**Dark Night Skies**

Draft report to the Cotswolds Conservation Board from the Dark Skies task and Finish Group

V2 October 2018

**Summary**

The dark skies of the Cotswolds are a notable aspect of the AONB. They have been identified as a special quality of the AONB and the importance of dark skies is being increasingly understood as part of our heritage and for health and wellbeing. The Cotswolds darks skies are, however, under increasing pressure from artificial lighting and have diminished in quality over past 20 years. The conservation and restoration of dark skies is a feature of the new Cotswolds AONB Management Plan 2018 – 2023 and has been recognised in the new National Planning Policy Framework but more needs to be done. Seeking Dark Sky Reserve status would boost the recognition and action to protect, conserve, interpret and celebrate the dark skies and landscapes of the Cotswolds AONB. Designation as a dark Sky Reserve is by the International Dark Skies Association and requires a rigorous application process collecting data on dark sky quality, a lighting inventory of the reserve’s core area, a Lighting Management Plan and a commitment to an ongoing programme of advice, events and reduction of light pollution. To achieve and maintain Dark Sky Reserve status, the Board will need to commit staff resource and money.

**Background**

The dark skies of the Cotswolds AONB have been noted by observation for some time for example when driving along the A40 between Burford and Andoversford. Survey data from 1993 and 2000 further highlighted the dark skies and indeed their decline but it was not until 2009 that the Board adopted a Position Statement on Tranquillity and Dark Skies. The position statement very much focusses on tranquillity with darks skies being a contributing measure along with noise.

In 2016 the Board adopted revised Landscape Strategy and Guidelines. The revision provided the opportunity to include the risk of introducing lit elements into dark landscapes and guideline to minimise or avoid light pollution, conserve dark landscapes and conserve areas dark skies. 2016 also saw the publication of CPRE’s Night Blight report and mapping[[1]](#footnote-1) which confirmed that a good part of the Cotswolds AONB still has good to high quality dark skies. The CPRE report has led to the Cotswolds Conservation Board to explore how the dark skies of the Cotswolds can be protected and the potential for a dark sky place designation by the International Dark-Sky Association.

The International Dark Skies Association (IDA) was founded in 1988 and is the recognised authority for night sky protection and is dedicated to protecting the night skies for present and future generations. Based in Tucson, Arizona, the IDA is a not for profit organisation funded by membership, grants, sponsorship and income from events and sales.

Dark skies are recognised in the National Planning Policy Framework 2018:

*180. 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:*

1. *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*
2. *identify and protect tranquil area which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
3. ***limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.***

DEFRA’s 25 year plan (2017) states in respect of AONBs and National Parks that:

*Over the next 25 years we want to make sure they are not only conserved but enhanced. Many of the policies set out in the rest of the Plan will contribute to making all areas more beautiful.*

One of those policies is that DEFRA is committed not just to minimising additional pollution but to *‘cut all forms of pollution’* – including light:

*Over the next 25 years, we must significantly cut all forms of pollution and ease the pressure on the environment. We must ensure that noise and light pollution are managed effectively.*

The (Draft) Cotswolds AONB Management Plan 2018 – 2023 recognises the value and threat to the Cotswolds dark skies:

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| **Outcome 7 (Dark Skies):** The dark skies of the Cotswolds AONB will have been conserved and enhanced, with fewer areas being affected by light pollution.  |

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| POLICY CE5: DARK SKIES1. Proposals that are likely to impact on the dark skies of the Cotswolds AONB should have regard to these dark skies, by seeking to (i) avoid and (ii) minimise light pollution.2. Measures should be taken to increase the area of dark skies in the Cotswolds AONB by (i) removing and (ii) reducing existing sources of light pollution.3. Consideration will be given to seeking a formal dark sky designation for those parts of the Cotswolds AONB that are least affected by light pollution.  |

**Benefits of protecting dark skies**

**Landscape character**

Dark skies and landscapes are a characteristic of most of the Cotswolds AONB and therefore covered by the primary purpose to the ‘conservation and enhancement’ of the AONB. The Landscape Strategy and Guidelines included measures to conserve dark skies and landscapes in the 2016 revision and the new Cotswolds AONB Management Plan 2018 – 2023 has a specific dark sky outcome and policies. Recognition of dark skies in the Cotswolds AONB Management Plan and supported by the LS&G should encourage local authorities to take dark skies into account when developing their own policies and determining planning applications, thereby helping to conserve and enhance the AONB. Inclusion also provides the opportunity for communities, individuals and businesses to take account of dark skies and to encourage developers and consultants to adopt good lighting practices.

