Snowdonia National Park Authority
Supplementary Planning Guidance

Obtrusive Lighting (Light Pollution)

14

October 2016

Contents

1.0 Purpose of this Document

1.1 This draft document is one of a series of Supplementary Planning Guidance Notes (SPGs) which provides further detailed information in support of the policies contained in the Eryri Local Development Plan (ELDP). The purpose of the Supplementary Planning Guidance on Obtrusive Lighting is:

- *To provide detailed Guidance about the manner in which the National Park Planning Authority will deal with those planning applications in which the developments proposed require exterior lighting which may have a harmful effect on the night-time character and wildlife of the National Park.*

- *To encourage developers, architects, lighting designers and ecological consultants to provide non-obtrusive lighting designs when preparing proposals for any development which incorporates an element artificial lighting outdoors. Consideration should also be given to possible obtrusive lighting from interior lights.*

- *To provide Guidance to assist officers and members in determining planning applications*

1.2 The document is to be published as an Interim SPG as the forthcoming review of the ELDP will need to acknowledge the Dark Sky Reserve Status obtained for the whole of Snowdonia National Park in November 2015. A more explicit policy will be required, when the ELDP is revised, to ensure that any exterior lighting required in a new development will not be obtrusive and cause light pollution nuisance to neighbours, harm to biodiversity and landscape interests. It will also protect those areas of Snowdonia with the darkest skies.

2.0 Background

2.1 Over a number of years there has been increasing concern about the loss of dark skies at night, highlighted in 2003, when Campaign for the Protection of Rural England published maps of light pollution across the UK, in their report entitled Night Blight. Light pollution has been recognised as *"one of the most rapidly increasing types of environmental degradation. Its levels have been growing exponentially over the natural nocturnal lighting levels provided by starlight and moonlight"*[1].

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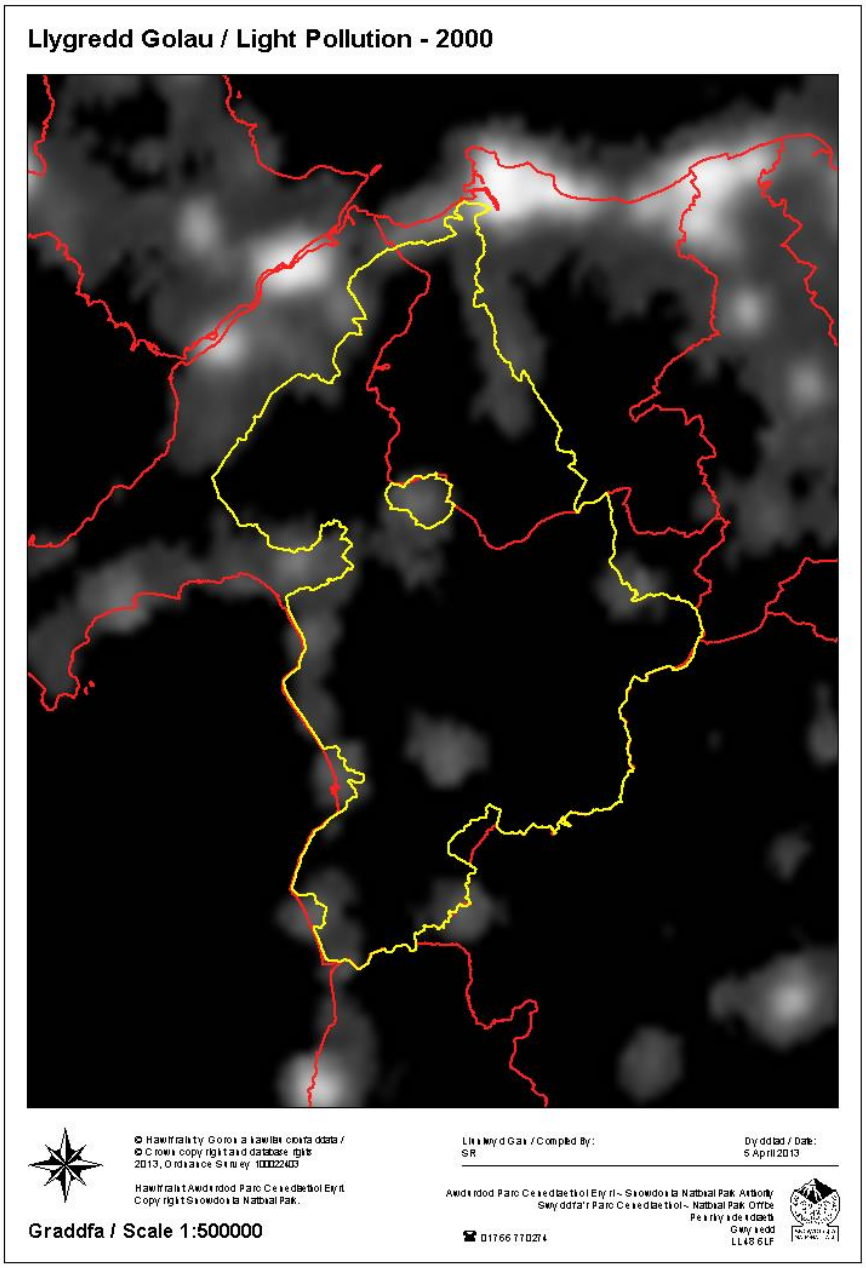
[1] Falchi F, Cinzano P, Elvidge CD, Keith DM, Haim A. **Limiting the impact of light pollution on human health, environment and stellar visibility**. J Environ Manage. 2011 Oct; 92(10):2714-22. doi: 10.1016/j.jenvman.2011.06.029. Epub 2011 Jul 13



2.2 Obtrusive lighting can be very disruptive to wildlife and humans.Natural light has profound effects on living things and much of their behaviour is affected by different light levels, day length and seasonality. Although the advent of artificial light has done much to safeguard and enhance the night-time environment for human beings it has come at a cost as obtrusive light can cause serious physiological and ecological problems.

