



## **PROTECTING THE NIGHT : Dark Skies and Artificial Light**

(October 2020)

Several years ago, Claverton formally elected not to have street lights. As a result, we have not only been able to preserve and protect our beautiful starlit skies and the rural character of the parish, but have also made an important contribution to protecting the many nocturnal species (*inter alia* the internationally important bat population, owls and vital moths) that live here and depend on darkness to forage as well as escape predation. There are also health benefits for us: light at night suppresses melatonin and is associated with a range of medical conditions. (*For further information on the above, a link to the Light Pollution Powerpoint will be available on the parish website in due course*).

The Cotswold Conservation Board is deeply concerned by the loss of dark skies within the AONB (40% since 1993). Dark skies are easily lost and we can all help to preserve and protect the night sky and the stars by the lighting choices we make, both individually and as a community. (*For further information see <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2019/03/Cotswolds-Dark-Skies-Artificial-Light-Position-Statement.pdf>*)

This résumé aims to provide residents with information on dark sky-friendly lighting (fittings and bulbs) that will also help to protect the ecosystem and the health of the community. It has been developed with the help of the Commission for Dark Skies (CfDS - the campaigning arm of the British Astronomical Association) and Bath Starlit Skies (the campaigning body for starlit skies in and around Bath). We hope that you will find it useful.

To summarise, there are 5 essential principles to good external lighting:

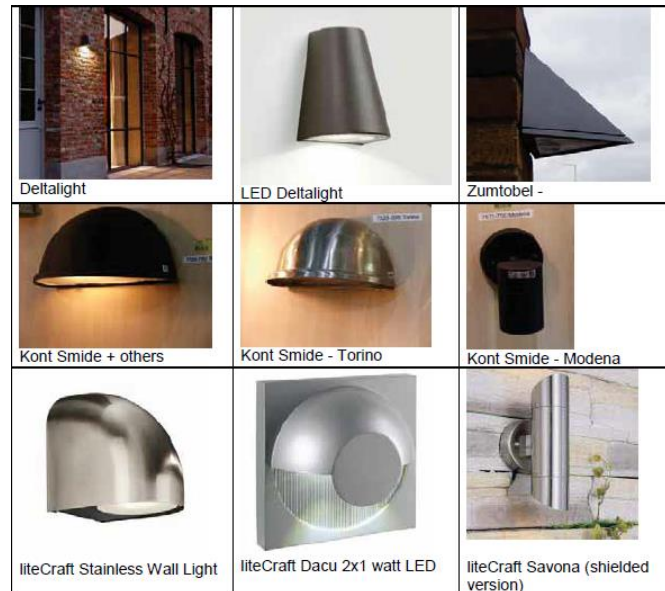
## Principles of good external lighting

**The 5-Star principles of good external lighting are :**

1. **DESIGN EXCELLENCE :** seek innovative lighting design solutions to light responsibly★
2. **DOWNWARD AND SHIELDED :** light only when and where it is needed. ★★
3. **LIMIT BRIGHTNESS:** dazzle is detrimental to safety, health, and our environment. ★★ ★
4. **USE WARM LIGHTING HUES:** be good to ourselves and the rich biodiversity around us. ★★ ★★
5. **ACTIVELY MANAGE:** sign up to a culture of continuous improvement in environmental management. ★★ ★★ ★

## 1. DESIGN EXCELLENCE : innovative designs to light responsibly

Well-designed, innovative light fittings prevent light from spilling to other than where it is needed. Good lighting practice guidelines recommend that light fittings be downward facing and fully-shielded. Some examples are given below. *n.b.* the key is that the light bulb cannot be seen.



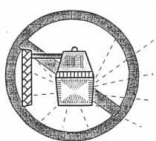
## B. DOWNWARD AND SHIELDED : Light when and where it is needed

### B1. Lanterns

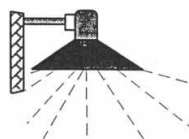
Many of us will have inherited the traditional lanterns that were installed when Claverton was re-developed in the 1980s. These lanterns, whilst perhaps giving the village a period look, allow light to escape upwards into the night sky and outwards into the countryside rather than concentrating it downwards where it is needed.