**Enjoyment and understanding**

There is increasing public interest in the night sky, in part encouraged by television programmes such as Stargazing Live and the Sky at Night. Stargazing events organised by astronomical societies are proving popular and the Kielder Observatory cannot cope with demand. Around 90% of the UK population rarely experience dark skies due to light pollution. As a consequence, areas of dark skies are increasingly important for people to experience natural darkness and see a starlit sky.

**Wildlife**

Life on earth has evolved with the natural cycle of day and night. Species have evolved to cope with and take advantage of natural darkness. Artificial lighting has an impact on species and ecosystems interrupting migration patterns, predator-prey relationships and the circadian rhythm of many organisms leading to stress and disruption of breeding patterns.

**Human health and well-being**

Humans have also evolved with the natural cycle of light and darkness and naturally adhere to a circadian rhythm. Photoreceptors in the human eye regulate the circadian rhythm which controls biological functions including alertness, temperature regulation and melatonin production. Melatonin is a hormone that induces sleep, boosts the immune system, lowers cholesterol and helps with the function of the thyroid, pancreas etc. Artificial light disrupts sleep and melatonin production which can lead to suppression of the immune system, increased risk of disease, mood instability and increased risk of mental illness.

Poorly designed and/or installed outdoor lighting can be a nuisance to neighbours and be a hazard to motorists, cyclist and pedestrians.

**Economic cost**

Artificial light costs money and produces CO₂. People are quick to complain about water leaking from mains but do not tend to give a second thought to wasted light. The IDA estimates that mis-directed light in the U.S.A costs $2bn a year and European dark sky organisations estimate €2bn is wasted across Europe. Protecting dark skies by minimising wasted light and promoting efficient outdoor lighting saves money by reducing energy consumption and reduces CO₂.

**Economic benefit**

Evidence from existing Dark Sky Parks and Reserves show that designation has led to ‘Dark Sky Tourism’, particularly in the winter months. Some Hotels and B&Bs in the Northumberland National Park and Kielder Water and Forest Park Dark Sky Park are promoting the designation and offering Star Gazing packages having already ensured their lighting is dark sky compliant. This is providing business in the winter months and benefiting the local economy in an otherwise quiet time of year.

**Lighting and crime**

Recent switch-offs and dimming after midnight by local councils shows that darkness does not encourage crime and that it reduces it. The assumption that lighting will always deter criminals is incorrect, and lighting in secluded areas provides the criminal with a courtesy light and the stark contrast between bright light and dark shadow can even obscure their presence. The misconception that ‘brighter is safer’ will, however, be fairly challenging to overcome.

**Designation as a Dark Sky Place**

**Benefits of International Dark Sky designation**

The principal benefit for the Cotswolds AONB of achieving IDA Dark Sky Place status is that it will contribute significantly towards the purposes of AONB designation; conserving and enhancing and enjoying and appreciating. It would give considerable weight to policies aimed at conserving dark skies and to campaigns to reduce existing light pollution. Dark sky status would also be a consideration for local planning authorities in determining planning applications.

Ten out of the 12 planning authorities in the Cotswolds AONB have policies for avoiding/limiting light pollution, two refer to avoiding/limiting light pollution within supporting text for policies on tranquillity or pollution. Only two, B&NES and Cherwell have policies for dark sky management or enhancement. Only one Highway Authority out of six, Gloucestershire, has a policy within their Local Transport Plan to avoid/limit light pollution but none have policies to enhance dark skies.

Dark Sky Place designation would encourage and provide the rationale for planning authorities to include or further develop dark sky policies as they review their plans. Some may be encouraged to develop and adopt dark sky supplementary planning guidance.

Dark Sky Place status also brings recognition of the efforts of those organisations who worked towards achieving international recognition for dark skies and ensures action continues towards conserving and enhancing dark skies and retention of Dark Sky Place designation.

Designation would encourage resident and neighbouring communities and visitors to engage with the Cotswolds dark skies and their conservation and enjoyment. Dark Sky designation would also support the development of dark sky tourism, particularly during the winter.

**Gaining Dark Sky Place Designation**

Dark sky place designation is by the International Dark-Sky Association based in Tucson, Arizona[[2]](#footnote-2). For landscapes such as the Cotswolds there are three dark sky place designations to consider:

International Dark Sky Sanctuary

An IDA Dark Sky Sanctuary is public or private land that has an exceptional or distinguished quality of starry nights and a nocturnal environment that is protected for its scientific, natural, or educational value, its cultural heritage and/or public enjoyment.