2.3 Traditionally most people have been used to buying bulbs with the light output graded in watts (W). These days, because watts are actually a measure of power and not light intensity, manufacturers are tending to refer to the “Lumen” (lm) output of a bulb. This is simply a measure of the total amount of “visible” light emitted from a source. Further technical information is provided in the Appendicies.

3.0 Snowdonia Dark Skies Reserve

3.1 A Dark Skies Reserve designation is a prestigious award given by the International Dark Sky Association (IDA) to select destinations that have proven that the quality of their night sky is outstanding and real efforts are being made to reduce light pollution. The Snowdonia National Park Authority applied to the IDA for Dark Skies Reserve status in the summer of 2015. This followed months of survey work by volunteers who went out to measure the quality of the night skies of Snowdonia.

3.2 Reserve status was granted in November 2015 for the whole of Snowdonia. Within the reserve three darker "core" areas have been identified (see Map 1). These areas have the darkest skies and are in the remotest parts of the National Park. Very little new development is expected in these areas therefore the emphasis will be on encouraging improved and more efficient use of lighting to maintain and enhance the dark sky. As result of better protection and care of the dark sky throughout the Park it is envisaged that;

- *the area's nocturnal wildlife will benefit*
- *the quality of the area's environment will improve*
- *Snowdonia will have a new natural attraction for visitors to the area at quiet periods of the year*
- *potentially the local economy may be improved*
- *the dark sky of Snowdonia will be protected and enhanced for future generations.*

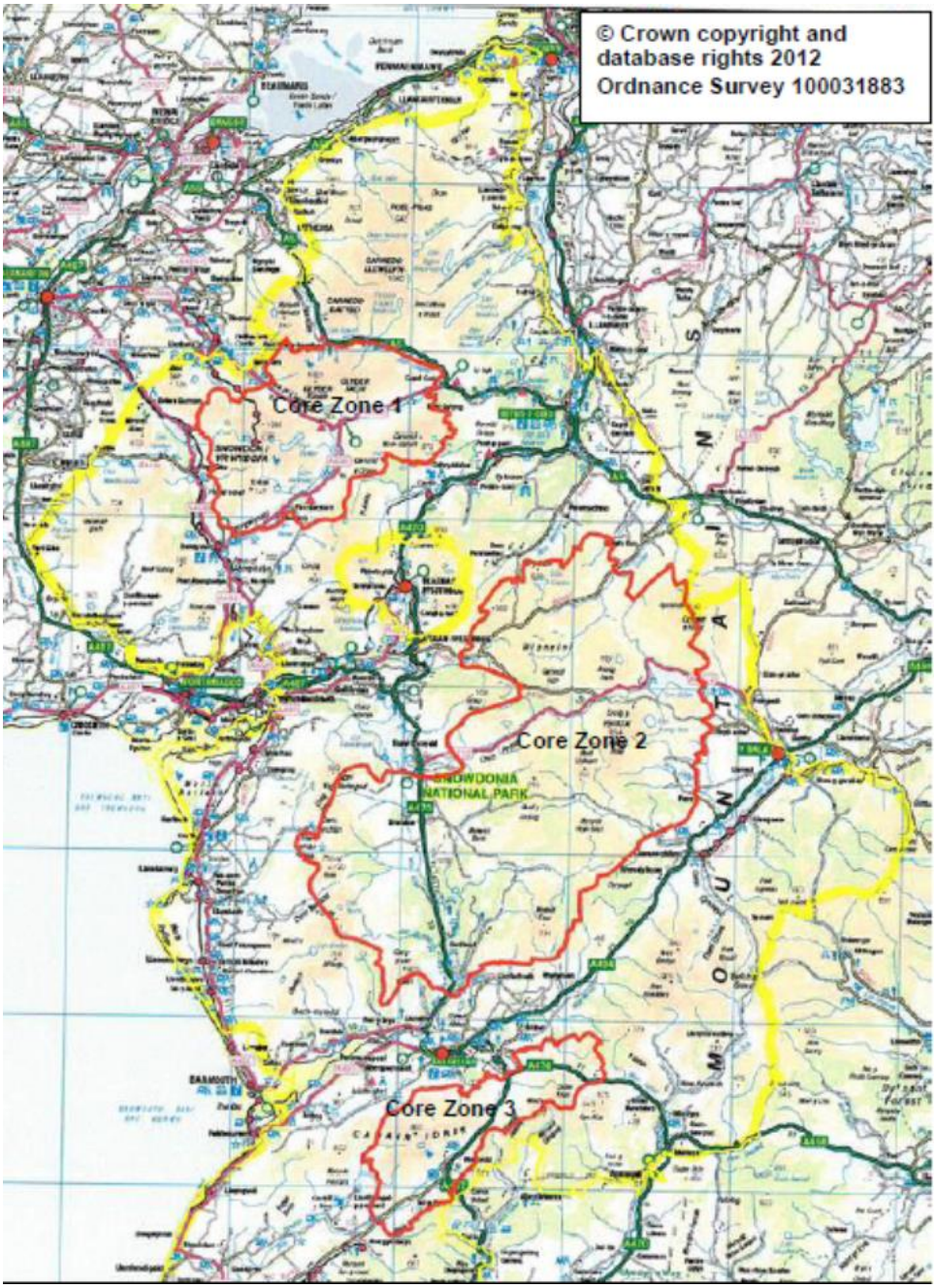
3.3 **The SNPA will not insist on any existing night lights being switched off and will not ask anyone to spend large amounts of money on changing all their lights. All we ask is for people to adjust their use of light especially when changing existing outside lights or incorporating new ones as part of a new development proposal.**

3.4 Whilst this document is primarily aimed at providing guidance for developers and those submitting planning applications for new developments there are steps that can be taken by residents and public bodies operating within the Park to reduce obtrusive lighting at existing properties – such as;.

- *considering the installation of low-wattage bulbs but with sufficient light intensity which is measured in lumens*
- *considering the installation of motion detectors on external lighting*
- *considering shielding or down-tilting external lights and using asymmetrical or double asymmetrical lights*
- *switching off lights when not needed and installing timer switches and dimmers.*

3.5 These measures need not be done immediately but can done when repairing or replacing light fittings and bulbs. In due course they will lead to reduced electricity bills and a reduction in the incidence of obtrusive light.

