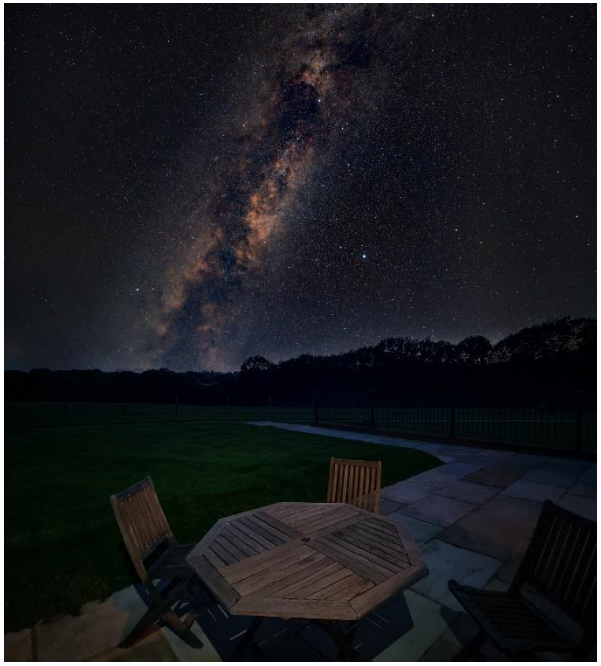
The High Weald National Landscape

an Area of Outstanding Natural Beauty

High Weald
National
Landscape



Planning Technical Advice Note: Dark Skies in the High Weald

Guidance for planners and developers on lighting proposals affecting the protected landscape.

Dark Skies Technical Advice Note

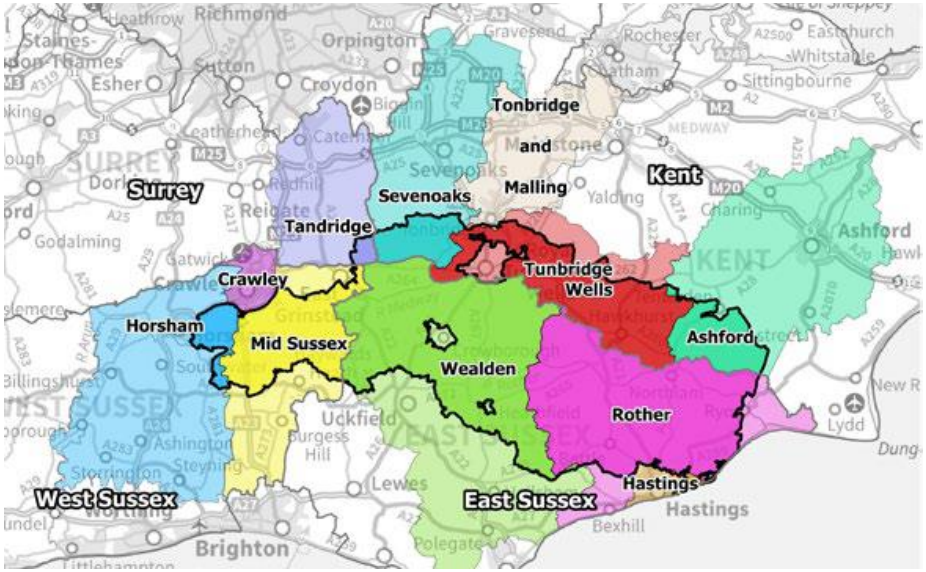
Published by the High Weald Joint Advisory Committee under the Countryside and Rights of Way (CRoW) Act 2000, on behalf of:

- East Sussex County Council
- Kent County Council
- Surrey County Council
- West Sussex County Council
- Ashford Borough Council
- Crawley Borough Council
- Hastings Borough Council
- Tonbridge & Malling Borough Council
- Tunbridge Wells Borough Council
- Horsham District Council
- Mid Sussex District Council
- Rother District Council
- Sevenoaks District Council
- Tandridge District Council
- Wealden District Council

The High Weald AONB Partnership was established in 1991 of 15 local authorities, Defra, Natural England, and organisations representing farming, woodland, access and community interests. The Partnership is responsible for publishing and monitoring the **statutory AONB Management Plan**.

The Partnership is supported by a small, dedicated staff team, the **High Weald AONB Unit,** which develops understanding of the High Weald's key components - their history, development, distribution, special qualities, deterioration, damage and loss - to provide an evidence base for the AONB Management Plan and related policy and guidance.

This guidance is based on that understanding and aims to help everybody conserve and enhance **one of England's finest landscapes.**



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Darkscape Consulting

High Weald Joint Advisory Committee
Woodland Enterprise Centre
Hastings Road, Flimwell
East Sussex TN5 7PR
Tel: 01424 723011
Email: director@highweald.org
Web: www.highweald.org

High Weald National Landscape Partnership

This edition published July 2024

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Introduction

The High Weald Area of Outstanding Natural Beauty (AONB) is a special place. Designated in 1983 and benefitting from strong legislative and policy protection to conserve and enhance its natural beauty, it is an exceptionally beautiful medieval landscape covering over 500 square miles across the counties of East and West Sussex, Kent and Surrey.

Its scattered settlements, ancient routeways, abundant ancient woodland, extensive open heaths, and small, irregular shaped fields, all draped over rolling hills of clay and sandstone, together create a unique landscape distinct from other parts of Britain. The area's natural beauty arises from a long history of human interaction with the natural environment; its main features were established by the fourteenth century, and it is considered one of the best surviving coherent medieval landscapes in north-west Europe.

Further detail on the special character of the High Weald is set out in the High Weald AONB Management Plan 2024-2029. The Management Plan's Statement of Significance defines what makes the High Weald special and identifies the qualities that justify its designation as a nationally important landscape. The High Weald's natural beauty is described by eight key components of character around which the Management Plan is structured, one of which is Dark Skies.

The High Weald AONB is characterised by having some of the darkest skies in the South-east of England, with the least skyglow. As well as contributing to the sense of remoteness and peacefulness, a number of nocturnal species for nature recovery within the High Weald are dependent on dark skies for feeding. Dark skies are also an intrinsic part of the landscape setting of the settlement pattern within the High Weald; and are important to the character and setting of the historic environment, in particular isolated farmsteads, small hamlets, and villages typically unlit by streetlighting.

The Management Plan includes specific objectives (DS1 and DS2) that seek to preserve the dark skies of the High Weald AONB, and to protect wildlife and habitats from light pollution across the High Weald.

This guidance aims to provide developers and planners with the necessary information to assess lighting schemes which are appropriate to the landscape.

The guidance will cover:

- **Overview of the importance of Dark Skies in the High Weald AONB**
- **Lighting Terminology and impacts**
- **Overview of light assessment, both in the design of external lighting schemes, and in building design and the location of development**
- **Best practice for lighting strategies in different types of development proposals**

The HW AONB JAC acknowledges that in some circumstances there is a duty of care to provide lighting to satisfy health and safety concerns and does not seek to eliminate or ban lighting regardless. However, the management of our dark skies relies upon good lighting design that is appropriate for the designated landscape, and does not unnecessarily pollute or pose a significant impact to the special quality of a starry sky. To quote the Institution of Lighting Professionals

Think before you light:

The right amount of light, where needed, when needed.

General Principles

With any installation, domestic or otherwise, the right light should be the aim. The following best practice design principles should be followed to ensure good lighting that reduces light pollution and its impact on dark skies. They represent all the relevant lighting policies found within the signposted guidance documents.

The Institution of Lighting Professionals' widely used and referenced guidance note '*GN01/21 The Reduction of Obtrusive Light'* specifies limitations and recommendations for lighting to prevent obtrusive light. It sets out that:

> **"Good lighting practice is the provision of the right light, at the right time, in the right place, controlled by the right system."**[1]

In general terms this requires the adoption of key principles that cover direction, light character, illuminance levels.

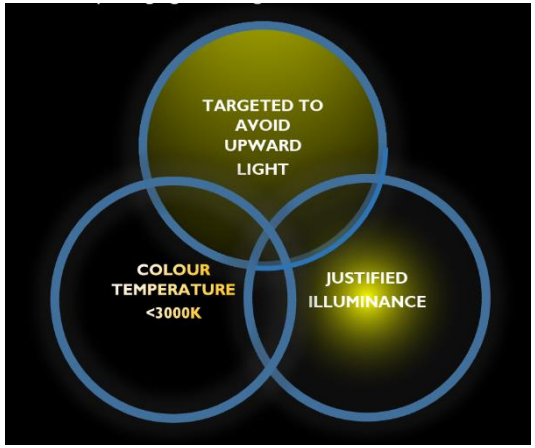


Figure 1 - From 'Towards a Dark Sky Standard'

USEFUL

- Any light should be justified with a clear purpose and benefit.
- Overall lighting impact should be appropriate for its setting, regardless of the design.

DESIGNED

- For larger non-domestic installations, professional designers should be consulted to ensure that illuminance, and control of spill light and glare, are appropriate for the task. Use the minimum possible number of lights.

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 or wildlife.
- All light above the horizontal should be avoided. Zero upward light is essential.

LOW LIGHT

- Lux levels: lights should provide the right illuminance referenced against design standards. Do not use needlessly over-bright lights.
- Glare: lights should be referenced against design standards and not produce unnecessary glare.

COLOUR

- Lamps should have a colour of 3000K or less. Lamps above 3000K should be avoided. 2200K is best for wildlife sensitive areas.
- Spectral emissions should avoid 500nm (nanometres) wavelengths, if possible

CONTROLLED

- Ensure external lights are controlled with timers or proximity (PIR) sensors, to ensure lights are not on when not needed or when activity is low, to reduce light pollution.

N.B. the terms referred to above are expanded on later in the guidance.

[1] ILP_Guidance_Note_1_the_reduction_of_obtrusive_light_-_2021.pdf

Summary – Planners' Checklist (Part 1)

To help assess the impacts of external lighting proposals on the dark skies of the AONB, and ensure that proposals minimise adverse impacts, the following checklist is recommended (the terms are expanded on later in the guidance). Lighting schemes requiring planning permission should be accompanied by a thorough lighting plan / lighting assessment, including obtrusive lighting calculations, usually prepared by a lighting designer.

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?

DESIGNED

- ☐ Has Environmental Zone E1 been referenced and used in the lighting calculations?
- ☐ Has the local and wider landscape setting been considered in visibility and impacts of lighting?
  - Topography, existing vegetation
  - Nearby sensitive wildlife sites or ancient woodland
- ☐ Has an obtrusive lighting compliance statement been submitted using ILP guidance?

TARGETED

- ☐ Do the designs shows that all luminaires achieve zero upward light (0% ULR)*
- ☐ Does the luminaire schedule show compliant fittings with image or photometry?
- ☐ Does the design show that light does not intrude into neighbouring areas?

LOW LIGHT

- ☐ Do designs should use lowest light levels to achieve illuminance (lux) for the task, and reference appropriate and relevant standards, e.g. Sports England, BS Standards?
- ☐ Are the fixings installed at the lowest possible height?
- ☐ Are the fixings "cut-off" (i.e. with the glass set flat to the horizontal), or are baffles or shields provided if necessary to control ULR?

COLOUR

- ☐ Has colour temperature for each luminaire has been provided? And CRI where appropriate?
- ☐ Colour temperature should be less than 3000K, ideally 2700K
- ☐ 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?

