Submission ID: SCDEDE22B

In response to the Examining Authority's written questions 2 the Dedham Vale National Landscape and Stour Valley Partnership wish to make the following comment to question LV 2.4. The Partnership considers that when undertaking detailed design of link pillars and compounds sufficient weight should be given to National Landscape guidance relating to use of colour in design and the National Landscape lighting guide-attached to this submission

Dedham Vale Area of Outstanding Natural Beauty

Guidance on **the selection and use of colour** in development

Guidance

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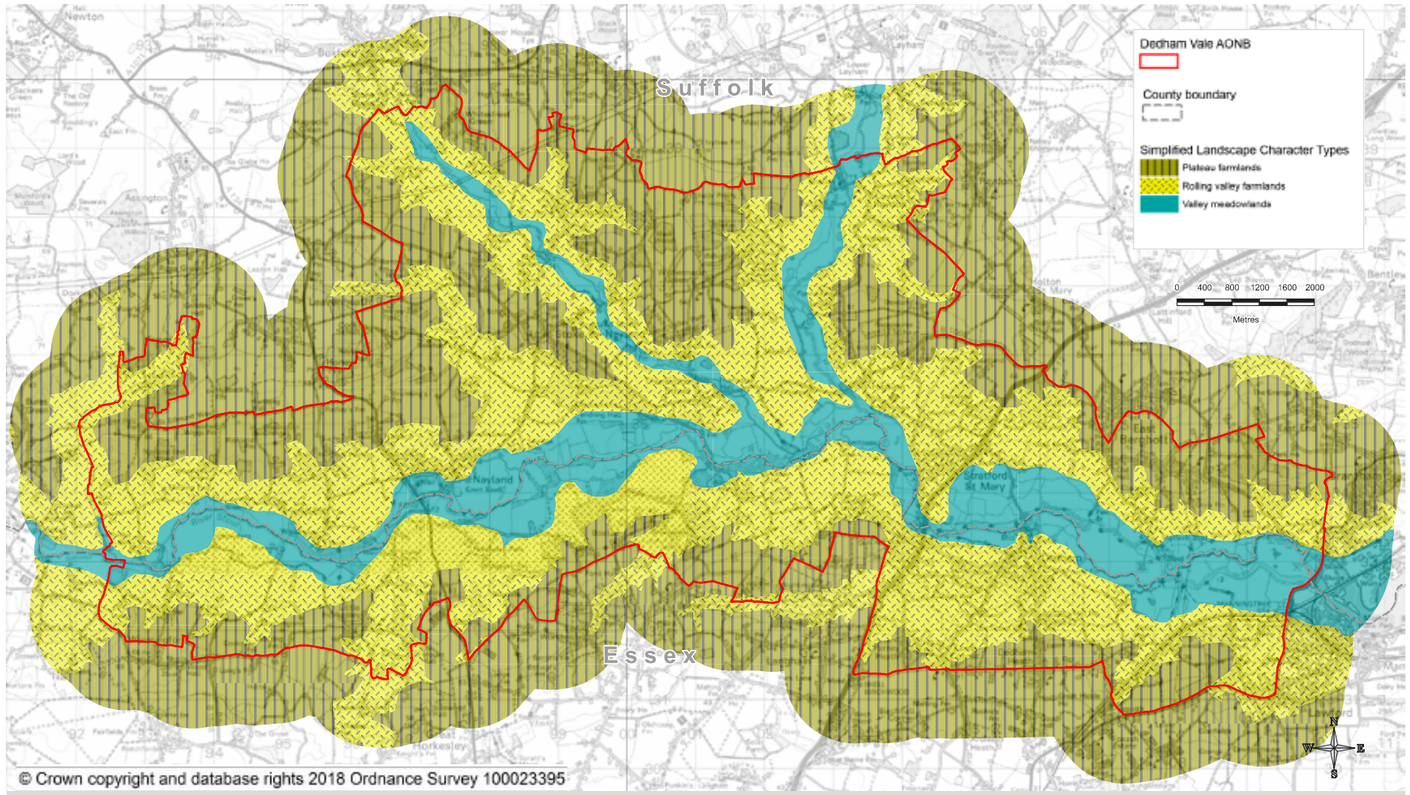
DEDHAM VALE
AREA OF OUTSTANDING NATURAL BEAUTY

Guidance on the selection and use of colour in development



A larger scale map is shown on page 3 to help you locate your site

Structure of this document

The guide is in two parts:

The Survey is a reference document which sets out the site survey work, illustrating the collection of colours from each landscape character type within the AONB. Site photographs and collected colours appear in sequence and culminate in a range of colours, the existing palette, that best represent the dominant colours and tones of that character area. The reference document is included with the guidance, to illustrate the provenance of colours, to offer visual inspiration from naturally occurring colour combinations, and to refresh people's familiarity with the AONB landscapes.

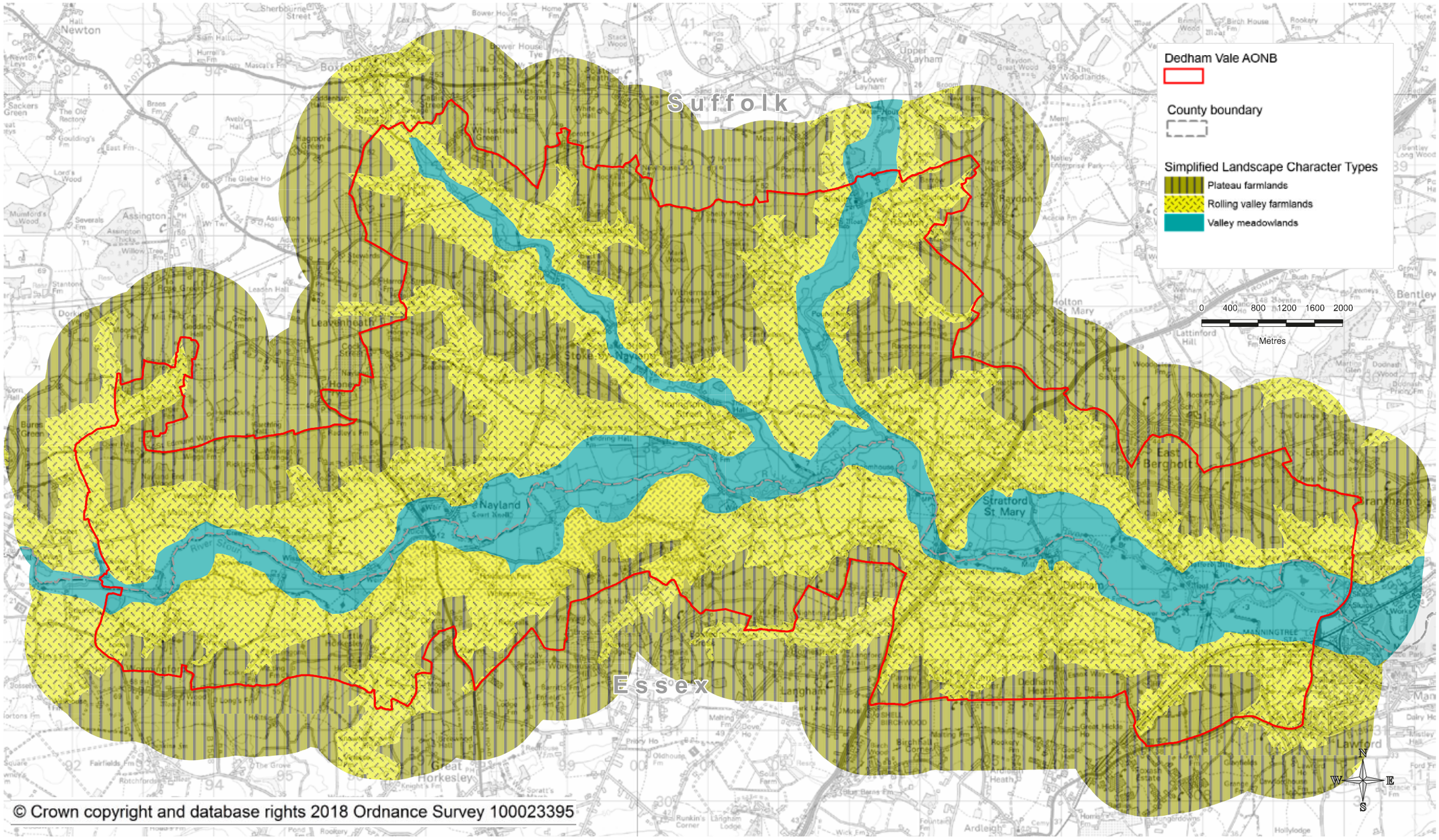
The Guidance offers colour guidance in two forms, the colourways and the developed palette. The existing palettes present information on the range of colours against which new development may be viewed. Based on these the guide presents developed palettes which contain a range of related colours which will work harmoniously with these existing colours.

The colourways offer examples of how colours selected from the developed palette may be put together to achieve harmonious and interesting results when applied to building elevations. Both documents offer advice on the principles of exterior colour design by highlighting a series of issues which should be considered when detailing a development.

This map illustrates the landscape character types of the AONB. Locate your development site and then follow the palette guidance associated with that area. In some cases the landscape character types have been grouped together in the developed palettes because of the similarities of their existing colour ranges. Consulting both survey and guidance will give you a clear understanding of the colour context, and help you make appropriate choices for your development.

Produced by Waygood Colour for Dedham Vale AONB, July 2018

Landscape character types for Dedham Vale AONB



1
Colour and the landscape

The landscape of Dedham Vale has been designated as an Area of Outstanding Natural Beauty (AONB) with the primary purpose of conserving and enhancing its natural beauty. Both natural and cultural influences have combined to produce the landscape that is so highly valued today.

1.1 Introduction

The Dedham Vale AONB is a subtle lowland river valley with an assemblage of features associated with this landscape still in place and intact. These features include a gently winding river and tributaries; gentle valley sides with scattered woodlands; sunken rural lanes; picturesque villages with imposing churches and historic timber framed buildings; scattered farmsteads and agricultural buildings; small fields enclosed by ancient hedgerows; riverside grazing meadows with associated drainage ditches and visible and hidden archaeology providing evidence of human habitation over previous millennia.

The area remains an overwhelmingly agricultural landscape, free of incongruous development and large scale industrial developments. Despite some intrusions of human activity in the twentieth and twenty first centuries, the area retains a rural charm and tranquillity and is largely free of infrastructure associated with modern life.

The essential character of the Dedham Vale AONB was established in the middle of the previous millennium and has remained intact despite social, technological events. The fundamental beauty of the area and the scenes of a working landscape were captured by England's finest landscape artist, John Constable RA. The sites of those outdoor paintings are still recognisable in the heart of what is now the AONB.

Colour makes a key contribution to the landscape character and local distinctiveness of the area. As well as the seasonal colours of spring and autumn, the geology and topography, soil, land cover and vegetation give rise to a variety of colours all of which characterise the area. New colours have been introduced as a result of agricultural practice, land-use, local building materials, infrastructure, and industry and, in combination, these have created a rich and unique palette of colours, which helps to define the character and the distinctiveness of this part of Britain.

A recent analysis of natural beauty within the AONB identified the strong presence of the indicators of special qualities. The analysis demonstrates that, of the six factors which contribute to natural beauty, Dedham Vale is particularly valued for its landscape quality, scenic qualities and cultural and artistic associations. These factors, with which colour is inextricably linked, are especially strongly expressed and give rise to the area's unique character.

The pressure for new development, especially housing is on the increase nationally. The Dedham Vale AONB is not immune to this and recent years have seen applications for housing associated with current settlements, significant development applications in the setting of the AONB and Nationally Significant Infrastructure Projects such as developments associated with electricity distribution and the railway network within and adjacent to the AONB. Housing infill in the smaller settlements within the AONB is a concern for many, these settlements often considered to be at capacity. New housing and business development is welcomed where it sits well with the patterns of historic villages and where it contributes to the natural beauty and special qualities of the AONB and Stour Valley. Developments that promote a sense of place and contribute to the architectural patterns of the area and seek to meet the needs of the community in terms of affordable housing are welcomed.

Whatever the type of development, it is vital that careful consideration is given to the design and use of colour when selecting materials and finishes. Sensitive colour choice does not guarantee sensitive development, but it can enhance the positive aspects of development and help to minimise the negatives.

1.2 The purpose of the guide

The purpose of this document is to provide direction and guidance on the selection and use of colour for building development within the AONB. 'Development' includes any building work, ranging from home extensions and conversions through to mass house building, agricultural and industrial premises, and retail and office buildings. It also includes infrastructure developments associated with transport, flood defences, power generation and distribution communications and other utilities.

This document needs to be read in association with the other guidance documents published by the AONB Partnership, in particular those that contain essential information on appropriate design within the AONB and the identification of the features that contribute to its natural beauty, the reasons for designation.

1.3 Who this guide is for

This document provides guidance for everyone considering or proposing development within the AONB, including landowners, property owners, developers, agents, advisers, architects and landscape architects. It is also targeted at those with responsibility for setting the framework for development and for making decisions about individual planning applications. This includes planning staff and their colleagues in local authorities and neighbourhood planning groups.

The guidance in this document will help those who value and care for this area to ensure that potential negative impacts of development on the character of the AONB are minimised, and that a sense of place is enhanced.

1.4 Status of this Guidance

A legal framework provides for the conservation and enhancement of the Dedham Vale AONB through better considered and designed development. This includes:

- **The Dedham Vale AONB Management Plan**, which 'formulates local authority policy for the management of the AONB and for the carrying out of their functions in relation to it' (Section 89 of the Countryside and Rights of Way Act 2000). The AONB Management Plan is a material consideration in relation to planning. The Guidance amplifies the content of the Management Plan in relation to the buildings of the AONB.
- **The Countryside and Rights of Way Act (CRoW) 2000** reaffirmed that the primary purpose of AONB designation is to conserve and enhance natural beauty. Section 85 of CRoW places a duty on all public bodies and statutory undertakers to 'have regard' to 'the purpose of conserving and enhancing the natural beauty of the AONB'. Using this guide will help those organisations demonstrate their compliance with this duty.
- **Paragraph 56 of the National Planning Policy Framework (NPPF)** states that the Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.
- **Paragraph 58 of the NPPF** states, among other things, that local and neighbourhood plans should develop robust and comprehensive policies that set out the quality of development that will be expected for the area and establish a strong sense of place, using streetscapes and buildings to create attractive and comfortable places to live, work and visit;
- **Paragraph 62 of the NPPF** requires that planning policies and decisions should address the connections between people and places and the integration of new development into the natural, built and historic environment.

Using this document will help public bodies to meet their statutory duties to have regard to the purposes of conserving and enhancing the natural beauty of the AONB. It will support developers who wish to submit development applications that recognise and acknowledge the natural beauty of the AONB.

1.5 Methodology

The guidance is based on the principle that a colour is never seen in isolation from surrounding colours. Selecting colours for buildings or any other form of development therefore, has to take account of the site context if good choices are to be made.

Indigenous site colours throughout the different landscape character types of the AONB have been documented, analysed and synthesised into 'existing palettes', which represent the dominant colours, tones, and colour associations that naturally belong to those areas.

Colours are recorded using the industry-standard Natural Colour System which gives individual references to 1950 colours and arranges them according to their attributes into a three dimensional model. These existing palettes are presented in **the Survey**.

Working from these palettes it has been possible to create 'developed palettes' of colours appropriate to a range of building materials and finishes, which will help integrate new development into that specific landscape. These appear in **the Guidance** along with a series of colourways, examples of how colours, selected from the developed palette, can be combined to harmonious and interesting affect.

This process of colour analysis and design is known as Environmental Colour Assessment. It presents an analytical approach to a subject many regard as a matter of personal taste and therefore beyond objectivity. However its intention is to provide a deeper understanding of the colours of specific places, the landscape character types that together form the AONB, and through this to create a framework within which people can choose colours for development which will suit the development and fit with the receiving landscape.

The intention is not generally to copy the infinitely complex palette of nature but to understand its constituent elements and to use this information to create a range of related colours, modified and extended to offer harmonious combinations which will help to integrate new structures into the landscape.

The degree of integration relates in part to the nature of the development and to sensitivity of the landscape to change. It varies from camouflage of new structures by close adherence to the existing colours and tones, through to the creation of landmarks that are rooted in the colours and tones of the landscape, but augmented and emphasised to achieve a visual dominance. Between these two examples sits the best of new development – true to its age, designed to a scale, layout and finish that is characteristic to the area, acknowledging cultural traditions, but also meeting the needs of today's society.

Developed Palettes are required in part to accommodate the difficulties of exactly matching natural colours seen in the landscape. Limited ranges of some building materials, the variance between the inherent and perceived colour of materials and the effects of light reflectance and distance when viewing colour, are amongst the many reasons why copying nature's existing palette is often unsuccessful. However both existing and developed palettes are presented in the guidance such that the provenance of a colour may be traced back, and that inspiration may be found in the colour's origins.

The Environmental Colour Assessment that underpins this guidance was undertaken in the winter months of 2017/18, and therefore clearly reflects the seasonal colours prevalent at that time. However, winter is an advantageous time of year to make the study. The exposed and elemental winter landscape lays bare the underlying colour palette of rock, soil, and essential vegetation. Seasonal foliage and the play of light and shade on leaf canopies do not distract the eye or screen new interventions as they may do at other times of the year. While seasonal variations in landscape colour are clear to see, less obvious but very relevant is the fact that a core of colours exist unchanged throughout the year, though relative visible proportions of those colours will vary.

2
Principles of exterior colour design

Colour guidance for development within the AONB is aimed at integrating new buildings into the landscape in a way that benefits both the landscape and the built form.

This can range from effectively camouflaging or minimizing the visual appearance of a utilitarian building to emphasizing the specific qualities of a place through the architecture, expressed in colour, form and massing.

Good colour choices depend upon a good understanding of the proposed development in relation to its landscape setting.

The following checklist gives an idea of some of the issues involved.

2.1 Is the development 'background architecture' or 'signature architecture'?

Small scale domestic development, village expansion, and developments associated with farming and rural industries will often be designed to fit within the grain, colour and texture of the local environment. Signature buildings may have a presence and scale which allows a more dynamic use of colour and materials, interacting with, and complementing the landscape setting, but also potentially standing out against it. This guidance deals primarily with the former type of development. If your scheme is of the latter type then you may wish to extend the relevant developed palette into more complementary or accented colours, or a different range of materials.

2.2 Where are the key views to the development?

It is necessary to anticipate the key viewpoints from which the completed development will be seen. Some viewpoints may be more sensitive than others and require an approach with colour which minimises the impact of the building, while others may require a stronger approach to aid the legibility of the scheme, or to strengthen street frontages.

2.3 From what distance will the development be seen?

While the nature of hue (colour) alters with distance, tonal (lightness/darkness) contrasts between built form and landscape remain largely constant. Therefore if a development will be visible from afar, and the intention is to 'lose' it in the landscape then the tonal qualities of the building rather than the hue (colour) of the building become particularly important. In this case it will be preferable to select tones which match or are slightly darker than the landscape when seen from a viewpoint in order to minimise its visibility.

The developed palettes all contain a tonal grey adjacent to selected key colours. If it is not possible to get that specific colour in the building material of choice then use the tonal grey to find an alternative colour of the same tone, as this will achieve similar results.

2.4 What is the effect of distance on colour?

Research shows that the perceived colour of a building façade, seen from some distance, tends to look less dark and brighter than the inherent colours of the material from which it is constructed. In other words a colour sample that may look slightly dull as a swatch will look more colourful and lighter on the façade. The developed colour palettes in this guidance have been largely adjusted from the existing palettes to take account of this with many colours darker

and less saturated than their brighter counterparts. The darkness of a colour or it's'blackness' is of great importance as this represents the tone or nuance of a colour. The effect of tone on the visibility of a building against a distant landscape has been referred to above. The difference in tone between a building and its surroundings is probably the most important factor contributing to the recognition of its form.

Hues (colours) can also change with distance. Perceived colours are often lighter and brighter than samples, with the exception of greens and yellows which tend towards blue when seen from a distance. In a study carried out in Sweden on this phenomenon, green close up became darker blue green at 2km and lilac grey at 20km.

All natural greens have some yellowness in their inherent colour though this does vary with seasonality and land management. If a developer wishes to use green on a development, and for it to appear green at a distance, then a green with a higher degree of yellow will be needed. Assumptions are frequently made that the only suitable colour for developments in rural areas, especially large scale industrial and agricultural developments is green. However many of the greens available as standard colours in suppliers' ranges do not contain enough yellow and black and the result is a glaring mismatch with the surroundings. This reinforces the point that tonality or nuance is all-important, especially when it is difficult to get the right hue.

2.5 What is the key landscape context of the development?

The subtle landscape of the AONB with its low rolling scenery means many views contain more than a single landscape character type. Often it is the landscape tract behind the development site which sets the context, rather than the land upon which the development sits. Careful analysis of the proposed development site should indicate which character type is most dominant and therefore which range of colours to consult.

2.6 Does the development address textures occurring within its landscape?

The choice of building materials and finishes as well as colour needs to be informed by the background texture of the landscape setting. This requires analysing adjacent building materials and vernacular detailing, and also the dominant vegetation and ground finishes to appreciate the depth of relief, play of light and shade and range of tactile surfaces which are characteristic in the area. These observations will help determine appropriate finishes and textures for the development, which in turn will have an impact upon the perceived colours.

Highly reflective roofing material

2.7 Is light reflectivity an issue?

Sunlight striking a surface can substantially alter the perceived colour making it both lighter and brighter in the landscape. South-facing elevations and inclined roofs will be particularly prone to this effect.

Amongst the common building materials, painted steel with a gloss finish can be highly reflective. It is possible to find some matt finishes to paint work in different colours, or to find alternative cladding materials such as fibre cement. If there is no realistic alternative to steel then select a dark tone for roofing material as these reflect less light than a light coloured sheet, though this may require additional investment to dissipate heat build up. Slates are another material where sheen can be problematic. Natural slate will weather back to a matt finish, however, man-made equivalents tend to remain consistent in colour and sheen for longer. Clay tiles are inherently matt at all times.

As a general rule matt colours will sit better in a rural context allowing for patterns of light and shade from surrounding vegetation to animate surfaces. Matt finishes are particularly important when considering development affecting sensitive views, especially from above.

North facing elevations will be in the shade and will potentially remain wetter for longer and therefore are darker in appearance. Some finishes and materials such as lime wash, lime render and some timber can change colour and tone with rain.

2.8 Does the building form require additional colours to aid legibility or to influence scale?

Introducing a different colour or material can help 'guide' people around a building, making its use more intuitive. If the scale of a building looks too large for its setting, introducing another colour of a dark or recessive nature may help to diminish the apparent scale by breaking up its massing.

A general rule of thumb is to only introduce a change of colour or material, where it makes sense to do so, e.g. for recessed or projecting panels, or where there are legibility or structural reasons. In general the more three-dimensional elevations appear, the more interesting they are. It is also true that too many colours can make a building look confused and fussy.

2.9 When the same colour looks different against different backgrounds

Simultaneous contrast occurs when the same colours look different when viewed against different backgrounds. In attempting to distinguish the colour against the background, the human eye tends to reinforce and exaggerate that difference. In reality this is more difficult to observe against a multi coloured background of landscape than it is against the controlled and hard surfaces of a building façade, and is more of an issue for the detailed finishing and articulation of a building. The seasonal variations which occur within a landscape mean that dramatic changes in background colour are relatively short lived and the perception of this phenomenon is more often caused by changing light conditions.

2.10 How will materials weather? Are they colourfast?

Highly saturated dark colours, especially reds, often fade after prolonged exposure to UV light, and some masonry paint colours need several coats to achieve the required depth of colour. Discuss this with the supplier to ensure the product is suitable for its intended purpose. Natural materials like timber will also fade and this needs to be anticipated before specification. While there is often a reluctance to stain newly constructed timber cladding it should be recognised that the same cladding will look quite different after about six seasons. There are some UV inhibitors that can be applied to timber to prolong their natural colours.

2.11 Use of White and Black

White is commonly used on buildings. It will co-ordinate with all colours as it is neutral, though generally its effect is one of sharp contrast. It is acceptable to use white on developments where white is characteristic and contributes to local distinctiveness. The same may be said of black.

However the range of commercially available off-whites and creams (and to a lesser extent dark greys) is very wide, and allows more responsive colours in relation to landscape, while bearing a close similarity to white and black.

Whatever colour choices are made, it is prudent to create a large sample to take it to site before committing to full-scale application. Examining a small sample under artificial light indoors can offer misleading information.

2.12 Understanding the context

The successful addition of new buildings to existing communities requires knowledge and understanding of the traditions and identity of that community, expressed through their buildings. Copying buildings from the past merely serves to undermine the quality of the originals and displays a lack of confidence in the future. It is perfectly possible to create contemporary buildings that sit perfectly comfortably amongst traditional ones, providing that sensitive design is applied. The choice of finishes, the selection of colours and the relationship of form and scale to setting are all key to this.

The effect of distance on colour

Valley meadowlands

Valley meadowlands
Survey summary and common colours

S 2002-B | S 2010-Y20R | S 2010-Y30R | S 2020-G90Y | S 4005-Y20R | S 3020-G70Y | S 3020-Y20R | S 5005-Y20R | S 4020-G70Y | S 5020-Y10R | S 6010-Y90R | S 7010-Y10R

Valley meadowlands
Developed palette

The developed palette offers you a choice of colours and is set out to help you put a colour scheme together.

The palette is laid out in eight horizontal lines as follows:

Three integration colours marked ABC, followed by two greys and a further three accent or trim colours also marked ABC, the final colour is a clay product either brick or tile.

How to read the palette

Select an integration colour from the first group of three, one of twenty-four colours. Integration colours are the main choice of your scheme, covering the main elevations. They are laid out from light to dark. Note if it is an A B or C colour.

Select an accent or trim colour from the second group of three, by matching colours A-A, B-B, and C-C. These colours can be used as a secondary elevation colour or for details such as door and window frames.

Now look at the greys. The first grey is a neutral grey and is the tonal average for the three related integration colours. Use this grey as a tonal reference when selecting alternatives if you cannot find a suitable building material in the integration colour of your choice. If you like the combination of your integration colour and trim colour with this grey, then add this to your scheme. However as it is of a similar tone to your integration colour, the combination will give a rather flat appearance to your elevations. If you want to emphasise the depth and variation of your elevations then choose the second grey colour which is either darker or lighter than the integration colours, and will therefore add to the visual interest of your building. The second greys also contain a hint of colour which will echo the quality of your integration colour.

Brick and tiles characteristic of the AONB form the last column. They descend from 'white brick', through shades of terracotta to deeper reds. If you intend to use brick for your development select a colour from the eight on display and order some samples to see how closely you can match to it, then work across the palette as above.

You may wish to put two integration colours together if this would suit your development. In this case try to select colours with a tonal contrast to give the elevations some relative depth.