3.6 Some areas of the National park have already benefitted from the installation of LED street lighting and further co-ordination with the highway authorities will lead to further reduce light pollution and at the same time save on energy costs. All organisations are therefore encouraged to play their part in enhancing and appreciating our dark skies.



Map 1: Dark Sky Reserve “Core Zones” in Snowdonia

4.0 Forms of Light Pollution

4.1 There are many reasons why obtrusive light (or light pollution) should be prevented but the prime objective for adequate control is to minimise the problem it creates for human beings, plants and animals thereby improving health and well-being, amenity and biodiversity.

4.2 Obtrusive lighting can be defined as the unnecessary brightening of the night sky as a result of upwardly directed light. Usually light pollution is caused by poorly designed development schemes and inappropriate lighting equipment. Obtrusive lighting can cause nuisance to residents and present safety problems through glare, especially to drivers. It also a waste of electricity. The details below give examples of the different types of obtrusive lighting. ***(For a more complete glossary of technical terms related to lighting used in this document visit the glossary at http://darksky.org/resources/glossary/)***

Glare Glare forms a veil of luminance from poorly controlled and directed lighting which reduces contrast and visibility. To road users, glare can be highly dangerous.
Light Trespass This occurs when light spills into neighbouring properties or areas and becomes a nuisance, this may lead to neighbour disputes.
Scenic Intrusion This is light pollution that can be caused by any light source or reflected glow that is not in keeping with the characteristics of an area recognised as having high landscape or townscape value. In addition to its location, orientation and intensity, the colour of a light can also be a significant intrusion as it can alter the character of a place after dark and adversely affect its scenic quality and amenity. This is of particular relevance to the Snowdonia National Park as it is a protected landscape and has Dark Skies Reserve status.
Sky Glow This is the glow that is visible around built-up areas resulting from the scattering of artificial light. Sky glow is often the most difficult form of light pollution to deal with and required a long term programme of measures to lessen its impact. It will often require the co-operation of highways authorities and private landowners to retro-fit more suitable lighting - this can usually factored into their maintenance and replacement plans.

Figure 1: Types of Obtrusive Lights
(Source: Guidance Notes for the Reduction of Obtrusive Light GN01:2011)

4.3 Obtrusive light also deprives many citizens access to the starry night skies and a generation of town and city dwellers has grown up without ever seeing the Milky Way. This fact and the concern about the ability of astronomers to view the heavens prompted the establishment of the Commission for Dark Skies (CfDS) in1989, to counter the ever-growing spread of skyglow which has tainted the night sky over UK since the 1950s.

4.4 The Commission for Dark Skies advocates the following measures;

- *Greater use of modern fittings which control the light emitted, to minimise sky-glow and light trespass.*

- *The right amount of light for the task, not wasteful over-lighting - Sensible wattages (a 40 W light will adequately illuminate the average driveway and garden) up to a maximum of 150 W;*

- *Controls on floodlighting of buildings, sports facilities, etc., with appropriate shielding, baffles and mounting adaptation causing lamps to shine preferentially downwards;*

- *Instructions about sensitive mounting, and information about light trespass and other possible adverse effects, in packaging of all exterior lights.*

5.0 Policy Context

5.1 **National Policy**
Planning Policy Wales (Edition 8, Jan 2016) refers to light pollution in Chapter 13 and recognises the need to balance the adverse impacts of lighting on the environment, amenity and wildlife with the need to provide security and enable night-time recreational and sporting events to take place.

13.13.2 There is a need to balance the provision of lighting to enhance safety and security to help in the prevention of crime and to allow activities like sport and recreation to take place with the need to:

- *protect the natural and historic environment including wildlife;*
- *retain dark skies where appropriate;*
- *prevent glare and respect the amenity of neighbouring land uses;*
- *and reduce the carbon emissions associated with lighting.*

Lighting to provide security can be particularly important in rural areas

13.14.2 Local planning authorities should adopt policies for lighting, including the control of light pollution, in their development plans.

13.15.3 Local authorities can attach conditions to planning permissions for new developments that include the design and operation of lighting systems (for example, requiring energy-efficient design) and prevent light pollution.

5.2 **The Policy Context in Snowdonia**

The Park's objectives and policies are stated in various Park Authority documents which define how the Park will be managed. The main document in this instance are Eryri Local Development Plan 2007 – 2022 and supporting Supplementary Planning Guidance documents. There are various references to light pollution in various policies as indicated below. These will be used in assessing the impact of new lighting proposals together with the information contained in this guidance. The emphasis will be on providing advice and information to improve lighting proposals rather than refusing new developments on lighting issues alone.

Development Policy 1: General Development Principles

To conserve and enhance the 'Special Qualities' and purposes of the National Park, development will only be permitted where all the following apply:

> *xii. The development is compatible with, and does not cause significant harm, to the environment, neighbouring residential amenity or the amenity of the Park by way of noise, dust, vibration, odour,* ***light pollution****, hazardous materials or waste production.*

Development Policy 10: Advertisements and Signs (10)

Advertisements or private signs on premises will only be permitted if all the following criteria are satisfied;

> *ii. The sign is not internally illuminated.*

Externally illuminated signs may be permitted where the following criteria are satisfied:

> *vi. The sign needs to be illuminated to enable customers to locate a business which is open during the hours of darkness.*
> *vii. The effects of the illumination do not compromise road safety and do not harm the character of the site, its surroundings, or the amenity of the neighbourhood.*
>
> *viii. The effects of the illumination do not have any adverse effect on* ***tranquillity.***

Development Policy 21: Tourism and Recreation (21)

Within the National Park the provision of existing tourist facilities will be protected

and enhanced through adopting the principles of sustainable tourism. New tourism development and the enhancement of current facilities will be supported where:

*vi. It does not have an adverse impact on the views to and from the National Park and does not generate an increase in noise or **light pollution**.*

Snowdonia National Park Authority Supplementary Planning Guidance

1. Guidance for Sustainable Design in the National Parks of Wales

- *Consider the impact of external lighting on the surrounding area, surrounding area, and seek out designs that minimise "backscatter" and general **light pollution.***
- *Where exterior or street lighting is required consider how **light pollution** disturbance can be minimised, for example by use of a full cut off fixture and a low pressure sodium light source.*

6. Nature Conservation and Biodiversity

8.14 In order to maintain healthy populations these species require, amongst other factors, unpolluted water, undisturbed river banks and bankside vegetation and the absence of ***artificial light***. Proposals for developments located near such habitats should not impact adversely on wildlife and on water quality and quantity.