Summary – Planners' Checklist (Part 2)

In addition, to help assess the impacts of the development proposal itself on the dark skies of the AONB, and the suitability of the site for the development proposed, and to ensure that proposals minimise adverse impacts of light pollution and light spill, the following checklist is recommended: (all these points are discussed in more detail later in the guidance)

N.B. This should be used in conjunction with the landscape-led design principles set out in the Management Plan and the High Weald Housing Design Guide.

Location of Development

- ☐ Has a site been chosen away from wildlife sensitive locations/habitats, including ancient woodland or bat foraging routes?
- ☐ If the proposed development type has greater inherent lighting demands or light spill, has a site been chosen away from intrinsically dark rural skies?
- ☐ Have floodlit sports pitches been sited in built-up areas where there is already a higher level of ambient sky glow?
- ☐ Have highly visually exposed or topographically prominent sites, such as those on ridge-tops, been avoided, so as to not introduce light development into areas characterised by dark skies?

Design of Scheme

- ☐ Has the layout of the scheme (for example the location and orientation of buildings, roads and amenity space) been designed to minimise likely lighting impacts by way of light spill and visibility of light source in the specific landscape context? (consider visibility in wider landscape views e.g. across valleys)
- ☐ Has the scheme sought to avoid suburbanisation of the night-time landscape character by avoiding lighting of driveway entrances on rural roads and minimising unnecessary lighting clutter?
- ☐ Are there implications on the character of the night-time landscape from any highways lighting requirements associated with the development, e.g. new junctions, pedestrian crossings etc? Can these impacts be avoided/minimised through alternative design approaches?

Design of Buildings

- ☐ Has light spill been minimised by avoiding large areas of elevational glazing and rooflights in the building design?
- ☐ Is the glazing specified to be less than 0.7 VLT (visible light transmission) to minimise light spill? **However, it should be noted that even with meeting this VLT there could still be an adverse landscape impact on the AONB.**
- ☐ Does the quantum of light pollution (spill, glow or glare) mean the proposed location/design of development is not appropriate, with regard to the character and context of the setting?

Dark Skies in the High Weald

The High Weald AONB is characterised by having some of the darkest skies in the South-east of England, with the least skyglow. This gives the AONB a sense of remoteness and peacefulness and connects the natural environment to the cultural and historic landscape.

Dark skies benefit both people and wildlife. They are generally defined as skies relatively free of light pollution where you can see a clear starry sky and importantly, our own galaxy the Milky Way, stretching as a ribbon of faint stars across the sky.

Evidence[2] shows that in the last few decades, the south-east of England has suffered a decline in quality; dark skies have gradually brightened as urban development and the population grows. Despite this growth and brightening of the region, the skies of the High Weald are of sufficient quality that much of the rural landscape still lies under dark skies where the Milky Way can clearly be seen. This means that we must protect and strive to enhance them for the benefit of wildlife and people alike.

The High Weald partnership has produced two interactive maps, regarding both satellite data readings and Sky Quality Data, to inform dark sky understanding and policy, viewable here: High Weald National Landscape (arcgis.com)

To precisely measure how bright the night sky gets, night-time satellite imagery of the earth is used as a raw input for the number and intensity of light sources, and the data shows the amount of artificial light. Comparisons of satellite data from 2015 to 2019 indicate light pollution is increasing within the darkest night skies of the High Weald. Meanwhile we have worked with a number of parishes across the area who have been taking light meter readings using sky quality meters (SQM). This device measures the brightness (luminance) of the night sky. The units are magnitudes per arc second^2 – denoted as SQM - and larger values of SQM indicate darker skies.

High Weald Management Plan

'Dark Skies' is one of the eight defining components of the natural beauty of the High Weald AONB set out in the High Weald AONB Management Plan 2024-2029. high-weald-aonb-management-plan-2024-2029

The Management Plan highlights key characteristics of dark skies within the High Weald, and key issues, including increasing light pollution in rural areas, sky glow from built up areas adjoining the High Weald AONB, and impacts on local wildlife. The Plan sets out two specific Objectives relating to dark skies, along with a series of Actions to support these.

Objective DS1

To preserve the dark skies of the High Weald AONB by minimising light pollution, obtrusive external lighting and internal light spill from domestic, commercial, and public premises in both existing and new developments within the High Weald, and from highways lighting.

underpinned by the following rationale:

To protect and maintain the existing dark skies within the High Weald for the benefit of all, including future generations for our health and wellbeing, and enjoyment, to increase our understanding and sense of place in the universe; and for the benefit of wildlife and to reduce energy consumption.

Objective DS2

To protect wildlife and habitats from light pollution across the High Weald.

underpinned by the following rationale:

Light pollution affects a wide range of nocturnal species, and those out during the day, from feeding to finding a mate and the ability to safely migrate. Light pollution is an additive stressor to habitat loss for already declining populations of many species across the High Weald.

[2] Evidence principally VIIRS datasets which have been used in third party analyses (CPRE).

Health and Wellbeing

It has long been known that light pollution can disrupt the circadian rhythms (body clocks) of people. While the impacts of lights that shine directly into windows can be immediately understood, the general brightening of the sky can lead to further health issues. Disruption to sleep will produce poor circadian regulations which can cause loss of attention, increased stress and fatigue, while blue-light rich lighting suppresses the increase of the hormone melatonin, which regulates the bodies sleep-awake cycle. Poor lighting can also impact on more intangible health and wellbeing concerns.

Wildlife and Dark Skies

As well as the dark skies contributing to the sense of remoteness and peacefulness in the area, a number of nocturnal species for nature recovery within the High Weald 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 showing that light can be very disruptive to many different species, not just from a disruption to their circadian body clocks, but also as a barrier to migration, movement and ecosystem integrity. Evidence shows that artificial light causes negative phenology[3] adaptions 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, whose night-time croaking is part of the breeding ritual. Artificial lights disrupt this nocturnal activity, interfering with reproduction and reducing populations.

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 High Weald AONB, the following should be especially considered:

Bats[4]

As nocturnal specialists, all bat species in the High Weald 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

Birds

Evidence shows 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 important areas for nesting birds

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. Evidence also shows that pollination rates in illuminated plants can be reduced by 62%[5]

- Avoid illuminating water or reflective surfaces
- Do not illuminate ecologically sensitive areas
- Use colour temperature, CCTs of less than 3000K
- Use narrow band minimal UV sources

[3] the timings of cyclical or seasonal biological events, such as migrations, egg laying and hibernation.

[4] Guidance Note 8 Bats and artificial lighting | Institution of Lighting Professionals (theilp.org.uk)

[5] (Knop et al 2017. Nature 548)

Planning Policy Context

NPPF

The National Planning Policy Framework (NPPF) 2023 makes reference to lighting in paragraph 185(c):

> **"limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."[6]**

Local Plans

Local Plan policies adopted by Local Planning Authorities may include strategic policies to protect dark skies. They set the overall approach to lighting within the authority and may be supported by other guidance.

Similarly, Neighbourhood Plans can include specific policies on preserving dark skies and regarding lighting and glazing within the landscape.

Planning Conditions

Planning Conditions can be a useful tool in controlling the detail of lighting installations, and hours of operation. However, they are not a substitute for fully considering lighting proposals as part of the determination of the application itself (since there may be some instances where the principle of the lighting has the potential to render unacceptable the application).

Sufficient information must be submitted upfront with the application prior to determination, to enable the proper consideration of the lighting proposal on the AONB character as part of the appraisal of the application as a whole.

Landscape & Visual Impact Assessments

LVIAs submitted to accompany planning applications should include light pollution assessments relating to the local context and receptors including key viewpoints, public routes, wider landscape character and topography, as well as the intrinsic High Weald AONB character. Reference to baseline values should be included.

Ecological Assessments

In wildlife sensitive areas such as AONBs, consideration must be given to the impact of lighting on these areas and the wildlife and local species that inhabits them. This is usually determined by an Ecological Assessment undertaken by a competent and qualified ecologist.

Natural England Advice

Natural England provide 'standing advice' to be taken into account when making planning decisions that affect ancient woodland, ancient trees or veteran trees. This advises on the need to assess both the direct and indirect effects of development on ancient woodland and veteran trees, and that negative effects should be avoided. The standing advice sets out that direct and indirect impacts can include the loss or deterioration of ancient woodland, ancient and veteran trees by a number of means, one of which is increasing the amount of light pollution.

Secured by Design

Secured by Design - Lighting This guidance, 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.

There is no evidence to suggest that adding lights will act as a deterrent to reduce crime; in fact, it may be the opposite. A badly installed or over bright 'security' light can produce unintended shadow areas for crime to occur unnoticed.

Minor light fitments on existing domestic buildings do not usually require planning permission. However, guidance in this document can be followed as best practice in all lighting installations. In addition to the recommendations in this guidance, it is important that any installation comply with building regulations.

[6] National Planning Policy Framework (publishing.service.gov.uk)

Dark Sky Zoning

The CIE:150: 2017 and the Institution of Lighting Professionals (ILP) 'Guidance on the reduction of obtrusive light' *Guidance Note 1 for the reduction of obtrusive light 2021 | Institution of Lighting Professionals (theilp.org.uk)* provides lighting designers, planners and environmental health officers with recognised technical limitations on stray light. The guidance sets out Environmental Zones E0 – E4 and advises that Local Planning Authorities specify these environmental zones for exterior lighting control within their Development Plans.

Under this guidance, the High Weald AONB falls within zone E1. Additionally, the guidance sets out that where an area to be lit lies close to the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone – this means that where a rural site is outside of, but adjacent or very close to the AONB boundary, zone E1 should also be used.

Recommended limits for more selected aspects of light pollution within CIE 150 and GN01 2021 are provided (see table 1 below) for each environmental zones. It establishes upward light and flux, light spill and luminance criteria for ambient lighting zones. All development with external lighting should meet or exceed all ILP guidance for the environmental zone in which the development is set to take place.

As a general rule of thumb:

In any rural setting in the AONB, roughly 2km from the nearest streetlit town, there is a high probability that the local skies are of sufficient quality (E1) to be classified as a 'dark sky' with the Milky Way able to be seen.

Zone	Sky Glow ULR [Max %]	Light Intrusion (onto premises) $E_{Vertical}$ [Lux]		Building Luminance [cd/m^2]	Upward Flux of installation (4 or more luminaires) [Max %]		
		Pre-curfew	Post-curfew		Road	Amenity	Sports
E0	0	n/a	n/a	<0.1	n/a	n/a	n/a
E1	**0**	**2**	**<0.1**	**<0.1**	**2**	**n/a**	**n/a**
E2	2.5	5	1	5	5	6	2
E3	5	10	2	10	8	12	6
E4	15	25	5	25	12	25	15

Table 1: Selected technical criteria from CIE 150 and GN01 21. Upward light, light spill, and luminance.

- Other technical limits such as luminous intensity of bright luminaires, effects on transport systems or sign luminance should be taken into consideration with reference to ILP GN01 2021 or CIE 150: 2017.
- n/a donates that lighting of this type is not expected in these zones.

‘Above’ & ‘Below’ Light

A dark sky is generally thought of as the ability to observe stars overhead, but this tends to neglect the importance of the landscape below it. It is far more useful to regard the protection of dark skies as two distinct landscapes; the skies above and the land below.