You do not need to use all the colour options available, up to three colours is typical, more can cause visual confusion, less will give a unified form but may lack some visual emphasis.

The colourways show how colours from the palette may be put together and the visual effects that can be achieved. Each colourway uses three colours, you may select all three or less and you may alter the proportions of each colour to suit your development. The colourways give examples from light, mid range and dark integration colours, some include brick colours and some combined integration colours. These are only suggestions and not definite prescriptions.

INTEGRATION COLOURS A	INTEGRATION COLOURS B	INTEGRATION COLOURS C	GREY NEUTRAL	GREY CONTRAST	ACCENT / TRIM COLOURS A	ACCENT / TRIM COLOURS B	ACCENT / TRIM COLOURS C	BRICK AND TILE
2502-B	S 2010-Y20R	S 3005-G80Y	S 2500-N	S 4502-Y	S 2020-G90Y	S 2010-B10G	S 3020-G80Y	S 2010-Y10R
S 2020-G90Y	S 2010-Y10R	S 3010-G90Y	S 2500-N	S 3502-Y	S 2010-R90B	S 2030-Y10R	S 3010-R90B	S 2010-Y20R
S 3010-R80B	S 4005-Y20R	S 4010-G70Y	S 3500-N	S 5502-B	S 3005-R80B	S 2005-Y20R	S 2502-Y	S 3040-Y40R
S 3020-Y10R	S 5005-Y20R	S 4020-Y	S 4000-N	S 5502-Y	S 3020-G90Y	S 3005-Y20R	S 4005-Y20R	S 3040-Y50R
S 4020-G70Y	S 4020-Y10R	S 4020-Y40R	S 4000-N	S 5000-N	S 2005-Y30R	S 2010-Y10R	S 4005-G80Y	S 4030-Y50R
S 5010-G90Y	S 5020-G70Y	S 5020-G90Y	S 5000-N	S 6502-G	S 2010-Y	S 2005-Y	S 3010-Y10R	S 4040-Y60R
S 5020-Y10R	S 7010-Y10R	S 7005-Y20R	S 6000-N	S 4502-Y	S 2020-Y10R	S 1005-Y10R	S 1005-Y20R	S 5030-Y60R
S 7010-G90Y	S 7010-Y90R	S 7020-Y	S 7000-N	S 3502-Y	S 3010-G90Y	S 6010-Y10R	S 2020-Y	S 5030-Y70R

Valley meadowlands **Colourways**

The Colourways are bands of colour selected from the developed palettes for each landscape character type in the AONB. They illustrate how colour schemes may be put together to produce harmonious and interesting results.

They do not represent actual building elevations, but do give some idea about the relative proportions of different colours you may choose to apply to your development.

How to use the Colourways

You may select all the colours within a colourway or you may select less and alter the proportions accordingly. These are examples only and not prescriptions. Typical lessons illustrated by the colourways are as follows:

Use an integration colour for main elevations and a trim or accent colour for secondary elevations or for door and widow frames. Integration colours, colours which have been derived from the landscape, are marked with an 'I' on the colourways.

Use a contrasting grey to add depth to your elevation, this may be useful to link contemporary extensions to existing properties or to help identify a particular function to the development

Contrasting greys may also act as a visual bridge between integration colours and accent colours. This may be required when looking for a more vivid effect from the trim colours, darker greys surrounding an accent or trim colour will make that colour seem more intense than the same colour against an integration colour.

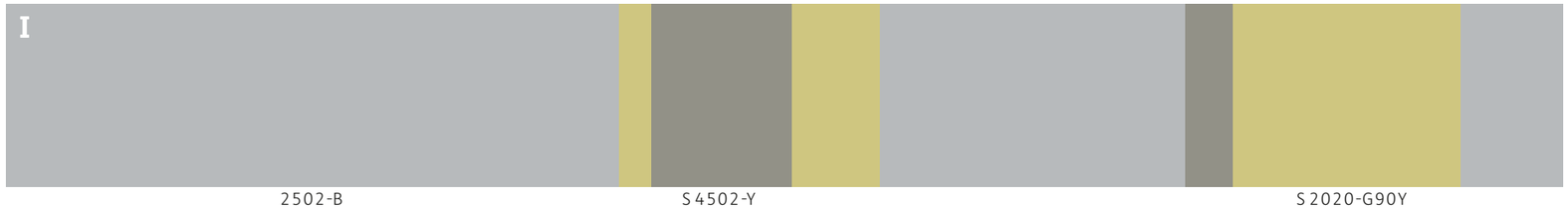
Lighter greys or accent colours will make the integration colours seem brighter. This is particularly the case with the darker integration colours as the contrast with the lighter colours becomes increased.

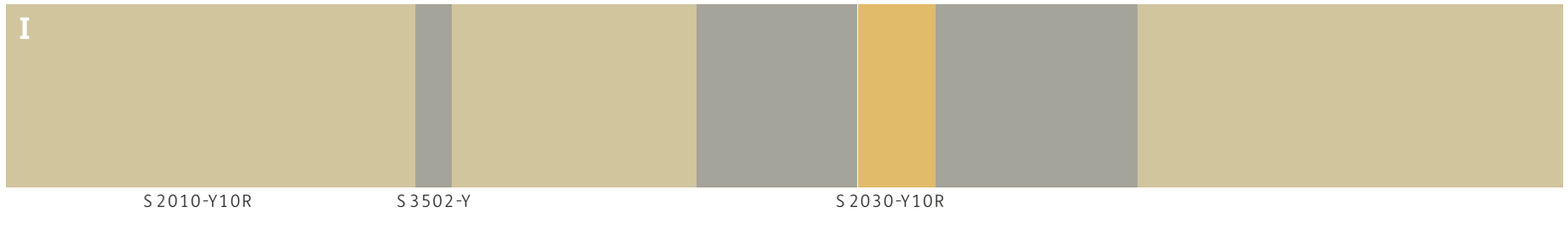
Using white or off-white as an accent colour keeps the primary integration colours and secondary elevation colours sharp and clean as maximum contrast between colours is achieved.

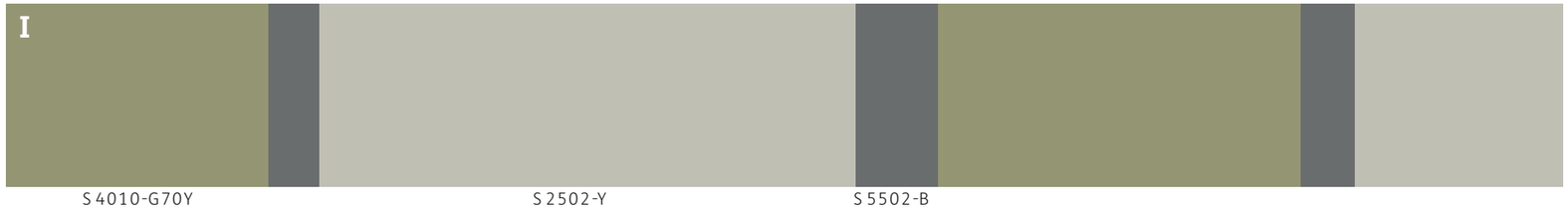
If your development would not benefit from emphasizing the relief of elevations then choose tonally similar colours to achieve a flatter effect while still introducing more than one colour. If the tones become very similar it may be difficult to discern variations in colour.

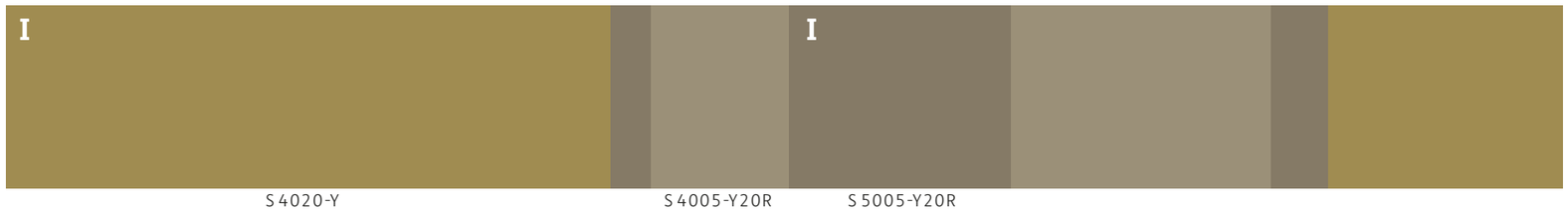
Where two or more integration colours are used the effect tends to be very 'earthy' and grounded, suitable for developments surrounded by strong landscape colours. In some cases a third colour has been introduced from the existing palette to enhance this effect.

Brick and tile colours may be selected from any of the eight appearing in the developed palette. In general if the brickwork appears at ground floor level with render above, choose a brick with a darker tone than the render. The colourways show darker brick colours appearing alongside darker integration colours and vice versa. When choosing bricks try to view panels of brickwork rather than a sample brick, the effects can be quite different.









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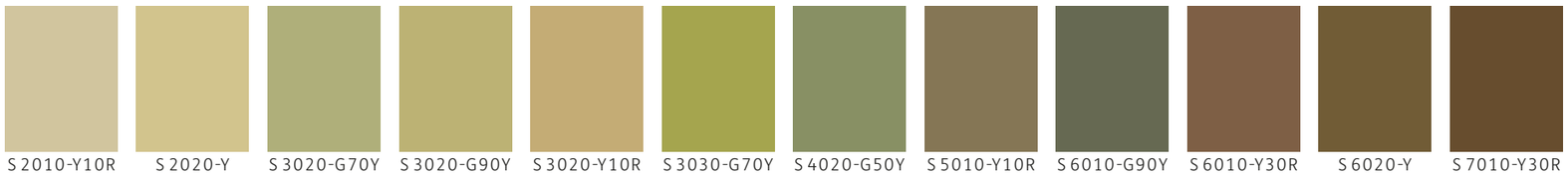
Rolling valley farmlands

Rolling valley farmlands
Survey summary and common colours



Rolling valley farmlands
Developed palette

The developed palette offers you a choice of colours and is set out to help you put a colour scheme together.

The palette is laid out in eight horizontal lines as follows:

Three integration colours marked ABC, followed by two greys and a further three accent or trim colours also marked ABC, the final colour is a clay product either brick or tile.

How to read the palette

Select an integration colour from the first group of three, one of twenty-four colours. Integration colours are the main choice of your scheme, covering the main elevations. They are laid out from light to dark. Note if it is an A B or C colour.

Select an accent or trim colour from the second group of three, by matching colours A-A, B-B, and C-C. These colours can be used as a secondary elevation colour or for details such as door and window frames.

Now look at the greys. The first grey is a neutral grey and is the tonal average for the three related integration colours. Use this grey as a tonal reference when selecting alternatives if you cannot find a suitable building material in the integration colour of your choice. If you like the combination of your integration colour and trim colour with this grey, then add this to your scheme. However as it is of a similar tone to your integration colour, the combination will give a rather flat appearance to your elevations. If you want to emphasise the depth and variation of your elevations then choose the second grey colour which is either darker or lighter than the integration colours, and will therefore add to the visual interest of your building. The second greys also contain a hint of colour which will echo the quality of your integration colour.

Brick and tiles characteristic of the AONB form the last column. They descend from 'white brick', through shades of terracotta to deeper reds. If you intend to use brick for your development select a colour from the eight on display and order some samples to see how closely you can match to it, then work across the palette as above.

You may wish to put two integration colours together if this would suit your development. In this case try to select colours with a tonal contrast to give the elevations some relative depth.

You do not need to use all the colour options available, up to three colours is typical, more can cause visual confusion, less will give a unified form but may lack some visual emphasis.

The colourways show how colours from the palette may be put together and the visual effects that can be achieved. Each colourway uses three colours, you may select all three or less and you may alter the proportions of each colour to suit your development. The colourways give examples from light, mid range and dark integration colours, some include brick colours and some combined integration colours. These are only suggestions and not definite prescriptions.

INTEGRATION COLOURS A	INTEGRATION COLOURS B	INTEGRATION COLOURS C	GREY NEUTRAL	GREY CONTRAST	ACCENT / TRIM COLOURS A	ACCENT / TRIM COLOURS B	ACCENT / TRIM COLOURS C	BRICK AND TILE
1005-Y20R	S 2010-Y10R	S 2020-Y	S 1500-N	S 3502-Y	S 2005-G80Y	S 4010-Y10R	S 2502-B	S 2010-Y10R
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S 3020-Y10R	S 3020-Y20R	S 4020-G50Y	S 3000-N	S 5502-Y	S 4020-Y10R	S 3005-B20G	S 3005-G50Y	S 3020-Y50R
S 5005-Y20R	S 5010-G50Y	S 5010-G70Y	S 5000-N	S 6502-Y	S 4010-Y10R	S 2010-G50Y	S 2005-Y30R	S 3030-Y30R
S 4020-Y	S 5010-Y10R	S 5010-Y90R	S 5000-N	S 6502-Y	S 3502-Y	S 3010-Y10R	S 5010-Y10R	S 3040-Y30R
S 6005-Y50R	S 6005-G80Y	S 5020-Y	S 5500-N	S 7000-N	S 2010-Y10R	S 3005-G50Y	S 2010-Y	S 3040-Y40R
S 6010-Y10R	S 6010-Y30R	S 7010-Y10R	S 6500-N	S 8000-N	S 2005-Y10R	S 2005-Y30R	S 2010-Y10R	S 3040-Y50R
S 6020-Y80R	S 8010-G30Y	S 8010-G90Y	S 7000-N	S 8502-Y	S 6005-G80Y	S 1005-G30Y	S 2005-G90Y	S 4030-Y80R

Rolling valley farmlands
Colourways

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How to use the Colourways

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Contrasting greys may also act as a visual bridge between integration colours and accent colours. This may be required when looking for a more vivid effect from the trim colours, darker greys surrounding an accent or trim colour will make that colour seem more intense than the same colour against an integration colour.

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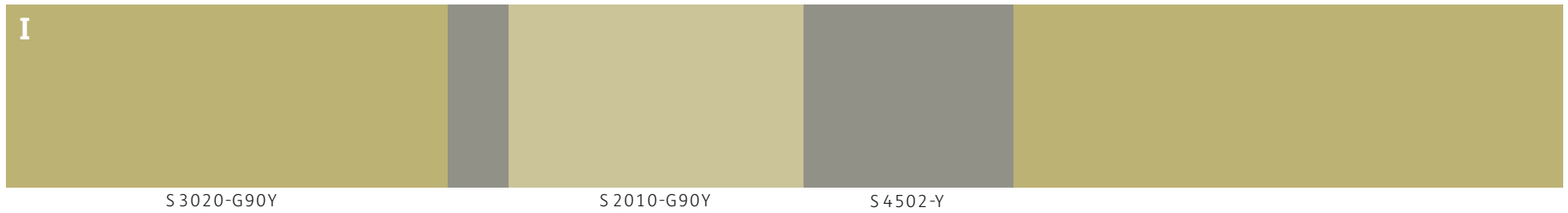

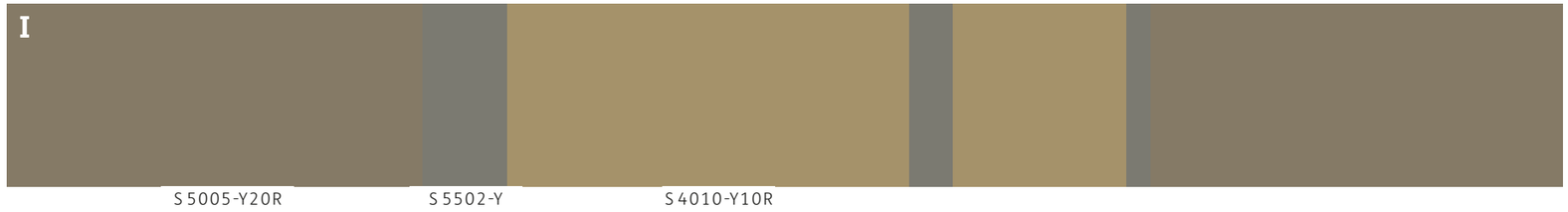

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Plateau farmlands

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S 8502-Y	S 6030-Y	S 7020-G90Y	S 7000-N	S 4502-Y	S 1502-Y	S 1505-Y	S 2020-Y10R	S 5030-Y60R
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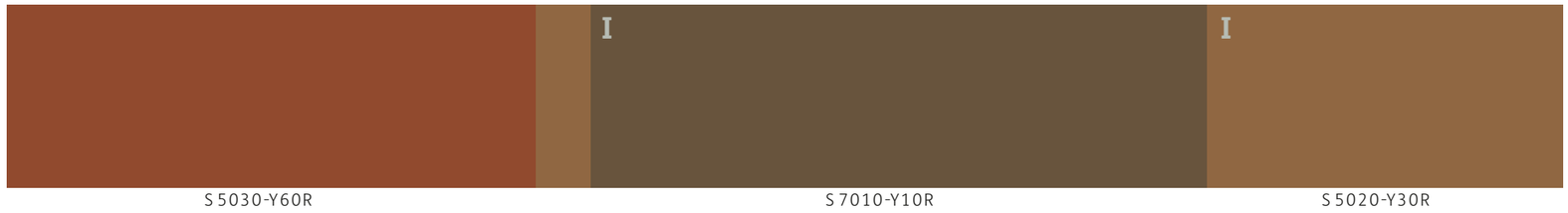
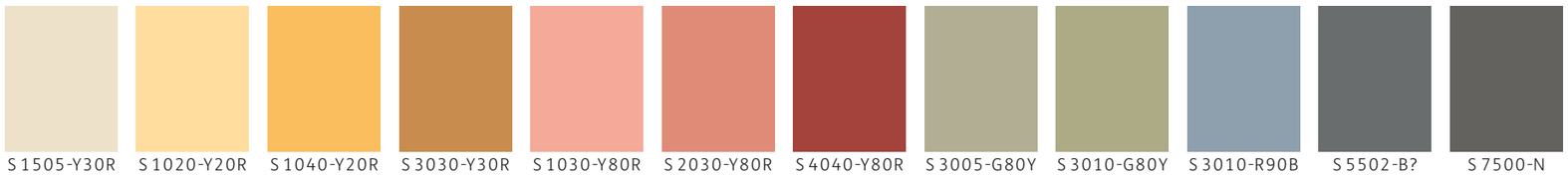


Buildings and settlements

Buildings and settlements
Survey summary and common colours



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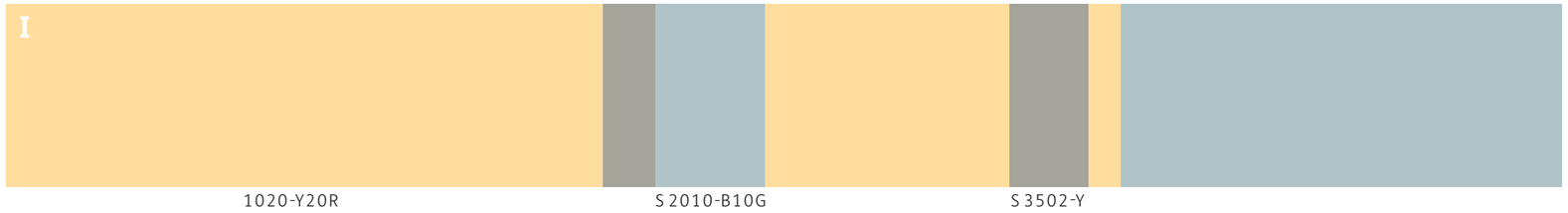

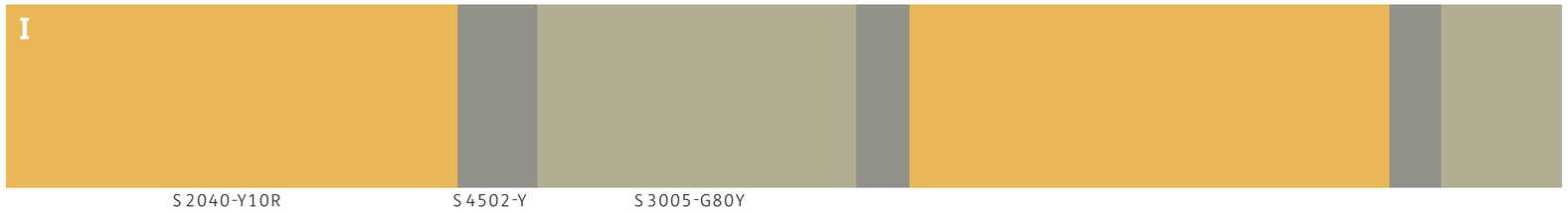

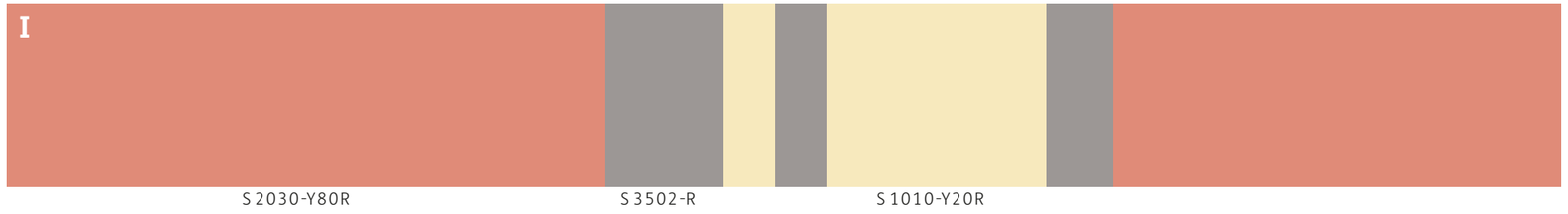

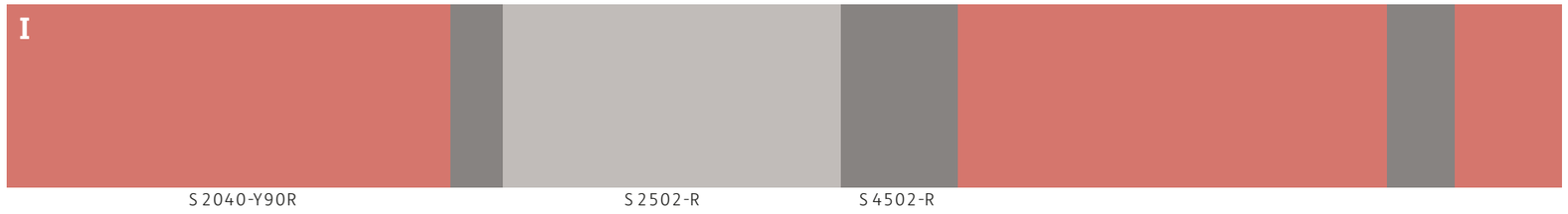

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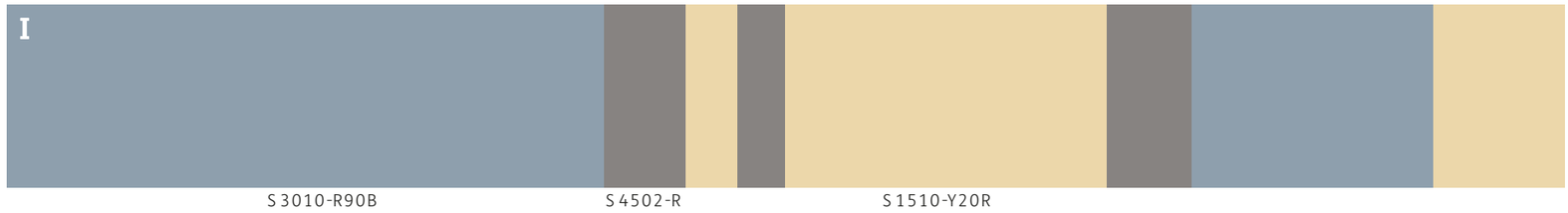
Where two or more integration colours are used the effect tends to be very 'earthy' and grounded, suitable for developments surrounded by strong landscape colours. In some cases a third colour has been introduced from the existing palette to enhance this effect.

Brick and tile colours may be selected from any of the eight appearing in the developed palette. In general if the brickwork appears at ground floor level with render above, choose a brick with a darker tone than the render. The colourways show darker brick colours appearing alongside darker integration colours and vice versa. When choosing bricks try to view panels of brickwork rather than a sample brick, the effects can be quite different.



Appendices

Appendix A
Materials and suppliers

A selection of building materials which may be suitable for use on developments within the AONB area.

Metal Cladding and Roofing

Tata Steel www.colorcoat-online.com produces a range of profiled steel sheet, from which the following colours may be considered:

Colorcoat HPS200 Ultra :
Anthracite (Ral 7016) nearest NCS S8005-B20G.
Merlin Grey (Ral 180 40 05) nearest NCS S6005-B20G.
Ardenne (Ral7022) nearest NCS S7005-Y20R.
Mole Brown (Ral 070 40 10) nearest NCS S7010-Y10R.
Moorland Green (Ral 100 60 20) nearest NCS S4020-G70Y.
Svelte Grey (Ral 080 50 20) nearest NCS S4010-Y10R.
Olive Green (Ral 100 30 20) nearest NCS S7010-G50Y.
Terracotta (Ral 040 40 40) nearest NCS S5030-Y70R.
Juniper Green (Ral 140 20 20) nearest NCS S8010-G30Y.
Van Dyke Brown (Ral 8014) nearest NCS S8010-Y80R, good against soil colour.
Oxidised (Ral 050 20 10) nearest NCS S8005-Y20R.
Black (Ral 9005)

Anthracite, Oxidised and Terracotta are also available as matt sheets and these should always be considered for roofing. Light reflection on pitched steel roofs can distort the colour substantially, rendering even dark colours as very light, a matt finish helps to reduce this risk.

Colorcoat LG a similar range of colours as above but with a leather grain finish and not specifically matt.

Colorcoat Prisma:
Solid colours only
Slate Grey (Ral 7012) nearest NCS S6502-B.
Anthracite (Ral 7016) nearest NCS S8005-B20G
Terracotta (Ral 040 40 40) nearest NCS S5030-Y70R.
Chocolate Brown (Ral 8017) nearest NCS S8010-Y90R
Black (Ral 9005)

Anthracite and Terracotta are also available as matt sheets and these should always be considered for roofing.

Euroclad www.euroclad.com produce a range of metal profiled sheet. The Vieo range of wall and roof cladding uses material from the Colorcoat HPS 200 Ultra range and Colorcoat Prisma range. Standing seam cladding is also available from Tata Steel in the Colorcoat Urban range, with a similar choice of matt colours.

Thomas Panels and Profiles www.panelsandprofiles.co.uk produces a range of roofing and cladding sheets, sharing some of the colours with Colorcoat HPS200 Ultra:
Vandyke Brown, Merlin Grey, Olive Green, Terracotta, Juniper green.
In addition:
Svelte Grey (BS 10B 23) nearest NCS S5010-G90Y
Slate Blue (BS18B29) nearest NCS 7502-B

Bacon Engineering www.acbacon.co.uk design and build a range of agricultural and industrial steel framed buildings using Tata Steel LG range. They also supply tanalised timber cladding and fibre cement sheets.