5.3 These policies will be re-examined during the process of reviewing the ELDP and may be consolidated into a single policy statement.

6.0 Lighting and New Development

6.1 **General Design Considerations**
The consideration of what lighting is necessary to a development should be undertaken at an early stage in the design process. It will be necessary to examine how the development will interact with the night time environment; how it will be used at night and, by design, minimise the need for exterior lighting - for example, by using lighting only where and when it is necessary, using an appropriate strength of light and adjusting light fittings to direct the light to where it is required. This makes sense and will save on energy costs.

6.2 Illumination should be appropriate to the surroundings and character of the area as a whole. The Institute of Lighting Professionals (ILP) has produced guidance regarding the reduction of obtrusive light within development schemes. It provides a good starting point for any applicant embarking on designing the lighting element of

their development scheme. It is available to download free of charge here. **https://www.theilp.org.uk/documents/obtrusive-light/.**

6.3 In general all development within the Snowdonia National Park area should aim to avoid over-lighting, and make use of shields, reflectors, baffles and timers to limit lighting impact. This will be especially true within the core areas (see Map 1) which have the darkest skies and areas of inherently dark landscapes, which can be experienced across the national park. In these areas the effects of new lighting should be kept to the minimum.

6.4 Regardless of location in designing a lighting scheme within a new development the SNPA will expect all applicants to clearly show the location of lights, type of lamps used, their lumen output and periods of night time use. The level of detail required with a planning application will depend on its scale and location. As a general rule applicants should consider the following checklist to assist them with their lighting decisions:

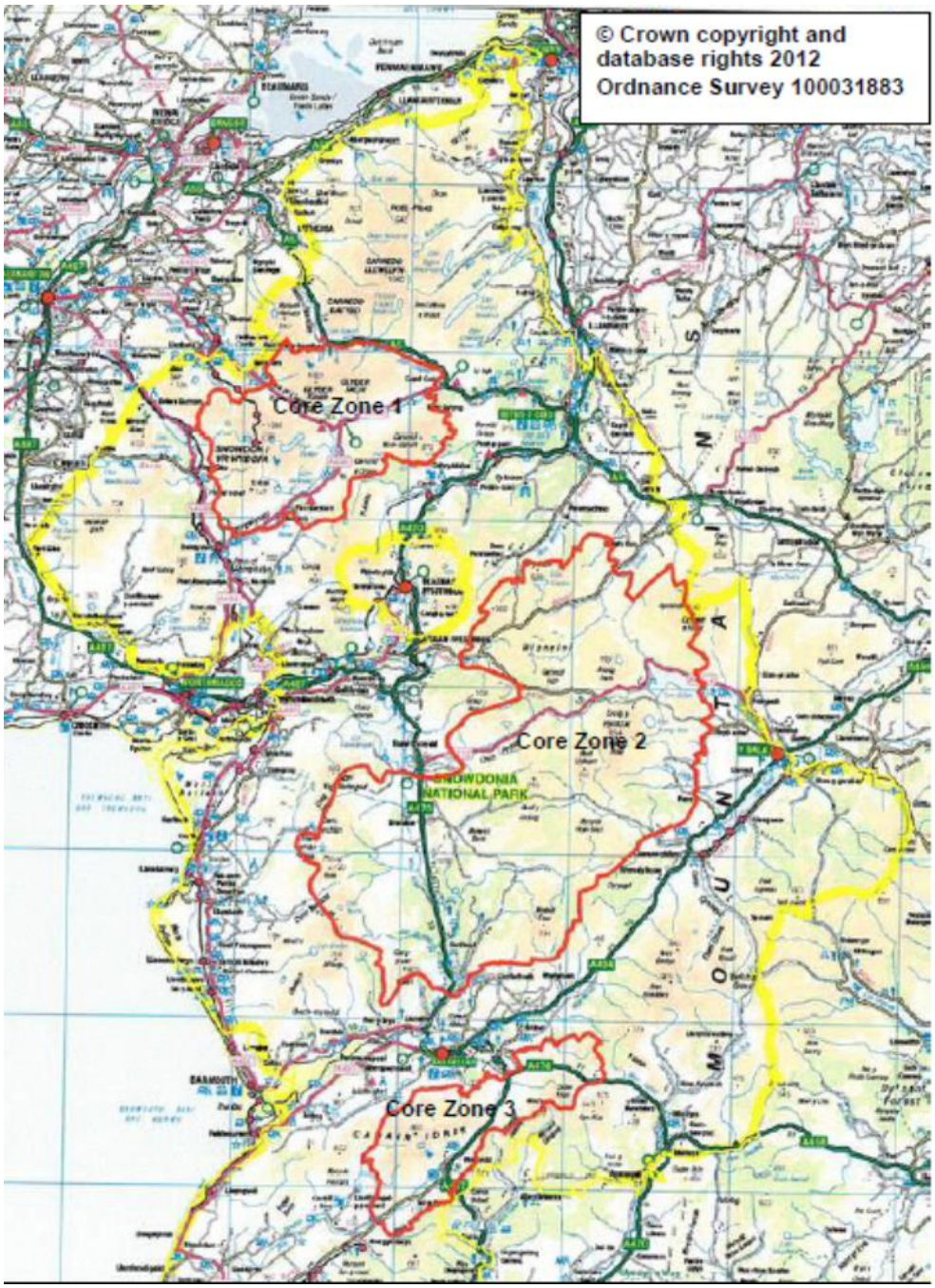
- **Why the lighting is needed.**
- **What may be affected by night time lighting e.g. neighbours, sites of ecological importance or protected species**
- **Will the lighting be visible from some critical viewpoints such as a public footpath or from surrounding higher ground.**
- **What kind of lights are required and their location.**
- **Should they have sensors**
- **Which areas are being illuminated and why.**
- **Can any design solutions overcome potential light pollution problems.**
- **What is the baseline information on existing lighting levels**
- **Light colour**
- **Potential light spillage to adjacent areas or the dark sky**

6.5 New lighting can be shown on plans and additional information provided on attached schedules. It may be the case that the Authority will ask for lighting details if these are not provided and new lighting is likely to be required. Where planning permission can be granted a planning condition could be attached asking for further lighting information.