The ‘above’ landscape is fairly obvious; it is the unobstructed sky full of stars. This landscape is predominately affected by sky glow from the street lights of the larger urban environment, but can also be significantly affected by over-bright single sources at the local domestic level. This guidance will recommend lighting designs that minimise light spill into the air including installation angles, surface illuminance and lights-off curfews.

The ‘below’ landscape describes more the ‘continuity’ of darkness across the High Weald AONB, which should be largely free of point sources of light. The nature of a rural landscape means that lamps can stand out due to the higher contrast between light and dark. While these sources may contribute relatively less to the overhead quality except in the immediate vicinity, being able to manage a landscape as a continuous dark habitat is of equal importance to protect this special quality and the relative tranquilly is offers; an interrupted view of the landscape below is just as important to us and to wildlife, as the interrupted view above.

Every effort should be made to consider external lighting and internal light spill that does not affect both the upward and downward dark landscapes. This guidance will recommend development design that minimises light intrusion in a dark landscape.

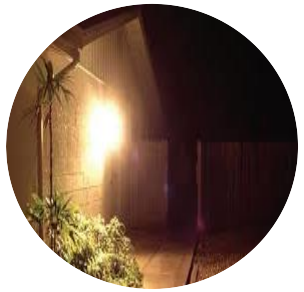
Types of Light Pollution

There are three generally accepted types of pollution associated with obtrusive light.

Sky glow

This is the brightening of the night sky which can be seen emanating in the horizon from cities and towns adjacent to the High Weald AONB boundary, or from other brightly illuminated areas. It is caused by the illumination of air molecules and particles and is created both by reflected surfaces and badly directed light. Light that travels near the horizontal is the most damaging as it travels furthest and lowest through the atmosphere. This can be avoided by ensuring lights are pointing down.

Glare



This is the uncomfortable brightness of a light source when viewed against a contrasting darker background. Due to the rural and less populated character of the landscape, lights in rural areas will be relatively higher in glare than in urban areas. This is particularly noticeable when looking from raised viewpoints into the darker landscape below.

Light Intrusion

This is the “trespass” of light spilling beyond the property or area being lit. Although this pollution generally relates to windows and intrusion into private property, light intrusion also applies to habitats and areas of high species interest.

Presence – a fourth consideration

Even if a lighting scheme were designed that avoided sky glow, intrusion and glare, there still exists the possibility of significant impact on dark and sensitive landscapes and wildlife due to the mere presence of the lights. This applies to impacts from both exterior and interior lighting. When the presence of lighting itself creates negative impacts, alternatives and re-siting should be considered.

Lumens, Candela and Lux

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. The obtrusive lighting criteria in Table 1 (page 11) are aimed to ensure that the output (lumens), intensity (candela) and illuminated brightness of surfaces (lux) is appropriate within the High Weald AONB.

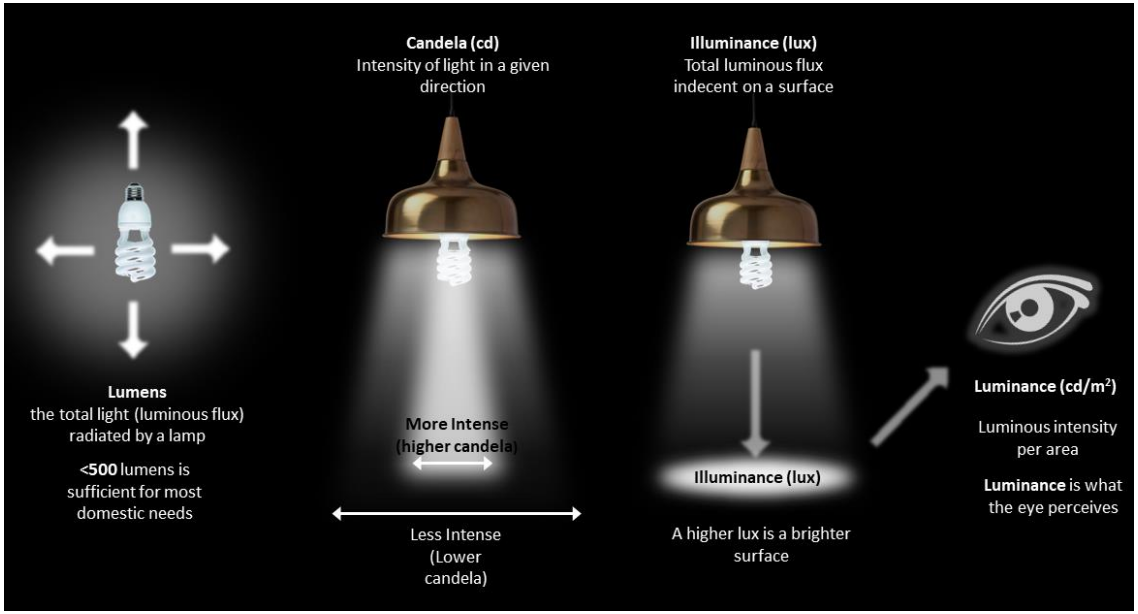


Fig 2: Illustrating Lumens, Candela, illuminance.

Lux levels - Uniformity

Lux levels should be designed to meet recommended levels for uniformity which prevents the patchy illumination of a surface to be significantly brighter in some areas than others. This is particularly important in car parks and sports designs where an even spread of light is preferred. Uniformity is usually stated in appropriate guidance standards (expressed as a ratio of the minimum illuminance to the average illuminance on the surface).

Colour Temperature & Spectrum

The colour temperature of a light sources is often referred to as the CCT of the source. It is measured in degrees of Kelvin (K). Cool white and blue rich lighting is the most harmful to wildlife and to humans. There is a substantial growing body of evidence that shows that the colour temperature of the lights can be particularly disruptive to circadian rhythms, sleep patterns and the production of melatonin. Dark Sky International recommends that **no installations be designed with a colour temperature CCT in excess of 3,000K.**

Fig 3: Kelvin Lighting Spectrum

Additionally, lights with a broad spectrum or 500nm (nanometre) 'spike' should be avoided in wildlife sensitive areas, in order to eliminate atmospheric light scattering which causes sky glow from artificial light at night - violet-blue light scatters 16 times more than warmer red light, and many LEDs produce harsh, often over-bright blue-white light, scattering high into the atmosphere, and affecting wildlife.

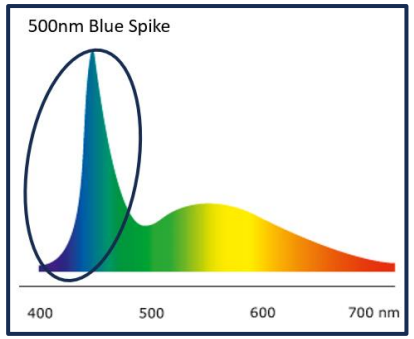
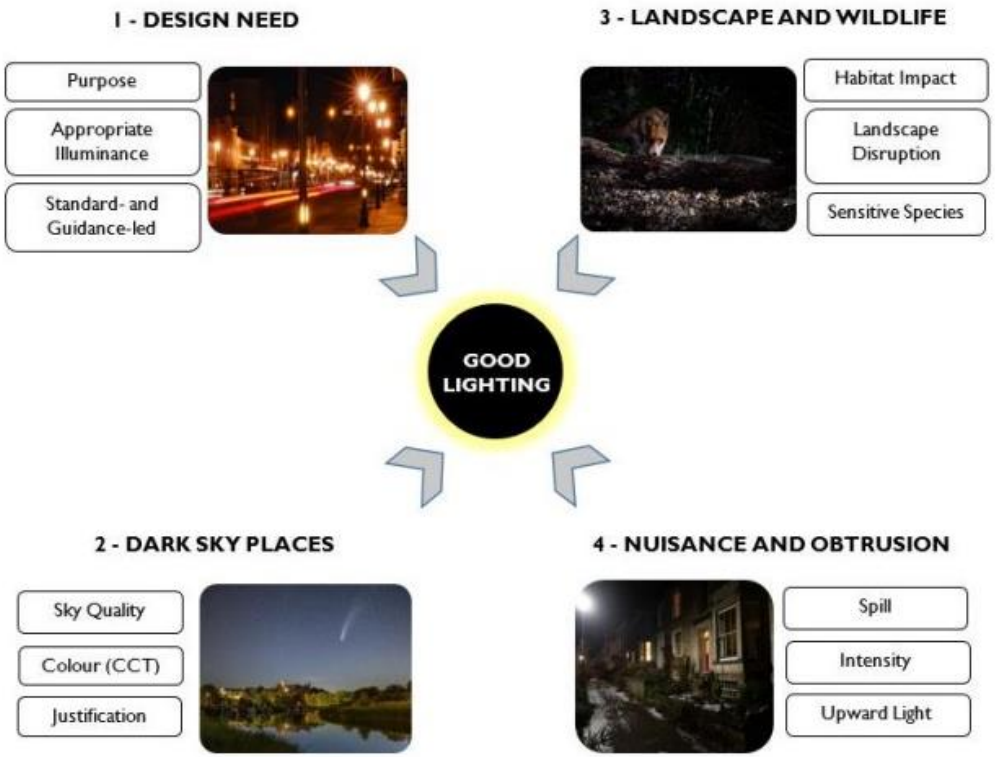


Fig 4: Spectral curve of LED lighting

Any benefits of otherwise good downward direction of light may be negated by blue-richness, over-brightness and glare.

Good Lighting Design

Good lighting design for dark skies needs to be well designed, meet existing standards and take into account the wider landscape. The four themes below are important things to consider when designing and assessing lighting schemes to minimise light pollution.



Lighting Assessments

Lighting schemes requiring planning permission should be accompanied by a thorough lighting plan / lighting assessment, usually prepared by a lighting designer.[7] The lighting plan / lighting assessment should following the guidance by the ILP *Guidance on Undertaking Environmental Lighting Impacts* and should include:

- A description of the need for the lighting;
- Confirmation that the scheme has been designed to confirm to Environmental Zone E1 obtrusive light calculations;
- The locational position of all proposed lighting;
- The installation details of all proposed lighting (angle, tilt, height);
- Technical specifications of the lighting including isolux, power, lumen output, colour temperature, CCT;
- A modelled illuminance plot of the proposal, detailing spill (including upward skyglow as upward light ratio %) and average illuminance against lighting guidelines;
- Baseline conditions, including details of any existing lighting, or any nearby lighting that is providing useful levels of ambient lighting, and baseline night-time photography from prominent view-tops;
- Proposed timings/curfew for proposed lighting;
- Assessment of residual impacts and landscape impact, including 3D rendered software representations for dark-sky locations.

The following sections of the guidance relate to specific lighting considerations for different development types, and signpost essential documents and other supporting resources to achieve good design.

[7] For example, the ILP maintains a directory of members Directory | Lighting Journal

Good Lighting Design – Location & Layout of Development

Landscape Character

While a lighting design can comply with all aspects of the technical specifications and minimise light pollution as far as reasonably practicable, nevertheless the presence of the lighting itself may cause a significant visual night-time impact on the landscape character of the High Weald AONB.

Regardless of design, there will always be some particularly sensitive areas of the High Weald such as the darkest areas of the AONB, topographically prominent areas, or those areas with particular wildlife sensitivities, where any lighting would be harmful to natural beauty, and inappropriate.