A sanctuary is typically situated in a very remote location with few (if any) nearby threats to the quality of its dark night skies and it does not otherwise meet the requirements for designation as a park or reserve. The typical geographic isolation of Dark Sky Sanctuaries significantly limits opportunities for public outreach, so a sanctuary designation is specifically designed to increase awareness of these fragile sites and promote their long-term conservation².

There are only 4 International Dark Sky Sanctuaries, none in the UK or Europe

International Dark Sky Park

 An IDA International Dark Sky Park (IDSP) is a land possessing an exceptional or distinguished quality of starry nights and a nocturnal environment that is specifically protected for its scientific, natural, educational, cultural heritage, and/or public enjoyment. The land may be publicly owned, or privately owned provided that the landowner(s) consent to the right of permanent, ongoing public access to specific areas included in the IDA designation².

There are 62 International Dark Sky Parks globally including Bodmin Moor, Elan Valley Estate, Galloway Forest and Northumberland National Park and Kielder. The vast majority are US National or State Parks and National Monuments which are under the control of the US or State Government.

International Dark Sky Reserve

An IDA International Dark Sky Reserve is a public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for its scientific, natural, educational, cultural, heritage and/or public enjoyment. Reserves consist of a core area meeting minimum criteria for sky quality and natural darkness, and a peripheral area that supports dark sky preservation in the core. Reserves are formed through a partnership of multiple land managers who have recognized the value of the natural night time environment through regulations and long-term planning²

There are 13 International Dark Sky Reserves globally including Brecon Beacons, Exmoor, Moore’s Reserve (South Downs) and Snowdonia.

**Best fit for the Cotswolds**

The Cotswolds AONB is a lived in, living landscape with villages and small towns within the AONB creating sources of light pollution. Adjacent to the AONB are large settlements which cause light pollution and glare which impact on the Cotswolds dark skies. Unlike some other dark sky places there are no large tracts of open country, mountain or moorland which are essentially free of artificial light. Taking into account these factors and the criteria for the different dark sky places, International Dark Sky Reserve is the most appropriate designation for the Cotswolds.

**International Dark Sky Reserve Designation**

The goals of Dark Sky Reserve creation fit well with the Board’s purposes and duty. They are:

* To identify and honour public or private lands and their surrounding communities for exceptional commitment to and success in implementing the ideals of dark sky preservation
* To promote eco- and astro-tourism
* To promote protection of nocturnal habitats, public enjoyment of the night sky and its heritage, and/or areas ideal for professional and/or amateur astronomy
* To encourage land administrators, surrounding communities and private interests to identify dark skies as a valuable resource in need of proactive protection
* To provide international recognition for such sites
* To encourage other locations to become environmental leaders on dark sky issues by communicating the importance of dark skies and by providing an example of what is possible with proper stewardship

Eligibility and requirements

There is a comprehensive set of eligibility criteria and minimum requirements for achieving and maintaining the Dark Sky Reserve designation. These are attached as Appendix ‘A’. The key points are:

* IDSRs are larger area of landscape, at least 700 km² with communities etc, and more focussed on delivery through policy, community involvement and partnership with landowners, and Local authorities.
* IDSRs have a core area and a buffer and seeks to value the night skies through regulation, formal agreements, guidance, persuasion and long-term planning. Private holdings within the core are exempt from ‘regulation’ but applicants are encouraged to obtain voluntary compliance.
* There is a requirement for a community programme to encourage new outdoor lighting to conform to night sky friendly guidelines. Communities can also apply to receive a certificate from the IDA verifying they are within an IDSR and have engaged.
* Two key documents are required. A Lighting Management Plan (LMP) and a lighting inventory and plan to bring 90% of outdoor lighting into compliance with the LMP within 5 years and 100% within 10 years of designation from a minimum baseline of 67% compliant at the time of application.

**International Dark Skies Reserve Application Process**

The process and application is comprehensive and rigorous. Following initial contact with the IDA an application to become an IDSR needs to include:

1. Map of the area to be designated showing core, periphery (buffer) and communities.
2. Letter of nomination from a qualified IDA member nominator
3. Letter of nomination consent from lead body (CCB)
4. Letters of support from local authorities, communities etc
5. Core documents supporting dark skies as a valued resource e.g. Cotswolds AONB Management Plan, Local development Plans etc.
6. Documentation providing evidence of dark sky quality. This includes data from a night sky brightness surveys from sites across the core area completed no more than two years before submission
7. A Lighting Management Plan (LMP) with policies and technical guidance on outdoor lighting to protect and improve the night time environment and dark skies. (see Appendix ‘B’)
8. A full lighting Inventory of the core area and a plan to bring 90% of outdoor lighting into compliance with the LMP within 5 years and 100% compliance within 10 years. The plan also includes identifying the current and future threats to dark skies and how they will be addressed. (see Appendix ‘B’)
9. Documentation of significance of the core area beyond its dark night skies e.g. AONB designation, nocturnal wildlife etc
10. Documentation of projects currently being delivered such as lighting retrofitting and community engagement.
11. Description of community events and engagement programme and information provision.
12. Description of future planned activity

There are 6 application submission deadlines through the year. The IDA Dark Sky Places Committee (DSPC) reviews the application and if supported it is forwarded to the IDA Board of Directors for final approval. Both the DSPC and Board of Directors can decline the application giving their reasons and recommendations for improvement.

