



Mayo Dark Skies

Ballycroy National Park
& Wild Nephin

Mayo International
Dark-sky Park

An Application to the International Dark-Sky Association

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2. Management Structure of Ballycroy National Park and Wild Nephin

The following outlines the management structures for the state lands (Ballycroy National Park and Wild Nephin) that are included in the application for Mayo Dark Sky Park status.

Ballycroy National Park and Wild Nephin area encompasses approximately 15,000 hectares.

2.1 Ballycroy National Park

Ballycroy National Park (BCNP) is managed by the National Parks and Wildlife Service (NPWS) of the Department of the Arts, Heritage and the Gaeltacht, which has headquarters in Dublin. BCNP is within the western division of NPWS, which is further divided into the mid-western and western regions.

BCNP is in the western region. The Regional Manager heads the regional staff, which includes two District Conservation Officers, Conservation Rangers, Information Officers and General Operatives who between them carry out a wide range of duties.

The Regional Manager can also avail of the services of a Divisional Ecologist, based in Galway, and is backed up by a corps of specialist research and administrative staff based in NPWS headquarters.

BCNP along with Killarney National Park, Glenveagh National Park, Wicklow Mountains National Park, Connemara National Park and The Burren National Park is classified as a Category II National Park under the IUCN categorisation (i.e. protected area managed mainly for ecosystem protection and recreation). The criteria for this category are listed below.

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1. Executive Summary

“It is indeed a feeble light that reaches us from the starry sky. But what would human thought have achieved if we could not see the stars?” Jean Perrin [French Physicist 1879-1942]

This application is submitted to the International Dark-skies Association’s Dark Sky Places programme by the Friends of Mayo Dark Skies Steering Group.

After a 12 month research project, the steering group formed in 2015 and is a collaboration of the two landowners; National Parks and Wildlife Service (Dept. of Arts, Heritage and the Gaeltacht) and Coillte, together with community representatives, local agencies, Mayo County Council & Galway Astronomy Club.

The objective of the group is to improve local awareness of light pollution in the area through outreach events and to establish an International Dark-sky Park in North County Mayo. The region is without doubt, already dark and the night time skies well preserved. However, it is our intention to ensure that the exceptional quality of the night-time skies in this region are preserved through continuous monitoring and with the support of the local authority and communities. Education and Awareness programmes will be delivered as part of our plan for outreach to the community and wider afield to nearby towns and municipalities in the Mayo region.

We believe our vision “Let’s keep Mayo Dark (Green)” is a realistic possibility through outreach and awareness programmes designed for inclusivity and ownership within the community.

We are proud to apply for Dark-sky Park status for Ballycroy National Park and Wild Nephin and, with kind permission of the IDA, we would hope to call it the Mayo International Dark-sky Park.

Friends of Mayo Dark Skies Steering Group

GEORGIA MACMILLAN

2 Acres Grove, Newport

Mayo, Ireland

To the Board of Directors

International Dark-Sky Association

RE: IDA Member Nomination for Mayo International Dark-Sky Park

In January 2010 I was lucky enough to move from Dublin to the West of Ireland where my roots lay, here in County Mayo. Appreciating the night sky here on the western edge of Europe, is something we can never take for granted. Just a glance out of the back window as I type this note and I am reminded that I am one of the lucky few to be able to see the milky way on a regular basis. My studies in outdoor education led me to research the impact of light pollution and its consequences that go way beyond our pleasure of viewing the starry skies. With that in mind, what better way to make some contribution towards combatting light pollution than to create a Dark-sky Park in our local region for future preservation of the night-time skies.

I am proud to be involved in the Friends of Mayo Dark-skies team. Our project has caught the imagination of many; from inspiring student-led dark-sky performance pieces to the establishment of local astronomy enthusiast groups. It has also raised the matter of lighting policies at county council level and received a nomination for a community Get Involved project. Most pleasing of all is that the project has taken a life of its own and has been fully adopted by the management teams of the Ballycroy National Park and Wild Nephin Wilderness. The support of our National Parks & Wildlife service ensures the longevity of the dark-sky project and strengthens the educational focus of its outreach to younger citizens.

Therefore it is with great pleasure that I nominate **Ballycroy National Park & Wild Nephin** as **Mayo International Dark-sky Park** recognition with the International Dark-sky Association.

Sincerely,

Georgia MacMillan

IDA Member

Criteria for IUCN category II national parks

Definition:

Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.

Primary objective

To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation.

Other objectives

- To manage the area in order to perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources and unimpaired natural processes;
- To maintain viable and ecologically functional populations and assemblages of native species at densities sufficient to conserve ecosystem integrity and resilience in the long term;
- To contribute in particular to conservation of wide-ranging species, regional ecological processes and migration routes;
- To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will not cause significant biological or ecological degradation to the natural resources;
- To take into account the needs of indigenous people and local communities, including subsistence resource use, in so far as these will not adversely affect the primary management objective;
- To contribute to local economies through tourism.

Management of Protected Areas

Ballycroy National Park forms part of the Owenduff/Nephin Complex Special Area of Conservation (site code SAC 000534) and the Owenduff/Nephin Complex Special Protection Area (site code SPA 004098). These are international important sites and are referred to as Natura 2000 and/or European sites. They are subject to strict protection under National and European Legislation. Special Areas of Conservation (SACs) are the prime wildlife conservation areas in the country and are considered to be important on a European as well as Irish level. They are selected and designated in accordance with the EU Habitats Directive. The Directive lists certain habitats and species that must be protected within SACs, including blanket bogs, heaths, lakes and river. These habitat types form the majority of the Ballycroy National Park. Special Protection Areas (SPAs) are designated in accordance with the EU Birds Directive (2009/147/EC) for the protection of endangered species of wild birds, including listed rare and vulnerable species, regularly occurring migratory species, and wetlands. Public authorities have strict duties and obligations in relation to the protection of SACs and SPAs, including in the exercise of their functions. They must take appropriate steps to avoid, in European Sites, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated. Activities, plans and projects within European sites are regulated by the public authorities. Any developments associated with the Dark Skies Parks will secure any necessary permissions and/or consents (if required), and will be in full compliance with the requirements of the Habitats Directive and the Birds Directive.

2.2 Wild Nephin Area

The Wild Nephin area is made up of National Park lands and Coillte lands. Coillte is a private limited company where all the shares are held by the Minister for Agriculture, Fisheries and Food and the Minister for Finance on behalf of the Irish State. The Board of Directors is appointed by the Minister for Agriculture and Food.

Coillte manages its forests to deliver social, economic and environmental benefits. One of the key areas where Coillte has a positive, measurable impact is in the provision of public goods. Public goods are “non market services” that cannot be traded but are enjoyed by many. These include contributing to national biodiversity, providing extensive recreation opportunities, protecting cultural heritage and improved water quality.

The Wild Nephin area was established under a memorandum of understanding (MOU) between NPWS and Coillte in March 2013 by both organisations for the purpose of protecting, developing and ultimately managing the Nephin Forest areas and adjacent National Park lands as a wilderness area (see Appendix v). The MOU sets out the general parameters under which the management and development of the Nephin Forest and the adjacent National Park lands as a wilderness area can be taken forward.

In September 2013 the Wild Nephin Management Board was convened. This group has three members from NPWS and three from Coillte. The Management Board are the ultimate management agent for the new Wild Nephin area and all actions and decisions relating to lands within this area must be agreed by this group under the terms of the MOU.



An Roinn
Ealaíon, Oidhreacht agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

National Parks & Wildlife Service,
Ballycroy National Park,
Lagduff More,
Ballycroy,
Westport,
Co. Mayo.



Tel: 076 100 2519
Fax: 076 100 2527

RE: Mayo Dark Sky Park Application

Ballycroy National Park encompasses 11,000 hectares of blanket bog, heath and mountainous terrain covering a vast uninhabited and unspoilt wilderness dominated by the Nephin Beg Mountain range. This National Park has exceptional quality for star gazing due to the sparse nature of surrounding villages and houses and the clean air quality.

Designation of the National Park as a Dark Sky Park would provide many benefits including an off-season tourism attraction, outreach environmental education opportunities on the importance of air quality and the reduction of light pollution and energy awareness. It would also heighten understanding of the sciences and astronomy and the importance of preserving night sky quality.

Ballycroy National Park is committed to dark skies and lightscape management and to dedicating resources to a public education programme including outreach and interpretation programs. We have also committed to a comprehensive management plan following the 'Lightscape Management Plan Guidelines'.

As Divisional Manager of the Western Division within National Parks and Wildlife Service (Department of Arts, Heritage and the Gaeltacht), I am delighted to support this initiative and the bid to designate Ballycroy National Park as a Dark Sky Park.

Yours sincerely,

Denis Strong

Divisional Manager



*An Roinn
Ealaíon, Oidhreachta agus Gaeltachta*
*Department of
Arts, Heritage and the Gaeltacht*



John C. Barentine, Ph.D.,
Program Manager,
International Dark-Sky Association.
Email: john@darksky.org
Tel: + 1 (520) 293-3198 x406
Web: darksky.org

Date: 7th April 2016.

Dear Sir,

Ballycroy National Park was established in November 1998, it is Ireland's sixth National Park and is located on the Western seaboard in northwest Mayo. It comprises of 11,000 hectares of Atlantic blanket bog and mountainous terrain, covering a vast uninhabited and unspoilt wilderness dominated by the Nephin Beg mountain range. Owenduff Bog, which form most of the western part of the Park, is one of the last intact active blanket bog systems in Ireland and Western Europe and is an important scientific and scenic feature of the National Park. The Park also protects a variety of other important habitats and species. These include alpine heath, upland grassland, heath and lakes and river catchments. Greenland White-fronted geese, Golden plover, Red Grouse and Otters are just some of the important fauna found within the Park. The National Park is itself part of the Owenduff/Nephin Complex Special Area of Conservation (SAC) and Special Protection Area (SPA). These European designations are part of the Natura 2000 Network, which protect rare and important habitats and species under the EU Habitats and Birds Directive.

A discussion document Management Plan for Ballycroy National Park was drafted in 2004. This document outlines a framework on how Ballycroy National Park is to be used and managed for the period 2004-2008 and beyond. The document never progressed beyond draft stage and was not implemented. It is the intention of the National Parks and Wildlife Service to revisit this document and it is one of our goals that the Ballycroy National Park would be managed in accordance with a specific agreed management plan for the Park. However, no timeline and commitment can be given in relation to the completion and implementation of this plan.

Ballycroy National Park conforms to a National Park as outlined in the IUCN (International Union for Conservation of Nature) Protected Areas Categories System. IUCN protected area management categories classify protected areas according to their management objectives. The categories are recognised by international bodies such as the United Nations and by many national governments as the global standard for defining and recording protected areas and as such are increasingly being incorporated into government legislation. National Parks (Protected Areas Category II) are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally

compatible spiritual, scientific, educational, recreational and visitor opportunities. Ballycroy National Park is managed in accordance with the IUCN *Guidelines for applying protected area management categories* (see attached).

Yours faithfully,

A handwritten signature in dark ink, appearing to read 'William Cormacan', written in a cursive style.

William Cormacan,
Regional Manager, Western Region,
National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,
2nd Floor, Custom House,
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*An Roinn
Ealaíon, Oidhreachta agus Gaeltachta*
*Department of
Arts, Heritage and the Gaeltacht*



John C. Barentine, Ph.D.,
Program Manager,
International Dark-Sky Association.
Email: john@darksky.org
Tel: + 1 (520) 293-3198 x406
Web: darksky.org

Dear Sir,

Over 11,000 hectares in the Nephin Beg Range of North West Mayo have been designated as the Wild Nephin Wilderness Area, to be known more simply as “Wild Nephin”. The Wild Nephin area was established under a memorandum of understanding (MOU) between the National Parks and Wildlife Service and Coillte signed on March 3rd 2013 by both organisations “*for the purpose of protecting, developing and ultimately managing the Nephin Forest areas and adjacent National Park lands as a wilderness area*”. The memorandum commits both parties to working together to deliver the wilderness project, which includes forest lands and parts of the Ballycroy National Park. A copy of the Nephin Wilderness Project Memorandum of Understanding (MoU) is attached.

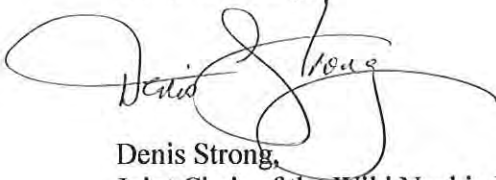
“The Memorandum of Understanding sets out the general parameters under which the management and development of the Nephin Forest and the adjacent national park lands as a wilderness area can be taken forward”. This ambitious and innovative project, the first of its kind in Western Europe, will deliver a dedicated wilderness of forest, mountain, bog, river and lakes in the Nephin Beg Range. The project will involve Coillte taking 4,400 hectares out of their commercial forest operation and rewilding this land, improving habitat and landscape quality over a 50 year period. The eventual intention is protecting a landscape of scale with functioning ecosystems while providing an authentic ‘wilderness experience’ for those that visit.

In September 2013 the Wild Nephin Partnership Board was convened. This management group are the ultimate management agent for the new wilderness area and *all actions and decisions relating to lands within the wilderness area must be agreed by this group under the terms of the MOU*. The management group, in conjunction with other stakeholders, will prepare and implement a conversion plan, which will uphold the definition of wilderness contained within the MOU and the initial feasibility study for the project. The conversion plan will detail the road map towards the “development” of wilderness conditions within the wilderness area and that the actions and objectives contained within this plan are designed to reach that goal.

The 15 year conversion plan is presently in draft phase. We expect that this document will be shortly finalised, and implementation of the plan will commence by the end of 2016. We see the Dark-Sky Park designation of the Wild Nephin area as an integral part of the Wild Nephin Project and sits well within the wild/wilderness concept. The Light Management Plan for the

Dark-Sky Park designation will be included as part of the final version of the conversion plan. The Wild Nephin Partnership Board commits to implementing all the measures outlined in the Light Management Plan and other measures that may arise in relation to achieving and maintaining the Dark-Sky Park designation.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Denis Strong', with a large, stylized flourish extending from the end of the name.

Denis Strong,
Joint Chair of the Wild Nephin Partnership Board,
National Parks & Wildlife Service,
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4 January 2016

Coillte support for the Mayo Dark Skies Project

Dear Georgia,

On behalf of Coillte, I would like to offer Coillte's full support for the Mayo Dark Skies project in Nephin. As you are aware, Coillte are currently in the process of transforming the management of the Coillte owned forests in Nephin to a wilderness area, in co-operation with the National Parks and Wildlife Service. The plan is to link up the Coillte owned lands with the adjoining Ballycroy National Park to create Irelands first wilderness area. This is an ambitious and unique plan that is currently managed jointly by a management group consisting of members from Coillte and the National Parks. This management group originally assessed the compatibility of the Mayo Dark Skies project with the Wilderness objectives and the group was fully satisfied of their compatibility. As a result, the management group agreed to fully support and participate in the Dark Skies project.

On behalf of myself and Coillte I would like to wish you well with your project and I would like to personally wish you well in your submission for Dark Skies status.

Yours sincerely

Tony Clarke
BAU2 Team Leader

Signed: 

2.7 Supporting letter of Management (Wild Nephin)

The National Parks and Wildlife Service and Coillte (the State forest company) designated WILD NEPHIN as a wilderness area on 3rd March 2013 following a comprehensive study (over two years) of the area. This examined the areas compatibility with a number of criteria set by the group for wilderness designation in Ireland.

One of the key requirements was that it should provide opportunities for PRIMITIVE RECREATION (the experiential criteria described in the Recreation Opportunity Spectrum developed by the USDA Forest Service where remoteness and the lack of human infrastructure - buildings, roads, transmissions lines and lights at night - are key parts of the experience to remote and wild area. A considerable area of the total area of 11,000 ha. now set aside as the wilderness, is now classified as either PRIMITIVE or SEMI-PRIMITIVE under the ROS criteria.

New Zealand definitions for wilderness suggest that a wilderness should be capable of supporting a two-day tramp in a wild landscape without covering the same ground. To check this I undertook a three-day (two night) backpack in the area and spent two nights in camp where no man made light was visible. I have spent many other nights camping in the area (including several at Lough Avoher Shelter) and invariably the night skies, assuming clear conditions, are magnificent displays.

The Wild Nephin Wilderness designation is a first for Ireland and indeed this part of Europe with the express objective of removing human presence (and management) from the landscape and allowing it to become a FREE WILLED landscape. I believe that the wilderness designation will help to protect the night sky qualities that currently exist and the dark sky park will reinforce the area as a wilderness.

As first Chairman of the Wild Nephin Wilderness management group, a wilderness advocate (and soon to be a postgraduate student in wilderness studies) I wholeheartedly support and endorse the designation of the Nephin Beg range as a DARK SKY PARK.

Yours sincerely,

William Murphy, M.Agr.Sc. (Forest Recreation)

WILDERNESS ADVOCATE
FORMER CHAIR, WILD NEPHIN WILDERNESS MANAGEMENT BOARD.

3. Introduction to Mayo International Dark-sky Park

The landmass encompassing Mayo International Dark-sky Park incorporates Ballycroy National Park and designated wilderness region of Wild Nephin. The two land masses overlap to a large extent forming a combined mass area of approximately 15,000 hectares.

The Dark-Sky Park management committee will have members (including Chairperson) from NPWS and Coillte as well as from local community groups. Management commitments will be written into any National Park management documentation (currently in draft - Jan 2016, further details in Appendix V) and will be included in the Wild Nephin Conversion Plan (2016-2031), which is in the process of being developed.

3.1 Why seek a Dark Sky designation in Mayo

County Mayo on the North Western coast of Ireland is a rugged landscape. The county has experienced the greatest depopulation of any county in Ireland during and after The Great Famine and it is hard not to sense this flight from the land as you walk through the county's magnificent mountain and moorland landscape.

The area was once described by Robert Lloyd Praeger as "the loneliest place in Ireland". He qualified his comment by referring to it "not as depressing but inspiring. You are thrown at the same time back upon yourself and forward against the mystery and majesty of nature".

The landscape can inspire and uplift the human spirit. Ballycroy National Park and Wild Nephin offer a sanctuary for plants and animals and provides valuable biodiversity reserves in an otherwise increasingly managed landscape. The rich

heritage and biodiversity is protected both by EU legislation and also by nature's own assets of Atlantic blanket bog and mountainous borders. Both 'Special Area of Conservation' and 'Special Protection Area' designations extend across most of the site and the next logical step is to preserve the most pristine natural starry skies that form our natural ceiling.

County Mayo is certainly no stranger to harnessing its unique and pristine landscape for outdoor recreation. The Barony of Erris (encompassing Ballycroy) was voted by The Irish Times readers as; "the best place to Go Wild" in Ireland and the nearby town of Westport is also known as the Adventure Capital of Ireland. The proposed Dark-sky Park is very accessible and offers visitors a rich variety of things to see and do in the region, as well as a warm welcome from the local communities who have embraced the Dark-sky initiative.



Figure 1: Claggan Mountain Coastal Trail (Photo - S. Hanley)



Figure 2: Road to Ballycroy (Photo - B. Wilson)



Figure 3: Mayo Dark Skies (S. Hanley)

3.2 Landscape of tranquility

The landscape of the Ballcroy National Park/Wild Nephin area is well known for its tranquility and remoteness. The 2011 census shows a population of less than 1,000 by selecting the entire land area within the N59 (national secondary route). Surrounding towns include Newport, Mulranny, Ballycroy and Bangor.

The map of Ireland's light pollution in Figure 5, indicates this region could be the best Dark-sky area in the country as there are no brightly lit towns or cities within close proximity.



Figure 4: Where nobody Lives Ireland Population Map (Broadsheet.ie)

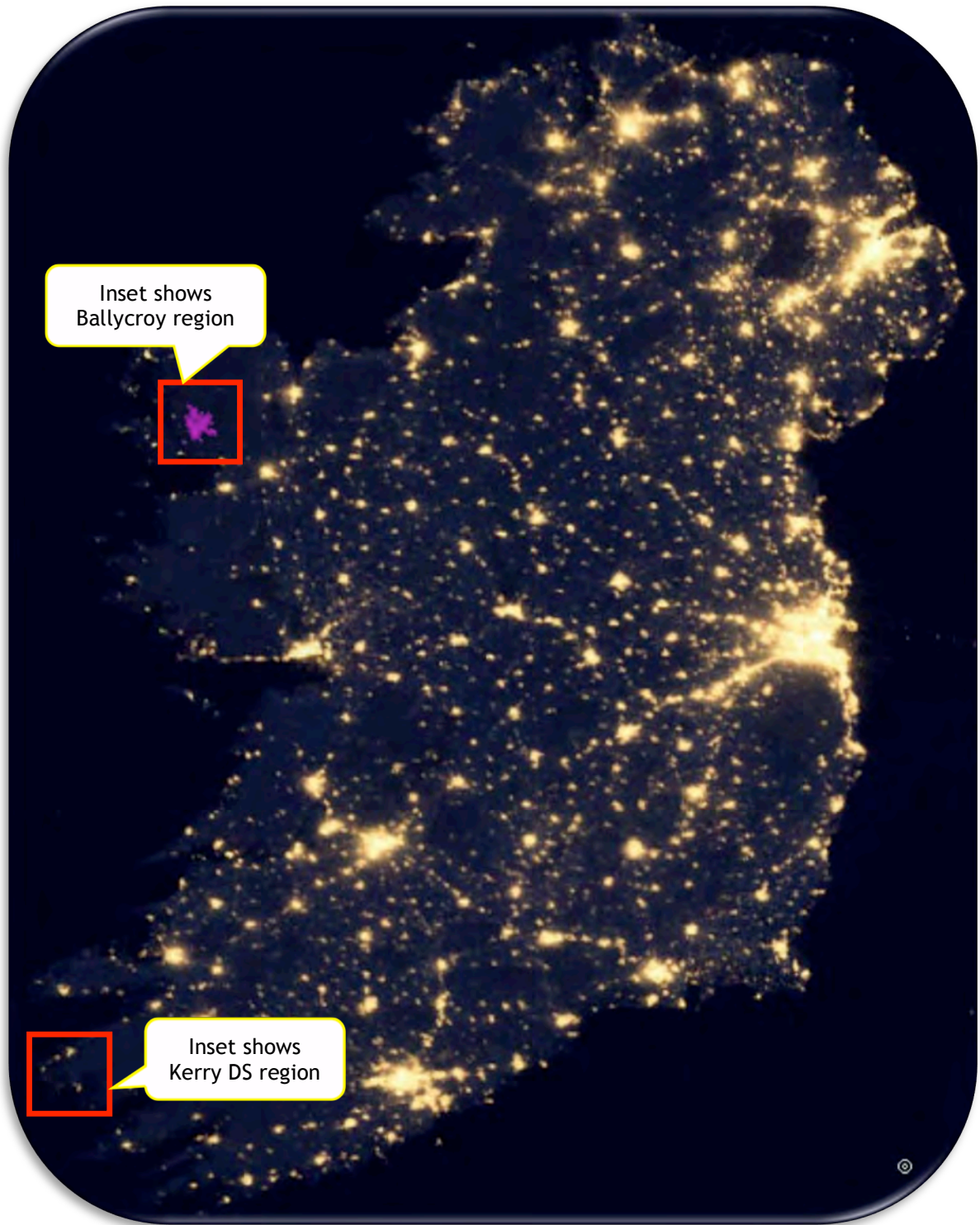


Figure 5: Light Pollution Map of Ireland

As a large part of the National Park is combined with Wild Nephin Wilderness, it was a logical step to include both land zones and support was quickly obtained by the management of both NPWS and Coillte Forestry.

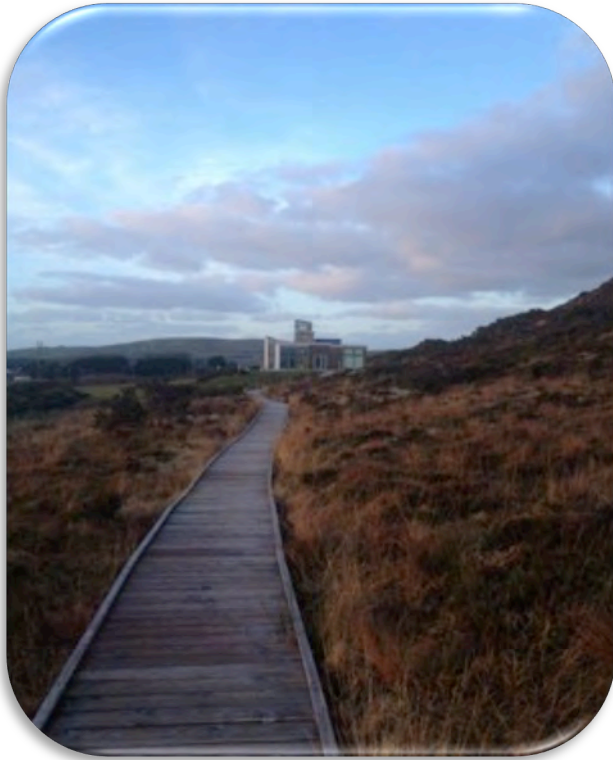
3.3 Visitor Facilities

Ballycroy National Park and Wild Nephin offer a wide range of facilities for visitors to the region. On the west side is the Ballycroy National Park Visitor Centre, which includes an interpretive exhibition (currently open from April to late October), café, parking and a looped board walk of approximately 2km suitable for wheelchair access. **All facilities are free of charge.** The Visitor Centre has a large car park, which can cater for in excess of 50 vehicles, plus five tour bus spaces and additional cycle rack facilities.