Location & layout of Development

The potential impacts of lighting on landscape character should be considered at the first stages of site assessment; when considering the suitability of the site for the development proposed:

- **Choose sites away from intrinsically dark rural skies for development types with heavier lighting demands;**
- **Floodlit sports pitches should wherever possible be sited in urban areas where there is already a high level of ambient sky glow;**
- **Choose sites away from wildlife sensitive areas, including ancient woodland;**
- **Consider the layout of the scheme; the location/orientation of buildings/roads/amenity space and their likely lighting impacts by way of lighting demands, light spill and visibility of light source.**

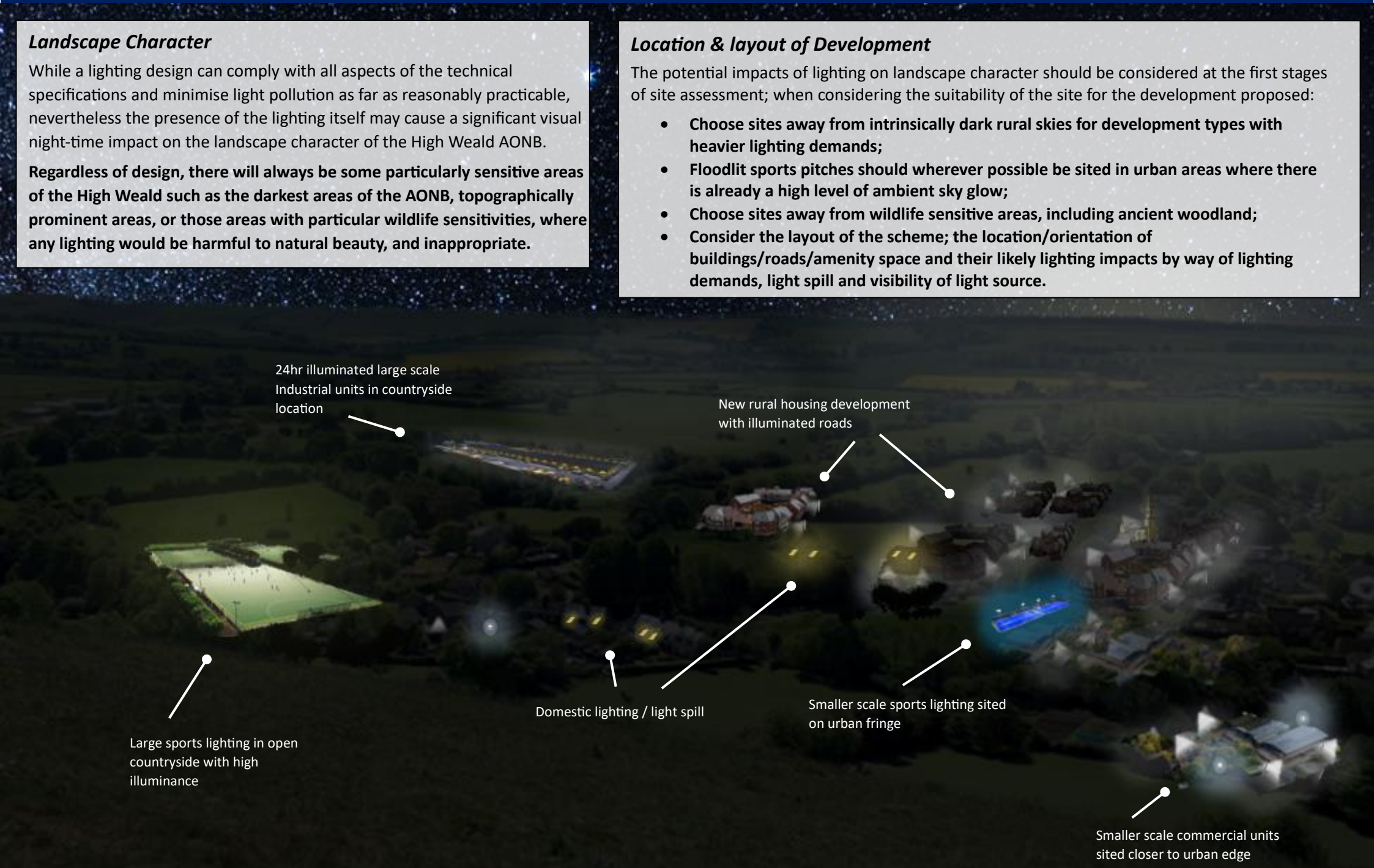


Fig 5: Illustration of lighting impacts of a variety of development types in different locations / landscape contexts

Good Lighting Design – Single Dwellings

Lighting associated with individual dwellings may cause light pollution from both externally fitted lights and from internal lighting spilling outside. The following considerations are important in considering proposals for new or replacement dwellings, including conversion, in the rural areas, both in terms of the appropriateness of the location for a new dwelling, the design of the building to minimise light spill, and the detail of external lighting proposals.

Key Checklist points:

- Avoid introducing light development into dark sky areas with new dwellings in remote or topographically exposed areas, or adjacent to wildlife sensitive sites
- Lighting is justified and decorative is minimal
- Use lights less than 500 lumens
- Angle lights downwards and choose fittings with zero ULR
- Use warm colour lights < 3000K
- Use PIRs or timers
- Minimise light spill by avoiding building designs with large areas of elevational glazing

External Lamp fittings

External light fittings should be minimised on dwellings in rural areas both to maintain dark skies and avoid suburbanisation of the night-time landscape character. In particular, lighting of driveway entrances on rural roads, and along driveways, should be avoided, as should uncontrolled decorative lighting, or overly bulky and utilitarian lighting.

The lowest possible lumen output should be used to generate required lux levels. 500 lumen output is sufficient for most domestic purposes, and the IDA advises that any lights above 500 lumens be installed with fully cut-off or “shielded” luminaires. Domestic fittings should be chosen that have zero upward light and reduce glare.

Spill from interiors

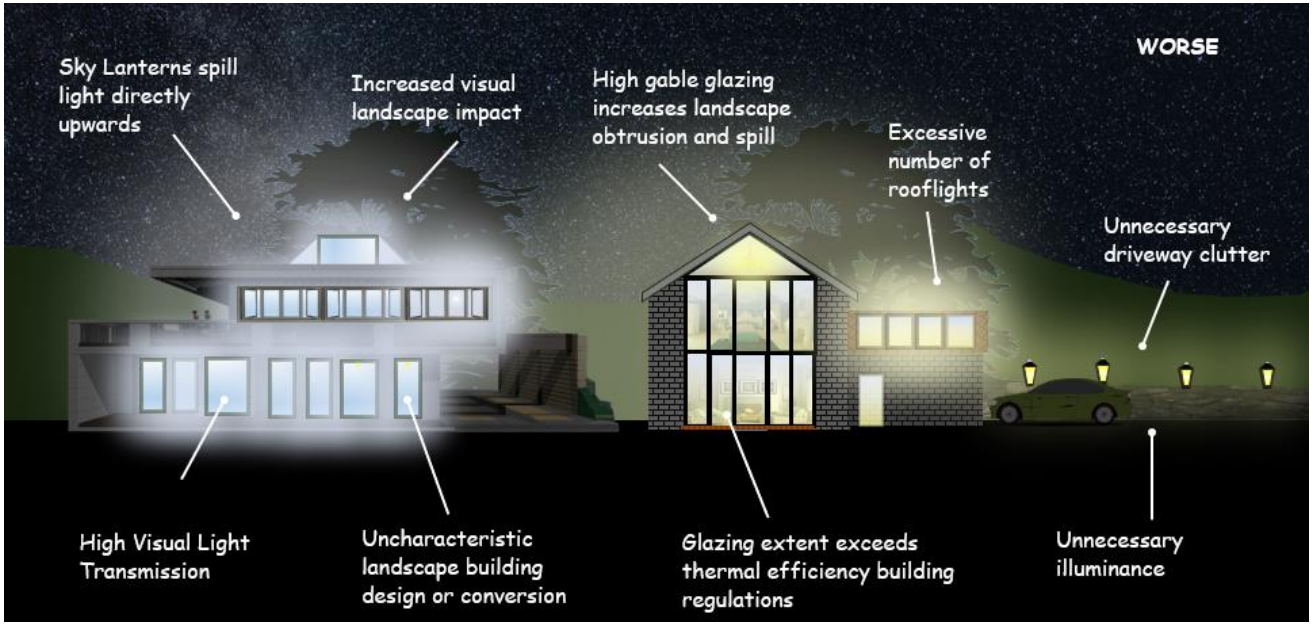
Light spilling out from inside dwellings can create significant amounts of light pollution, having a significant adverse impact on night sky quality and the integrity of a dark landscape in a rural context, similar to external lighting.

Light spill is affected by the amount of glazing; with normal domestic glazing, relatively small scale, the landscape impact is usually low. However, with the large, contemporary style of domestic glazing where significant proportions of elevations are glazed, the landscape impact is greater, as there is more potential for harm. A further consideration is the landscape impact of domestic scale rooflights and lanterns, as the angle of the rooflights can increase the impact of light spill more than vertical glazing.

Potential considerations of light spill on landscape character and mitigations include:

- Does the quantum of light spill in the context mean the proposed location/design of development is not appropriate, with regard to the character and context of the setting?
- The overall glazed area should always be less than 50% of the total elevation area, and large continuous areas of glazing (wide expanses or floor-to-eaves) should be avoided in the elevational design. The exception is in glazed cart-bay entrances to converted barns, where the recessing of the glazed screen can help shade and minimise light spill, and where rooflight can be deployed to minimise the need for new openings in walls that would harm the traditional agricultural character of the barn.
- While operational measures such as blackout blinds and shutters **cannot be used as mitigation for inappropriate light spill** – while they can be effective, they are entirely dependant on behavioural habits of the building user, and as such cannot be used as conditions on planning permissions as they would fail tests of reasonableness and enforceability.