Painted Steel cladding can be sourced from other suppliers such as Coilcolor who offer a standard range including Moorland Green, Olive Green, and Juniper, they also can source a much wider range of colours including NCS colours

VMZ www.vmzinc.co.uk produces a range of cladding and roofing panels in zinc.

ANTHRA-ZINC matches some slate colours and works well with PV panels. Nearest NCS S8505-Y20R

Pigmento has the texture of QUARTZ-ZINC but is coloured:
Pigmento Blue, nearest NCS S6010-B10G
Pigmento Red, nearest NCS S6010-Y90R
Pigmento Green, nearest NCS S4005-G80Y
Pigmento Brown, nearest NCS S6005-Y80R

J. G. Steelcraft www.jgbsteelcraft.co.uk offer corrugated Corten steel cladding cut to requirements from a coil, and offering the benefits of rusted standard corrugated steel without the inherent damage to the material. Cladding panels as rain screen cladding in Corten are supplied by Kingspan **www.kingspanbenchmark.co.uk** and NES Solutions **www.nes-solutions.co.uk**

Fibre cement cladding and roofing

Marley Eternit www.marleyeternit.co.uk produce a range of fibre cement products for cladding:

Cedral Lap has a standard range of 23 colours and comes in plank sizes of 3600 mm. x 190mm. This dimension with a wood grain finish is already being used as a substitute for timber on weather boarded properties.

Colours worth considering include:
Sage green NCS S4010-G90Y
Forest Grey NCS S8005-G80Y
Pearl NCS S4005-G80Y
Pewter NCS S5500-N
Cream White NCS S0502-Y
Beige NCS S0505-Y20R

Cedral Lap can be matched to any NCS co-ordinate providing the order exceeds the minimum quantity for specials.

Cedral Click tongue and groove planks are available in a standard range of 7 colours. Colours worth considering include:
Grey NCS S3502-R
Grey Brown NCS S3005-Y20R
Cream White
Beige.

Marley Eternit also produce through coloured fibre cement boards in the Equitone Range.

The following colours from the Natura range of Equitone are worth considering:
Natural Grey NCS S5005-G80Y
Fossil Grey, NCS S4005-G80Y
Autumn Dusk NCS S4005-Y20R
Sepia NCS S7005-Y20R

Equitone Pictura Range (not through coloured):
Mocha NCS S5005-Y50R
Fawn Grey NCS S3502-R

Equitone Linea Range:
Hessian NCS S4005-Y50R

Equitone Tectiva range (through coloured with grain):
Sahara NCS S3030-Y70R
Hessian NCS S4005-Y50R
Linen NCS S2005-Y20R
Calico NCS S1002-Y50R

Marley Eternit also produce profiled fibre cement for roofing.

Within their range the following colours may be useful:
Tawny Brown NCS S3040-Y60R
Bracken NCS S5010-Y50R
Van Dyke Brown NCS S8005-0Y50R
Anthracite NCS S6502-Y
Laurel NCS S8010-G50Y

Timber cladding

Weatherboard cladding for paint finish is locally available from many building supply yards. For appropriate colours and products see wood finishes.

Thorogood, www.thorogood.co.uk offer cladding in Western Red Cedar, European Oak, Siberian Larch and a modified redwood – Thermowood. They also supply beams and other structural timbers.

Coyle Timber www.coyletimber.com offer products in hard and soft woods, cladding, structural timbers, engineered timbers and roofing shingles, they also have a timber conservation department.

Wood finishes

Dulux Trade www.duluxtrade.co.uk offer a range of 600 colours in their opaque wood stain collection. They also offer a designer range and a natural wood colour range though only some of these are suitable for exterior application. As with the trade palette NCS co-ordinates can be recognized by tinting machines.

Sikkens www.sikkens.co.uk are also part of the AkzoNobel group and offer a variety of professional woodcare systems. Rubbol exterior opaque coating system offers colours from NCS, Ral, BS4800 and their own 4041 colour concept range. The Cetol Systems for Exterior offers two collections, Classic and Style with finishes in translucent and opaque, matches to NCS will need to be made by visual comparison.

Beeck www.beeck.com produce plant based wood paint in semi–gloss finish to NCS classification. It is available in the UK through Ty Mawr www.lime.org.uk

Crown www.sadolin.co.uk produce Sadolin wood stains in opaque and translucent finishes using their own colour range for Superdec and Beach Hut colours, they also offer colours in Ral Classic and BS4800.

Translation tables exist between Ral and NCS.

Osmo www.osmouk.com produce a wide range of specialist wood protection and colour finishes.

Render

K Rend www.K-Rend.co.uk produce silicone thin coat render in a wide range of NCS colours. An NCS fan deck is available from their Technical Support Centre.

Wetherby Building Systems www.wbs-ltd.co.uk produce thin coat renders to cover external insulation refurbishments. The HECK range offers a wide range of NCS colours, including:

NCS S1010-Y20R
NCS S1010-Y
NCS S1015-Y
NCS S0520-G90Y
NCS S0520-Y10R
NCS S0520-Y20R
NCS S3030-Y50R
NCS S5010-B90G
NCS S2030-Y10R
NCS S4005-R50B
NCS S5502-Y
NCS S5502-B
NCS S7500-N

Anglia lime www.anglialime.com offer lime based renders, mortars and plasters, limewash and pigment additives and lath, insulation and re-enforcement. Lime products are breathable and of particular significance for traditional buildings.

Masonry Paint

Dulux Trade www.duluxtrade.co.uk offer Weathershield for exterior wood, metal and masonry. The colour palette bears similarities with NCS and Dulux tinting machines recognize NCS coordinates. Dulux also produce a range of Heritage finishes derived from research into period colours.

Armstead Trade www.armsteadtrade.co.uk part of the Akzo Nobel group as are Dulux offer a fan deck with the full range of 1950 NCS colours.

Crown Trade www.crowntrade.co.uk offer Sandtex for exterior wood, metal and masonry with a similar colour range to Dulux and with tint machines which also recognize NCS codes. Crown also produce a range of historic colours.

Keim Mineral Paints www.keimpaints.co.uk have a wide range of breathable mineral and silicate paints to suit a variety of substrates and conditions. Equivalent NCS references can be given for their range upon request

Anglia Lime www.anglialime.com offer limewash in white and sell pigments for mixing into other colours.

Ingilby www.ingilby.co.uk are a local paint manufacturer with the ability to match to any colour as well as offering a wide range of their own colours.

They also specialise in breathable lime based paints, hand made paints for period properties.

Building Boards

Rock Panel www.rockpanel.co.uk produce compressed pre formed building boards for cladding in a range of 24 standard colours. For orders in excess of 100m any NCS colour may be specified. NCS equivalents for the standard range may be given upon request.

Trespa www.trespa.com produce building boards in a standard range of 67 colours. Special colours can be produced for significant projects.

Colours include:
Mid Grey NCS S5000-N
Taupe NCS S6010-Y90R
Cactus Green NCS S4010-G70Y
Natural Greige NCS S6005-Y50R

Bricks

Due to the lack of suitable stone in the area, brick has been the main building material, based upon the clay beds of the River Stour, and with the advent of railways, from further a field. Very few local brickworks remain and today many imported bricks and artificially coloured bricks are in evidence. One key brick company remains, however, and that is **The Bulmer Brick and Tile** Company www.bulmerbrickandtile.co.uk This company still uses original clay beds, and can match any brick for colour and finish using entirely natural processes, rather than chemical dyes. They have supplied their bricks to many projects in the area for both domestic and prestigious schemes, producing bricks from light orange through a range of reds to purple. They also can match to the Suffolk white brick using a Gault clay with slaked lime and crushed chalk. The experience and knowledge of bricks vested in this company makes them a unique local resource, and one worth contacting for any development which may involve the use of brick.

Another local company that hand makes bricks is **WH Collier ltd** www.whcollier.co.uk making bricks dug from their own London seam clay reserves. Their bricks are made to both metric and imperial sizes and include the Anglian Range, Aldeburgh Range and Primrose Range. The clay used predominantly by this company produces buff to yellow bricks.

Other hand made bricks present in the area include the Swanage reds www.swanagehandmadebricks.com Handmade Light Red, Red Multi and Heather Red.

HG Mathews www.hgmathews.com based in Buckinghamshire are a specialist brick company producing a wide colour range of bricks from light soft orange through red to purple. The Chalfont Reds are a suitable colour for this area. As well as handmade bricks, which are of particular value to conservation and heritage projects, the company also makes machine made bricks using the same coloured clays. Mathews also supply lime, sands and lime mortars and eco blocks for cob construction.

Within the national brick companies **Ibstock Brick Ltd** www.ibstock.com manufacture a very wide range of brick colours. The Leicester red stock, Ivanhoe cream, and Bradgate red have all been used within the county.

It should be noted that due to variation in brick colours, especially multis the colour reference is approximate only and other factors such as texture and finish should be considered when choosing bricks. A sample panel of a metre square is advisable.

Mortar

The colour of pointing mortar can have a profound effect upon the visual appearance of brickwork, and to a lesser extent on blockwork.

The sample panel of brickwork referred to above is also the opportunity to test mortar colours. Tradional mortar colours in the area tend to range from a tawny off white to a chalky white and this should be followed in new development.

Tarmac www.tarmac.com/mortar/mortar produce over 50 shades of factory produced mortar.

Premier Mortars www.premiermortars.co.uk have a similar range of 48 shades of mortar

HG Mathews and Anglia lime (see above) produce a range of lime mortars. These mortars are vapor permeable and essential to show off the qualities of hand made bricks.

Clay tiles

Clay tiles come in many profiles, the plain tile with a cross cambered surface and the pantile are common in the area.

Wienerberger www.wienerberger.co.uk manufacture a wide range of clay tiles through their Sandtoft, Koramic and Keymer ranges.

Kent Clay Tiles www.spicertiles.co.uk produce the Hanbury Range and the Spicer Range. Appledore, Honeywell and Churchland from the former, used in combination work well, as does medium antique and dark antique in the latter. Keymer **www.keymer.co.uk** produce a wide range of hand made tiles. The Peg and Traditional range fits with the area, in a variety of finishes, Antique , Weathered and Elizabethan.

Babylon Tiles www.babylonworks.co.uk make traditional Kent Peg tiles in various styles and shapes in two colours, Traditional Terracotta and Dark Antique.

Dreadnought Tiles www.dreadnought-tiles.co.uk manufacture 3 ranges of traditional plain clay roof tiles: machine made, Rustic hand crafted and Classic handmade.

Slate

Slate is less common in an area, where clay tiles are more prevelant. If it is to be used then the traditional source is from Wales. Welsh slate can still be purchased, though generally at a premium price.

Welsh slate ltd www.welshslate.com produce roofing colours as follows:
Cwt-y-bugail, a dark blue grey slate
Penrhyn, a heather blue slate

Stoneleaf www.stoneleafslates.co.uk supplies a slate close to the hue of welsh slate, called Celtic Grey.

Reclaimed Welsh slate can be found from architectural reclamation yards.

Monier Redland www.monier.co.uk produce manufactured slate which once weathered is a viable substitute to real slate:

Cambrian Heather and Cambrian grey weathered

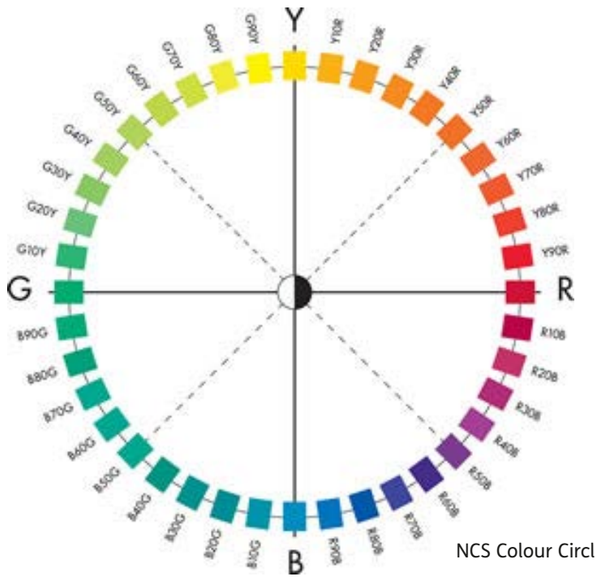
Stone and aggregates

Gravels and sands used in landscaping should follow where possible the colour range of local bed rocks rather than be imported from different regions of the country.

Lyndon Pallett www.thelpgroup.co.uk operate quarries at Beccles, Lakenheath and Bungay in Norfolk. Shingle from 10–40mm, ballast from 10–20mm and washed sharp sand and soft sand can be obtained from Henham and Kirby Cane quarries.

Appendix B
Introduction to NCS

In order to accurately communicate the colours we see, we need a reference or notation system with the ability to pinpoint precise colour.



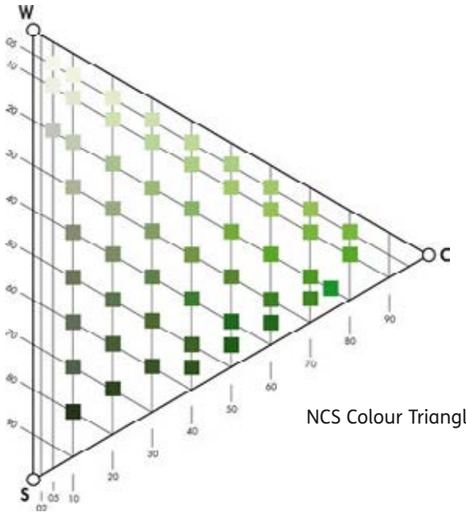
NCS Colour Circle

Six Elementary Colours are the basis for the Natural Colour System. These are White, Black, Yellow, Red, Blue and Green. The colours are shown below on the three dimensional model called the NCS Colour Solid. Every colour in the Natural Colour System is contained within the NCS Colour Solid, and can be described in terms of the six Elementary Colours.

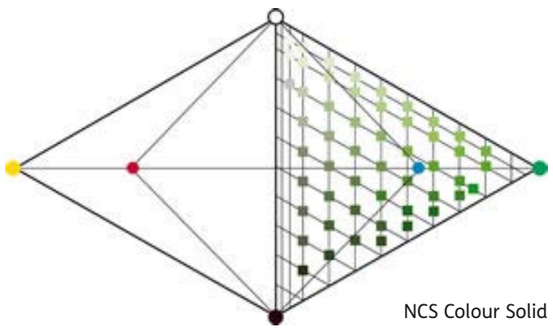
In order to more easily pinpoint colours within the NCS Colour Solid, the NCS Colour Circle and NCS Colour Triangle are used.

The NCS Colour Circle is a horizontal slice through the NCS Colour Solid, and shows a progression from Yellow to Red to Blue to Green and back round to Yellow in 10% steps.

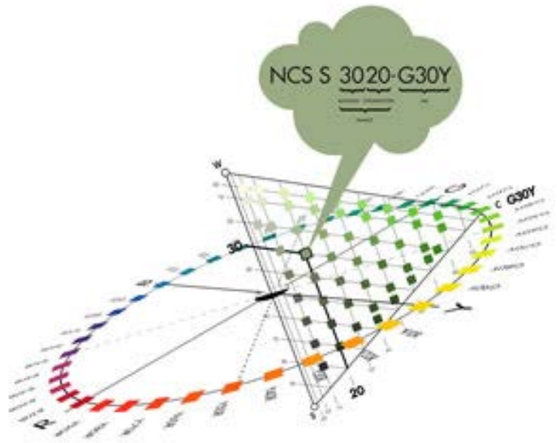
All the colours in the NCS System have a percentage of Whiteness or Blackness, and this is best illustrated using the NCS Colour Triangle. The NCS Colour Triangle is a vertical slice through the NCS Colour Solid. C stands for maximum colour intensity or Chromaticness, W stands for White and S for Black. The scales for Chromaticness, Whiteness and Blackness are each divided into one hundred parts which can be interpreted as percentages.



NCS Colour Triangle



NCS Colour Solid



The NCS Colour Triangle and the NCS Colour Circle are used to pinpoint colours within the NCS System. The diagram above pinpoints a colour with 30% Blackness and 20% Chromaticness, with a location on the NCS Colour Circle of G30Y. The complete NCS Colour Notation is S3020-G30Y.

Using the NCS Colour Notation it is easy to define the appearance of a colour. In this notation (below) 3020 indicates the Nuance of the colour. The Nuance describes the relationship of the colour to Black (S) and to maximum colour intensity or Chromaticness (C). The Whiteness is determined as 50%, as the sum of the values of the three attributes (Chromaticness, Whiteness and Blackness) must always be 100%. The Hue, G30Y, describes the relationship of the colour to the Chromatic Elementary Colours, in this case G and Y. G30Y means Green with 30% Yellow. The letter S preceding the NCS notation means that the colour is from NCS Edition 2.

NCS Colour Notation

Achromatic colours (Black, White and Grey) lack Hue and are only given nuance notations, followed by -N for neutral. S 0500-N is White and is followed by S 1000-N, S 1500-N, S 2000-N and so on to S 9000-N, which is Black.

A Vision for the future

In a world where natural and cultural landscapes are being lost at an unprecedented rate, remaining areas where the rural idyll and people's pastoral roots can still be discovered are profoundly important. The connection of one of Britain's best loved painters with Dedham Vale serves to focus attention on such a vision for the future, and gives the area added interest and value.

The human race is characterized by its unquenching thirst for new ideas, change and development, but people equally value, to an increasing extent the continuity and integrity to be found in their landscape heritage.

The Dedham Vale Landscape, Countryside Commission 1997

We hope that in some way this guidance helps to achieve that future vision.

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Guidance prepared by Waygood Colour
www.waygoodcolour.co.uk

LIGHTING DESIGN GUIDE

Dedham Vale National Landscape

&

Coast & Heaths National Landscape

Guidance to reduce light pollution

and protect our dark skies.

Dedham Vale National Landscape

&

Coast & Heaths National Landscape

LIGHTING DESIGN GUIDE

Guidance to reduce light pollution and protect our dark skies.

July 2023

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Document prepared by

DARKSCAPE CONSULTING

TABLE OF CONTENTS

A note on terminology

This document uses:

- The name Coast & Heaths National Landscape (CHNL) for the area designated as the Suffolk Coast & Heaths Area of Outstanding Natural Beauty.
- The name Dedham Vale National Landscape (DVNL) for the area designated as the Dedham Vale AONB.

'AONB' is the still the legal designation and is used within this plan when referring to AONB's outside of both the Suffolk Coast & Heaths, Dedham Vale and the designation nationally.

At times they are both abbreviated to 'National Landscapes'.

1. Introduction

Both the Dedham Vale and Coast & Heaths National Landscapes are renowned for their tranquil landscapes 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 few towns and areas of open and relatively uninhabited countryside the landscapes offer 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 increases light pollution and reduces our ability to appreciate and benefit from our dark skies. Lighting on rural roads, village streets, houses and other developments have the potential to increase light pollution. It also 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.

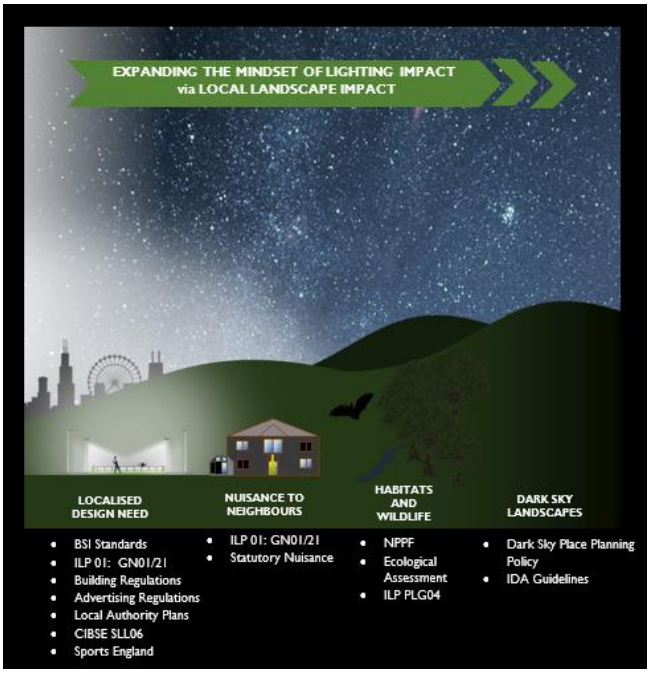

Figure 1 - The relation of standards and guidance to local and landscape needs. From Towards a Dark Sky Standard.

The Purpose of this Guidance

The purpose of this guidance is to protect our night sky by promoting good practice in external lighting and internal light spill. Its aim is to foster behavioural change and reduce light pollution by effective design using industry standard best practice – it does not call for an outright ban on lighting but rather the right light in the right place at the right time. Effective design for dark skies will enable us to see the stars more clearly whilst also saving energy, reducing nuisance and minimising the impact of lighting on wildlife, people and on our National Landscapes. It will also contribute to protecting the landscapes wider special qualities, defined character and tranquillity.

More fundamentally, this guidance aims to support behaviour that does not negatively impact dark skies within the Dedham Vale and Coast & Heaths landscapes by establishing a proactive dark sky 'mind-set'. This means looking at the impacts beyond the immediate areas to be lit and ensuring that relevant standards, landscape assessments and other professional guides are followed. As Figure 1 shows, to protect our dark skies properly we need to expand our 'mind-set' from the local need to the wider landscape impact using appropriate guidance and standards that should be referenced at different spatial levels. The documents listed in Figure 1 are more applicable to non-domestic installations where public, employee or other user safety is an essential safety.

Public bodies under section 85 of the Countryside and Rights of Way Act 2000 who have a duty to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty, should ensure that appropriate regard has been given to lighting design and its impacts.

Who is this guidance for?

This document provides guidance for anyone who is using, replacing, or installing new external lighting in or around the Dedham Vale and Coast & Heaths National Landscapes; this includes householders, businesses and developers who may or may not require planning permission. It also is for those installing new glazing and windows. Achieving good lighting and glazing design is essential for protecting the rural character of the landscape.

Due to the contrast against a darker landscape setting, the impact of lighting at night will have a larger relative visual impact than daytime views. As such, development that may be many miles from the landscape boundaries can have a significant visual impact on the landscape.

This guidance is primarily aimed at;

1. Those seeking to install minor lights or glazing for mainly domestic purposes who need general advice.
2. Non-domestic schemes that may need planning permission and a more thorough design led by professional principles.
3. Planning officers who need guidance on assessing lighting and glazing designs.
4. National Landscape partners and stakeholders providing advice.

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

This guidance is also targeted at those with responsibility for setting the framework for development and for making decisions about individual planning applications; this includes planning staff and their colleagues in local authorities. As such, this guidance provides planners with the necessary information to assess most small lighting designs.

Everyone can help reduce light pollution, reduce energy use and save money by improving the type of outdoor lighting they use. There are many simple and cost-effective solutions which can reduce the impact of outdoor lighting on the environment whilst still providing a feeling of safety and comfort, by delivering the right amount of light only when and where it is needed. Sometimes all it needs is turning the light off. By increasing our awareness and following some simple principles, we can all help to minimise light pollution and protect dark skies.

Do I need Planning Permission?

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 light your garden path, doorway or driveway and purchase appropriate low level off-the-shelf luminaires, you do not need planning permission. You can use the advice in this guidance to help you do this and avoid impact on the National Landscapes.

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;

- Existing domestic buildings which have a condition removing permitted development rights included on a decision notice relating to the building.
- Listed buildings – these require planning permission and listed building consent.
- New residential developments
- Non-domestic buildings if the installation of a lighting design requires a material change in the appearance of a structure or engineering operations.
- Advertisements illuminated or otherwise which are subject to the Town and Country Planning (control of Advertisements) regulations 2007.

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 to achieve a specified level of illuminance. Designers will ensure that the luminaires achieve all the necessary requirements to satisfy both lighting needs and dark sky compliance. Large scale lighting should employ the services of a competent designer.

In any circumstance, you will probably need some form of lighting design if your development is new and needs planning permission.

2. Dark Skies over our National Landscapes

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', which shows the level of stellar visibility measured using naked-eye limiting magnitude (NELM). Under better 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 an International Dark-sky Association place application.

The SQM will return a value of the brightness (magnitudes) of an area (arcsecond^2) 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. 21 and above is rare in the UK. Volunteers within The Dedham Vale have measured 21+ in some places. Only one measurement of 20.65 has been recorded within the Coast & Heaths landscape at the Westelton Common Dark Sky Discovery site. However, comparison with satellite data between the two landscapes show that similar 21+ measurements would be expected in the Coast & Heaths National Landscape.

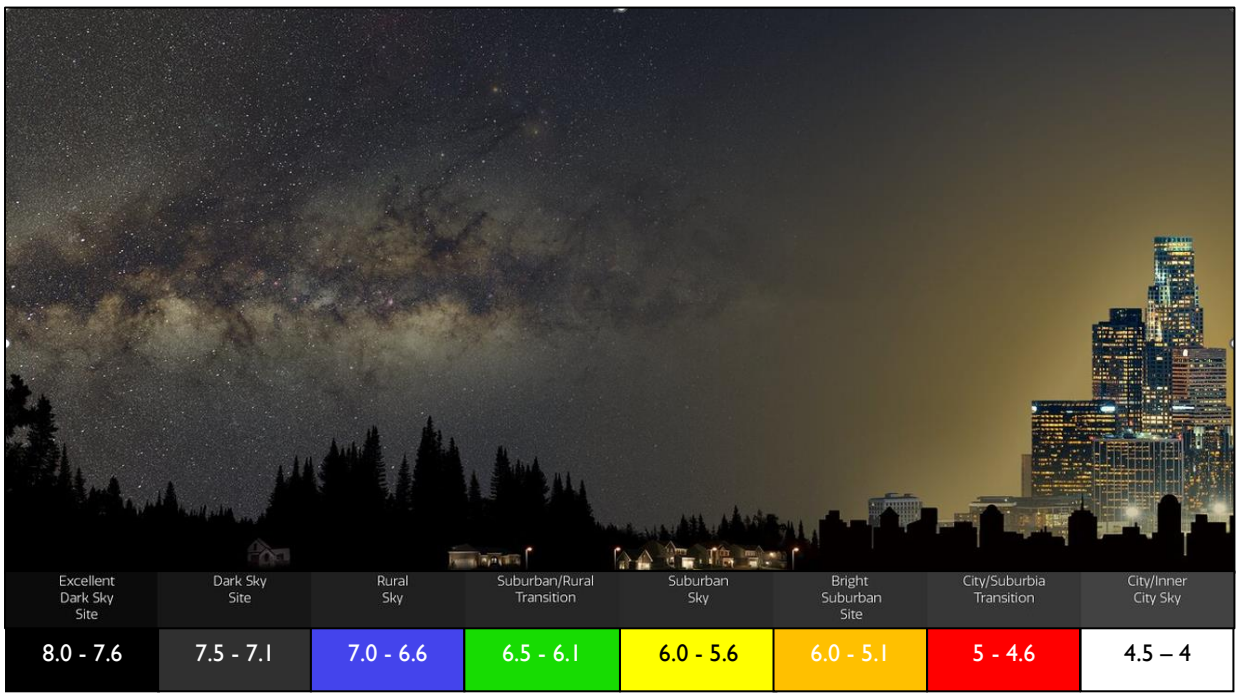

Figure 2 Credit: NOIRLab/NSF/AURA, P. Marenfeld. Global sky conditions from city to the best dark sky sites. Bortle scale expressed in naked eye limiting magnitude has been added. Note that the Milky Way will start to become visible in the suburban sky, 20.5+

Dark night Conditions and threats

Both the Dedham Vale and Coast & Heaths National Landscapes are designated for their distinct landscapes which are rich in biodiversity and cultural heritage. As typically rural landscapes the skies above will be of regional importance to residents within and surrounding the landscape. While neither National Landscapes have yet secured an International Dark-Sky Association (IDA) place status like other UK protected landscapes that have achieved designation, it is still important to protect skies that could qualify for this accreditation at a later date.

