Llywodraeth Cymru
Welsh Government

Good Practice Guidance:

Planning for the Conservation and Enhancement of Dark Skies in Wales Quick Guide

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Winner

1.0 Introduction

Dark Skies are an important natural resource for Wales, the people who live here, now and in the future, and for wildlife.

Wales has some of the darkest skies in the world where stars can be seen clearly from areas that are free from man-made light. However, light pollution is a problem in Wales and there is still a lot we can all do to make things better, and our skies darker.

We have two goals for improving dark skies in Wales:

- Reduce the level of current light pollution, and
- Improve the quality and natural darkness of the night sky

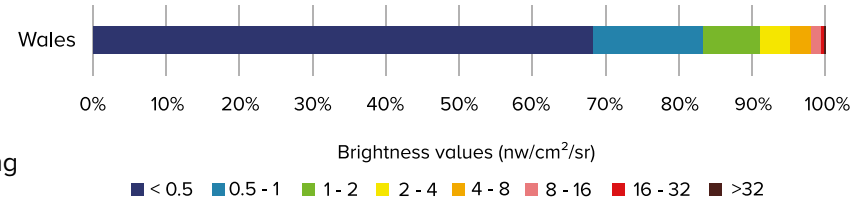
Put simply, these goals can be achieved by using **the right light, in the right place, at the right time.**

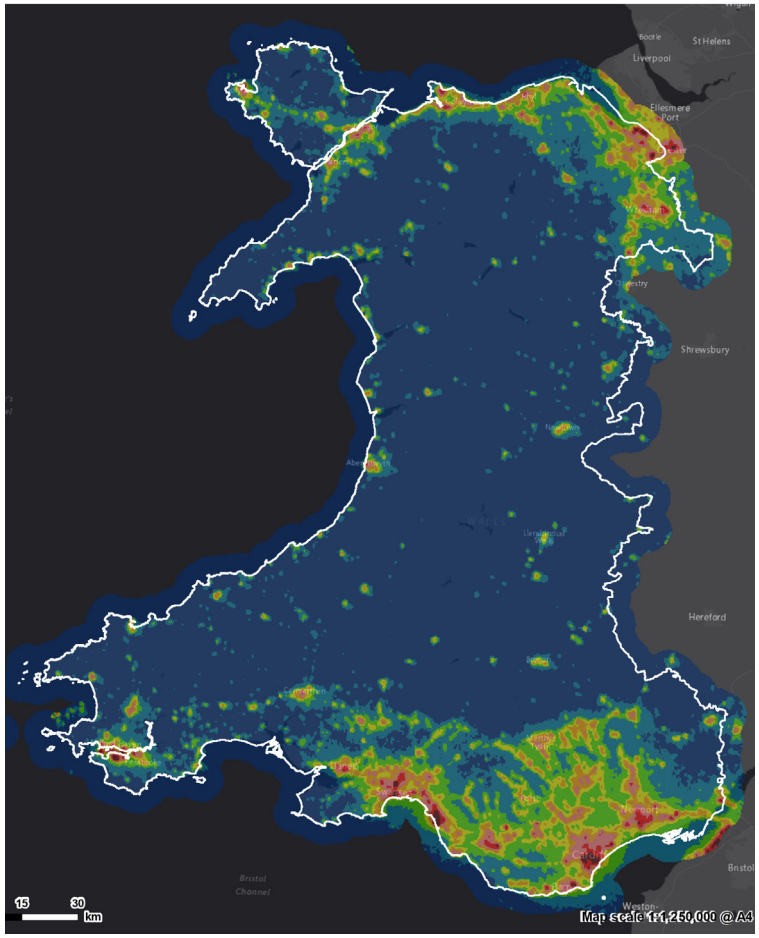
This quick guide provides guidance on how to plan for dark skies so that they are protected and improved, reducing light pollution and making the quality of the night sky better. It encourages dark sky-friendly lighting that will protect the night sky and improve the quality of life for people and wildlife, as well as reducing carbon use and saving money.