Additionally, different methods can be used to control the transmission of visible light through the glass. Glazing manufacturers provide a range of Visible Light Transmissions (VLT), and this VLT value of glass can be selected to minimise glazing impact while providing sufficient visible light for the purpose. Domestic glazing should aim to be less than 0.7 VLT. **However, it should be noted that even with meeting this VLT there could still be an adverse landscape impact on the AONB.**



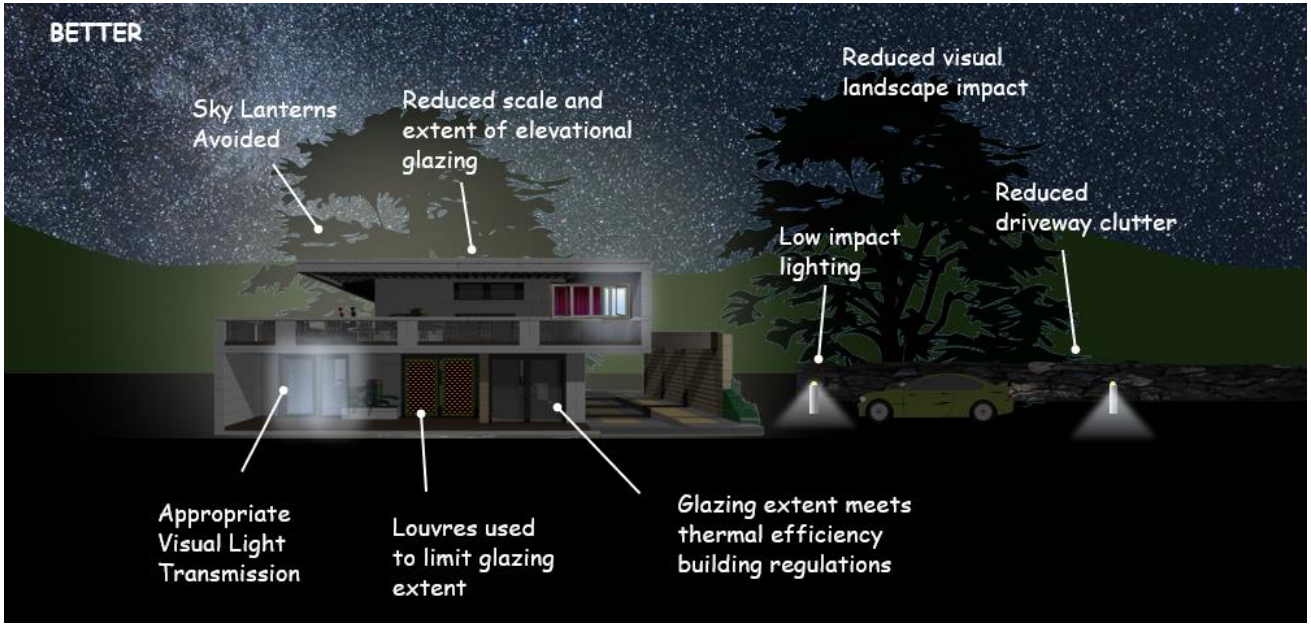


Fig 6 (above) and Fig 7 (below) illustrating principles of worse and better approaches to minimising light spill and light pollution from individual dwellings and external lighting schemes associated with them.

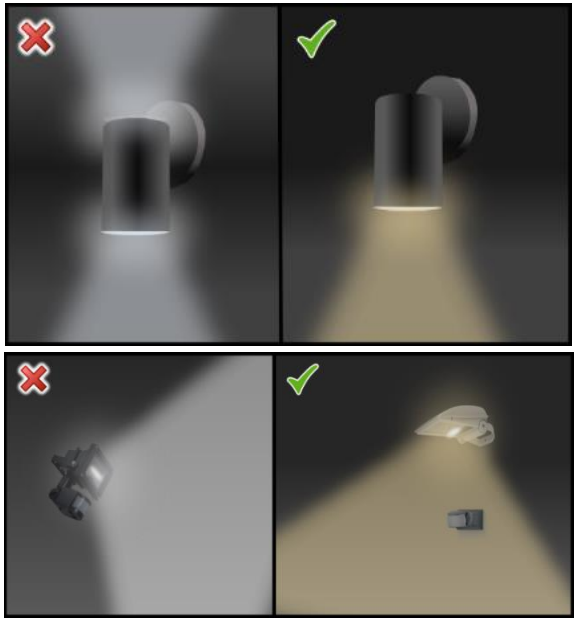


Fig 8: external lighting fittings – right hand images show directional, shielded light creating less upward skyglow.

Good Lighting Design – Housing Developments

New housing developments associated with the largely unlit rural villages of the High Weald have the potential to create light pollution and adversely affect the dark skies of the AONB in a number of ways, including light spill from dwellings themselves, and from street lighting and amenity lighting. In addition to those considerations for individual dwellings, described in the previous pages, the following points should be addressed:

Key Checklist points:

- Developments located away from dark sky sensitive areas e.g. ancient woodland and wildlife-rich sites and habitats
- Avoidance of inappropriate light development into dark sky areas with new dwellings in remote or topographically exposed areas, or adjacent to wildlife sensitive sites
- Design site layout to minimise light spill
- Use domestic lights less than 500 lumens
- Shield any lights above 500 lumens and angle lights downwards
- Avoid tall street-lighting columns where possible
- Use PIRS and low level bollards with timers for amenity routes and spaces
- Illuminance standards are referenced for road lighting

Location of development & Site Layout

The potential for light pollution should firstly be considered at site allocation stage, or as part of the consideration of the suitability of the site for development in the AONB. In this regard, highly visually exposed sites such as those on ridge-tops, should be avoided, along with sites in close proximity to dark sky sensitive areas such as ancient woodland or designated protected wildlife areas.

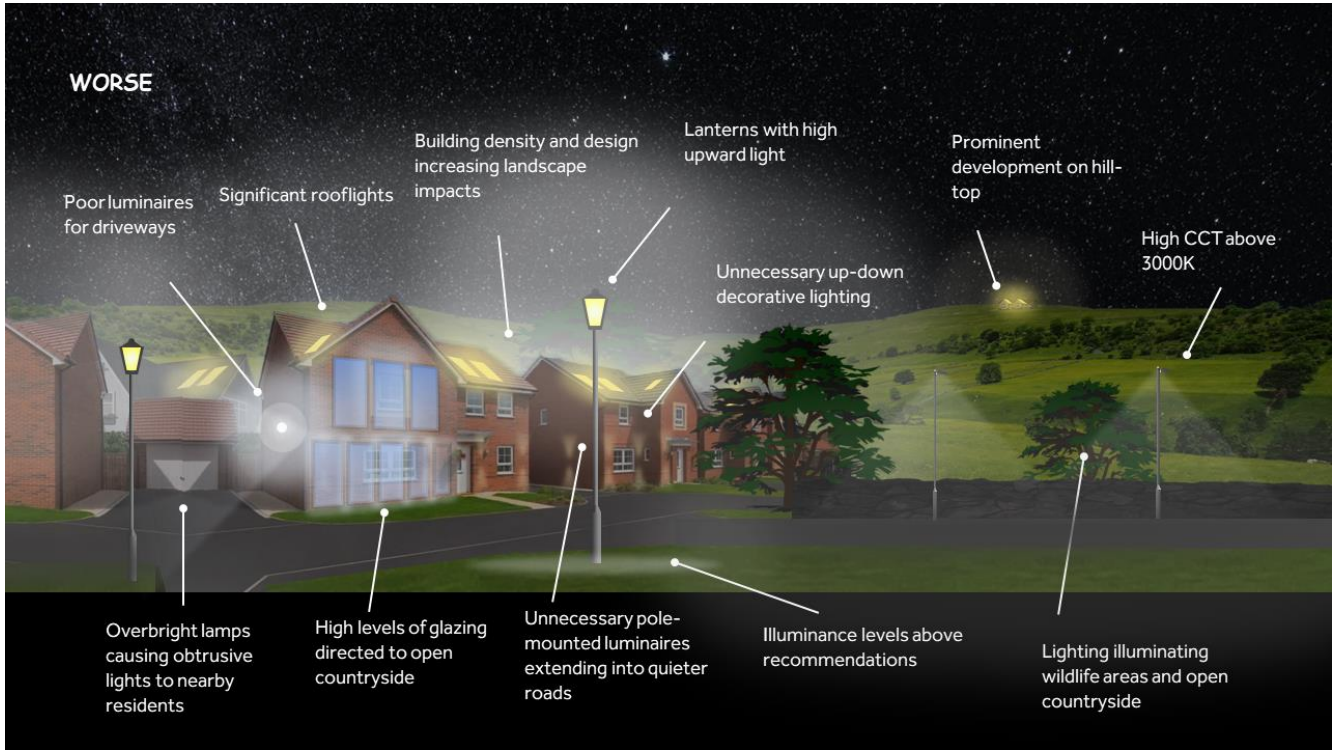
Site layouts should seek to minimise adverse impacts of lighting, including light spill, by the orientation of streets and buildings, and the design of junctions, to protect wildlife-rich sites and habitats from external lighting, as well to avoid the urbanisation of landscape character in and on the edge of rural settlements.

Street Lighting & Amenity Lighting

There is no statutory requirement on local authorities in the UK to provide public lighting; while 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; highway authorities' duty of care to the road user does not require public lighting.

Street lighting should not be considered as required in all cases; it is uncharacteristic of settlements in the High Weald, and should be avoided where possible. Local Highways Authorities' street lighting design guides can be used to determine design parameters, and any street lighting required for round-a-bouts or junctions on adopted roads, or for new pedestrian crossings, should be kept to the minimum necessary and should adhere to best practice in terms of location, illuminance and equipment design and light temperature, to avoid unnecessary skyglow and light spill. 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 the urban settlements that point to dark zones.

Where lighting is needed, minimised and ecologically informed lighting schemes should be devised, regarding location of lighting, direction, lux levels, colour temperature and light fitting design. Within new developments, a range of lighting solutions can help illuminate amenity routes and spaces whilst limiting the total lumen output, possible glare scattering and reduce the surrounding impact. For example, using PIRs affixed to individual buildings and low-level bollards or ground recessed side-beam luminaires, rather than tall, brighter columns which have heightened visibility in the landscape, and greater glare. (Sources further away from the surface require brighter lights with a greater source intensity than those closer to ground level to achieve the same illuminance, so installations should be as close to ground level as practicably possible.) Bollards can also be fitted appropriate electronic gear that can control dimming or the switching times. However, bollards may not be appropriate in the vicinity of certain wildlife habitats (e.g. bat river routes), where ground recessed side-beam luminaires might be used instead.



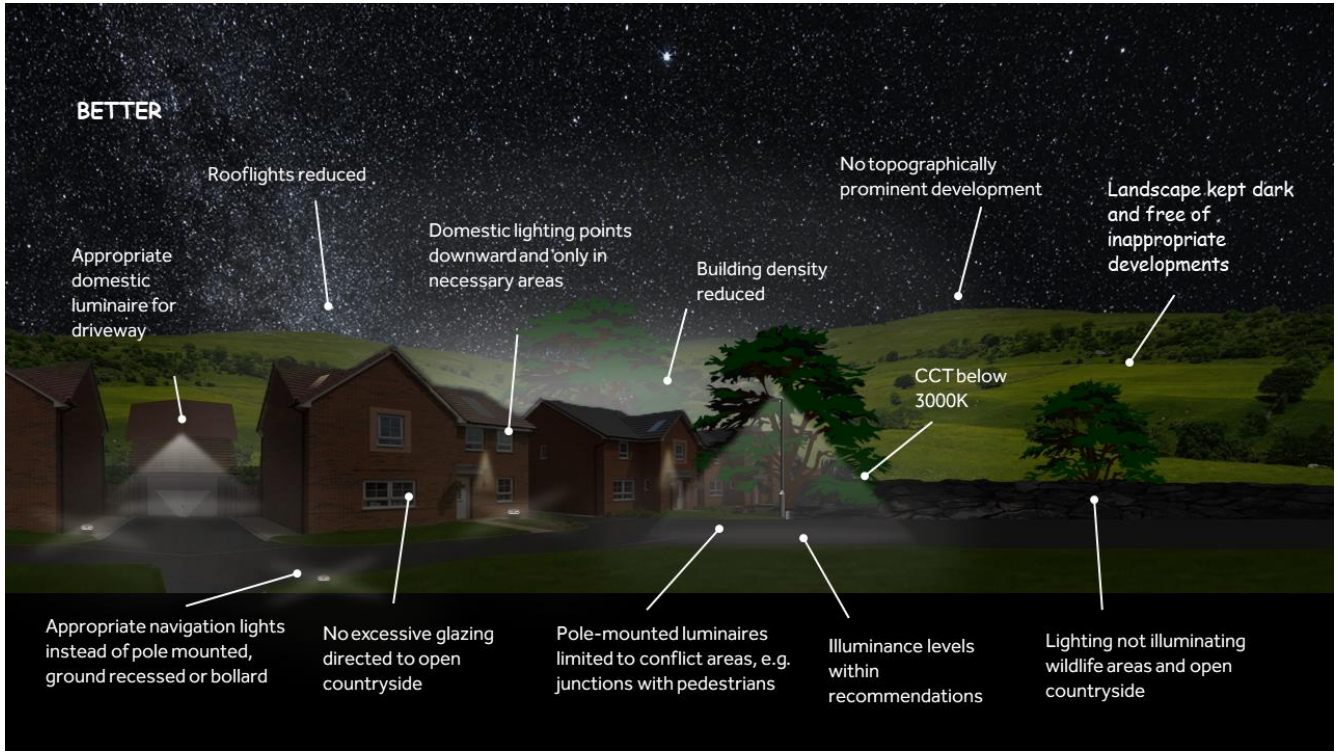


Fig 9 (above) and Fig 10 (below) illustrating principles of worse and better approaches to minimising light pollution from housing developments and external lighting schemes associated with them.