The Countryside Charity (CPRE) campaigns to raise awareness about light pollution. In 2015 they worked with Land Use Consultants (LUC) to create a Night Blight map showing the relative darkness of the night sky across England (Figure 4). The mapping is based on remote satellite sensing and shows light emanating from the ground and upward facing lights that unnecessarily pollute.

As the map shows, the Dedham Vale suffers with light pollution from some rural villages such as Nayland, the A134 corridor and the Stoke by Nayland Resort Hotel. The landscape also suffers the effect of light pollution from Manningtree and the larger city of Colchester in the South. The area between the A134 and the A12 is a continuous area of darkness showing higher areas of relative quality.

The Coast & Heaths shows a greater difference in conditions between the larger unit to the north and the smaller units that reside between Ipswich, Manningtree and Felixstowe. These smaller units show higher levels of light pollution and lower sky quality compared to the larger unit.

The northern unit shows much higher levels of darkness but in addition to more common influences of small towns such as Thorpeness and Southwold, it is influenced by some major sources. Prominent sources include the MoD Woodbridge and Airfield and Sizewell Nuclear Power Station. The landscape also suffers from the surrounding towns and cities including Lowestoft in the North and Ipswich and Felixstowe in the South. There are also two Dark Sky Discovery sites within the boundary, Walberswick NNR and Westleton Common.

As the maps show both landscapes are at risk from the spread of urban development and the introduction of major lighting installations along their boundaries. The National Landscapes has specific threats from the spread of lighting from existing major development sites particularly the construction of energy projects and from offshore wind turbines.

It is important therefore, that development both inside and outside the boundaries properly considers good lighting practice to limit the impact of light pollution and protect good intrinsic areas of darkness within each landscape boundary.

The CPRE Scale

The scale used in the CPRE mapping is dependent upon the resolution of the satellites being used. The VIIRS satellite has a minimum detectable radiance of 3nW cm^{-2} with a resolution of 750m and is unable to detect the impactful blue light peak of LED light. Comparing the maps to sky quality measurements, the highest scales (1 to 2) roughly approximate to 20.5 and above. Areas under these categories are likely to provide good astronomical opportunities and dark skies.

Figure 3 - All Sky Image from Nayland. Mike Barrett

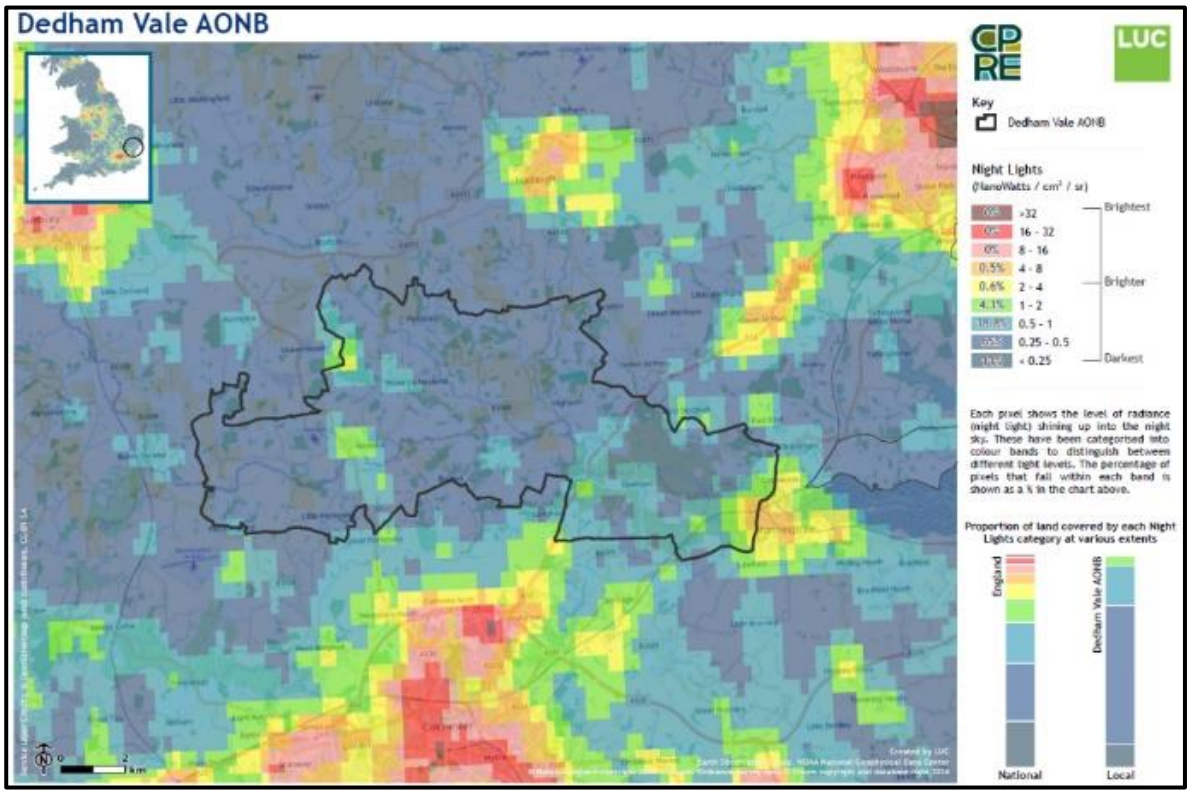

Figure 4 - Dedham Vale National Landscape Sky Quality. .(Earth Observation Group, NOAA National Geophysical Data Center. Data processed by LUC on behalf of CPRE)

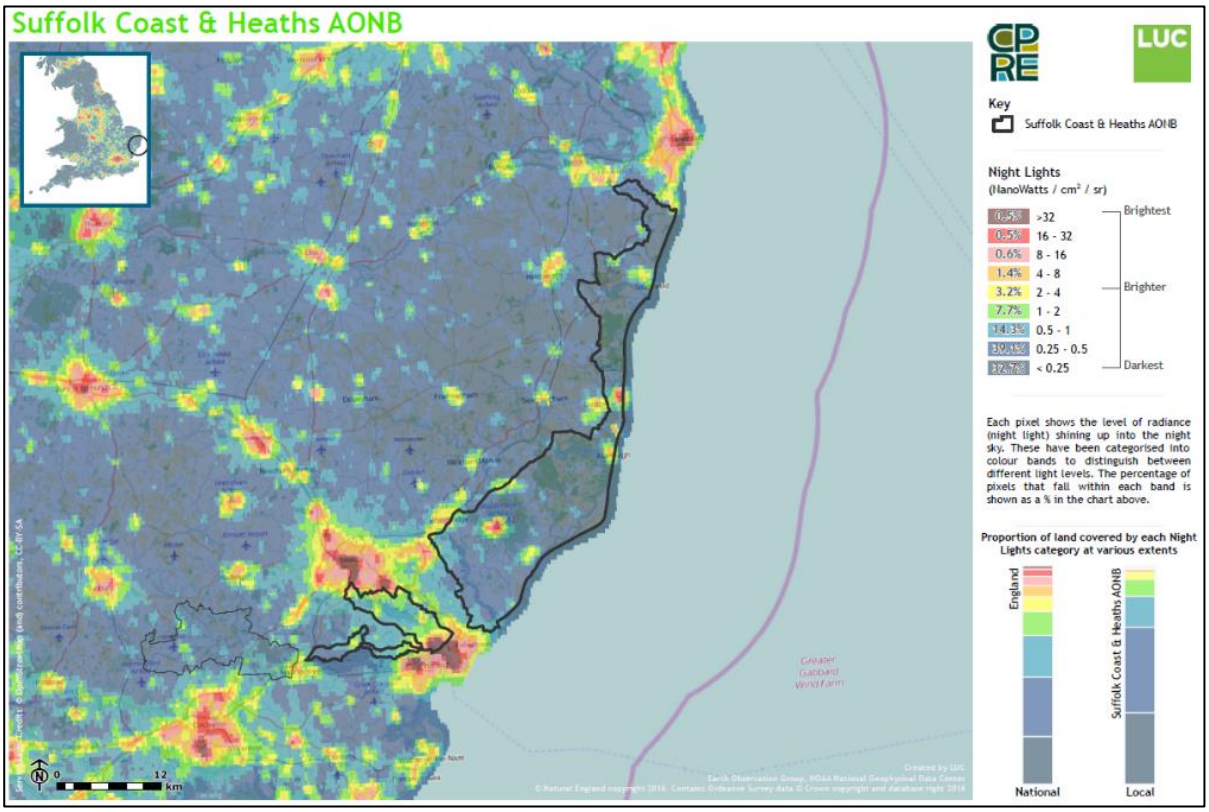

Figure 5 – Coast and Heaths National Landscape Sky Quality (Earth Observation Group, NOAA National Geophysical Data Center. Data processed by LUC on behalf of CPRE)

Dedham Vale National Landscape Sky Quality

The CPRE maps show the Dedham Vale National Landscape has 76% of its landscape classified as 'dark' (<0.5 nWcm^{-2} sr^{-1}) with 11% categorised as pristine (<0.25 nWcm^{-2} sr^{-1}). It ranks 20th of the 34 National Landscapes in England.

Boundary	Night light 1 (<0.25)	Night light 2 (0.25-0.5)	Night light 3 (0,5-1)	Rank
Dedham Vale Landscape	11%	65%	18.8%	20
Colchester District	2.1%	32.9%	31.4%	117
Babergh	13.4%	53.1%	19%	38
Tendring	0.8%	30.2%	33.6%	97

Coast & Heaths National Landscape Sky Quality

The CPRE maps show that Coast & Heaths National Landscape has 73% of its landscape classified as 'dark' (<0.5 nWcm^{-2} sr^{-1}) with 32% categorised as pristine (<0.25 nWcm^{-2} sr^{-1}). It ranks 29th of the 34 National Landscapes in England.

Boundary	Night light 1 (<0.25)	Night light 2 (0.25-0.5)	Night light 3 (0,5-1)	Rank
Coast & Heath Landscape	32.7%	39.1%	14.3%	29
Suffolk Coast	2.1%	32.9%	31.4%	117
Waveney	24%	41.3%	13.9%	75

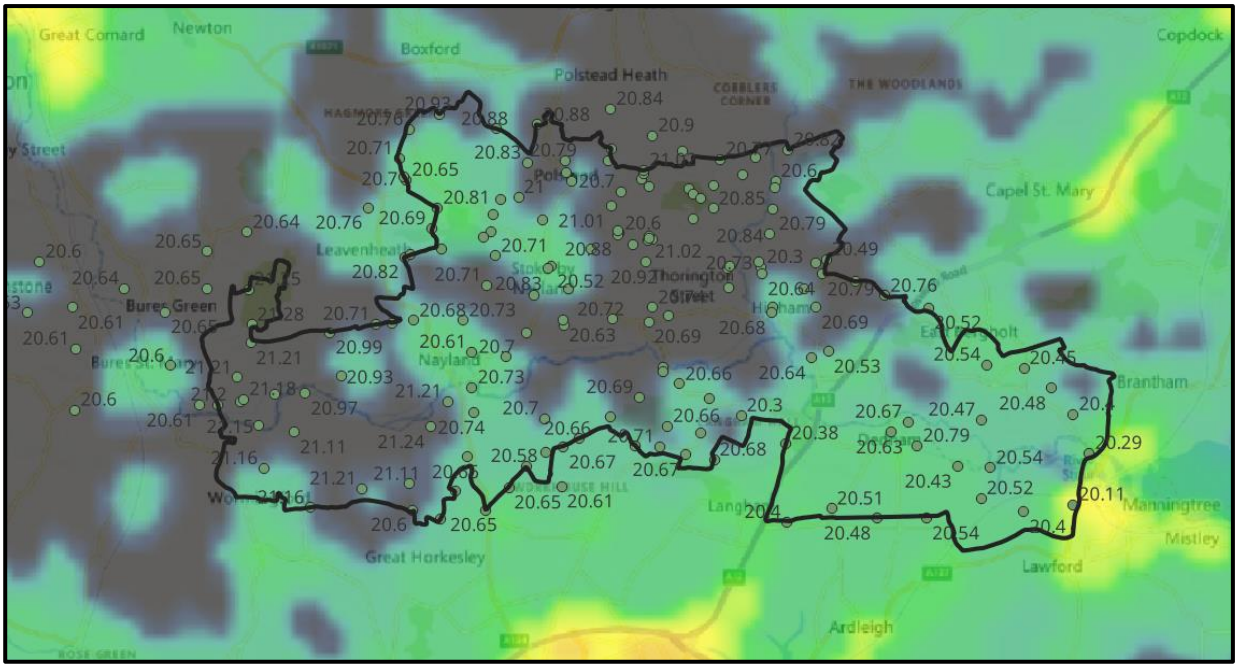

Figure 6 - Sky Quality Measurements in the Dedham Vale National Landscape

On the Ground Measurements

Sky quality measurements have been taken within the Dedham Vale. Figure 5 shows above where these values were taken overlaid over VIIRS 2022 satellite data and figure 6 shows an interpolation of the data showing areas between 20-20.5, 20.5-21 and 21 and above.

They show good levels of darkness with some areas measuring above 21 magnitudes per second^2. They show reasonable agreement with VIIRS 2022 datasets and show that favourable dark sky conditions of 20.5 magnitudes per arcsecond^2 throughout the rural landscape. Given these values, it is fair to assume that Coast & Heath National Landscape will have similar levels of consistency.

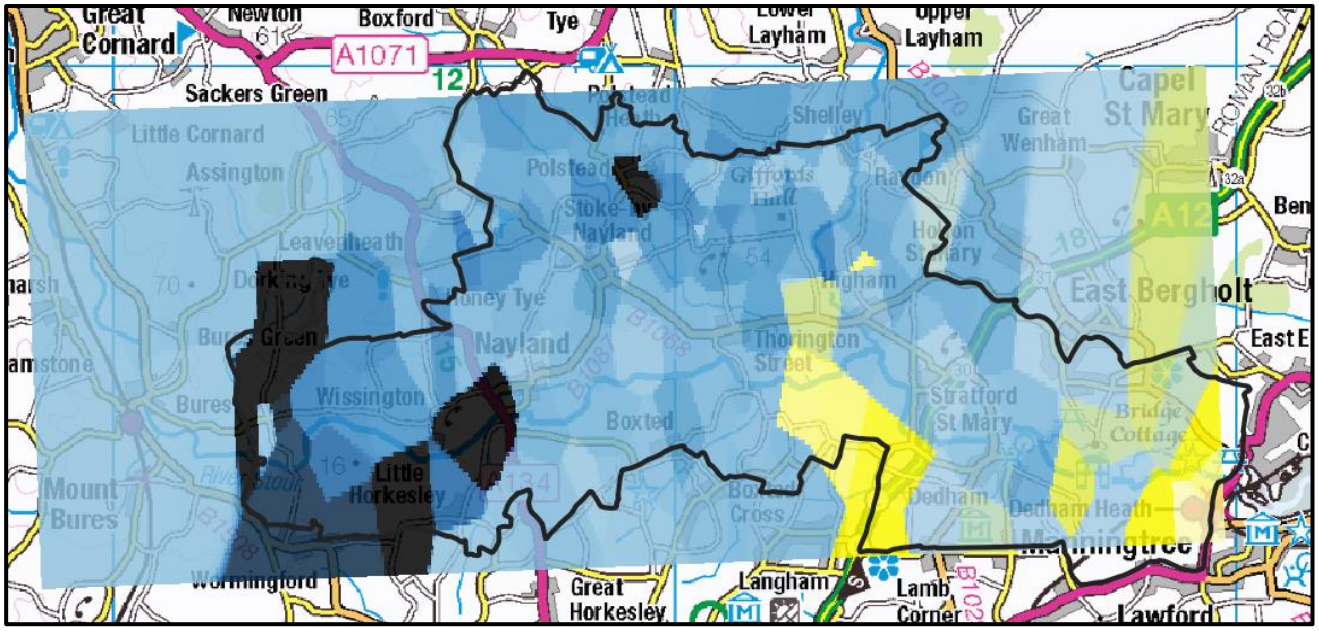

Figure 6 - Inverse Distance Weighting interpolation of Sky quality data. Dark blue to black (21+), blues (20.5 to 21) and yellow (20.5 and less).

Computed histogram shows a peak at 20.6 with consistent values between 20-5 and 21.

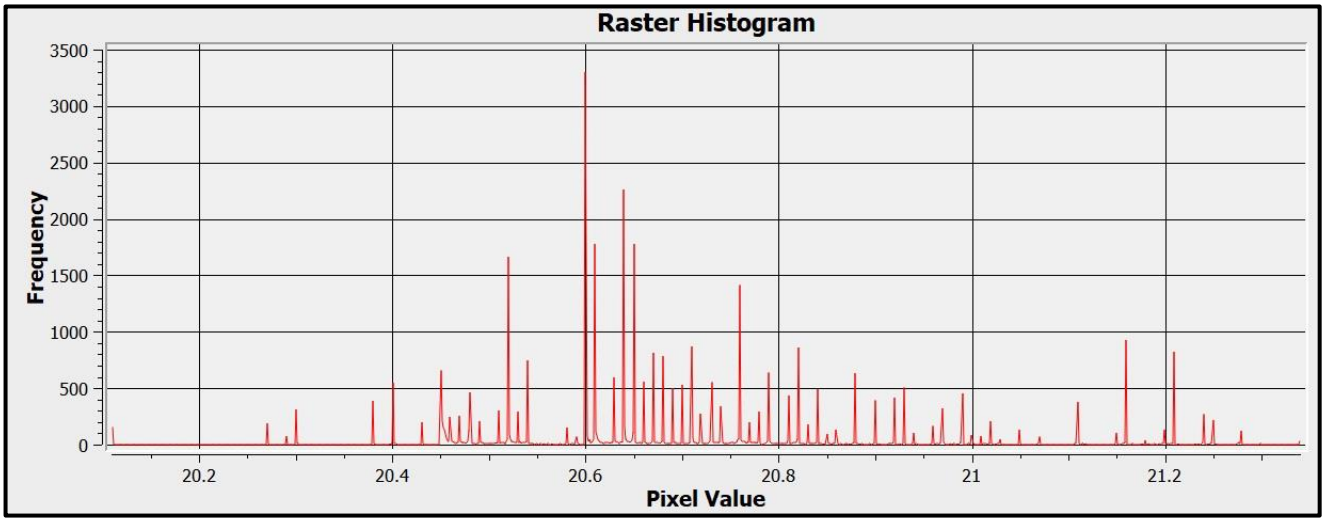

Figure 7 - Histogram of Sky Quality Measurements. Shows peak at 20.6 magnitudes per arc second²

Ambient lighting zones

The standard practice in external lighting design is to apply ambient lighting environment zones (E-zones) to set different lighting requirements under different sky conditions. Due to the difference in ambient lighting between urban and rural settings, different levels of obtrusive light are allowed although zero upward light is preferred in all zones.

The Institution of Lighting Professionals guidance on the reduction of obtrusive light (GN01 ILP: 2021) recommends lighting specifications based on these ambient zones. They state different levels of upward light, intensity, glare and building luminance for these zones which should be followed in any lighting design. The landscapes will either be E1 or E3/4 with an additional caveat on upward light. If in doubt, consult with officers to determine zone compliance requirements.

Using sky quality data, the Dedham Vale and Coast & Heaths National Landscape has been categorised into two main rural and urban zones based upon the use of Council or National Highways Authority owned road column street lighting in urban areas. Urban street lighting has a clear and measurable impact on sky quality and is a useful demarcation between ambient lighting environments. The environment zones are set as;

A rural zone which includes areas of the landscape that has sky quality measurements satisfying.

- E1 – Rural landscape, small villages, very little street lighting

An urban zone to include,

- E3 – Urban/Suburban settlements, towns, villages using street lighting.

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, Areas of Outstanding Natural Beauty, IDA buffer zones etc.**
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 night-time activity

Table 1 - Environment Zones. GN01 ILP The Reduction of Obtrusive Light. The rural landscape will be E1. Refer to the guidance note for recommended limitations of lighting parameters in each zone for, property illuminance (spill), intensity, sky glow and upward light, and building luminance.

IMPORTANT: DESIGN COMPLIANCE

For all lighting development within the rural setting (not within urban areas using Local Authority streetlighting) it is expected that plans will aim to achieve E0 compliance under ILP GN01 2021 as a matter of principle. Use of E1 criteria instead of E0 should be clear in the design justification.

- The need for E1 compliance is particularly relevant to road, amenity, and sports lighting where residual effects are likely to cause significant adverse landscape impacts (refer to Table 7 in GN01 2021). Installations of amenity and sports lighting schemes using more than four luminaires are not expected in E1 zones due to the residual impacts.

- E1 areas are expected to reside between the urban fringe boundaries and the darker rural setting. Measurements above 20.5+ are likely to begin within 2km of the edge of the street-lit urban fringe (E3) boundary.

- Illuminated main roads and highways, such as the A143 or the A12, should not be considered as 'urban' development. They should reflect the wider surrounding ambient lighting levels and in rural areas, would be classified as E1 as a minimum.

- Note that E2 zone is not used, as both landscapes prefer to give the landscape the maximum protection under the ILP GN01 guidance in relation to the protected status and its sky quality.

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 ILP GN 01 guidance which allows positive values of ULR in E3/4. The Dedham Vale and Coast & Heaths National Landscapes seek zero upward lighting in all cases and supersedes the ILP guidance in this technical respect.

Dark Sky Discovery Sites

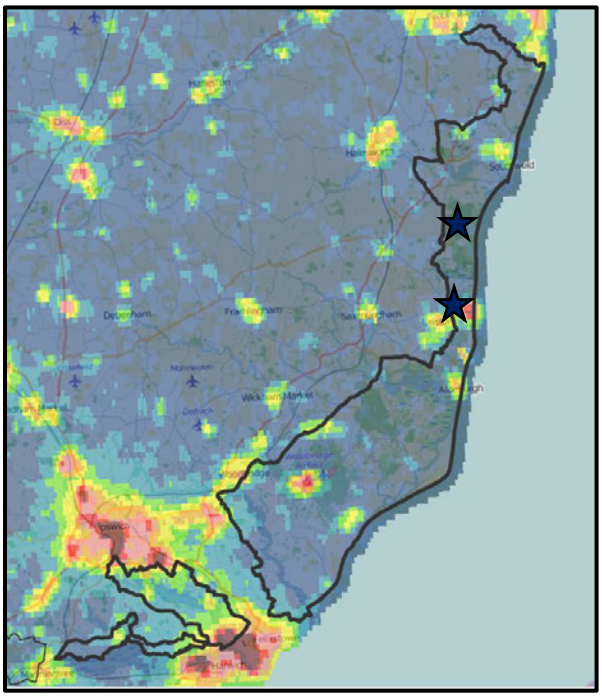

Figure 8 - Dark Sky Discovery Sites in Coast & Heaths National Landscape. Earth Observation Group, NOAA National Geophysical Data Center. Data processed by LUC on behalf of CPRE

In 2019 two Dark Sky Discovery sites within the Coast & Heaths National Landscape were approved by the UK Dark Sky Discovery Network. These sites, at Walberswick National Nature Reserve and Westleton Common, have been recognised for the opportunities they offer to observe the night skies and are further proof of the importance of dark skies above the landscape. Special attention should be given to these sites to ensure that light pollution is avoided for both visitors and wildlife. This should be achieved with an appropriate environmental lighting impact assessment methodology that ensures that the ecology surrounding these sites is given due regard.

3. What is Light Pollution

Light Pollution Definition and its effects

Light pollution is the presence of unwanted, inappropriate, or excessive artificial lighting. While protecting dark skies is important, light pollution affects many different aspects of society. Poorly designed, badly installed, inappropriate and waste light can affect nature and wildlife, increase energy costs, and impair health and wellbeing especially if a nuisance to neighbours. It also affects the way we interact and live within our spaces by making us feel safe, connected and part of a community. Viewed as a wider society issue it is important to ensure that lighting meets the needs of people but does not create inappropriate and unnecessary pollution.

As recent evidence in *Nature Ecology and Evolution (Nov 2020)* has shown, artificial lighting pollution is impacting the hormone levels, breeding cycles, activity patterns and predator-prey interactions of a broad range of species. A study by University of Exeter which combined 126 previous papers to assess the impact, concluded that light spill should be treated as another form of pollution. Combined with the effect on humans, light impacts in many ways:

- Songbirds, amphibians, bats, insects and trees have all been shown to suffer under artificial light. Breeding patterns, foraging routes and pollinators are disrupted, with evidence showing a third of insects attracted to lights will die because of the encounter.
- The human cycle is disrupted by negatively affecting the production of Melatonin in the brain which helps regulate sleep, enhances the immune system, reduces cholesterol levels and the endocrine system.
- Glare can be highly dangerous to road users. It can cause accidents when motorists are distracted or blinded by lights.
- Lighting costs money and can create CO2. Unnecessary light pollution wastes power and money to householders, businesses, and the public sector.

Three main types of light pollution

Light pollution has three main sources: Sky glow, glare and light trespass. The strength and direction of any lights source can exacerbate pollution and blue-white light is particularly damaging as it able to penetrate the atmosphere at greater distances.

It is also important to consider a 'fourth' source of pollution, which is due to the presence of lighting itself within dark areas and the residual impact.

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 badly directed light sent above the horizontal and scattered by aerosols and particles in the air. It can also be reflected from surfaces. Light that travels near the horizontal is the most damaging as it travels furthest through the lower, denser atmosphere. This can be avoided by ensuring that lights are directed downwards where the light is needed. 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. This is particularly noticeable when looking from raised viewpoints into the darker landscape below.