The full version of the guidance can be found here:
Planning for the Conservation and Enhancement of Dark Skies in Wales.

The National Map of Wales' dark skies and light pollution, classified into the eight colour bands

	Brightness values (nw/cm²/sr)	% of total area	Area (km²)
Darkest	<0.5	68.1	14,458
	0.5 – 1	15.0	3,184
	1 – 2	7.9	1,667
	2 – 4	4.3	9.8
	4 – 8	2.7	574
	8 – 16	1.5	314
	16 – 32	0.4	95
Brightest	> 32	0.1	28





Llangollen, Dee Valley

2.0 What is light pollution?

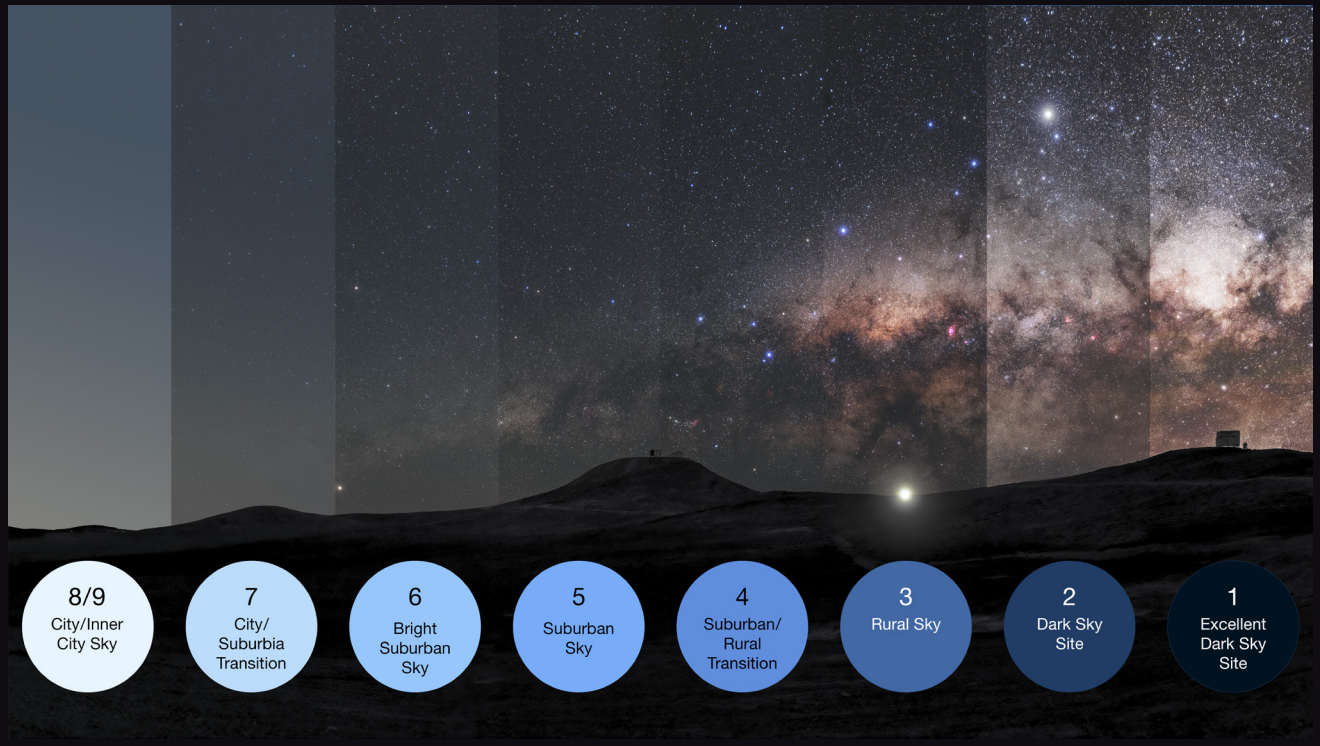
Light pollution is man-made, artificial light that lights up areas where it is not needed or wanted, or where there is too much light. It happens when not enough thought is given to the type or amount of light that is needed.