Lanterns can be easily modified by :

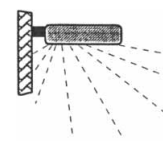
- \* painting the sides black
- \* using an E27 to GU10 adaptor and a GU10 bulb on top/down fittings (see Appendix);
- \* using a low Kelvin, low Lumen light bulb (such as Philips Classic 2.3W, 2000K, 125 Lumen or Philips Lustre 2200K, 325 Lumen) and only using the lights when needed; or
- \* changing the light fitting to a fitting that directs light downwards and is fully shielded, for example :



Change this ...



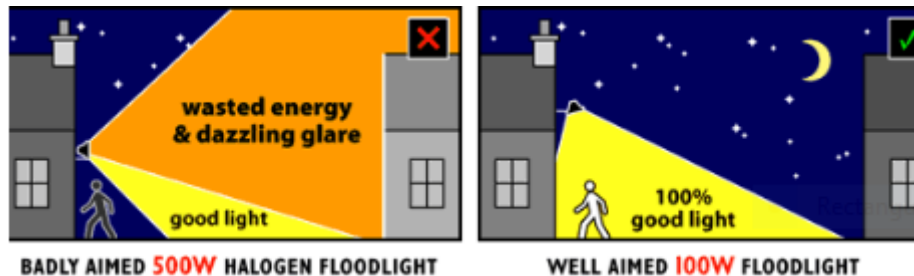
... to this...



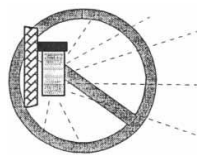
...or this

## B2. Bulkheads and Spotlights

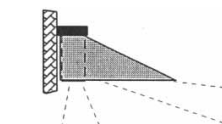
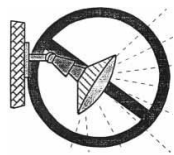
Bulkheads and spotlights are often much brighter than needed and are also often incorrectly installed by electricians (they should be fitted horizontally). By fitting visors, angling spotlights downwards or fitting them to a wedge, light can be spread more effectively with less bright bulbs.



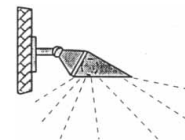
Bulkheads and Spotlights can be modified by...



directing the light downwards and



... installing visors



(1) Beware when buying spotlights – some on the market cannot be angled and almost all are brighter than necessary (see '**Security**' below): they should be less than 3000K. If you happen to have a spotlight that cannot be angled, it can be made to point downwards by adding a wedge.

(2) Spotlights with integral sensors usually only work if the light is angled outwards: it is therefore better to buy a separate light fitting and sensor.

## B4. Uplighters and Downlighters

Uplighters send light up into :  
the night sky and potentially into  
neighbouring homes. They should be avoided.



Downlighters in eaves are not  
consistent with the architecture  
of the village and should be  
avoided.

## C. LIGHT WHEN IT IS NEEDED

Using timers can help to contain the amount of light used. Some people like sensors; however, they can be triggered by passing animals and the wind.

## D. SECURITY LIGHTING : Less is more!

There is a popular misconception (promoted by manufacturers and electricians) that brighter light is better for security. In fact the opposite is true. At night we are dark-adapted and therefore need very little light to see. Bright light can literally 'blind' us by bleaching our vision (think car headlights). It

also creates areas of deep shadow where miscreants can hide. The following video and photos illustrate this :

[www.darksky.org/light-pollution/lighting-crime-and-safety/](http://www.darksky.org/light-pollution/lighting-crime-and-safety/)

[www.britastro.org/dark-skies/pdfs/HANDBOOKTEXT.pdf](http://www.britastro.org/dark-skies/pdfs/HANDBOOKTEXT.pdf)

[illinoislighting.org/crime.html](http://illinoislighting.org/crime.html) (listed under the internet heading Outdoor Lighting and Crime Prevention)

[softlighthouston.com/education](http://softlighthouston.com/education) (listed under the internet heading Education – Softlight Houston)

## E. SKYLIGHTS

Installing (and using!) blinds on velux windows also helps reduce light pollution.