6.6 For major development and infrastructure projects within and adjacent to the National Park, proposals will need to demonstrate that lighting has been designed to avoid adverse effects upon the experience of dark skies and dark landscapes of Snowdonia National Park. In addition to the information requirements set out above, site analysis of the current baseline experience of dark skies, dark landscapes and current lighting effects would be required.

Appendix 1: Good Practice Guidance for Outside Lighting in the International Dark Skies Reserve

International Dark Sky Reserve status was granted to the Snowdonia National Park in November 2015 and covers the whole of Snowdonia. Within the Reserve three darker “core” areas have been identified (see Map 1). These areas have the darkest skies and are in the remotest parts of the National Park. Very little new development is expected in these areas therefore the emphasis will be on encouraging improved and more efficient use of lighting to maintain and enhance the dark sky.



Map 1: Dark Sky Reserve “Core Zones” in Snowdonia

Environmental Zones in the Snowdonia National Park

All Dark Sky designated award schemes have well defined environmental zone boundaries as follows.

E0: New lighting excluded - eg Dark Sky Core.

E1: Intrinsically dark Areas - eg Dark Sky Buffer Zone, Area of Outstanding Natural Beauty and National Parks

E2: Low district brightness - eg Dark Sky External Zone - Rural or small village locations

E3and E4 (in CIE150:2005) do not relate to conditions expected in or close to a Dark Sky designated award area

These zones are determined by the quality of the ambient night-time light experienced in each zone. The three maps below show the environmental zones in the Dark Sky Core areas in Snowdonia.