Types of light pollution

Sky glow
This is the glow that can be seen around urban areas and settlements, giving a 'halo' effect. It can affect areas many miles from the original light source.

Glare
This is uncomfortable brightness that causes people to squint, shield their eyes or turn away from the light. It can reduce what, and how far, people can see, and can be very dangerous for road users.

Nuisance / light intrusion
This is where light 'spills' into places where it is not wanted or needed. It is disrupting for wildlife and people and has a negative impact on landscapes.



Bortle Scale – European Southern Observatory

To help measure Dark Skies, we use the Bortle Scale which has nine levels that relate to the brightness of the night sky, seen by the naked eye. Level one shows excellent dark skies and levels seven to nine show very poor to bad night skies with high levels of light pollution.

3.0 Why do dark skies matter?

When lighting is not properly controlled, it can have negative impacts on people and wildlife and wastes energy and money.

	Nature	Human health and well-being	Energy use	Safety
⊘	Many animals need natural darkness for feeding, breeding and movement. Man-made light can change their behaviour and harm ecosystems. Lighting affects all wildlife including insects, birds, bats and other mammals.	Too much light and lack of darkness can disrupt sleep and cause health problems.	Unnecessary lighting wastes both energy and money and increases the release of carbon.	Poor lighting can create contrasts in light and dark spaces and encourage crime. The right lighting can make spaces safer and more attractive without causing light pollution.
✓	Protecting dark skies can improve biodiversity by maintaining darkness in movement corridors and protecting habitats for feeding and breeding.	Darkness at night helps humans sleep better and improves physical and mental health. It can also connect us to our past as our ancestors saw the same night sky, and it provides opportunities for tourism such as star-gazing.	The right lighting reduces the amount of carbon used and saves money and energy.	No light or the right lighting often reduces crime by reducing contrast between light and dark spaces.

4.0 Planning for Dark Skies

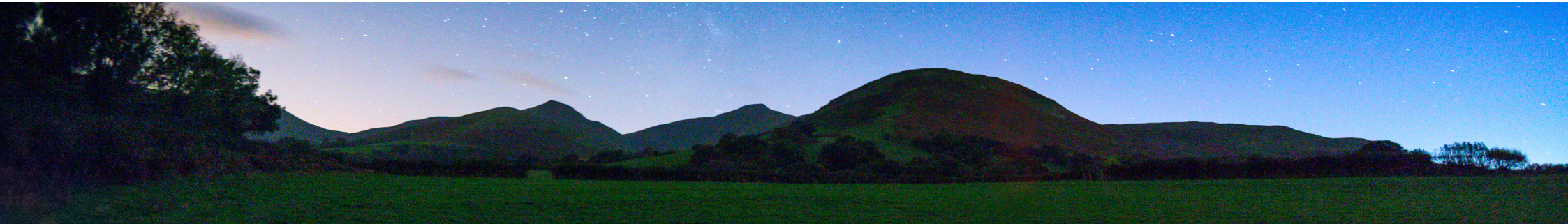
When planning the lighting for a development, it is important to understand the existing location and environment. Small-scale developments should follow basic lighting principles, while larger projects may need a full lighting plan. Lighting plans should balance the need for lighting with the impact on people, wildlife and landscapes.

– Don't use lighting unless it is needed	
– Light only what needs to be lit	
– Lights should not be brighter than necessary	
– Use warm colour lighting	
– Use timers and sensors to control lighting	
– Use lighting that is installed low down	
– Limit inside lights spilling outside, use curtains and blinds	
– Keep light away from wildlife	

The symbols below show who or what would benefit from the good lighting principle	
Nature	
Human health and well-being	
Energy use	
Safety	

The good lighting principles can easily be remembered as:

The right light
In the right place
At the right time.