Light trespass

Sometimes called 'light intrusion", this involves external light spilling beyond the property or area being lit. Although this pollution definition generally relates to windows and intrusion into private property, the term 'light intrusion' also applies to natural habitats and areas of high species interest. Light trespass can also occur from internal light that spills into darker places.

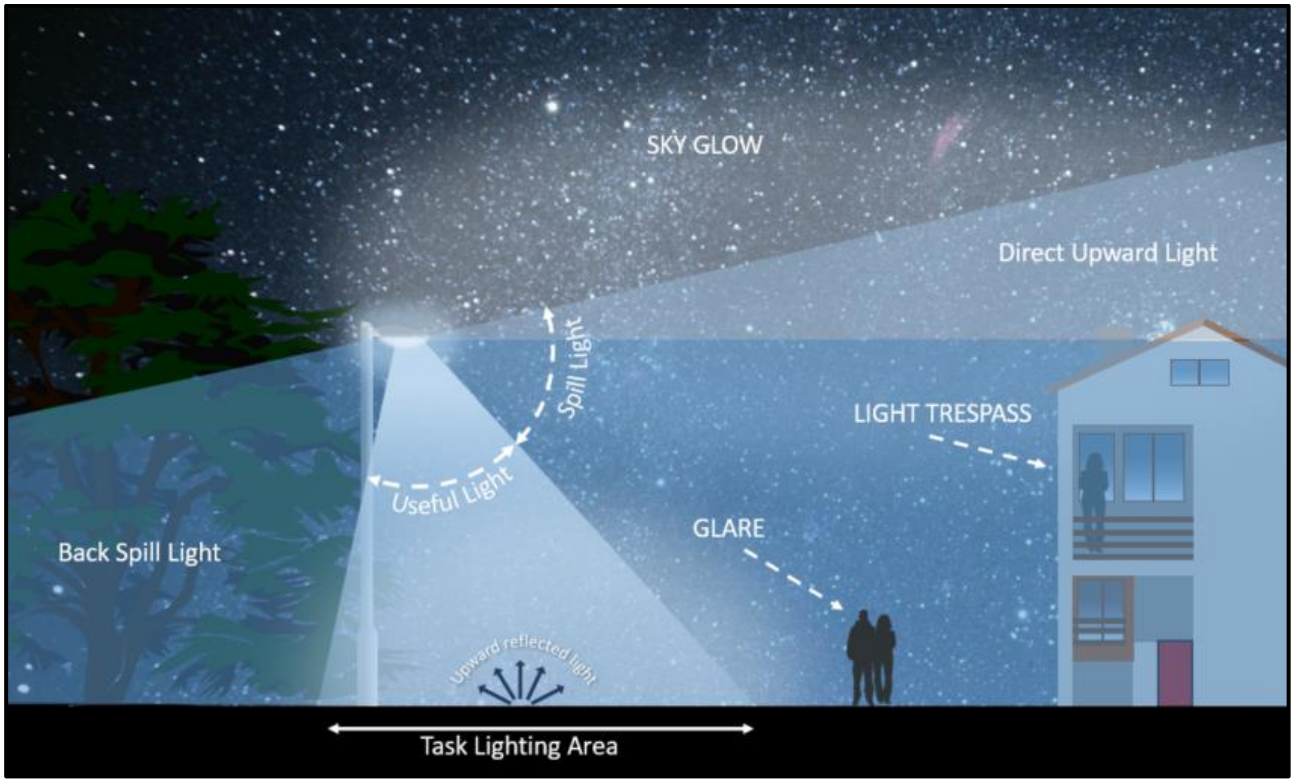

Figure 10 - Light Pollution. Sky Glow, Light Trespass and Glare.

Presence – a fourth consideration

Even if a lighting scheme were designed that avoided sky glow, trespass and glare, there still exists the possibility of significant **residual impacts** on dark and sensitive landscapes and wildlife due to the presence of the lights and the illuminance it provides. This applies to impacts from both exterior and interior lighting. When the residual impacts of lighting itself creates negative impacts, alternatives and re-siting should be considered or avoiding the proposed development. This is relevant for more brightly lit places, such as sports pitches or greenhouses that pose a greater threat.

Light pollution is made worse by blue-white light which can be found in many (Light Emitting Diode) LED lamps. The blue-white light can penetrate the atmosphere much further than yellow and orange lights.

Residual impacts are difficult to avoid as they cannot be mitigated unless the light is completely removed from use. As a minimum amount of light will be required for illuminating surfaces, it will always be visible to some extent. While some acceptability of residual impacts must be given in providing light, even the best lighting plans cannot completely avoid some level of impact.

Residual impacts can be assessed using the methodology in ILP GN04 Lighting Assessments. Significant levels of negative residual impact may not be appropriate in a dark landscape regardless of the efficiency of the design.

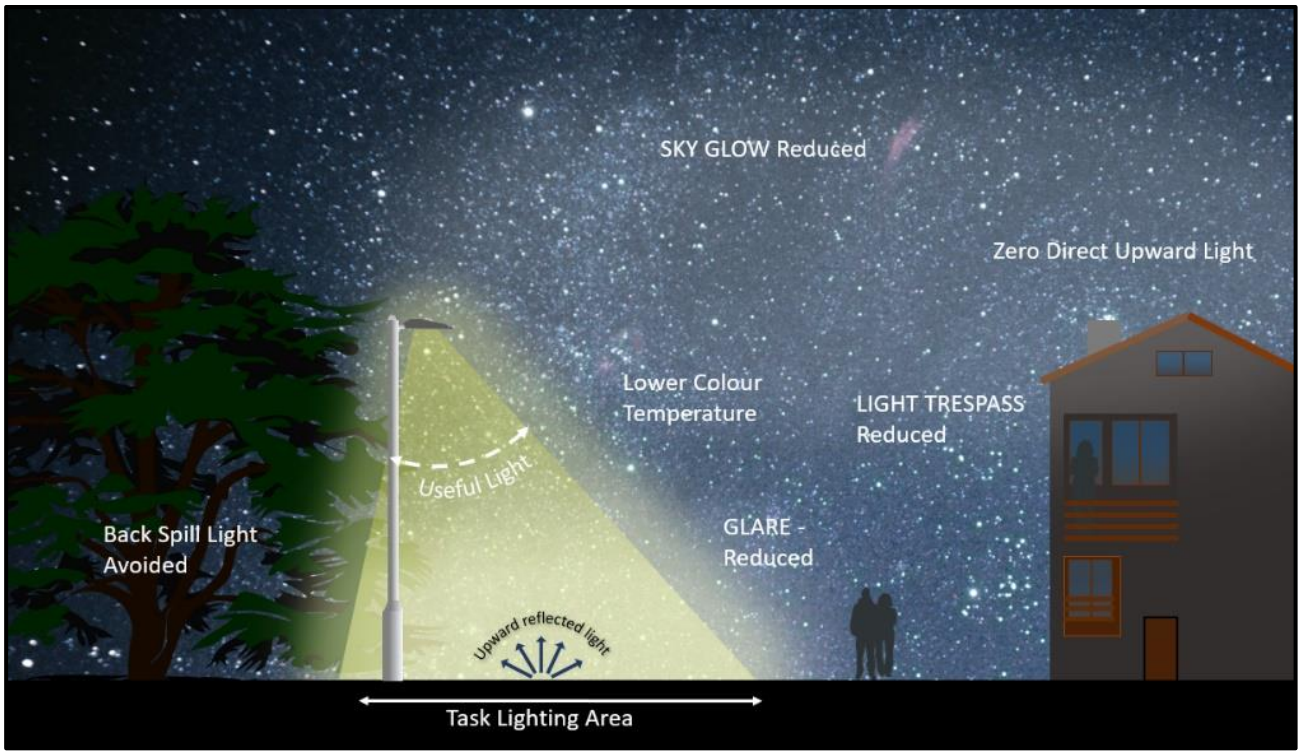

Figure 11 - Reduced sources of Light Pollution. The residual impacts of the lighting - the presence - remains.

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Light Pollution Control in the UK

Light Pollution and the Law
In 2005, Clean Neighbourhoods and Environment Act 2005 – Statutory Nuisance (para 79-fb) was extended to include light nuisance,

> "fb – artificial light emitted from premises so as to be prejudicial to health or a nuisance"

Local authorities must take reasonable steps to investigate complaints of artificial light nuisances. If a nuisance exists or may occur, an abatement notice to cease will be issued within a set timescale. For any resident, it is important not to be a nuisance by reducing pollution and following good lighting practice.

It is important to note that the threshold and process for nuisance lighting is different from planning. A nuisance requires a 'victim' who can show that they are being negatively impacted by lighting that has probably not received any obtrusive light reduction design. The harm is quantified by directly measuring obtrusive light spill metrics that fall into internal spaces by Environmental Health Officers. In contrast, planning control requires that light spill is reduced, ideally before the lights are installed, and to comply with obtrusive light requirements.

Light Pollution and National Planning Policy Framework (NPPF)
The National Planning Policy Framework NPPF (2021) provides local authorities with a baseline when developing planning policy; paragraph 185

> 185 – 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."

The NPPF references the importance of conserving and enhancing landscape and scenic beauty (Section 5), which would include darkness. Para 176 requires that 'great weight should be given to conserving and enhancing' protected landscapes which have the highest status of protection. Para 176 also requires that development is limited and sensitively designed to 'avoid or minimise adverse effects' on designated area. This would include well designed lighting and understanding the full impact on darkness.

Para 177 also note that permission for major development be refused other than in exceptional circumstances.

Duty of Regard of Section 85 CROW 2000 bodies,
Section 85 of the Countryside Rights of Way Act 2000 places a requirement of a general duty of public bodies, which should include the impact of light pollution as regard,

> (1) In exercising or performing any functions in relation to, or so as to affect, land in an area of outstanding natural beauty, a relevant authority shall have regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty.

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.

How Light is Measured

Light is composed of individual wavelengths across the electromagnetic spectrum that give lamps their colour and strength. To ensure lighting designs are effective in reducing light pollution it is useful to understand the different measurements of light – Lumens, Lux, Candela and Colour (Kelvins and spectral wavelength) and how they impact on light pollution.

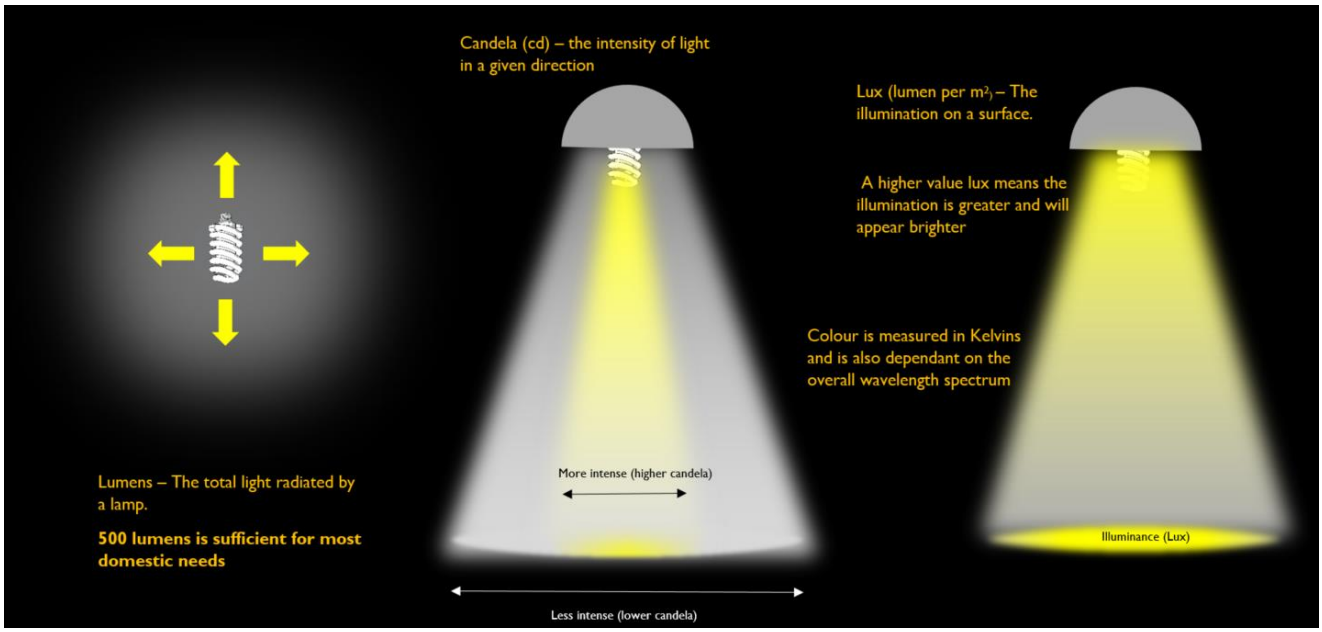


Figure 12 The properties of light. Credit Darkscape/South Downs National Park Authority Technical Advice Note

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_m) 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 could contribute to neighbour's obtrusion and glare issues. 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.

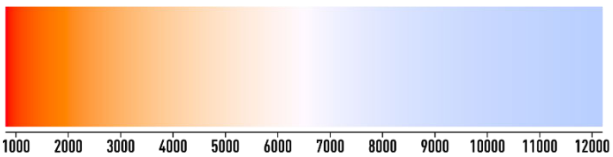


Figure 13 - The Kelvin Scale (K)

The colour of light will also change the way we perceive objects under its light – the colour rendition. Some lighting applications, such as sports or rail platforms, require a certain colour rendition quality which precludes the use of lower colour temperatures. It is important to ensure that the colour temperature (CCT) and the colour rendition index (CRI) are compatible.

Figure 14 - Different colour temperature lamp types

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 spectrums with a high degree of blue light, which increases the impact of light pollution. However, newer LEDs now filter out damaging blue light without changing the overall colour temperature (CCT) or the Colour Rendition Index (CRI). Some manufacturers show the spectrum, but this is not common.

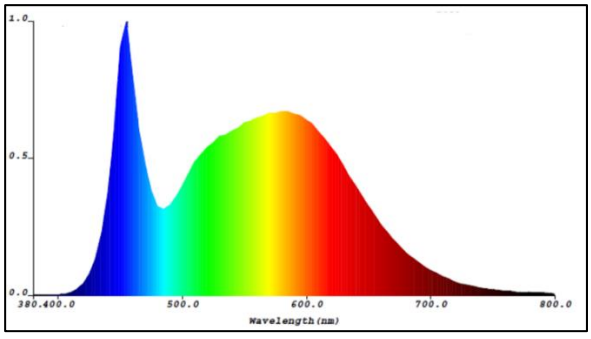


Figure 15 - The colour spectrum from a 5000K lamp with a prominent blue peak which exacerbates light pollution.

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 will need specific colour rendition levels to achieve safe and natural play.

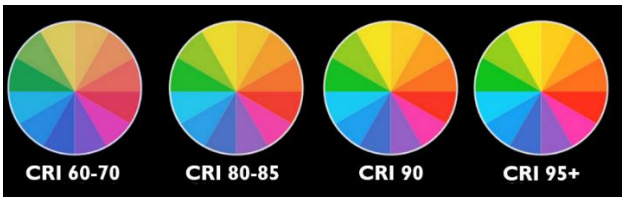


Figure 16 - Colour Rendition Index (CRI).

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.

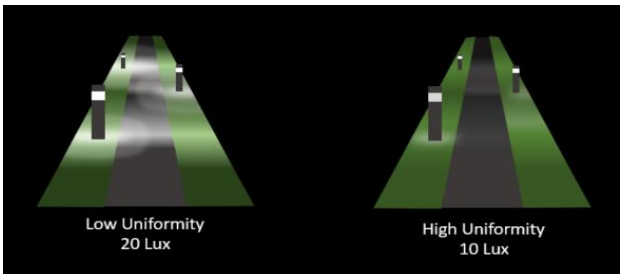


Figure 17 - Uniformity and illuminance

Measuring Sky Quality

Sky Quality can be measured either by looking down at the Earth from above and measuring the upward light or by measuring the brightness of the sky from the ground. Most ground measurements use a Sky Quality meter either with a Unihedron meter, or a TESS photometer which cost around £150. More complicated options are available, such as data loggers or all-sky units, but for quick measurements, the simple hand-held button operated units are acceptable.

You can also get a rough estimation of sky quality by counting the number of stars in the constellation of Orion which can be seen in the winter months. Observers can count the number of stars within the rectangle formed by the shoulders and feet. The number of stars you can see will give you the indication. The CPRE, the countryside charity, used this method for their star count. In a city centre you will be lucky to make out 10 stars whereas under a good Milky Way dark sky in the UK you should be able to see around 25-30. Theoretically, there are 40 stars visible to the naked eye within Orion, but you need to be in a very dark place and have very good eyes to see them all.

Figure 18 - CPRE Star Count

Figure 19 - Light pollution in Boxted, Essex. Nik Szymanek

4. Dark Sky Design Lighting Principles

The following best practice design principles should be followed to ensure good lighting that reduces light pollution and its impact on dark skies. They are the corner stone of good lighting for dark skies and can be found in many of the referenced guidance's. With any installation, domestic or otherwise the aim should be,

the *right light, in the right place at the right time*

Useful

Any light should be justified with a clear purpose and benefit. The overall lighting impact should be appropriate for the task and the local setting, regardless of the design.

Targeted

Light should be directed to where it is needed and not spill into neighbouring spaces. All light above the horizontal should be avoided. **Zero upward light is essential.**

Asymmetric lights should be used where possible to reduce light spill, lower mounting heights, improve efficiency and eliminate upward light.

Low light

Lights should provide the right illuminance referenced against design standards where appropriate. Do not use needlessly over-bright lights as there will be more pollution and unnecessary glare. Use **500 lumens** and less for domestic lighting. Lights should be installed at their lowest practical height.

Controlled

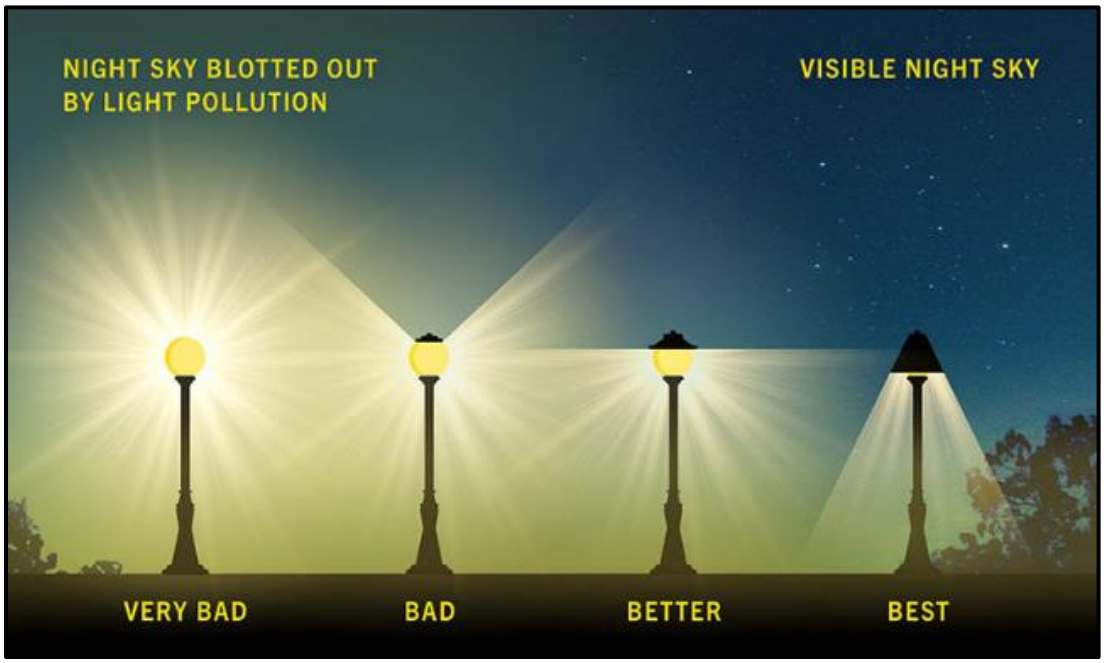
Turn off when not needed with manual switches, timers or proximity (PIR) sensors. Ensure lights are dimmed or selectively activated when activity is low, to reduce light and energy use.

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 and adhere to relevant standards.

Colour

Lamps should be **3000K** or less and ideally **2700K**. These are sometimes described as 'warm white'. Lamps above 4000K described as 'neutral' and 'cool' should be avoided as they generally have more blue light within the spectrum. Spectral emission should avoid blue-wavelengths of **<500nm**.



5. Advice for Minor and Domestic Development

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

- Minor and Domestic Lights
- Internal light spill through glazing

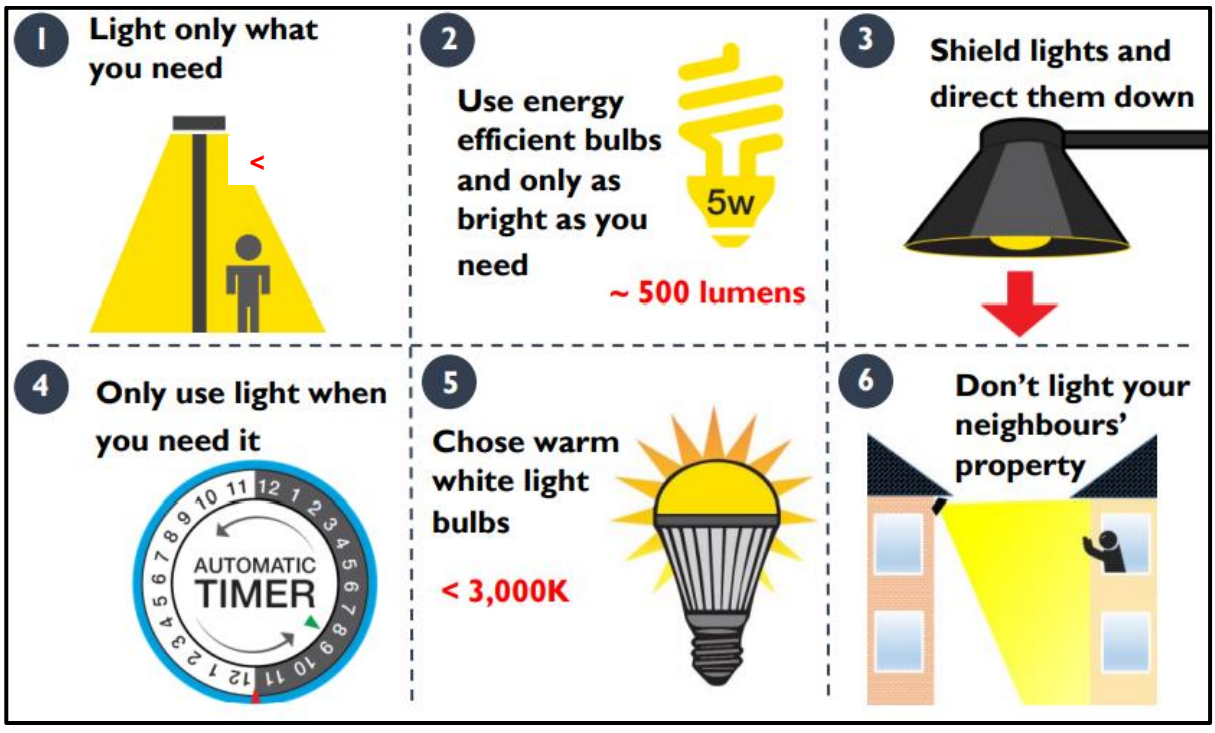
Minor and Domestic Lights

The first consideration is whether lighting is needed at all. As minor fittings (see accompanying specification) are not generally subject to planning control or need a lighting designer, it is important that users and homeowners installing domestic lights understand the difference between good and bad lighting. What can seem an enticing deal at the retailers can turn out to be inappropriate and a nuisance to neighbours and overly polluting. Moreover, it may negatively affect the night sky and the near environment. Residents often buy and install lighting that is more powerful than a streetlight which can have a significant negative impact.

Follow these simple steps from the International Dark-Sky Association to ensure good-neighbourly lighting that protects dark skies.