Left to right : (1) no blind; (2) internal venetian blind; (3) internal and external blind

## 3. LIMIT BRIGHTNESS : Dazzle is detrimental to safety, health and the environment

The brightness of a bulb is determined by its Lumen output (formerly Wattage). Light bulbs are often sold as being 'watt equivalent'. This is somewhat misleading: one '60W equivalent' can in fact be much brighter than another as old Watts correspond to a range of Lumens and can therefore be more or less bright.

Old Watts	Approx Lumens
<b>25 W</b>	230 – 270 spotlight
<b>35 W</b>	250 – 280 spotlight 200 – 300 Useful Lumens (spotlight) 390 – 410 lamp
<b>40 W</b>	440 – 460 lamp
<b>50 W</b>	330 – 400 spotlight 350 – 450 Useful Lumens (spotlight)
<b>60 W</b>	800 – 850 lamp
<b>75 W</b>	1000 – 1100 lamp
<b>100 W</b>	1500 – 1600 lamp

## HOW MANY LUMENS ARE NEEDED?


The IDA and CfDS recommend that outdoor lighting should not exceed 35 lumens/m<sup>2</sup> of illuminated target surface and ideally be as low as 10. By way of comparison, the full moon is about ¼ of a lumen per square metre!

Please avoid 'dusk to dawn' light bulbs: in bad weather they can stay on all day!