Figure 6 Ballycroy Visitor Centre. Photo G.MacMillan

NPWS management is currently investigating the costs and practicalities of an on-site observatory. An area about 10 minutes walk from the Visitor Centre along the boardwalk has been identified as a possible location for an observatory site. This would be a longer term goal but demonstrates the commitment of the management team to ensuring the dark-sky goals achieve long term sustainability.



The NPWS has also recently purchased telescope equipment for visitors use at Dark-sky outreach events, binoculars and other magnification equipment is already on-site. It will establish a dedicated area for the Dark-sky Interpretive Programme upon successfully achieving Dark-sky recognition. Staff training in relation to dark-sky education will also be included and external

courses are already being investigated.

Figure 7: Boardwalk from Visitor Centre (Photo G.MacMillan)

Figure 8: Bicycle Racks at Visitor Centre (Photo G. MacMillan)

In recognition of the value a Dark-sky would have to the region, management of Ballycroy National Park has agreed to open the venue during the off-season (Oct- April) for organised outreach events on the calendar for the Dark-sky programme. Car parking and access to the boardwalk will also be permitted for dark-sky viewing at any time.



There is also ample car parking and access to the east side of the proposed Dark-sky Park. The stone bothy shelter at the edge of the Letterkeen forestry looped

walk pictured below is a regular with hikers and casual walkers at all times of the day /night.



Figure 9: Stone Bothy at Letterkeen Car Park (Photo S. Hanley)

There are also several other access points on the circumference of the site where cars may park or pull in for stargazing. For the more adventurous visitor, a hiking trail gives access to the centre of the darkest and most remote zone. This is only recommended for the experienced hiker and physically fit visitor. We propose to grade each viewing point appropriately for the visitor and this will be made clear on all our communication points (web and printed material as well as signage).

3.4 Ballycroy National Park

Ballycroy National Park was established in November 1998, it is Ireland's sixth National Park and is located on the Western seaboard in northwest Mayo. It comprises of 11,000 hectares of Atlantic blanket bog and mountainous terrain, covering a vast uninhabited and unspoilt wilderness dominated by the Nephin Beg mountain range. Between Nephin beg and Slieve Carr, at 721 metres above sea level, the highest mountain in the range, lie the Scardaun Loughs.

To the west of the mountains is the Owenduff bog. This is one of the last intact active blanket bog systems in Ireland and Western Europe and is an important scientific and scenic feature of the National Park. The Park also protects a variety of other important habitats and species. These include alpine heath, upland grassland, heath and lakes and river catchments. Greenland White-fronted geese, Golden plover, Red Grouse and Otters are just some of the important fauna found within the Park. The National Park is itself part of the Owenduff/Nephin Complex Special Area of Conservation (SAC) and Special Protection Area (SPA). These European designations are part of the Natura 2000 Network, which protect rare and important habitats and species under the EU Habitats and Birds Directive.

Visitor numbers to Ballycroy National Park reached almost 40,000 people this year.

3.5 Wild Nephin Wilderness

The Wild Nephin Wilderness Area is a partnership agreement between Coillte and the NPWS. The objective of the partnership is to create a wild landscape of some 11,000 ha in the remote and wild area of the Nephin Beg range that is protected for the benefit of nature, outdoor recreation and long term landscape values. As such the Wilderness Conversion Plan currently being drafted (see Appendix V) will exclude all future developments that are inconsistent with its aims, thus ensuring the potential for future light pollution is avoided.

Conifer forests, while not native to the area, represent an important landscape type in the west of Ireland. Wild Nephin will set aside and protect these as undisturbed examples and allow them to develop to their wild potential. Forest landscapes also have a high carrying capacity value for recreation and protection of forest landscapes will enhance the recreation value of this landscape and in particular the constituent National Park lands.

Over the course of the 15-year Conversion Plan, timber harvesting, thinning, reforestation will aim to improve the landscape and habitat qualities through landscape design.

Two long distance hiking trails dissect the wilderness giving access to the general public.

3.5.1 The Western Way

This is part of a 179km linear walking route running North/South. The section running through the Dark-sky Park is set on forest tracks and moorland paths. The large forest area has no habitation and, apart from some forest tracks, the Western Way is not easy to cross. This is a major trail traversing across some of the wildest and most remote forests in the west of Ireland, giving a feeling of wilderness and offering real solitude to the visitor. Those who travel on the Western Way will come across some interesting features such as the old walls of former homesteads that indicate the level of habitation of this area in past times.

The Dark-sky Park section of the Western Way is approximately a 20km trek in remote country and should not be undertaken lightly. While it is possible to walk it in 8 - 10 hours, it may be wise to consider an overnight camp en route.



Figure 10: Letterkeen Loop (Forest trail)

3.5.2 The Bangor Trail

'The Telegraph' newspaper (UK) named The Bangor Trail as one of Europe's top 24 walking routes. A challenging 30km hike from Newport to Bangor Erris through the uninhabited mountain range of Nephin Beg. The rolling hills of the Nephins give the area its greatest asset - the expansive sky, which is constantly changing - this is Ireland's Big Sky Country and idyllic for stargazing in the wilderness. The Bangor Trail has a long history and may date back to the 16th century. It was the main route for people and livestock, and emigrants travelling from Bangor Erris to Westport would have used it. There are Mountain Meitheal huts (Mountain Meitheal is a volunteer organisation to maintain the uplands environment) on the trail that providing decent shelter for campers. With no roads and no houses for miles around, The Bangor Trail is an exhilarating escape into the wilderness (ref: Erris Beo Tourism).



Figure 11: Bangor Trail (Erris Beo Website)

There is also a series of looped walking trails including a multi access trail and picnic area at the Letterkeen loop car park. Local tourist offices have free maps with information and routes on all the walks in the area.

The following maps are provided to assist an appreciation of the land boundaries:

Map 1 Figure 12: Ballycroy National Park Boundary Map

Map 2 Figure 13: Wild Nephin Boundary Map

Map 3 Figure 14: Ballycroy NP & Wild Nephin Wilderness Map (Combined)-
Proposed Dark Sky Park - Incorporating Ballycroy National Park and
Wild Nephin combined boundaries.

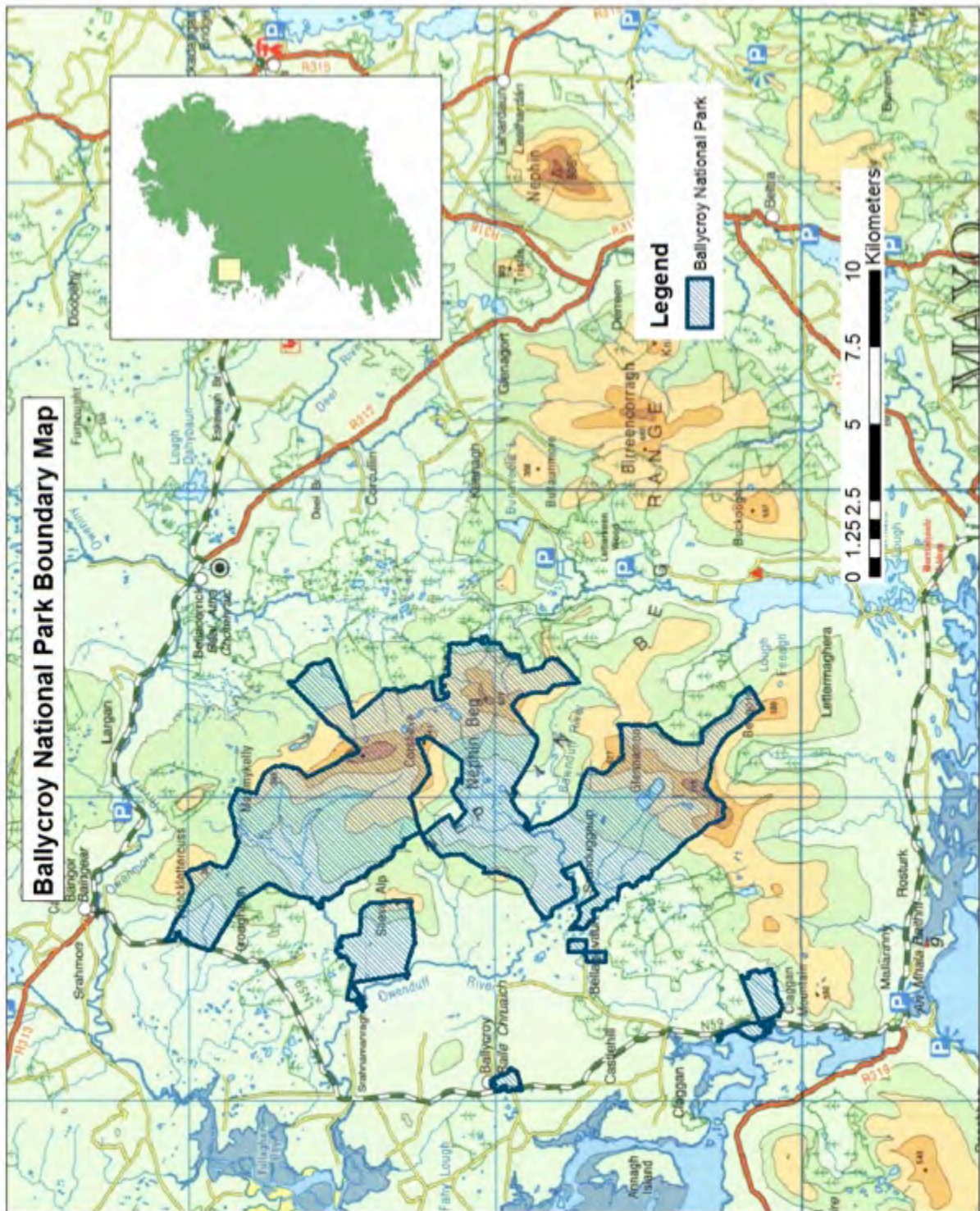


Figure 12: Ballycroy National Park Boundary Map

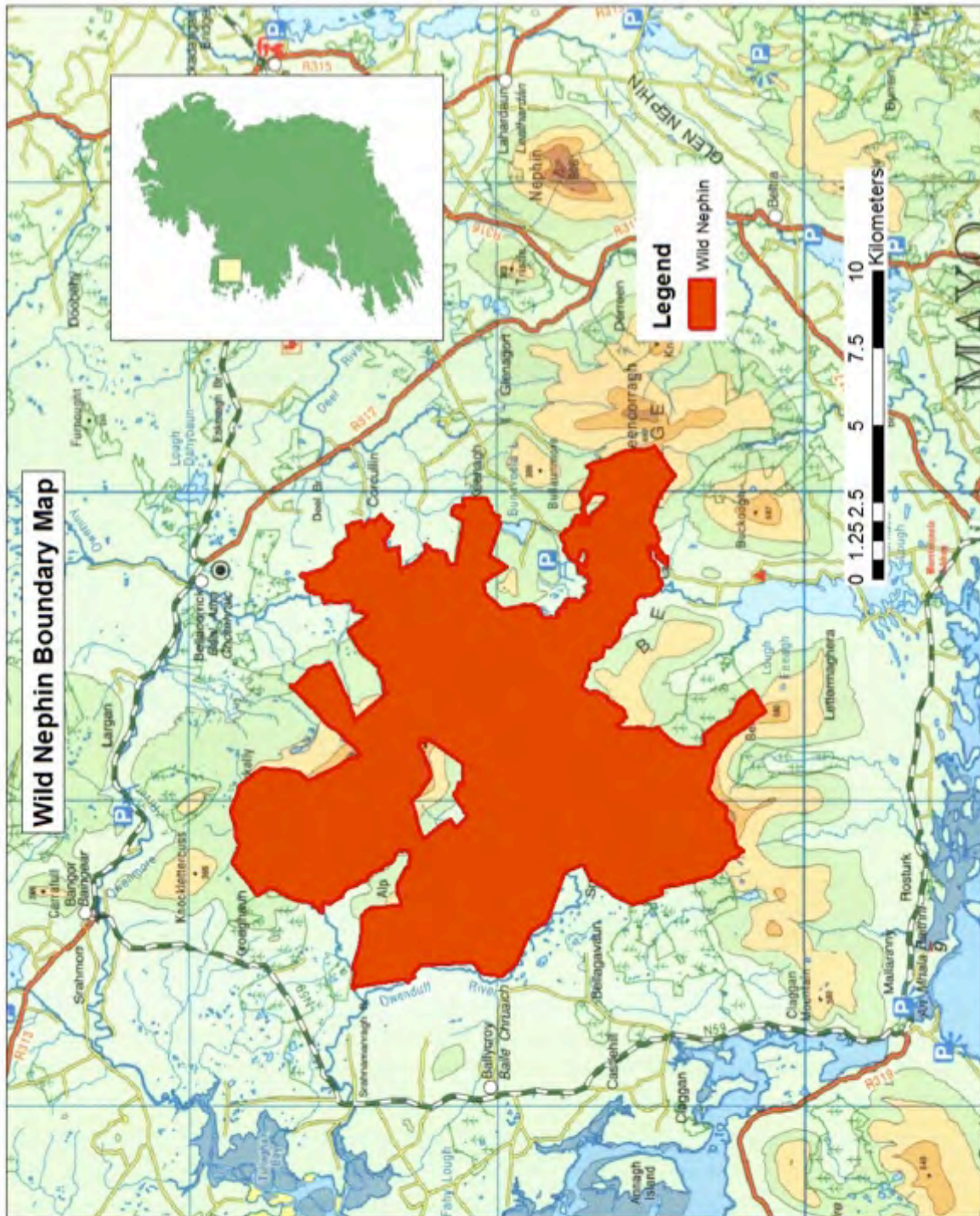


Figure 13: Wild Nephin Boundary Map

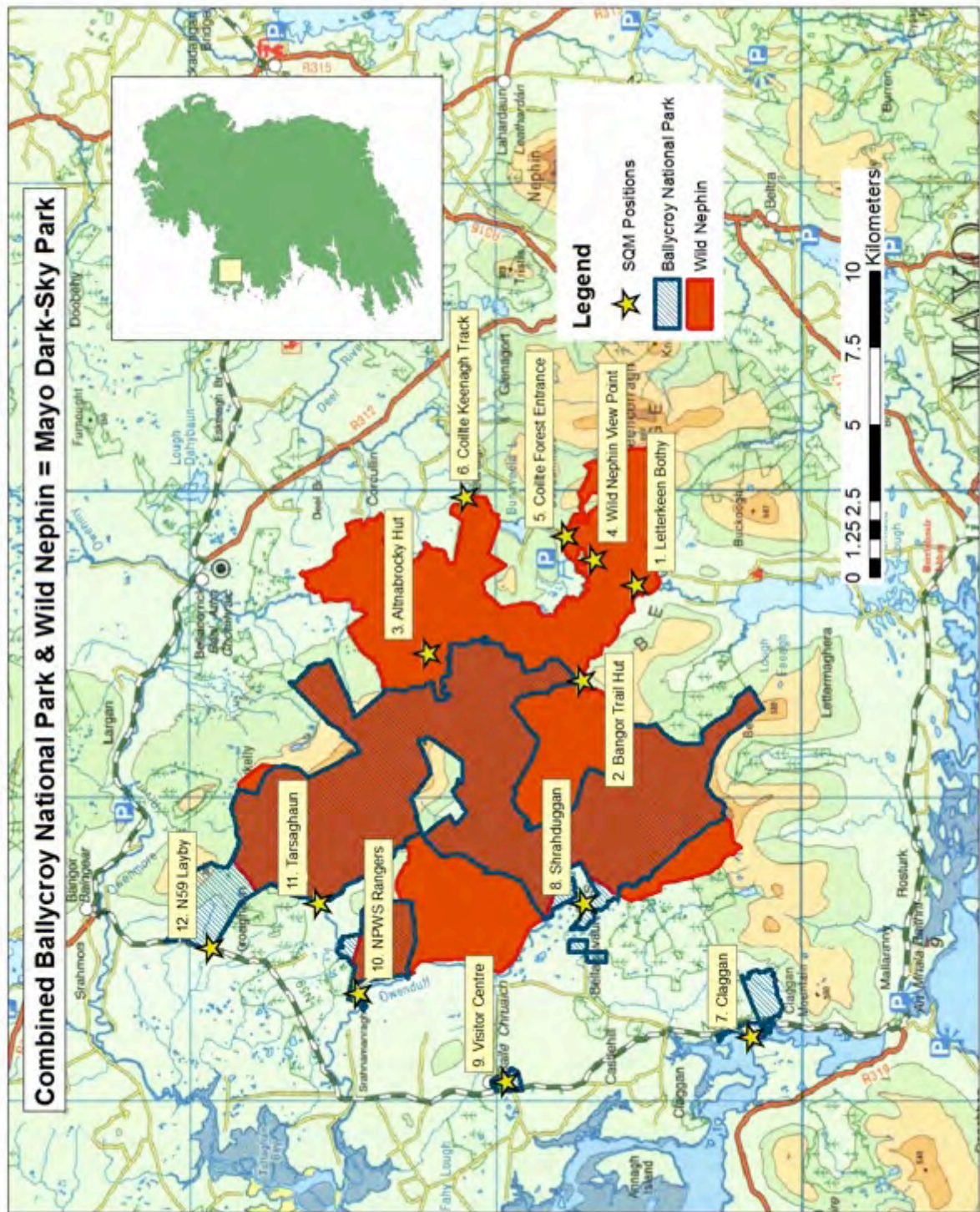


Figure 14: Ballycroy NP & Wild Nephin Wilderness Map (Combined)

The above image also shows the sites used for SQM readings

3.6 Communities surrounding the Proposed Dark-sky Park

3.6.1 Ballycroy

Ballycroy is beautiful, unspoilt village located on the West Coast of Ireland. It is situated along the N59 and nestles quietly between Mulranny village and Bangor in the Barony of Erris, touching the Wild Atlantic ocean with breath taking views of Inishbiggle Island, Achill Island and parts of Erris. It is surrounded by the Nephin beg mountain range covering a vast uninhabited and unspoilt wilderness making it an ideal location for the Dark Sky Park.

Ballycroy is the 'Gateway to Erris' and forms part of the Wild Atlantic Way and it is made up of 47 small townlands with a sparse population of only 600 people dotted around the area surrounding. The village itself has 2 shops, 2 pubs one being the very old and established world renowned 'Clery's pub' where you can step back in time. It has a church, 2 National schools, Garda station post office and a vibrant Community centre.

Ballycroy is totally unspoilt, rich in culture and history and has a very strong community spirit. This spirit brought Ballycroy to be the first ever entry from Connaught to enter the Pride of Place Competition. This is a 32 county Competition, which celebrates the role of the volunteer. The community achieved joint second place.

Fishing is one of the main attractions of the area and Ballycroy is renowned for its Salmon. William Trevor's 'Ballroom of Romance' was shot on location in Ballycroy.

Inishbiggle Island forms part of Ballycroy Parish. The Island lies between Achill and Ballycroy. It is 623 acres in area and is home to seventeen island residents. There is a ferry operating all year round from Doran's point in Ballycroy.

Work is currently underway for the Ballycroy Greenway connecting the National Park Visitor Centre to Mulranny Greenway. This new cycle route will compliment the sensitive landscape, comprising board walk and gravel paths.

The Barony of Erris was voted the ‘Best Place to go Wild ‘ by the Irish Times because of its vast wilderness and Ballycroy is the ‘Gateway ‘to it- again the Ideal location for The Dark Sky Park with vast areas of the night sky being so visible.

3.6.2 Newport (Baile Ui Fhiacháin)

Newport is a small picturesque town, which nestles on the shores of Clew Bay, famous for its 365 Islands and as the gateway to Mulranny, Achill, Nephin and Ballycroy. It lies 18 km west of Castlebar, the county town of County Mayo, and 11 km from Westport.

Founded in the early 1700’s, it is an attractive seaside resort and part of a beautiful and unspoilt coastline. It has the distinction of the Black Oak River flowing through its centre. The jewel of Newport’s architectural heritage is St. Patrick’s Catholic Church (1914) constructed in the Irish Romanesque style by Rudolph M Butler. Its beautiful stained glass east window (“The Last Judgment”) is the last one completed by renowned artist Harry Clarke (1930). The fine doorway at the entrance is modelled on the one in Clonfert, Co Galway.

Another beautiful feature is Newport’s seven arch viaduct, built in 1892 to carry the Westport to Achill railway line. The viaduct has now been restored as a signature feature for Newport town.

In 2010 the first stage of the Great Western Greenway (Newport to Mulranny) opened. This now stretches from Westport to Achill and is a world class 42km traffic free cycling and walking facility. It follows the line of the old Westport to Achill Railway and facilitates visitors and locals alike. It is set in one of the most beautiful and scenic areas in the West of Ireland. Visitor numbers to the Greenway have reached as high as 250,000 per year (in 2014).

The population of Newport and its hinterland is approximately 1,600 (with 600 in the town itself). Predominantly a rural farming area, approximately 150 people are employed in the town itself (in retail and tourism). Hotels in Westport and

Mulranny, and business enterprises in Westport, Mulranny and Castlebar also provide employment to those in the area.

Visitors to Newport have increased substantially in the past 3-4 years. Its main attractions are the Great Western Greenway, the high quality of its waymarked walks and trails, and its unspoilt coastline.



Figure 15: Newport Town, Mayo

3.6.3 Mulranny

Mulranny is a hidden treasure of spectacular landscapes and outdoor adventures perched on the Wild Atlantic Way along the rugged coast of Co. Mayo. Mulranny is located on an isthmus, a narrow neck of land that joins the Currane Peninsula to the Nephin mountain range and separates Clew Bay from Bellacragher Bay. It is this feature that endows Mulranny with a unique dichotomy of landscapes and seascapes.

Mulranny's Clew Bay coastline is dominated by Rosmurrevagh Machair. Rare Machair systems are only found on the north western coasts of Ireland and

Scotland. Rossmurrevagh Machair is rich in biodiversity, being home to Bird's Foot Trefoil, night scented Sea Campion, Belted Beauty Moth and migratory Brent Geese.

Bellacragher Bay '*The Bay of the Plunder*' is located north west of Mulranny village. It is sheltered by the Curraun Massif and remote from the Atlantic currents. It also basks under the steep southern face of Claggan Mountain. These features collectively give rise to Mulranny's '*Mediterranean*' microclimate. Here one can find Ireland's largest stand of Mediterranean heather as well as ancient oaks and Scots Pine. This warm sunbathed realm is the chosen birth place of the rare Mulranny Old Irish Goats.

Mulranny offers beautiful coastal landscapes and seascapes. Its diverse vistas can be accessed along the 6km Mulranny Loop Walk, from the Victorian Causeway and the hand cut stone pier. Clean blue flag beaches and coastline offer an enhanced outdoor experience for all.

Mulranny's Environmental Centre offers interactive learning by guides during Walking Weekends, Heritage Week and Foraging Events.

Stewardship of Mulranny's environment, access, conservation and participatory learning events are the growing hallmarks of Mulranny's sustainable tourism brand.



Figure 16: Mulranny Strand (Photo Mulranny.ie)

4. Dark Sky Goals

These “optically clean” places are now a sanctuary for astronomers, both amateur and professional. The first ever Dark-sky Park was in 2007 in Utah’s Natural Bridges National Monument Park. Since then such regions have popped up across the world.

Dark-sky zones have made news headlines in Ireland due to the recognition of South West Kerry as an International Dark-sky Reserve by the IDSA in January 2014.

So what is a Dark-sky Park? A public 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.

4.1 Objectives of a Dark-sky Park

- To identify, restore, and protect public lands (national, state, provincial, and other parks and notable public lands), and publicly accessible private lands, with exceptional commitment to, and success in implementing, the ideals of dark sky preservation and outstanding night skies.
- To promote eco- and astro- tourism;
- To promote protection of nocturnal habitat and human health, public enjoyment of the night sky and its heritage, and/or areas ideal for professional and amateur astronomy;
- To encourage park administrators to recognize dark skies as a valuable resource in need of proactive protection;
- To provide international recognition for such parks;

- To encourage parks and similar public entities to become environmental leaders on dark sky issues by communicating the importance of dark skies to the general public and surrounding communities, and by providing an example of what is possible with proper stewardship.



Figure 17: Night Skies of Ballycroy (S.Hanley)

5. Astronomy in Ireland

Astronomy is the oldest science, with links in Ireland stretching back more than 4,000 years to the construction of the most famous Irish monument Newgrange in County Meath.

The west of Ireland has many fine examples of Neolithic structures that contain remarkably precise astronomical orientations and alignments, two of these are located not far from Ballycroy National Park just across Clew Bay near Ireland's most famous mountain; Croagh Patrick. The first is located in the townland of "Bohea", here from "St Patrick's Chair" the position on the Sun appears to set on the summit of Croagh Patrick and then roll down the right side of the Mountain - 'the rolling sun'. It happens only on 18 April and 24 August; to denote the different phases of the agricultural year. The rock and its alignment are thought to date back to the Bronze Age c.2000 BC.

The other megalithic complex is at Killadangan, situated on a salt marsh on the southern shore of Clew Bay, about 5km west from Westport. Here the complex is comprised of an earthen enclosure, a stone row, three standing stones, a possible stone circle. The stones are in alignment with a small niche in the eastern shoulder of Croagh Patrick. At 1:45pm on 21st December (Winter Solstice) the Sun sets in this small niche.

Ballycroy National Park encompasses a vast, uninhabited wilderness area around the Nephin Beg Mountains. It is one of the last remaining large tracts of intact blanket bog in Western Europe, a windswept waterlogged wilderness in one of the country's most sparsely populated regions, a haven for amateur astronomers. We can't claim many truly wild areas left in Ireland, indeed nor in Europe for that matter. Stand in some of the other National Parks around the country and you're still only a couple miles from the nearest road. Ballycroy is very different. The road network is very much sparser. This region boasts some of Ireland's wildest and remotest places – like the Nephin Beg range of mountains, which is probably the most remote place in this country.