Minor Lights Specifications

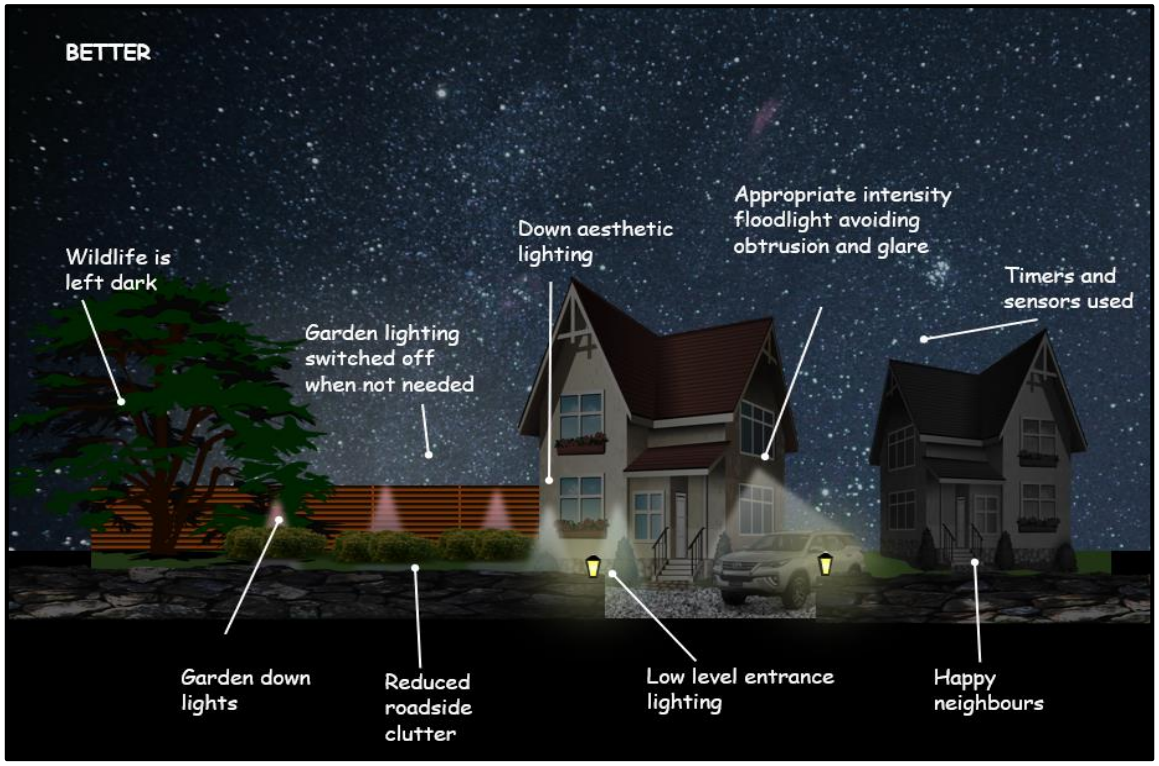
- Lamps of less than 500 lumens (~5W LED) is fine for navigating the garden path, and 1,000 lumens (11W LED) is acceptable for those requiring a little extra light for most uses, like parking the car and getting the keys in the door.
- You should not need a light greater than 1,500 lumens (~15w LED) for most domestic uses. Multiple low-powered lights in the right places are better than one bright light.
- Anything above 500 lumens, where this is justified, should be fully shielded so that the light goes downwards. LED lights are best to achieve downward light.
- Proximity sensors such as infra-red (PIR) should be used to light only when needed. Try and use separate sensors so you can angle the light without comprising its function (vice versa)

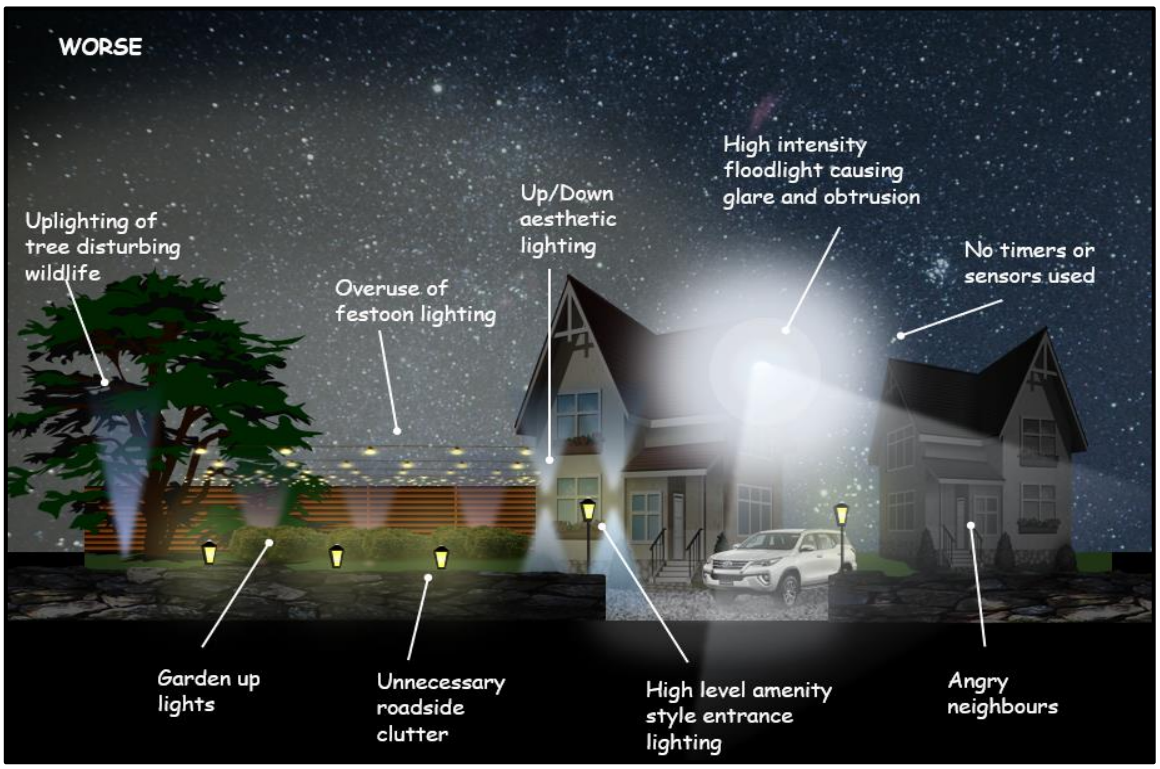


Domestic and Minor Lighting Best Practices

Domestic lights and internal spill can be relatively un-obtrusive provided they are low powered and installed correctly. If done well – even with streetlights – you could get a good view of the night sky and have a low visual impact on the landscapes and their characteristic tranquillity.

In addition to the advice above, the Institution of Lighting Professionals has produced further domestic guidance. ILP - GN09: Domestic exterior lighting: getting it right!. This leaflet advises on appropriate lighting for the task in hand, providing the level of illumination required but not becoming a cause for concern to adjacent residents or affecting the natural environment surrounding your property.





Key Considerations

Nuisance to neighbours
Badly installed lighting will always annoy your neighbours and can be a source of bad feeling. To avoid this, ensure you purchase lights under 1500 lumens, 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.

Over lighting in domestic luminaires
While it is tempting to get the best bang for your buck many domestic options are over bright and too powerful for most domestic purposes. You do not need anything more than 1500 lumens and 500-1000 will be sufficient for most domestic uses and aesthetics. County Council Street lights operate at their lowest setting around 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 7 to select the right power.

Using minor domestic style lights for commercial needs
Commercial lighting needs are often guided by illuminance standards and require a lighting designer but there may be circumstances where domestic and minor lights installed by the owner without using a lighting designer are more appropriate. For example, office doors, farm-shed entrance or a small pathway may require one single luminaire rather than a complex design. In these circumstances, this section on minor lighting and the following section on small commercial lighting should provide sufficient guidance to install the right light.

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.

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 when not needed.

Planners Domestic Checklist

Domestic lighting will not usually require planning permission unless it is part of a new development or a change of use. Important aspects to look for are,

- 500 lumens for most domestic uses.
- Downward pointing luminaires.
- Less than or equal to 3000K Colour Temperature (warm white).
- Have a clear purpose and illumination area.
- Off when not needed.

Designers Domestic Checklist

Within any planning report applicants should ensure to include and make clear;

- Justification for the lighting describing the relevant task areas
- Lumen and Colour Temperature levels are shown.
- Pictures of the luminaires are provided.
- Any deviation from best practice, e.g., using heritage style lanterns on listed buildings, is given.
- That the lighting is not obtrusive under ILP GN01 guidance to neighbours.

Luminaire Advice

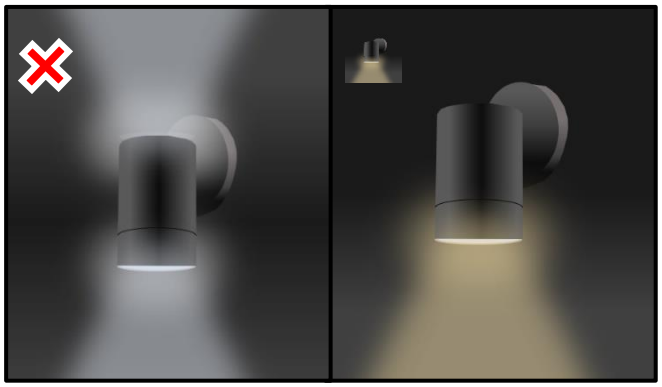
Coach or Heritage Style

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.

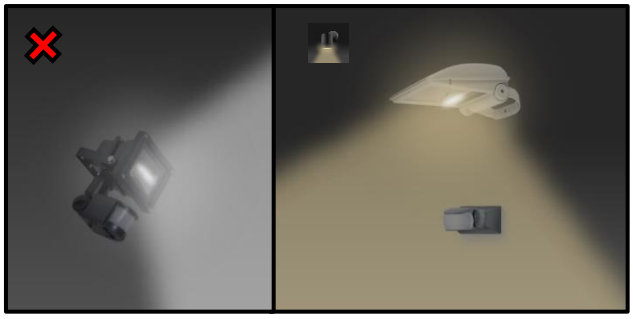
These can be difficult to find so ensure a light of less than 500 lumens or choose an alternative historical design.

Up Down Luminaires

Avoid up-down wall lights as they are designed to generate upward light. Use down wall-lighters instead. Many luminaires of this style use a 8W GU10 lamp which can be higher than 500 lumens, Buildings will still retain an aesethetic quality with a down lighter.



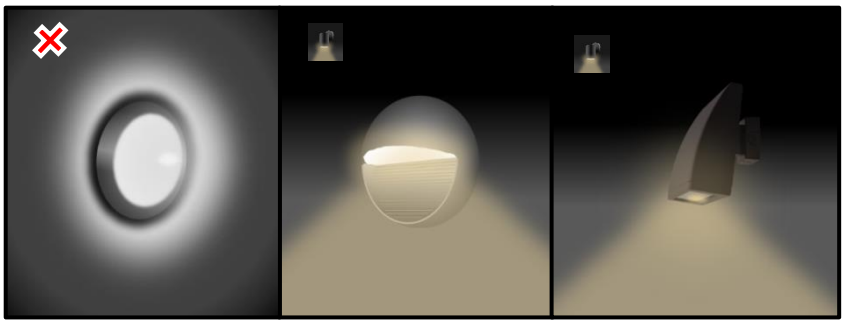
Halogen Luminaires and PIR Sensors



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.

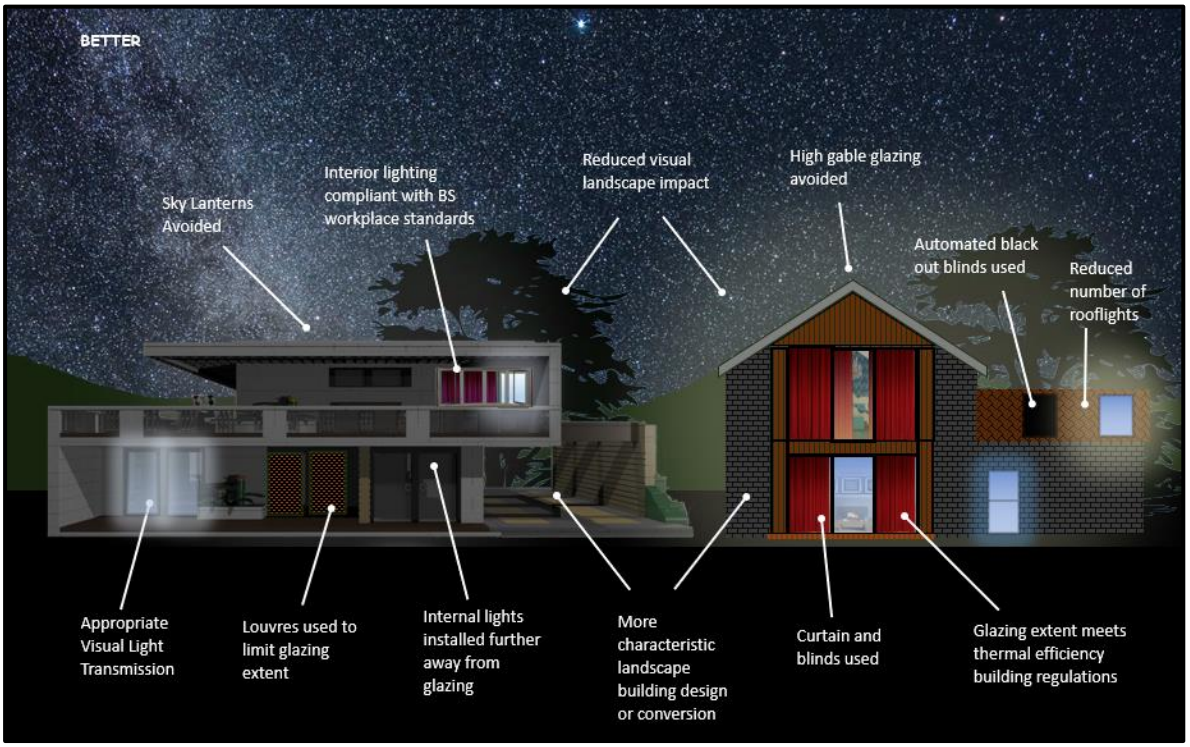
Walkways and bulkheads

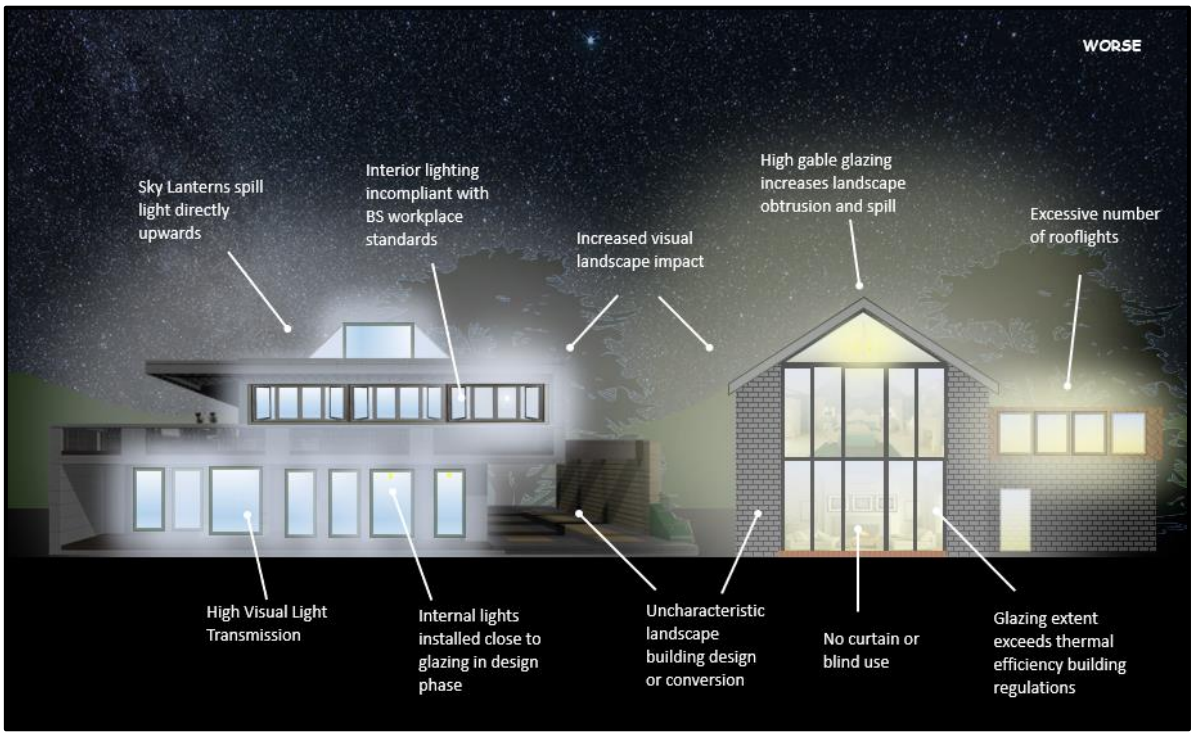
Avoid circular or other "window" shaped bulkhead lights that emit light upward. Use bulkhead lights that direct light downwards or have shielding. Try and ensure that emergency luminaires on batteries follow these principles.



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 than 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.





Key Considerations

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 is preferred with 0.5 for roof lights.

Black out blinds/Louvres
The use of automated black out blinds can considerably reduce the amount of internal light spill from roof lights. 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.

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 L1to reduce this thermal heating.

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.

Excessive Glazing – Landscape Impact and character
Large continuous areas of glazing can cause obtrusive landscape impacts. Linear extents with high levels of internal lighting can be highly visible within a landscape, especially from view tops. 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 reduce this impact wither by adopting a more characteristic design process, reducing the extent or using external louvres or shielding to reduce the landscape impact.

Figure 20 - The visual impact of internal light spill. Credit Dan Oakley

6. Advice For Non-Domestic and Larger Developments

Non-domestic lighting is different from normal domestic lighting because it tends to have a greater impact and you may be obligated under a 'duty of care' or insurance needs to provide lights for other users than just yourself. It will also often be on a larger scale, use multiple light sources and be more complex.

This means that you need to consider a professionally led design because you may need to achieve more precise levels of illuminance, reduce pollution and light to meet the needs of your users. This can be more complicated than ordinary 'off the shelf' domestic lighting and may need professional input from a qualified lighting designer. For some small low-level schemes where domestic lights of around 500 lumens are used in small numbers and small areas, the domestic lighting guidance may be sufficient.

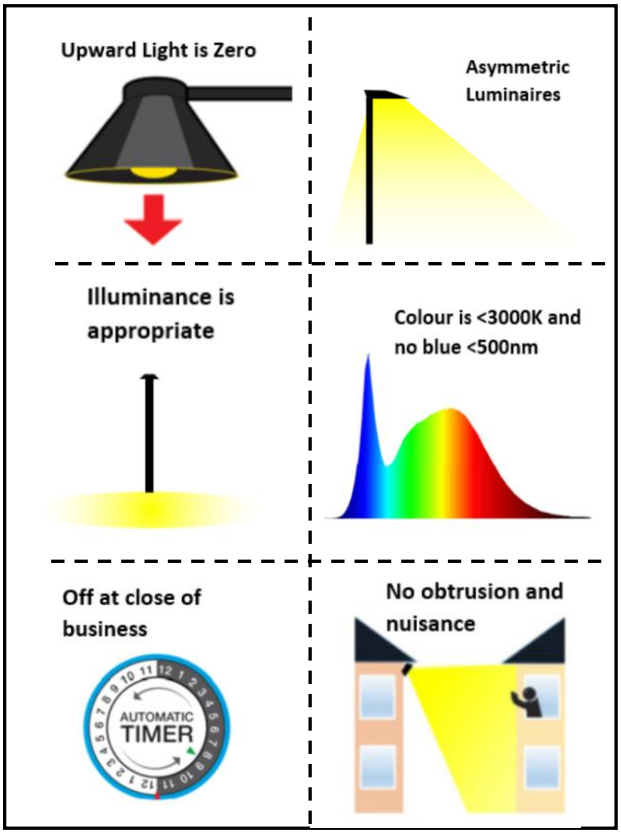
Further information on good lighting practice is provided on these areas in the following sections for both external and internal spill from glazing. Common non-domestic lighting schemes will generally include (but not limited to).

- Roads and walkways
- Public areas
- Sports facilities
- Small Business Commercial
- Offices
- Farms
- Car Parks
- Larger Commercial

Some of these developments may not be expected in dark places. GN01 ILP 23 recommends that sports and amenity lighting installations using 4 or more luminaires are not expected in E1 and E0 zones, and that roads lighting is not expected in E0 zones. This is an expectation and may not be realistic in the landscapes despite the E1/E0 zone.

Non-domestic Lighting principles

There are important principles to consider on non-domestic lighting and luminaires. While the advice for domestic users is still applicable to non-domestic uses, there are additional principles that should be followed.



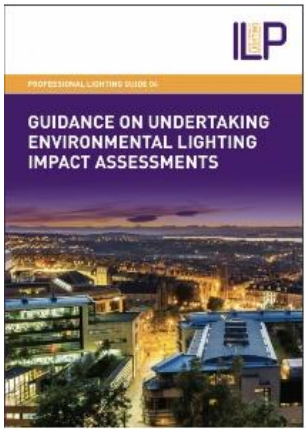
Planners and Designers Checklists

To aid the assessment of non-domestic applications with planners it is recommended that designers ensure that key information is clearly expressed in any lighting design. Equally, planners should be able to understand and access the same metrics to make an assessment.

Section 9 and10 provides a checklist for assessing the important metrics within a lighting design.

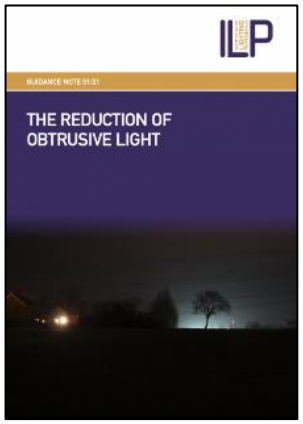
Key Starting Design and Assessment Documents

While exact lighting specifications can be found in relevant standards within the following sections, key documents that should be considered in all designs will include:



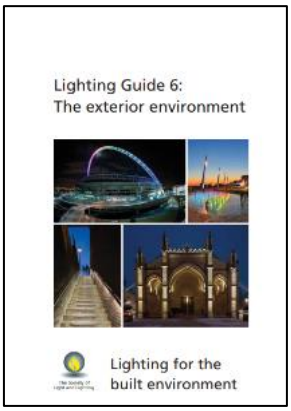
Institution of Lighting Professional Guidance on Undertaking Environmental Lighting Impact Assessments PLG04

This document describes the steps and industry standard methodology to conduct a lighting impact assessment. It includes sections on establishing a baseline of existing lighting levels, viewpoints and identification of critical receptors such as windows and wildlife areas. There is also a section on the residual impacts which should be taken into account throughout the planning decision process.



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, upward flux, intensity and illuminance criteria for lighting zones.



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.

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.

General Considerations

Asymmetric luminaires

Asymmetric luminaires are very useful in controlling lighting, particularly in all non-domestic settings. These luminaires have optics that internally bends the emitted light from the lamp and directs it to specific areas reducing waste light, for example long thin paths. Symmetric luminaires have no directing optical controls which means that the light is distributed more evenly over wider angles, usually 120 degrees. The benefit of asymmetric lights is that they can be installed flat so upward light, and spill is reduced. They can also be installed at a lower height as the light is more efficient in illuminating the right area. Many new LEDs in streetlights and floodlights have asymmetric beams to achieve more efficient illuminance standards. Asymmetric domestic lights are much harder to find as they are more general in use.

Illuminance appropriate and Visual Impact

Higher levels of illuminance will be more prominent in darker landscapes and will introduce more significant levels of visual landscape impact. Regardless of the efficiency of the lighting scheme to reduce obtrusive light, the residual level of luminance (the light coming from a surface) which cannot be avoided, may still present an inappropriate visual impact for the setting. Generally, illuminances levels (light shining on a surface) of over 10 lux will begin to create a noticeable luminous landscape impact. While much depends on the size, extent and intensity of a lighting scheme, illuminances requirements over 10 lux may need to be avoided due to the inherent harm.

Upward Flux

Under ILP GN01 23, designs should calculate the upward flux ratio which allows the effect of both direct and reflected components of the whole installation to be considered. It takes into account the contribution of the reflectance from the illuminated area and spill areas and ensures that the overall level of upward light aims to reduce the impact of sky glow.

Table 7 in ILP GN01 23 recommends UFR values for each ambient lighting zone and assumes that road, amenity and sports lighting using 4 or more luminaires are not expected in E0 and E1 zones.

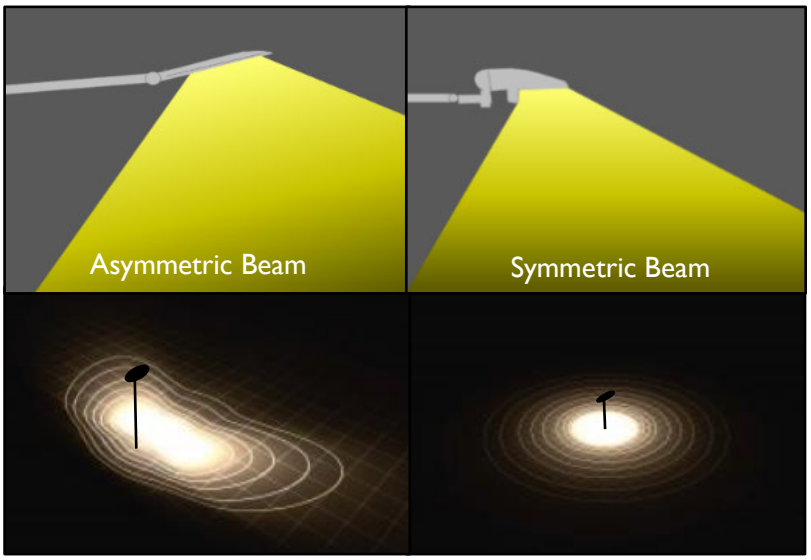
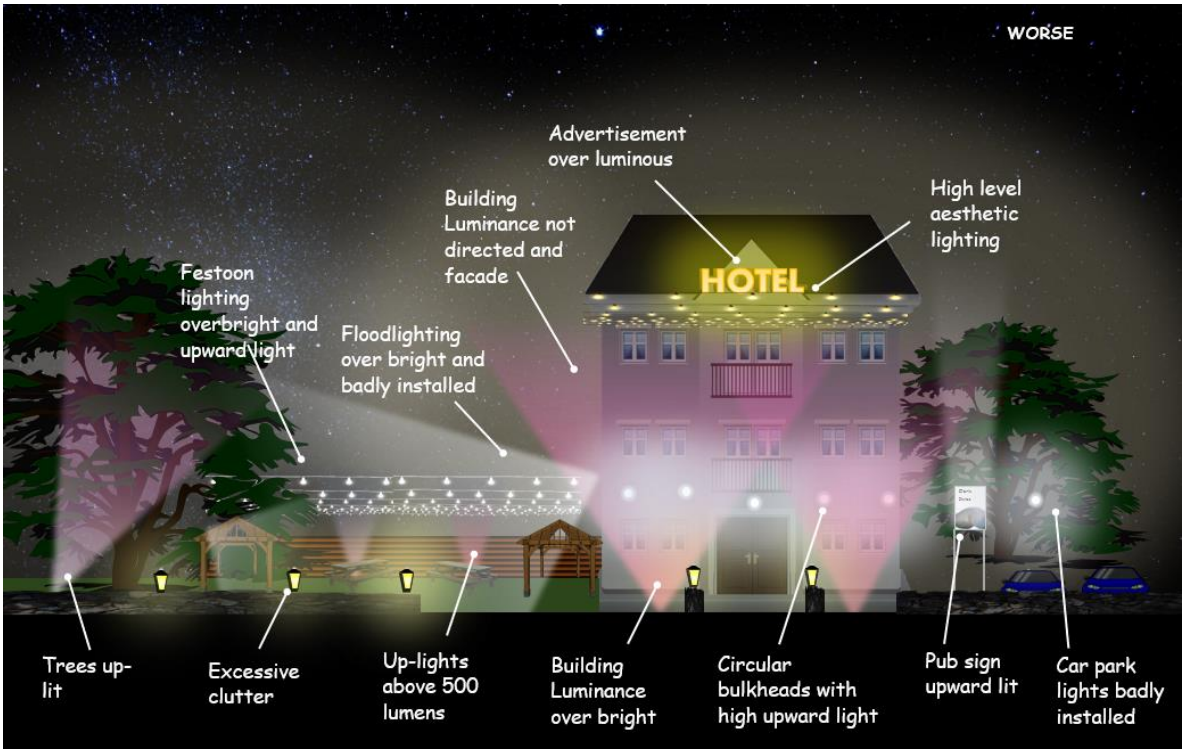
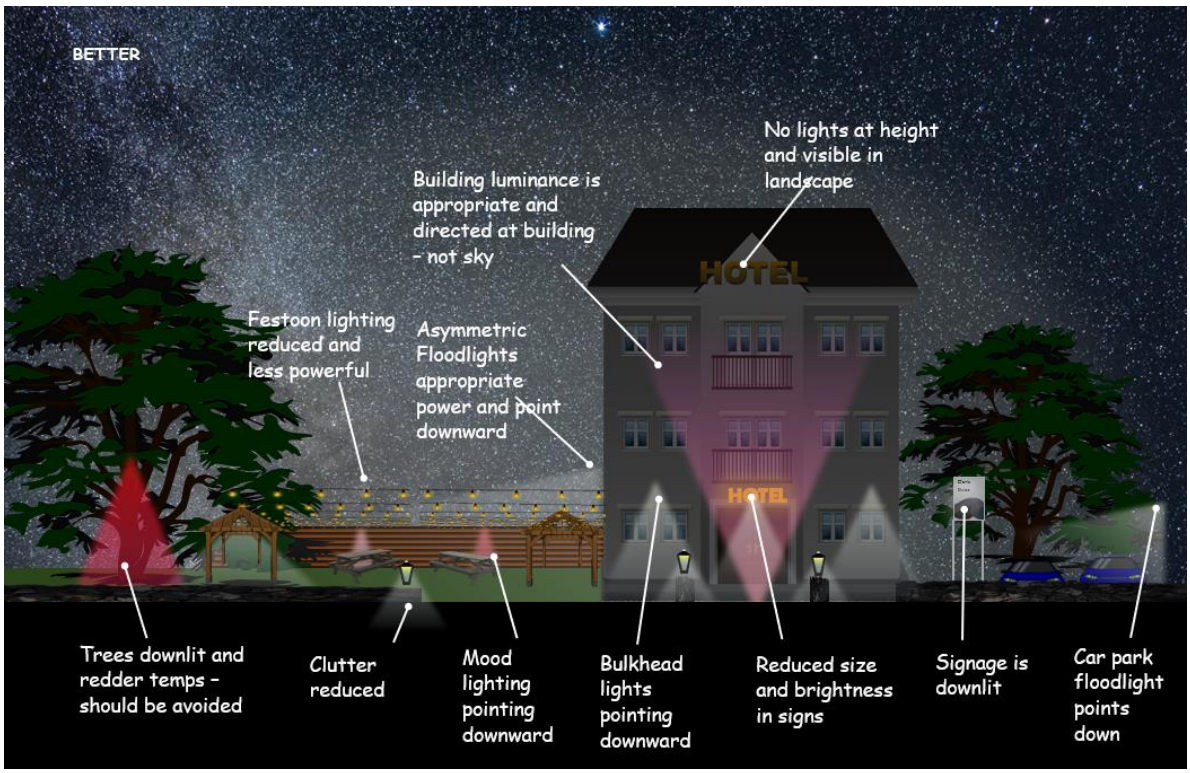


Figure 21 - Asymmetric and symmetric beam patterns.