5.0 How does good lighting make a difference?

Lighting Issues

1. Roof lights spill lights upwards.
2. Overly bright sports lighting and spillage beyond where it is needed.
3. Overly bright unshielded light, glare extending beyond area required.
4. Light intrusion in rural landscapes and wildlife habitats.
5. Security light glare.
6. Lights left on out of hours of work.
7. Intrusive illuminated neon LED signs.
8. Artificial light along river corridor affecting wildlife.
9. Limited or no visibility of astronomical features in night sky.
10. Cumulative light spill.
11. Bright external LED decorative illumination affecting nocturnal wildlife.
12. Upward sky glow.
13. Unshielded lights with unnecessary wall lighting.
14. No curtains or blinds making light visible at distance.
15. Streetlight intrusion into properties, gardens, trees and other habitats.

Lighting Improvements

1. Blinds on roof lights or low Visible Light Transmission (VLT) glazing.
2. Lighting is directed downwards to illuminate only the sports area.
3. Shielded programmable lights on sensors directed downwards to task areas.
4. No unnecessary light intrusion in the landscape.
5. Directed security lights with proximity sensors.
6. Lights are switched off at close of business.
7. Low powered illuminated signs to lighting standards, turned off outside business opening hours.
8. Minimising artificial light along river corridor and floodplain for wildlife.
9. Improved visibility of astronomical features in night sky. Improved sense of dark sky related tranquillity.
10. Minimal and well-designed external lighting only where essential.
11. Low powered or no garden lighting. Decorative lights are programmed to be turned off through the night.
12. **Warmer** coloured lights (<2700K) directed downwards, reduced light scattering.
13. Retrofit of shielded lights directing light downwards to where it is needed.
14. Lights are switched off when not needed. Curtains and blinds are used and closed at night.
15. **Warm** spectrum (<2700K) programmable streetlights with peak wavelengths higher than 550nm; shields used where necessary to direct light only to where needed.

The following images show how poor lighting can be improved

5.1 Residential lighting

BEFORE

- Light shining into sky.
- Illuminating large parts of house and garden.
- Bright white light greater than 3000 kelvin.

AFTER

- Lights fully shaded – no upward spill.
- Lights centered only where needed – over doorways.
- Warm colour temperature – less than 3000 kelvin.
- Lights on timers / sensors.

Llangwyfan, Clwydian Range and Dee Valley

5.2 Sports lighting

BEFORE

- Lights not shielded – lights shining a long distance beyond the playing area and causing glow into the sky.
- Overly bright white light causes glare.
- Lights are on maximum whenever switched on.

Clwb Rygbi Rhuthun

Rhuthun Lawn Tennis Club

AFTER

- Properly angled and fully shielded.
- Light directed to playing surface.
- Low reflective playing surface.
- Reduced colour temperature <3000k reduces glare.
- Lighting fully controllable – turned off when not in use, lights dimmable for training sessions.

5.3 Public buildings

BEFORE

- Lights permanently switched on at night.
- Cold, white lights causing glare and dark shadows.
- Unshielded lights.

AFTER

- Fully shielded lights preventing upward glow.
- Warmer 2700K lights.
- Position changed to light only where needed.
- Lights only on when needed.

By following the good lighting principles in this guidance, and the use of dark sky-friendly lighting, we can all contribute to conserving and enhancing Wales' night skies for future generations.

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Cyfoeth Naturiol Cymru
Natural Resources Wales

Parc Cenedlaethol Eryri
National Park

Parc Cenedlaethol Arfordir Penfro
Pembrokeshire Coast National Park

Conwy
Cyngor Bwrdeistref Sirol
County Borough Council

Bryniau Clwyd a Dyffryn Dyfrdwy
Tirwedd Cenedlaethol
Clwydian Range and Dee Valley
National Landscape

Ynys Môn
Tirwedd Cenedlaethol
Anglesey
National Landscape