Irish amateur astronomers continue on their never ending plight to view the night sky from a place where the limiting magnitude is down to 7.5. In these type of skies the zodiacal light, gegenschein, and Aurora are all visible – even with direct vision, the galaxy M33 or the Planet Uranus is obvious with the naked-eye. Should Ballycroy National Park & Wild Nephin obtain the Dark-Sky Park status then it will become the final frontier for stargazers around our country.

Ronan Newman – Secretary of the Galway Astronomy Club

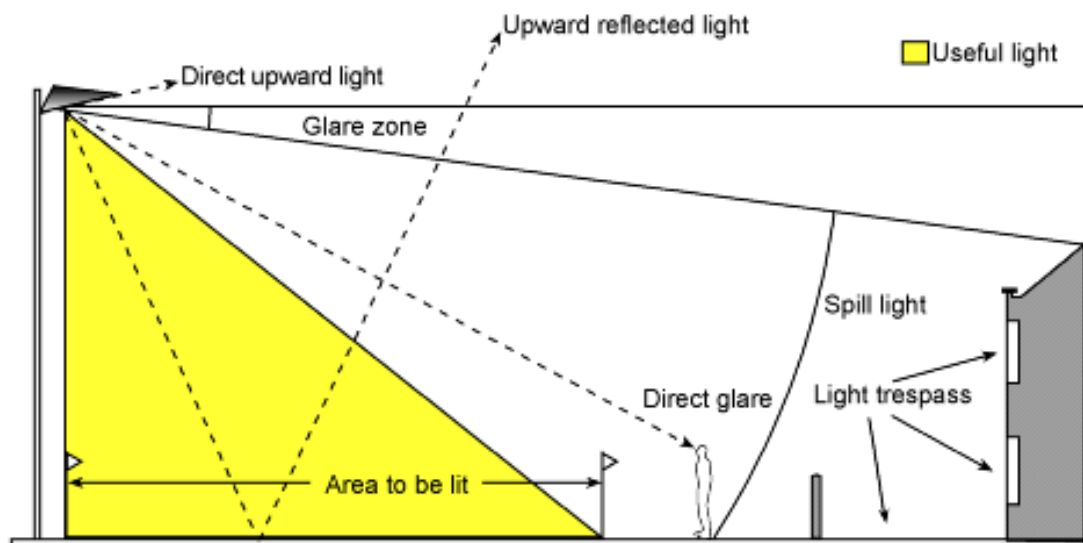


Figure 18: Kildangan Astro-Archaeological alignment

6. The Issue of Light Pollution

The issue of human health, effects on wildlife and a general waste of valuable energy are important reasons to take light pollution seriously. Even though much of County Mayo currently has low levels of light pollution, it is increasing (see evidential data photos of satellite shots taken between 2000 and 2005). A small amount of light pollution in a rural area has a more significant impact than in an urban environment.

It is important to strike a balanced view and the establishment of a dark-sky park does not ignore the benefit of having artificial light in our community. However, it is lighting at the wrong place or at the wrong time that is of concern, as well as the wrong type of lighting for the intended purpose, and this is what is considered light pollution.

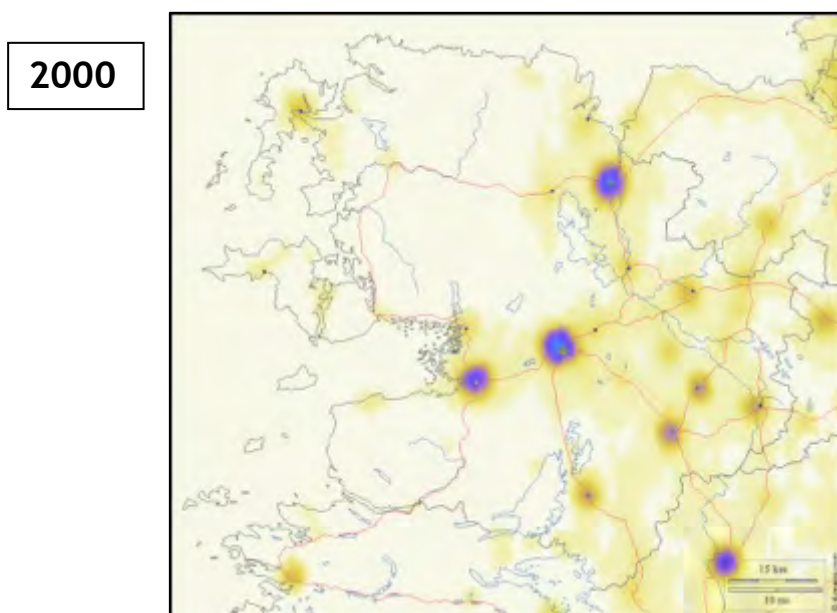


Light pollution is often caused by the way light is emitted from lighting equipment. Choosing proper equipment and carefully mounting and aiming it can make a significant difference.

Figure 19: How light pollution occurs (Source: Institute of Lighting Engineers)

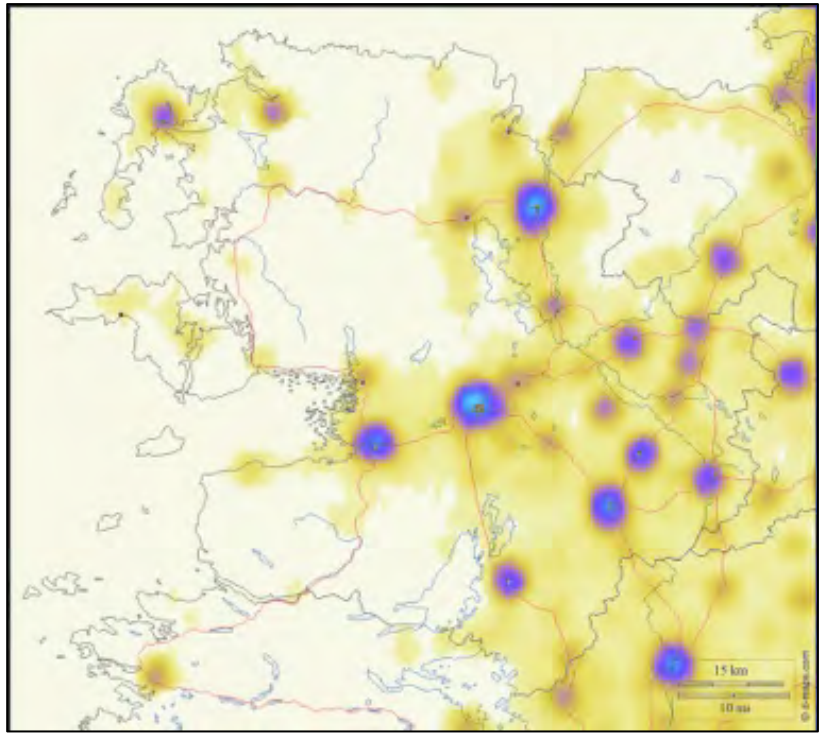
In seeking dark-sky recognition, this project aims to preserve the existing dark-sky quality in the area and highlight the impact of increasing light pollution within the county and further afield. Developing a policy of dark-sky preservation promotes sustainable tourism (the concept has a large following of astro-tourists), can develop educational programmes for schools and surrounding educational centres, meets with the environmental policies of the Ballcroy National Park and promotes energy saving strategies for local authorities, commercial premises and domestic dwellings.

In Ireland, between 1992 and 2010 there was a +20% increase in light level across most of the country as determined from satellite measurements due to increased development during the boom years.



Satellite imagery showing light lost to space in 2000 (above) and 2005 (below). Colour is used to represent light intensity, with white showing pristine areas, shading to blue in the high light centres. Note the location Ballycroy-Nephin region is in the heart of the largest pristine area.

2005



7. Education and Interpretation

Ballycroy National Park has an interpretation programme that seeks to raise awareness of the special qualities of the National Park. A landscape that is mostly free of light pollution and therefore excellent for star gazing is one of those qualities. The success of the events organised so far demonstrate that there is significant and increasing public interest in learning about our night skies. The work conducted on the Dark-sky Park application has also helped to build contact between the National Park and local communities and will form the basis for establishing active local astronomy groups. The project so far has also increased awareness across a broad range of people, with national and local interest.

With the potential for Dark Sky Park status, Dark Skies interpretation will form a dedicated part of our wider education programme as summarised below by the Head Guide of Ballycroy National Park:

The Education and Interpretive Services to be provided at the Mayo Dark-sky Park will be a critical component of the Dark-sky plan. Our aim is to inspire all ages with a love for the night sky through engaging and educational activities and resources. The project will develop and deliver Dark-sky related programmes to the general public and to education groups such as schools and universities. By utilising expertise within the initial stakeholder organisations such as Ballycroy National Park, NPWS and interested individuals locally these programmes are expected to be implemented for our 2016 opening season.

An Education/Interpretation Action Plan will be drawn up with specific outputs to be met within agreed time frames. Education programmes will adhere to an evaluation process which will look at outcomes and outputs primarily through participant feedback from questionnaires and surveys and analysis of service user numbers and make-up.

This Education Programme will initially address topics such as Astronomy, Light Pollution and Nature/Landscape Conservation. As participation and awareness of the programme grows it is also expected that new and novel components will be added.

The proposed core components of the Education and Interpretation Plan are

1. Curriculum-based programmes for primary and secondary schools, which investigates the importance of the night sky and the impact of light pollution through presentation, experimentation and participation. This will initially be delivered at the Ballycroy National Park Education Centre.

2. Development of Mayo Dark Sky-classroom activity and resources for inclusion in the Discover Primary Science and Maths (DPSM) programme. This is a national programme run by Science Foundation Ireland (SFI) to foster interest in Science, Technology, Engineering and Maths (STEM) amongst children in primary school. Ballycroy National Park Education Centre is a SFI approved Discover Centre currently offering workshops and outreach programmes.

3. Dark-Sky Interpretation materials will include information on topics such as Introduction to Astronomy and Light Pollution. A self-Guided Mayo Dark Sky Trails Booklet will be available online and through local organisations and businesses. This is expected to play a crucial role in encouraging Astro Tourism in the area.

4. Public engagement will be vital to the success of Mayo Dark-Sky Park. The main emphasis will be an education/awareness programme delivered to the general public through presentations, public lectures, star-gazing sessions, night walks and creation and support of local astronomy groups. This is expected to be a regional undertaking and to be delivered by stakeholder organisations and interested individuals/groups. Ballycroy National Park Visitor Centre is mooted as a potential hub due to its location and facilities (parking, bathrooms, facilitation space).

5. Educational and Interpretive information will be made available for download on the National Park's website with a dedicated page for the Dark-skies Educational programme.

This is not intended to be an exhaustive list of undertakings but rather a jumping off point for future collaboration with interested groups and communities who wish to promote and utilise stewardship of Mayo Dark-Sky Park. It is noted that dedicated dark-sky programming must occur at least four times per year and it is our goal to exceed this minimum requirement.

Therefore, we believe that our outreach and educational plans will lead to the establishment of an active club in the near future. This achievement, together with our plans for raising awareness on the impact of light pollution through educational talks and events, will develop a more sustainable and inclusive project in the long term for this region.

To demonstrate our commitment and approach to the educational outreach of this project, we have included our events held in the region to date with a short report on each in the following table:

Description of Event

Educational Lecture on Light Pollution entitled “How can we keep Ireland (Dark) Green” by Prof. Brian Espey of Trinity College Dublin. 16 Feb 2015



Professor Espey is a leading academic lecturing in astrophysics and has written

some of the few research papers on Light Pollution from an Irish perspective.

Our launch event was attended by 80 people, most of whom knew nothing about the impact of light pollution. This was excellent and reported in the local press (see media section) gaining momentum and interest in the community project of preparing an application for Dark Sky status.

Introduction to Astronomy talk by Ballina based astronomer John O’Mahony. 19 March 2015 This event drew over 25 attendees from the rural area of Ballcroy on a cold dark evening.

John demonstrated the use of a basic Dobson Telescope and brought binoculars also to encourage members to start with backyard astronomy. He also demonstrated software programmes such as Stellarium to assist learning and identification of the night sky sights. The introductory night was excellent very informative for anyone considering amateur Astronomy as a hobby. A good indication of the local interest and support for this project, several of the attendees have since met to form the basis of a new astronomy enthusiasts group using online guides and star charts. It is hoped that eventually this group will form a community based Astronomy Club once more expertise is developed.

Perseids Watch at Mulranny as reported by Carol Loftus: 10 Aug 2015

Due to the bad weather we had to cancel the Perseids Watch at Mulranny Beach. However some interested people showed up who had not seen our cancellation notice.

A group from Castlebar Tidy Towns arrived with deckchairs, sandwiches and coffee and just before 10.30 a family of five arrived. We decided to go onto the beach with the light meter and take some readings. The beach is a great location for star gazing as light from the village is blocked by the rocks and with



no lights over the vast expanse of Clew Bay on a clear night the skies can be spectacular. We had a discussion about the Mayo Dark Skies project, the Perseids, the ISS and Saturn, which we would have been able to see if the sky had been clear.

Brian Wilson Astro-photography Gallery Launch, Ballycroy NP 18 Sept 15

Brian Wilson titled his photographic exhibition - 'The Wonders of Mayo's Night Sky'. He has taken some amazing photographs of the Mayo's night sky. Among his stunning photographs are images of local landmarks with the aurora borealis, planets and stars. Brian gave a fascinating talk about how he takes such beautiful photographs, how he got started and what drives him to photograph the night sky.

Public Information talk - Georgia Macmillan from the Mayo Dark Skies project talked about the opportunities and challenges presented in trying to achieve official recognition of Ballycroy and the surrounding areas as a Dark Sky Park and explained how the community can work together to reduce light pollution.

Ronan Newman from Galway Astronomy Club talked about the Aurora Borealis in Ireland. He explained science behind the Aurora Borealis and delivered an interesting lecture on its appearances, mostly around our north west coast! Ronan also talked passionately about what it is to be an amateur astronomer. He is currently the secretary of Galway Astronomy Club and regularly makes the journey to Mayo to enjoy the pristine skies.

The evening was a great success and attended by over 100 people.



Figure 20: Outreach event poster

Light Pollution talk by Prof. Brian Espey at Ballcroy National Park. 10th November

Prof Espey's last talk in February proved very popular and we decided to invite him to return as many local people in Ballcroy had not been able to make the Castlebar location previously.



This is also a critical time in our application process to increase the awareness of light pollution and how it can be combatted. In publicising this event, we have also attracted attention from professionals involved in light planning and policy making in the Mayo region. Over 40 attended this very informative event with questions stretching the evening talk to over 2 hours demonstrating the engagement and interest it provoked in the subject.

Appreciation of the Night-sky in an Urban setting

10th December 2015. Lough Lannagh Castlebar.

This was a collaborative event with GMIT students from the Outdoor Education / Creative Arts class who presented a Dark-sky themed artistic interpretative event. This was an excellent example of communicating the importance of dark skies to the general public. The class of students had to take ownership of this aspect of the event, meaning they too had to understand and support the dark-sky objectives. A theatrical night-time kayak and performance piece on the value of the night was presented on the lake for onlookers to enjoy.

Public participation was invited and home made candle-lanterns distributed by the students as well as willow framed paper lanterns to illuminate the tree lined pathways.

Over 100 people attended or took part in the event despite recent flooding and storm warnings from Storm Desmond. Unfortunately the plan to turn off all public lighting had to be postponed for safety as flooding had obscured public pathways. However, the council engineers were willing to oblige us!

Other less formal events have taken place since the launch of the dark-sky initiative in Mayo.

- Hiking the Bangor trail 7-9 September - Over 20 students from GMIT college undertook a 2 day hike along the remote Bangor Trail in September. This incorporated an evening of stargazing from the middle of the Dark-sky park as well as taking light measurements with handheld SQMs (readings exceeding 21.7!). A talk on the environmental impacts of light pollution and plans for the dark-sky park was also provided and a well-timed opportunity to glimpse the Venus Moon Conjunction.
- Launch of Wild Nephin Wilderness at Letterkeen Bothy - 4 September. This launch event included a Dark-sky information point for visitors to gain information on the Dark-sky plans and concept. A sample information leaflet is provided in the appendices of this application.
- Light Pollution talk at Rural Training Centre on 11th October. The purpose of this community group event was to increase awareness of light pollution and how to reduce it in nearby municipalities.
- Light Pollution and Dark-sky Park Introductory talks for Inishbofin Island community - 26 November & 13 January. By invitation, members of the Friends of Mayo Dark Skies gave introductory talks on the issues of light pollution and an outline on the creation of a Dark-sky site.
- Kilmovee Heritage Centre - A talk on Light Pollution and preserving night time skies by Mayo Dark Skies team was scheduled but was cancelled due to unforeseen circumstances. However, the scheduled talk on Astrophotography and Stargazing walk by Steven Hanley did take place and was very well received.

- Kildangan Winter Solstice Walk - 21st December. Our astro-archaeology heritage in Mayo is probably best known for the bronze aged Standing Stone alignment at Kildangan. On the winter solstice the sun sinks into the shoulder of the iconic Croagh Patrick mountain and aligns with the standing stones. This annual event was well attended and the weather allowed a visual display of scientific heritage that is rarely experienced by many of us.



Figure 21: GMT Dark Skies Night (S.Hanley)

8. Dark-sky Projects

In addition to lighting corrections being made within the boundaries of the National Park as outlined in the Light Management Plan, we have been working on several projects outside of the proposed dark-sky park to reduce the impact of light pollution in the surrounding community areas. A brief summary of each is below and demonstrates our commitment to taking a leadership role in developing dark-sky friendly lighting and public education on light pollution.

■ Ballycroy Villlage

Following a door to door survey, we have obtained agreement for part-night lighting to be trialled as a pilot programme on the Cross Hill Residential Estate in the middle of the village between the hours of 12.30am to 5am. Residents were happy to take part in the scheme and some even highlighted the issue of public lighting interfering with their sleep at night. The existing lighting fixtures on this development have been prioritised by Mayo County Council lighting engineers for upgrade and replacement to full cut off lighting and energy improvement initiated by the steering group of Mayo Dark Skies.

■ Local Monument

Changes to the lighting installation of a local religious monument in the heart of Ballycroy have also been undertaken. A previous spotlight was in operation at the foot of the monument, shining unnecessary lighting into the sky from dusk til dawn. The first step in correction of this lighting has been taken in switching off this monument light from 10pm and this is being followed by a complete replacement of the upright installation to a full cut off downlight.

Additional commitments to lighting adjustments in Ballycroy have also been made by the local community centre, Garda station and petrol station. The local working Men's Shed have offered their services for further local

adjustments to residents or small businesses who may need assistance in making lighting adjustments.

■ **Mulranny**

Located on the edge of the Nephin Mountain range, Mulranny is a small village with a big environmental conscience. The Mulranny Environmental Group won the Group of the Year Award at this years National Ocean Hero Clean Coast Awards year. Recently they opened their redesigned village and their new energy efficient public lighting scheme. The LED, full cut-off lighting now in the centre of the village replaced the former amber sodium lighting, thus considerably reducing their contribution to light pollution. Mayo Dark Skies has also gained agreement to further reduce lighting energy output by dimming the village night lighting during the hours of 12.30am to 5am.

■ **InishBiggle Island light removal**

A spot light shining up from nearby Inishbiggle Island was previously visible from the Ballycroy village area. This light source was investigated with local residents and engineers and established that strong winds in the region had blown a harbour light fixture from a down position to an upright. This has now been adjusted correctly and the light source removed from view.

■ **Leave No Trace Education Programme**

This is a nationally adopted code of ethics for outdoor recreation users. Light pollution awareness information has been incorporated into presentation training materials for sessions delivered in County Mayo. We are also working with Leave No Trace to include light pollution as part of the standard training materials for nationwide delivery.

■ Local Agenda 21 Environmental Partnership

The Local Agenda 21 Environmental Partnership Fund promotes sustainable development by assisting small-scale environmental projects at local level. The Dark-sky project has also received a small amount of funding from the Local Agenda 21 Energy Agenda to establish a programme with the following objectives:

1. to survey Ballycroy and its surrounds with a view to obtaining Dark-sky status for Ballycroy National Park & Wild Nephin Region from the International Dark-sky Association;
2. to extend light pollution surveys within the county, targeting key areas shown in aerial satellite shots showing artificial lighting at night.
3. to increase awareness of light pollution, and the associated wastage in resource and economic terms. This will be conducted in an educational format in conjunction with students attending nearby GMIT (in collaboration with GMIT Mayo's Green Campus) as well as local communities and general public.
4. to provide information to assist future decisions on this topic both by the Council and also in a national context

■ Working with other potential Dark-sky Sites

Members of the Mayo Dark-Skies steering group have made two visits to potential Dark-sky Community/Sanctuary Inishbofin island (off the coast of County Galway) to provide advice on establishing a dark-sky application/plan. Sky-Quality Measuring meters (SQM-L and SQM-LU-DL) were brought along for demonstration purposes to the island community group and the first ever dark-sky readings were recorded on either side of the island. A light pollution presentation was also given. This visit was organised on an entirely voluntary basis by two members of the Mayo Dark skies steering group.

■ Biodiversity and Light Sensitivity Research Thesis

Sky Quality Meter data from our dark-sky measurement programme has been identified and used in a biodiversity and light sensitivity survey of Ballycroy National Park as part of a Thesis for a MSc Student of Trinity College Dublin. The main objective of the thesis is to establish “what are the effects of night light on sensitive species in protected areas in Ireland?” The results of this work will be available shortly.

■ Get Involved Community Project

The Mayo Dark-Skies project has been nominated by the Connaught Telegraph (provincial newspaper) as one of only two of their national entries in this year’s “Get Involved” community project competition, sponsored by the Sustainable Energy Authority of Ireland (SEAI). This uses the findings from a dissertation on light pollution for the proposed Dark-sky park to raise awareness of light pollution in the region through community participation. This nomination and the progress of the Dark-sky project was featured in the list of achievements at the Awards Ceremony of Galway-Mayo Institute of Technology attended by over 1000 people from all over Ireland.

9. Future plans

As mentioned earlier, the ongoing management of the Dark-sky Park will fall under the responsibility of the NPWS/Wild Nephin management team and resources have been allocated appropriately. This secures the long term sustainability of Dark-sky park. However, the community members of the Mayo Dark-Skies Steering Group, will continue community outreach involvement, thus strengthening the objectives of the dark-sky park and its link to the public.

The following plans are in place in addition to the Dark-sky Education and Interpretation Programme (see Chapter 7) that will be implemented by the National Park team.

■ February Event - “I was there. The Universe story” by Michael Casey

Michael Casey is an author and researcher based in Newport. He recently wrote the gorgeously illustrated book “*I was there. The Universe Story*” and will host an evening introductory talk on Stargazing and Astronomy. Weather permitting, we will conduct a short walk to view the constellations from the Daithi Ban looped walk at the Ballycroy National Park Visitor Centre.

■ Astronomy Group Development

One of the key challenges identified by our steering group is the fact that we do not have an active astronomy club in the region. A survey was conducted to establish the public’s level of awareness of light pollution in the towns surrounding the proposed Dark-sky Park, and to gauge the interest in taking part in astronomy/educational events. Results indicated interest in astronomy events was very high, showing good support for the development of a local astronomy club. With the help of neighbouring county astronomy clubs, we plan to develop the interest into an active group with regular outings organized as part of the dark-sky programming calendar.

■ Dark-sky Friendly Lighting Suppliers

Discussions have taken place with local hardware and lighting suppliers on the type of exterior lighting available. The nearest electrical supplier is located in Bangor Erris and is working with our team to obtain an improved selection of dark-sky friendly lighting available for local residents wishing to upgrade their lighting. Once agreed the Dark-sky Park will include this and other suppliers who agree to offer dark-sky friendly lighting in their information guide on light pollution.

■ Astro-Tourism development

Those involved in local tourism and local businesses will be offered educational workshops to assist them in becoming ambassadors to the new Dark-sky park. A programme similar to the Star-Makers business programme established by Northumberland Dark-sky Park is anticipated. We have engaged with several of the UK dark-sky places in this regard and arranged a visit from the Funding Development officer of the Brecon Beacons International Dark-sky Reserve. This will be the first in a series of workshops to assist the promotion of the dark-sky park.

■ Outdoor Education Conference

The annual conference in Outdoor Education will be hosted by Galway-Mayo Institute of Technology on 22nd April 2016, celebrating 50 years of Outdoor Education in Ireland. Mayo Dark-skies have been included on the event programme for a talk on the benefits of Dark-skies to those involved in Outdoor recreation.

Further educational events will be scheduled to include talks about light pollution & energy saving, astronomy, astro-heritage, and nocturnal wildlife.

10. Culture and Heritage

UNESCO's World Heritage Convention supports a website dedicated to Astronomical Heritage. This is a term referring to evidence of ancient astronomy in the form of tangible remains, such as monuments, sites and landscapes. The website includes a global map of astronomical heritage sites such as Britain's Stonehenge. Ireland's sites of Newgrange and Armagh Observatory are among those included on the site's Irish Astronomy Trail (Ruggles, 2010).

Putting a cultural value on the night is a subjective concept. However, Ludwig Wittgenstein, the famous Austrian philosopher of the twentieth century directly refers to the tranquility of the north West of Ireland in his quote *"I can only think clearly in the dark. In Connemara, I have found one of the last pools of darkness in Europe"* (Robinson, 2008).

In his report for An Taisce, entitled "Protecting the Night Sky on the Urban Fringe of Dublin", Tomás Bradley has used a process called The Burra Charter in his methodology to evaluate the cultural significance of the night skies on the urban fringe of Dublin (2012). It covers a sequence of investigations and actions leading to policy management and recommendations, and it demonstrates how values can be created for our cultural heritage such as Nightscapes, for preservation.