From the above list, three particular requirements stand out, the Lighting Management Plan, Lighting Inventory and Sky Quality Surveys

**Lighting Management Plan**

A comprehensive lighting Management Plan is a key requirement and needs to be adopted by a significant number of communities across the core area and buffer zone corresponding to at least 80% of the population and 80% of the DSR area. The plan describes the responsibilities for lighting and how that lighting is and will be managed. This includes identifying the lighting policies within the local plans and transport plans covering the DSR area.

There are a set of minimum requirements for inclusion in the lighting Management Plan which are in Appendix ‘B’.

**Lighting Inventory**

The lighting inventory is a formal audit of outdoor lighting within the DSR core area and is used to determine the rate of compliance with the Lighting Management Plan. The inventory also helps to identify the threats and opportunities and sets the baseline against which progress towards the target of 90% compliance can be measured. The audit covers all forms of outdoor artificial light. To complete the lighting inventory, surveys will be required to record the position and fitting types of exterior lighting. Over a large core area it may be possible to use sample surveys and extrapolate these over a wider area. The criteria for the lighting Inventory are listed in Appendix ‘B’.

**Sky Quality Surveys**

An essential part of the application and to demonstrate ongoing improvement of dark skies are sky quality surveys. Surveys using a Sky Quality Meter can only be undertaken during ‘astronomical darkness’- on clear nights when the moon is below the horizon. The sun also needs to be at least 18° below the horizon which limits the survey period to between October and February. A number of sites across the core area need to be identified including darkest and lightest to achieve a comprehensive survey. Sites need to be visited and measured more than once to average out readings. Panoramic photographs of the horizon also need to be taken from the core area showing the number and extent of surrounding ‘light domes’ (light flare from surrounding towns and cities).

**Maintaining the Dark Sky Reserve designation**

The IDSR designation is not awarded in perpetuity and is subject to regular review. An annual report is required by the IDA outlining the Reserves activities during the year including dates and brief descriptions of events, lighting retrofit projects, press articles etc. Consequently there is the requirement to maintain an ongoing programme to reducw the impacts of lighting to achieve 90% compliance after 5 years and 100% compliance after 10 years and a programme of sky quality surveys, events, publicity and engagement with local authorities, communities and businesses. Failure to maintain progress and/or comply with IDA requirements can lead to suspension or revocation of designation

**An IDSR Programme for the Cotswolds**

To fulfil the requirements of an application to the IDA for Dark Sky Reserve status will take considerable time and effort. The involvement and co-ordination of willing volunteers, particularly to help undertake the sky quality survey and lighting inventory will need to be a key part. The evidence supporting the application needs to be thorough and of a high quality and cannot be more than two years old. The time period for sky quality surveys and to some extent the lighting inventory, is limited to a few winter months. To capture enough quality data and evidence will therefore require two winter survey periods. Alongside this there is the requirement of publicity, events and promotion, the need to gain the commitment of local authorities and communities and to begin to deliver examples of good lighting practice and retrofitting.

A programme to fulfil the application requirements will therefore take two years. An outline two year programme is attached as Appendix ‘C’.

**Resources and Cost**

To deliver a two year programme leading to the submission of an application to the IDA will require officer time supported by a budget for equipment, volunteer support, supporting lighting installations and promotion. The programme should be possible with a half-time officer over the two years.

Estimated cost of completing IDSR application over two years

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| --- | --- | --- |
| Project officer. Part time, 24 months |  | 32,000 |
| Office, supplies & services etc |  | 13,500 |
| Travel/mileage/expenses |  | 2000 |
| Laptop/IT |  | 1000 |
| Purchase Sky Quality Meters etc | X5 | 1100 |
| SQM Survey training (venue, refreshments) | X4  | 600 |
| Sky Quality Surveys – volunteer mileage. 2 seasons |  | 800 |
| Community engagement and sign up |  | 4000 |
| Establish example lighting installations.  |  | 5000 |
| Promotion & Guidance |  | 5000 |
| Photography |  | 2000 |
| Stargazing events | X8 | 2000 |
| Contingency |  | 2000 |
| **Total** |  | **£71,000** |

The resources and cost for maintaining DSR status are likely to be along very similar lines circa £35,000 per annum.