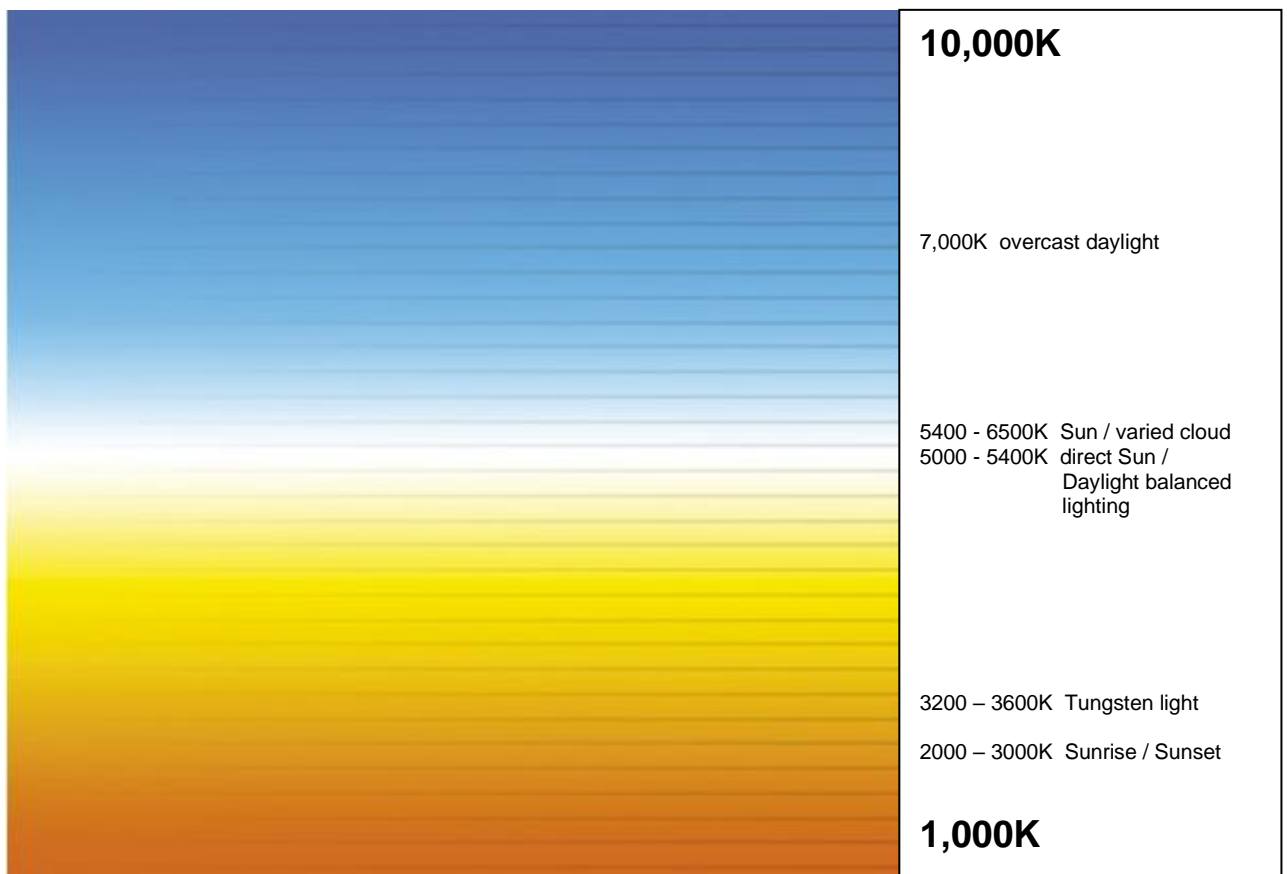
## GLOW STONES

An intriguing lighting option are Glow Stones. These are solar-powered stones that can be used as, or to delineate, a garden path and steps. The Lead at CfDS even uses two green ones to keep deer out of his garden! For further information go to : <https://www.glowstones.com/>

## 4. USE WARM LIGHTING HUES : LEDs and Colour Temperature (aka Kelvin)

 Beware! - nowadays, many light fittings come with integral LEDs that are startlingly white (in excess of 3000K). These LEDs contain a significant amount of short-wave blue that is detrimental to the environment (fauna and flora) as well as human health.

If you are unable to find an LED light fitting with less than 3000K then either choose a fitting with amber LEDs (bearing in mind the number of Lumens - see 3 above) or, better still, one where you can change the bulb. Choosing lighting with a colour temperature of less than 3000K (and preferably as low as 2000K) is being good to the environment and good to ourselves. It still provides adequate lighting. (see **D. SECURITY LIGHTING** above):





## **APPENDIX : SUGGESTED LIGHT BULBS AND ADAPTORS (subject to revision)**

When buying light bulbs, it pays to go for big brand names such as Phillips, Sylvania, Bell or General Electric as the quality of light (strength and colour) is more consistent from light bulb to light bulb. Look for the CRI number, it should be no less than 80.

The following are various light bulbs and adaptors currently available. With the exception of the E27 to GU10 adaptor, they are all made by Philips.

### **a) BAYONET B22 FITTING**



**Extra Warm White : Philips Classic LED A60 Non-dimmable Light Bulb, B22, 2.29W, Gold 2000K, 125 lumens**

### **b) SCREW E27 FITTINGS**



**Extra Warm White : Philips Vintage LED E27 A60 2.3W B20 Gold / Replaces 14W 2000K, 125 lumens**



**Warm White : Philips LED Luster (Dimmable) 5W E27 Flame Dimmable / Replaces 32W 2200K, 350 lumens**

**c) E27 to GU10 ADAPTOR (available from : <https://www.ledkia.com/uk/>)**

Downward-facing E27 screw fittings can be adapted for use with GU10 bulbs. This has much the same effect as having a downward-facing, fully-shielded light fitting.



2.39 £

E27 to GU10 Adaptor

**d) GU10 BULBS**



**Philips LED Spot (Dimmable) 4W, GU10 from warm to extra warm white, Warm Glow dimmable**

2200K to 2700K, 280 Lumens



**Philips LED Spot 4.6W GU10 Warm White, Non-dimmable / replaces 50W**

2700K, 355 Lumens

**FOR FURTHER INFORMATION AND TO ORDER LIGHT BULBS GO TO :**

<https://www.lighting.philips.co.uk/consumer/choose-a-bulb>

<http://www.cp-lighting.co.uk/>

<https://www.amazon.co.uk/>

<https://www.any-lamp.co.uk/>

<https://www.ledkia.com/uk/>