The Friends of Mayo Dark Skies steering group has requested that Nightscapes are included in the Strategic Development plan for Mayo in the next update and has also received support from the Heritage Council of Ireland for this application (see letters of support).

11. Sky Quality Measurement

Naturally, it is taken for granted that the region must be dark but a survey must be undertaken to ascertain the average darkness. One of the ways to do this is by gauging the faintest Naked Eye Limiting Magnitude (“NELM”) of stars (Griffiths, 2013). This method identifies the magnitude of the faintest star an observer can discern, under given sky conditions. The limiting magnitude depends strongly on sky transparency and the observer’s experience. British Astronomer Steve Owens has developed an interpretive flow chart (see Appendix i) Figure 47, which assigns the visual description to a Bortle scale measurement for classifying the quality of the skies seen.

11.1 Survey Instrument; Unihedron Sky Quality Meters

The Sky Quality Meters (“SQMs”) used in this application were manufactured and distributed by Unihedron in Canada. These meters measure how much light strikes their lens, or sensor, and converts that amount of light into a reading known as Magnitudes per Square Arc Second (“mpsas”). This term is defined in the abbreviations section of this document.

SQM-LU-DL models (See Appendix ii), were affixed to wooden posts in selected locations, inside a weather-proof casing, together with a battery pack (6 x AA batteries) for the duration of their recording period. These meters were pre-set to take readings at five minute intervals, starting from dusk until dawn.

SQM-L models were used for demonstration purposes and for taking random manual readings. Instructions for taking these manual readings are simple and detailed on the IDSA website. Essentially, the device is pointed overhead (at the zenith), and a button pressed to trigger a reading. Within a few seconds the digital display gives an indication of the darkness of the night-sky above, compared to the darkest possible place (i.e. pitch black). The meters have been pre-calibrated with a darkest possible reading so they are ready to make this comparison.

11.2 The Dark-sky Survey Methodology

The methodology for conducting a night sky quality survey was developed for this study in consultation with Prof. Espey, and with the assistance of the NPWS Park Rangers. To ensure a comprehensive survey, SQM readings were taken at both the darkest and the brightest areas of the zone and a wide cross section of locations.

The SQM-LU-DL fixed meters were first installed at data collection points, which were safe to access and appropriately distributed. Data was retrieved regularly and checked for integrity. The meters were pre-calibrated with each other and measured against European Standards by Prof. Espey for accuracy. The guidelines, provided by the IDSA, requires a minimum of 12 different locations from which readings should be taken. The combination of fixed and handheld meters used in this methodology to record data over extended time frames, exceeds these requirements.

This allowed for analysis during changing weather conditions and lunar cycle periods, increasing the likelihood of measuring a truly random sample.

12. Results

The volume of readings, from multiple locations, makes interpretation somewhat cumbersome. In order to put the information into perspective, Table 1 shows the qualifying classifications sought by the IDSA for a Dark-sky status award.

Table 1: IDSA Classification tiers for SQM readings

Classification Tier	Unihedron Sky Quality Meter Readings of Magnitudes per sq. arc second (mpsas)
Bronze	Greater than 20, Less than 21
Silver	In excess of 21 and less than 21.75
Gold	In excess of 21.75

For the reader's convenience, an overview of SQM readings is presented in Figure 22. These readings have been grouped by frequency and allocated in the classification tiers provided above. Only two locations are provided in this sample to reduce repetitiveness covering the brightest and one of the darkest areas. Suffice it to say, meter readings in all locations recorded qualifying data, some more frequently than others.

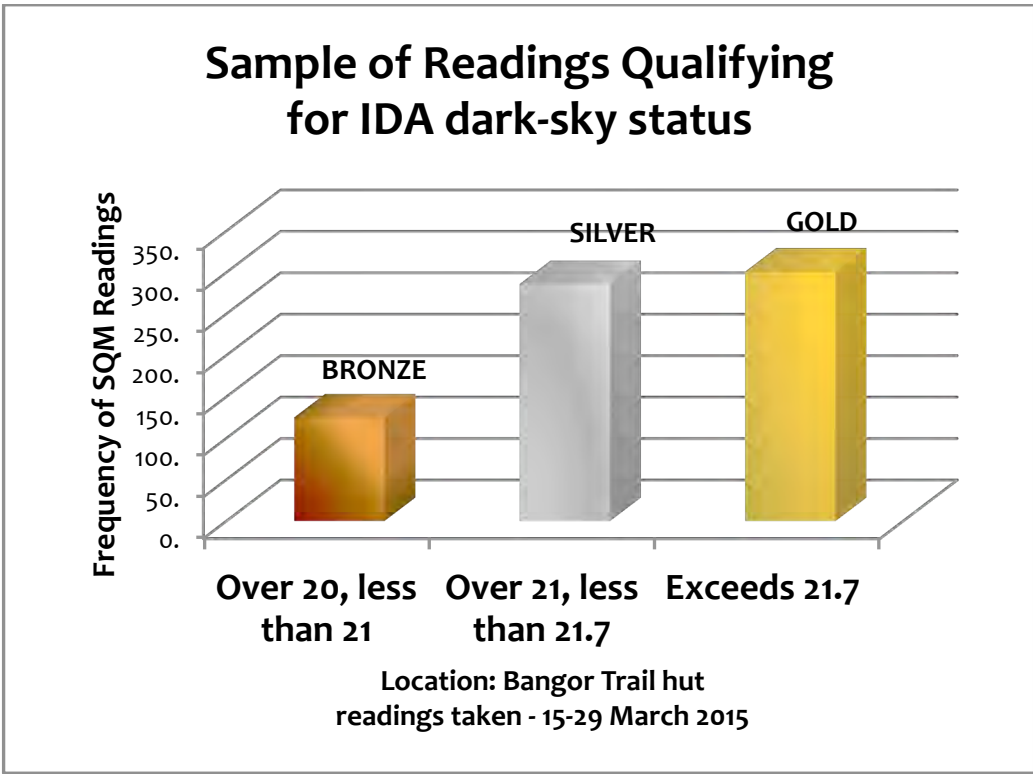
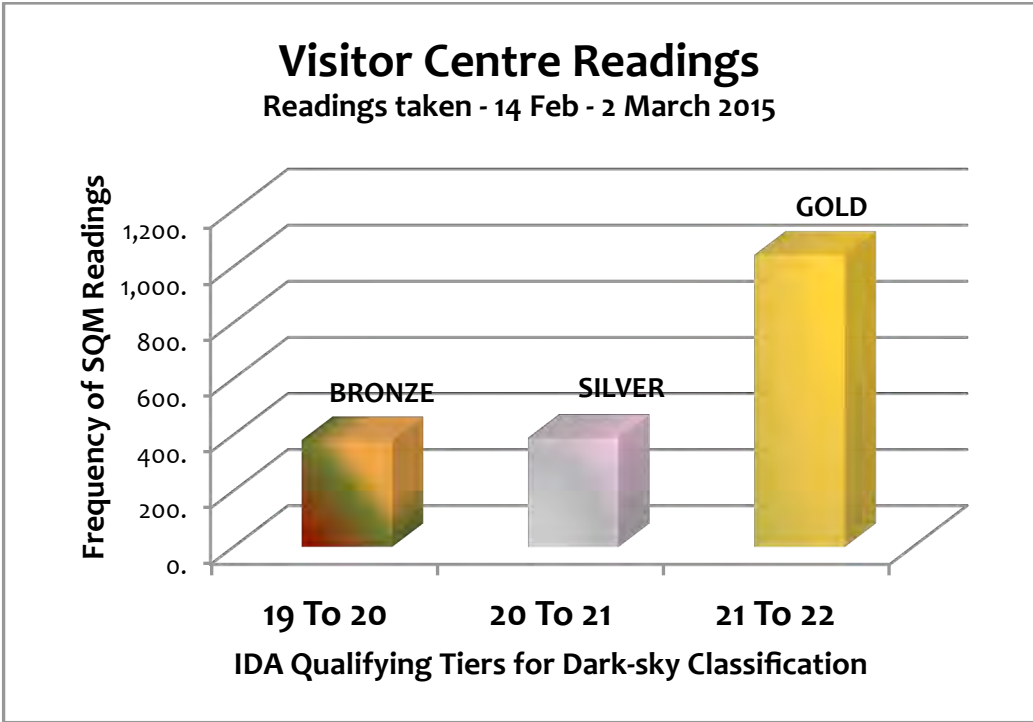


Figure 22: SQM Readings classified in IDA tiers

Samples provided of brightest (Visitor Centre & Darkest areas)



13. Key Locations around the Dark-sky Park

The following is a description of the main 12 locations from which sky quality measurements were taken. A brief summary of each location is presented below, together with a snapshot of the dark-sky readings. A full data set containing thousands of SQM readings is provided to the IDSA along with this application to support the data.

The sites were been graded by accessibility as follows:

Grade 1 - Easy access with facilities (either car parking or visitor/interpretive)

Grade 2 - Easy access by car

Grade 3 - Access only by foot - site may be remote.

UNGRADED - Site included for data point readings only. Public access not permitted or not recommended.



Figure 23 Letterkeen Bothy & C-park (Photo - G. Dowling)



Figure 25: Letterkeen Bothy (Photo - G Dowling)

1. Letterkeen Bothy

Grade 1 Site - Car parking facilities for at least 15 cars and easy road access for cars, cyclists and walkers. Excellent viewing point for all users. Zero artificial lighting at the site or within view-range. This is the start of Wild Nephin Wilderness. Stone shelter is open to visitors 24 hours. Disabled access and starting point for various forest trails and looped walks. Interpretive information provided at this site for visitors. Dark-sky interpretative signage also to be added upon approval of site.

Nearest town - Newport (13km).

Grid reference Point: F96914 05542	GPS: 53,59.336N 9,34.341W
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2. Bangor Trail Meitheal Hut

Grade 3 Site - Remote site on edge of Bangor Trail accessible by foot. Nearest car parking on forest trail over 1km hike. Access requires walking along rough track and some mud. Expansive viewing of wilderness with wooden hut shelter.

Allows experience of pristine environment wilderness, with option not to traverse any further. No artificial light or man made structures within eye sight.

Grid Reference Point: F93804 07303

GPS 54,0.248N 9,37.221W



Figure 26: Bangor Trail Hut (Photo Meitheal website)

3. Altnabrocky Meitheal Hut

Grade 3 Site - Access only by foot along forestry track for approx. 8 kilometers from nearest car park (Letterkeen). Ideal for the hiker wishing to stargaze in remote location with access to mountain range for the more experienced outdoor enthusiast. Remote location. Zero artificial light.

Grid Reference Point: F94694 12332

GPS 54,2.968N 9,36.512W



Figure 27: Wild Nephin View (Photo G. MacMillan)

4. Wild Nephin View Point

Grade 2 Site - Rural roadside parking with panoramic views of Wild Nephin mountain range. Easy access by car with parking for 2/3 vehicles and nearby picnic bench. Interpretive information panel at this site for mountainous views. Dark-sky interpretative signage also to be added upon approval of site. Zero artificial light on site.

Grid Reference Point: F97732 06893	GPS 54,0.074N 9,33.620W
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Figure 28:Coillte Forest Entrance (G.MacMillan)

5. Coillte Forestry Entrance

Grade 2 Site - Rural roadside location with access to forest tracks and parking. Viewing from parked location or option to walk into Wild Nephin wilderness along forestry tracks. Zero artificial lighting at site.

Grid Reference Point: F98510 07826	GPS 54,0.586N 9,32.927W
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6. Keenagh/Coillte Forest Track

UNGRADED site - Not easily accessible to general public. Visits not recommended. Located at end of Coillte Forestry track.

Grid Reference Point: F99777 11118	GPS 54.03958 -9.53055
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Figure 29: Claggan Mountain Coastal Trail (Photo - G. MacMillan)

7. Claggan Boardwalk

Grade 1 site - Excellent parking and viewing facilities with the option to walk a 2km trail along a stunning coastal bay route. Wheelchair access. No artificial lighting on site. Access to be improved for cycling in near future with development of greenway extension from Mulranny route. Nearest town - Mulranny 5.5km

Grid Reference Point: F82160 01779	GPS 53,57.120N 9,47.743W
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8. Shrahduggan (Blue Lodge Road)

Grade 2 Site. Accessible by car via narrow country road. Excellent viewing in the plains of the park. Plans for further development to facilitate visitor access. Currently parking for 2/3 cars and access for cycling walkers. Zero artificial lighting on site.

Grid Reference Point: F86514 07231	GPS 54,0.116N 9,43.887
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Figure 30: Ranger's Van - Shrahduggan

9. Ballycroy National Park Visitor Centre

Grade 1 Site. Excellent Visitor Centre facilities, which will be the main location for Dark-sky dedicated programming and events. Indoor and outdoor seated areas, and toilet facilities and extensive car parking. Wheelchair accessible. 2km circular boardwalk and elevated viewing point over national park expanse with interpretive signage on route. Visitor Centre building open April to October but boardwalk and car park open all-year round. Lighting curfew in place. Nearest town - Ballycroy village 1km.

Grid Reference Point: F80704 09792	GPS 54,1.417N 9,49.261W
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10. NPWS Ranger's Office Lagduff

UNGRADED site - Location used for Dark-sky measurements only - public access not permitted for security reasons.

Grid Reference Point: F83584 14581	GPS 54,4.037N 9,46.736W
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11. Tarsaghuan Beg

Grade 3 Site - Access only via hiking route on the Bangor Trail. Road access not permitted (private road only). Remote location along Tarsaghuanmore River with expansive views for those adventurous hikers. Zero artificial lighting in area.

Grid Reference Point: F86505 15896	GPS 54,4.784N 9,44.089W
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12. N59 Layby/Bullylaur Stream

Grade 2 Site. Easy access to layby for parking along N59 road, short walk onto Wild Nephin land for viewing area. Note - adjacent land without trails or pathways on boggy terrain. Zero artificial light.

Grid Reference Point: F85056 19426	GPS 54,6.667N 9,45.498W
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13.1 SQM Findings

We obtained data readings from twelve separate locations by moving the meters around, and this accounts for some gaps in the date ranges. This is presented in a series of scatter charts with data from meters in each location. These meters took continuous readings, and the nightly cycles can be seen from the peaks and troughs of the charts, as light changes from night to day.

The charts presented herein have been edited for the reader's convenience to highlight the qualifying range of readings for Dark-sky application. The data regularly shows readings of pristine darkness in excess of 21.75 mpsas.