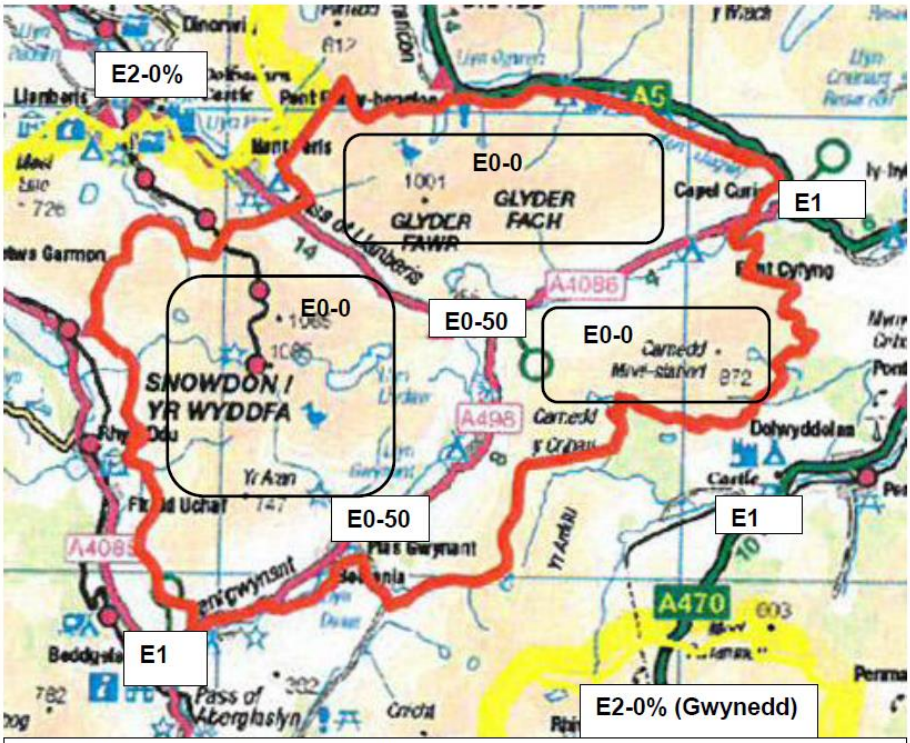


Figure 2.15 : Core Zone 1 internal and adjacent buffer Environmental Zones

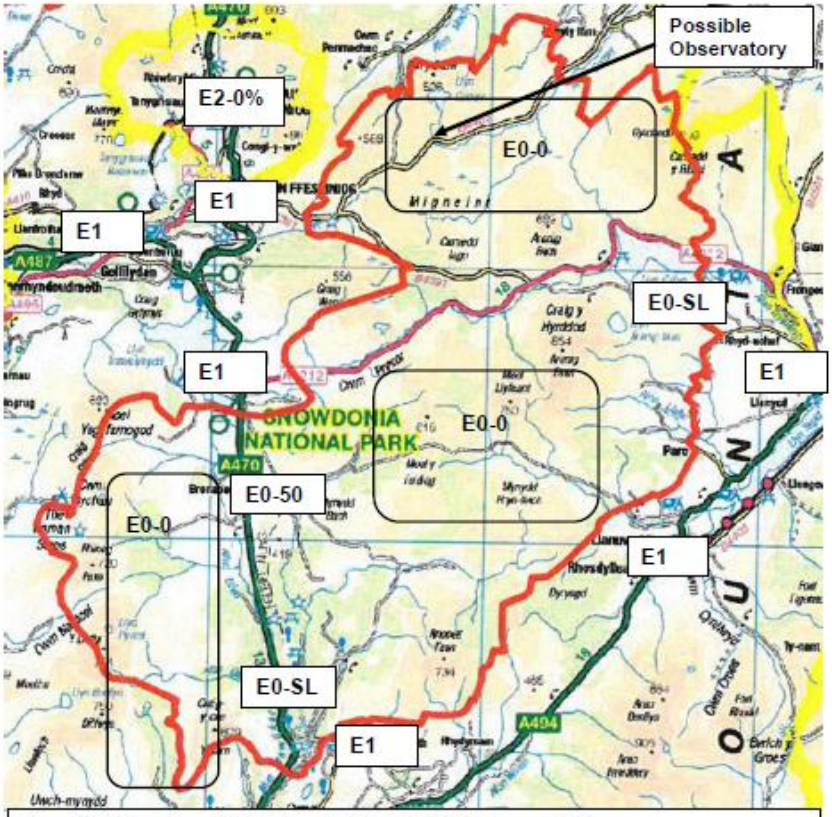


Figure 2.16 : Core Zone 2 internal and adjacent buffer Environmental Zones

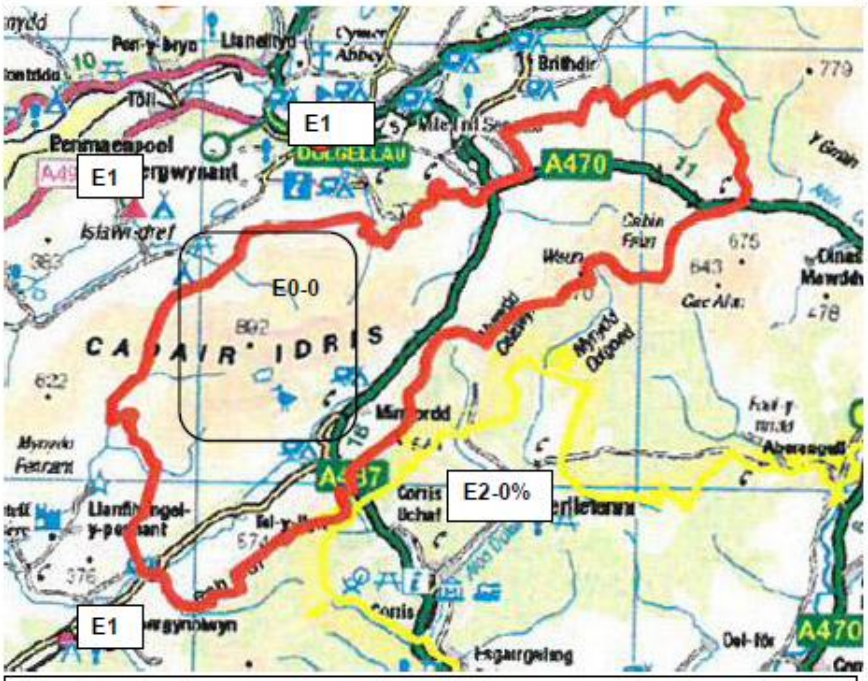


Figure 2.17: Core Zone 3 internal and adjacent buffer Environmental Zones

The **Snowdonia National Park – Dark Sky Reserve External Lighting Master Plan** (LMP) recommends varying degrees of stray light control for each of the zones identified in Snowdonia (see below)

Zone	Definition	Typical Examples	Implications	Means to Achieve
E0-0	Dark	Typically uninhabited areas e.g. National Nature Reserves	No new external lighting units and residents encouraged to modify existing units	Adapting or modifying existing units to this end
E0-250	Predominantly dark. Some light spill is inevitable up to 250m beyond the new light source or up to the property boundary whichever is nearer to the property	All remote properties within the zone boundary e.g. isolated farmsteads	New units must be compliant and residents encouraged to modify existing units to prevent no more than 0.1 lux [1]straying beyond their property	New units must be fully cut-off/shielded regardless of lumen output. Encourage existing units to be adapted or modified to this end
E0-50	Predominantly dark. Some light spill is inevitable up to 50m beyond the new light source or up to the property boundary whichever is nearer to the property	Limited or no street lighting	New units must be compliant and residents encouraged to modify existing units to prevent no more than 0.25 lux straying beyond their property	New units must be fully cut-off/shielded regardless of lumen output. Encourage existing units to be adapted or modified to this end
E1in	Intrinsically dark.		New units	Residents

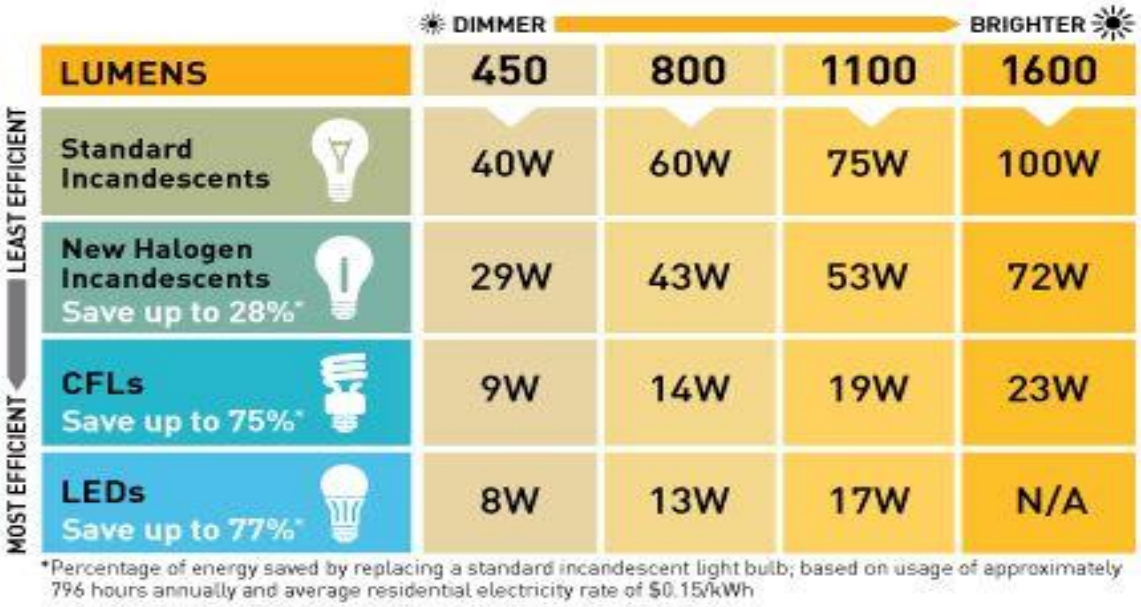
[1] Lux is the SI unit of illuminance, equal to one lumen per square metre. A 100 lumen light source, concentrated on to an area of one square metre, lights up that square metre with an illuminance of 100 lux. However, if the same 100 lumens light source is spread over ten square metres it produces an illuminance of only 10 lux.