Fig 11: street lighting and bollard lighting - directional, shielded light installations create less upward skyglow.

Good Lighting Design – Outdoor Sports Grounds

Amenity floodlighting, particularly sports pitches, be they associated with community facilities, MUGAs, or with schools' facilities, are one of the biggest threats to dark skies. While the installation can be compliant with dark sky criteria the level of residual surface illuminance may present a significant risk to the AONB, particularly in dark locations. Such lighting installations may not be appropriate.

Lighting designs will be different between sports, but key principles for new and upgrading of existing facilities apply throughout.

Key Checklist Points:

- Design Scheme illuminance levels in accordance with standards for the specific sport/activity. e.g. **Sport England Design Guidance Note**
- Hours of lighting are limited and appropriate
- Site sports grounds closer to built-up locations and away from sensitive areas such as ancient woodland
- Low reflective surfaces (colour and type) used
- Light fittings emit 0% upward skyglow and use shielding
- Height of columns to minimum required
- The CRI is appropriate for the level of play with lowest CCT achievable
- Lighting report shows obtrusive light calculations for nearby receptors.

Lighting schemes for new or updated outdoor sports facilities should be prepared by a qualified lighting designer who is experienced in dark skies lighting. Where the scheme is designed by the lighting product manufacturer, they should be made aware of the above principles and requirements, ideally at an early stage of the design process.

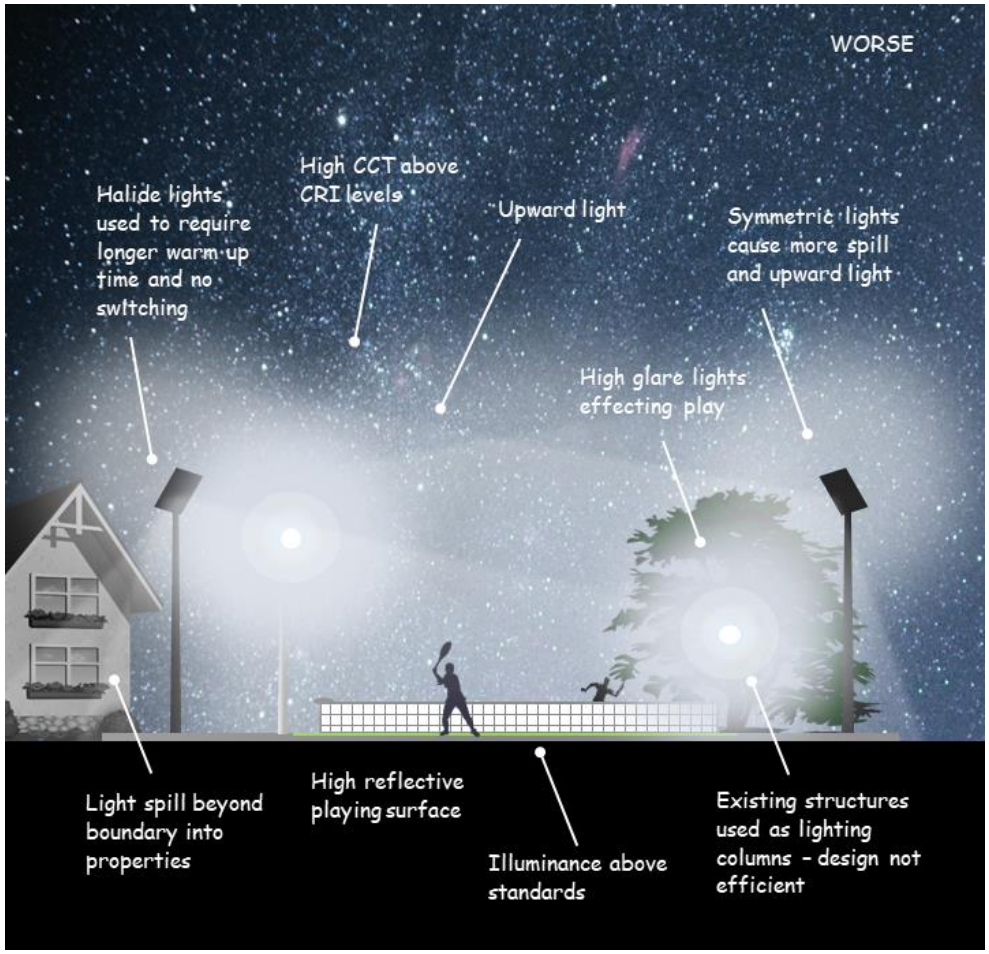
Sport England have produced the useful guidance note: *Sport England – Design Guidance Notes: Artificial Sports Lighting*. of which section 4.0 covers Outdoor Sports Lighting.

The document sets out principles for good lighting design and contains useful advice regarding appropriate lighting levels. It provides details on minimising light spill and glare through the careful design of lighting installations, identifies those activities that have special requirements, and provides recommended illuminances for specific sports and activities. It is important that sports lighting is appropriate for the level of play (e.g. community amenity or league) and that the CRI levels maintained. The lowest CCT levels should be used for the required CRI levels.

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 AONB.

Floodlight fittings used should be those where the front glass is designed to be used in the horizontal position, often referred to as "flat glass" or Full Cut-off types. They are especially useful for illuminating large areas such as car parks or sports pitches where you don't want any upward light.

External lighting at sports grounds should be controlled via automated switch-offs when not being used and after the approved hours of operation, to avoid them inadvertently being left on later in the evening/night-time. Additional conditions should be added to any planning permissions granted, to limit the use of any lighting to the approved hours of operation only, in order to protect the dark night skies of the AONB. The proposed timing/curfew for proposed lighting might vary from summer to winter and seasonal use, since the degree/timing of night-time darkness varies throughout the year, and should be chosen to minimise adverse impact on dark night skies and on nocturnal wildlife.



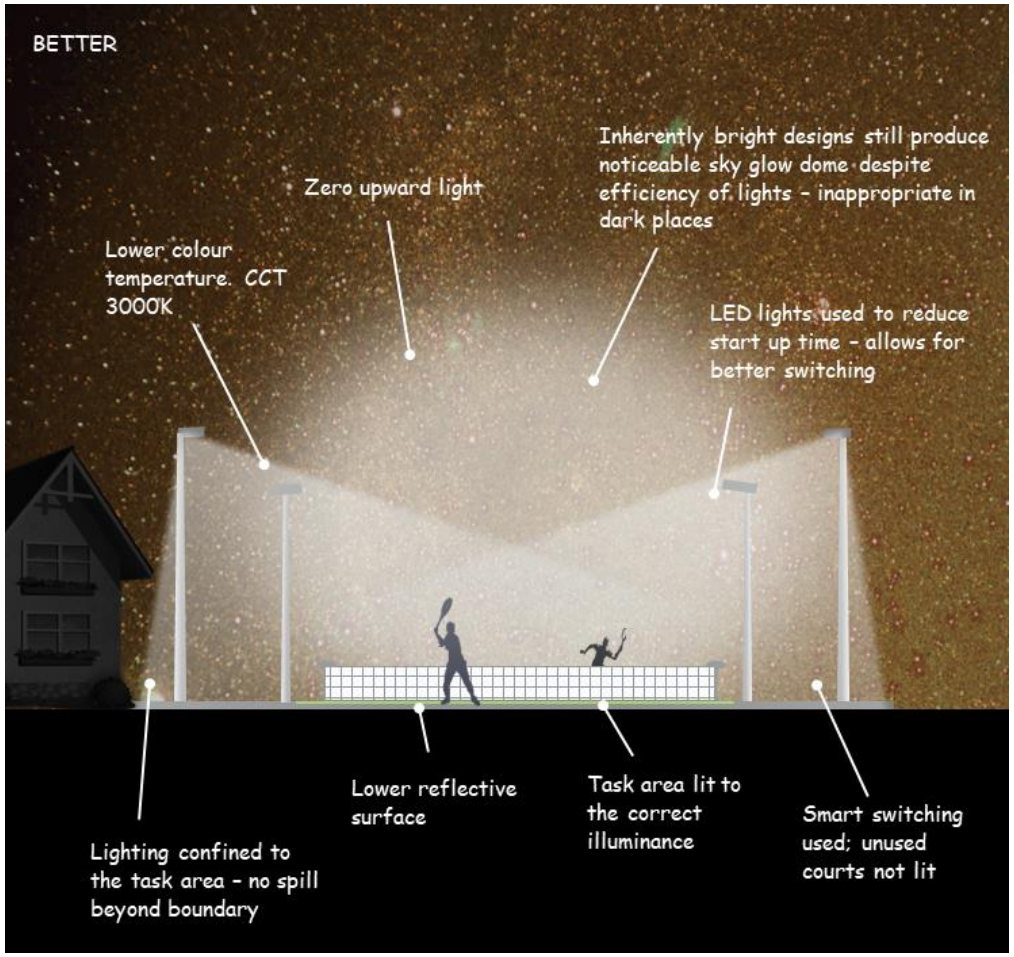


Fig 12 (left) and Fig 13 (right) illustrating principles of worse and better approaches to minimising light pollution from sports playing facilities and external lighting schemes associated with them.

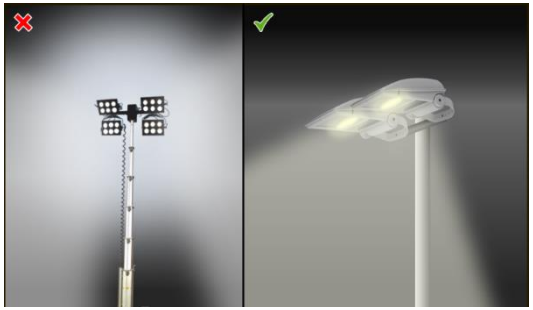


Fig 14: directional, shielded light installations create less upward skyglow.