Small Commercial Lighting Good and Bad Practice

Commercial developments present some of the largest challenges to a dark landscape as owners tend to install their own lighting and assume that more is better and offers a competitive advantage. However, due to these assumptions small commercial places can – and often – install over bright and numerous sources of light pollution with little thought for dark skies or the wider landscape. Some common problems are shown in the following images.





Context

Small commercial lighting can include many development types; shops, hotels, pubs, offices, theatres and communal buildings like village halls, doctors surgeries. 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.

You need to provide a duty-of-care to your users and that implies an appropriate level of light to avoid liabilities and unnecessary risk.

Key Considerations

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 5 lux maintained average with larger car urban parks receiving 15 lux preferably using bollard lighting rather than column mounted luminaires. Proximity sensors should be used.

For illuminance levels refer to BS EN 12464-2:2014. Road or path lighting may also be required which needs to 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.

Advertising Regulations – Commercial
Although advertising is subject to regulations (Town and Country Planning 2017) steps should be taken to illuminate signs only when needed, using low powered downward lights, such as LED strips. The luminance of lights is addressed in ILP PLG 05: The Brightness of Illuminated Advertisements.

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 problem 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.

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 ILP GN01 2022 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^2.

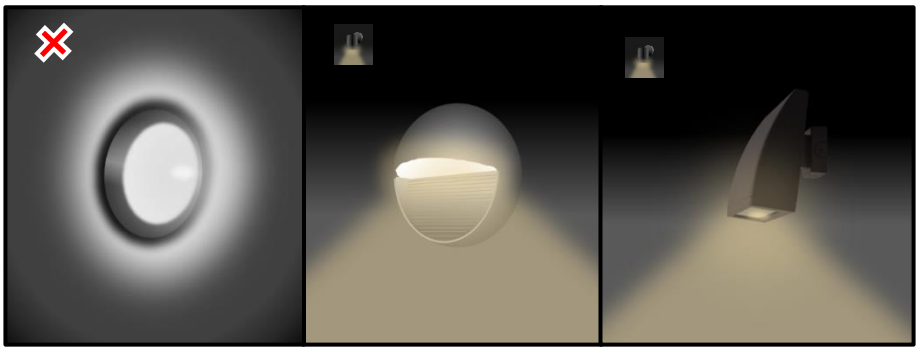
One single bright light vs more, lower powered
Larger spaces should not be illuminated with one single bright light – usually installed at an inappropriate height. Instead, larger spaces should be lit with more, lower powered lights at lower heights. This will spread light more evenly, reduce glare and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

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

Luminaire Advice

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.



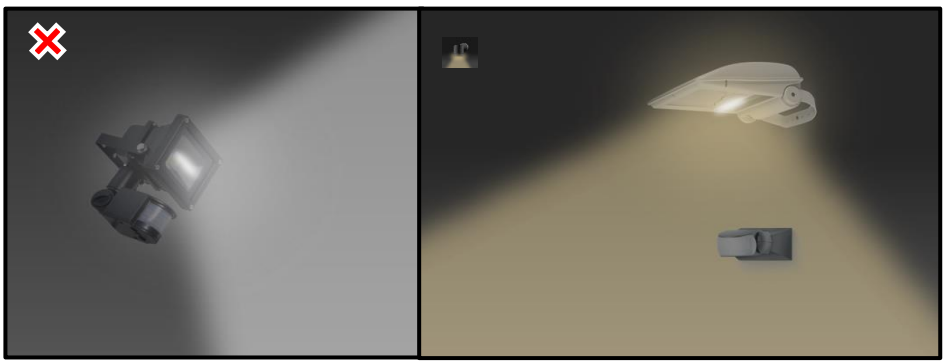
Festoon and String Lighting

Festoon and string lighting is a common choice in many commercial businesses to create an appealing aesthetic. There are many types and styles, but it is best to avoid festoon lights that have bright individual lamps. Aim for 200 lumens (4W LED) and less.

Upward light can be controlled using shielded lamps, but these are difficult to find. Ensure that low lumens <200 lumens are used.

Area Floodlighting

Area floodlighting can be over bright, badly installed and cause uncomfortable glare to users. Halogen PIR lights should be avoided, with a preference towards appropriate power, 3000K LED's with a separate sensor.



Car Parks Good and Bad practice

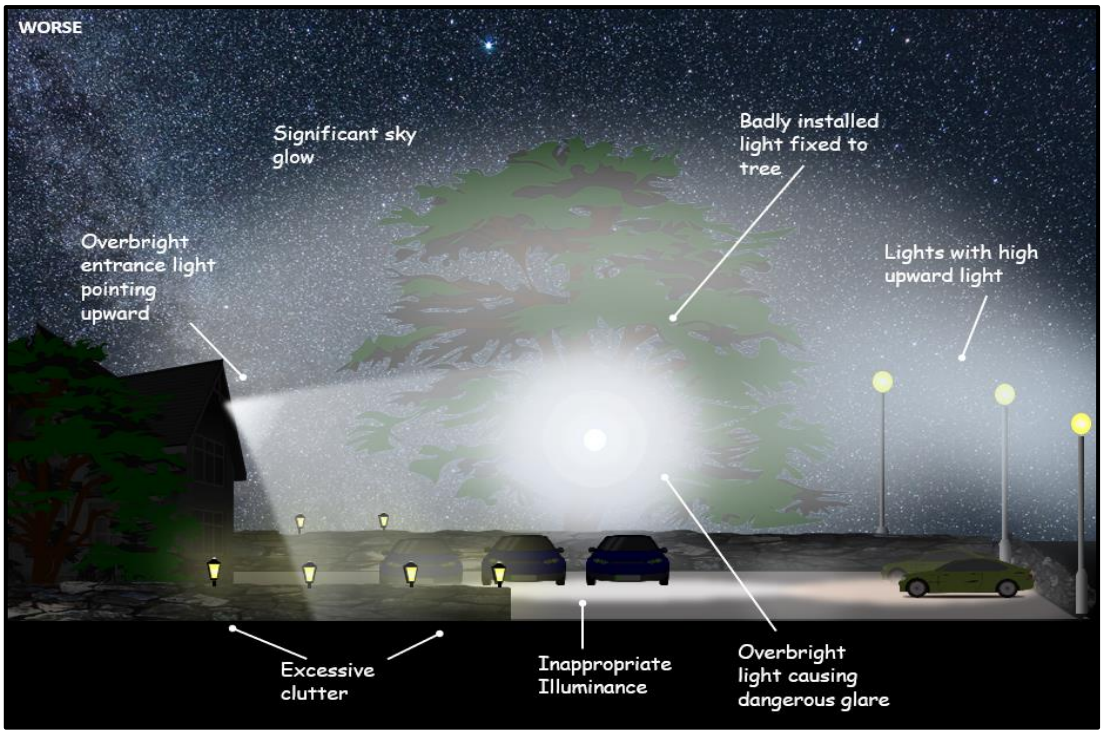
Car parks will need lighting as they either need to provide adequate light for workers or for the public pedestrians walking to and from their vehicles.

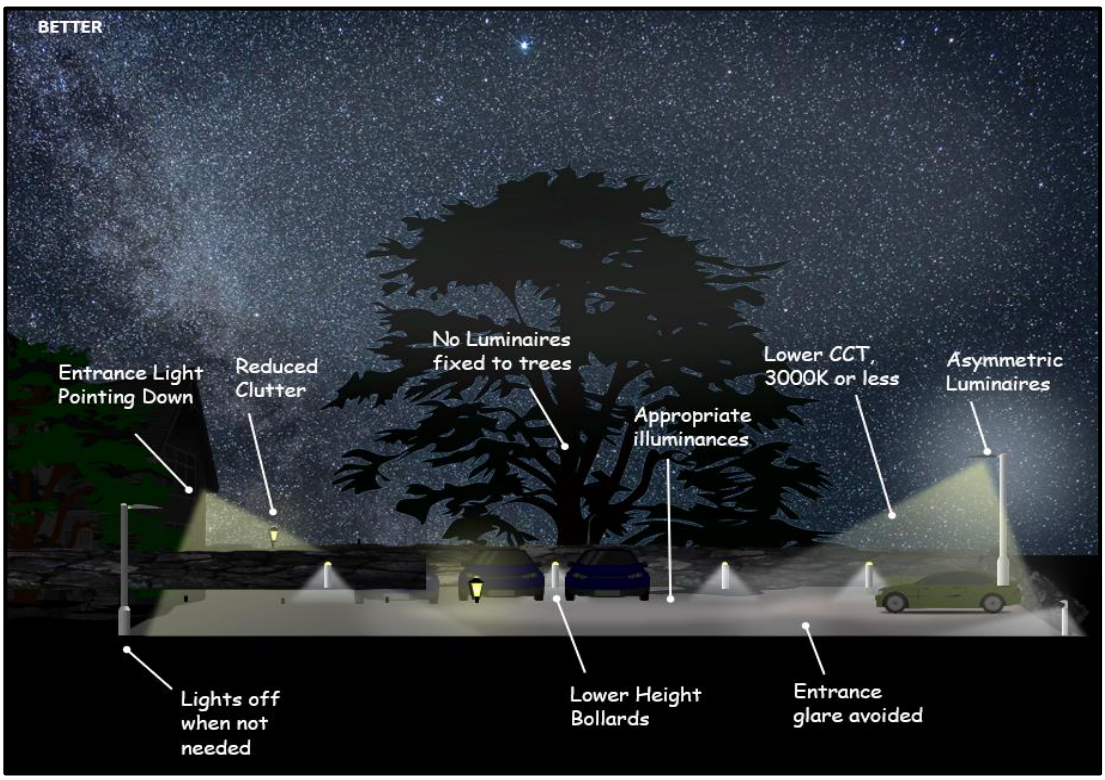
Brtish Standards BS EN 12464 and BS 5489 should be used to determine illuminance and light quality. The level of illumination depends on the locaton of the parking and level of use. For example, A small quiet rural car park will need less illuinance than a larger, busier urban car park.

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

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

For areas with higher crime areas, the Secured by Design offers additional design advice in addition to these illluminance levels.





Key Considerations

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 vehicles 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.

Over lighting – illuminance
Many non-designer led car parks 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 7 provides some recommendations for the strength of LED luminaires against the size of the area.

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.

Bollards or poles
Low level bollards are useful 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 than pole mounted lights. In this regard care should be taken to use bollards in appropriate spaces, or as navigation aids around the parking area.

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

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.

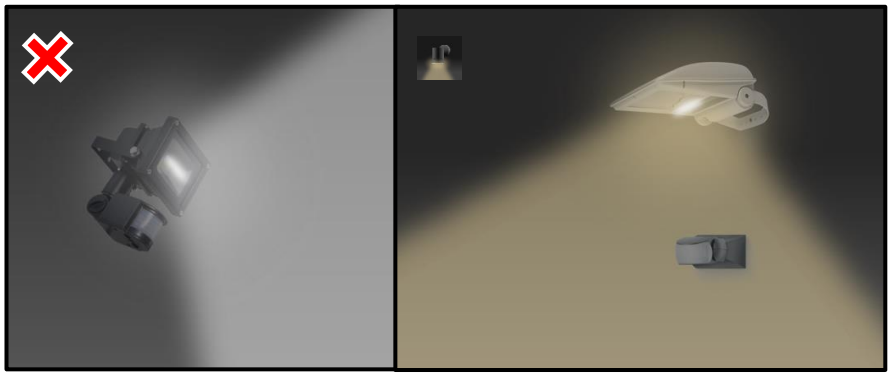
Additional mitigations should include, using a CCT of 3000K and less to reduce sky glow, shielding prominent and potentially obtrusive luminaires from view and – importantly – using timers or sensors to ensure that lights are off when not needed.

Upward Flux – Amenity Light
ILP GN01 21Table 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.

Luminaire Advice

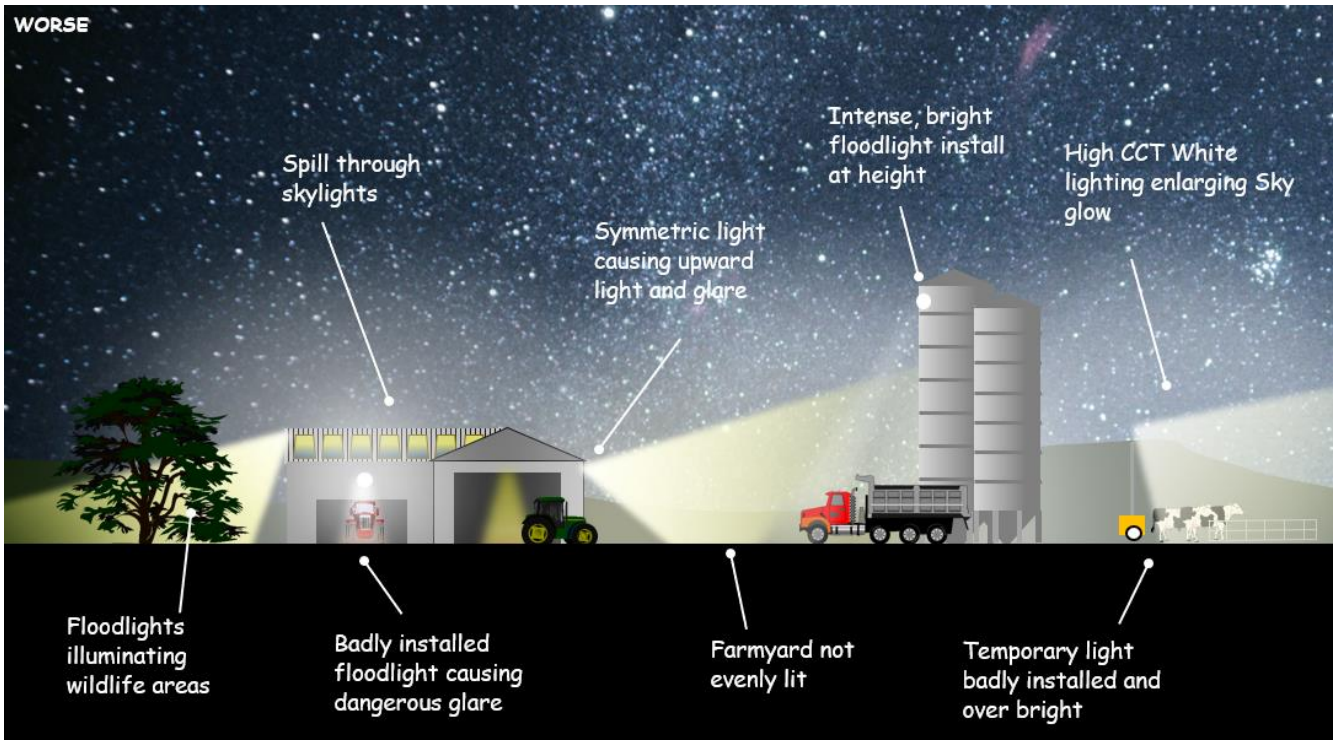
Area Floodlights

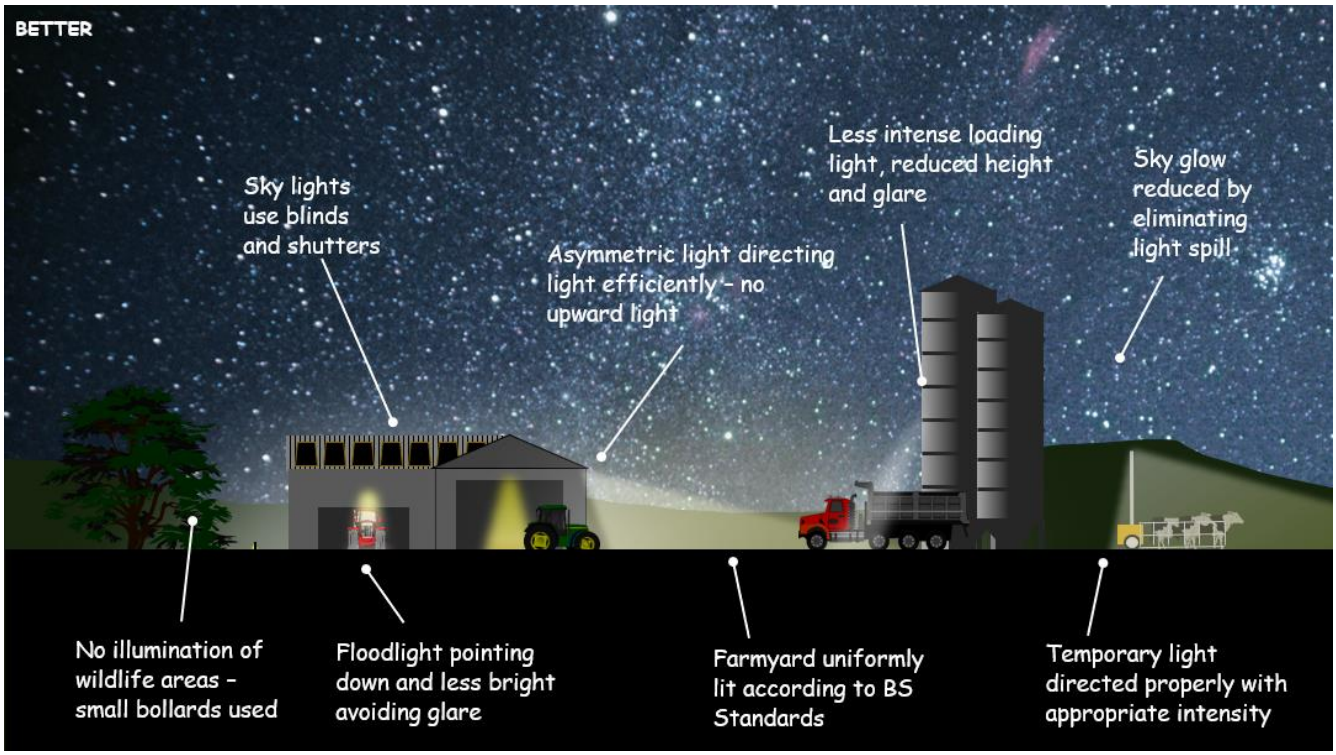
Avoid symmetrical halogen security lights with high colour temperatures and a fixed PIR Sensor. Use tiltable warm white LED lights with appropriate power to avoid glare. If a sensor is used, you can position the PIR sensor to trigger for people not wildlife.



Farms Good and Bad Practice

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.





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;

- **Farm-yards**: 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.

Other lighting criteria such as uniformity, glare and CRI values are also recommended in BS EN 12464-2. 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.

Key Considerations

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 be detrimental to wildlife and visual intrusion. 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 7 to purchase the right kind of lights for the approximate needs.

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.

Wildlife in the Open Countryside
The rural location of farms 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 area, waterways and the open countryside. The use of asymmetric luminaires that reduce spill and appropriate illuminance are essential.

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. 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 the urban fringe, 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.

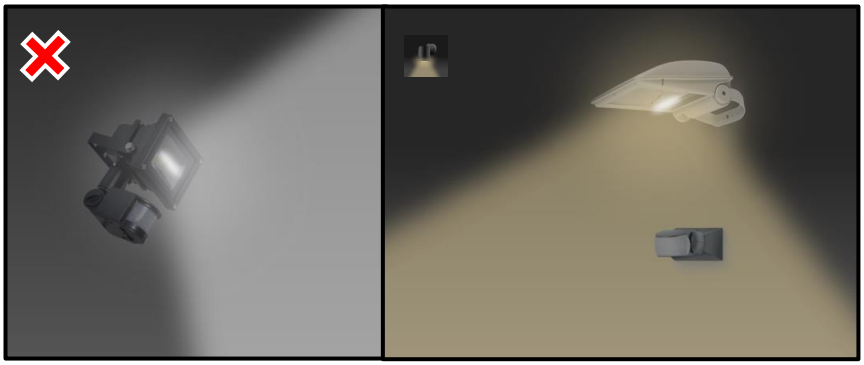
Lighting for Security
Security is an important consideration for a farm. While there is no direct evidence to show that lighting or lack of it has any effect on crime, the document Secured By Design – Lighting Guide by the Police gives general advice for this type of lighting. However, security lighting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

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

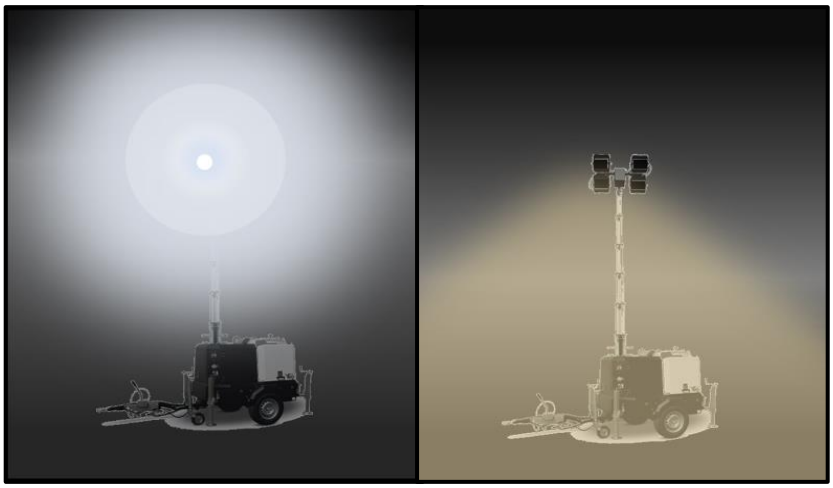
Luminaire Advice

Area Floodlights

Avoid symmetrical halogen security lights with high colour temperatures and a fixed PIR Sensor. Use tiltable warm white LED lights with a separate PIR sensor. You can position the PIR sensor to trigger for people not wildlife.

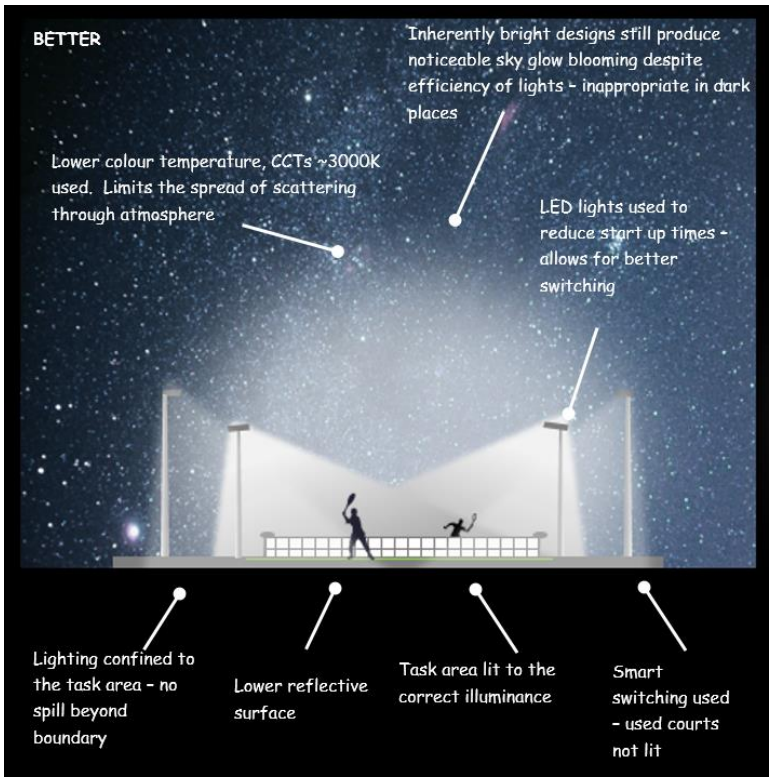


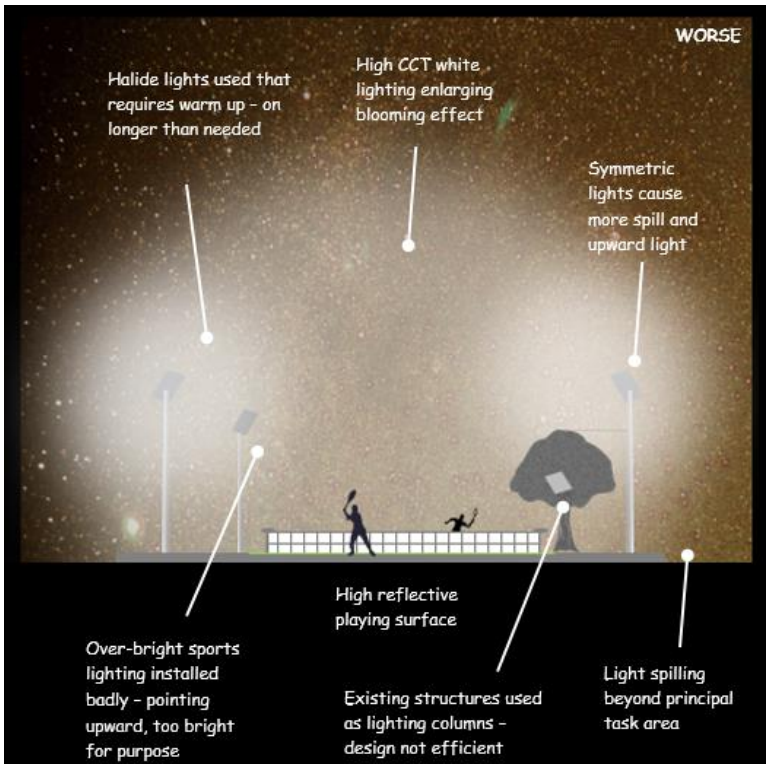
Temporary Floodlights



Lights on mobile generators which can be erected for temporary needs should follow good practice. Care should be made to ensure that the lights are pointing downward, and the minimum amount of light is used to perform the task. Temporary lights can be capable of producing very high brightness to cover many different tasks. Try and use as few individual lamps as possible.