**Dark Skies and Artificial Light Position Statement**

A policy for Dark Skies is included in the Cotswolds AONB Management Plan 2018 – 2023. Guidelines to protect dark skies, or more accurately, dark landscape are included in the Cotswolds AONB Landscape Strategy and Guidelines, having been included in the 2016 revision. The Board has also adopted a position statement on Tranquillity and Dark Skies, but dark skies are a comparatively minor element. As a step towards strengthening the importance of the Cotswolds darks skies and their conservation and enhancement, a new position statement on Dark Skies and Artificial light is required accompanied by guidance on lighting. A draft is in preparation and draws upon this report.

A new Dark Skies and Artificial light position statement will effectively cast adrift the tranquillity part of the existing document. The need for a new Tranquillity Position Statement will need to be considered taking into account how tranquillity is covered by the enhanced policy in the new 2018 – 2023 Cotswolds AONB Management Plan.

A position statement on Darks Skies and Artificial Lighting will also contribute to the Lighting Management Plan requirement for the Dark Sky Reserve application.

**Other considerations**

**Dark Sky Discovery Sites**

The Dark Sky Discovery Sites programme is entirely separate from the IDA and is organised by the UK Dark Sky Discovery Partnership; a network of national and local astronomy and environmental organisations[[3]](#footnote-3). There is considerable scope for Dark Sky Discovery Sites within the Cotswolds AONB and designation of new sites will help promote dark skies and support an application to the IDA for Dark Sky Reserve status.

The UKDSDP aims to:

• Engage people from diverse backgrounds with the night sky;
• Encourage positive attitudes towards science and technology;
• Support the development of dark sky places, awareness and tourism
• Develop a national network of dark sky communicators;
• Create long-lasting organisational partnerships in this area.

Dark Sky Discovery Sites are places that:

* are away from the worst of any local light pollution
* provide good sightlines of the sky
* have good public access, including firm ground for wheelchairs. The sites are generally freely accessible at all times - please check the links for any special access arrangements.

There are two darkness ratings:

* "Orion" sites. At these sites, the seven main stars in the winter constellation [Orion](http://www.darkskydiscovery.org.uk/the_night_sky/simple-winter-stars.pdf) are visible to the naked eye. Typically, this means away from, or shielded from, bright lights such as street lights, security lights or approaching car lights.
* "Milky Way" sites. At these sites the Milky Way is visible to the naked eye. They are much darker sites found only in more rural areas.

Nominations for Dark Sky Discovery Sites are made to the UK Dark Sky Discovery Partnership.

There are currently two Dark Sky Discovery Sites in the Cotswolds AONB; The Rollright Stones, Oxfordshire and Aunt Phoebe’s Recreation Ground, Long Compton, Warwickshire. Although in different Counties they are just over 1 mile from each other. Both are ‘Milky Way’ class.

**A Cotswolds National Park?**

There are ongoing discussions looking at the pros and cons of National Park designation for the Cotswolds. The timescales for achieving Dark Sky Reserve status and those for a possible National Park are very likely to be quite different and therefore have no impact on each other. In the event of a National Park it should be possible to revise the Dark Skies Core Area boundary, if required, in consultation with the IDA.

**Conclusion**

Dark skies are a feature of the Cotswolds AONB. The CPRE Night Blight mapping of 2016 provides evidence of the quality of the Cotswolds dark skies but also shows that they have declined since the early 1990’s. Dark skies are part of our heritage and increasingly are being shown to be important for biodiversity and human health and wellbeing. There are XX Astronomical Societies and groups covering the Cotswolds AONB and their public stargazing events are increasingly popular boosted by growing interest in the night sky by television programmes notably Star Gazing Live and the Sky at Night.

Conserving and enhancing dark skies is not about turning the lights off but is about the right type of light in the right place when needed. Reducing the impact of artificial light also reduces energy waste and consequently saves money and has benefits for the Cotswold economy.

The primary purpose of the Cotswolds AONB and the Cotswolds Conservation Board is the conservation and enhancement of the special qualities of the AONB. Dark skies are one of those special qualities. Whilst the Board and the Cotswolds AONB Management Plan have policies for the protection and enhancement of dark skies, it is something that cannot be achieved in isolation. Planning authorities, highway authorities, government agencies, local communities and business need to be encouraged and supported to play their part whether through policies, promotion or action. Is AONB designation, the NPPF and having policies in the AONB management plan and local plans enough? In reality it helps, but it is not enough.