Reserve	Up to 0.5 lux light spill is inevitable at the property boundary		must be compliant and residents encouraged to modify existing units to prevent any light straying into their neighbours' windows by adapting or modifying existing units to this end	encouraged to use bulbs with an output less than 600 lumens or ensure lighting unit is fully cut-off/shielded if greater than 1000 lumens
E1 Beyond reserve	Up to 1 lux light spill is inevitable at the property boundary inclusive of any contribution from street lighting		Residents encouraged to modify existing units to prevent any light straying into their neighbours' windows by adapting or modifying existing units to this end	Residents encouraged to use bulbs with an output less than 1000 lumens or ensure lighting unit is fully cut-off/shielded if greater than 3000 lumens

Brightness of the Bulb

The light bulb industry has changed radically over the past few years with the gradual phasing out of incandescent filament bulbs, driven by legislation and a drive for greater energy efficiency. The old style of bulbs have been replaced by new technologies such as Light Emitting Diodes (LEDs) that require significantly less energy to produce the same brightness as the incandescent bulbs. Installing energy saving lights translates into saving money in the long term also.

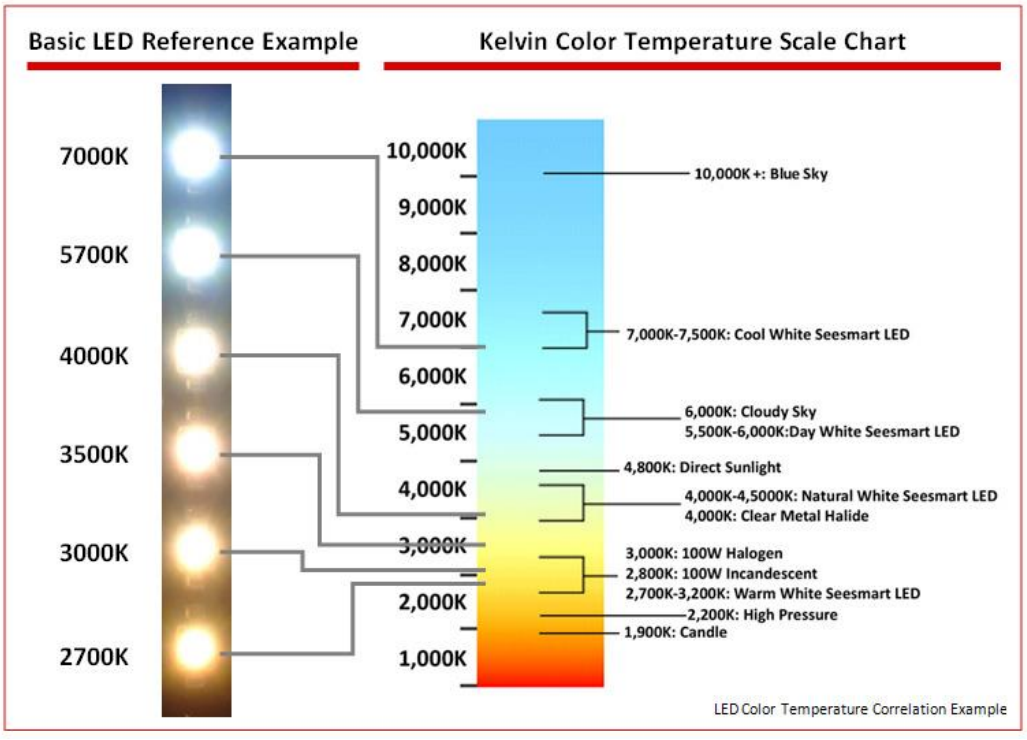
Traditionally light bulbs were rated by their wattage, however this is a measure of power rather than light intensity, more recently however manufacturers are rating bulbs in **lumens.** This is a measure of the total amount of "visible light" emitted from the source. The Table below demonstrates the comparison of the output in lumens contrasted with the varying wattages of the different bulb technologies. For example a 10 watt LED produces an equivalent brightness as a 60 watt incandescent bulb.



Colour of the Light Emitted

It is a fallacy to think that white light bulbs emit the same colour light. In reality there are different tones of white light and this is measured on the **Kelvin Scale** (K).

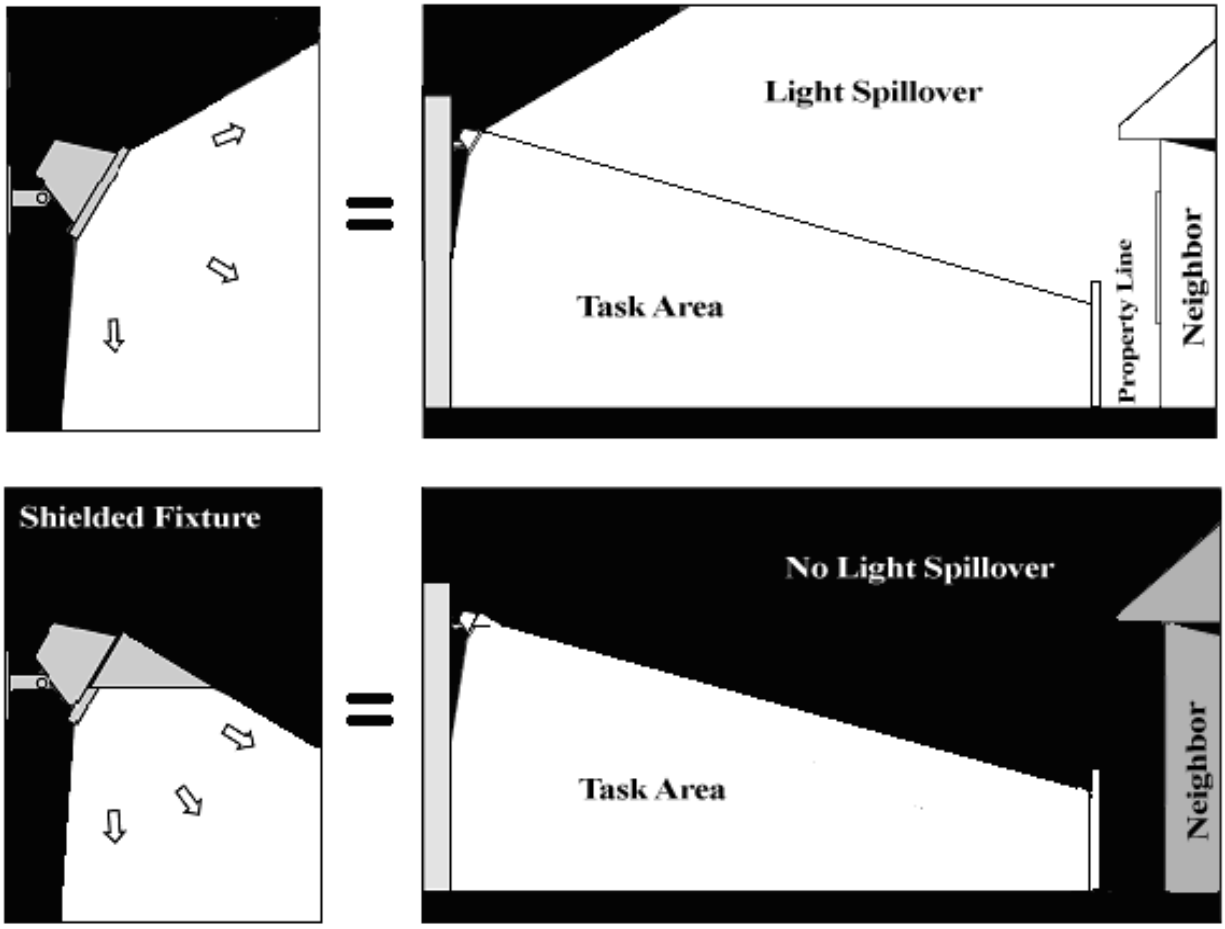
Traditionally manufactures have used terms such as “warm white”; “cool white” or “brilliant white” to differentiate the quality of the light, but increasingly the use of LEDs has led to the tendency to identify the Kelvin rating of the bulb. **The Table below gives examples of LED and the Kelvin Scale**



Within the Snowdonia Dark Sky Reserve a Kelvin range of 3000 – 4000K is preferable for new exterior lighting as it avoids the piercing blue white light, which has harmful effects on nocturnal wildlife, and also the orange glow associated with outdated sodium bulb used extensively for street lighting.

Positioning Outside Lights

As well as seeking to ensure the brightness of external lighting is compatible with the Environmental Zone in which it is proposed, **where** and **how** the light is installed is vitally important. If floodlighting is unavoidable it will be necessary to ensure that **no light escapes above the horizontal plane and is directed to where it is required and not onto neighbouring property.** (See illustration below.)



Examples of Acceptable/Unacceptable Lighting Fixtures are given in **Appendix 2.**

Appendix 2: Examples of Acceptable/Unacceptable Lighting Fixtures

Appendix 3: Additional Sources of Information

Parc Cenedlaethol Eryri/Snowdonia National Park Authority
http://www.eryri-npa.gov.uk/looking-after/dark-skieshttp://www.eryri-npa.gov.uk/__data/assets/pdf_file/0008/661418/GweldSer-SeingStars.pdf

Snowdonia National Park – Dark Sky Reserve External Lighting Master Plan
Lighting Consultancy and Design Services Ltd. Rosemount House, Well Road, Moffat. DG10 9BT

Institute of Lighting Professionals - https://www.theilp.org.uk/home/

Guidance Notes for the Reduction of Obtrusive Light GN01:2011 Institute of Lighting Professionals https://www.theilp.org.uk/documents/obtrusive-light/

International Dark Sky Association - http://darksky.org/light-pollution/

The effect of light and lighting on landscape and views.
Karl Jones (director and principal landscape architect of Crestwood Environmental; member of LI Technical Committee)
https://www.youtube.com/watch?v=RDTWlFE8D8g&feature=youtu.be

Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations International Commission on Illumination (CIE) CIE 150:2003 ISBN 978 3 901906 19 0

Understanding and Dealing with Obtrusive Light 3rd Edition 2006
Lighting Consultancy and Design Service Ltd, Rosemount, Well Road, Moffat

Guide on the limitation of the effects of obtrusive light from outdoor lighting installations. CIW, Report, 150:2003 Society of Light & Lighting. CIE Publications 222, Balham High Road, London SW12 9BS

Guidelines for Landscape and Visual Assessment
Landscape Institute and IEMA. Spoon Press. ISBN 0415 213185x

Lighting Guide No 6 (1992) The Outdoor Environment. CIBSE Society of Light & Lighting. 222 Balham High Road, London SW12 9BS.

Technical Report no. 4 Sports Lighting Guide and Others e.g. Sports Council, Lawn Tennis Association. CIBSE Society of Light & Lighting. 222 Balham High Road, London SW12 9BS.

BS 5489 - 1:2003: Road lighting design: Code of Practice. BSI

BSEN 13201 - 2:2003. Performance Requirements. BSI

Technical Report No. 5. Brightness of Illuminated Advertisements (2001)
ILP https://www.theilp.org.uk/resources/ilp-technical-reports/plg05-the-brightness-of-illuminated-advertisements/LP

ILP Technical Report 24: A Practical Guide to the Development of a Public Lighting Policy for Local Authorities. ILP https://www.theilp.org.uk/resources/ilp-technical-reports/tr24/