Good Lighting Design – commercial, industrial and community buildings

Lighting installations associated with commercial and industrial buildings and activities in the High Weald AONB generally comprise those associated with farm buildings and farm complexes, rural business parks, utilities and waste infrastructure, community buildings and facilities such as schools and car-parks, including EV charging points, and rural leisure operations such as golf courses and equestrian facilities.

While the size and scale of commercial and community developments 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). The 'Planners' Checklist' set out in this guidance should also be followed.

Key Checklist Points:

- Lights are justified and have a commercial purpose
- A lighting designer is used except for small scale, limited number of minor domestic style lights.
- Shield any lights above 500 lumens
- Angle lights downwards
- Avoid tall lighting columns or high fixing positions of luminaires
- Use PIRs or timers
- Turn off lighting at close of business
- Locate developments away from dark sky sensitive areas e.g. ancient woodland
- Any commercial greenhouse should have zero light spill.

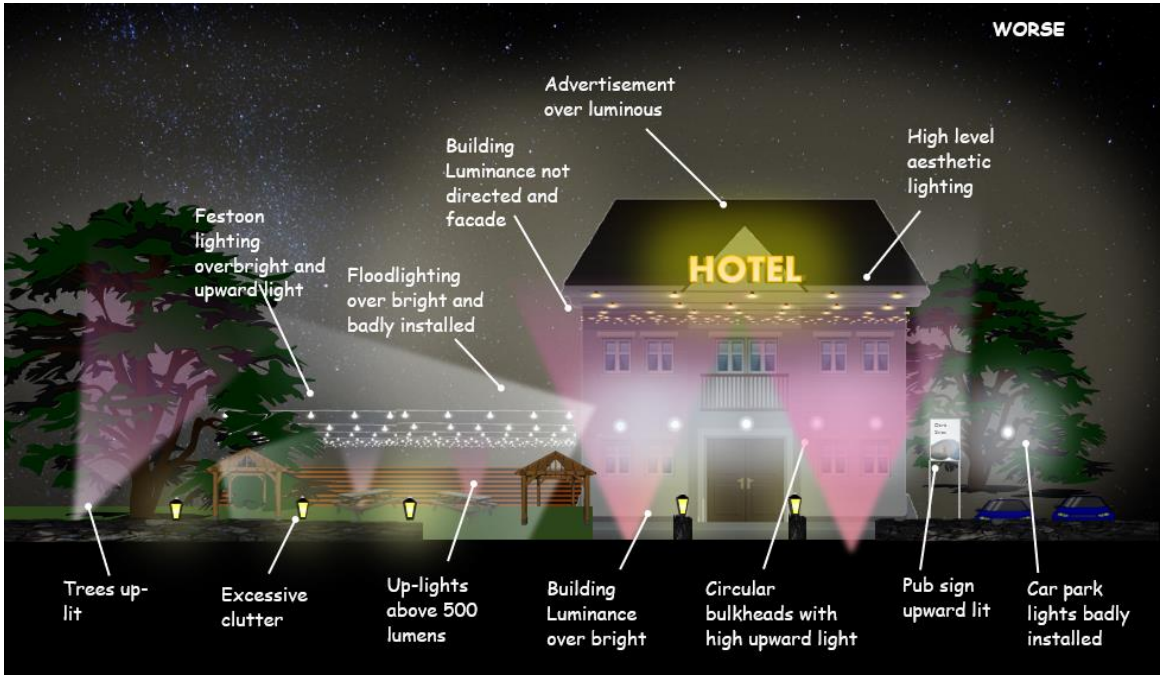
Illuminated Signage and Advertisements

Illuminated signs should generally be avoided within the High Weald AONB as an E1 lighting zone. However, Local Planning Authorities may include lighting policies in their Local Plans, and there may be some village and town centre locations where sensitively designed, time-controlled lighting to signage may be considered.

In these cases, the ILP Professional Lighting Guide 05 'The Brightness of Illuminated Advertisements including Digital Displays' should be used to determine the appropriate level of illuminance - the guide sets a maximum permitted recommended luminance of 100 candelas per square metre, cd/m^2. This is a measure of the "objective brightness" of the sign.

Additional High Weald AONB guidance.

- Proposed lighting should also be considered within the context of the character of the location; village and area, in particular where it would impact on heritage assets.
- All illuminated advertisements installed on properties should be switched off on close of business.
- Any installations on properties should not exceed the height of the property.
- Any peripheral sites with installations should not face towards areas of darkness or lower environmental zones.
- Up-lighters or any other fixing which would create upward skyglow should not be used.
- Lighting should be designed with a colour temperature CCT of below 3,000K.



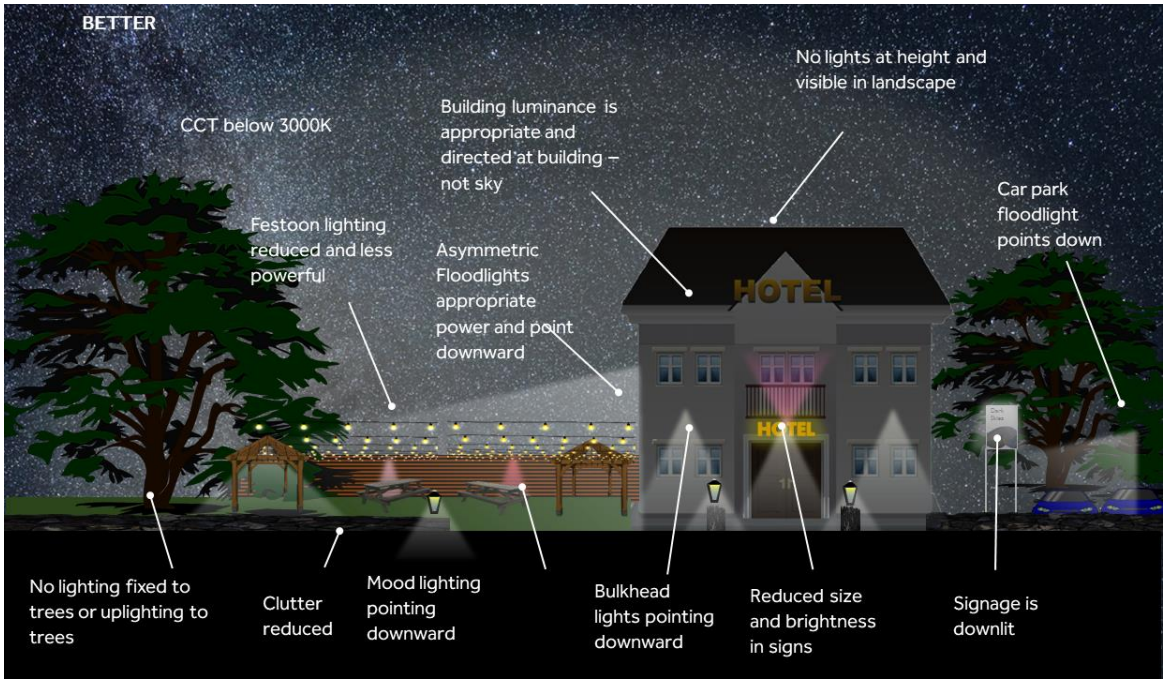


Fig 15 (above) and Fig 16 (below) illustrating principles of worse and better approaches to minimising light pollution from smaller commercial developments such as pubs, retail, tourist accommodation development, small-scale community facilities, and the external lighting schemes associated with them.

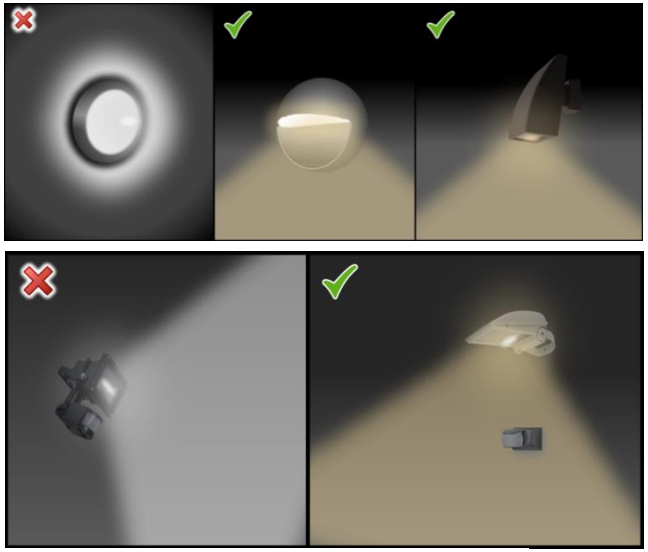
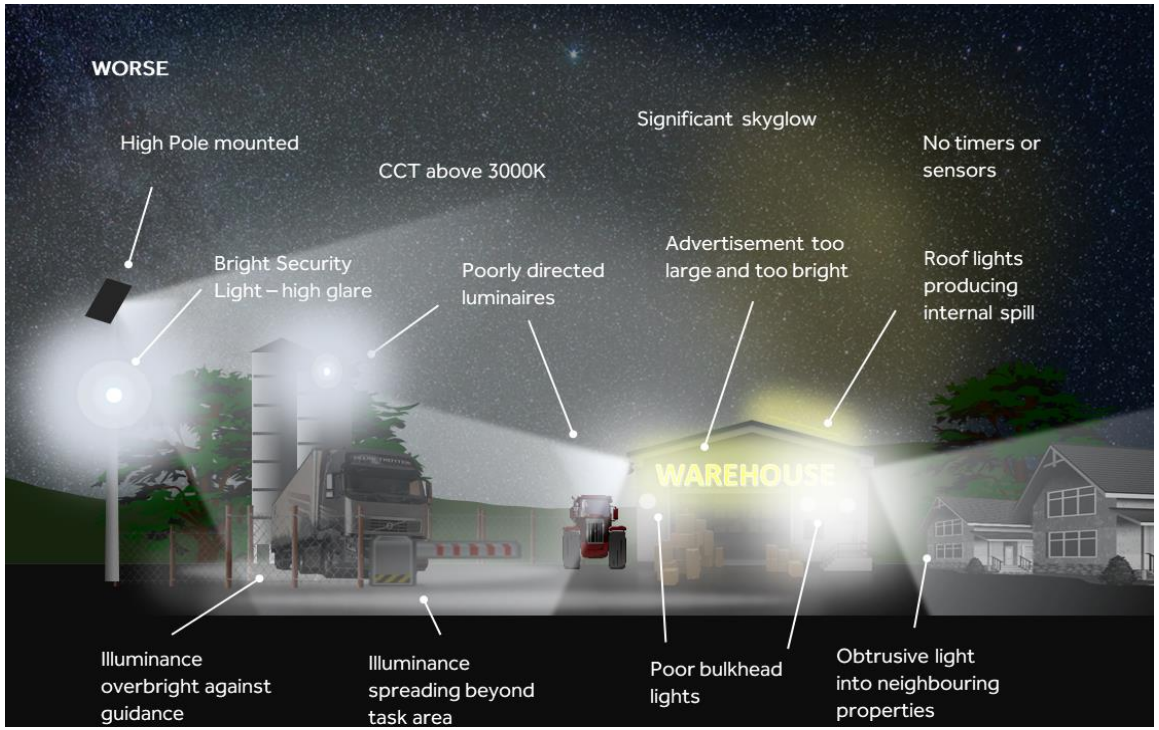


Fig 17: directional, shielded light installations create less upward skyglow.