International designation by the IDA as a Dark Skies Reserve would give considerable additional weight to the importance of the dark skies and to their protection and enhancement. It will make people take notice, and with guidance and support, to conserve, enhance and enjoy the dark skies of the Cotswolds.

Designating all or part of the Cotswolds AONB as an IDA Dark Sky Reserve would significantly support the delivery of the primary purpose of AONB designation and the two purposes and duty of the Cotswolds Conservation Board

**Recommendations**

The Dark Skies Task and Finish Group recommend:

1. That the Board resolves that the dark skies of the Cotswolds AONB should be actively conserved and enhanced and enable the public to understand and enjoy them.
2. That a draft Position Statement on Dark Skies and Artificial Light is prepared for adoption
3. That the Landscape Strategy and Guidelines for the Cotswolds AONB is reviewed to ensure the recognition, conservation and enhancement of dark skies is properly taken into account
4. That the support of local authorities and parish councils is sought
5. That the resources are found/allocated to making an application to the IDA for Dark Sky reserve status and for maintaining that status.

**International Dark Skies reserve eligibility criteria and minimum requirements**

**Appendix A**

The criteria which must be met to be eligible for IDSR designation are:

1. The core of the proposed IDSR must be a public or private land protected for scientific, natural, educational, cultural, heritage and/or public enjoyment.
2. Private inholdings and lands similarly situated within the core zones of Reserves are formally exempt from regulation under the terms of this document, but applicants are encouraged to obtain voluntary compliance from private landowners.
3. The core zone boundaries must be drawn according to, and consistent with, the following principles:

A) A core area does not have a minimum area requirement but must provide sufficient area to meet the outreach and public access requirements described in this document.

B) The proposed core area boundary may take any shape and may follow logical or natural geographic features.

C) The core need not be a single, contiguous land; multiple cores may be defined, but this approach must be justified in the application document.

D) If the core includes a publicly protected area, such as a national or regional park, it must strive to fully encompass the boundaries of that area.

1. The peripheral zone boundaries must be drawn according to, and consistent with, the following principles:
	1. The proposed peripheral zone boundary must be singular, contiguous, and completely enclose the core zone. It may take any shape and may follow logical or natural geographic features.
	2. The peripheral area must encompass a minimum of 700 km² (270 mi2 or 173,000 acres) around the core, roughly equivalent to a circle of 15-km/9.3-mile radius, OR a land area sufficient to mitigate 80% of current and expected future light pollution threats to the core.

C) Large areas of open water, such as oceans, bays, and larger lakes, do not count toward the 700 km2 / 80% requirement.

The actual area of the peripheral, or buffer zone, may be reduced or increased by the IDA Dark Sky Places Committee (DSPC) on a case-by-case basis to ensure future protection of the core.

1. The boundaries of neither core nor periphery must not be arbitrarily drawn to omit areas that would increase the difficulty of achieving IDSR status, but must instead embrace these areas as an opportunity for improvement. If an irregular shape for either is chosen, it must be justified in the text of the application.
2. The core must provide an opportunity for regular public night time access, with or without supervision. A portion of designated land may meet this requirement, or access must be available for a fraction of the length of the night. In some cases, such as when working with areas that protect endangered wildlife, archaeological sites, or other sensitive resources, this requirement may be adjusted.
3. The core must provide an exceptional dark sky resource, relative to the communities and cities that surround it.

Minimum requirements for IDSR

1. A quality comprehensive Lighting Management Plan (LMP) should be adopted by a sufficient number of communities within the entire IDSR (core and periphery) corresponding to at least 80% of population AND 80% of designated area of protection. The regulations contained in the LMP must apply to all private AND public landowners within the area of protection. Some exceptions may apply but are individually subject to IDA approval. Minimum standards are described below in the section titled “Lighting Management Plan Guidelines”.
2. Typical night time conditions characterizing the core must be consistent with or exceed the following criteria:
	1. The Milky Way is readily visible to the unaided eye;
	2. There are no nearby artificial light sources yielding significant glare; and
	3. Any light domes present are dim, restricted in extent, and close to the horizon. These conditions correspond approximately to a visual-band zenith luminance of 21.2 magnitudes per square arcsecond (0.4 mcd/m2) and a naked-eye limiting magnitude (NELM) of +6.

In order to substantiate the sky quality, measurements of the night sky brightness at the zenith must be made with suitable instruments, or the NELM must be estimated by a qualified observer. Further, panoramic nighttime photography of the horizon must be included in order to substantiate the number and extent of light domes visible from the site. Measurements of night sky brightness must be distributed over a sufficiently long enough period of time in order to average out fluctuations over timescales ranging from hours to seasons in length.

Applicants should discuss their measurement protocol with the International Dark Sky Places Program Manager and submit all data necessary to substantiate these conditions.

Any designated IDSP that no longer meets these conditions but documents a visual- band zenith luminance from 20.0 to 21.19 magnitudes per square arcsecond or a naked-eye limiting magnitude (NELM) no higher than +5 will be included in a List of Endangered IDSP Sites published on the IDA website. IDA reserves the right to duly suspend or revoke the IDSR designation of a Reserve with night sky quality that falls below a visual-band zenith luminance from 20.0 to 21.19 magnitudes per square arcsecond or a naked-eye limiting magnitude (NELM) of +5.

1. Evidence of community commitment to dark skies and quality outdoor lighting, as shown by at least two-thirds (67%) of existing outdoor lighting fixtures within the core conforming to the LMP at the time of application (or an alternative fraction approved by the DSPC).
2. A lighting inventory and a plan to bring 90% of outdoor lighting in the core into compliance with the Reserve’s LMP within five years of receiving an IDSP designation, as well as a written commitment to bring the core into 100% compliance within ten years of designation.
3. A measurement program must be maintained either by the core managing agency, communities, private landowners or other public or private organization to follow the evolution of light pollution in the core and assure that the night sky quality does not degrade. Applicants are encouraged, but not required, to submit their measurements to the citizen science projects such as My Sky At Night (myskyatnight.com) and Globe At Night (globeatnight.org).
4. A description of current and suspected future threats to dark skies over the core zone, and a plan to address these threats.
5. Communities must have a number of examples of conforming lighting installations proportional to the size of the population they serve, both on roadways AND on different private sites (industries, stores, public services, etc.):
6. Each participating municipality (excluding businesses, residences, and partners without installed lighting) should have completed at least one highly visible demonstration project with night sky friendly lighting consisting of at least 10 lighting fixtures for each 5000 residents; AND/OR
7. Approximately 10% of fixtures outside of the core must be retrofitted or brought into compliance with the appropriate regulation. This percentage does not include fixtures that were compliant upon the initial lighting survey, but rather must show active motivation of the community to make changes through the form of retrofits and/or appropriate physical changes to the current fixtures’ form. Such changes may include, but are not limited to, installation of adaptive controls such as dimmers and motion sensors.
8. Participating communities must have a program, either through education, economic incentives, permitting or regulation, to encourage all new outdoor lighting fixtures to conform to the relevant regulation or guidelines for night sky friendly lighting.
9. The Reserve’s commitment to public education is demonstrated by all of the following:
10. The importance of dark skies, natural night time darkness, and the benefits of quality lighting should be part of Reserve interpretation/outreach programs. If the Reserve typically provides interpretive programs, then dark skies must be one of the central themes communicated through on-site interpretation. If interpretive programs are not typically offered, then publications, flyers, press releases, media, or other outreach are appropriate substitutes.
11. Dedicated dark skies programming must occur at least four times per year; however, more frequent events are preferable. These events may highlight the value of natural night time darkness in any appropriate way.
12. Acknowledgement of the protected area by government or regulatory agencies situated higher than community level (county/province/etc.) with the perspective that dark skies are an important scientific, natural, cultural, and/or scenic resource value as shown by the inclusion of appropriate language in official documents for long term planning . Communities within the IDSR will receive a certificate verifying the community as a part of the IDSR upon request. Those who wish to erect a sign must address a letter to IDA referring to the community as a part of the IDSR and giving specific examples of their engagement (lighting fixture replacement, outreach program, etc.).
13. Once established, the Reserve must erect and maintain appropriate signage indicating the International Dark Sky Reserve designation along a roadway entrance, along a footpath entrance if no roadway exists, or a visitor contact centre.
14. The Reserve will submit an annual report to IDA by 1 October of each year detailing activities and progress towards fulfilling IDA IDSR goals during the previous year. The report serves to document that the Reserve continues to meet minimum program requirements; sustains partnership, outreach, and interpretive efforts; and makes adequate progress toward at least 90% compliance with LMPs. The report should include dates and brief descriptions of interpretive events, lighting retrofit projects, community outreach, etc. New measurements of the night sky brightness in the core must be obtained and included in the report. It should also provide information on any new lands acquired since designation and/or the most recent prior report, as well as any potential future sale of land that may result in reassessment of IDSR status (see “Sale or Transfer of Land Ownership,” below). Samples of printed materials and press articles should also be included.

Electronic submission of these documents is required in Microsoft Word or PDF format. If the annual report is not sent in a timely fashion, IDA may suspend the IDSR status until the annual reporting requirements have been met.

A Reserve is exempt from the annual reporting requirement in the calendar year in which the IDA designation was awarded. If the designation is received after 1 October of a given calendar year, the Reserve’s first annual report to IDA will be due on 1 October of the following calendar year.

**International Dark Skies reserve Lighting Management Plan and Lighting Inventory**

**Appendix B**

**Lighting Management Plan**

The LMP must contain at least the following minimum provisions:

1) The written policy meets or exceeds applicable agency or departmental policies regarding outdoor lighting and conforms to all local, regional, and national laws.

2) The use of outdoor light at night is only prescribed when it is strictly needed, where it is needed, and in the appropriate amount for a specific task. The purpose of outdoor light that is allowed under the policy should be specifically to ensure public safety.

3) All outdoor lighting fixtures >500 initial lamp lumens6 must be fully shielded7 and make appropriate use of timers and motion sensors. Lighting of ≤500 initial lamp lumens may be left unshielded for special purposes, such as historical preservation.

The approved special uses must be stated in the LMP. IDA will scrutinize these uses to ensure that core lighting is a suitable example of quality lighting for the public and protects the nighttime environment to the maximum practical extent. IDA may request additional descriptions, photographs, or drawings of these lights. These lights are not exempt from the other lighting guidelines, and must still be designed in such a way to minimize impact to the nighttime environment. Lighting controlled by motion-activated sensors and which limit the duration of illumination to less than five (5) minutes after activation is exempt from regulation by the LMP.

4) Lighting must be chosen to minimize the amount of short-wavelength light emitted into the nighttime environment. The lighting policy must restrict lighting in this respect according to one of the following prescriptions:

A) The correlated color temperature (CCT) of lamps must not exceed 3000 Kelvins;

**OR**

B) Allowed lighting must not emit more than 25% of its total spectral power at wavelengths < 550 nanometers; **OR**

C) The scotopic-to-photopic (S/P) ratio of allowed lighting must not exceed 1.3.

These metrics may be found in manufacturer data sheets for lighting products.

5) Visitor activities with respect to the introduction of unnecessary artificial light at night into the core environment must be regulated. This must include reasonable limits on the lighting of camping equipment and recreational vehicles, as well as a general prohibition of inappropriate “light painting,” the use of searchlights, and similar activities. Note that this requirement is in no way intended to compromise visitor safety; lighting required in emergency situations may be exempted from compliance.

6) Illuminated signs8 must be regulated as follows:

A) Operation is prohibited from one hour after local sunset to one hour before local sunrise (unless strictly required for wayfinding or identification of concessions in the Park during normal business hours); **AND**

B) Displays must be single-color on a black background; **AND**

C) Luminance must not exceed 100 nits (100 candela per square meter); **AND**

D) The luminous/illuminated surface area of an individual sign must not exceed 200 square feet (18.6 square meters).

7) A policy governing the installation of temporary lighting in the core requiring that any such installation will adhere to the LMP to the greatest possible extent and whose duration will be limited to the shortest possible time.

**Lighting Inventory**

A lighting inventory is a formal audit of outdoor lighting. It is used to determine rates of compliance with the LMP within the IDSR core and to identify lighting equipment in need of rehabilitation through retrofitting or replacement. A complete inventory of outdoor lighting in the core is a requirement for IDSR status, and it must be accompanied by a plan under which lighting in the core will be brought into compliance with the LMP under the terms specified in “Minimum Requirements for All Reserves” (above).

The following must be taken into consideration when collecting and reporting lighting inventory data:

1) When there are numerous outdoor lights it is acceptable to group lights by facility or area. Whether the fixtures are fully shielded, are special purpose fixtures under 500 initial lamp lumens, and the intended lighting application must be noted for each fixture or group of fixtures.

2) Daytime photographs or manufacturer diagrams of each fixture type should also accompany the inventory.

3) Inoperable fixtures, including those physically disconnected from power supplies, must be inventoried. Only those physically disconnected from power supplies may be counted as compliant for the purpose of determining the rate of LMP compliance.

1. CPRE Night Blight http://www.nightblight.cpre.org.uk/ [↑](#footnote-ref-1)
2. http://darksky.org [↑](#footnote-ref-2)
3. The Royal Observatory, Edinburgh, Royal Astronomical Society, Federation of Astronomical Societies, Society for Popular Astronomy, British Astronomical Association, British Association of Planetaria, Institute of Physics, Commission for Dark Skies, UK Association for Science and Discovery Centres [↑](#footnote-ref-3)