Sports Lighting Good and Bad Practice





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) 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.

Key Considerations

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 ILP GN01 (2021) *'The reduction of obtrusive light'* which recommends levels of intrusion into windows and boundaries.

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.

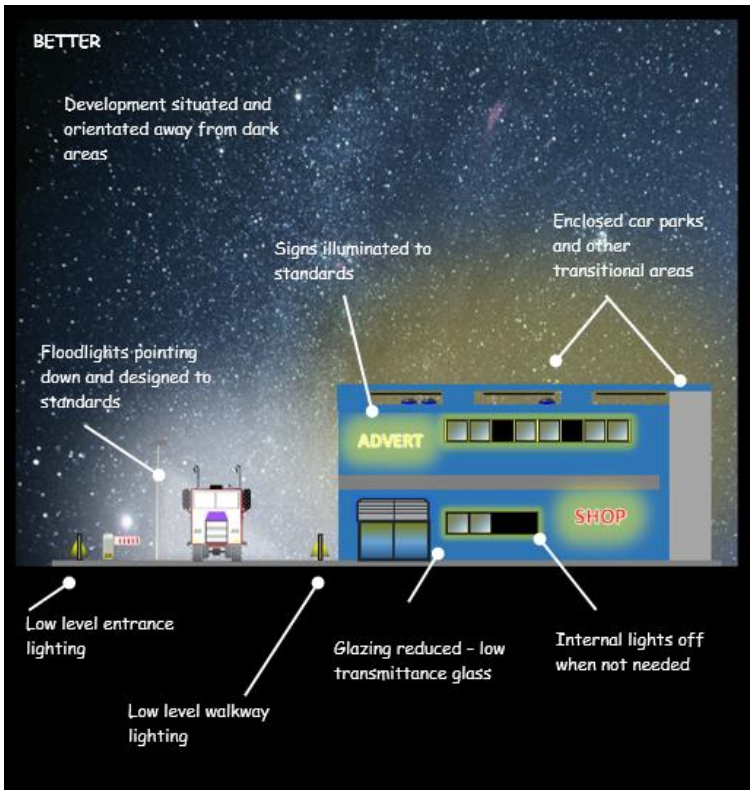
Colour in Sports Lighting
Sports illuminance needs a high level of colour rendition (CRI) to allow players to sight the play properly and pick a ball out from the background. This means that higher colour temperature LED (5000K+) are often used to achieve higher colour rendition which exacerbates the 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.

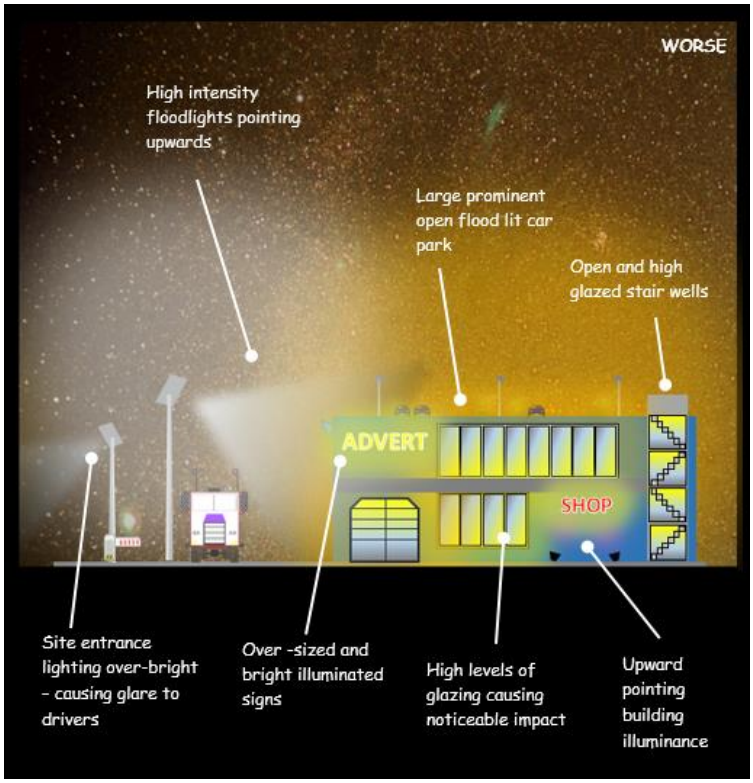
Landscape Visual Impact on Special Qualities
Due to the higher levels of illuminance, sports pitches can have a significant impact on landscape and the landscapes special defined qualities even if the design of the lights is compliant with standards. For example, a tennis court may have compliant lighting in terms of illuminance, colour rendition and colour temperature but due to the light presence of the illuminated surface, it can 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.

Upward Flux
ILP GN01 21Table 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 urban areas where it is accessible and has a much reduced impact due to the high ambient lighting level.

Large Commercial Lighting Good and Bad Practice





Larger scale commercial lighting can have a large impact due to its scale, use and requirement – and **a lighting designer is needed** in nearly all cases. It is unlikely that a safe and effective design cannot be achieved without an experienced lighting designer.

The range of luminaires used can be complex to meet the needs of illuminance standards for different work and public areas. Bulkhead, street, floodlight, bollards and advertisements are all typically used, all requiring a specific purpose and need.

Luminaires are often mounted at increased height (up to15m) and will be more powerful to ensure illuminance levels under British Standards BS EN 12464-2 2014 *Light and Lighting of workplaces* are met.

The levels of illuminance can be higher than most single commercial designs and over wider areas. This means that the generated sky glow is larger and more intense, and the visual intrusion of lights can have wider landscape impacts.

Large, glazed buildings and industrial complexes can generate significant internal spill, particularly if larger single elevations are used that appear as linear blocks of light in the landscape.

There may also be additional impacts from increased traffic flow, particularly if the development is new. The light of headlights can create noticeable landscape impacts even though the effect is temporary.

Key Considerations

Advertising Regulations
Although advertising is subject to regulations (Town and Country Planning 2017) steps should be taken to illuminate signs only when needed, using low powered downward lights, such as LED strips. The luminance of lights is addressed in ILP PLG 05: The Brightness of Illuminated Advertisements and should be relevant to the ambient lighting E-zone. Lights should off at close of business.

Mounting Height
The lowest practical mounting height should be used for all luminaires in achieving the required illuminances. High mounted luminaires that illuminate wide areas with over bright lights should be avoided. Using more lower powered lights than fewer high-powered lights is more preferable.

Car Parking
Car parks have different illuminance needs for different levels of use and locations. If lighting is justified, larger car parks will need 10 to 20 lux depending on usage and hazardous areas. Sometimes, lighting with bollards is more difficult to achieve uniform illuminances. If column mounted lights are used it is important to reduce the height to the minimum in achieve illuminances. For illuminance levels refer to BS EN 12464-2:2014. Road lighting may also be required which needs to comply with design requirements of road lighting, covered in BS 5489-1-2020: and BS EN 13201-2 – Road Lighting Performance requirements.

Asymmetric Luminaires and colour
Due to the large illumination area and larger sky impact, asymmetric lights should be used to avoid upward light where it is not needed. The lowest colour temperature should be sought ideally 3000K but 2700K where possible, with blue-rich LEDs avoided. CRI's of 0.7-0.8 should be achievable with modern LEDS of 3000K.

Internal Light Spill
Large commercial buildings can have significant internal light spill. Extensive glazed elevations, sky lights or Perspex roofs can allow internal light to spill out and be visually intrusive. Large, continuous glazed elevations should be avoided, and black-out blinds should be considered for all glazed surfaces (glass or plastic) that have internally lit spaces throughout the night. For glass, a suitable visible light transmission should be used to reduce the amount of light passing through the material.

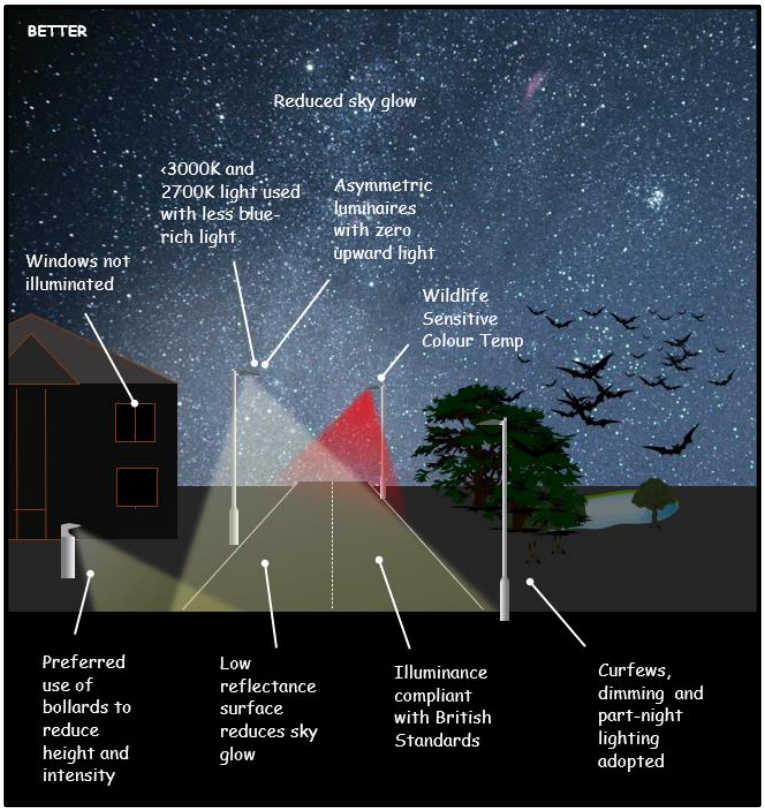
Depending on the size of the glazing there could be potential landscape impacts. Commercial sky lights should aim for a lower VLT (<0.4) than domestic sky lights as the internal lighting environment may be higher. Large structural elevations should also have a low VLT, ideally achieving 0.4.

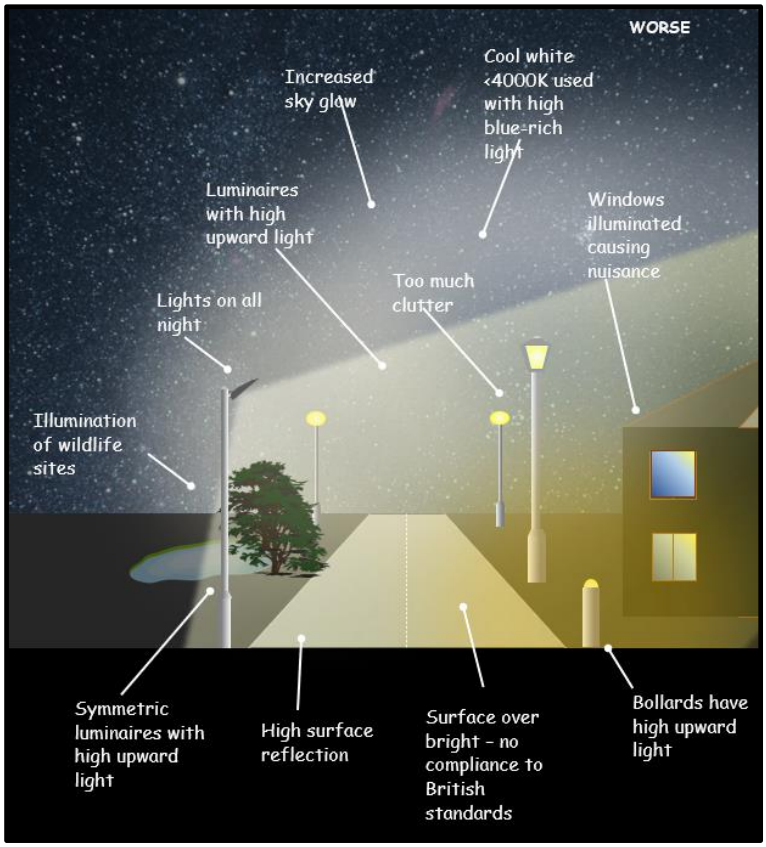
In order to achieve the correct internal illuminance BSI - Light and lighting of workplaces BS EN 12464-2:2011 Part 1: Indoor Work Places should be used.

Construction Phase
Any temporary lighting required during the construction phase should receive the same consideration as planned permanent lighting. Temporary lighting should ensure that an appropriate CCT is used, that the lights are pointing downwards, that they are off and they are of appropriate illuminance to avoid over lighting.

While the need for site security is appreciated, any security CCTV lighting should ideally be on proximity sensors to operate only when triggered.

Roads and Paths Good and Bad Practice





The illumination of residential roads is generally the responsibility of the Local Lighting Authority (usually the county Council) or the Highways Agency for larger roads. New developments that require street lighting of roads should comply with the Local Lighting Authority's design guidance adopted by the authority for ongoing maintenance. The installation of street lighting for roads is not a legal requirement – you don't have to provide lighting unless there is a clear safety need. 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.

The design requirements of road lighting is covered in BS 5489-1-2020: Design of road lighting and BS EN 13201-2 – 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.

Key Considerations

Justification
Streetlights are a key determinant of sky quality, so it is important that there 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.

Low Mounting Height - Bollards
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. The Secured by Design guides provide more information for more urban areas.

Illuminance Curfews
Modern LEDs can be dimmed down to achieve different levels of illuminance. As roads and paths will have a mixed level of use-age 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 night-time impact and save money. Curfews are particularly effective in rural parts of the landscapes.

Colour Correlated Temperature
Some LEDs will have high colour temperature and a blue-white spectrum. They should be avoided as they contribute to the sky glow effect. The British Standards refer only to Colour Rendition levels (CRI) rather than colour temperature, as colour rendition can be achieved with different levels of colour temperature. In this respect it is recommended that colour temperatures of 3000K and 2700K, with low blue-light should be used in achieving British Standard CRI levels.

Low Reflectance surfaces
Different road and path materials reflect light different. To reduce the indirect scatter of lights, Low reflectance road and path surfaces should be used to reduce the light scattering into the atmosphere. Black and dark grey asphalt has a much lower reflectance (albedo) of around 0.05 to 0.1 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 the heat retention to uncomfortable levels.

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 Worcestershire, red luminaires could be used in these places.

Upward Flux
ILP GN01 21Table 7 assumes that road lighting is not expected in E0 zones and 2% in E1. 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 road lighting in these zones.

Luminaire Advice

Column mounted luminaire

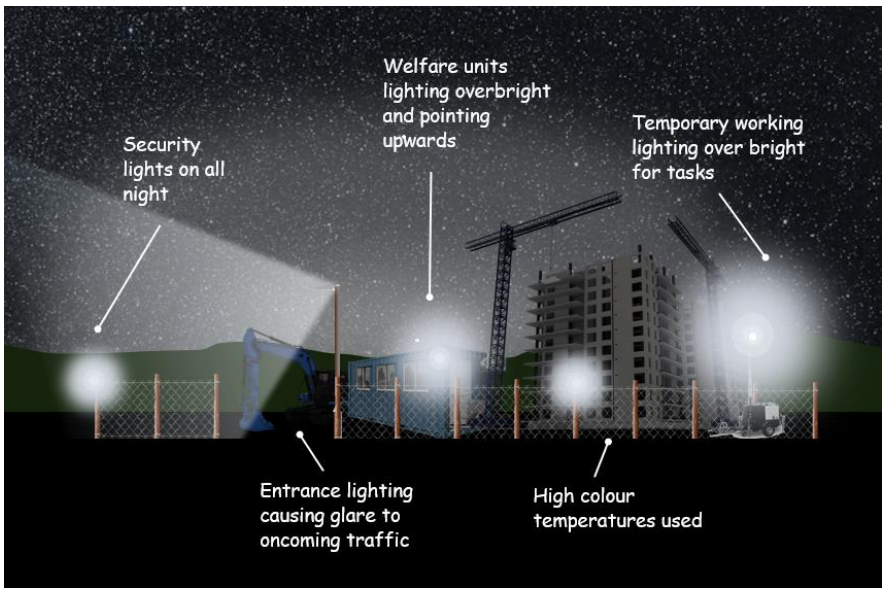
Luminaires with a high amount of upward light should be avoided. Blue rich CCT's above 3000K should also be avoided. Even with heritage area needs where historic style limits the choice, street lighting should be <3000K and direct light downward as much as possible.

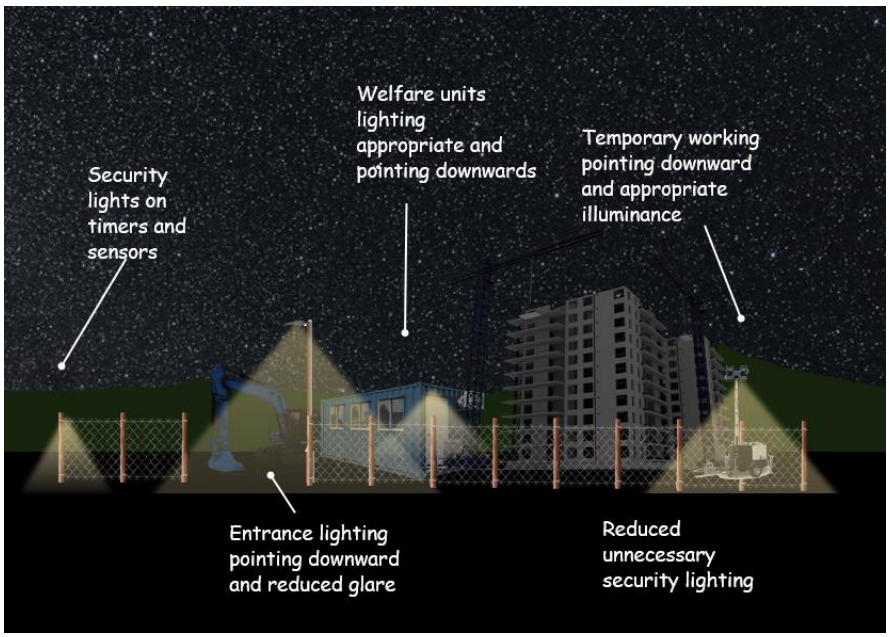
Bollards

Where appropriate, low level bollard lighting can significantly reduce the visual impact of lighting but maintain illuminance. Luminiares with a high upward light should be avoided. Modern bollards can direct light downwards much better. <3000K should also be preffered. Asymetric luminaires should also be considered where light spill could be contained.

Construction Phases

New developments will require constructions phases that need safe illumination for workers. The lighting will be temporary but could have a significant impact on landscapes. Any lighting for construction phases should follow the same principles as permanent lighting. A lighting designer should be consulted to produce an effective lighting plan, especially for larger projects.





Key Considerations

Illuminance levels

The illuminance of areas should be appropriate for the task with reference to British Standards BS EN 12464-2 lighting of outdoor workplaces. Care should be taken to ensure that the minimum amount of light is provided to workers, but it is not over illuminated. The choice of LEDs power should reflect this.

Upward Light

All lights should be pointing downwards to avoid the generation of sky glow. Fixtures that cannot be adjusted downwards should be avoided.

Colour Temperature

High colour temperatures above 3000K should be avoided. LED with 3000K should have sufficient CRI to achieve lighting requirements for CCTV.

Security and night lights

While the need to provide sufficient light for security through the night is appreciated, care should be taken to ensure that any security lights are on suitable timers and sensors to trigger on the detection of movement. Construction tasks lights should be off at close of work leaving only essential security lighting that should comply with lighting requirements on upward light and colour temperature.

Using a lighting designer.

As a construction site is a place of work, there needs to be an appropriate level of illuminance that meets working standards for health and safety. It is recommended that a lighting designer be consulted to produce an appropriate lighting plan that achieves illuminance levels but does not necessarily pollute the sky. The construction lighting should be considered within a landscape and visual impact assessment (LVIA) and within the lighting plans luminaire details.

7. Lighting Purchasing Recommendations

You can't 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

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.				

IDA Fixture Seal of Approval

The IDA's Fixture Seal of Approval program provides objective, third party certification for lights that minimise glare, reduce light trespass and don't 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 night-time environment. IDA does not sell lighting and is not endorsing any of the lighting within this document – the seal is for demonstration only.

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 proper qualified and competent lighting specialist should be consulted for the design.

This table provides approximate values for areas listed in BSE and HSE documents, however, the user will remain responsible for the lighting and its use –

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

Remember – try buy asymmetric and 3000K or less!

Area to be lit m^2	Approximate Target illumination levels (Typical levels as listed in BSI and HSE documents)				
	(5 lux) DOMESTIC areas, walkways	(10 lux) DOMESTIC driveways, small car parks, traffic areas for 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

Notes

- Lighting using 11W or 1000 lumens or less is general a low risk **(Thick bolded cells)**
- Lighting above 11W and 1000 lumens but less than 60W and 6500 lumens is a medium risk
- Lighting above 60W and 6500 lumens is high risk. 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.

8. Key Documents, Standards and Guidance for a Lighting Plan

The following diagram illustrates the key documents used in non-domestic lighting plans and how they relate to the different spatial scales - from local to landscape. The diagram shows which metrics are important to each spatial consideration.

When all documents and metrics have been covered, there will remain residual impacts that sometimes cannot be avoided.

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.

CIBSE LG06: The exterior environment (2016) has further general guidance for lighting the exterior environment.

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.

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.

BSI – Lighting and Lighting. Sports Lighting BS EN 12193:2018

This standard sets recommendations for illuminances and other lighting metrics for sports lighting.

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.

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.

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. The ILP has guidance for all of the UK and Ireland: PLG05: the brightness of Illuminated advertisements

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

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.

Landscape Impact and Wildlife

ILP Guidance on Undertaking Environmental Lighting Impact Assessments PLG04

In sensitive wildlife areas such as National Parks, National Landscapes, National Nature Reserves or protected landscapes, sufficient consideration should be given to appropriate lighting plans. This guidance provides advice on both rural and urban environmental impacts. This guidance also includes assessments on residual impacts that cannot be easily mitigated by designed.

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.

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.

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.

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.

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.

Figure 22 - Orion Nebula . Mike Barrett

9. Lighting Assessment and Plans

Whether a lighting scheme requires planning permission or not, it may need the services of a qualified lighting designer to create an assessment or plan. A plan should contain essential 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.

Planners will need to quickly and clearly understand how a lighting plan 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 impacts. The more clearly you can show this information, the better.

A lighting assessment should include and make clear the following to planning officers.

1	Site description	A summary of visual impact assessment description adapted for lighting, including indication of applicable environmental zone
2	Assessment method	A description of the methodology for site visits, design and evaluation
3	Baseline Assessment	An assessment of the current lighting at site, identification of sensitive ecological receptors, special qualities, viewpoints and general dark sky conditions
4	Proposed development	This is the main technical part of the plan. It should include • Design objectives • Task requirements • Relevant guidance, standards and legislation that relate from local to landscape • Task calculations • Obtrusive light calculations • Luminaire schedules and installation plans • Luminaire specifications (lumens, CCT, CRI, spectral distribution)
5	Residual effects	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	Potential mitigation	A description of any potential mitigations used, including curfews, reduced illuminances, or shielding
7	Conclusions	A summary of the report covering installation and operational phases. This should summarise the main technical requirements and be clearly presented to a planner.

The ILP Professional Lighting Guide 04 – Guidance on undertaking environmental lighting impact assessments, has additional information on these elements.

CIBSE LG06: The exterior environment (2016) has further general guidance for lighting the exterior environment.

10. Planners Checklist

The following flow charts aim to provide designers and planners with the basics steps to develop and assess lighting installations and internal glazing.

External Lighting

JUSTIFIED LIGHTING

- There must be a clear justification for lighting with full consideration to mitigate at the design phase. It should serve a beneficial purpose and be necessary.
- The need for planning permission should be checked.

DETERMING LIGHTING TASKS NEEDS

- Ensure that lighting conforms to recommend illuminance, spill and glare levels in appropriate key documents, e.g. BS 5489, 12464 using lowest illuminance levels as necessary
- Ensure that critical dark skies criteria are included
  - Upward Light Ratio = zero
  - <3000K CCT or less, aiming for <500nm spectrum

ASSESS LOCAL IMPACT

- Nearby locations where lighting could be a direct or indirect visual nuisance for both humans and wildlife are identified.
- Lighting has regard to obtrusion and nuisance in key documents, ILP GN01, Building Regulations

ASSESS LANDSCAPE IMPACT

- Sensitive receptor sites and dark area have been assessed and identified.
- Use a lighting impact assessment.

APPLY MITIGATIONS

- Appropriate mitigations have been considered.
  - Curfews and dimming regimes
  - Proximity sensors
  - Additional shielding and louvres

CHECK THE PRESENCE AND RESIDUAL IMPACT

- Does the residual lighting impact still represent a significant intrusion into the landscape even if the lighting complies with obtrusion and illuminance standards?
- Is there a reduction in sky quality and an increase in sky glow domes

Internal Lighting

DETERMINE THE GLAZING TYPE

- What is the intended purpose of the glazing? Domestic/Commercial?
- Are there alternatives?

ASSESS THE GLAZING EXTENT

- Is the amount of glazing appropriate for the use and location?
- The decision should be based on analysis of the development in the landscape taking to account
  - Landscape impact
  - Disruption to dark landscapes
  - Visible intrusion
  - Urban/rural density and remoteness
  - Shielding by vegetation and buildings

SET RECOMMENDATONS FOR VLT

- Use the table to set recommended factors for visible light transmission.

APPLY MITIGATIONS

- Determine and set additional mitigations (e.g. blackout blinds, hours of use)

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Front Cover: [redacted]. Fish Eye image showing the Milky Way and light pollution in Polestead

Back cover: [redacted]. Poor lighting control and sky pollution in Boxted