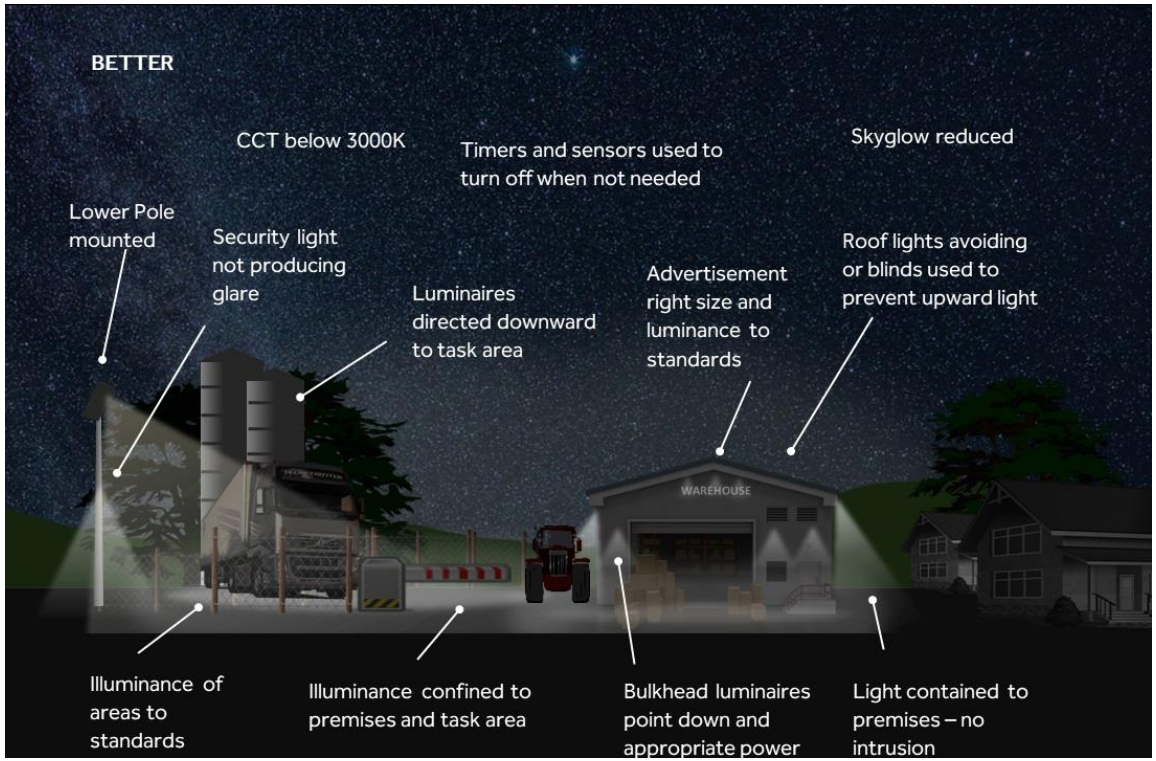


Fig 18 (above) and Fig 19 (below) illustrating principles of worse and better approaches to minimising light pollution from larger commercial/industrial developments such as offices, warehouses, workshops and distribution centres and the external lighting schemes associated with them – the principles apply equally to rural agricultural complexes, equestrian facilities, and to community buildings such as schools, car-parks and leisure facilities.

Festivals, events & 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.

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 been 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 AONB 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.

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. Designs should avoid fixing lights to trees, where they could have harmful impacts on wildlife, particularly nesting birds and bat roosts.

Surfaces

The type of surface can impact on 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)

Temporary Floodlighting

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 seen 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 useful information can be found in the South Downs National Park Design Guidance for events, creative commissions, and lighting festivals in dark skies.

Lighting Product types & Mitigation

Lighting fixtures, known as 'luminaires' fall into two categories:

- Symmetrical Luminaire: This is where light is directed in a symmetrical pattern around the luminaire and are useful for lighting large areas to a high level of uniformity, such as decorative installations. The luminaire design should not cause undue levels of obtrusive light.
- Asymmetrical Luminaire: Road lighting and area floodlights typically use asymmetrical fittings that direct light in a certain path, either along the road, sports courts or buildings. The use of asymmetrical luminaires allows the design to minimise light spill in unwanted areas or to provide high luminance levels in particular areas. Off-the-shelf security lights are fitted with asymmetrical design and as such should be installed correctly to only light the intended task areas.

Luminaires can have a variety of glass features and optics that alter the path of light and can be classified according to the amount of light glare, backward spill and upward light. All luminaires should be fully shielded to comply with the upward light E1 criteria within Table 1, to avoid illumination above the horizontal plane passing through the lowest light-emitting portion of a fixture.

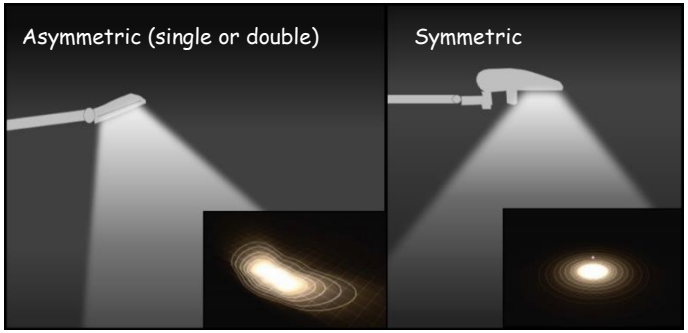


Fig 20: Asymmetric and Symmetric lighting fittings

Shielding

Lighting impacts on both installations and reflections can be mitigated using physical barriers to an observer. These are particularly important where installations are in locations which can be seen from surrounding viewpoints, and might include:

- Cowls or baffles affixed to the installation at source.
- Introduction of a separate physical barrier such as a tree/hedge line or fencing to soften the impact. **However, established woodland or wildlife areas should not be considered as a barrier.**

When selecting shielding, it is important to choose types that do not stand out in the daytime. Some options can be intrusive, particularly on halide lights – LED lighting offers lighting options that will limit the need for additional shielding.

Proximity and Timed Circuits and Sensors

Where possible, proximity PIR (Passive Infra-Red) sensors should be fitted to external lighting. This will minimise the amount of time the light is on for and greatly reduce the impact of pollution. Timed circuits should be used with these, to prevent lights from being needlessly on after a certain time so they will only trigger when needed and won't come on at night. Effective motion sensors can be effective in deterring crime.

Automatic Dusk till Dawn (low light) sensors fitted to lights should be **avoided** unless fitted with a separate curfew switch. They cause lights to be illuminated all night as they will detect the onset of sunset and sunrise and trigger a light to switch on and off.

Lights-Off Curfews

To prevent waste and excessive areas of light pollution, curfews should be considered as significant lighting controls; the best light to protect dark skies, is a light that isn't on.

All external lighting schemes should include a curfew, preferably using the most beneficial to dark skies. Curfews can be applied at various times during the night and the year, since the degree of night-time darkness throughout the year will vary according to the angle of the sun below the horizon. Around midsummer, for example, it never gets truly dark, while during the peak astronomy season in winter, astronomical observations can be made earlier in the evening, requiring earlier times on lighting controls.

In E1 Zones (Intrinsic rural dark skies), evening curfews should provide some lighting access for early evening and commuter times, but not impinge on earlier astronomical opportunities. Curfew times should be set as early as possible as and no later than 8pm, except in summer.

Building luminance

Buildings are often lit to create a sense of place or to emphasise architectural structures. While this style of lighting can be appropriate and effective in urban environments, it is not appropriate in the dark sky areas of the High Weald AONB. The light from the building surfaces will scatter light in all directions creating sky glow and prominent luminance in the landscape. Luminance should comply with Table 1.

Visible Light Transmission (VLT)

Not all glass is the same. Different methods can be used to control the transmission of visible light through the glass. Glazing manufacturers provide a range of Visible Light Transmissions (VLT), and this VLT value of glass can be selected to minimise glazing impact while providing sufficient visible light for the purpose. Glazing should aim to meet the 'target VLT' for typical glazing types shown below, especially in dark landscapes.

- Visible Light Transmission (VLT) is a ratio/percentage that indicates the proportion of light passing through. It is usually expressed as a number between 0 and 1, where the higher the value, the more light passes through. The lower the number the less internal spill.
- All glazing has a potential landscape impact either by disrupting the dark landscape with point sources, or through the spill of light into the air. Generally, smaller glazing areas with lower internal illuminance levels will disrupt the landscape less and have a lower impact. Larger glazed elevations with brighter internal illuminance will stand out more and pollute more. **It should be noted that even with the appropriate VLT there could still be an adverse landscape impact on the AONB.**

Glazing Type	**Potential Landscape Impact (N.B. depends on site/location context)**	**Target VLT**
Normal Domestic Glazing	Low impact	~0.75
Large, continuous domestic glazing	Medium/high impact	0.4 to 0.65
Domestic roof lights and lanterns	Medium impact	0.4 to 0.65
Structural glazing	Very high impact	~0.4

Further Reading / References

Government Departments & Agencies

- National Planning Policy Framework 2023
- Statutory Nuisance from Insects and Artificial Light – Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005
- Lighting in the Countryside: Towards good practice (Countryside Commission, 1997) - *(Out of Print but available on www.communities.gov.uk/index.asp?id=1144823)*
- English Heritage: External lighting for historic buildings (2007)
- Sports England: Artificial Sports Lighting (2012)

BSI Standards Publication

- BS 5489-1: 2013 Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas) For specific dark sky reference, see Section: 4.3.5: Obtrusive Light)
- BS EN 13201: 2015 Road lighting – Parts 2, 3 and 4
- BS EN 12193: 2007 Light and lighting – Sports lighting
- BS EN 12464-2: 2014 Lighting of work places – Outdoor work places

CIBSE/SLL Publications:

- CLL Code for Lighting (2022 edition)
- The Lighting Handbook (2018 edition)
- LG0 Introduction to Light and Lighting (2017)
- LG1 The Industrial Environment (2012 edition)
- LG4 Sports Lighting (2023 edition)
- LG6 The Exterior Environment (2016)

CIE (International Commission on Illumination) Publications:

- 001 Guidelines for minimizing Urban Sky Glow near Astronomical Observatories
- 92 Guide for floodlighting (1992)
- 115 Recommendations for the lighting of roads for motor and pedestrian traffic – Second Edition (2010)
- 126 Guidelines for minimizing Sky glow (1997)
- 150:2017 - Guide on the limitations of the effect of obtrusive light from outdoor lighting installations (2nd ed)
- 154 The Maintenance of outdoor lighting systems (2003)

ILP Publications:

- Guidance Note 1 for the reduction of obtrusive light 2021 | Institution of Lighting Professionals (theilp.org.uk)
- Guidance Note 8 Bats and artificial lighting | Institution of Lighting Professionals (theilp.org.uk)
- Guidance Note 9 Domestic exterior lighting: getting it right | Institution of Lighting Professionals (theilp.org.uk)
- The Outdoor Lighting Guide | Institution of Lighting Professionals (theilp.org.uk)
- PLG04 GUIDANCE ON UNDERTAKING ENVIRONMENTAL LIGHTING IMPACT ASSESSMENTS | Institution of Lighting Professionals (theilp.org.uk)
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Published by the High Weald Joint Advisory Committee on behalf of: