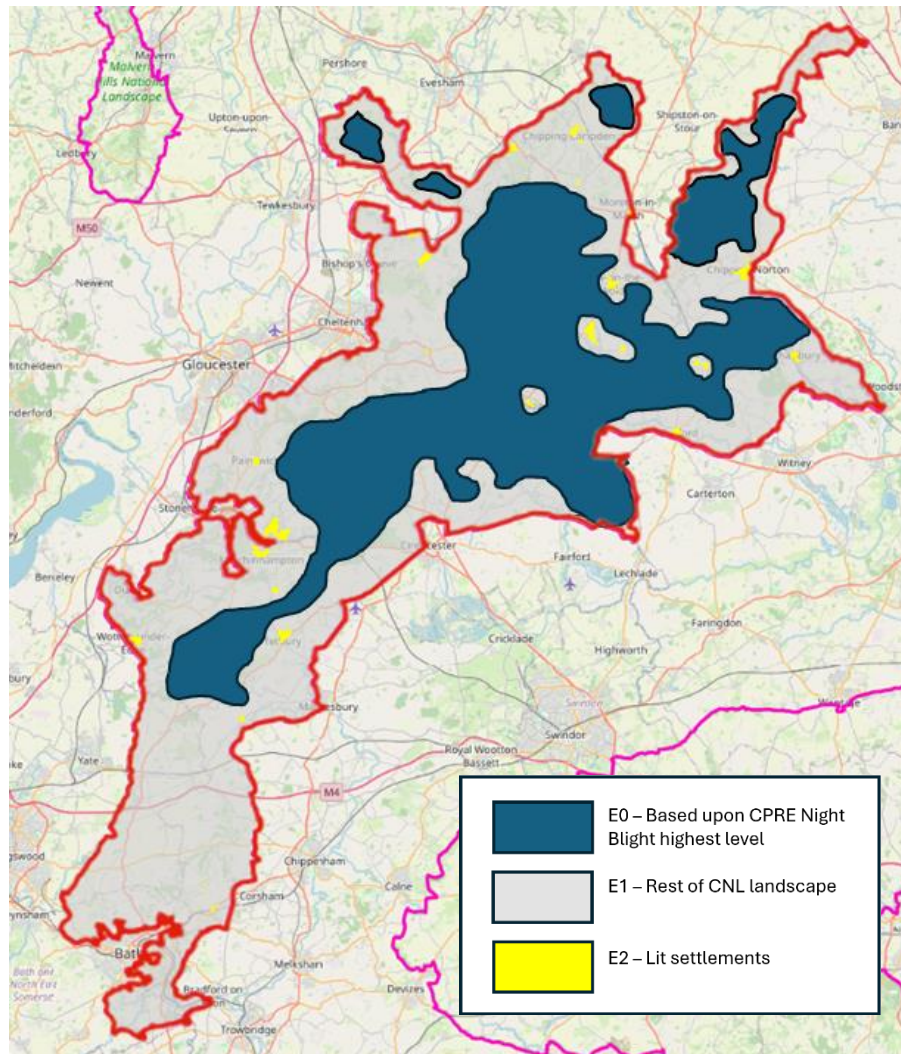


Figure 6 - E-zones in the Cotswolds National Landscape. E0 are based on general conditions from CPRE Night Blight dataset

### 2.5.2 Upward light

GN01 ILP 2021 stipulates different levels of upward light, intensity, glare and building luminance for these zones, but in one important respect does not fully meet ROLAN night recommendations. Under this, the upward light from luminaires is allowed to increase from 0 to 5% as urbanisation increases, with 2.5% allowable in rural E2 zones. This conflicts with zero upward light to meet ROLAN and DarkSky International requirements.

#### IMPORTANT: UPWARD LIGHT RATIO (ULR)

In **all zones** an installed upward light level of **ZERO** is sought in all cases, irrespective of ambient lighting zone. This is in contrast to the GN01 ILP 2021 guidance which allows positive values of ULR in E2/3/4.

**The Cotswolds National Landscape seeks zero upward lighting in all cases and supersedes the ILP guidance in this technical respect.**



### 2.5.3 Landscape Intrusion

GN01 ILP 2021 Table 7 also provides guidance on the expected types of development within zones to minimise sky glow through the overall upward flux ratio<sup>11</sup>. For an E2 zone, some road, amenity and sports lighting are applicable, whereas only road lighting is expected in E1 zones. Avoiding all amenity or sports lighting may be difficult in the Cotswold National Landscape due to the communities and lighting needs. This may introduce installations of sufficient size and extent that their presence and sheer illuminance levels in the landscape or settlements may be inappropriate. (Large sports lighting in E2 zones for example).

Generally, illuminance levels over 10 lux (based upon a small quiet rural car park) will begin to noticeable intrusions into the landscape regardless of the efficiency of the lighting. Although the overall impact depends upon the size, scope and extent of the illuminance areas, proposals over this 10 lux threshold should consider specific designs elements to mitigate this threat. As figure 7 shows, illuminance levels can be considerably higher than 10 lux.

Proposals should consider an Environmental Impact Lighting Assessment such as PLG 04 – [Guidance on undertaking environmental lighting impact assessment](#)<sup>1</sup> with particular reference to residual impacts and their mitigation to avoid intrusion.

#### IMPORTANT: LANDSCAPE INTRUSION

Some installations may be initially expected and compliant in terms of sky quality conditions under GN01 ILP 2021, but their presence and illuminance extent could present an unacceptable and intrusive threat to dark skies and landscape character

**The Cotswold National Landscapes seeks to minimise the landscape impact of inappropriate installations regardless of zone and supersedes the ILP guidance in this respect.**

<sup>11</sup> Upward flux ratio is the combined light from the luminaire *and* the scattering of light from the surface. It differs from upward light ratio as this relates to individual luminaires not the entire installation.

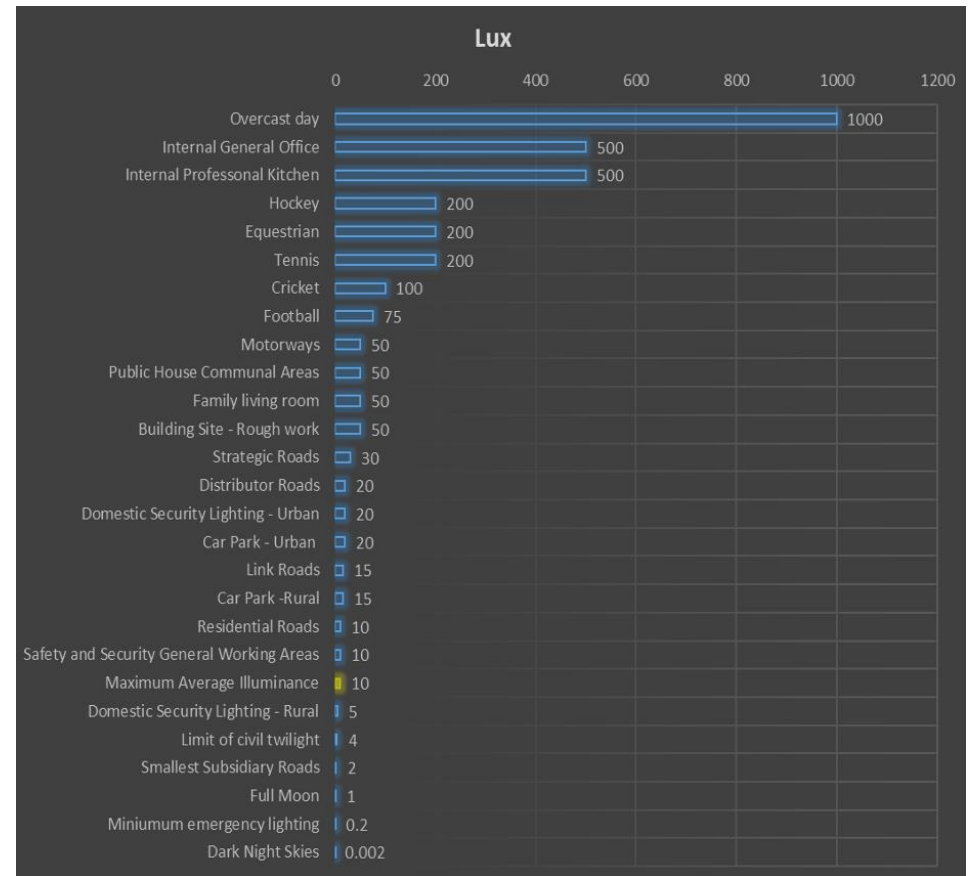


Figure 7 - Example average illuminance levels (lux)

## 2.6 Increase in Light pollution – Urban Spread

The Cotswolds dark skies are threatened from the urban spread of towns and nearby cities. Figure 8 shows yearly Visible Infrared Imaging Radiometer Suite (VIIRS) datasets from 2017 to 2023 which clearly show that the sky quality in and around the Cotswolds National Landscape has been continually eroded – despite Covid 19.

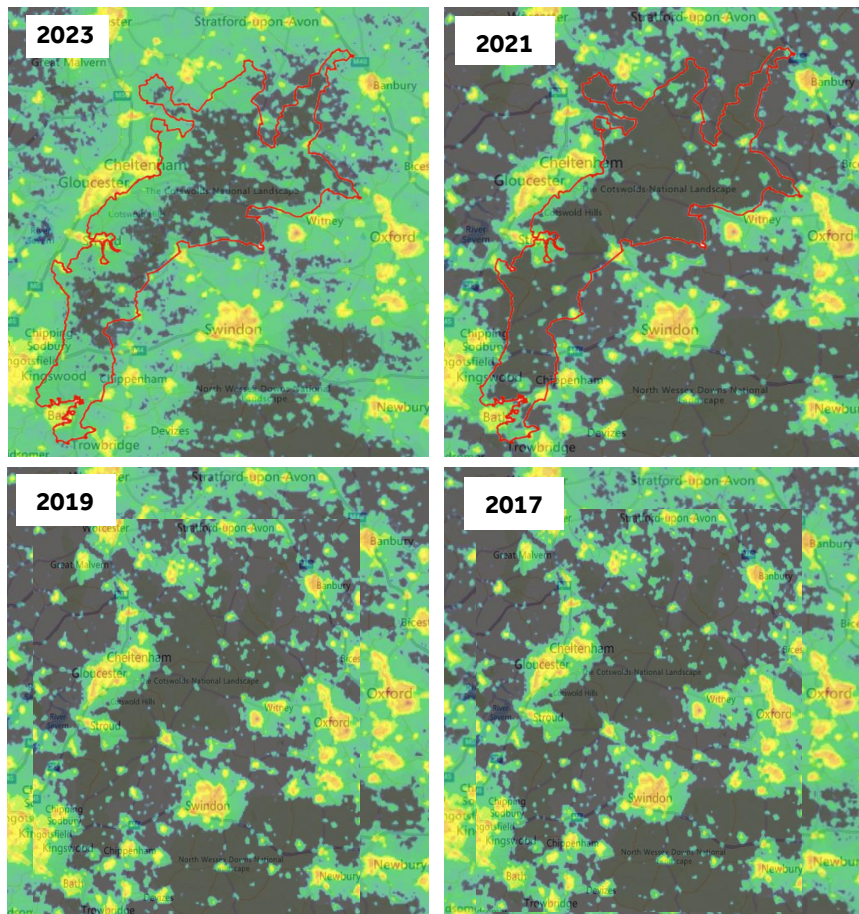


Figure 8 - VIIRS Yearly Datasets - NASA's Black Marble nighttime lights product and Jurij Stare [www.lightpollutionmap.info](http://www.lightpollutionmap.info)

Even with a noticeable minimum during the Covid years in 2021, there has been a slow loss of dark skies consistently from 2016 as the surrounding towns and cities increase their lighting footprint. Figure 9 shows a general decline (increase in ground radiance) of sky quality measured over an open area away from the light pollution within settlements, within the Cotswolds National Landscape. A similar decline has been noted in wider UK SQM measuring stations.

While some of the decline can be attributed to environmental changes the spread of both good and bad lighting installations is a further contributor.

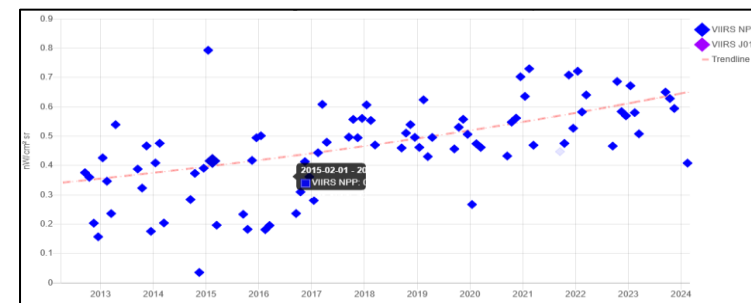


Figure 9 - Yearly VIIRS datasets – [lighttrends.lightpollutionmap.info](http://lighttrends.lightpollutionmap.info)

**This shows that local authorities within and around the CNL should use this lighting guidance to seek to further the purpose of conserving and enhancing the threatened CNL dark skies and natural beauty of the National Landscape**

Due to the influence of lighting to the dark skies of the CNL, local authorities around the landscape should have regard for dark skies and mitigate the impact where there is

- Direct light spill into the CNL
- Where the frontage of lighting elements is visible from the CNL landscape
- Where development increases ambient lighting within the CNL

## 2.7 Images and Photography from dark sites

The following images have been provided by local astronomy groups; Cotswolds Astronomical Society (CAS) and Chipping Norton Amateur Astronomical Group (CNAAG). They show that the dark skies in and around the Cotswolds National Landscape are a valuable resource to connect with the cosmos and that they are threatened by nearby towns and their urbanised spread. Using this guidance and achieving wider its adoption by local authorities would serve to reduce the impact from these threats.



*Figure 10 - Astronomical images from Cotswolds Astronomers taken in and around the National Landscape:*

*Top row from left all Cotswolds Astronomical Society (CAS): Credit: Star Trails, Callum Potter. Bodes Nebula. Neowise Comet James Weightman.*

*Bottom Row Chipping Norton Amateur Astronomical Group, (CNAAG) from left: Aurora Mel Gigg. M45 Graham Clayton. Eastern Viel Nebula Anothony Lewis.*



## 2.8 Light Pollution Control in the Cotswolds National Landscape

Light pollution and the requirement to use responsible outdoor lighting at night is primarily controlled through the planning process. This is achieved through the use of national and local policy documents for the Cotswolds National Landscape which includes a position statement on lighting. This guidance directly supports these documents but does not supersede the CNL Management Plan and the Position Statement. Additional legal requirements whose enforcement functions are outside the remit of planning officers will also apply.

Proposals should ensure that the relevant national and local policies are referenced within designs. The spatial control is through;

- Cotswolds National Landscape policies
- National Planning
- Local and Neighbourhood Plans and Strategies
- Statutory Obligations and Legislation
- Local Lighting Authorities

The appendix provides further content on these, but more relevant extracts follow.

### COTSWOLDS NATIONAL LANDSCAPE

#### 2.8.1 Cotswolds National Landscape Position Statement

The Cotswolds Conservation Board produced a position statement on [Dark Skies & Artificial Light in 2019](#). The statement recognised the desire for a standard to be used and to establish the practical parameters by which local policy and proactive engagement will seek to match National and International Goals for Dark Skies conservation and enhancement in a consistent manner across the landscape. This guidance provides technical advice in support of this statement and does not supersede it.

#### 2.8.2 Cotswolds National Landscape Management Plan

The CNL Board position statement on Dark Skies and artificial light in 2019 relates to the [Cotswolds Management Plan 2023-2025](#). Outcome 7 states that

‘fewer areas of the National Landscape are affected by light pollution’, and policy CE5 refers to dark skies. (see box right Policy CE5). Lighting installation should show their compliance with policy CE5 and outcome 7.

#### Policy CE5 – Dark skies:

- CE5.1. Proposals that are likely to impact on the dark skies of the Cotswolds National Landscape should have regard to these dark skies, by seeking to avoid and where avoiding is not possible, minimise light pollution.
- CE5.2. Proposals that are likely to impact on the dark skies of the CNL should have regard to recognised standards and guidance, in particular, that published by the Institution of Lighting Professionals and the Commission for Dark Skies
- CE5.3. Measures should be taken to increase the area of dark skies in the Cotswolds National Landscape by removing, and where removal is not possible, minimising existing sources of light pollution.
- CE5.4. Consideration will be given to seeking a formal dark sky designation for those parts of the Cotswolds National Landscape that are least affected by light pollution.

In addition, the [CNL Landscape Strategy and Guidelines](#) provide details on landscape character assessments and the influence of light pollution on dark skies. All Landscape Character Types (LCT) reference dark skies, which should be reflected within lighting designs. A map showing where the darkest skies reside over the LCT is shown in the appendix.

### NATIONAL PLANNING

#### 2.8.3 Light Pollution and National Planning Policy Framework (NPPF)

[The National Planning Policy Framework NPPF \(2024\)](#) provides local authorities with a baseline when developing planning policy; Section 15 paragraph 198

**198** – Planning policies and decisions should also ensure that new development is appropriate for its location, taking into account the likely effects (including cumulative effects) of pollution on health, living



conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: [...] c) limit the impact of light pollution in local amenity, intrinsically ***dark landscapes*** and nature conservation.”

Para 189 also notes providing great weight to dark skies:

**189** - ‘Great weight should be given to conserving and enhancing’ protected landscapes which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas and should be given great weight in National Parks and the Broads. The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas’.

Para 190 – which specifically relates to National Landscapes - also notes

**190** – ‘When considering applications for development within National Parks, the Broads and Areas of Outstanding Natural Beauty, permission should be refused for major development other than in exceptional circumstances, and where it can be demonstrated that the development is in the public interest.’

The NPPF will be subject to updates which may mean this guidance does not reflect the latest version. Applicants will be expected to use the current NPPF and relevant policies. The guidance uses the latest version available.

Further supporting information on how to consider light within the planning system can be found on GOV.UK website – [Guidance Light Pollution](#).

## LOCAL PLANS

### 2.8.4 Local Plans and strategies

Developments within and around the CNL will need to ensure that local district and borough plans/strategies are incorporated, in addition to the overarching policies within the CNL Management Plan and the Dark Skies & Artificial Lighting position statement.

All the relevant plan and strategy references and extracts can be found in the Appendix. The local plans will also have specific policies that require that developments do not threaten the special qualities and landscape character of the CNL/AONB. Lighting designs should ensure that these policies are met. Designs should ensure that all other relevant policies are referenced, where applicable.

### 2.8.5 Neighbourhood plans

In addition to the local plans that all contribute to the conservation and enhancement of the dark skies of the CNL, individual neighbourhood plans should be used to ensure that lighting designs are compliant with their policies. Designers need to ensure that relevant neighbourhood plans are referenced within their designs.

## STATUTORY OBLIGATIONS AND LEGISLATION

### 2.8.6 Light Pollution and the Law

Proposals should avoid creating nuisance by poor lighting. In 2005, [Clean Neighbourhoods and Environment Act 2005 – Statutory Nuisance](#) (para 102 -2) was extended to include light nuisance, “**artificial light** emitted from premises so as to be prejudicial to health or a nuisance”. The relevant council will determine if light levels are a nuisance, mostly based upon GN01 ILP: 2021.

### 2.8.7 Duty of Regard of Section 85 CROW 2000 bodies,

[Countryside Rights of Way Act 2000](#) places a requirement of a general duty on public bodies, which should include the impact of light pollution as regard,

85 (1) - 'In exercising or performing any functions in relation to, or so as to affect, land in an area of outstanding natural beauty in England, a relevant authority other than a devolved Welsh authority must **seek to further** the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty'.

Para 84 (4) also notes 'A local planning authority whose area consists of or includes the whole or any part of an area of outstanding natural beauty has power, subject to subsections (5) and (6), to take all such action as appears to them expedient for the accomplishment of the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty or so much of it as is included in their area.'

### 2.8.8 Light Pollution and Wildlife sites and species

The [Wildlife and Countryside Act 1981](#) is the principal mechanism for the protection of wildlife in Great Britain. Under the Act, it is illegal to disturb certain species, including bats, and artificial light can constitute an offence. While some species are particularly sensitive to artificial light, all wildlife and their habitats can be disrupted by artificial light. When developing or assessing a planning application that includes lighting, it is important to be aware of any designated (statutory and non-statutory) wildlife sites and protected species nearby. An assessment of any potential impacts should be undertaken, and a plan made to remove or mitigate these. The Institution of Lighting Professionals and the Bat Conservation Trust created [Guidance note 8/18 Bats and artificial lighting in the UK](#) to help guide lighting assessments of bat species.

### 2.8.9 Illuminated Adverts Regulations

Advertisements illuminated or otherwise subject to [Town and Country Planning \(control of Advertisements\) regulations 2007](#) may require planning permission.

Illuminated adverts should also reference the ILP guide PLG05 [The Brightness of illuminated adverts](#).

### 2.8.10 Health and Safety Executive

If you are an employer with workers or have the public accessing your site, you will have a duty of care. This means providing a safe environment that is sufficiently illuminated to prevent harm. A risk assessment should be undertaken to determine where harm may be prevented with lighting.

### 2.8.11 Levelling Up and Regeneration Act 2023

The Levelling-up and Regeneration Act 2023 provides further duties for public bodies to conserve and enhance the natural beauty of protected areas. Specifically, section 245 (6) (a) (A1) states that:

245: 6 (a) (A1) In exercising or performing any functions in relation to, or so as to affect, land in an area of outstanding natural beauty in England, a relevant authority other than a devolved Welsh authority must **seek to further** the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty

Public bodies should ensure that lighting designs meet this section.

## LOCAL HIGHWAY AUTHORITIES

### 2.8.12 Local Highway Authorities

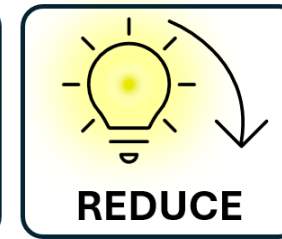
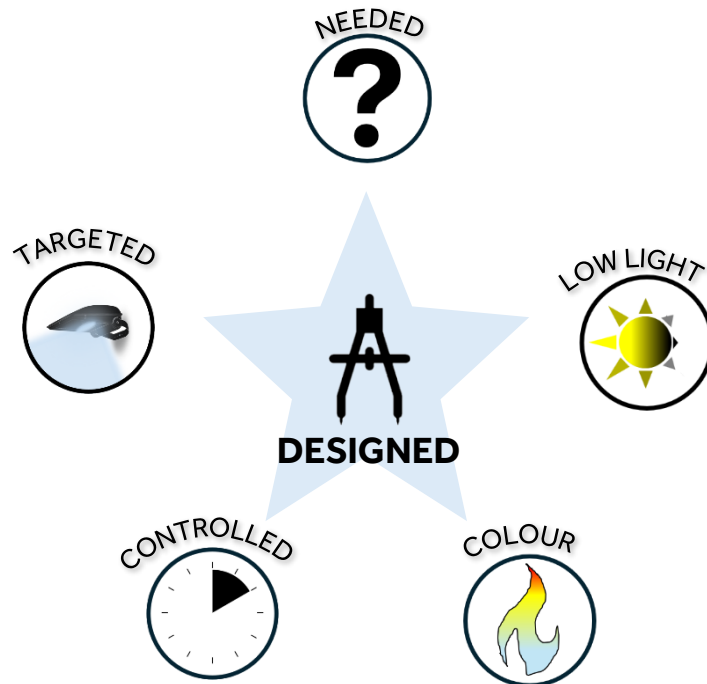
There are a number of highway authorities within the CNL that provide street lighting. While there are variations in completion, content and requirements, there are policies and street scene design guides that provide greater detail on lighting requirements. Links to policies can be found in the appendix.

### 3 LIGHTING DESIGN TECHNICAL CONTENT

#### 3.1 The Key Principles of Responsible Outdoor Lighting



Lighting installations should be **designed** to ensure they are fit for purpose and minimise impact. This does not necessarily require the services of a lighting designer, but there should be a process where lights are properly planned and installed. The design process should consider the main principles of responsible outdoor lighting to ensure all wider impacts of light pollution are reduced.



#### NEEDED



Lighting should be clearly justified, appropriate for the area with a clear purpose and benefit without presenting unacceptable intrusion.

#### TARGETED



Light should be directed to where it is needed and not spill into neighbouring spaces, or in a direction that causes a nuisance to neighbours, wildlife or the night sky.

#### LOW LIGHT



Light should be no brighter than necessary and provide appropriate illuminance for the activity.

#### COLOUR



Warm colour lights should be used to reduce the impact on sky glow, wildlife and human health.

#### CONTROLLED



Lights should be shielded, dimmed or turned off when not required.

### 3.2 General Outdoor Lighting Checklist

#### USEFUL



- Is the light needed? Has the design fully justified the use of external lighting? (The reasons should be clear and evident, and critical to the development, e.g. access, safety and business needs)
- Has unjustified aesthetic and decorative lighting been avoided?
- Is the proposed lighting appropriate in the landscape?

#### LOW LIGHT



- Do designs use lowest light levels to achieve illuminance for the task and reference relevant standards, e.g. Sports England, BS Standards, adverts.
- Are the fixings installed at the lowest possible height?
- Are the fixings “cut-off” or are baffles or shields provided if necessary to control ULR?
- Is calculated average illuminance within the required %-age of recommended average?



To help assess the impacts of the lighting proposals on the dark skies of the Cotswolds National Landscape, and ensure that proposals minimise adverse impacts, the following checklist is

#### TARGETED



- Has the correct environmental zone been referenced and used in the lighting calculations?
- Do the designs show that all luminaires achieve zero upward light (0% ULR)
- Does the luminaire schedule show compliant fittings through images or photometry?
- Does the design show that light does not intrude into neighbouring areas?
- Has the local and wider landscape setting been considered in visibility and impacts of lighting?
  - o Topography, existing vegetation
  - o Nearby sensitive wildlife sites or ancient woodland
  - o Introduction or spread of lit elements
- Has an obtrusive lighting compliance statement been submitted using ILP guidance?

#### COLOUR



- Has colour temperature for each luminaire been provided? And CRI where appropriate?
- Colour temperature should be ideally 2700K or less, maximum 3000K.
- Luminaires should avoid 500nm wavelengths - lighting which emits an ultraviolet component or that has a blue spectral content can be particularly harmful to wildlife.

#### CONTROLS



- Has information regarding the proposed timing / curfew for proposed lighting been submitted?
- Do the controls reflect summer to winter variations, and have they been chosen to minimise adverse impact on dark night skies and on nocturnal wildlife?
- What are the proposed methods of control, e.g. automated timer or PIR?



### 3.3 Lighting Designs and Plans

The installation of external lighting will require design, planning and the submission of key information to planners to assess. The level of detail and scope of inclusions needed to produce a complete design does, however, depend upon the level of complexity of the development and if a lighting designer has been used. Lighting designers are usually required to calculate obtrusive light calculations, provide plans, illuminance levels and provide nighttime assessments using professional software – this is not always appropriate to simple designs and can be expensive.

A lighting designer may not be appropriate in all circumstances and may not be necessary if you are confident, and you can install compliant and appropriate lighting yourself. Simple designs that feature simple plans, low number of lights in smaller areas can be submitted provided key elements are provided for planners to check the lighting compliance.

The level of detail and inclusions within a lighting design is proportionate to the scale of the development. Proposals should ensure that sufficient inclusions are provided to enable a determination – more information may be requested by planning officers should further information be needed.

#### 3.3.1 Simple Lighting Installations

For simpler lighting installations you may do yourself, it does not need all the elements of a more complicated design prepared by a lighting designer.

The key information need will be

- Checklist compliance
- Images of the luminaire – ideally as expected on installation
- The colour temperature, CCT
- The power output, lumens and watts
- How it will be installed to achieve zero upward light
- Where it will be installed – basic site plan
- Any controls or timers being used
- How many lights

Much of this information will probably be on the product website either as listed or under the 'specification' tables. Sometime a separate spec sheet is provided like this example. There is sufficient information provided to show that this domestic light is dark sky compliant - <500 lumens, 3000K and zero upward light.

WALL LIGHTS		6W ROUND
<b>STEP 1</b>		FITTED WITH 2M 12V H05RN CABLE
12V / NO ELECTRICIAN NEEDED		
<b>USEFUL INFORMATION</b>		
• IP65 (most wall lights are IP44)		
• Louvre system allows different angles for both top & bottom		
• 300MM cable attached with IP68 connector		
		<b>BOX CONTENTS</b>
		• 6W Wall light
		• Plugs
		• Screws
		• Instructions
		NITELUX / 38

Figure 11 - Example Luminaire specification for a wall lighting (Nitelux). Note that the datasheet has information on lumens, power, colour temperature and shows that zero upward light can be achieved upon installation.

### 3.3.2 Professionally designed lighting installations

Lighting installations that are more complex and need precise calculations of obtrusive light, illuminance and nighttime impact should be created by a qualified lighting designer<sup>12</sup>. A design should contain essential assessment information to show how the lighting is justified, what luminaires are used and where, how it complies with relevant standards and considers wider landscape and wildlife considerations. A design should not only describe the lighting details and plans but should show how it complies with the responsible lighting principles and checklists in this document and how it protects the night sky, wildlife and heritage.

Planners will need to quickly and clearly understand how a lighting design complies with relevant standards and how it will not cause harm to the landscape by producing light pollution. A design should clearly summarise the justification, the tasks need, mitigations, local and landscape impact, and use the checklists to show compliance.

**The more clearly you can show this information with a design, the better.**

It is highly recommended that key checklist items (illuminance levels, upward light, colour temperature, etc) are clearly marked and highlighted. This will make a planning officers job much easier and will reduce the possibility of delays clarifying this information.

For more prominent or complex designs a lighting design should include and make clear the key checklist items to planning officers and reference ‘PLG 04 – [Guidance on undertaking environmental lighting impact assessment](#)’. The level should be proportionate to the scale and the detail will largely depend on if the installation, its location and impact. It will require the services of a lighting designer.

Note that for small and minor domestic lighting, a designer may not be required, in which case some basic technical content should be included, such as upward light, basic plans, colour temperature, product images and any controls. Illuminance calculations are not required for minor domestic fittings.

1	<b>Site description</b>	A summary of visual impact assessment description adapted for lighting, including indication of applicable environmental zone
2	<b>Assessment method</b>	A description of the methodology for site visits, design and evaluation
3	<b>Baseline Assessment</b>	An assessment of the current lighting at the site, identification of sensitive ecological and heritage receptors, nearby lighting, special qualities, local plans, viewpoints and general dark sky conditions
4	<b>Proposed development</b>	This is the main technical part of the plan. It should include <ul style="list-style-type: none"> <li>• Design objectives and justifications</li> <li>• Task requirements and illuminance calculations</li> <li>• Relevant guidance, standards and legislation being used in design</li> <li>• Obtrusive light calculations</li> <li>• Luminaire schedules and installation plans</li> <li>• Luminaire specifications (lumens, CCT, CRI, spectral distribution)</li> <li>• Signage luminance calculations</li> </ul>
5	<b>Residual effects</b>	Assessment of the changes caused by the lighting, including during the construction and operational phases. This should also include effects to the dark landscape and wildlife and overall visibility after installation and mitigations
6	<b>Potential mitigation</b>	A description of any potential mitigations used, including curfews, reduced illuminances (dimming), or shielding
7	<b>Conclusions</b>	A summary of the report covering installation and operational phases. This should summarise the main technical requirements and be clearly presented to a planner.

Table 3 - Recommended design elements based on ILP: PLG 04

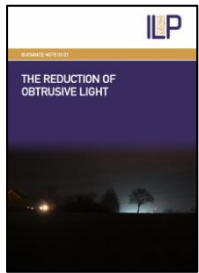
<sup>12</sup> Lighting consultants can be found [Directory | Lighting Journal](#)

### 3.4 Lighting Plan Elements

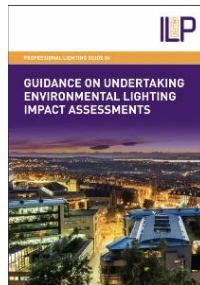
A lighting design should include some key elements for assessment. While there is some variance on the functionality of the software being used, there are some elements that should be included. For the ease of understanding and assessment by planners, it is highly recommended that designers ensure that this information is prominent and easily accessible to the reader. A qualified lighting designer will have no problem in providing most of this information.

#### 3.4.1 Key lighting reference documents

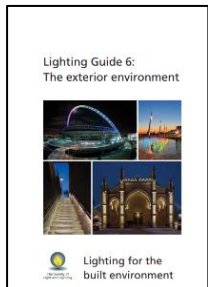
The advice in this guidance and a good lighting plan will require the reference of key documents. They should form the initial basis for developing a lighting plan. Many of the policies within this guidance are based upon the information within these documents.



Both ILP documents [Guidance on Undertaking Environmental Lighting Impact Assessments PLG04](#) and [The Reduction of Obtrusive Light GN01/21](#) GN01 and PLG 04 are fundamental documents for lighting plans. Other ILP guides (see appendix) are also useful. [ILP GN08](#)



[Bats and Artificial Lighting](#) should also be referenced if an ecological assessment is needed.



[CIBSE: SLL: LG06: The exterior environment \(2016\)](#) This provides the reader with a firm foundation from which to approach exterior lighting design.

British standards on lighting in workplaces [BS-EN 12646-2](#) and roads [BS 5489-1](#) should be

referenced to ensure correct illuminances.



#### 3.4.2 Baseline Information

Details of any existing lighting within the proposal should be included – this is often useful to look for opportunities to improve poor lighting and seek opportunities for enhancements. Existing on-site lighting that can be improved to lower the overall resultant footprint should be considered as an opportunity for positive enhancement.

Nearby sources of light, e.g. villages, floodlit facilities, should be indicated to provide context upon the overall setting. Nighttime photography from a number of viewpoints should also be included for most non-domestic proposals.

Light pollution maps are useful to provide some background information on the setting and the wider environment. E.g. [CPRE datasets](#), or [lightpollutionmaps.info](#) and the precise determination of the E-zone.

Sky quality can be provided either through lux levels or sky quality monitors, but this will not impact on the need to use luminaires that achieve zero upward light. If a sky quality monitor is used, the [methodology](#) used by DarkSky International should be used.

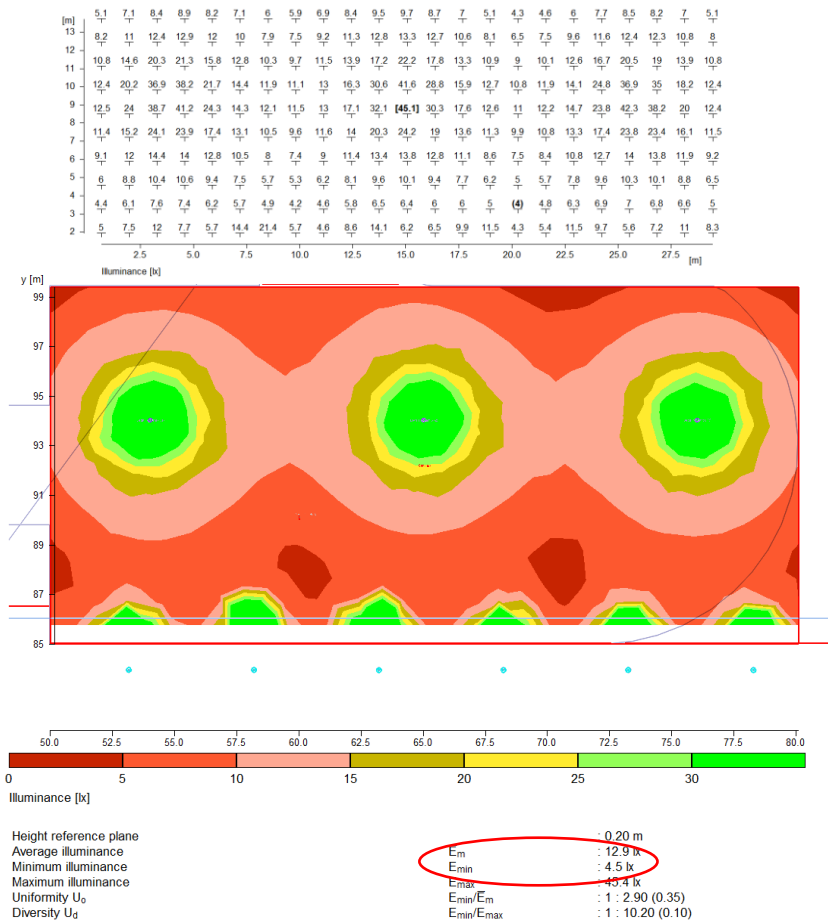


Figure 12 - Baseline elements: Photography, Sky Quality data from satellites and SQM

### 3.4.3 Illuminance Calculations and tolerance

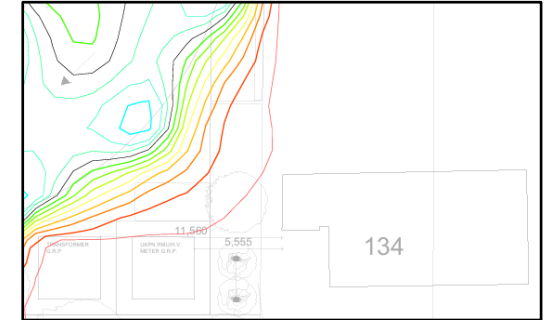
Designs should include calculation details of the illuminance levels used within the task areas. They can either be tabular, isoline or coloured contours. Ensure that the **reference illuminance ( E ) standard** and **the calculated average,  $E_{min}$**  is highlighted. Calculated average illuminance should aim to be designed to be within a percentage tolerance of the recommended average illuminance level as recommended by DarkSky International [Model Ordinance template](#):

- **25% for outdoor lighting**
- **10% for sports lighting (above 100 lux)**



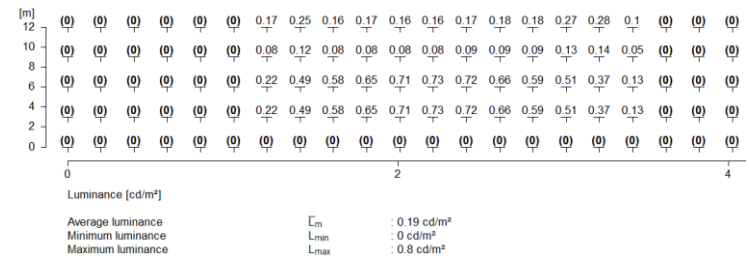
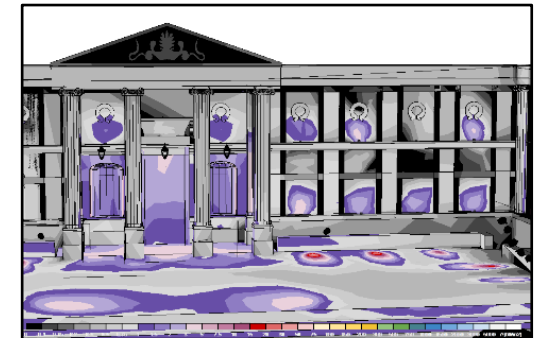
### 3.4.4 Light Spill in Neighbouring properties

For designs that may pose a threat to nearby properties, heritage or wildlife areas, wider illuminance plots that show the light spill into these areas should be calculated. Confirmation of the vertical light spill into premises should be shown. The light spill should be referenced against GN01 ILP 2021 for the appropriate E-zone.



### 3.4.5 Luminance Calculations

For specific building façade illumination only, designs should include luminance values in either tabular or contour form. The luminance should be referenced against the GN01 ILP 2021 for the appropriate E-zone. Lights mounted on walls that illuminate the ground should not need to provide this information. **Average illuminance  $L_m$**  for the building area should be highlighted.





### 3.4.6 Luminaire schedule

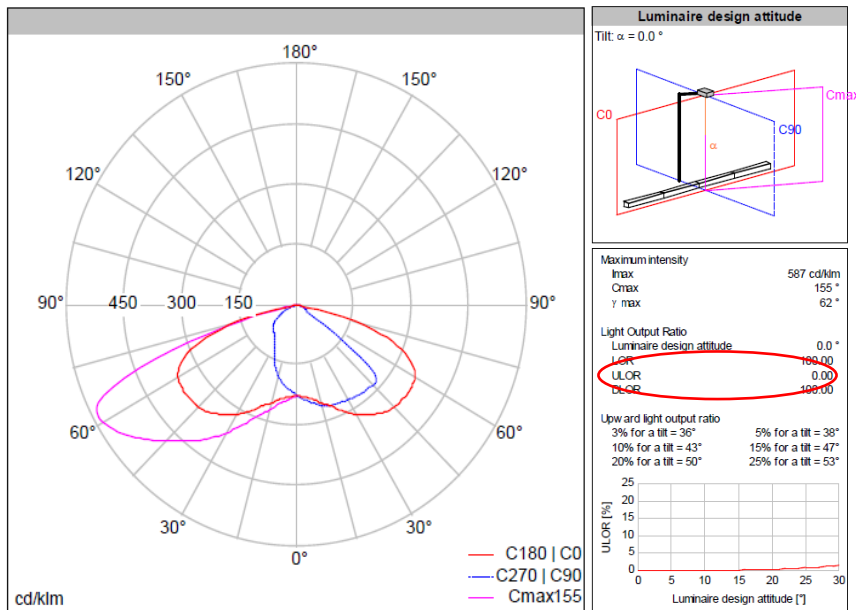
Details of all luminaires should be provided. This should include details on upward light, lumen output and colour temperature *after installation*. Where possible Isometric polar plots (that indicate upward light) should also be provided and highlighted. Images of the luminaires are extremely useful and should be included.



### Urba

96671785 UA 12L35-740 NR CL1 T60E ANT

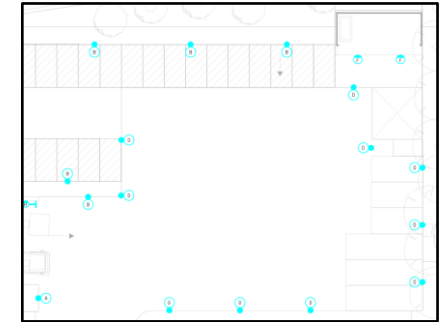
### THORN



Credit Thorn Lighting

### 3.4.7 Luminaire Layout

The position and installation details of the luminaires (tilt angle) should be provided, preferably in plan or elevation form. Tabular X-Y coordinate representation should not be included. Different types of luminaires should be indicated.



### 3.4.8 Colour renditions.

3D renditions should only need be provided where proposals are complex, have a number of different illuminance standards and task areas. They are useful in showing the overall lighting character particularly within an overall nighttime landscape internal spill.



## 4 LIGHTING ADVICE GUIDES

### 4.1 Reducing Light Pollution

In order to seek to further the conservation and enhancement of the dark skies in the CNL, light pollution requires both control of new installations and improving existing lighting. Much of the information in this technical guidance contains relevant advice on how to achieve this with any lighting. Using ROLAN and the five basic principles of good lighting, owners should be able to assess their own existing lighting and determine on positive steps to reduce pollution.

While voluntary actions are encouraged there may be opportunities with new installations submitted to the planning system that can achieve further enhancement - assessing all the lighting associated within the development proposals, both existing and planned will help indicate where further gains could be made to reduce the overall footprint.

Sometimes simple actions such as tilting lights downward can make a significant difference. There will be however, instances where additional commitments are made both in terms of planning and cost. The aim with any lighting installation is to achieve full compliance in all relevant technical elements.

#### 4.1.1 Public Lighting Improvements

One of the key determinants of sky quality is the influence of street lighting. The use of LEDs provided clear advantages over older sodium streetlights in terms of light efficiency, control and upward light, but early variations of LED's had high levels of whiter light which exacerbated sky glow. While newer LED variants now provide much better colour temperatures without sacrificing other lighting metrics, not all lighting authorities have been able to capitalise on the most modern improvements. To reduce the impact of public street lighting, the following is recommended.

- Adopt and switch to a maximum of 3000K LEDs to reduce sky glow

- Where conditions allow, use lower colour temperatures of 2700K and 2200K to further reduce sky glow
- Seek to use LED's that have colour spectra that minimise the blue wavelengths below 500nm
- Adopt dimming regimes that alter the level of illuminance according to the level of business throughout the night
- Adopt part-night lighting regimes to remove the influence of pollution during the quietest and darkest times of the night
- Promote the use of shields where light is straying into domestic windows

#### 4.1.2 Commercial and Private Lighting

While public lighting is a clear determinant of sky quality, recent evidence<sup>13</sup> shows that a substantial component of light pollution is not caused by street lighting (as many authorities have switched to modern LED's) but by commercial properties. This is largely due to the availability and versatility of LED lights that can be used in many applications. LED's now help to transform public spaces, reduce crime and change the perceptions within urban settlements, but their low cost and installation possibilities have greatly increased their contribution to sky glow. While some lighting developments will require planning, there are nevertheless, opportunities to voluntarily reduce light pollution which will also provide benefits in terms of cost, carbon emissions, wildlife impacts and health issues. The advice in this guidance should help you reduce your private lighting footprint.

#### 4.1.3 Voluntary Improvements

You can make positive changes by looking at your lights and checking against the best practice advice in this guidance. You should

- Decide if the lights are useful and remove or turn off (timers and sensors) those that are not
- Tilt existing lights down to where the light is needed or upgrade to lights with no upward light
- Avoid excessive decorative lighting where it serves little purpose

<sup>13</sup> Allan Howard. 'Not Guilty M'Lud'. Lighting Journal March 2023.

- Use warmer colour temperatures with a maximum of 3000K
- For commercial lights, turn off lights at close of business

Some modern luminaire types may not be appropriate for the character of buildings and homes within the CNL – a heritage ‘coach’ lantern may be more appropriate despite some upward light. In these cases, using a 500-lumen lamp should be sufficient.

#### 4.1.3.1 Planning process – Existing lighting

Lighting development proposals can also reduce pollution by including an assessment of existing lighting within an application. While there may be financial or logistical reasons that may prevent reductions within the entire site, proposals should provide details of existing lighting and look to offset any new additional impacts by improvements lighting already in use.

#### 4.1.3.2 Building use

Evidence<sup>14</sup> shows that the internal light spill from office buildings after close of business hours contributes to sky glow. While there are a number of underlying reasons why office lights are left on (e.g. insurance, late night working), there are nevertheless gains to be made by reducing the internal lighting environment at night. While this is more an issue for cities with high rises, there are urban settlements and commercial business areas within and around the CNL with offices that should be encouraged to turn internal lights off at close of business, protect the sky and make energy and cost savings.

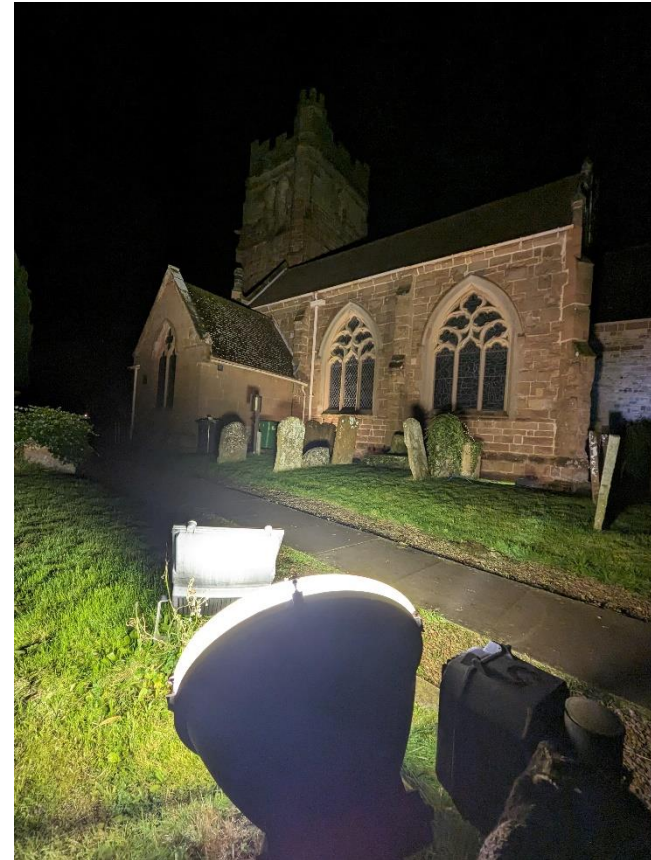


Figure 13 - How not to illuminate. Inappropriate luminaires used to illuminate a heritage asset (not in the CNL). Credit Dan Oakley

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<sup>14</sup> Oba et al (2005): [Sky glow caused by the spill light from office buildings](#): Journal of Light & Visual Environment 29(1): 19-24

## 4.2 Minor and Domestic Lighting Developments

The following section provides advice for domestic residences which will typically include:






- Minor and Domestic Lights
- Internal light spill through glazing.

The technical requirements for domestic lighting are quite simple and follow the 5 main principles. The key environment E zone criteria can be met provided domestic lights are:

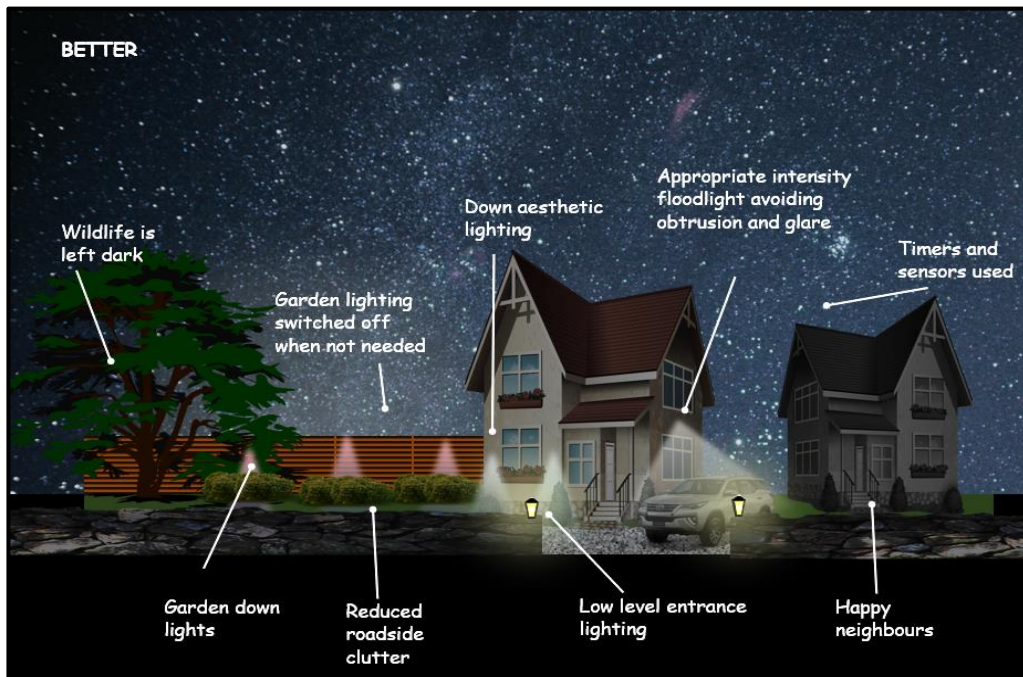
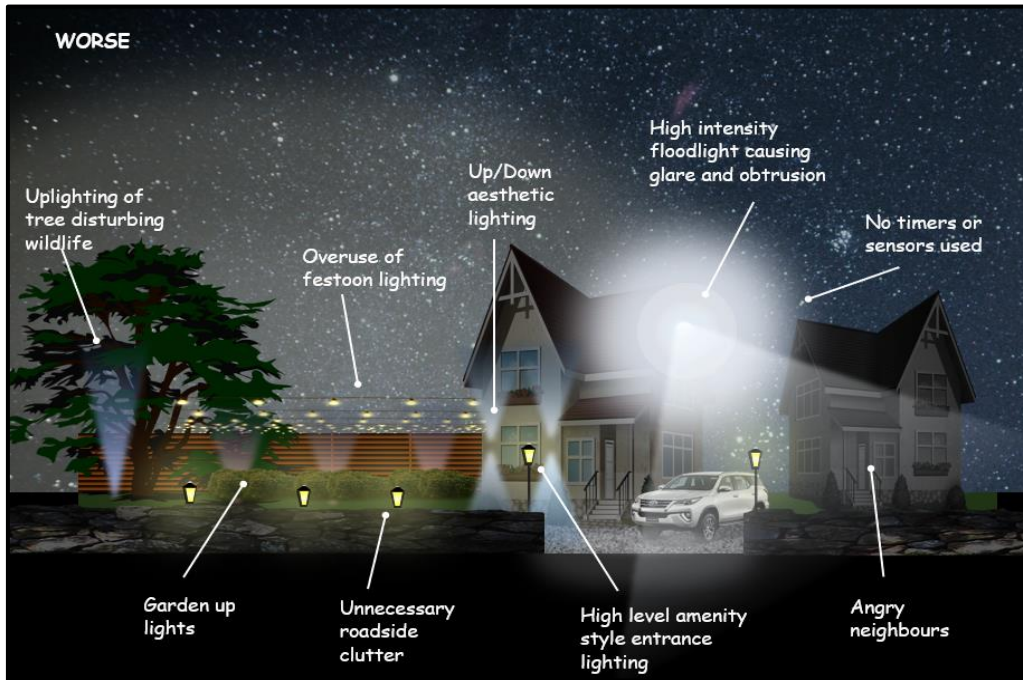
- Around 500 lumens or less (~5W LED), with 3000K or less
- Fully shielded above 500 lumens
- No greater than 1500 lumens
- Fitted with proximity sensors and/or timers.
- Pointed where it is needed and not beyond the property.



Figure 14 – Five lighting principles -postcard from UK Dark Sky Partnership

<b>NEEDED</b>	
	<input type="checkbox"/> Is the lighting needed and justified? <input type="checkbox"/> Has unnecessary decorative lighting been avoided?
<b>TARGETED</b>	
	<input type="checkbox"/> Are lights pointing to where they are needed? <input type="checkbox"/> Are any lights above 500 lumens fully shielded? <input type="checkbox"/> Is illumination beyond the property avoided?
<b>LOW LIGHT</b>	
	<input type="checkbox"/> Lights with 500 lumens (~5W LED) used? <input type="checkbox"/> Are lights above 1500 lumens avoided? <input type="checkbox"/> Are the fixings installed at the lowest possible height?
<b>COLOUR</b>	
	<input type="checkbox"/> Do the lights use 3000K (Warm white) and lower?
<b>CONTROLLED</b>	
	<input type="checkbox"/> Do the lights use PIR sensors or controlled timers? <input type="checkbox"/> Are dusk-till-dawn lights avoided?





## Key Considerations

### 4.2.1 Nuisance to neighbours

Badly installed lighting can annoy your neighbours. To avoid this, purchase lights under 1000 lumens, ideally 500, point them downwards and away from other properties, and use proximity sensors to turn off when not needed. Install them at the lowest practical height to reduce nuisance. If your light is too powerful and proven to be disruptive you may risk breaching environmental nuisance laws.

### 4.2.2 Over lighting in domestic luminaires

While it is tempting to get the best value, many domestic options are over bright and too powerful for most domestic uses. You do not need more than 1500 lumens and 500-1000 will be sufficient for most domestic uses. Residential streetlights operate at their lowest setting ~ 3000 lumens at a height of 5m, so bear this in mind when you install lights.

Overbright and badly directed light can also be a hazard to oncoming drivers as the glare could be dangerous. If you need more light to illuminate an area, it is better to use more lower powered lights rather than one over-bright luminaire. Use the guidance in section 5.2 to select the right power.

### 4.2.3 Aesthetic lights

While it is accepted that exterior lights do change the look and feel of a building or garden, it is important to do this with the 'less-is-more' adage in mind. Mood lighting has a better impact when it can be clearly perceived and appreciated and not lost in unnecessary clutter.

### 4.2.4 Garden Wildlife

Up lighting of trees should be avoided to benefit wildlife, especially with lights over 500 lumens. However, using red colours will also help as it disrupts wildlife less. Ensure to turn off lights when not needed.

### 4.2.5 Colour temperature

Lights should be 3000K and less to prevent nuisance to wildlife

## Luminaire Advice for homeowners

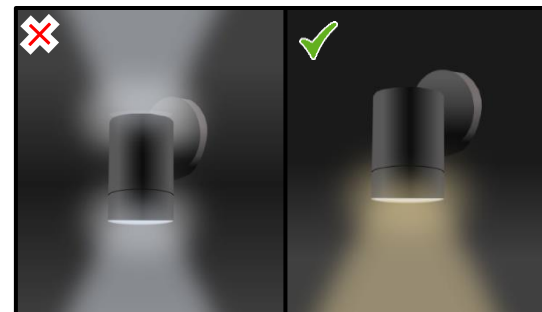
### Coach or Heritage Style



Avoid Coach Lanterns with hanging cool white lamps of high (more than 500 lumens). Use Coach lanterns of less than 500 lumens with a warm white LED in the top as this reduces upward light.

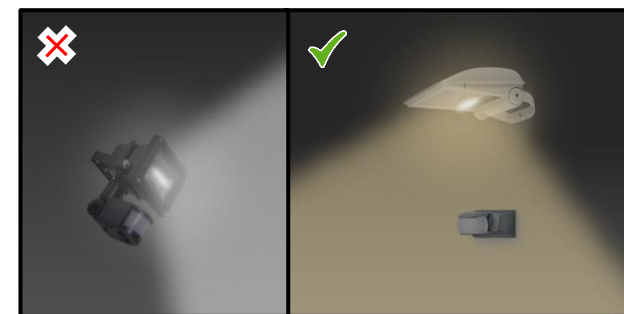
These can be difficult to find so ensure a light of less than 500 lumens or choose an alternative historical design.

### Up Down Luminaires



Avoid up-down wall lights as they are designed to generate upward light. Use down wall-lighters instead. Buildings will still retain an aesthetic quality with a down lighter.

### Halogen Luminaires and PIR Sensors

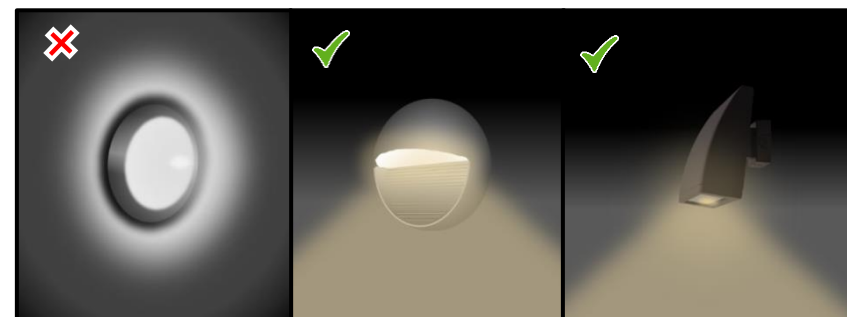


Avoid bright halogen security lights with a fixed PIR sensor, as they cannot be tilted sufficiently and detect movement. Use tiltable lights with separate PIR Sensor so you can

position the triggering point and tilt the luminaire properly. Appropriate power LEDs are good for this.

### Walkways and bulkheads

Avoid circular or other "window" shaped bulkhead lights that emit light upward. Use bulkhead lights that direct light downwards or have shielding. Try and ensure that emergency luminaires on batteries follow these principles.





### 4.3 Internal Light Spill

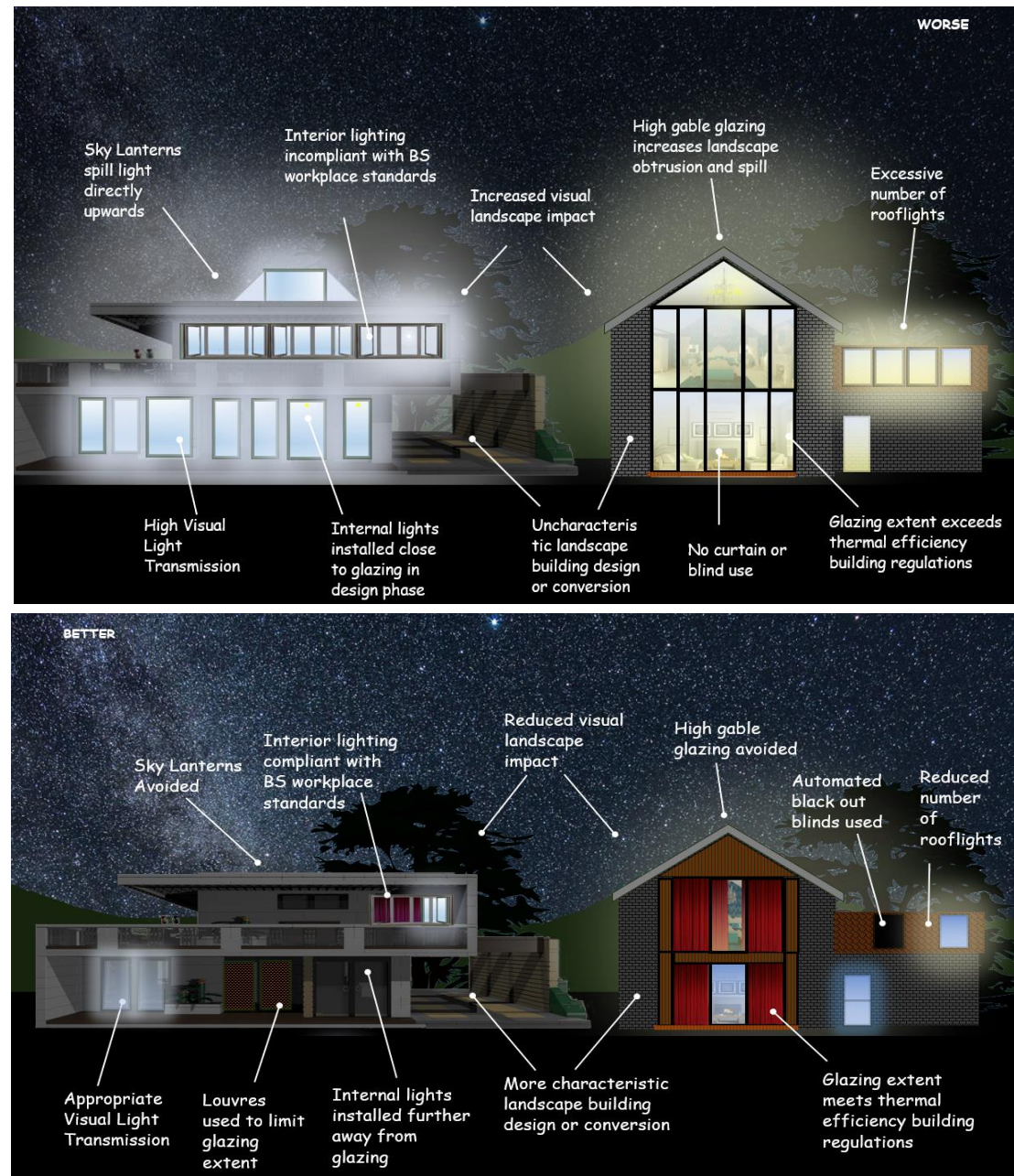
Internal light spill through domestic glazing can have a greater impact on the landscape than external lighting. If glazing is excessive, of poor quality or points upwards such as rooflights, internal light can present obtrusive light sources that reduce dark skies and disrupt the continuity of the landscape.

Generally, the loss of overhead sky quality is not as severe as it can be for external lighting, but as the extent of the light occupies a greater area than that of a single lamp it does have greater potential to disrupt the quality of the landscape. However, it is within the control of residents to remove all light spill with proper controls and behaviour.

Glazing on commercial and business properties will also have a similar impact which can be more pronounced in rural areas. Internal spill should be controlled by design and by additional behaviours - such as turning lights off at close of business and encouraging closing blinds/curtains.

Due to the difficulties of control with internal light spill, proposals should look to follow the following general design principles, in order of priority.

- Avoid excessive glazing on elevations
- Avoid the need for roof lights
- Use appropriate visible light transmission
- Mitigate with internal control systems



## Key Considerations

### 4.3.1 Excessive Glazing – Landscape Impact and character Design

Large continuous areas of glazing can cause obtrusive landscape impacts, particularly when glazing begins to exceed 50% of a single elevation normally fitted with multiple windows. Linear extents with high levels of internal lighting can be highly visible within a landscape. The design of modern glazing systems can also be inconsistent with typical building landscape character which produces uncharacteristic impacts in a dark landscape.

Consideration should be given to reducing this impact by adopting a more characteristic design process and reducing the extent. When glazing exceeds <50% on a single elevation, large single elevations or multi-floor to eaves glazing/cart shed openings or single elevations should be avoided without some form of mitigation.

### 4.3.2 Excessive Glazing – Thermal Issues

Large extents of glazing that let in a large amount of solar radiation can cause houses to overheat. Building regulations require that glazing should not exceed 25% of the floor area to meet energy efficiency building regulations (which does depend on thermal properties of the glass). [See Building Regulations Part L1](#).

This can be avoided by reducing the glazing extent or using external shielding/blinds to reduce the solar input. Modern glazing is improving thermal regulation, but limits to the glazing should be considered.

### 4.3.3 Visible Light Transmission (VLT)

Visible Light Transmission is the amount of light that passes through glazing. The VLT level can be selected to reduce the amount of internal spill. For domestic glazing, a VLT of ~0.65 +/- 0.05 is preferred with 0.5 for roof lights. These values are within the standard purchasing options for these glazing types.

### 4.3.4 Black out blinds/Louvres

The use of automated black out blinds can considerably reduce the amount of internal light spill from roof lights and should be the last mitigation after other design considerations are met. Some manufacturers of rooflights produce smart systems that trigger on the onset of darkness and can be controlled on mobile devices. Ensure that the fabric completely eliminates all internal spill.

Exterior louvres can also be used and may be a preferred option for walled glazing rather than rooflights.



Figure 15 - The visual impact of internal light spill (imaged brightened for printing). Credit Dan Oakley



## 4.4 Housing Developments

New housing developments proposed in the rural villages of the Cotswolds National Landscape have the potential to create light pollution and adversely affect dark skies in a number of ways including light spill from the dwellings themselves but also from street lighting and any amenity lighting.

### 4.4.1 Location of development and layout

Light pollution should be considered at the site allocation stage or within a development suitability assessment. Highly visual exposed sites such as those on higher elevations or in close proximity to ecologically sensitive areas or heritage assets should be avoided.

Layouts should seek to minimise adverse lighting impacts by the appropriate orientation of streetlights, buildings and road junctions to protect wildlife-rich sites and urbanisation on rural settlement edges.

### 4.4.2 Street Lighting & Amenity lighting

While Highways Authorities have a duty of care to the road user, there is no statutory requirement on UK local authorities to provide public lighting. The Highways Act 1980 empowers a highway authority to provide lighting for any highway or proposed highway for which they are, or will be, the highway authority.

Uncharacteristic streetlighting should not be considered as required in all cases and should be avoided where possible. New developments that require street lighting of roads should ensure that the relevant Highways Authority design guidance and policies are referenced (see section 2.8.12).

If a development requires street lighting which is to be adopted by the local Highways Authority, the potential for lights to be controlled by dimming or part night schemes should be explored. This is particularly important with lighting in dark areas or on the edge of urban settlements that point to dark zones.

To avoid over lighting, calculated average levels of illuminance should not exceed ~25% tolerance of the recommended levels.



#### NEEDED

- Is the lighting needed and justified?
- Has unnecessary decorative lighting been avoided?
- Are the developments located away from dark sky sensitive areas, e.g. ancient woodland wildlife-rich sites and heritage?



#### TARGETED

- Are lights pointing where they are needed?
- Are any lights above 500 lumens fully shielded?
- Is illumination beyond the property avoided?



#### LOW LIGHT

- Are Lights with 500 lumens (~5W LED) used?
- Are domestic lights above 1500 lumens avoided?
- Are the fixings installed at the lowest possible height?
- Are illuminance standards for good lighting referenced and within ~25% of recommended levels?
- Does the development avoid unacceptable landscape impacts?
- Are adaptive illuminance levels appropriate?



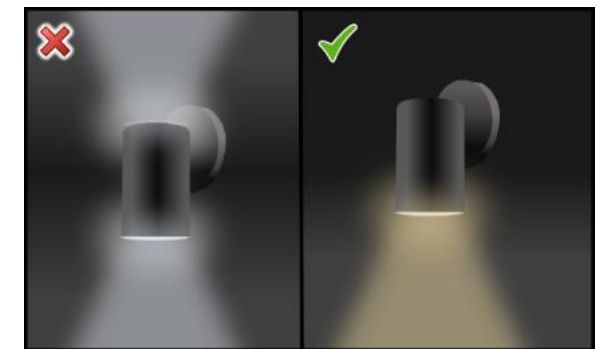
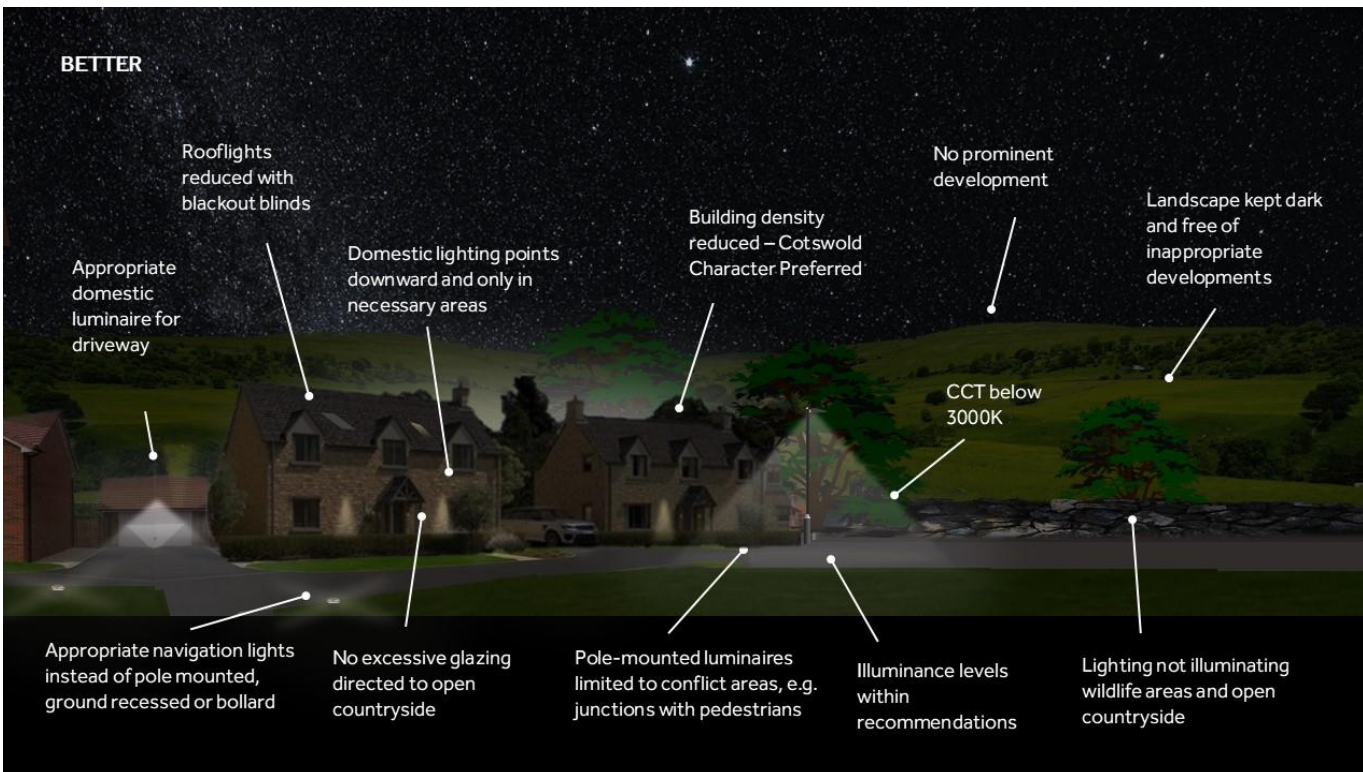
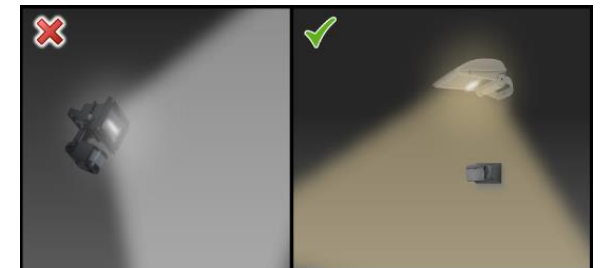
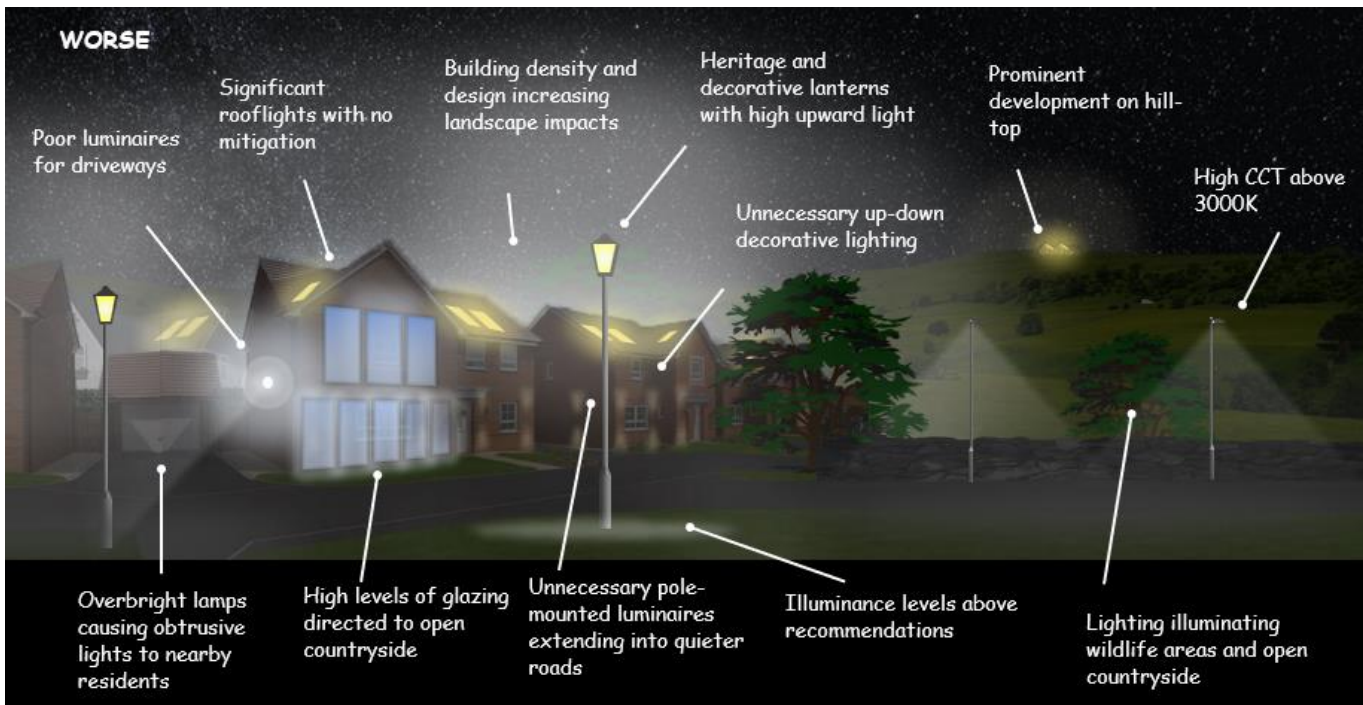
#### COLOUR

- Do the lights use 2700K (Warm white), max 3000K?



#### CONTROLLED

- Do the lights use PIR sensors or controlled timers?
- Is part night lighting or dimming used?



## Key Considerations

### 4.4.3 Size and layout

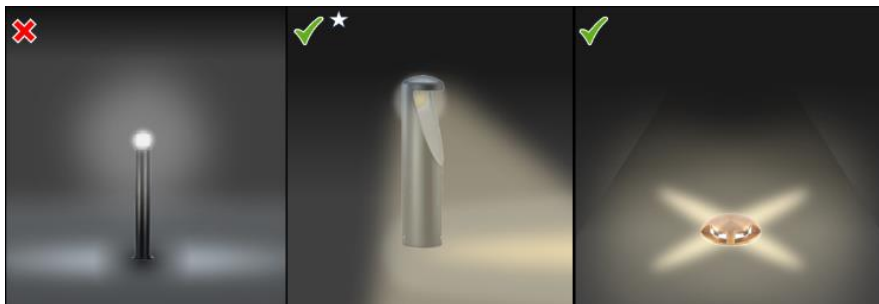
The larger the site, the higher level of light pollution will be produced. More dwellings will require more domestic lights, internal sources and more roads potentially requiring more streetlights. Larger developments may also generate 'conflict areas where pedestrians and faster moving traffic share similar spaces – these 'areas often require column mounted streetlights.

To avoid these issues, the size, orientation and layout of the developments should be carefully considered at the very earliest stages of allocation and design to ensure that the need for higher levels of lighting and their prominence is avoided.

### 4.4.4 Column mounted luminaires

The use of streetlighting should not be required in all cases and avoided where possible. Where possible, column mounted street light luminaires should be avoided with a preference for lower lumen and low height luminaires such as bollards or ground recessed fixtures. Streetlights on high columns will be more noticeable in the landscape and will be producing higher levels of luminous flux anywhere from 3000 to 10,000 lumens for most residential purposes.

Lower height luminaires such as bollards and ground recessed lamps offer alternatives to areas where navigation is more important than luminous surfaces. However, the use of these types of luminaires must be carefully weighed against the need for required illuminance levels in key areas,



maintenance, possibility of damage and specific impacts on Bats (see [GN08/23](#))

### 4.4.5 Dwelling Character and glazing

The choice of modern style buildings and architectural fashions can produce dwellings with higher levels of glazed surfaces. While rooflights can be managed through extent and automated black out blinds, it is preferable that new traditional style development proposals reflect the local Cotswold building character that traditionally adopts lower levels of glazed surfaces.

### 4.4.6 Adaptive Dimming and part night lighting

Dimming or part night lighting schemes should be considered in any size housing development. Analysis of expected traffic volumes should inform the use of reduced illuminance levels throughout the night. For example, where traffic levels allow, illuminance could be lowered from 20 to 10 lux during hours of limited use. This is particularly relevant to brighter lit conflict areas that may benefit from reduced illuminance in low traffic times. PIR sensors are an additional option to use and ensure lights are only on – or made brighter – when needed.

In some circumstances part night lighting may also be explored as an option. This is not just beneficial to light pollution but will also reduce energy costs.

### 4.4.7 Colour Temperature

A colour temperature of 2700K is preferred for streetlights, with a 3000K maximum. This is achievable with many LED amenity lighting options and often will meet CRI requirements without having to increase column numbers or raising energy levels significantly.

### 4.4.8 County Council Street Lighting Adoption

Designs that are to be adopted by the lighting authority should ensure that they meet the requirements of the authority guides.

#### 4.5 Commercial – including Farms

Lighting installations associated with commercial and industrial buildings and activities in the Cotswold National Landscape generally comprise those associated with farm buildings and farm complexes, rural business parks, utilities and waste infrastructure, schools and carparks, and rural leisure operations such as golf courses and equestrian facilities.

While the size and scale of commercial properties varies, in all cases, general best practice lighting principles apply (see images below) with regard to the need for light, and what type, and appropriate locations for developments that require lighting (such as avoiding ridge-top locations, or particularly wildlife sensitive locations such as near ancient woodland).

Commercial lighting can include many development types, farms, shops, hotels, pubs, offices, theatres and communal buildings like village halls, Doctor's surgeries. It also includes illuminated adverts. Typical lighting needs vary but will likely need to provide illuminance for doorways, car parks, pathways and advertisements which sometimes can be achieved with minor lights. Some commercial uses will depend on the 'night economy', such as pubs, that will want to use architectural and aesthetic lighting to create welcoming spaces.

The decision to use a lighting designer is the responsibility of the owner. Premises that are using single or a low number of minor domestic style luminaires may benefit from following the advice in the domestic section. However, premises that have more defined public and amenity areas, such as walk-ways, car parks or trip hazards that will require brighter or more luminaires and compliance with illumination standards should consult a lighting designer.

Farms have some permitted developments rights for lighting on existing buildings, which means that luminaires could be installed that have very little consideration for design. Due to their rural location, the contrast between a dark landscape and lighting means that the visual impact can appear relatively higher than urban settings. Principles of good lighting should be followed to avoid landscape impacts.



#### NEEDED

- Is the lighting needed and justified?
- Has decorative lighting been minimised?
- Is an Environmental Impact Assessment for nearby wildlife, heritage or residences required?



#### TARGETED

- Do lights point downward and where they are needed?
- Are any lights above 500 lumens fully shielded?
- Is illumination beyond the property avoided?
- Are asymmetrical lights used for floodlighting?
- Have obtrusive lights to nearby premises been calculated?



#### LOW LIGHT

- Are minor lights with 500 lumens (~5W LED) used?
- Are the fixings installed at the lowest possible height?
- Are Illuminance standards for good lighting referenced and within ~25% of recommended levels?
- Does the development avoid unacceptable landscape impacts?
- Do any illuminated signs follow regulations?



#### COLOUR

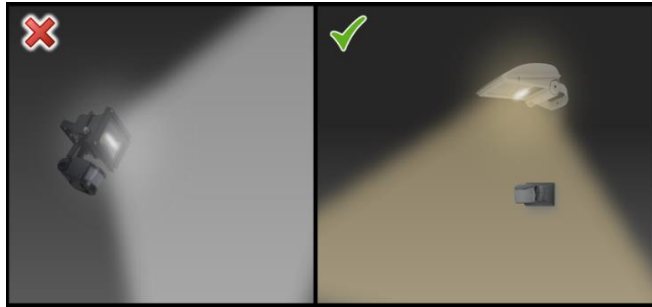
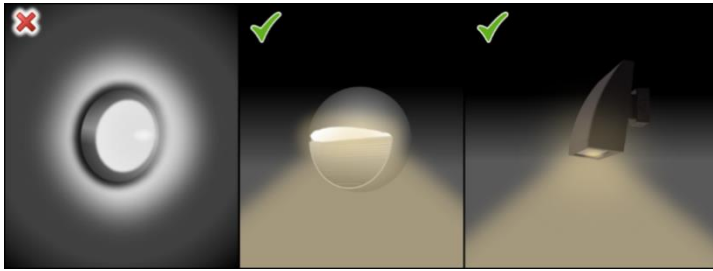
- Do the functional lights use 3000K (Warm white) and lower?



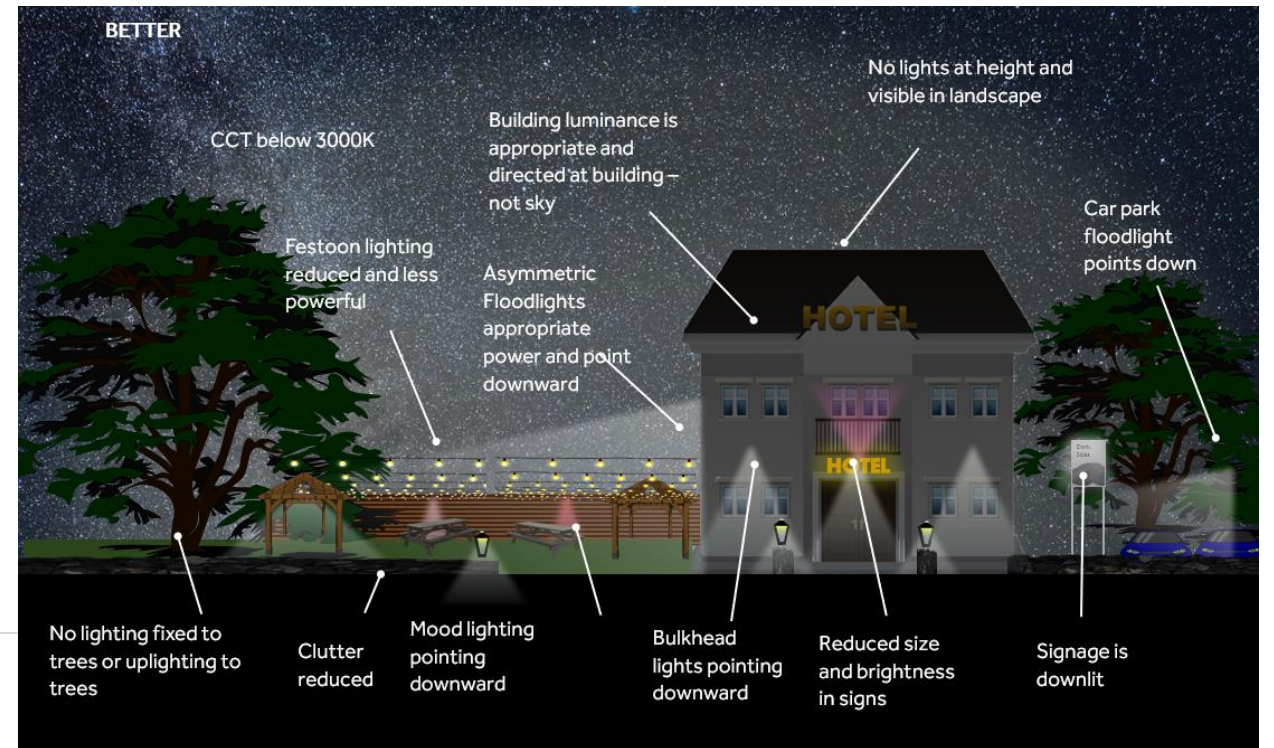
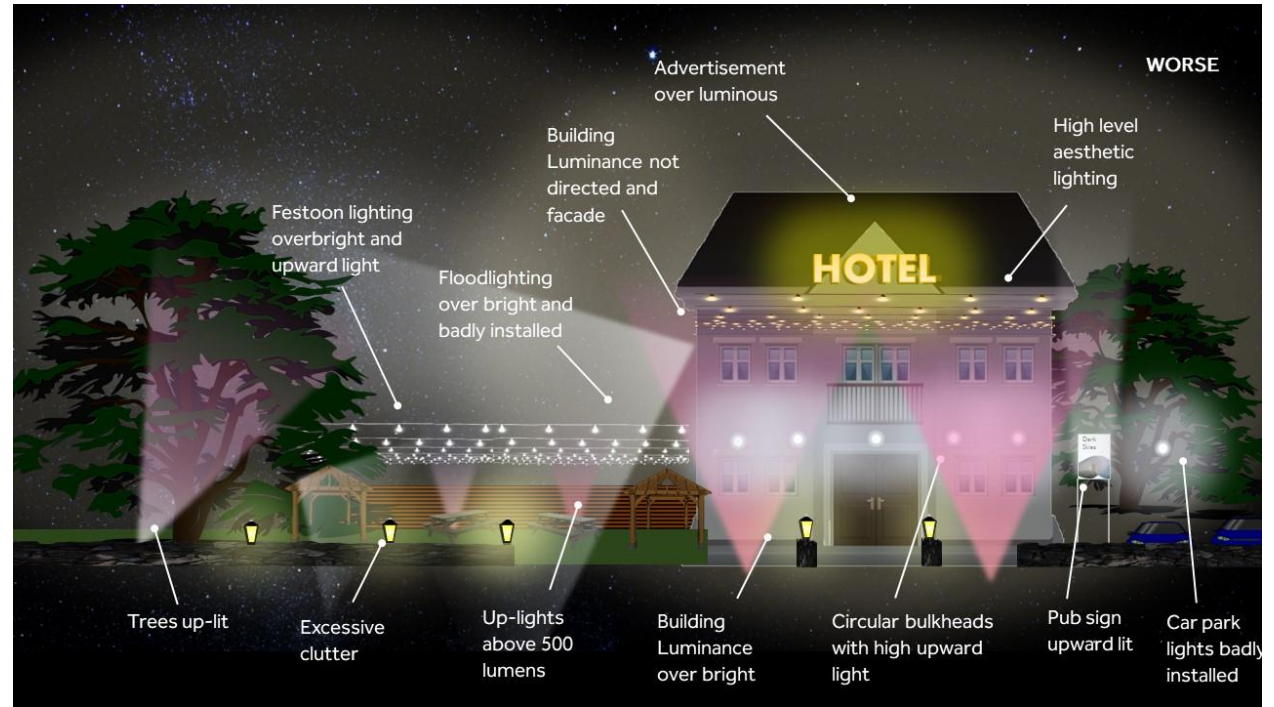
#### CONTROLLED

- Do the lights use PIR sensors or controlled timers?
- Are lights off at close of business?

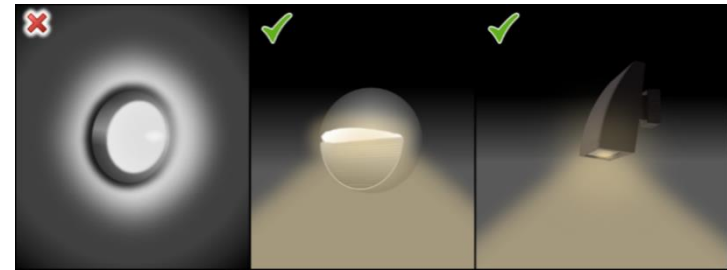
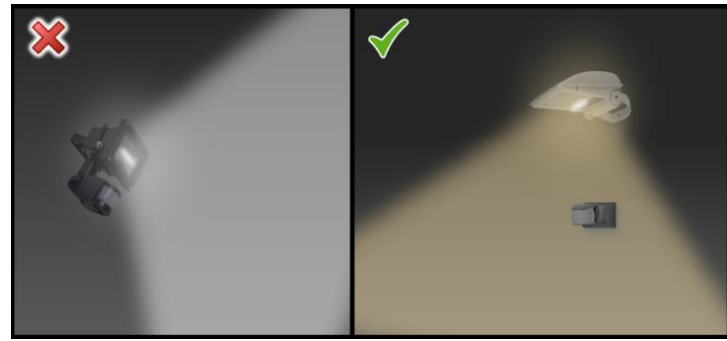
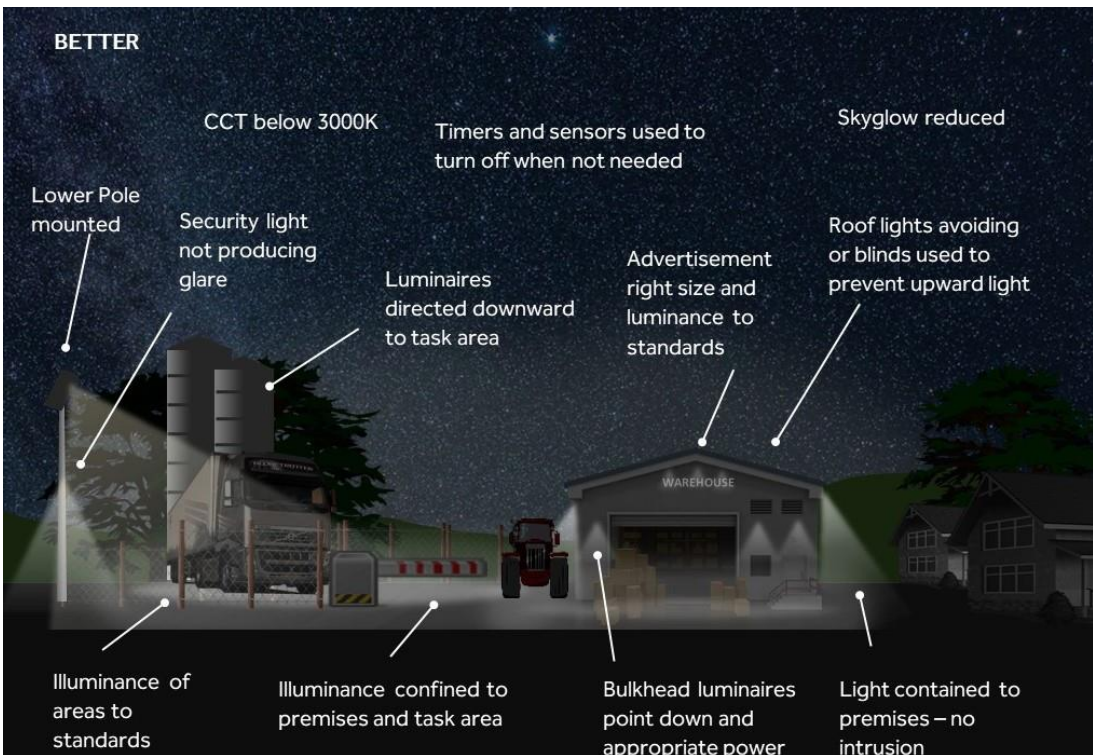
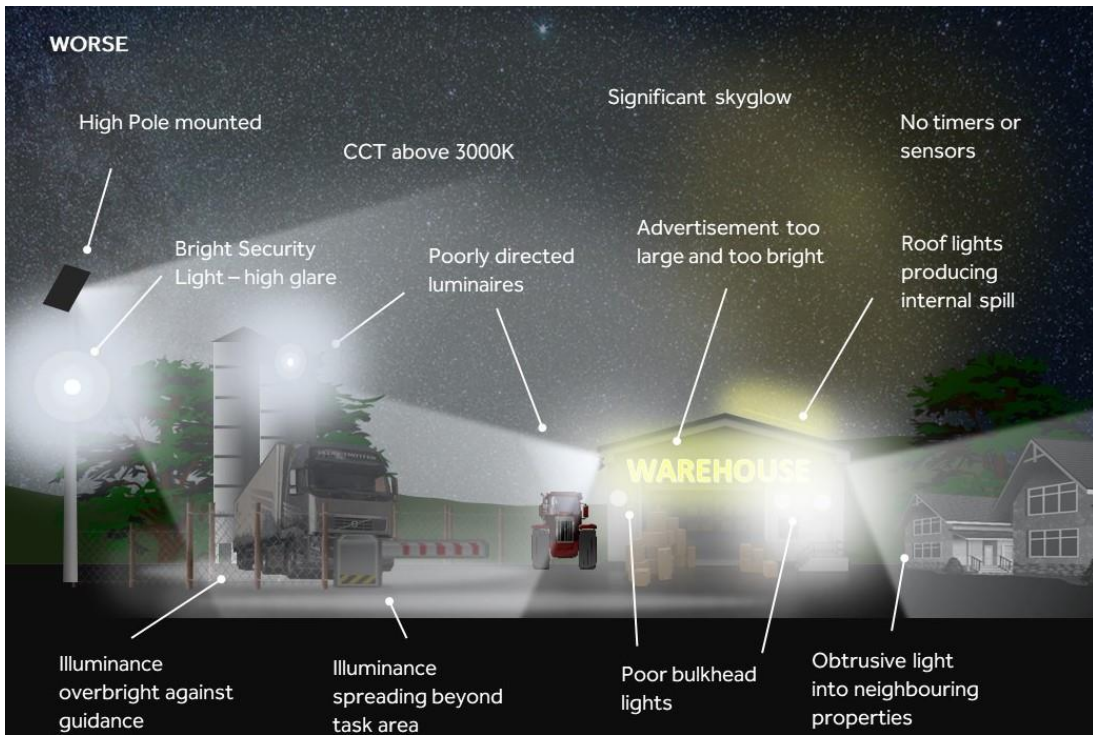




- Spherical bulkhead lights should be avoided. Stand-alone emergency lighting with zero upward light can be difficult to source due to the positioning of the battery pack. If possible - separate emergency power circuits should be considered fitted with eyelets.
- Overbright floodlights with poor optical control, built in PIR sensors and high CCT should be avoided. Lower power, asymmetrical flood lights with lower CCT should be used.
- Built in PIR sensors often obstruct the positioning of floodlights. A separate PIR sensor should be fitted in a position that best suits the movement of people to limit being triggered by wildlife.
- Illuminated adverts should use ILP PLG05 to determine luminance and should be less than 100 candela / m<sup>2</sup> (nits)
- Consider any nearby Heritage assets that may be impacted by lighting







## Key Considerations

### 4.5.1 Car Parking, roads and paths

Car parks have different illuminance needs for different levels of use and locations. If lighting is justified, small, quiet car parks in rural areas should have a recommended maintained average of 10 lux with larger urban car parks receiving 15 lux preferably using bollard lighting rather than column mounted luminaires. Proximity sensors should be used.

While there is no statutory requirement to light, for recommended illuminance levels refer to [BS EN 12464-2:2014](#). If road or path lighting is required it should comply with design requirements of road lighting, covered in [BS 5489-1-2020](#): and [BS EN 13201-2](#) – Road Lighting Performance requirements.

See section below for more information on roads and paths.

### 4.5.2 Aesthetic lighting

Architectural and aesthetic lighting choices such as festoon strings and fairy lights are popular with commercial lighting, so it is important that any 'mood' lighting leaves a minimal impact. To do this:

- Avoid up lighting building facades above ILP guidelines.
- Point downwards.
- Turn off at close of business.
- Avoid bright lights that create glare – this could create problems for your visitors.
- Minimise the number of fixtures.
- Mount at the lowest practical height
- Festoon lighting should use low powered lamps, <150 lumens per meter and preferably fitted with shades.



### 4.5.3 Architectural Façade Lighting

The intentional illumination of building facades should be avoided, especially in rural areas where the luminance of buildings can be very prominent in the landscape. Powerful floodlight up lights should not be used, as they are poorly controlled and bright. Modern alternatives such as low powered unobtrusive window lighting, should be considered. The GN01 ILP 2021 guidance note should be used to ensure that building luminance complies with the relevant environmental zone. In E0/E1 zones the luminance should be less than 0.1 cd/m<sup>2</sup>.

### 4.5.4 One single bright light vs more, lower powered

Larger spaces should not be illuminated with one single bright light – usually installed at an inappropriate height. Instead, larger spaces should be lit with more, lower powered lights at lower heights. This will spread light more evenly, reduce glare and reduce visual impact.

### 4.5.5 Internal Light Spill

Black-blinds and curtains should be used for properties with high levels of internal spill and prominent landscape visual impact. Blinds should be programmed to trigger on the onset of astronomical darkness which is approximately one hour after sunset. Retail units with front shop windows should turn off internal lighting on close of business.

#### 4.5.6 Lighting for Security

Security is an important consideration for a rural business. While there is no direct evidence to show that lighting or lack of it has any effect on crime, the document [Secured By Design – Lighting Guide](#) gives general advice for this type of lighting. However, security lighting should be considered carefully and complemented by supplementary systems, e.g., smart alarms. Any lighting should still be of the right brightness, upward light and colour temperature to avoid pollution.

#### 4.5.7 Illuminated adverts

Illuminated adverts can have a significant impact on the character of a landscape. Both internally lit and externally lit adverts should be subject to design to avoid these impacts. They are subject to control under advert regulations under [The Town and Country Planning \(Control of Advertisements\) \(England\) Regulations 2007 \(legislation.gov.uk\)](#).

Further guidance from the ILP should be followed that restricts the luminance levels. This is generally consistent with DarkSky International guidelines that require that illuminated signs do not exceed **100 candela m<sup>-2</sup>**. Signs should be turned off at close of business or within an acceptable time frame.

While branding limitations may require use of multiple colours, the use of single colour on darker backgrounds is preferred.

#### 4.5.8 Heritage Assets

Any commercial lighting should consider the impact on any heritage assets in the area. Lighting installations should avoid any harm to these places where there is the potential to adversely impact their character. [The Setting of Historic Assets](#) provides some good practice advice.

#### 4.5.9 Other Considerations

Businesses may also require lighting for car parks, roads, advertisements, small business premises or sports (menage) lighting. Other good and bad practices chapters should be referenced when considering these lighting schemes. Likely references will include small commercial lighting, parking and roads/paths.

#### Additional Considerations for Farms

As a farm is a place of business owners must be careful to illuminate different areas of the farm properly. According to HSE Lighting at work [HSG38](#) and British Standards [BS EN 12464-2 2014](#) *Light and Lighting of workplaces*, farmyards have two general areas of varying illuminance;

- **Farmyards:** with moving vehicle, machines and people – require 20 lux average
- **Equipment sheds and Animal sorting pens:** with movement in hazardous area – require 50 lux average.

Although this level of illuminance is above the 10 lux threshold for what can be considered inappropriate development, it is important to note that farming is an appropriate commercial development in the landscape and should be given some additional visual impact tolerance than other commercial types. Agriculture also has some permitted development permission that include lighting – as such a planning application may not be necessary unless there is a material change. However, it is important to ensure that farmyards and places requiring 20 lux do this with minimal impact to the landscape.

Other lighting criteria such as uniformity, glare and CRI values are also recommended in [BS EN 12464-2: 2014](#). This document provides some LED power purchasing recommendations for achieving different illuminance levels for simple applications where larger, complex and more hazardous areas may need a lighting designer.

#### 4.5.10 Wildlife in the Open Countryside

The rural location of businesses means that they will be surrounded by wildlife and darkness where even the smallest lights can be more visually obtrusive than urban settings. As a growing amount of evidence is showing, light pollution disrupts wildlife just as much – perhaps even more – than people. Migration routes, circadian rhythm, pollination and even agricultural efficiency can be affected by light pollution. As such it is important that lights do not unnecessarily illuminate or shine into wildlife areas, waterways and the open countryside. The use of asymmetric luminaires that reduce spill and appropriate illuminance are essential.



#### 4.5.11 Ecological and Landscape Impact Assessment

Due to the location of farms in the rural landscape, an ecological and landscape impact assessment such as the [Institution of Lighting Professionals Guidance on undertaking environmental lighting impact assessments](#), should be taken for lighting designer led larger installations that present potential for harm. The assessment should be proportionate to the scale of the development and cover appropriate sections of guidance.

The contrast between light and dark, particularly in more remote rural farms, means that the impact of lighting is magnified compared with other higher ambient lighting areas. For more remote farms away from lit settlements, consideration to the wider environment should be made and should include an assessment of the impact through ecological receptors and the view from the surrounding landscape. More consideration of the illumination levels, hours of use and intensity should be considered. Impact assessments should make reference to the EIA regulations within the [Town and Country Planning EIA regulations 2017](#).

#### 4.5.12 Farmyard Floodlighting

Lighting of farmyards is usually achieved with area floodlights. It is important to consider asymmetric luminaires to reduce upward light and ensure glare is not an issue. Badly installed bright lights can cause glare issues where unwanted visitors and workers can become hidden – this is a safety and crime issue. They can also cause significant visual intrusion in a dark landscape which can also be detrimental to wildlife. Areas that are more hazardous or have more conflicted uses with people and machinery should receive greater attention. Floodlights should be installed at the lowest practical height to achieve the illumination.

Use the table in section 5 to purchase the right kind of lights for the approximate needs.

#### 4.5.13 Farm Building Roof Lights and Greenhouses

Greenhouses, open barns, poly tunnels or sheds with large amounts of glazing and roof-lights can introduce significant impacts. While natural light and artificial light is important to operate in all hours, internally installed

luminaires should be lower than roof lights to avoid direct upward light spill. For new buildings and improvements, black out blinds should be considered to activate upon the onset of darkness. This is particularly important for greenhouses as the internal light spill can reduce sky quality for many miles.

Operational open barn elevations may be more difficult to shield due to the need for natural light during the daytime. External louvres can be used in addition to turning off lights at night when they are not needed. Farm animals will benefit from dark skies as well.



*Figure 16 - An example of good farm lighting. Courtesy Mike Hawtin. North York Moors National Park. Note the correct colour temperature, direction, shielding and appropriate levels of illuminance for safe working.*

## 4.6 Sports

Sports lighting has a very high impact in dark sky places and **a lighting designer is needed**. These developments often reduce sky quality and can be seen for miles in the surrounding landscape. This is due to the high illuminance and colour needs to enable users to play safely. The luminaires are often installed at high levels to ensure correct illuminance even with asymmetric lights, which means the lamps can be very bright and visible. As such, the lowest practical mounting height should be used in achieving the designed illuminance.

Different sports require different levels of illuminance and colour depending on the skill level, intensity and ability to see play. Community level sports such as football, tennis and hockey, will require illuminance levels of 300 lux with appropriate uniformity of around 0.7. Lighting requirements can be found in the [Sports England Artificial Lighting Guide 2012](#).

Horse arenas and equestrian menages can have a significant impact on the dark rural landscape. The illuminances needed can range from 100 to 500 lux ([BS EN 12193](#)) 2018 and would be very prominent even if low reflectance material is used. A lighting designer should be used to ensure that luminaires are installed correctly, and suitable curfews used. Luminaires should not be erected 'ad-hoc' on existing structures as they will probably not achieve appropriate illuminances and limit obtrusive light. Using trees as fixing points should also be avoided. Temporary lighting should not be used as the luminaires are general in purpose and will not be appropriate for this type of activity.

Where possible, these installations should be sited in built-up areas where there is already a higher level of ambient sky glow. Every effort should be made to assess the surrounding area for access and provision for that activity, where it may be more appropriate to use. Clubs and societies should consider joint use and memberships to prevent the installation of high-powered lighting in dark areas in the National Landscape.

To avoid over lighting, calculated average levels of illuminance should need exceed 25% (less than 100lux) and 10% (above 100 lux) of the recommended levels .

### NEEDED



- Is the location of the sports ground appropriate?
- Does the site constitute an inappropriate residual impact?
- Is the site located away from dark sky sensitive areas, e.g. ancient woodland, wildlife-rich sites and habitats?

### TARGETED



- Do lights point downward and where they are needed?
- Have asymmetric beam lights been used to constrain light?
- Have obtrusive lights to nearby premises been calculated?

### LOW LIGHT



- Is the design illuminated with appropriate standards within ~% recommended levels?
- Have low reflective surfaces been considered?
- Are the fixings installed at the lowest possible height?

### COLOUR

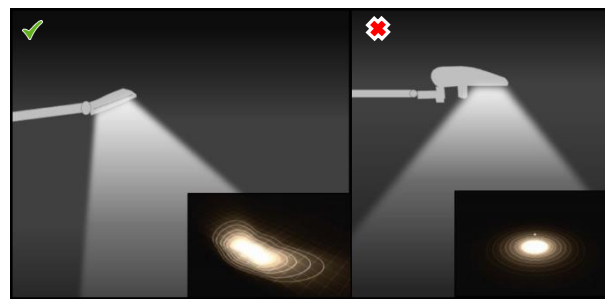
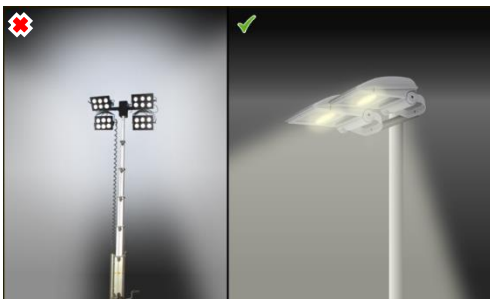
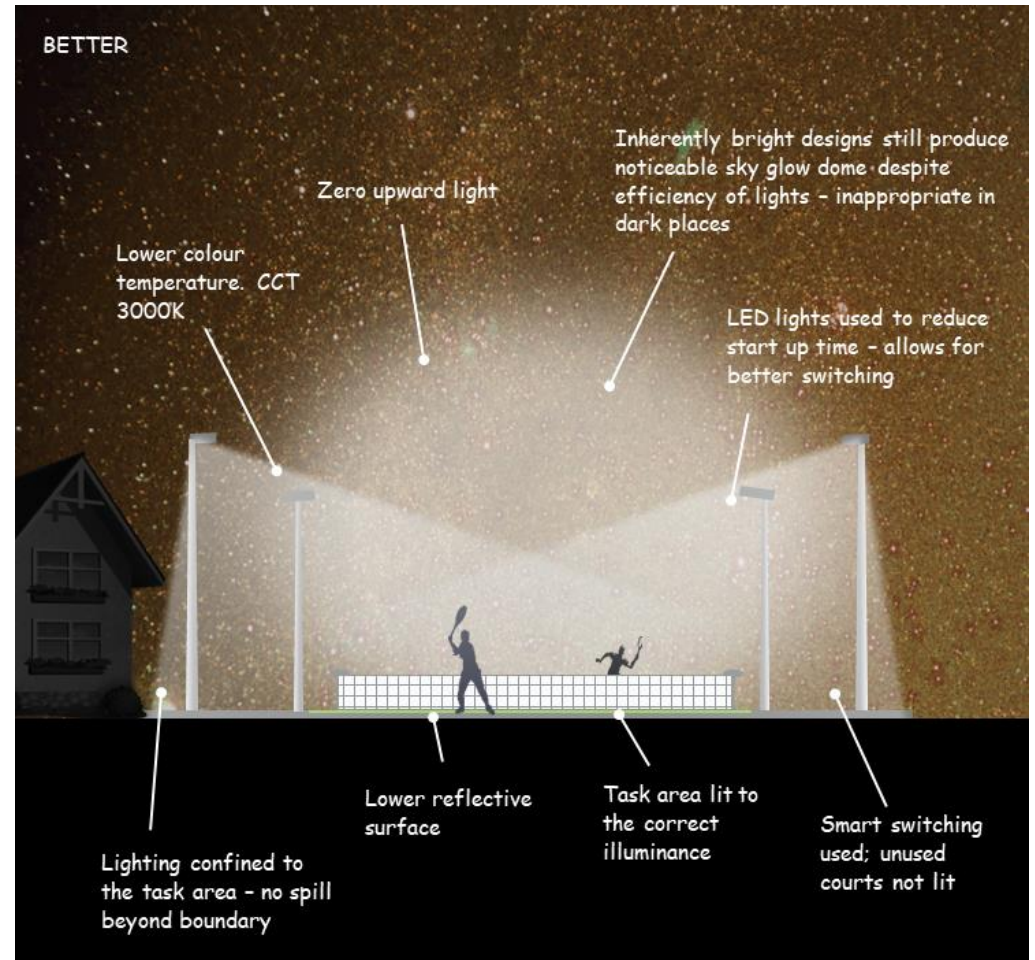
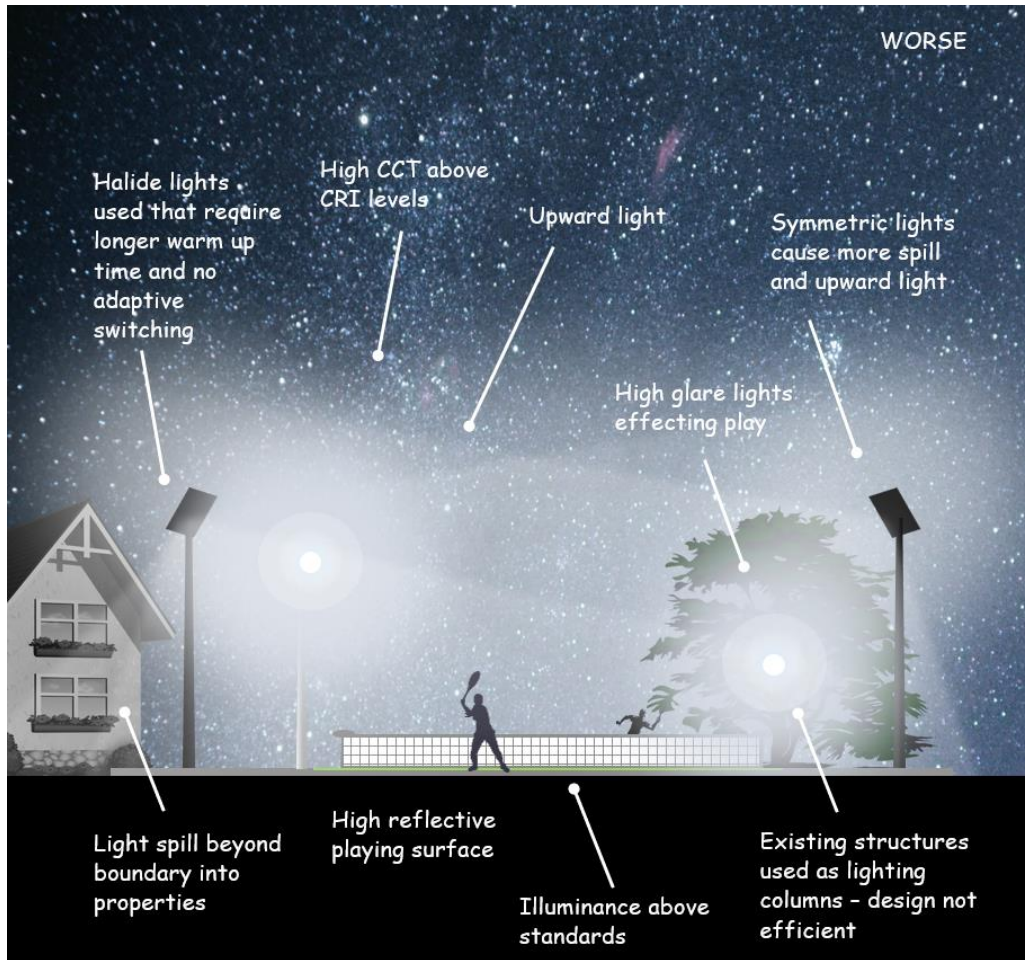


- Do the lights use lowest CCT?
- Is the CRI level appropriate for the level of play?

### CONTROLLED



- Are the hours of use limited and appropriate?
- Can each in-use playing surface be illuminated individually?



- Some sports lighting installations may not be appropriate in some places. Depending on the scale, location, prominence and background ambient levels, sports lighting in open rural areas or on the fringes of urban development may not be appropriate.
- Asymmetric lights have better light control and reduce spill as they direct light more efficiently into the required space.
- Colour temperature is low as possible, ideally <3000K



## Key Considerations

### 4.6.1 Nuisance

Sports lighting near residential areas can cause nuisance due to their intensity and glare. It is important that light obtrusion is avoided. Designs should reference [GN01 ILP \(2021\)](#) 'The reduction of obtrusive light' which recommends maximum levels of intrusion into windows and boundaries.

### 4.6.2 Sky Glow – Asymmetric Sports Lights

High powered symmetric lights can cause significant sky glow, particularly if the main beam points to the middle of the playing surface. Modern asymmetric LEDs should be used to direct light more efficiently without causing upward light. They are designed to be installed flat and at the correct lowest height to reduce intensity and upward light.

### 4.6.3 Colour in Sports Lighting

Sports illuminance needs a high level of colour rendition (CRI) to allow players to sight the play properly and pick a ball out from the background. This means that higher colour temperature LED (5000K+) are often used to achieve higher colour rendition which exacerbates the impact of skyglow as the light penetrates further into the atmosphere. This effect can be avoided. Modern LEDs have much better range of colour rendition with lower colour temperatures which is stated on the product spec. Colour rendition index levels of 60 are normally required for most community levels of play. The spectral range should also be checked to avoid blue colours with higher colour temperature needs, <3000K should be used where CRI allows.

### 4.6.4 Landscape Visual Impact on Special Qualities

Due to the higher levels of illuminance, sports pitches can have a significant impact on the landscape's natural beauty and special qualities even if the design of the lights is compliant with standards. For example, a tennis court may have compliant lighting in terms of illuminance, colour rendition and colour temperature but due to the light presence and illumination of the surface, it may create a significant visual landscape impact. There is very little you can do to mitigate against this and depending on the location, could harm

darker skies. The residual impact could be of such significance that it may present a threat to dark skies and may need to be reconsidered or avoided.

GN01 ILP 21 Table 7 assumes that sports lighting is not expected in E0 and E1 zones. While this may be difficult in practice, every effort should be made to use low reflectance surfaces to reduce the creation of sky glow and the upward flux ratio. The overall landscape impact, including the residual impact will also determine the acceptability of sports lighting in these zones.

In this respect, it is always preferable to site sports lighting in lit settlements where it is accessible and has a much-reduced impact due to the high ambient lighting level. Proposals on the edges of urban areas that influence the open rural setting should ensure that all mitigations have been considered, particularly the careful use of curfews.

### 4.6.5 Over lighting

In order to reduce the possibility of over lighting, the calculated average of the illuminance levels should be within 25% (less than 100 lux) and 10% (above 100 lux) of the recommended lux levels within relevant guidance and standards.

### 4.6.6 Curfew and use

Sports lighting should be subject to appropriate curfews ideally by 10pm or one hour after the end of play. The curfew can be adjusted for later times if the facility is within the centre of urban environment.

If the design of column spacing allows, only pitches in use should be illuminated. Ideally a smart system should be considered to achieve this.

### 4.6.7 Level of Play

The lighting levels recommended will change according to the level of play. Levels of play are usually separated into community and recreation, local competitions with public viewing, and more professional and regional competitive uses. The higher the level of competition, the higher the levels of illuminance and CRI need to be. The correct level of play should be determined to ensure that the appropriate levels of illuminance are used.



## 4.7 Roads

The illumination of residential roads and pathways is generally the responsibility of the Highway Authority, with major roads the responsibility of National Highways. However, the installation of street lighting for roads is not a legal requirement – you don't have to provide lighting unless there is a clear requirement to do. However, if lighting is installed, there is a legal responsibility for the owners to maintain it according to British Standards. As such **a lighting designer should be consulted.**

Some commercial and industrial developments will also require road and path illumination and should follow the same design requirements. They should ensure that any relevant design guides (see section 2.8.12)

The design requirements of road lighting is covered in [BS 5489-1-2020](#): Design of road lighting and [BS EN 13201-2:2015](#) – Road Lighting Performance requirements. Lighting of roads and public amenity areas - Code of practice. The illuminance of roads depends on the traffic use and the mix of pedestrian needs (road class). Both standards should be used to determine road class.

The design of road and pathway lighting for amenity uses also depends on crime and CCTV requirements. In these cases, column lights and higher levels of colour rendition are favoured in order to provide sufficient illuminance of facial recognition – bollards are not useful in these areas. For low crime areas where CCTV is not required, lower-level luminaires such as ground level recessed luminaires or bollards remain a viable option to reduce the overall amenity impact. An analysis of crime rates will assist this assessment.

Nearby ecological areas may also impose further design considerations. For wildlife corridors, e.g. bats, lower colour temperatures than 2700K are recommended, with the avoidance of certain luminaire types such as bollards. [ILP GN08](#) provides more details.

Private road lighting that is not adopted by the local authority should ensure that lighting is installed only where needed and is appropriate for the level of use – clutter should be avoided. Navigation lighting should follow as many of the checklist requirements as appropriate.

### NEEDED



- Is the streetlighting absolutely necessary?
- Can column mounted luminaires be avoided in preference for bollards or ground recessed?

### TARGETED



- Do all luminaires have zero upward light?
- Have asymmetric beam lights been used to constrain light?
- Have obtrusive lights to nearby premises been calculated?

### LOW LIGHT



- Is the design illuminated with appropriate standards with ~25% recommend levels?
- Have low reflective surfaces been considered?
- Are the fixings installed at the lowest possible height?
- Have traffic use adaptive illuminances been considered?

### CONTROLLED

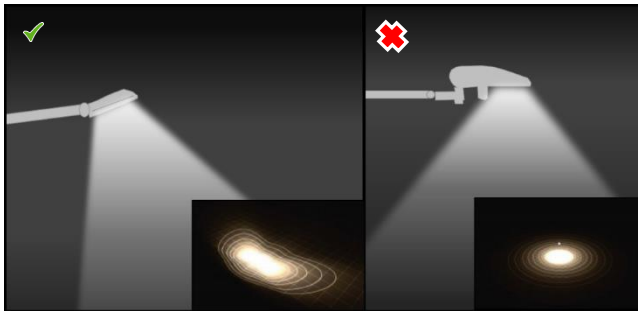
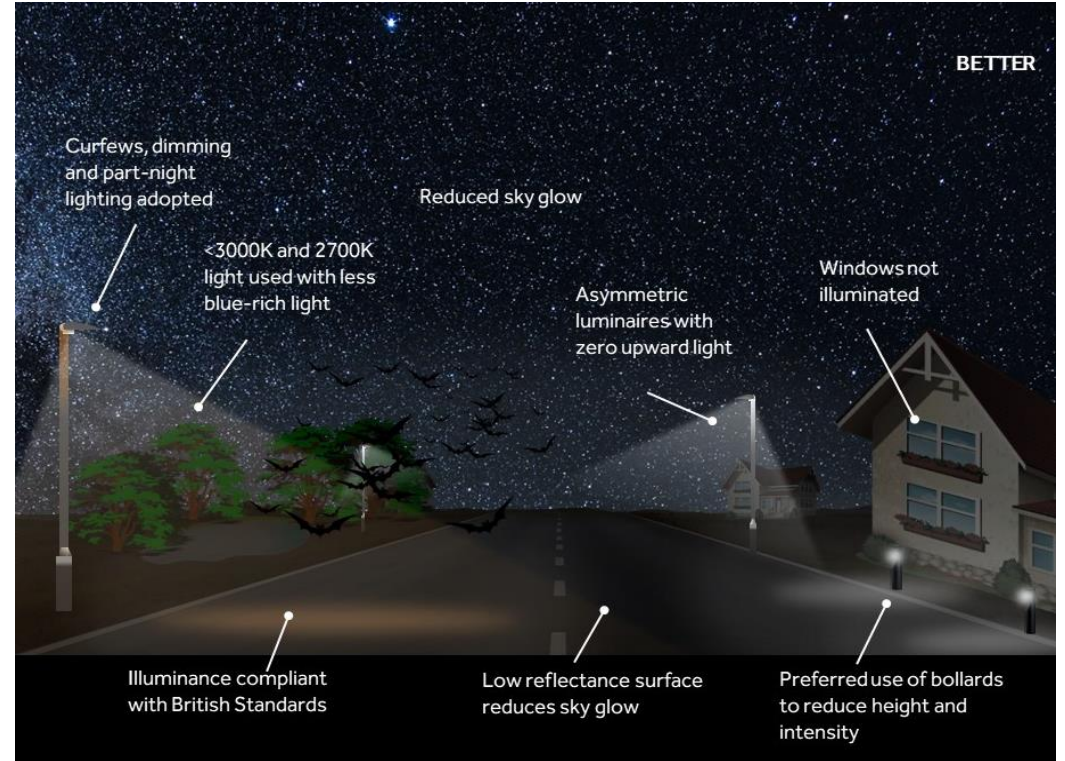
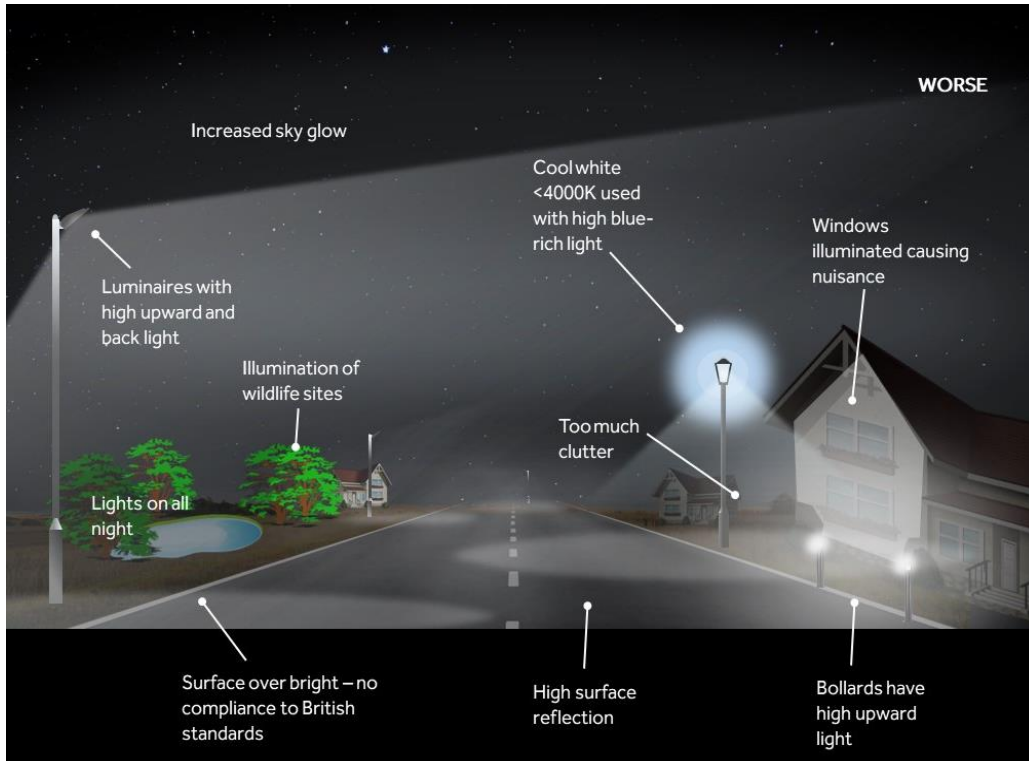


- Are the hours of use limited and appropriate?
- Can part night lighting be considered?

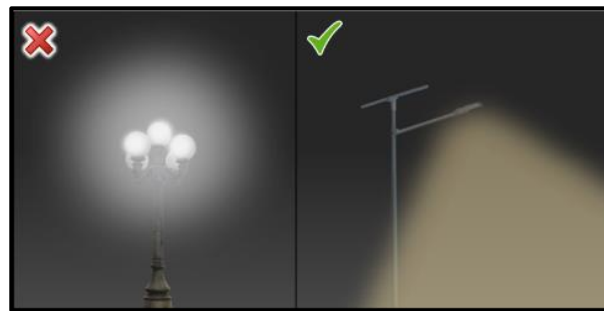
### COLOUR



- Do the lights use a CCT maximum of 3000K?
- Has the minimum CRI level been met?
- Has CCT (<2200K) been considered for wildlife impacts?



- Asymmetric lights have better light control and reduce spill as they direct light more efficiently into the spaces



- Lights have zero upward light spill



- Bollards have zero upward light spill or low power (<500 lumen) recessed lights. Bollards should be avoided near bat populations near waterways

## Key Considerations and luminaire advice

### 4.7.1 Justification and Design Guides

Streetlights are a key determinant of sky quality, so it is important that there is a clear and essential need for the lights. Adding streetlights is often an 'expectation', but this should be challenged and assessed for actual need especially in more rural areas. The need for lighting could be avoided with effective consideration at the initial development design phase. Clutter should be avoided with only lighting where it is necessary with proposals referencing the correct Highway Authority Design guides and policy.

### 4.7.2 Low Mounting Height – Bollards and Ground Recessed

For quiet residential access roads or pathways low bollards could be used instead of higher column mounted streetlights. Bollards will help reduce the source intensity and visibility while keeping illuminance levels. Spill can also be limited using asymmetric optics. Bollards also reduce the generation of sky glow as the lamp is relatively less bright than pole mounted lights.

Bollards should be used in areas where the risk of vehicular damage or vandalism is low and should be assessed against [ILP GN08](#) if there are any bat populations nearby. Ground recessed luminaires are another option where navigational lighting is useful. They are often lower than 500 lumens and can direct light sideways rather than straight up. Despite having some upward light, as the output is low, they are a viable alternative to more brighter column mounted lights in specific areas.

### 4.7.3 Adaptive Illuminance and Curfews

Modern LEDs can be dimmed down to achieve different levels of illuminance. As roads and paths will have a mixed level of useage throughout the night, it is recommended that LEDs be dimmed to different road classes that reflect the changing use. Lights can also be subject to a part-night lighting regime where some lights are switched off when usage is very low. A consultation is often needed to achieve this, but it will reduce the nighttime impact and save money. Curfews are particularly effective in rural parts of the landscape.

### 4.7.4 Colour Correlated Temperature

LEDs with high colour temperature and a blue-white spectrum should be avoided as they contribute to the sky glow effect. It is recommended that colour temperatures of 3000K (and lower 2200-2700K), with low blue-light should be used in achieving British Standard CRI levels.

### 4.7.5 Low Reflectance surfaces

Different road and path materials reflect light differently. To reduce the indirect scatter of lights, low reflectance road and path surfaces should be used to reduce the light scattering. Black and dark grey asphalt has a much lower reflectance (albedo) of around 0.05 to 0.1 when new, compared to grey cement concrete, 0.35 to 0.4. Care should be taken in urban areas to ensure that low reflectance materials do not increase heat retention to uncomfortable levels.

### 4.7.6 Lighting for Wildlife Corridors

In some places, road lighting may need to be installed close to highly sensitive wildlife routes, where priority species, such as bats, may be disrupted by lighting. Following examples from other places in the UK, such as A4440 in Worcestershire, red luminaires or 2200K could be used in these places. As [ILP GN08](#) shows, bollards may not be appropriate in these areas.

### 4.7.7 Over lighting

In order to reduce the possibility of over lighting, the calculated average of the illuminance levels should be within 25% of the recommended lux levels within relevant guidance and standards.

### 4.7.8 Clutter

Excessive clutter of bollards and pole lighting should be avoided where appropriate. Lighting should be used only where necessary, particularly in within Conservation Areas. In these cases, the character of the conservation area should be considered within the overall design.

## 4.8 Car parks

Car parks need lighting as they either need to provide adequate light for workers or for the public pedestrians walking to and from their vehicles. The need depends on use, activity and the presence of any risks (obstacles, paths, etc). Car parks should be illuminated where there is a clear need and ideally led by a risk assessment.

British Standards BS EN 12464 and BS 5489 can be used to determine illuminance and light quality. The level of illumination depends on the location of the parking and level of use. For example, a small quiet rural car park will need less illuminance than a larger, busier urban car park. There is no legal requirement for a lighting designer to use British Standard levels, but owners should be expected to provide sufficient lighting where this is a safety risk to users.

For exterior car parks, there are three general usage levels of lighting (average lux and uniformity of 0.25) under the British Standards

- High usage: 20 lux,
- Medium: 10 lux
- Low: 5 lux

To avoid over lighting, calculated average levels of illuminance should not exceed 25% tolerance of the recommended levels.

### NEEDED



- Is the lighting necessary in all places?
- Does the lighting avoid wider landscape impacts?

### TARGETED



- Do all luminaires have zero upward light?
- Have asymmetric luminaires been used to constrain light?
- Have obtrusive lights to nearby premises been calculated?

### LOW LIGHT



- Is the design illuminated with appropriate standards with ~25% recommended levels to usage levels?
- Can column mounted luminaires be avoided in preference for bollards or ground recessed?
- Are the fixings installed at the lowest possible height?

### COLOUR



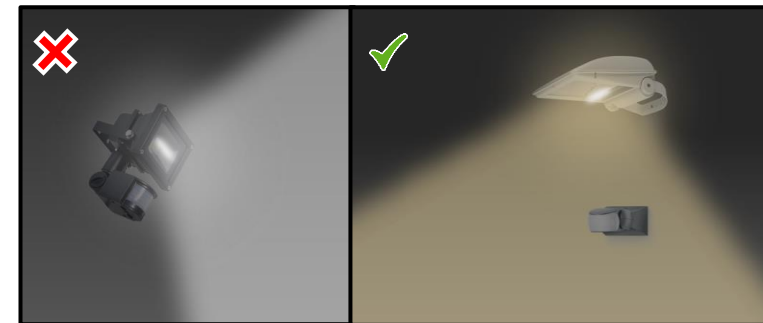
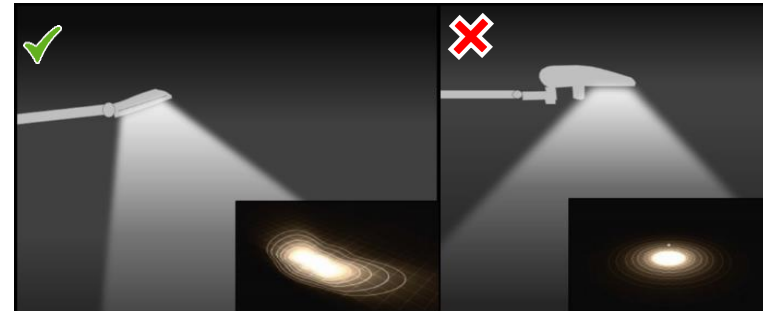
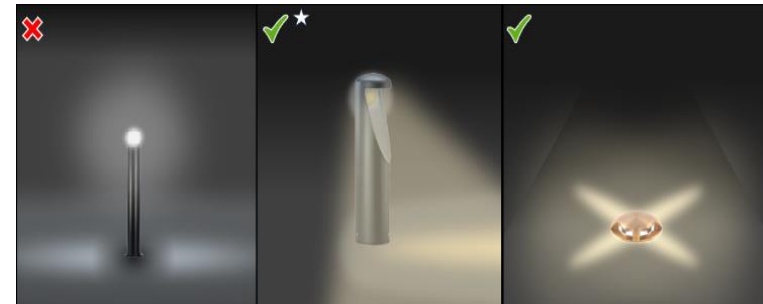
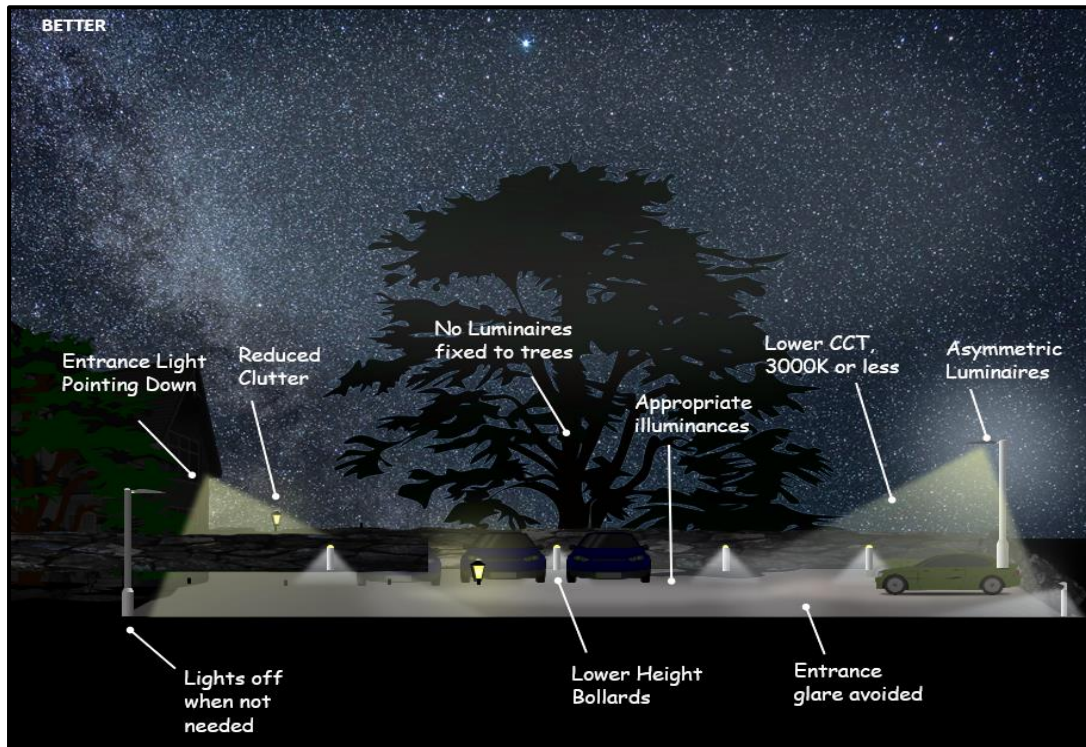
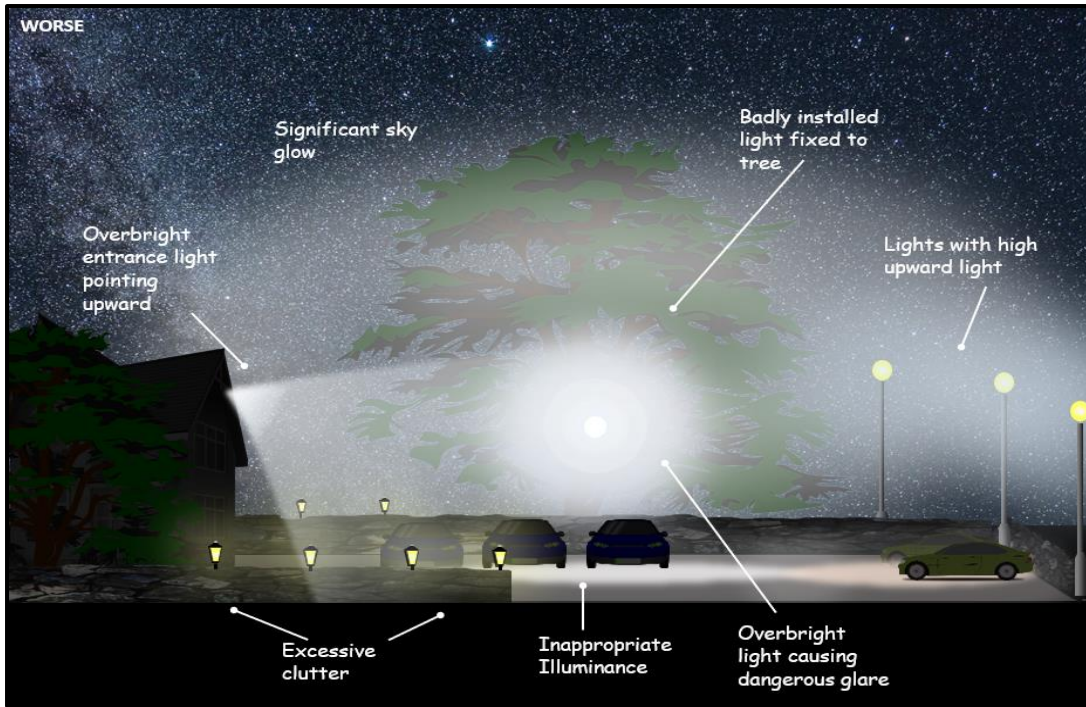
- Do the lights use a CCT of 3000K and lower?
- Has the minimum CRI level been met for CCTV?

### CONTROLLED



- Are the hours of use limited and appropriate?
- Can PIR sensors be used?





- Overbright floodlights with poor optical control, built in PIR sensors and high CCT should be avoided. Lower power, asymmetrical flood lights with lower CCT should be used.
- Asymmetric lights used to reduce spill as they direct light more efficiently into spaces
- Built in PIR sensors often obstruct the positioning of floodlights. A separate PIR sensor should be fitted in a position that best suits the movement of people.

## Key Considerations

### 4.8.1 Over lighting – Glare

Intense luminaires installed badly can create glare issues for users. This can be a particular issue when lights point directly towards entrances where oncoming vehicle users may suffer glare and increase the potential of harm to other users. It is important to direct light properly, with the right intensity and avoid excessive glare into conflict areas.

### 4.8.2 Over lighting – illuminance

Many car parks that have not used a lighting designer tend to use lights that are over bright for the appropriate illuminance. This will increase the surface luminosity and increase the sky glow impact. Luminaire power should be appropriate for the level of illuminance – section 5 provides some recommendations for the strength of LED luminaires against the size of the area.

In order to reduce the possibility of over lighting, the calculated average of the illuminance levels should be within 25% of the recommended lux levels within relevant guidance and standards.

### 4.8.3 Asymmetric Luminaires – Upward light

As car park floodlighting typically uses higher strength luminaires, there is more availability to use asymmetric luminaires than symmetric. Asymmetric luminaires will direct the light better and avoid the potential for creating upward light.

### 4.8.4 Bollards or poles

Low level bollards can be considered as they reduce the height of luminaires and reducing the intensity. However, bollards can be susceptible to damage, and they don't spread the light as effectively over larger areas as pole mounted lights. They can also be damaging to nearby bat populations (see [ILP GN08](#)). In this regard care should be taken to use bollards in appropriate spaces, or as navigation aids around the parking area. Ground recessed lighting may be a feasible option to act as a navigation aid to users.

Bollards may not be appropriate in higher crime areas, as they struggle to provide sufficient vertical illuminance for CCTV and facial recognition. The secured by design guidance should be referenced in these circumstances.

### 4.8.5 Ecological and Landscape Visual Impact

As car parks can be quite large, well-used and require high pole mounted luminaires, the visual impact on the landscape and ecology can be high. Although car park lighting can comply with standards, the overall presence of the lighting can produce significant residual impacts that may be difficult to overcome.

Additional mitigations should include using a CCT of 3000K and less to reduce sky glow, shielding prominent and potentially obtrusive luminaires from view and – importantly – using timers or sensors to ensure that lights are off when not needed.

### 4.8.6 Landscape appropriateness - Amenity Light

GN01 ILP 21 Table 7 assumes that amenity lighting is not expected in E0 and E1 zones. While this may be difficult in practice as there is a legislative driver to provide lighting for public car parks, every effort should be made to use low reflectance surfaces for new car parks to reduce the creation of sky glow and the upward flux ratio. The overall landscape impact, including the residual impact will also determine the acceptability of amenity lighting in these zones. Lighting above 10 lux is likely to produce minor/moderate levels of adverse impact, depending upon the design.

### 4.8.7 Clutter

Excessive clutter of bollards and pole lighting should be avoided where appropriate. Lighting should be used only where necessary, particularly in within Conservation Areas. In these cases, the character of the conservation area should be considered within the overall design.

## 4.9 Heritage and Architectural Assets

The illumination of heritage assets is usually undertaken to enliven the building space and to accent the architectural features. Done well, appropriate lighting can transform a place or building and highlight the key characteristic features without compromising the local impacts. It can provide a focal point for important community assets and support the nighttime economy. Done poorly, lighting can harm the character of the place, degrade the night sky and even damage the building itself. The choice of luminaires is not just a design issue – it is also important to protect the physical structure.

Due to the range of heritage assets, it is difficult to give any specific guidance for all types and settings. Lighting needs will be different and will strongly depend on the architectural features and the character of the asset. Most importantly, the provision of lighting on heritage assets requires a decorative and artistic element – in addition to any existing safety needs - which is entirely dependent on the specific setting, style and any logistical constraints. As such, the guidance presented in this section is very broad and general and does not provide specific advice that can be applied in all cases – a lighting designer may be needed to ensure that the design is appropriate and effective.

Some assets may benefit from no illumination. The character and setting of older assets, such as archaeological or historical landmarks, may be degraded by nearby lighting development spilling into the area. It is important to ensure that any lighting does not degrade both the night sky and the character of these assets.

The Historic England Good Practice advice in Planning note 3 (2<sup>nd</sup> edition) on [the Setting of Heritage Assets](#) provides some guidance. Further guidance on the external lighting of historic buildings can be found on the [Historic England](#) website. There is a separate legislative regime for protection of listed buildings. [Planning \(Listed Buildings and Conservation Areas\) Act 1990](#) requires applications for listed building consent for any works and associated infrastructure, to have special regard for preserving the special architectural or historic interest of the structure/building and its setting.

### NEEDED



- Is the lighting necessary in all places?
- Does the lighting create the desired aesthetic?
- Has the daytime impact of new fixtures been avoided?
- Does the lighting avoid wider landscape impacts?

### TARGETED



- Do all luminaires point at the building and not the sky?
- Are key architectural features appropriately illuminated?
- Do nearby lights avoid spill onto the asset that could degrade the character?

### LOW LIGHT



- Are low-powered lights used to prevent overbright building illuminance and highlight decorative features?
- Are inappropriate over bright floodlights avoided?
- Is the overall ambient lighting level as low as possible?

### COLOUR



- Do the lights use a CCT of 3000K and lower?
- Does the colour complement the natural tones of the building?

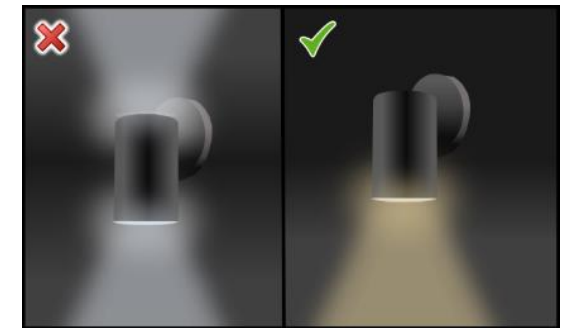
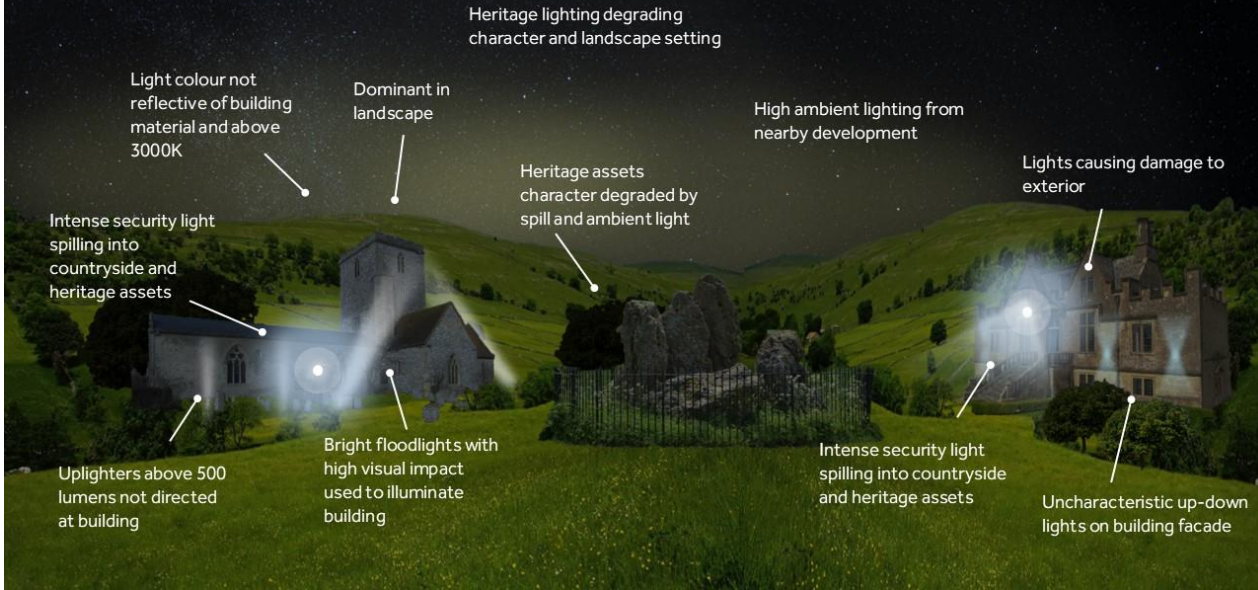
### CONTROLLED



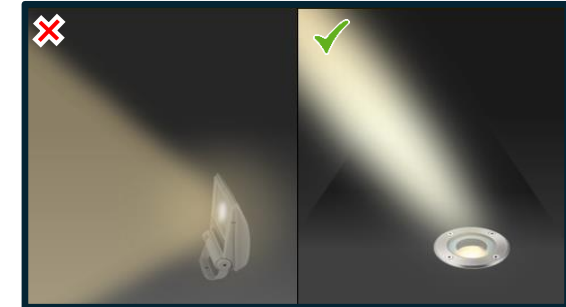
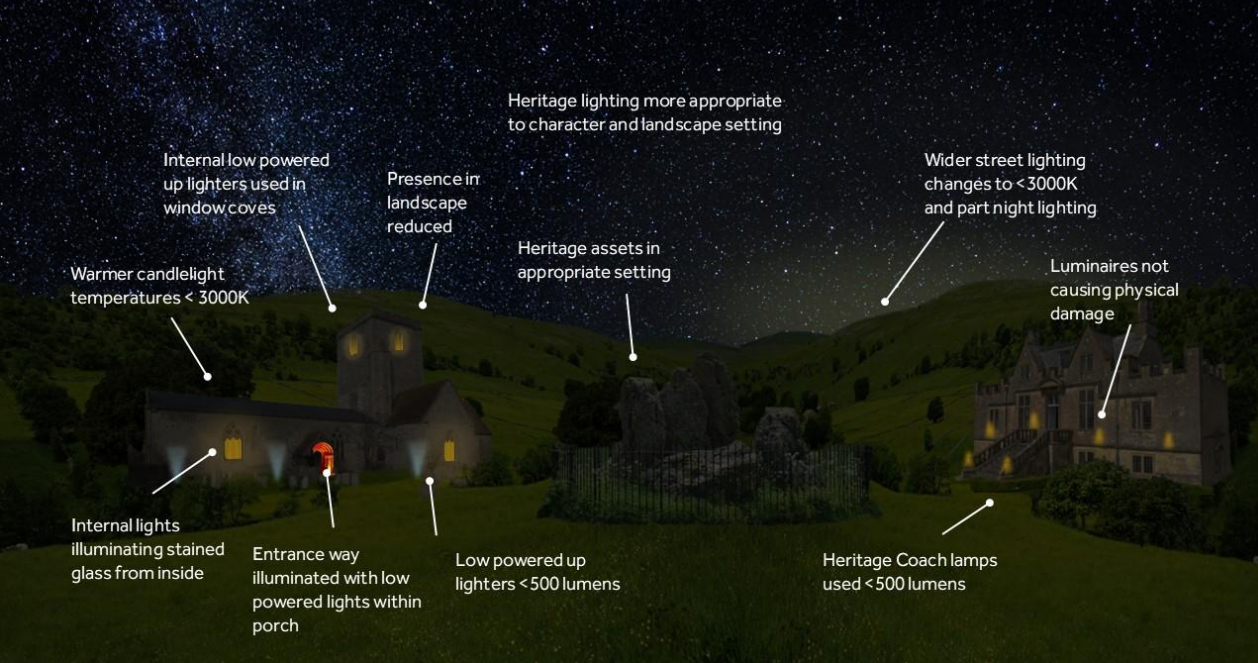
- Are the hours of use limited and appropriate?
- Can the lighting be turned off when not needed?



**WORSE**



**BETTER**



- Coach style lanterns of less than 500 lumens should be used. Modern LED versions offer better optical control
- Modern styles should be avoided
- Bright floodlights with high undirected upward light should be avoided. Low power narrow band lights of 500 lumens should be used.



## Key Considerations

### 4.9.1 Historic Luminaire Choice

The illumination of heritage and architectural assets will sometimes require appropriate luminaires (both the lamp and the housing) – that reflects the historic character. Modern luminaires may not be appropriate even though they may offer greater light control. In cases where the historical character may be adversely impacted by modern light styles it is appropriate to use more historic and heritage 'coach' style lights. It is still possible to reduce light pollution by using lamps of 500 lumens or less and colour temperatures lower than 3000K. This is also acceptable within DarkSky international rules.

### 4.9.2 Decorative Luminaire choice

The range of LED choices offers a vast opportunity to illuminate buildings that reduces light pollution but still provides the desired effect. LEDs are much smaller, lighter and more energy efficient than alternatives and can be used in smaller spaces. Care should be taken to ensure that all illuminated spaces use modern LEDs that reduce light pollution as far as possible, without undermining the aesthetic impact.

### 4.9.3 Damage

Care should be taken to avoid damage to the physical structure of a building when installing a light or associated infrastructure. This is particularly important for listed buildings where invasive mounting types – screws, bolts, etc, could damage the exterior.

Often it is easier to illuminate with lights not attached to the building, but this should be reviewed against the nighttime impact, particularly with upward light. LED's and more sympathetic fixing options offer potential solutions to this.

### 4.9.4 Stone colour

It is important that any decorative lighting compliments the natural stone features of buildings. There is often a temptation to illuminate buildings with unnatural colour throughout the spectrum in order to make the building more visible and have greater presence. However, it is more appropriate to use the

correct colour of light that compliments the actual colour of the surface to be illuminated. While this can often result in the use of whiter light to provide better colour rendition, lower colours of 3000K or less are still appropriate and should be considered. Often the best colour light is very similar to the colour of the features.

### 4.9.5 Upward light

Upward light is often unavoidable when illuminating buildings. Due to the building features, desired effect and logistical issues, lighting cannot be all pole mounted and pointing down. Upward pointing lights should be directed to the building surfaces and not into the open sky. The placement of low powered lights underneath eaves, arches, window frames and doorways will prevent light spill directly into the sky.



Other bespoke options can also be explored. Masks, baffles and louvres can be fitted to lights to constrain the beam angle. This hand made mask to illuminate a church shows how unnecessary light can be avoided.

### 4.9.6 Lower powered narrow beam lights

There is temptation to illuminate buildings with bright upward pointing wide beam floodlights – this is to be avoided (see page 37 Figure 13). These designs are easier in concept, uses fewer lights and greatly increase the overall presence, but can create significant visual nighttime visual issues. The use of these high-powered lights often fails to accent the character of the building and washes the site in light. It is far better to use lower powered narrow band lights that accent key features that reduce the overall footprint. More low powered lights (500 lumens or less) are better than one overbright floodlight. The resultant aesthetic effect may also be more visually appealing.

#### 4.10 Festivals, events and temporary lighting

Temporary installations of a duration of less than 28 days *may* not require planning control – Local Planning Authorities can advise on a case-by-case basis. Some installations such as festivals or music events can nevertheless have a substantial impact on dark skies and could be designed with a regard for dark skies.

##### 4.10.1 Outdoor Festivals

A festival can produce the highest introduction of light pollution of any activity. Theatrical lighting, lasers, car parks, campsite lighting and large LED screens are designed to be bright, intense and dynamic which can produce impacts that can be seen over many miles. The principles of good lighting design should still be applied where possible, including car park and area lighting, pedestrian areas and some stage lighting. The following recommendations in the National Landscape should be regarded:

- Festivals should avoid the winter months where the impact on dark skies is at its greatest throughout the night. In most cases, festivals are summer activities, but care should still be taken to reduce the pollution.
- Festivals should look to use access roads for patrons that do not encroach into the landscape.
- Festivals should avoid using distance penetrating sources such as sky scanners or lasers.
- The character of heritage assets should be considered

##### 4.10.2 Light Festivals and Art

Lighting festivals are becoming popular events across the UK with many venues hosting spaces for artistic or theatrical lighting. While there is no standard design guidance for light festivals to use, nevertheless the principles of good lighting design in the context of dark skies as set out in this guidance should be applied in the artistic brief, particularly to ensure no adverse impacts to wildlife.

##### 4.10.3 Surfaces

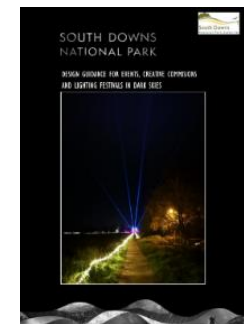
The type of surface can impact upon the visibility of the installation and the amount of light being reflected back into the atmosphere, with lighter coloured surfaces performing worse in this regard. Illumination of water in particular should be avoided. Evidence shows that illumination of reflective surfaces can impact wildlife. 'Polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates'. (Bat Conservation Trust)

##### 4.10.4 Temporary Floodlighting – including construction

Temporary lighting such as portable floodlight systems are extremely bright to cater for most purposes, but they are highly threatening to dark skies. Due to its design and general use, temporary lighting can be installed badly creating significant light pollution. Care must be taken to ensure that the power and installation of the equipment is appropriate for the task and is not obtrusive to neighbours.

- Where temporary lighting is needed to be used beyond the minimum period of 28 days or with consistent regularity over some years, then planning permission should be sought.
- Temporary and portable floodlighting should not be used in dark areas.
- Temporary and portable floodlighting should not be used for sports facilities. **A permanent design should be proposed.**

Further Information can be found in the [South Downs National Park Design Guidance for events, creative commissions, and lighting festivals in dark skies.](#)



## 5 SECTION 4. SUPPORTING INFORMATION

### 5.1 Understanding Light

The brightness of light is measured in three ways; **Lumens**, **Candela** and **Lux**. Lux and lumens are properties of light that are useful to assess the appropriateness of lighting installations. Obtrusive lighting criteria in ILP GN01 2021 are aimed to ensure that the output (lumens), Intensity (candela) and illuminated brightness of surfaces (lux) is appropriate within the Cotswolds National Landscape.

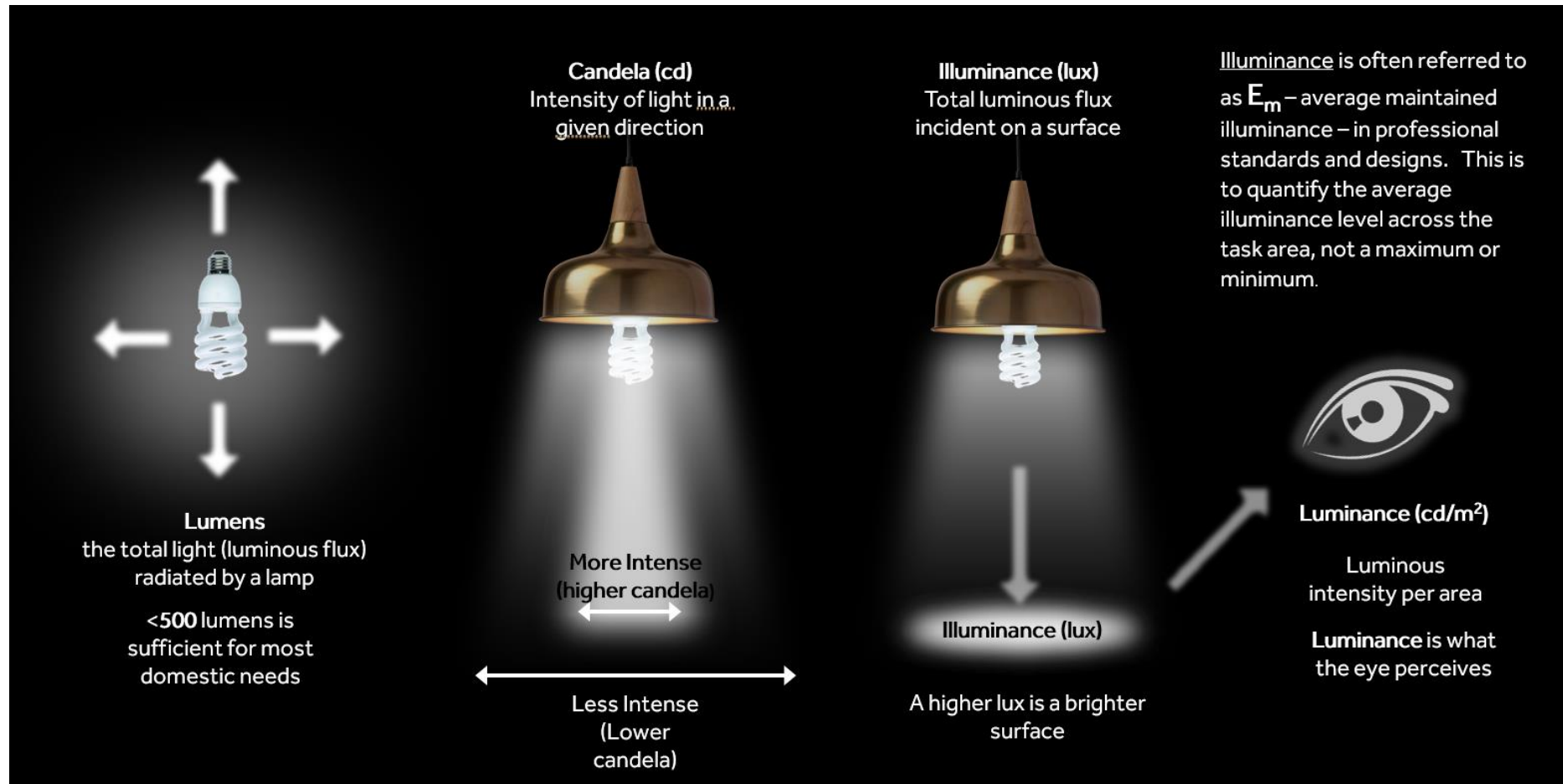


Figure 17 - Light Metrics and how they are connected

**Lumens** is how much light is emitted in all directions. Bulbs – or **lamps** - used to be sold according to the watts which is the amount of energy the lamp used but now, as LEDs are much more energy efficient than older incandescent bulbs, most retail options list the lumen output. Hardware or electrical retailers will often stock off-the-shelf lamps from 200 to 1,500 lumens. As it is important to avoid over-light by using higher lumen levels, **500 lumens** and less is appropriate for most domestic purposes – you should not need more than 1500.

**Lux** is the amount of light that falls on a surface and represents the illuminance (E) on the ground. Illuminance is the right amount of light needed to do certain tasks and activities. For most non-domestic purposes or where a developer has a 'duty-of-care' to users, illuminance levels should comply with existing standards for illuminance. Using the right average illuminance (**E<sub>m</sub>**) is key to user safety and not over lighting.

**Candela** is the intensity of light in a given direction and describes luminous intensity. It shows how bright the light source is and how far away the object can be seen. High levels of intensity in any direction contributes to obtrusion and glare issues to neighbours. The Internal optics and lenses of the whole light – the **luminaire** - will direct lamp light into a beam direction. Luminaire is the general term for a complete electric light unit.

**Colour Correlated Temperature (CCT)** which is measured in Kelvins (K) describes the colour appearance of light. The higher the colour temperature the bluer the light will appear. It is blue-white light that is particularly damaging to dark skies and should be avoided. Many lamps will state their colour temperature with some abbreviating as 'cool' (5000K or more) or 'warm' white (3000-4000K). 3000K and less is important for dark skies, ideally achieving 2,700K.



Figure 18 - The Kelvin Scale (K)

**Colour Spectrum** represents the distribution of wavelengths across the electromagnetic spectrum in the visible, ultraviolet and infra-red range. White light will be composed of many underlying wavelengths of different colour. It is the blue wavelengths <500nm, within LED lighting that can cause greater impact. The first LED lights tended to have spectra with a high degree of blue light, which increases the impact of light pollution. However, newer LEDs now filter out damaging blue wavelengths without changing the overall colour temperature (CCT) or the Colour Rendition Index (CRI). Some manufacturers show the spectrum, but this is not common. Note that for similar CCT levels of 4000K (moonlight) the underlying spectra can be very different and contain damaging blue wavelengths.

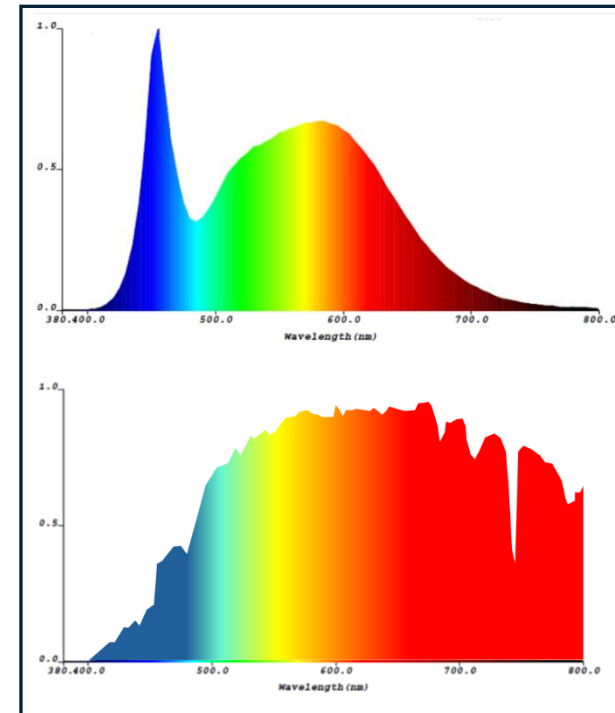


Figure 19 - Comparison between 4000K lights and spectra. LED above (4000K) and Moonlight below (4200K). Note a large blue spike in the LED but not in the natural light



Colour Rendition Index (CRI) is a measurement of how natural colours render under an artificial white light source when compared with sunlight. The index is measured from 0-100, with a perfect 100 indicating that colours of objects under the light source appear the same as they would under natural sunlight. Some lighting uses, such as sports pitches or CCTV will need specific colour rendition levels to achieve safe and natural play.

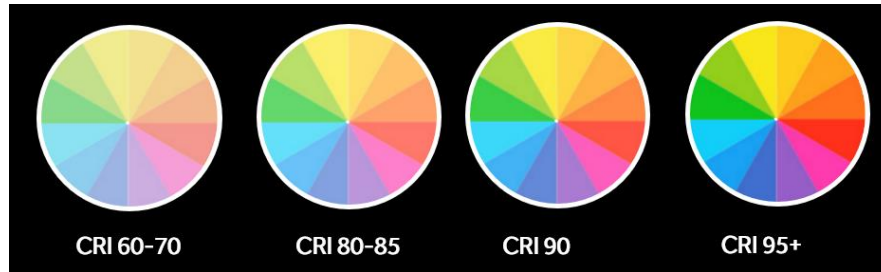


Figure 20 - Colour Rendition Index (CRI).

#### Uniformity:

Uniformity (U) is the ratio of the minimum light level to the average in a specified task area. It relates to the evenness of light across a surface and is the appearance of light to dark 'blotches'. Lighting with good uniformity has less blotchy light-to-dark areas and a fairly consistent level of light, whereas less uniformity is where there are greater differences between light and dark patches. Often, better uniformity can lower the overall illuminance needs. Different places have different uniformity needs and may not be required in design. Standards will define the uniformity level need, such as sports lighting guides where high levels of uniformity across a playing surface are needed.

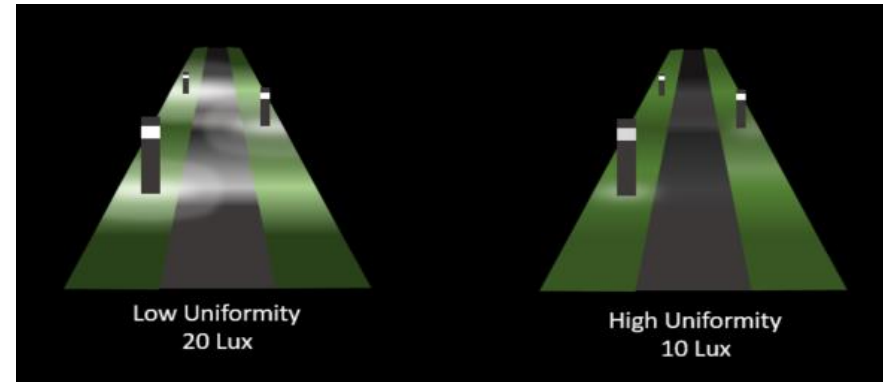







Figure 21 - Uniformity and illuminance

## 5.2 Purchasing Recommendations

You cannot always trust 'Dark Sky Friendly' labels on products. Use the following guides to purchase the right lamps for your needs. Remember that 500 lumens is suitable for most domestic needs and to use warm white lamps

### 5.2.1 Minor Lamps: Brightness and approximate power

This table below, based on recent searches, provides the power wattages for different types of bulb brightness that you will find in most retailers. Some are being phased out, but you may still have some in the cupboard that you might want to use. For most minor domestic purposes, 500 lumens is normally more than enough. For lamps greater than 500 lumens, you should use shielding or luminaires that direct all the light downward.

BULB BRIGHTNESS (lumens)	220+	400+	700+	900+	1300+
Incandescent 	25W	40W	60W	75W	100W
Halogen 	18W	28W	42W	53W	70W
CFL 	6W	9W	12W	15W	20W
LED 	4W	6W	10W	14W	18W
LED GU10 	3W	5W	8W	10W	12W

<500 Lumens is better.

Table 4 - Lamp brightness comparison

### 5.2.2 DarkSky International Approved Lighting and Certifications

DarkSky International's [Fixture Seal of Approval program](#) provides objective, third party certification for lights that minimise glare, reduce light trespass and do not pollute the night sky.

All products approved in the program are required to be fully shielded and to minimize the amount of blue light in the nighttime environment. DarkSky International does not sell lighting and is not endorsing any of the lighting shown in this document – the seal is for demonstration only.



Note: The IDA Dark Sky approved badge is sometimes used on product specs

### 5.3 Watts and Lumens: to achieve the right illumination (lux)

The table below recommends LED wattages (W) and lumen values (lm) to achieve approximate levels of illuminance for certain standardised tasks within an area. While they are more relevant to non-domestic installations, any householder should aim to purchase LEDs at the recommended level to achieve minimum lighting footprints.

There are also special cases under Permitted Development, where non-domestic users are not subject to design controls. In these cases, the table should provide some guidance on correct purchasing. Note that when the area or the level of illumination increases and the potential impact is sufficiently high, a properly qualified and competent lighting specialist should be consulted for the design.

This table provides approximate values, and the user will remain responsible for the lighting and its use –

**if in doubt, and to verify levels, consult a professional lighting consultant.**

Area m <sup>2</sup>	Approximate Target Illumination (E <sub>m</sub> ) (typical levels as listed in BSI and HSE documents)				
	(5 lux) Domestic areas, walkways	(10 lux) Domestic driveways, small car parks, areas with slow moving vehicles	(20 lux) Farmyards, clearance and excavation	(50 lux) Loading and unloading, vehicle turning, construction areas, equipment sheds	(100 lux+) Sports, fine detail and precision work*
25	3w 400lm	6w 500lm	11w 1000lm	30w 3000lm	CONSULT LIGHTING SPECIALIST
50	5w 500lm	11w 1000lm	23w 2500lm	60w 6500lm	CONSULT LIGHTING SPECIALIST
100	11w 1000lm	23w 2500lm	50w 5000lm	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST
250	30w 3000lm	60w 6500lm	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST
500	60w 6500lm	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST
1000	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST	CONSULT LIGHTING SPECIALIST

Notes

- Lighting using 11W or 1000 lumens or less is in general a low risk (Green bolded cells)
- Lighting above 11W and 1000 lumens but less than 60W and 6500 lumens is a medium risk (Yellow)
- Lighting above 60W and 6500 lumens is high risk (Red). This lighting should be properly designed in consultation with a lighting specialist. It is not appropriate for households.
- The comparable lumens approximations within the table are valid as of 2020. The efficacy of lumens per watt depends on available technology.

A specialist lighting consultant should be used for any fine detail and precision work, due to the inherent risk.



## 5.4 Relevant Documents

### 5.4.1 Lighting Impact Assessment

[The ILP Professional Lighting Guide 04](#) – Guidance on undertaking environmental lighting impact assessments, has additional information on these elements. Particular care should be taken when considering the residual impacts. These are impacts that are often outside the control of a light designer and should be considered as part of a wider night landscape visual impact assessment. **Requires payment.**

[CIBSE LG06: The exterior environment \(2016\)](#) has further general guidance for lighting the exterior environment. **Requires payment.**

### 5.4.2 Determining lighting for immediate task areas

[BSI - Light and lighting of workplaces: BS EN 12464-2:2014](#)

This standard sets specific requirements for lighting of tasks in most outdoor workplaces and their associated areas in terms of quantity and quality of illumination. Section 5 provides the lighting requirements for various tasks, e.g. farmyards, pedestrian walkways. **Requires payment.**

[BSI – Lighting of roads and public amenity areas. Code of practice BS 5489-1:2020](#)

This standard sets recommendations for general principles of road lighting and its aesthetic and technical aspects, including advice on operation and maintenance. **Requires payment.**

[BSI – Lighting and Lighting. Sports Lighting BS EN 12193:2018](#)

These standard sets recommendations for illuminances and other lighting metrics for sports lighting. **Requires payment.**

[HSE – Lighting at Work HGS38.](#)

This guidance explains how lighting contributes to the health and safety of people at work. It deals with assessing and managing the health and safety risks attributable to lighting in the workplace, good practice and the minimum recommended illumination levels that meet H&S requirements. **Free Download.**

[Sport England – Design Guidance Notes: Artificial Sports Lighting](#)

This Design Guidance Note considers artificial sports lighting for both internal and external sports activities and identifies those that have special requirements. Recommended illuminances for activities are provided. **Free Download**

[Illuminated Adverts](#) The Illuminated Advert regulations covered by the Town and Country Planning (control of advertisements) (England) 2007, discuss the specifications for installation. Luminance and controls are recommended for different ambient lighting zones. **Payment required.** The ILP has guidance for all of the UK and Ireland: [PLG05: the brightness of illuminated advertisements.](#)

### 5.4.3 Assessing and reducing the impact of obtrusive light

[Institution of Lighting Professionals GN01/21 The Reduction of Obtrusive Light](#)

This widely used and referenced guidance note specifies limitations and recommendations for lighting to prevent obtrusive light. It also considers industry comment regarding the assessment and definition of obtrusive lighting. It establishes upward light, intensity and illuminance criteria for lighting zones. **Free Download.**

[Clean Neighbourhoods and Environment Act 2005 – Statutory Nuisance](#)

This statutory legislation specifies that installations be avoided where ‘artificial light emitted from premises (is) prejudicial to health or a nuisance.’ (Section 102 (2)(fb)). To avoid enforcement by the local authority, lights should be pointing in the right direction and be appropriate for use. **Free Download.**

### 5.4.4 Landscape Impact and Wildlife

[CIBSE: SLL: LG06: The exterior environment \(2016\)](#)

The guide aims to provide readers with a firm foundation from which to approach exterior lighting design. Since light source technology is advancing rapidly, the guide provides a holistic approach to the design of the exterior environment, rather than concentrating on product performance, which quickly becomes out of date. **Payment required.**

#### [Bat Conservation Trust and ILP: Bats and artificial lighting in the UK](#)

This document is aimed at lighting professionals, lighting designers, planning officers, developers, bat workers/ecologists and anyone specifying lighting. It is intended to raise awareness of the impacts of artificial lighting on bats, and mitigation is suggested for various scenarios. However, it is not meant to replace site-specific ecological and lighting assessments. **Free download**

#### [Towards a Dark Sky Standard](#)

As a precursor to the planning process and as an extra resource for applicants, "Towards A Dark Sky Standard" is a general guide and overview of the key considerations needed for good lighting design and the protection of dark skies. While it is not a formal planning document, the information within it will help applicants, developers, lighting professional and the general public to install lighting that does not unnecessarily impact on dark skies. **Free Download.**

#### 5.4.5 Energy, avoiding nuisance and crime.

##### [Building Regulations](#)

If you are installing an external light which is supplied from your electrical system, then you should ensure reasonable provisions are made to enable effective control and/or use of energy efficient lamps. One recommended option is to install a light **not exceeding 150W per light fitting** (which is excessive for most LED domestic uses) where the lighting automatically switches off, both when there is enough daylight and also when it is not required at night. **Free Download**

##### [Secured By Design – Lighting Guide](#)

This guide, produced by Police Crime Prevention Initiatives, aims to increase awareness of security, public safety and lighting. It recognises the need to balance different objectives and incorporates the requirement to avoid causing light pollution in the design of buildings, estates and public spaces. **Free Download.**

#### 5.4.6 General Lighting

##### [The Responsible Outdoor lighting at Night](#)

(ROLAN) Manifesto sets out ten core principles for external illumination and a plan of action to implement positive change in the lighting community to lead to a more sustainable, healthier, and safer future for all. **Free Download**

#### 5.4.7 Heritage

[The Setting of Heritage Assets](#) provides good practice advice on managing change within the settings of heritage assets against the background of the National Planning Policy Framework. **Free Download**

[Planning \(listed Buildings and Conservation Areas\) act 1990](#) provides the legislation to protect listed buildings. Applications for listed building consent are made through the local planning authority. **Free Download**

#### 5.4.8 DarkSky International

DarkSky International provides a recommended [Outdoor Lighting – Municipal Ordinance Template and User Guide](#). **Free download**

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## 6 Appendices

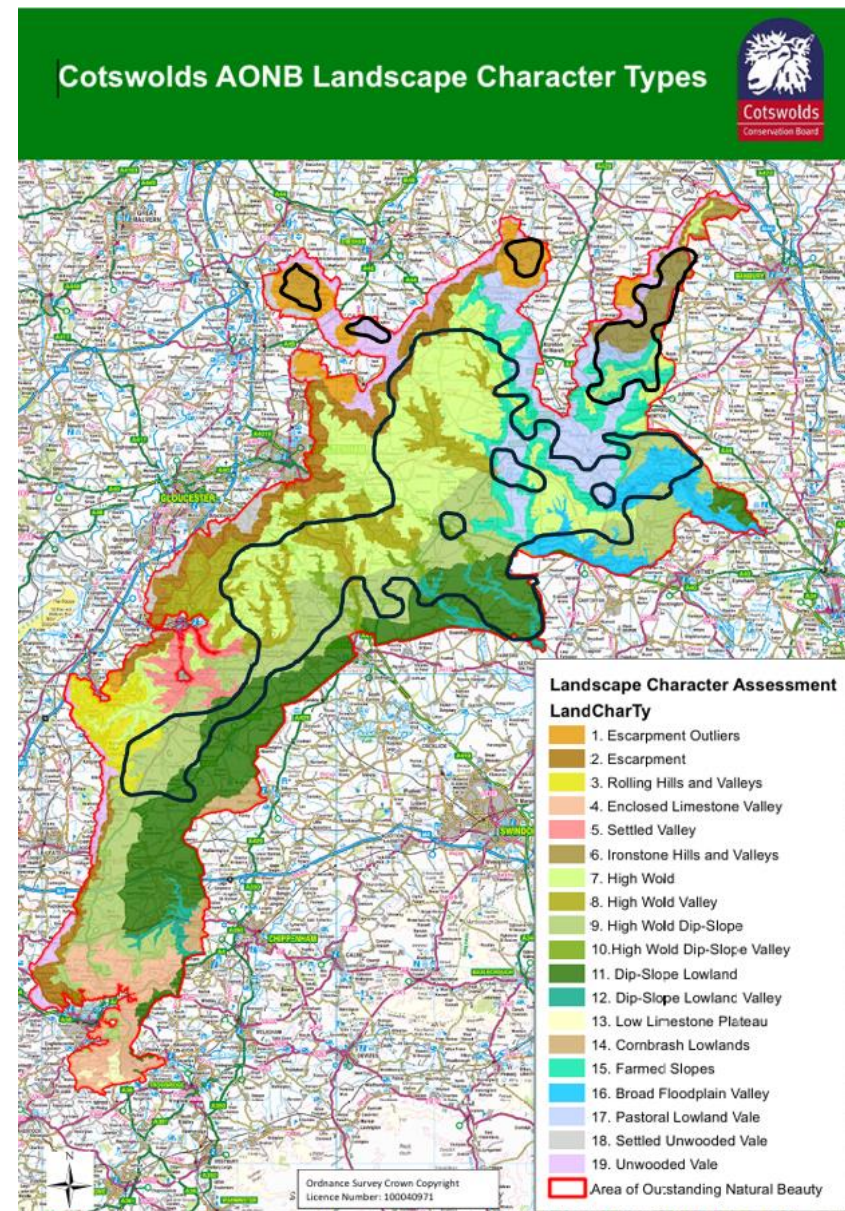
### 6.1 Landscape Character Types

[CNL Landscape Strategy and Guidelines](#) provide details on landscape character assessments and the influence of light pollution on dark skies. The map shows the location of landscape character types and dark skies. The black lines indicate the highest levels according to CPRE mapping

Figure 23 - Cotswolds Landscape Character Types and areas of highest sky quality on CPRE Night light Maps (black lines)



Figure 22 - Fisheye from Daglingworth (20s exposure). Credit Niel Havard Cotswold Astronomical Society



## 6.2 Local Plans and Strategies

The following sections provide details on Local Plans that reference dark skies and the reduction in light pollution. The policies vary in content and scope, but a proposal should reference the relevant local policies and neighbourhood plans.

### 6.2.1 Cotswolds District Council Local Plan 2011-2031

Policy EN4: The Wider Natural and Historic Landscape: Noting section 10.4.11 supporting policy EN4.

Policy EN5: Cotswolds Area of Outstanding Natural Beauty (AONB)

The Cotswold Design Code (p202) key considerations should also be referenced with any lighting designs.

#### [Cotswolds District Council Local Plan](#)

### 6.2.2 West Oxfordshire Local Plan 2031

Policy EH8 – Environmental Protection

Policy EH2 – Landscape Character

Policy EH1 – Cotswolds AONB

Policy EH4 – Public Realm and Green infrastructure

#### [West Oxfordshire Local Plan](#)

### 6.2.3 Stratford-on-Avon District Core Strategy 2011 to 2031

Policy CS.11 Cotswolds AONB

#### [Stratford-on-Avon District Core Strategy](#)

### 6.2.4 Cherwell Local Plan 2011-2031

Policy ESD 12: Cotswolds AONB

Policy ESD 15: The Character of the Built and Historic Environment

#### [Cherwell Local Plan](#)

### 6.2.5 Tewkesbury Borough Plan 2011-2031

Plan should be used with reference to Gloucester, Cheltenham and Tewkesbury Joint Core Strategy 2011-2031 (see below)

Policy EMP5 – New Employment Development

Policy RCN2 New Sports and Recreational Facilities

#### [Tewkesbury Borough Plan:](#)

### 6.2.6 Gloucester, Cheltenham and Tewkesbury Joint Core Strategy 2011-2031

Policy SD14: Health and Environmental Quality:

Policy SD7: The Cotswolds AONB

#### [Joint Core Strategy](#)

### 6.2.7 Wychavon District – South Worcestershire Development Plan 2016

Policy SWDP 23: The Cotswolds and Malvern Hills AONB

Policy SWDP 21: Design

#### [SWDP 2016](#)

### 6.2.8 Stroud District Local Plan Nov 2015

Policy ES7 Landscape Character

#### [Stroud District Local Plan](#)

### 6.2.9 South Gloucestershire Core Strategy 2006-2027

Policy CS9 – Managing the Environment and Heritage

#### [South Gloucestershire Core Strategy](#)

### 6.2.10 Gloucester City Plan

Refers to Gloucester, Cheltenham and Tewkesbury Joint Core strategy SD7 AONB.



Policy B3: New employment development and intensification and improvements to existing employment land

[Gloucester City Plan 2011-2031](#)

6.2.11 Wiltshire Core Strategy 2015

Core Policy 51 Landscape

Core Policy 57 – Ensuring high quality design and place shaping

[Wiltshire Core Strategy](#)

6.2.12 Bath and Northeast Somerset Development Plan

B&NES Development Plan incorporates

Policy NE2: Conserving and Enhancing the Landscape and Landscape Character.

Policy D8: **Lighting**

Developments within the B&NES district should reference use the Bath [World Heritage Site Management Plan](#) and the [Pattern Book Lighting Strategy](#) which provides specifications for lighting within this UNESCO World Heritage Site

[Core Strategy and Placemaking Plan.](#)

### 6.3 Street lighting policies

#### **Bath & NE Somerset Council**

- [Street lighting policy](#)
- Additional design guidance for Bath can be found within the [Bath Pattern Book Lighting Strategy](#)

#### **Gloucestershire County Council**

- Design guidance [Manual for Gloucestershire Streets](#) and
- appendix J street lighting [developer guide](#)

#### **South Gloucestershire**

- [Street Lighting Policy April 2024](#)

#### **Oxfordshire County Council**

- [Street Lighting Illuminated Sign Policy](#)
- [Residential Design Guide Publication](#)

#### **Warwickshire County Council**

- [Street lighting – Warwickshire County Council](#)
- [Warwickshire Design Guide - Part 8 Street lighting](#)

#### **Wiltshire County Council**

- [Guidance for Neighbourhood Planning within Wiltshire: Integrating High Quality Design](#)
- [Streets and street scene](#)

#### **Worcester County Council**

[Streetscapes Design Guide](#)