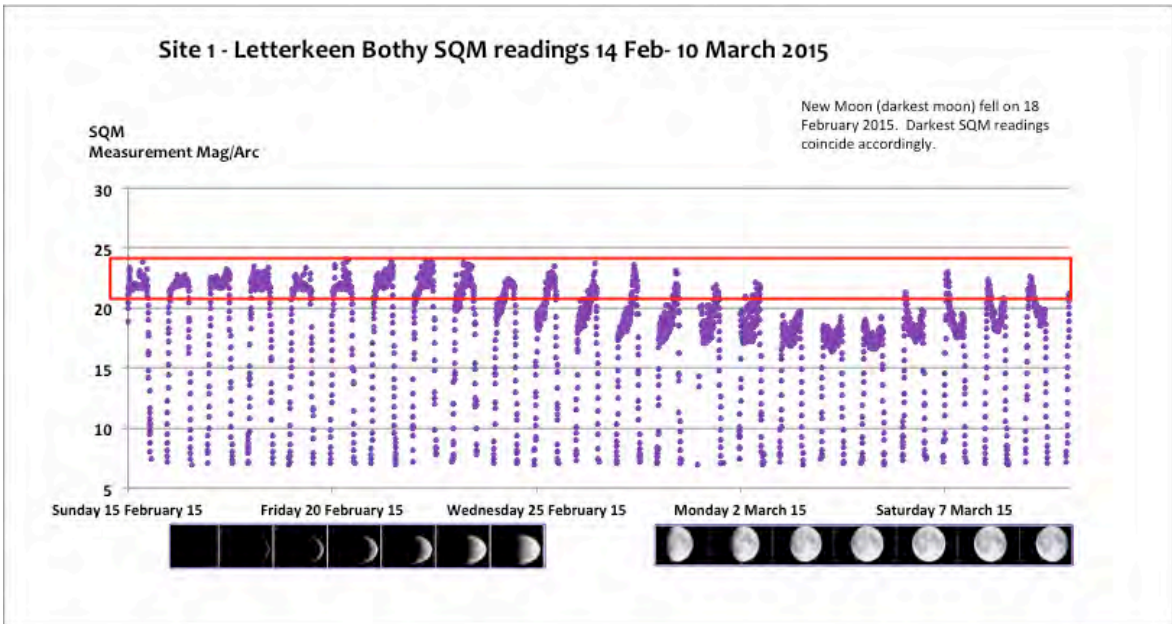


Figure 31: Site 1 Letterkeen SQM Readings 15 Feb-10 Mar 2015

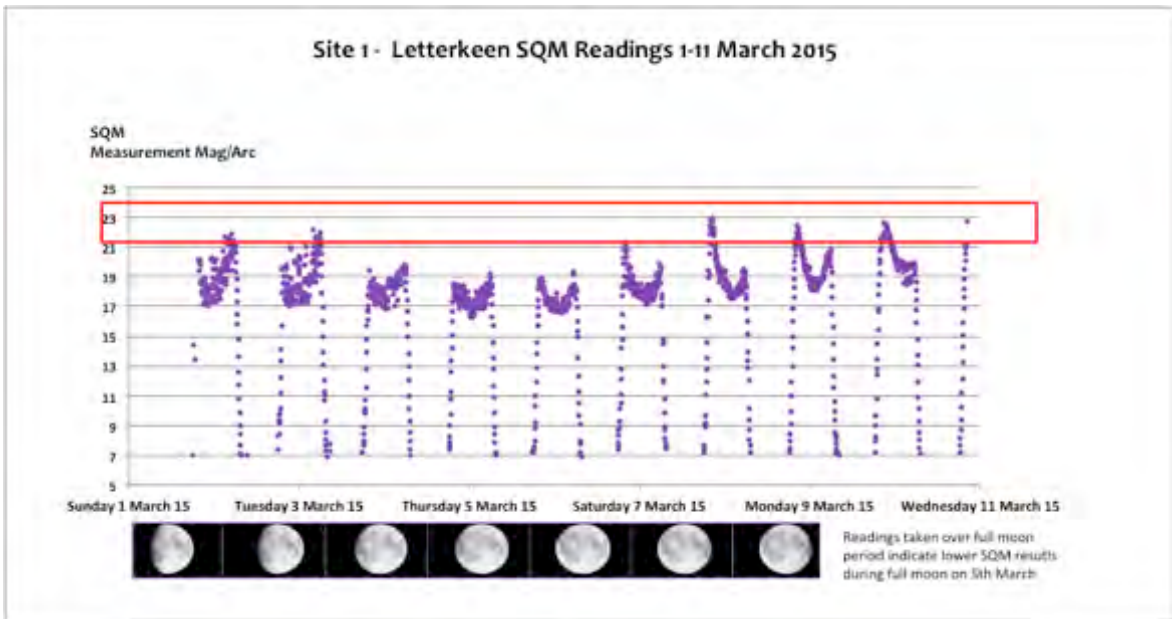


Figure 32: Site 1 Letterkeen SQM readings 1-11 March 2015

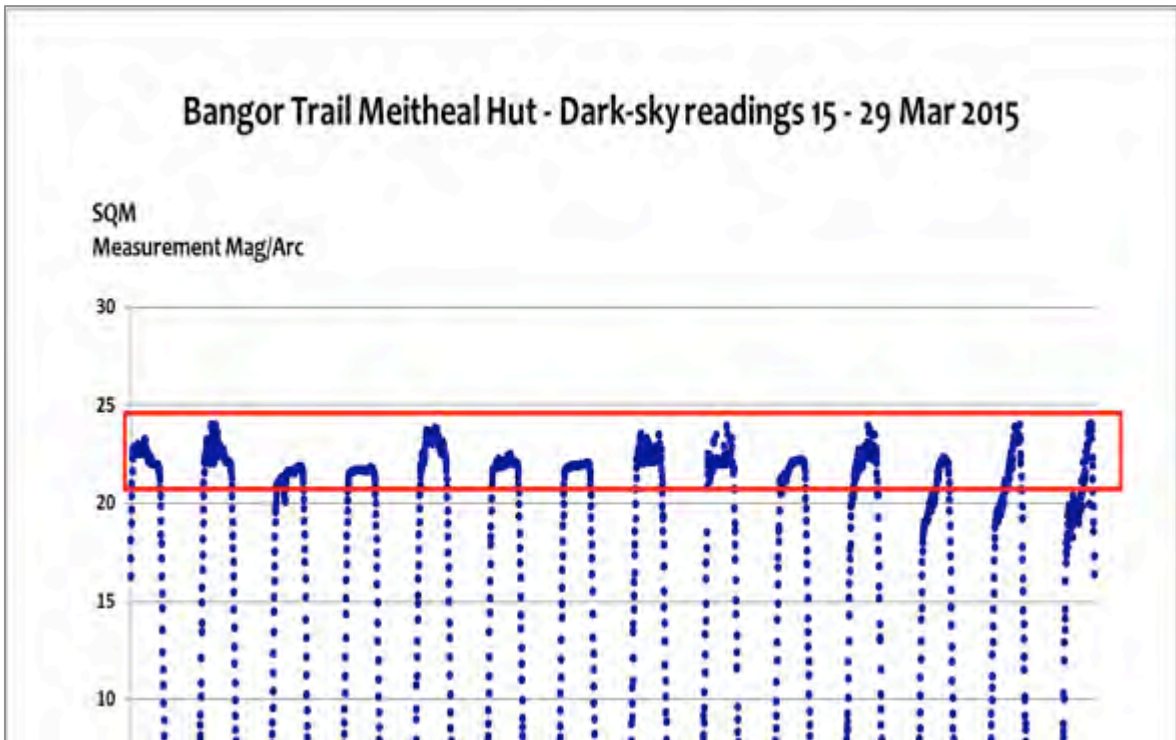


Figure 33: Site 2 - Bangor Trail Hut SQM readings 15-29 Mar 2015

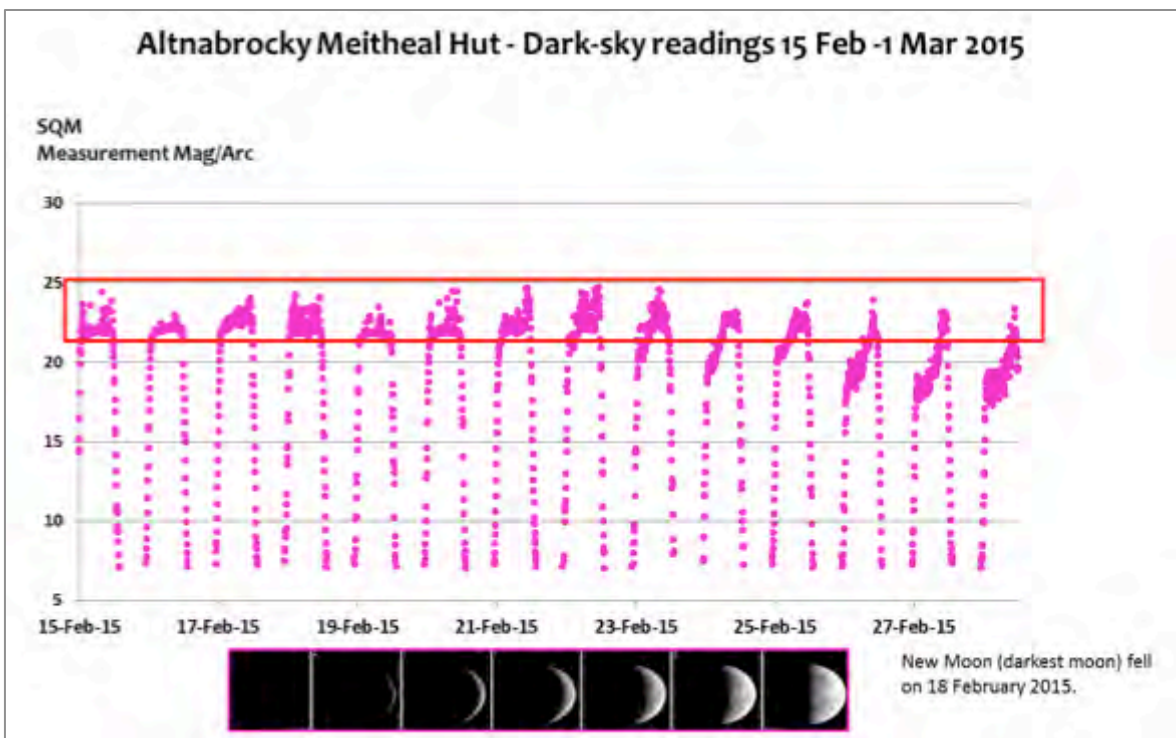


Figure 34: Site 3 Altnabrocky Hut SQM readings 15 Feb-1 Mar 2015

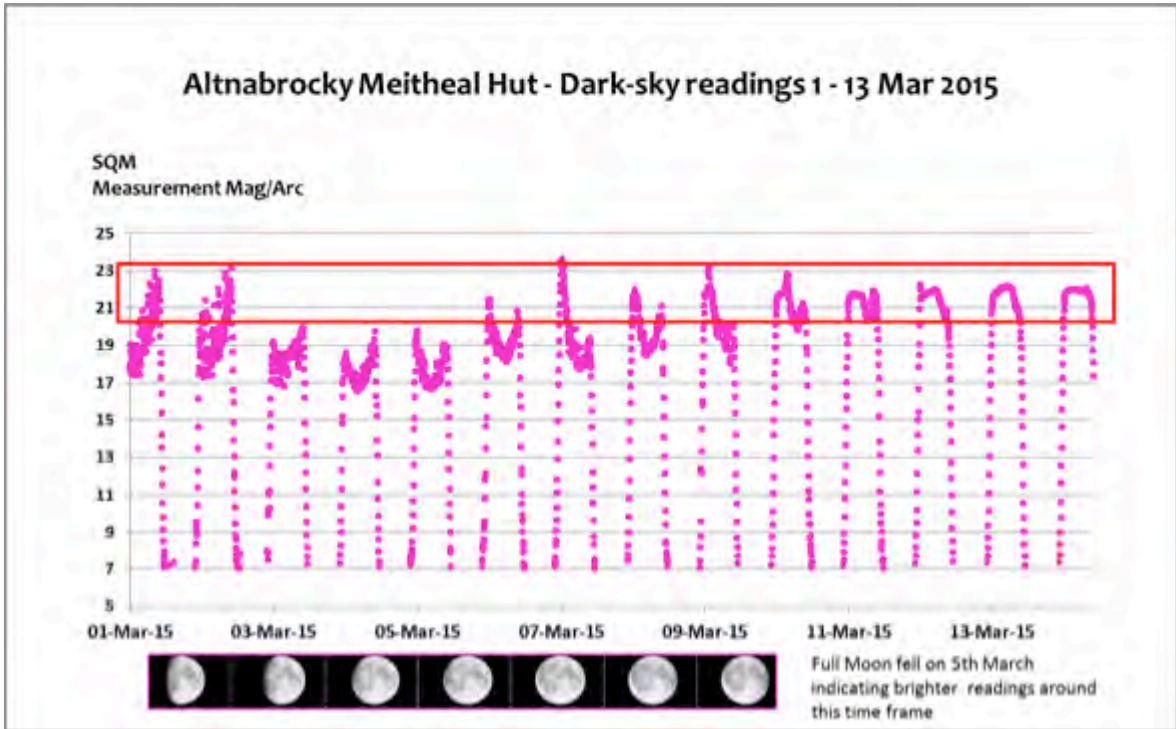


Figure 35: Site 3 Altnabrocky Hut SQM readings 1-3 Mar 2015

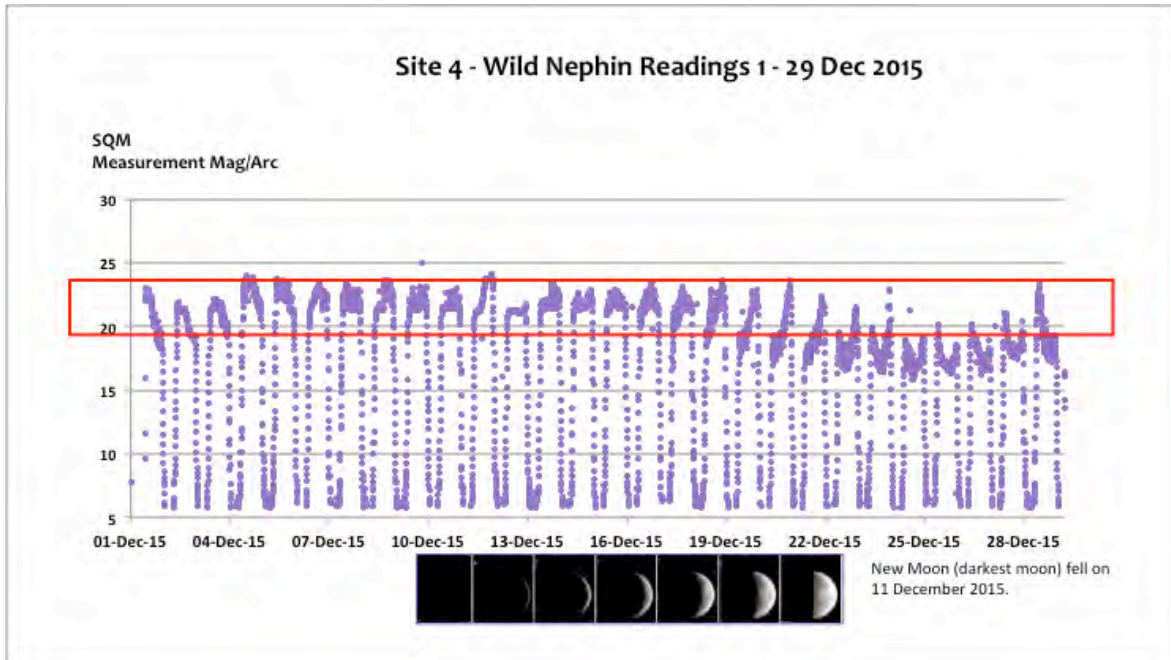


Figure 36; Site 4 Wild Nephin 1-29 Dec 2015

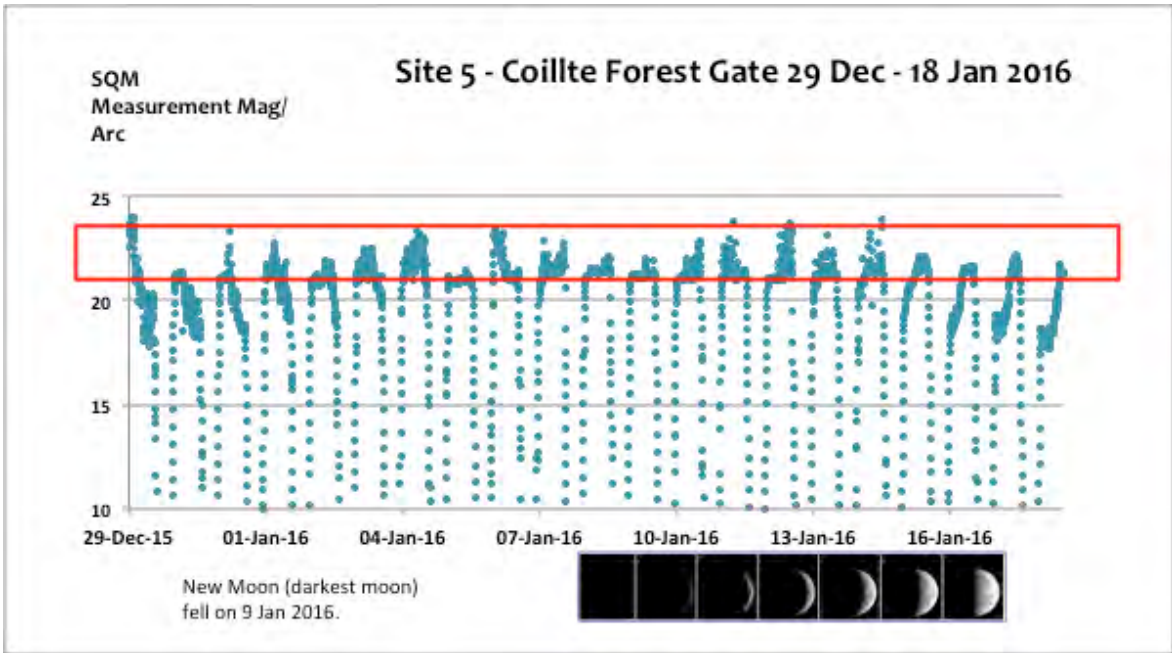


Figure 37: Site 5 Coillte Forest 29 Dec - 18 Jan 16

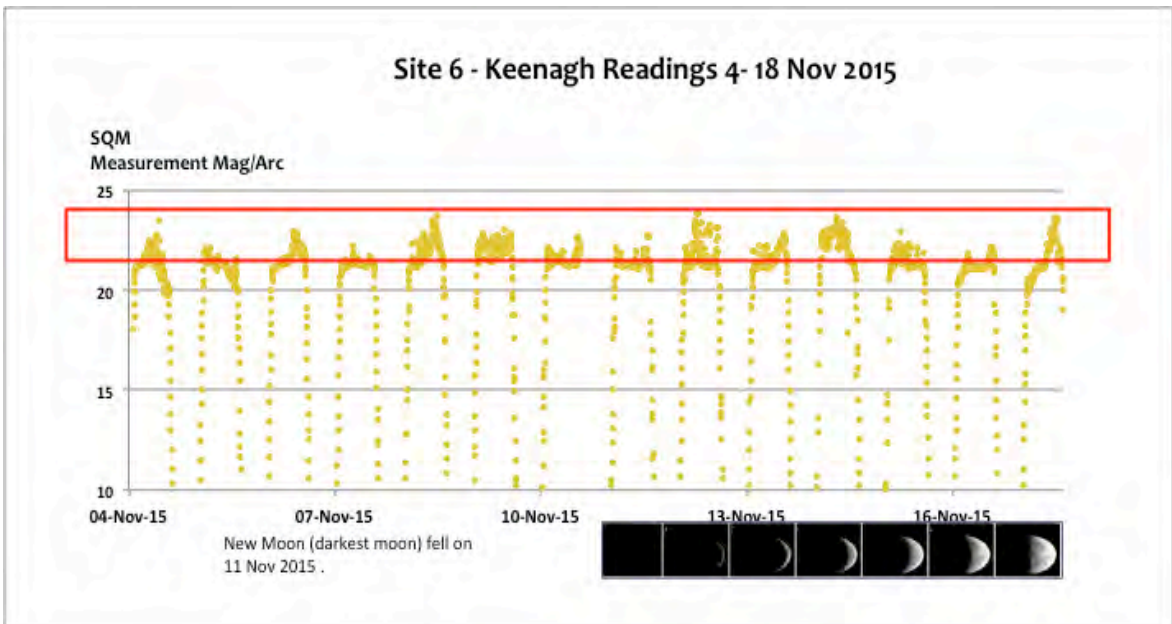


Figure 38; Site 6 Keenagh 4-18 Nov 2015

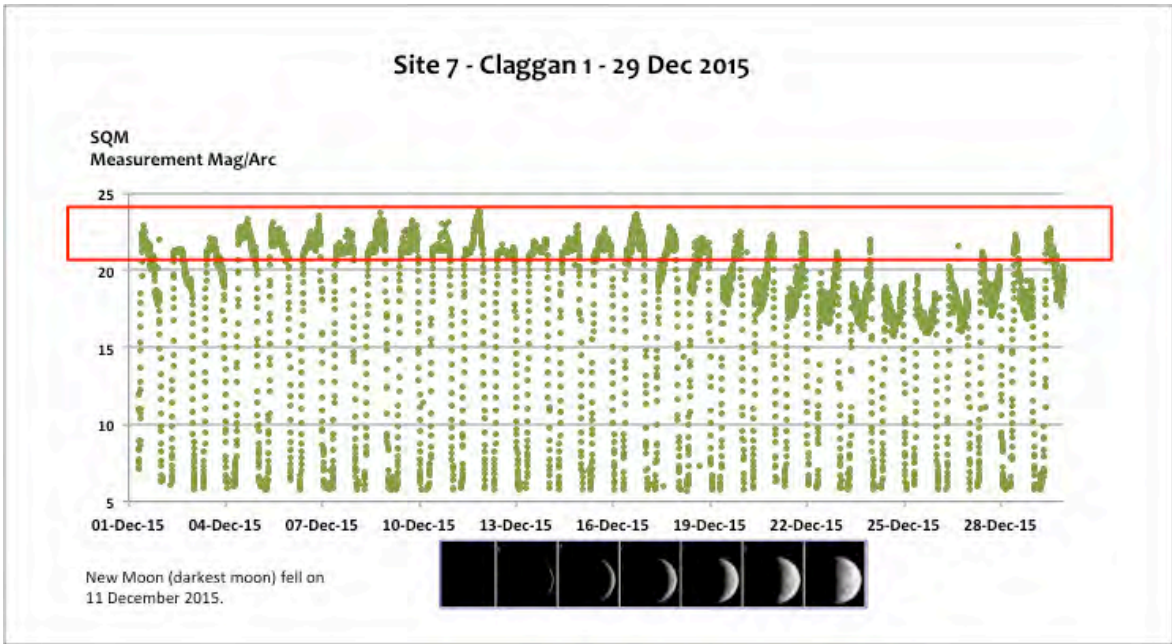


Figure 39; Site 7 Claggan 1-29 Dec 2015

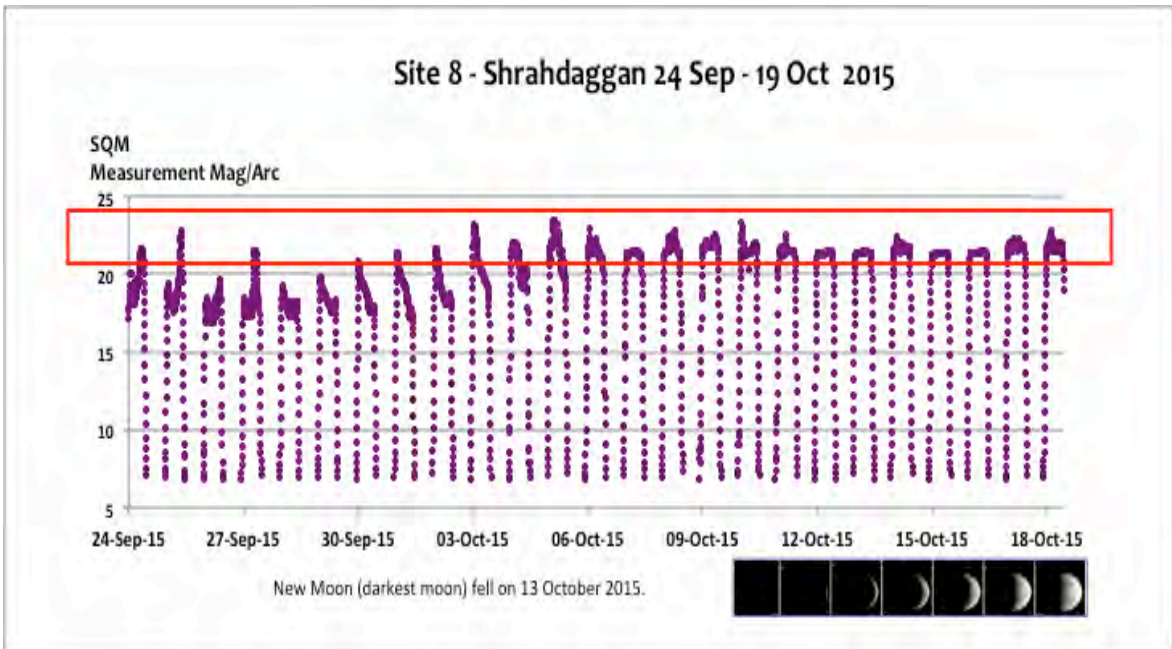


Figure 40; Site 8 Shrahdaggan 24 Sept to 19 Oct

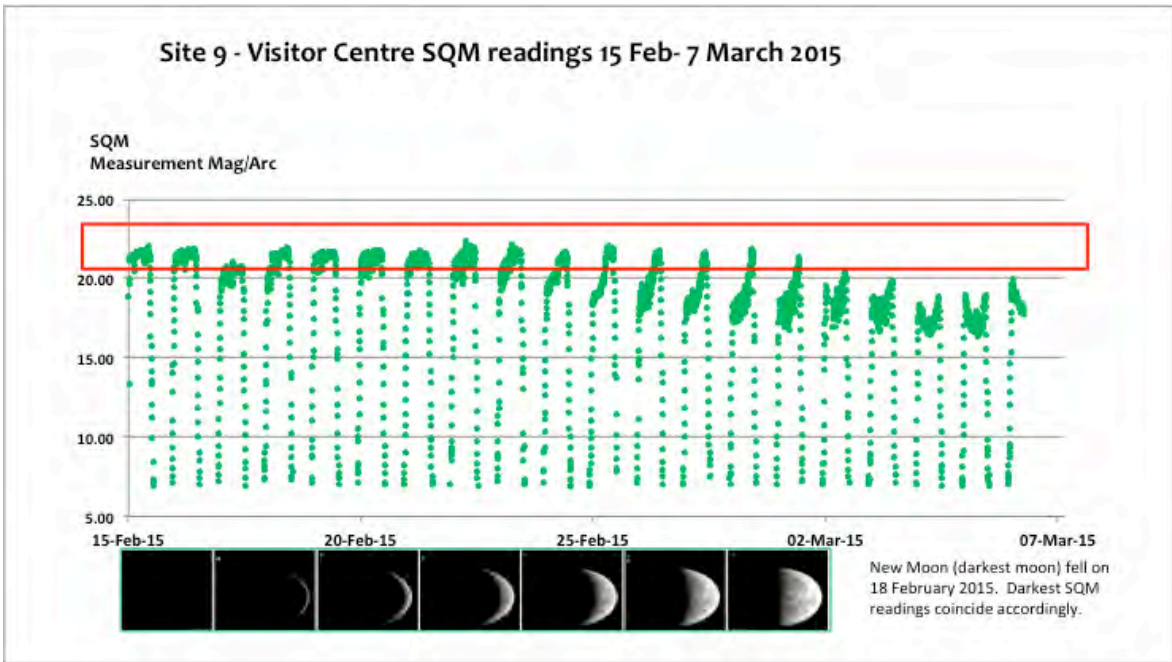


Figure 41: Site 9 Visitor Centre SQM readings 15 Feb - 7 Mar 2015

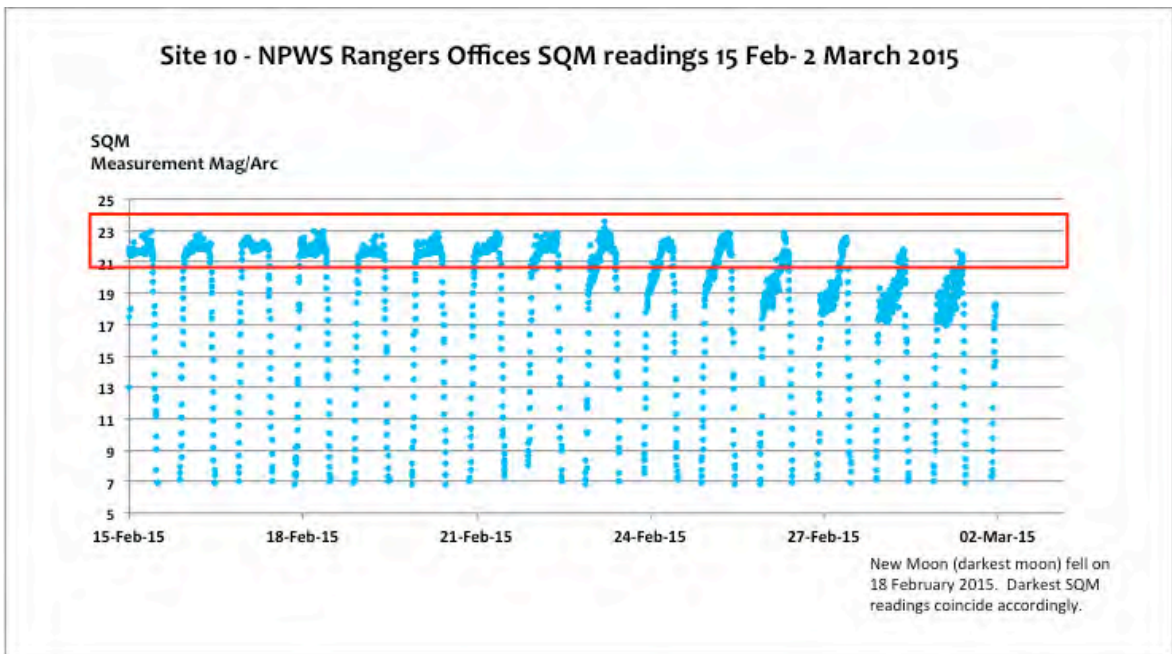


Figure 42: Site 10 Rangers Office SQM readings 15 Feb to 2nd March

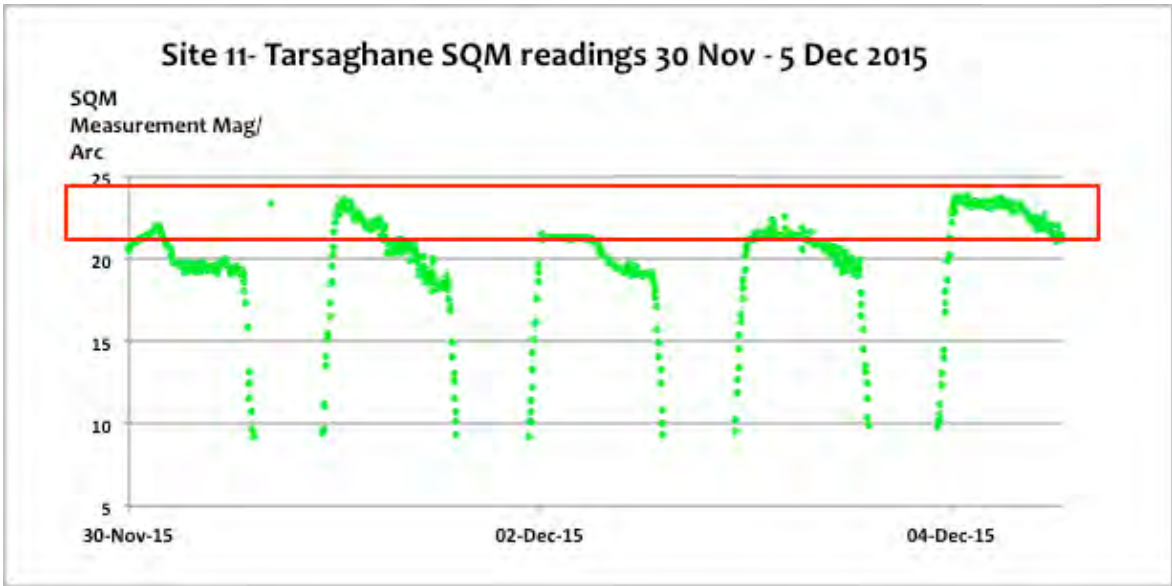


Figure 43 Site 11 Tarsaghuan Beg 30 Nov - 5 Dec 2015

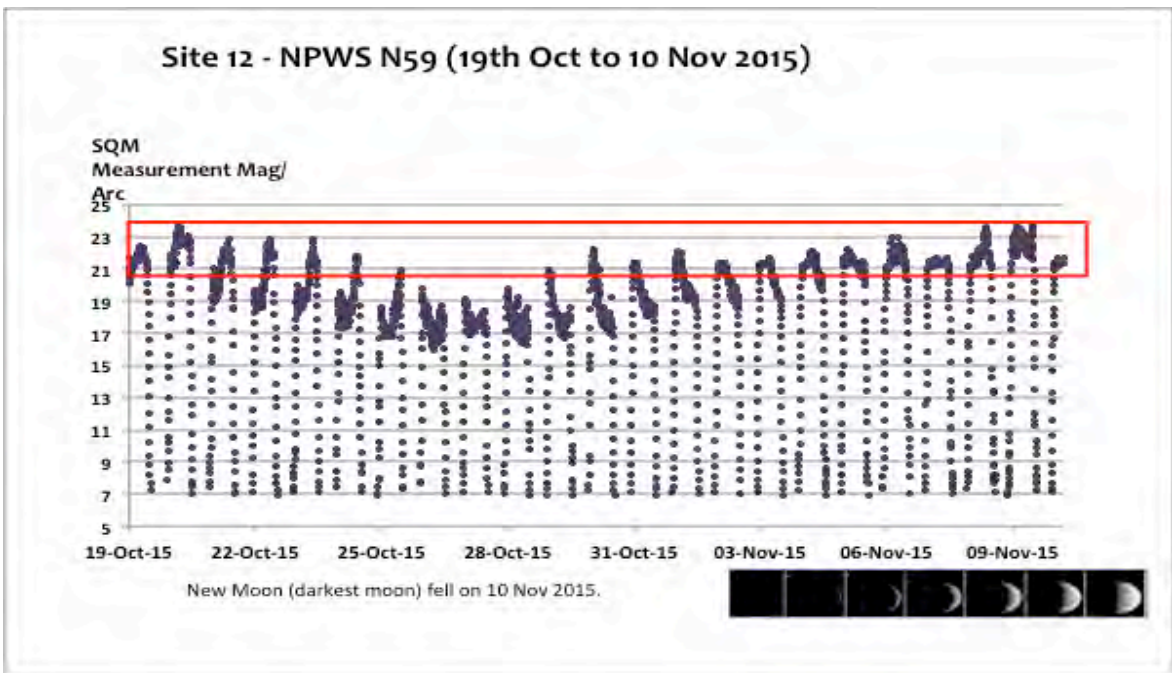


Figure 44: Site 12 N59 19 Oct to 10 Nov 2015

13.2 Interpreting the chart data

A number of factors contribute to how dark the night sky is, including the moon, milky-way, airglow from gases in the atmosphere, and the largest contributor - light pollution from man-made sources of illumination. Readings showing a smoother arc line indicate a clearer night, whereas those with a scattered line indicate that the weather on the night in question was cloudy. Cloud cover reflects light, which can adversely affect readings in otherwise very dark locations.

The charts also include information on the lunar cycle to explain why the readings fluctuate throughout the period displayed. As a point of reference, a new moon (i.e. the darkest moon), fell on 18th February 2015, and the graphs indicate darker skies at that time.

The vertical axes illustrate the magnitudes per square arc second (mpsas). As indicated previously, the higher the number; the darker the sky reading. Therefore, the most significant readings for this research are those highlighted by the red rectangle.

13.3 Classification of Award

Our data logging meters returned in excess of 40,000 readings of dark-sky measurement. This provided an unprecedented amount of statistical data on light pollution in Ireland for analysis. The expert view on the accuracy of SQMs in extremely dark locations is that they become somewhat unreliable at the lowest sky brightnesses (Bará et al. 2014). Our data regularly exceeded 21.9 mpsas, the tipping point for relying upon SQM and we therefore disregarded thousands of records.

Meter Calibration

We point out that the SQM-DL meters used for the initial survey were inter-calibrated to enable comparisons of the data to be made. A correction,

subtracted from each meter's reading, amounted to no more than 0.07 mpsas. In addition, a correction of -0.10 magnitudes was also applied to all readings to allow for light loss in a (clean) window of the weatherproof housing.

We requested that Lumineux Consultants compared our meter with a number of others, which constitute the Dutch light pollution network. The study found that our meter tended to yield *brighter* magnitudes (offset 0.265 mpsas), although we note that older meters may yield slightly fainter readings as they age (Spoelstra 2015). Whereas the range tested does not extend to the faintest magnitudes, the relationship is very linear to below 20 mpsas (see Appendix iv).

IDA Award Designation Indicators

In addition to the large cross-set of SQM data readings, we believe our site complies with Gold-Tier IDA requirements on the basis the following indicators listed in the IDA guidelines for designation:

Philosophy - as evidenced by readings, photography and visual conditions, Ballycroy National Park & Wild Nephin exceeds the Gold-tier indicator with negligible impacts from light pollution; the site has zero lighting for extensive distances as evidenced by night sky photography and light pollution map on page 23.

Artificial Light & Skyglow - typical observer would never be distracted by glaring light sources. Light domes are either non-existent or dim/close to the horizon;

Observable Sky Phenomena - visiting astronomers have been extremely excited by the array of phenomena (including Aurora) observed at this site. The Milky Way is easily visible as are meteor showers and zodiacal light;

Nocturnal environment - as an area already designated and protected for wildlife conservation, the site of Ballycroy National Park & Wild Nephin excels on this indicator for Gold-tier status. The area is devoid of lights that would cause wildlife disorientation and a team of Park Rangers are constantly monitoring the nocturnal environment for research and conservation;

Light Measurements - as evidenced by sky photography, visual observation of astronomers and SQM reporting, under clear skies, this site excels in Visual Limiting Magnitude, Bortle Scale and Unihedron Sky Quality Meters.

Future security - In addition to exceeding the above indicators, the strength of management and commitment to dark-sky protection by our National Parks and Wildlife Service (for the first time in Ireland) is a significant part of this application. This provides security to ensure that the Dark-sky Park will be managed with longevity in mind and has the potential to be replicated at other National Parks across the country. The Mayo Dark-skies Project was escalated through the governing department to An Taoiseach (Irish Prime Minister) and two supporting letters from Ministers of Department are provided with this application.

Facilities - The Visitor Centre at Ballycroy National Park already has excellent facilities, all of which are free of charge to visitors. The 2016 Programme plans to prioritise the Dark-sky Park on the educational events list of the National Park.

In conclusion, the visual conditions across most of the Ballycroy National Park / Wild Nephin site are substantially similar to those of most Gold-tier IDA Dark Sky Places.

Calibration References:

Salvador Bará, Brian Espey, Fabio Falchi, Christopher CM Kyba, Miguel Nieves, Paolo Pescatori, Salvador J. Ribas, Alejandro Sánchez de Miguel,, Philipp Staubmann, Carlos Tapia Ayuga, Günther Wuchterl, Jaime Zamorano 2014 Report of the 2014 LoNNe Intercomparison Campaign, available at:

http://www.cost-lonne.eu/wp-content/uploads/2015/07/2014_LoNNe_Intercomparison_Report.pdf
(downloaded on 8th Feb 2016)

Chelmos Observatory in Greece (<http://helmos.astro.noa.gr/about.html>)

14. Future Monitoring Responsibilities

NPWS management will appoint staff to assume responsibility for the Dark-sky Park. This will include, inter alia, a quarterly monitoring programme for the sky quality measurement. NPWS has already purchased five Unihedron SQM-LU-DL and one handheld SQM-L unit to carry out future monitoring responsibilities. A member of the park-ranger staff has also been actively involved in the preliminary fieldwork required to measure dark-sky readings for this application.

Quarterly readings will be taken over new moon periods from at least 4 locations within the future dark-sky park. The locations selected will include the most frequently visited site as well as at least one of the more remote sites. The data will be transferred into graphical /chart format and included in the annual report and any significant decline in sky quality measurement will be investigated. This data will also be shared with Friends of Mayo Dark-skies for educational/research purposes relating to light pollution.

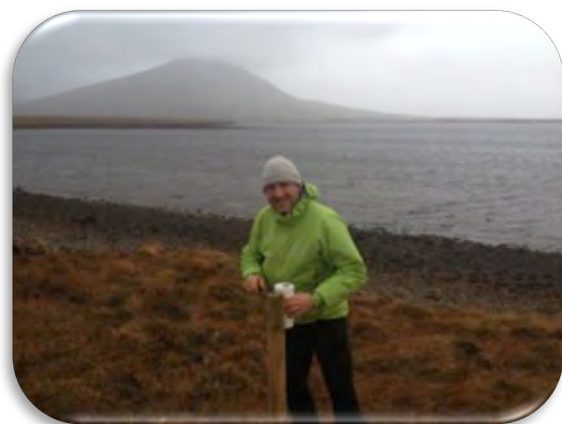


Figure 45: Managing Dark-sky Monitoring sites

15. Lightscape Management Plan

The lightscape management plan has been prepared in collaboration with lighting management authorities who are responsible for lighting within and beyond the proposed Dark-sky Park area. Lighting management objectives have been agreed so that they are practical and there is support for a long-term vision to conserve and enhance the dark sky quality of the region through responsible lighting management.

The objectives of this Lightscape Management Plan are:

- To ensure the preservation of pristine dark-skies over and beyond Ballycroy National Park & Wild Nephin.
- To promote the reduction in light pollution and light waste wherever possible whilst demonstrating good night-time lighting practices.
- To seek improvement in the nocturnal environment of wildlife,
- To protect and expand dark observing sites for astronomy, and provide accessible locations for the general public to experience the naturally starry skies of Mayo.
- To provide guidelines for the management of existing and future lighting within and beyond the Dark-sky park

The plan has been prepared in accordance with guidelines from the International Dark-sky Association and also where relevant, Outdoor Lighting Guidelines for Dark-Sky preserves, from The Royal Astronomical Society of Canada.

This plan promotes the adoption of best practice in planning for lighting, the use of appropriate lighting fixtures and their correct installation. It also aims to provide practical advice on mitigating obtrusive light both within and outside of the National Park boundary.

The key elements of the best practice ethics within this plan are as follows:

Lighting shall only be used where it is needed, when it is needed and in the appropriate amount for the specified task required.

Outdoor lighting fixtures should be fully shielded and make appropriate use of timers and motion sensors.

The IDSA guidelines state “*the LMP should conform to, or surpass agency or departmental policy on lighting and dark sky protection as well as other applicable guidance and laws (e.g. environmental leadership programs, agency orders, wilderness act, energy management guidelines).*”

As stated in The National Energy Efficiency Action Plan 2009-2020, the Public Sector has been challenged to reach energy-efficiency savings of 33% by 2020. This target requires management commitment at the highest level and the involvement of all public sector employees.

This Lightscape Management Plan is the first of its kind to be adopted by the NPWS/Wild Nephin management team. It represents a leadership template for other complimentary environmental programmes. Mayo County Council has also noted that the Dark-sky policies will assist the authority in achieving its energy efficiency obligations by 33% has prompted the council to look at innovations such as part-night lighting of street dimming in public areas outside of the Dark-sky designated land.

Lighting within the proposed Dark-sky Park

The majority of the proposed Mayo International Dark-sky Park encompassing 15,000 hectares has no artificial lighting whatsoever. Only two locations have on-site lighting and these are; the National Park Visitor Centre and the Park Rangers Offices at Lagduff. The latter premises are not accessible to the public due to security reasons (this is the only area in the whole of the proposed Dark-sky park that is not publicly accessible). These external lighting fixtures are

documented in the accompanying Lighting Inventory, together with the rationale behind these lighting fixture details of when they would be in use.

Lighting within these two sites is the responsibility of the National Parks and Wildlife Service, who outsource the duties for maintenance of external lighting to the Office of Public Works (OPW), a government owned service organisation providing Estate Portfolio Management and Flood Risk Management Services across Ireland.

Lighting outside of the Dark-sky Park

Public lighting in surrounding villages and small towns is managed by Mayo County Council who outsource to a public maintenance contractor, Electric Skyline. We have worked closely with both parties to ensure that policy and planning for public lighting in these areas will be managed in accordance with the objectives of this plan.

It should be noted that the proposed Dark-sky Park does not have the statutory power to request that local residents, businesses or organization replace existing external lighting. However, we have developed a plan of education designed to influence the local community to encourage change as the awareness of potential light pollution is increased

Light Management Policy Statements

1. To continue to improve existing lighting fixtures on the two properties within the Dark-sky park to achieve an objective of 100% compliance within the next two years, providing the fixtures continue to meet health & safety obligations and regulations. This policy exceeds the requirement for 90% compliance within a five year target.
2. Any future replacement of existing fitted within the park properties thereafter shall maintain or exceed the dark-sky guidelines.

3. All outdoor lighting fixtures with the park properties must be fully shielded and make appropriate use of timers and motion sensors.
4. To ensure that the correlated color temperature of lamps in outdoor lighting within park property shall not exceed 4000 Kelvins.
5. To adopt a policy of not illuminating previously unlit areas of park owned land, unless specifically for issues of human or animal safety and or welfare.
6. To adopt a policy prohibiting illuminated signs within the Dark-sky Park. To improve the visibility of signs after dark, their location, colour scheme, and material should permit reading the sign with flashlights or existing lighting.
7. To maintain a self-imposed curfew of zero lighting on Park property lighting when buildings are not in use. Any future security camera arrangements should be installed using infra-red lighting or motion sensor lighting only.
8. To continue to actively engage with local residents in the surrounding towns and areas of the Dark-sky park, providing advice and guidance on good lighting practices that are dark-sky compliant. In particular, to ensure that no lighting will be allowed to be projected into the dark-sky park from adjacent property owners.
9. To continue our SQM sky monitoring programme to ensure the existing sky quality does not diminish and maintain records and an annual report to demonstrate this monitoring.

10. To continue active engagement with Mayo County Council to request improvement or adaption of street lighting within the surrounding villages of the proposed dark-sky park. Such changes might include, but not be limited to; proposed retrofit/replacement, timing alteration, reduction in wattage.
11. To actively encourage all residential and commercial properties surrounding the Dark-sky Park to adopt a policy of zero, or to reduce as far as practicable, exterior lighting after 22.30 hours. This should not inhibit the need for businesses to manage out-of-hours duties in accordance with health and safety legislation.
12. The policies identified in this Light Management Plan should in no way endanger human or farm livestock by restrictive lighting practice.

16. Lighting Inventory

Lighting on the grounds owned by the National Park includes two sites as detailed below.



Premises 1 - Ballycroy National Park Visitor Centre				
Fixture Make & (Wattage)	Quant.	Fully Shielded	Compliant	Application/Curfew in place
Vik HPS (70W)	5	No (see photo)	No	Not in use at any time - requested removal asap
Disano Faro 1230 (18W)	18	Yes with Louvre (see photo)	Yes	Walkway bollards only in use during open events. Curfew in place for all other times.
WE-EF 108-0010 PFL240 (150W)	24	Full Cut Off (see photo)	Yes	Car park lighting as prescribed upon original building spec in 2009. Only in use for open events. Curfew in place to switch off when building not in use.
Bulkhead (8W)	2	No (see photo)	No	Curfew in place to switch off when building not in use. Replacement downlight requested.
Premises 2 - NPWS Rangers Offices, Lagduff				
Entrance/Doorway Bulkhead type (18W) under soffits	6	No (see photo)	Yes	Curfew in place to switch off when building not in use.
WE-EF 108-0010 PFL240 (150W)	1	Yes	Yes	Not in use. Originally installed for security purposes, requested removal.
Gable end bulkheads	3	No	No	Requested removal or replacement with downlight/compliant.
Total	59			

Lighting 84% compliant at time of application.


It should be noted that lighting fixtures were specified by the OPW at the time of building completion in 2009 and purchase of the Lagduff office site. The Visitor Centre lighting covers a large car park area and walkway around the

building itself. The lighting specifications adhered to health and safety requirements providing sufficient lighting for security camera recordings at the time. The current fixtures are now under review with recommendations for decommission and replacements as detailed in the lighting inventory table.

	
<p>Under soffit lighting (rangers office)</p>	<p>Bollard lighting (Visitor Centre)</p>
	
<p>Car Park lighting (Visitor Centre)</p>	<p>Outdoor Stairwell bulk (Visitor Centre) To be replaced.</p>

	
<p>Gable end light (Ranger's Offices)- to be removed or replaced.</p>	<p>Not in use at all - to be removed.</p>
<p>Examples of lighting at 2 NP sites incl compliant & non compliant (see inventory)</p>	

Lighting fixture types recommended to replace above types:

	Description & purpose
	<p>Bollard lighting 1 x 11W LED bulb SLV Quadrasyl 75</p>

	<p>TIVOLI IP65 LED outdoor wall light 1 x 3W LED</p>
	<p>Lumecon LWP-FC-30 LED Wall Pack 32 W. Outdoor security/Wall light</p>
	<p>Round LED outdoor spotlight Meret, IP54. 6 x 1 W Cree LED Outdoor downlighter</p>

Light inventory Confirmation from Park Administrator

Susan Callaghan - (DAHG) <Susan.Callaghan@ahg.gov.ie>
To: "mayodarksky@gmail.com" <mayodarksky@gmail.com>

Mon, Jan 25, 2016 at 10:09 AM

Hi Georgia,

To confirm that the light inventory is accurate and it can be included in the Dark Sky Park application.

Regards,

Sue

Sent from my Samsung device



Public Street Lighting Inventory

The street lighting inventory provided below gives an outline of the villages along the secondary road network surrounding the proposed dark-sky park. The control of public lighting listed below is outside of the scope of the Dark-sky management and falls within control of Mayo County Council. However, it has been included for information purposes as the county council has agreed to work on bringing all lighting in the region into dark-sky compliance.

Town/Village name:	Ballycroy
Distance from nearest dark-sky boundary	<1km
Population	500 (inc townlands)

Lamp Type	Watts	Quantity	Duty Cycle
SON	150W	9	Dusk/Dawn
SOX	55W	3	Dusk/Dawn
SXHF	55W	1	Dusk/Dawn
SON	70W	7	Dusk/Dawn**

** Agreement reached to switch to part-night lighting scheme.

Town/Village name:	Bangor Erris
Distance from nearest dark-sky boundary	4.5km
Population	500

Lamp Type	Watts	Quantity	Duty Cycle
SON	150W	31	Dusk/Dawn
SON	70W	43	Dusk/Dawn

Town/Village name:	Mulranny
Distance from nearest dark-sky boundary	4.5km
Population	450

Lamp Type	Watts	Quantity	Duty Cycle
Philips LUMA 1 LED	90W 4000K	20	Dusk/Dawn**
Milano IPP Class 1 LED	24 x 2.4W 4500K	8	Dusk/Dawn **
SON	150W	43	Dusk/Dawn

**New LED village lighting changed to dimmable from 10pm

Town/Village name:	Newport
Distance from nearest dark-sky boundary	11.5km
Population	600

Lamp Type	Watts	Quantity	Duty Cycle
SOX	135	23	Dusk/Dawn
SON	150W	1	Dusk/Dawn
SON	70W	23	Dusk/Dawn

17. Acknowledgements

The Friends of Mayo Dark-skies Steering group would like to thank all those who contributed to or supported this application in any way. In particular, sincere thanks to John Barentine of the IDA for his continuous advice and guidance. Prof. Brian Espey, Martyn Taig of Bloomwaters Illustrations, Anthony Tekatch of Unihedron, Brian Wilson, Steven Hanley, Lynda Huxley, Orla Prendergast, Yvonne McDermott, Mary Henning, Mick Smith & Arts Squad, Maeve Foran, Barry Dalby, Seamus Butler, Sean Corcoran, Sabina Trench, Ruth Coulthard, Leslie Fry, Duncan Wise, Albert White, Julie Ormonde and John O'Mahony.

In the absence of closing remarks, the reader is invited to simply appreciate the majestic Milky Way, in a view of the night-time skies of County Mayo.



Figure 46: "Twisted Sisters" by kind permission of Brian Wilson

18. Letters of Support

We are pleased to present the following letters of support in addition to the management and structural letters provided at the start of this application. This indicates the strength of our application and also the value places upon our night-skies across a broad spectrum of supporting parties.

1. Minister for Arts, Heritage and the Gaeltacht
2. Minister of State for Tourism & Sport
3. Mayo County Council (Director of Planning, Economic & Community Development)
4. Electric Skyline (County Lighting Contractor)
5. Prof Brian Espey - Trinity College Dublin (Physics & Astrophysics Dept)
6. Dark Skies Ireland (Irish Chapter of the International Dark-sky Association)
7. Galway Mayo Institute of Technology - Heritage/ Green Campus
8. The Heritage Council (Head of Policy & Research)
9. An Taisce (The National Trust for Ireland)
10. Leave No Trace (Educational Outdoor Ethics Programme)
11. Bat Conservation Ireland
12. Dr Elvira de Eyto - Marine Institute
13. Dr Aoibhinn Ní Shúilleabháin (National TV Science Presenter)
14. South West Mayo Development Company (Rural Recreation Officer)
15. Erris Beo (Erris Tourism Board)
16. Newport National School
17. Newport and District Development Company
18. Mulranny Community Futures
19. Belmullet Tidy Towns
20. Dara Calleary TD - Local Politician
21. Mairead McGuinness - Vice-president of the European Parliament
22. Rose Conway-Walsh - Local Politician



An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
Oifig an Aire
Office of the Minister

Susan.Callaghan@ahg.gov.ie

22nd
January, 2016

Dear Ms. O'Callaghan,

Thank you for your communications as Chair of the standing committee that is leading in the application to the Dark Skies Association for recognition of Ballycroy National Park as an exceptional area for star gazing.

It is noted that Ballycroy National Park encompasses 11,000 hectares of blanket bog, heath and mountainous terrain covering a vast uninhabited and unspoilt wilderness dominated by the Nephin Beg Mountain range. This National Park has exceptional quality for star gazing due to the sparse nature of surrounding villages and houses and the clean air quality.

Designation of the National Park as a Dark Sky Park would provide many benefits including an off-season tourism attraction, outreach environmental education opportunities on the importance of air quality and the reduction of light pollution and energy awareness. It would also heighten understanding of the sciences and astronomy and the importance of preserving night sky quality.

Accordingly, as Minister for the Arts, Heritage and Local Government I am delighted to support this initiative and the bid to designate Ballycroy National Park as a Dark Sky Park.

Yours sincerely,

Heather Humphreys TD

Minister for Arts, Heritage and the Gaeltacht

Oifig an Dáilcheantair - Aonad 2, Bóthar an Mheal,
Muineachán, Co.Mhuineacháin, Éire.
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Facs/Fax: (047) 71912
Ríomhphost/E-mail: heather.humphreys@oir.ie

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limistéar 01
Gréasán: www.ahg.gov.ie
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**An Roinn Iompair
Turasoireachta agus Spóirt**

**Department of Transport,
Tourism and Sport**

Oifig an Aire Stáit • Office of the Minister of State

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All correspondence to be forwarded to Constituency Office

Quay Street, Westport, Co. Mayo, F28 FT96

Tel: 098-27012, Fax: 098-27644, Email: michael.ring@oir.ie

05 November 2015

To whom it may concern,

As Minister of State for Tourism & Sport, I wish to strongly support the application for a Dark Sky Park in Ballycroy, Co. Mayo.

Ballycroy is an area of outstanding natural beauty and the nocturnal environment is particularly spectacular for astronomy enthusiasts.

It is known that preserving natural darkness has positive effects on nocturnal wildlife within Dark Sky Park areas, which would also result in an increase in visitors to this area of natural beauty, particularly during the off-peak tourist season.

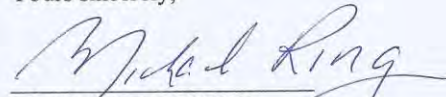
I understand that the project will live in Ballycroy National Park. The National Park in Ballycroy has created a lot of interest from visitors, both national and international. The granting of this Dark Sky Park to Ballycroy would be of a tremendous boost for Ballycroy and the surrounding areas.

If approval were secured for the Dark Sky Park in Ballycroy then it would mean that the Ballycroy National Park would be open all year round. This would be of substantial benefit to everybody involved.

I understand that Ballycroy Community Council, Ballycroy Tourism, Mayo County Council, the National Parks & Wildlife Service and Coillte are all working together to bring the Ballycroy Dark Sky Park to fruition. I wish to fully endorse their application.

As Minister of State for Tourism & Sport, I am anxious to support this application in any way possible. Should you need any further information, please do not hesitate to contact me.

With kind regards,
Yours sincerely,


MICHAEL RING T.D.
Minister of State for Tourism & Sport



Comhairle Contae Mhaigh Eo

Áras an Chontae, Caisleán an Bharraigh, Contae Mhaigh Eo.
Teileafón: (094) 9024444 Facs: (094) 9023937

Do Thag. / Your Ref.

Ár dTag. / Our Ref.

8th January 2016

RE: Mayo County Council proactively in support of the Mayo Dark Skies Project.

Dear Gerald,

Over the last few months Robert Coyne from my Tourism Unit has provided me with regular updates on your project, "**Mayo Dark Skies**", which covers The Ballycroy National Park and Wild Nephin Areas of County Mayo. Mayo County Council (MCC) is very supportive of this concept and of your intention to secure international recognition for the natural benefits which the Ballycroy National Park and Wild Nephin Area currently enjoy. Our goals and objectives of making the Mayo Dark Skies Reserve a location that can be used internationally as an example of best practice are entirely complimentary.

Mayo County Council (MCC) is the planning authority for the Ballycroy National Park & Wild Nephin Area and is extremely aware of the potential benefits to be accrued from a designation proposal as outlined. In addition MCC has responsibility for the upkeep of the public lighting network across the entire county, and are continually looking at ways to improve this network. There is now a shift towards rolling out and retrofitting with energy efficient lighting into the public lighting landscape. All future public lighting procured by MCC will be designed in an energy efficient way that will be Dark Sky compliant.

This policy will also help MCC achieve a 33% energy saving reduction by 2020 and we would be happy to discuss further innovations such as part-night lighting or street dimming with yourselves in due course.

Mayo is fortunate to have an amazing night sky and it is our aim to maximise the benefit this provides. We will continue in our endeavours to alleviate unnecessary lighting pollution.

Yours sincerely

JOANNE GREHAN

Director - Planning, Economic and Community Development



11th January 2016

Ged Dowling
Mayo Dark Sky's Project
Ballycroy
Co Mayo

Re: Electric Skyline Support for Mayo Dark Sky's Project

Dear Ged,

Electric Skyline presently are the Public lighting Maintenance contractors for 14,000 Public Lights throughout the county. We hold this contract till 2020. As the contractor we are backing the Dark Sky's Project and as part of this will advise Mayo County Council when choosing new lighting to consider the following:

- Consider Light Pollution when upgrading lighting schemes throughout towns and villages
- Street Lighting Policy, help prepare a Street Lighting Policy which could include Environmental Lighting Zones to ensure that the appropriate lighting levels are used in each zone, with very strict requirements applying in identified dark areas.
- Part-night lighting schemes, encourage local authorities to investigate how part-night lighting schemes (e.g. switching off between midnight and 5am) or dimming could work in their areas, including examining the cost, energy and carbon savings. This should be done in full consultation with the local community.
- LED lighting, Mayo Council have already adapted LED has the future lights source for the county
- Targets for replacing lights, Mayo County Council are considering at present how to achieve the 33% energy saving by 2020 and lighting is the easiest and quickest way to achieve this. We will advise them on this
- Preserving dark skies, it is Electric Skyline intention to preserve dark skies and ensure all new scheme's take this into consideration.

I wish you the very best with the project and please be aware that Electric Skyline are available for queries or advice for the duration of the project.

Yours faithfully,

Sean Corcoran
Managing Director



Ms. Georgia MacMillan
Mayo Dark Skies,
No. 2, Acres Grove,
Newport,
County Mayo

Dear Georgia,

As you know, I am an astrophysicist who has been involved in light pollution work since 2009 because of my interest in observing the night sky for research as well as outreach and have been assisting with the measurement, analysis, and outreach aspects of the Mayo Dark Skies proposal.

Your measurement work, using the SQM Data loggers is the most extensive in Ireland to date, and supports your assertion that Mayo has pristine skies over a wide area. As such, I am keen to support your application for an ID-SA designation to both preserve and protect this important location, which is important from the point-of-view of both sky and ecological considerations, as well as having the potential to boost eco-tourism in the area.

From my visits I have found an engaged and active community of people working towards the goal of obtaining Dark Skies accreditation and I am delighted to support your work and I wish you the very best in turning this proposal into a de facto International Dark Sky Association recognised reserve.

With every good wish,

Brian Espey

Prof. Physics & Astrophysics

An tOllamh Brian Espey

OLLAMH COHMLACH, FÍSIC AGUS RÉALFÍSIC

Scoil na Fíisce

Coláiste na Tríonóide,
Baile Átha Cliath,

Prof. Brian Espey

ASSOCIATE PROFESSOR, PHYSICS & ASTROPHYSICS

School of Physics

Trinity College Dublin,
The University of Dublin,

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Brian.Espey@tcd.ie

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Dark Sky Ireland
c/o 5 Wolverson Glen,
Dalkey,
Co. Dublin

January 8, 2016

Georgia MacMillan,
Ballycroy National Park

cc International Dark Sky Association,
USA

Dear Georgia and International Dark Sky Association,

I am very happy to support the creation of the Mayo International Dark-Sky Wilderness Park.

The National Park is a great example of a blanket bog system, is part of a Special Area of Conservation and has the Nephin Beg mountain range dominating the landscape. With such an unspoiled natural resource and small rural communities surrounding it, it is not a surprise that the park also has very little light pollution.

Its remote location on Ireland's west coast is a popular tourist location, yet the major Irish towns and Cities such as Galway, Sligo and Castlebar are all within a two hour drive. This makes the proposed Dark Sky Park easily accessible to many people thought the year and will help boost the local tourist industry particular in the low season. Indeed amateur astronomers from around the country have made visits to the park since the idea of creating a Dark Sky Park was proposed.

The park has an existing Visitor Center which hosts exhibitions and talks on the wildlife, geology and local history. Dark Sky and Astronomy outreach will fit in well with the existing activities of the Center and is sure to bring a greater understanding of our astronomical heritage and nocturnal ecology to the many visitors to the area.

I hope that the IDA will grant Dark Sky Park status to the project.

Yours Sincerely,

Albert White MSc. FRAS
Dark Skies Ireland, Irish Chapter of the International Dark Sky Association



GMIT

INSTITIÚID TEICNEOLAÍOCHTA NA GAILLIMHE-MAIGH EO
GALWAY-MAYO INSTITUTE OF TECHNOLOGY

Campas Mhaigh Eo, Bóthar Chathair na Mart,
Caisleán an Bharraigh, Co Mhaigh Eo, Éire

Mayo Campus, Westport Road, Castlebar,
Co Mayo, Ireland

22nd January 2016

Re: Ballycroy National Park Dark Skies Application

To Whom It May Concern:

In my capacity as lecturer in Heritage Studies and as Green Campus Secretary for GMIT Mayo Campus, I write in support of the Ballycroy National Park and Mayo Dark Skies application for official 'Dark Sky' status. On behalf of our Green Campus committee, I wish to articulate the committee's support of the application currently being lodged.

We have worked closely with the Mayo Dark Skies team to assist them in their efforts and to promote the dark skies concept and to highlight the impact of light pollution to our student population and the general public. This has included hosting talks by leading experts on the topic, in addition to hosting outdoor dark skies events. We are committed to continuing and expanding on these joint efforts and are currently exploring options for increased co-operation.

GMIT Mayo Campus is willing to offer on-going support to Mayo Dark Skies in their work. I strongly urge you to favourably consider their application for 'Dark Sky' status.

Best wishes,

Dr Yvonne McDermott
Assistant Lecturer in Heritage Studies
GMIT Mayo Campus
Westport Road
Castlebar
Co. Mayo
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3 November 2015

Friends of Mayo Dark Skies
c/o Georgia McMillan
2 Acres Grove,
Newport,
Mayo

Dear Georgia

On behalf of the Heritage Council I am delighted to support the bid by the Friends of Mayo Dark Skies to the International Dark-Sky Association for Dark Sky Park status in the Ballycroy area of Co Mayo.

Light pollution has a major impact on landscapes, wildlife, and the setting/ understanding of archaeological monuments and buildings throughout Ireland. The designation of a new Dark Sky Park at Ballycroy will raise awareness of the importance of protecting this aspect of our heritage, in addition to the benefits of protecting the resource of the Ballycroy area. It will be a welcome addition to the Dark Skies reserve on the Iveragh peninsula Co Kerry.

I wish you all the best with the bid.

Best wishes

Beatrice Kelly
Head of Policy and Research



Mayo Dark Sky Steering Group
Ballycroy National Park
Ballycroy
Co. Mayo

22.01.16

RE: Mayo Dark Sky Park - Ballcroy National Park and Wild Nephin Region.

To Whom It May Concern,

On behalf of An Taisce, - The National Trust for Ireland, I am delighted to support Mayo Dark Sky Park.

There are several implications caused by excessive artificial lighting including ecological, economic, health, historical and cultural consequences.

The designation of dark-sky zones would enhance awareness of light pollution, encourage the conservation of the night sky with the aim of protecting the environment, saving energy, money and resources and also protect astronomical amenity.

I hope you are successful in achieving this.

Yours Sincerely,

Doireann Ni Cheallaigh,

Planning and Environmental Policy Officer
An Taisce - The National Trust for Ireland



To whom it may concern,

Re: Letter of Support for Mayo Dark skies

Leave No Trace is an outdoor ethics programme designed to promote and inspire responsible outdoor recreation through education, research and partnerships. It is endorsed for outdoor recreation by Ireland's country side council "Comhairle na Tuaithe" and the Northern Ireland Outdoor Action Plan. Leave No Trace awareness courses are based on seven principles aimed at increasing personal responsibility and stewardship of the outdoors. This includes the impact on wildlife, consideration to other users and encourages consideration of the human impact people leave on the environment.

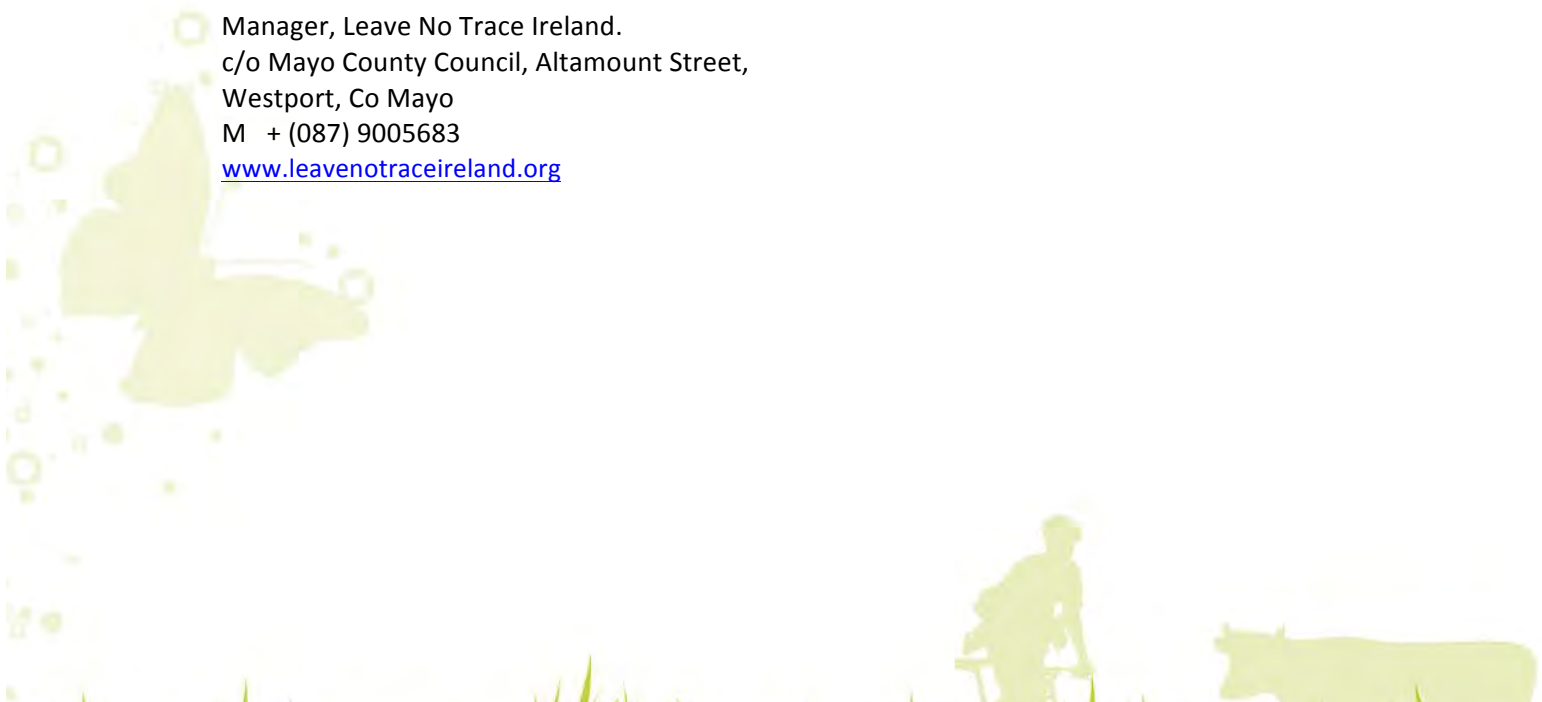
Education about light pollution fits well with the Leave No Trace educational and research values. Recently, Leave No Trace has established a very close working relationship with the Mayo Dark-skies team who are active trainers and have started to include Light pollution as a factor in the educational awareness courses. Leave No Trace fully support the initiative for Mayo International Dark-sky Park designation and wish the team success in their application.

Please do not hesitate to contact me if you.

Yours Sincerely

Maura Lyons,

Manager, Leave No Trace Ireland.
c/o Mayo County Council, Altamount Street,
Westport, Co Mayo
M + (087) 9005683
www.leavenotraceireland.org



Georgia MacMillan
Friends of Mayo Dark Skies Project
2 Acres Grove,
Newport,
Mayo
mayodarksky@gmail.com
georgia@internationalmagic.com

22nd January 2016

Dear Georgia,

At a meeting on 12th January 2016, the council of Bat Conservation Ireland unanimously decided to send you a letter of support for International recognition of Ballycroy National Park & Wild Nephin to become a dark-sky park.

All of the nine known bat species in the islands of Ireland are sensitive to the impacts of artificial lighting with some of our bat species being extremely light sensitive. Inappropriate lighting has caused bats to be denied access to roosts, foraging areas and commuting routes.

Older buildings and bridges are frequently roosted in by our most dark loving bat species and the practice of floodlighting these is a troubling and unnecessary expense. New lighting may cause bats to delay emerging from their roosts, expose bats to the risk of increase predation from raptors and cause bats to roost in sub-optimal conditions negatively affecting their breeding success.

Under the Habitats Directive 92/34, planning authorities must be satisfied that favourable conservation status of European protected species (including bats) can be maintained before granting planning permission. Unfortunately, the aforementioned are frequently overlooked when lighting is considered.

Bat Conservation Ireland are also aware that unnecessary lighting negatively affects other wildlife and that the lack of maintaining darkness at night may have serious implications for human well being and health.

We look forward to the successful recognition of Ballycroy National Park and Wild Nephin as a dark-sky park and hope that the campaign leads to the general reduction of light pollution and that we can all clearly see the stars throughout the islands of Ireland.

Best wishes,
Austin Hopkirk (Chairperson)

Foras na Mara
Rinn Mhaoil
Uarán Mór
Co. na Gaillimhe
Éire

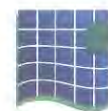
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institute.mail@marine.ie

www.marine.ie



Foras na Mara
Marine Institute

5th January 2015

To whom it may concern:

The Marine institute (previously the Salmon research Agency) has been conducting long term ecological research in the Burrishoole catchment in Mayo since 1959, primarily focussed on the biology of native diadromous fish species (salmon, trout and eel). We welcome the Mayo Dark Skies initiative, and feel that it will contribute positively to the development of North West Mayo as a tourist hub for those seeking to observe nature in one of the least anthropogenically impacted parts of Ireland.

Yours sincerely

Dr. Elvira de Eyto (on behalf of the Marine Institute)

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Baile Átha Cliath 2
Éire

Marine Institute
80 Harcourt Street
Dublin 2
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linkedin.com/company/marine-institute



September 2015

To whom it may concern,

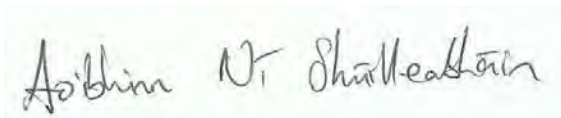
As a native of rural Mayo I am delighted to support the Mayo Dark Skies Ballycroy initiative. As a physics graduate, I am proud to acknowledge that my interest in the subject came from invaluable experiences of star-gazing in my back garden. The unpolluted night sky in this region of the west of Ireland provides unique opportunities for people to marvel and wonder at all our night sky has to offer from the Northern Lights to the Milky Way. Recognising the dark skies of North Mayo will be a wonderful asset to the county and will provide further reason for tourists to visit the county and for locals to value all that nature has to offer in the locale.

As a science educator, I am delighted that this project will focus on all there is to see in the night sky and have no doubt that more young people will be encouraged to be curious about the world around them as a result of this positive initiative.

I congratulate those who are promoting the Mayo Dark Skies Ballycroy and hope the project will garner wide support.

I wish you every success in your efforts to recognise, promote, and preserve the wonderful night-time vistas of this very special part of the West of Ireland.

Mise le meas agus le buíochas,

A handwritten signature in cursive script, reading "Aoibhinn Ní Shúilleabháin". The signature is written in black ink on a light-colored background.

Dr Aoibhinn Ní Shúilleabháin

Carey Walsh Building, Georges Street, Newport, Co. Mayo
Tel: 098 41950 Fax: 098 41952
Main Street, Balla, Co. Mayo
Tel: 094 936 6692 Fax: 094 936 6693
E-Mail: info@southmayo.com
Web: http://www.southmayo.com



To whom it may concern

The South West Mayo Development Company have been involved in the promotion and development of locally led tourism and recreation initiatives in the South and West regions of County Mayo for over twenty years.

We welcome the Mayo Dark Initiative and are delighted to be a part of this new and exciting project for the area.

We are confident the project will contribute positively to the range and scope of facilities available in the area.

Yours sincerely,

Martin Dillane
Rural Recreation Officer.

Directors: Michael Biggins; Gerry Butler; Mary Callaghan; Bernie Connolly; Angela Costello; Tom Gill; Donagh Gilmartin; Mary Jackson; Maura King; John Magee; Noreen McGarry; Patsy O'Brien; Seán Ó Coisdealbha; Michael O'Donnell; Mary O'Reilly; Margaret Sheehan; Anne Sweeney; Michael Walsh,
Company Secretary: Fionuala O'Malley
Registered in Dublin No. 182222. Recognised by the Revenue Commissioners as a Charity No. CHY 10482





20th January 2015

Re: Mayo Dark Sky Application - Ballycroy National Park & Wild Nephin

A chara,

As a community organisation, and as a tourism destination marketing organisation, Erris Beo is proud to have a great working relationship with Ballycroy National Park.

The Erris region has been voted the best place in Ireland to go wild! (*The Irish Times*) We are very proud of this title and indeed, it reflects everything that is wonderful about Erris – a region which has one of the longest coastlines on the Wild Atlantic Way. We have four lighthouses, which certainly attest to the sheer darkness of the area! People come here to experience the best of both worlds: solitude & silence / craic & ceol; daring watersports & coasteering escapades / tranquil walks & cycle routes; adventure & excitement / relaxation & rejuvenation. Visitors have commented on the uniqueness of the Erris light, during the day, which attracts artists & painters from all over the world. And, of course, people are blown away by the wonderful darkness of our night sky, where comets, meteors, shooting stars & galaxies “perform a show” every night! One visitor commented that she couldn’t believe how the night sky over Erris could be “so bright and black at the same time”.

The ethos of Erris Beo is to try and make the Erris region a better place in which to live, to work, and to visit. To that end, we are conscious of promoting tourism in a sustainable manner and in a responsible manner. Our environment, our culture and our heritage are very important to us, as a community organisation. We work very closely with Ballycroy National Park. For example (alongside Baile Slachtmhar Bhéal an Mhuirthead / Belmullet Tidy Towns) we organise an annual Midnight Corncrake Tour for the Erris Beo Festival, which attracts people from all over the country wishing to hear the elusive crex-crex call.

We are delighted to support the Mayo Dark Sky application. We endeavour to support and to encourage good lighting practices in Erris in any way that we can - to preserve our night sky not only for the enjoyment of locals & visitors alike, but also for heritage & cultural purposes.

We wish the Mayo Dark Sky group *ádh mór* and we look forward to welcoming more astro-tourists to the Erris region!

Le mór-mheas,

Rina Garrett

Tourism Development Manager



**MULRANNY
COMMUNITY
FUTURES**

27th January 2016

Mr Ged Dowling
Mayo Dark Project
Ballycroy
Co. Mayo.

Dear Ged,

Mulranny Community Futures are delighted to support the Friends of Mayo Dark Sky's in their application to the International Dark Sky Association for Dark Sky Park status for Ballycroy National Park and the Nephin Beg Mountains.

The night skies in this part of County Mayo are worth preserving as it is becoming more difficult with the spread of urban areas and the subsequent increase in light pollution to see the wonders of the night skies such as the Milky Way.

Tourism is a very important part of the economy in Mulranny and Ballycroy. The granting of Dark Sky Park status to Ballycroy National Park and the Nephin Beg Mountains will bring a whole new tourism sector to this beautiful and remote part of Mayo with increased visitor numbers to Ballycroy, Mulranny, Bangor and other surrounding small villages particularly in the off peak seasons.

We wish the committee every success with this endeavor.

Kind regards

Michael Hughes

Chairperson Mulranny Community Futures
Mulranny
Co. Mayo.



Newport | NS

Learning Together in Harmony

Newport National School, Newport, Co. Mayo

Georgia MacMillan
Friends of Mayo Dark Skies
c/o Ballycroy National Park
Ballycroy
Westport
Co. Mayo

17th January 2016

Dear Georgia,

I can't tell you how delighted I was to hear that Wild Nephin and Ballycroy National Park, right on our doorstep, were seeking official Dark Sky accreditation.

Newport National School has long celebrated the natural beauty and resources all around us. It is true to say that children can sometimes take for granted the rare natural beauty that is all round them, and here in Newport national school we are constantly looking for ways to encourage them to observe, appreciate and understand what an amazing natural and unspoilt environment they live in. The pupils in the school are regularly brought on day trips to both the National Park and to Letterkeen Woods. Most recently the children participated in the official opening of Wild Nephin Wilderness area and enjoyed workshops on foraging, water sampling and bushcraft. This led to the formation of a Science Club who meet regularly after school to share knowledge and carry out a variety of experiments. This year's project on local birds and their feeding habits was chosen for exhibition at the Primary Science Fair in the RDS.

The school is fully supportive of the Mayo Dark Sky initiative and wishes you and your team all the very best in your endeavours. We look forward to many more school projects involving Wild Nephin, Ballycroy National Park, and, hopefully, Mayo Dark Sky Park!

Yours sincerely,

Bird Chambers
Principal



Sue Callaghan
Friends of Mayo Dark Skies
c/o Ballycroy National Park
Ballycroy
Westport
Co. Mayo

10th December 2015

Dear Sue,

Newport and District Development Company (NADDCo) was established in 1994 to identify ways to promote Newport and surrounding areas as a place to live, work and visit. We understand and fully appreciate just how vital it is for small communities and towns to work together in remote rural areas in order to ensure they not only survive but thrive. We therefore salute you and your team for the initiative you have taken in seeking official Dark Sky accreditation for the area incorporating Wild Nephin and the Ballycroy National Park, an initiative that also sees the towns and villages of Newport, Mulranny, Ballycroy and Keenagh working together for a single purpose for the first time.

One of NADDCo's primary responsibilities is the manning and running of the Newport Community Tourist Office, which helps 5,000 visitors every year between May and October. We understand through talking to these visitors that what they love about this area north of Clew Bay is the unspoilt, authentic quality of the landscape and the people. To say that Mayo Dark Sky Park would constitute an important development for the area would be an understatement! With the growth of urban sprawl and its associated light pollution, more and more people will seek escape to unspoilt places with unlit skies, where many will see the majesty of the Milky Way for the very first time!

We would like to wish the working group associated with the project the very best of luck and assure you of our enthusiastic support. We look forward to working with you on future Dark Sky events.

Yours sincerely,

Fiona Hopkins
Chairperson, NADDCo

Áras Mhaolchiaráin,
Sráid an tSéipéil,
Béal an Mhuirthead,
Co. Mhaigh Eo



097 20977)
baileslachtmhar@gmail.com @
TidyTownsBelmullet f

23^ú Eanáir 2016

Georgia, a chara,

Who would have thought growing up and living in this wonderful corner of the world on the periphery of Ireland, on the periphery of Europe, that a dark sky was something not to be taken totally for granted! But with our growing awareness of light pollution and smog in other parts of the world it is indeed something to be treasured and preserved.

Even the least knowledgeable amongst us have always been able to look above and easily recognise the Plough, Ursa Major, Ursa Minor, The Milky Way and the Aurora Borealis!

Being part of the annual Tidy Towns competition, Baile Slachtmhar Bhéal an Mhuirthead are committed to achieving best environmental practice in all aspects of our daily lives in our town and in the surrounding area, with special emphasis on reducing any practice that would harm our precious wildlife. This obviously includes the conservation of our night sky and the elimination of any practice that would hinder this.

This is an area where the call of the corncrake is heard annually, where rocks millions of years old are covered in golden lichen (signifying the purity of our air), where the turnstones, brent geese and barnacles return each year, and where the Plough and Milky Way are clearly visible on a star-lit night. Lest there be any doubt about our appreciation for our dark skies we have a special name for a night filled with stars here on the west coast – *oíche spéirghéaláí!*

These are the skies that have been so beautifully photographed and exhibited in Brian Wilson's amazing exhibition last year in Ballycroy National Park. We fully support Ballycroy National Park and Wild Nephin in their Mayo Dark Sky application. Go n-éirí an t-ádh libh!

Is mise le meas,

Katherine Mangan

Cathaoirleach
Rúnaí
Cisteóir

Séamus Howard
Katherine Mangan
Margaret Tallott

086 6010959
097 81289
097 82367

Iorras Glan

Iorras Glas

Iorras Gaelach



DARA CALLEARY TD
WORKING FOR YOU IN MAYO

International Dark Sky Association

RE: Ballycroy Dark Skies Park, Ballycroy, Westport, Co. Mayo

3 November 2015

Dear Sirs,

I write on behalf of the Mayo Dark Skies - Ballycroy Dark Sky Park who are seeking approval from the IDSA to develop a Dark Sky Park at the above address.

I wish to fully endorse and support the proposed project and the development of a Dark Sky Park at Ballycroy National Park in county Mayo.

The National Park at Ballycroy has been identified as a strong contender to be developed into a Dark Sky Park with very strong possibilities for the community if such a project was developed.

I am available to assist the promoters in any way that helps to advance the plans and strongly endorse their proposal.

Sincerely,

Deputy Dara Calleary TD
Fianna Fáil Spokesperson for Enterprise, Jobs & Innovation





EUROPEAN PARLIAMENT

Member of the European Parliament

BY EMAIL

Breege Grealis
Ballycroy Community Centre,
Ballycroy,
Westport,
Co Mayo.

25.11.2015

RE: Letter of Support to the Dark Sky Initiative in Ballycroy

Dear Ms. Grealis

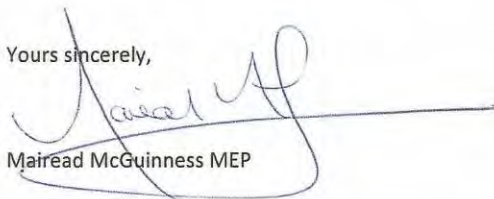
I would like to express my support for the creation of an International Dark Sky Park (IDSP) in Ballycroy, Westport, Co. Mayo.

Dark skies are a rarity. I understand that there are just 30 certified Dark Sky Parks worldwide and only 7 of which are located in Europe.

In Ireland, the Iveragh Peninsula Co. Kerry, has been designated as a Dark Sky Reserve.

I support the Ballycroy community in their ambition to have the Ballycroy National Park certified by the International Dark-Sky Association as an IDSP.

Yours sincerely,



Mairead McGuinness MEP

Mairead McGuinness MEP
Vice-President of the European Parliament

ASP 10 E 102, European Parliament, Rue Wiertz, B-1047 Brussels, Belgium
▪ Tel: +32 228 45214 ▪ Fax: +32 228 49214
▪ mairead.mcguinness@ep.europa.eu ▪ www.maireadmccguinness.ie



ROSE CONWAY-WALSH

Mayo County Councillor

Drum, Clogher, Ballina,

Co. Mayo, Ireland.

Mobile: (087) 284 6830

E-Mail: roseconwaywalsh@eircom.net

2nd November 2015

Breege Grealis
Ballycroy Dark Sky Park
Ballycroy Community centre
Ballycroy
Westport
Co Mayo

Dear Breege,

Re: Ballycroy Dark Sky Project

I write to give my full and wholesome support to the efforts that are being made to the Ballycroy Dark Sky Park project.

I do this on the basis that this is a unique opportunity to expand on development of Ballycroy National Park and associated developments.

I recognise the wonderful work done throughout the whole community and the collaboration with state agencies and the community and voluntary sector to bring this and other projects forward.

I firmly believe that the Dark Sky Park will bring much needed tourism to Ballycroy and the surrounding area and will compliment the Wild Atlantic Way and other progressive developments along the Western Seaboard.

In additional, the value in increased tourism will help create and sustain employment and enterprise creation in this high unemployment area.

I look forward to working with you to ensure the success of this initiative.

Kind regards

Rose Conway-Walsh

19. Friends of Mayo Dark-skies Steering Group

This application was prepared and collated by Georgia MacMillan and Ged Dowling with the help of the Friends of Mayo Dark Skies Steering group (individual members listed below):

Susan Callaghan - Head of Ballycroy National Park Visitor Centre

William Cormacan - Regional Manager, National Parks and Wildlife Service

Bríd Colhoun - Head Guide Ballycroy Visitor Centre

Leonard Floyd - Park Ranger Ballycroy National Park

Dermot Tiernan - Coillte / Wild Nephin

Fiona Hopkins - Newport Community Development

Carol Loftus - Mulranny Environmental Group

Breege Grealis - Ballycroy Community Group

Robert Coyne - Mayo County Council

Martin Dillane - South West Mayo Development Co

Ronan Newman - Galway Astronomy Club

Declan Holmes - Keenagh, Newport

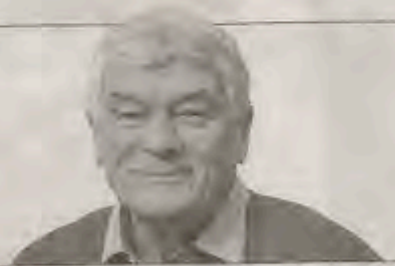
Christina Togher - Ballycroy

Cathal Masterson - Ballycroy

6 Environment

Another Life

Michael Viney



At the edge of Ireland, a window on the universe

A couple of winters after moving to Mayo I reported Venus to the Garda Síochána. There she was, on a starry February night, lying right on the sea's horizon and flickering with vivid flames, red, white and blue, in the unsteady eye of my binoculars.

I just thought, as I told the Louisburgh sergeant (we had one back then), that it might be a ship on fire or sending up flares. He called back, having checked with the coast guard, to reassure me.

Venus has apparently done other dramatic things lately, arriving at its perihelion, its closest point to the sun, and keeping an eight-yearly rendezvous with Spica, a whirling dumb-bell of two stars, each bigger and hotter than the sun. But, as I write, the weather has been doing some whirling of its own, blanking out the night sky and any glimpse of its brightest planet.

My pleasure in the stars is thus of the lyrical and gobsmacked variety rather than the astronomical. The privilege of living with so frequent and so stunning a window on the universe has been a profound reward of living at the western edge. Even coming up to Christmas, as reindeer gallop up gables and shining icicles chase around walls, most of Mayo stays blessedly dark on the twirling disco ball of the world lit up at night.

The reward, of course, is the promise of attracting, in winter, star-gazing tourists strung with binoculars or setting up tripods and telescopes.

The Kerry reserve sprang from the efforts of South Kerry Astronomy Group (south-kerry-astronomy-group.ie). A similar, if more modest, initiative is under way in Tipperary, where Shannonside Astronomy Club (shannonsideastronomy-club.com) has hopes of a "dark-sky park" centred on Lough Gur, Co Limerick, which has yielded the crucial SQM reading of 21.1.

All this finds support from Dark Sky Ireland (darksky.ie), which, like Georgia MacMillan, finds even more value in an unpolluted night than in filling B&Bs with star-struck winter hobbyists. Both are informed by research into the effects of light pollution on wildlife, plants and human health and happiness – light pollution disrupts the circadian cycle of night and day.

The toll on migrating birds of collision with lit buildings has been familiar, but the more subtle damage to wildlife of constant and diffusing light has now come under scrutiny. It disrupts the feeding and breeding cycles of insects, hormone rhythms of frogs, timings of flowers and leaf fall, survival of nocturnal animals and much more.

where on Nephin mountain, the great, shadowy backdrop to Ballycroy National Park and its 11,000 hectares of wilderness. That this should also become a gold-starred International Dark-Sky Park as designated by the International Dark-Sky Association (darksky.org) is the ambition of an eager project team with much national and local support.

A central figure is Georgia MacMillan, who, changing lifestyle in her mid-40s, has recently earned an honours degree in outdoor education at Galway-Mayo Institute of Technology in Castlebar. Research for her dissertation on the effects of light pollution and preserving the clarity of night skies involved long-term measurement of the darkness of Ballycroy nights.

This was done with readings from an SQM, a sky quality meter used by astronomers, which converts available light into magnitudes-per-square-arc-second, or "mags/arcsec²"; a really dark place scores more than 21. With meters on loan from Dr Brian Espey, an astrophysicist at Trinity College Dublin, the most sustained readings were above 21, recorded at a hillwalkers' hut on the Bangor trail, remote from towns and farm lights.

The Mayo project follows another in Co Kerry (kerrydarksky.com), designated the first gold tier Dark-Sky Reserve in the northern hemisphere, covering most of the Iveragh Peninsula. While Mayo can offer a park with public ownership and protection, Kerry's reserve depends on landowners and planners to preserve the quality of its darkness.

“The more subtle damage to wildlife of constant and diffusing light has now come under scrutiny

A lot depends on the way public light is used, on its shielding from the sky – even, it now seems, on its colour. As part of the Ballycroy project another graduate of GMIT, Gerard Dowling, is working on a light-management plan that offers dark-sky-friendly options to local communities and the county council.

Official dealings with the Republic's 420,000 public lights are first concerned with saving energy, and Mayo, as it happens, has been pioneering a trial of control by computerised “dimming and trimming” of street lights in the town of Crossmolina.

Another economically attractive option is LED street lights, which save energy and reduce sky glow. But the white-blue colour of their light can, it seems, raise stress levels in nearby nesting songbirds and upset their circadian rhythms.

I am frankly not surprised – the glare of LED yard lights is quite ghastly – and would agree with warming up the tone (but not, please, to the dispiriting sodium ambers of the past).

Michael Viney's *Reflections on Another Life*, a selection of columns from the past four decades, is available from IrishTimes.com/IrishTimesBooks





STARRY, STARRY NIGHT

CIARA
MOYNIHAN

LEWIS EDITOR
c.moynihan@mayonews.ie



Students on the GMT Mayo Outdoor Education programme are planning to celebrate darkness on Thursday, December 10, at Lough Lannagh, Castlebar. Don't worry, there will be no chanting, and no goats will be harmed. It's not that kind of darkness.

Here in Mayo, we are lucky enough to have some of the most beautiful night skies in Europe, thanks to the comparative lack of light pollution. By organising a 'night appreciation' evening, the students are contributing the Mayo Dark Skies Project, which was set up as a community group to prepare an application for International Dark-Sky recognition for the Ballycrov and Wild Nephin wilderness.

To get Dark-Sky recognition, an area not only needs to prove that it is sufficiently dark from an astronomy point of view, it must also engage with the wider community in nearby urban spaces through education and outreach events to raise awareness of light pollution and energy waste, and their impact on environmental issues.

In January 2014, the International Dark Sky Association named Kerry's Iveragh Peninsula the first International Dark Sky Place in Ireland. The Kerry Inter-

national Dark Sky Reserve also became the first Gold Tier-designated Reserve in the Northern Hemisphere - an achievement that has been trumpeted as a stellar string in the county's Wild Atlantic Way bow, placing the county at the forefront of potentially lucrative 'astro-tourism' (yes, that's a thing). Wouldn't it be great if Mayo could follow suit?

Research for the Mayo Dark Skies Project began at GMT Mayo through the Outdoor Education degree programme, with the support of GMT Mayo's Green Campus group and staff. The Lough Lannagh event will include a short demonstration of student works from the Creative Arts module, designed to appreciate the beauty of natural night time, followed by a night paddle in kayaks around Lough Lannagh and beyond by students and local kayak/canoe clubs.

The idea is to create awareness of, and take time to appreciate, the value of natural night skies in the west, and to allow for some star gazing from kayaks in the middle of the lake. The evening will also highlight how outdoor activities can still continue to be enjoyed throughout the darker winter evenings.

GMT is inviting everyone in the community to join in by taking part in a short candle/lantern-lit gathering at the lake whilst the kayakers are on the water. The evening will culminate with refreshments at the Greenway Café in Lough

continued page 49

MAGICA

Dark Sky project aims to attract stargazers

BY FRANCES TONER Mayo Advertiser, Fri, Jul 31, 2015



Ballycroy looks set to be officially named as one of darkest spots in Ireland in a bid to attract stargazers to the national park there.

Denis Strong, divisional manager with the National Parks and Wildlife Services, said Ballycroy National Park is working with GMIT on the project and is very close to achieving 'Dark Sky' status, an international rating which means the area is relatively free from light pollution and a perfect spot to take in the wonders of the nighttime sky.

There is only one other Dark Sky designated area in Ireland, which is located on the Iveragh Peninsula in Co Kerry, and only a handful in the UK.

Mr Strong was addressing a meeting of the West Mayo Municipal District in Ballycroy National Park visitor centre on Monday afternoon.

He said six meters were installed in the area to monitor light pollution and the readings so far are very promising.

"We are now making plans to put in a telescope viewing area which will add another string to our bow here in the national park," said Mr Strong.

Ballycroy aims for a brighter future with dark-sky status

By David

Light pollution is a growing concern for those who want to preserve the natural beauty of the Ballycroy National Park.

With a view to protecting the natural beauty of the park, the National Park Authority has set up a working group to examine the impact of light pollution on the park's dark sky status.

The Ballycroy National Park is one of the most beautiful in the Wick region of Co. Mayo.

It is a place of natural beauty and tranquility, and the park's dark sky status is a key feature of its appeal.

As a result of the park's dark sky status, the National Park Authority has set up a working group to examine the impact of light pollution on the park's dark sky status.

Members of the National Park Authority are working to protect the park's dark sky status.

They are doing this by working with the local community to reduce light pollution and protect the park's dark sky status.

The park's dark sky status is a key feature of its appeal, and the National Park Authority is working to protect it.

Light pollution is a growing concern for those who want to preserve the natural beauty of the Ballycroy National Park.

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As a result of the park's dark sky status, the National Park Authority has set up a working group to examine the impact of light pollution on the park's dark sky status.

Student seeks Dark Skies award for national park

Cutting back on light waste is essential

A FOURTH year outdoor education student, Georgia Mac Millan, is working in collaboration with national parks and wildlife groups in Newport and Malraeny and a TCD astrophysicist professor to have Ballycroy National Park declared a Dark Skies area.

Georgia's final year dissertation, called 'Preserving our night time skies', examines light pollution. She will be using Ballycroy National Park as a case study, monitoring light pollution in the area with the aim of declaring the park a dark zone.

Professor Brian Espey, an astrophysicist in the School of Physics, Trinity College Dublin, visited GMT Mayo at Georgia's invitation. He agreed to train Georgia and her team of volunteers in the use of specialised equipment for measuring light pollution, and also delivered a lecture on light pollution.

Prof. Espey has a teaching observatory called the Moon's Observatory which is situated a mere 800m from the centre of Dublin, where light



Pictured, from left, Robert Nelson, GMT Green Campus coordinator, Prof. Brian Espey, TCD Department of Physics, Michael Gil, head of department, GMT Mayo, Georgia MacMillan, fourth year outdoor education student, Lynda Husley, GMT chair of Green Campus committee, and Sharon Cameron, environmental awareness officer, Mayo County Council.

pollution is strong. Since the Arnsagh European Light Pollution Symposium meeting in 2009, he has been active in the field of light pollution and its abatement, and is currently involved with the EU COST Programme ES1204 Loss of Night Network.

Brian asks the question: 'Should we make Ireland Darker Green?'

He elaborated: 'With the arrival of electricity our normal day and night division has become blurred, disrupting the wake and sleep cycle that we, and other life, has evolved with.

'In the past few decades Ireland has also seen a large growth in light across the country, with most of the country seeing a change of up to 20%. Our towns produce two to three times as much light as those in the North. Cutting back on light waste now makes environmental, health and economic sense.'

GMT outdoor education lecturer Orla Preslerigat said Georgia's project is very exciting for Mayo.

'It is a big initiative involving experts and local groups in Malraeny and Newport. It's my understanding that there

is only one other area with the dark sky brand in Ireland, and that is in Co. Kerry. We look forward to developments in this project.'



HOME SHARERS/HOST FAMILY


Home Sharen are individuals, partners and families who provide in their own home an environment that they wish to share with a young person/adult with a learning disability who needs this opportunity for personal reasons in their lives.

I am an eighteen year old young woman with autism and I am seeking a family in the Carleton, Westport or surrounding areas who might be interested in providing a supportive home away from home for me, for one weekend a month.

I enjoy an active life! I love to go swimming in both swimming pools and the lakes, I love all types of water activities, I have had some surfing lessons and have been kayaking as well. I love nature walks, climbing and cycling. I like to relax in the evenings in the bath/shower, listening to music and watching TV. I like to know what the daily routine is and what's happening next. I have people who know me very well and they will help us to get to know each other.

A remuneration package is available.

Internal enquiries and further information available from:
Katie@HomeShareCare.com / 087 9476177 / 087 9476177



CRCfm is now recruiting for the position of
Radio Presenter / Sound Production Assistant



6 Western People | Monday, July 13, 2015

News

Dark skies could place Ballycroy on the final frontier for stargazers

BY KEITH BOURKE

BALLYCROY is seeking to become a haven for stargazers as it aims to gain Dark-Sky Reserve status.

Dark-Sky Reserve status is granted by the US-based International Dark Sky Association which grants the title on the basis of the exceptional quality of the night sky in an area. A part of southwest Kerry was given the status last year and now Ballycroy aims to follow suit.

Georgia McMillan, a native of London, now living in Newport, penned a dissertation on light pollution in the night sky, as part of her Outdoor Education Course at GMT.

After examining Dark Sky locations in the UK and now Kerry she thought why not Mayo and Ballycroy.

Georgia is now part of a steering committee, which plans to achieve the status for Ballycroy with Ballycroy National Park involved in the process.

"It's about preserving what we have rather than making significant changes," Georgia explained.

Born in London, Georgia has

Bangor Erris connections through her mother and she has been living in Mayo for over 20 years.

"I've always enjoyed the long evenings. I'm not an astronomer by any means but I've always appreciated the night skies in Mayo," she said.

Georgia envisages there will be no need for radical changes to the current lighting in the area. The Ballycroy National Park is likely to be one of the main viewing points for visiting astronomers with the Coillte bothy on the Newport side another potential vantage point for stargazing.

The aim is to bring astronomers from all over the world to Ballycroy where they can view unhindered visible sky phenomena such as the

Milky Way.

Georgia said that the project is still very much in its infancy with more in-depth studies of sky quality needed to be carried out but she has been enthused by the local reaction so far and the steering committee hope to have their application completed by Spring next year.



View the glories of the Milky Way and other galaxies on December 10

CLOUD cover permitting, the glories of the northern sky will be visible from Lough Lannagh, Castlebar, on the night of December 10.

Star gazers, both amateur and the more serious minded, are polishing up their telescope and binocular lenses in the hope they will be able to focus on distant galaxies.

The planned event, organised by Uíra Perinbergast, GMT Outdoor Education Centre director and lecturer, has been organised in support of the drive to have Ballycroy National Park and the surrounding area designated as a Dark-Sky Park, the first in Ireland.

A local committee has been established to further the Dark Sky objectives, with support from the National Parks and Wildlife Service and Mayo County Council. Representatives from Ballycroy, Westport, Maltramy, as well as other locations in north west Mayo are involved.

The stargazing event planned

for Lough Lannagh, a popular location for outdoor activities and education, represents a serious attempt to foster interest in astronomy and the stars amongst a wider audience.

"Says Uíra Perinbergast: "Hopefully the night will be clear and frosty. These are the ideal weather conditions for enjoyable and successful star-gazing."

"It promises to be a fun filled as well as educational event. Kayakers from GMT and local clubs will cross the lake in a candle-lit boat."

"There will be a candle-lit procession around the lake starting around 6.30 p.m. Lough Lannagh is a fantastic venue for such an event, the first of its kind."

Meanwhile, down at the Ballycroy National Park, moves are afoot to run a project, in conjunction with GMT, to involve students in raising awareness of light waste pollution.

Earth pollution, which dims views of distant stars, is regarded as one of the biggest obstacles to successful and enjoyable star watching.

Says Georgia MacMillan, one of the leaders of the Ballycroy Dark Sky Initiative: "We plan more outreach events including some educational programmes for schools in the area in the new year."

"These will include science based programmes in cooperation with astronomy clubs and related events to build awareness of how artificial light affects our wildlife and environment."

"We will also be promoting ways that communities can save energy and costs through simple measures to reduce light waste without compromising safety or visibility, in fact to enhance it."

The elimination of local light pollution in the Ballycroy area which could hinder star-gazing is one of the immediate aims of the Dark-



Sky team.

"We want to encourage local people to think about the lights they are using," Georgia MacMillan explains, "Simple repositioning of lights can help."

Excessive lighting, Ms. MacMillan adds, can also have impacts for wildlife and human health (through circadian clock interference).

Professor Brian Foley, senior lecturer in Physics & Astrophysics, Trinity College, Dublin, will give a talk on light pollution at Ballycroy

National Park Visitor Centre on the night (Tuesday) at 8 p.m.

The title of the presentation will be "Light Pollution: Why We Should Care and What We Can Do About It."

All are welcome.

Georgia MacMillan is a graduate in Outdoor Education at Galway-Mayo Institute of Technology. She recently completed a dissertation, "Preserving our Night-Time Skies", as part of her studies for a BA (Hons) Degree.

Bortle Scale classification

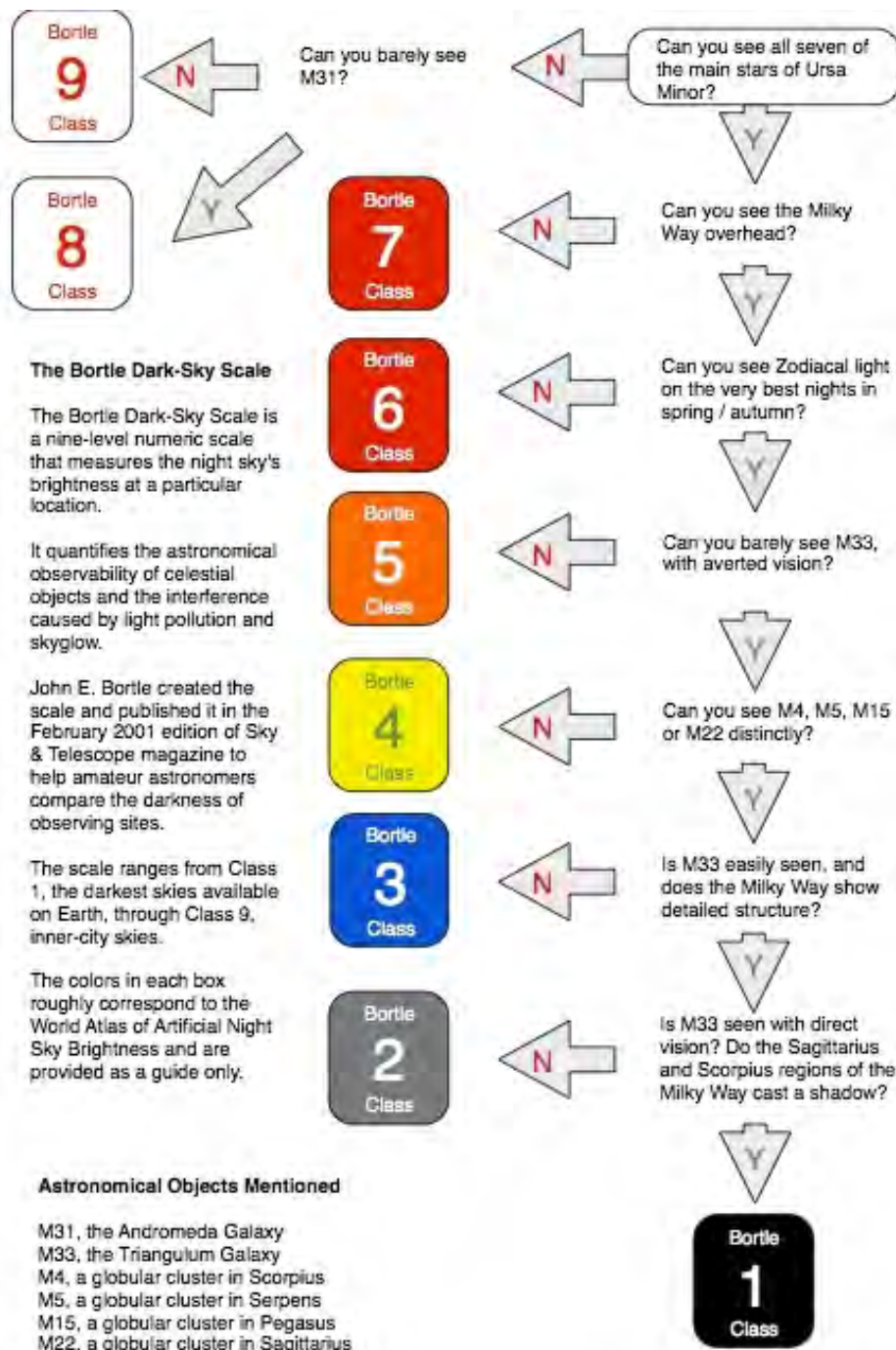
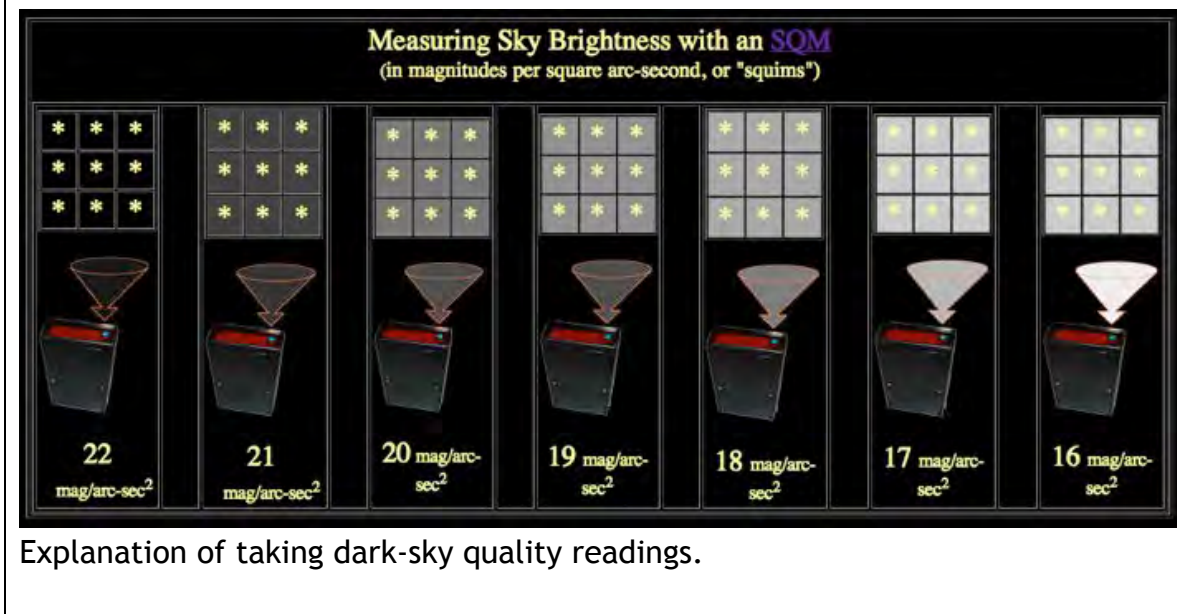
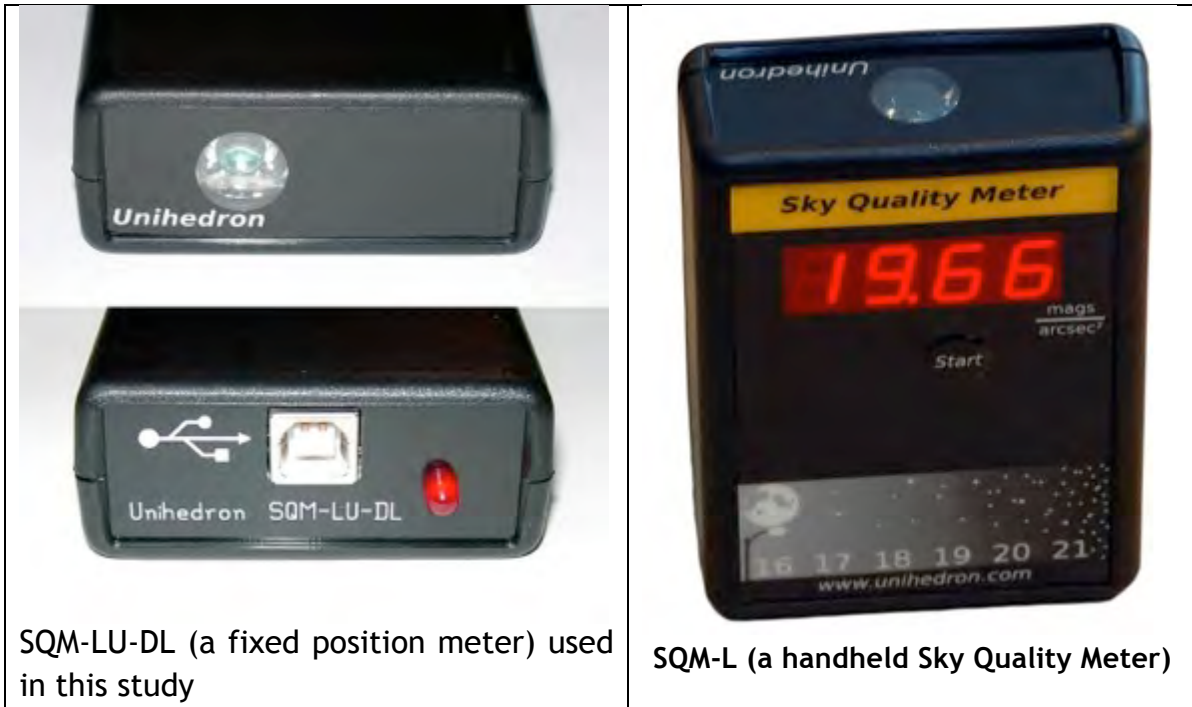


Figure 47: Bortle Scale Flow Chart

22. Appendix ii

Illustrations of technical Equipment:



23. Appendix iii

Sample leaflets distributed to raise awareness of light pollution

Bright lights make us feel safer?

Research indicates there is no conclusive benefit that night lighting deters crime.

Most property crime is still committed during the day, or inside lit buildings. Outside illumination can cast shadows which can even hide the intruders, rather than reveal them (compare the photos – poorly designed lighting does not add to safety).

Lights also help a criminal see what they are doing!

Come stargazing in Mayo!

We are applying to the International Dark-sky Association for recognition of Ballycroy National Park/Wild Nephin as Ireland's first Dark Sky Park.

Dark Sky Parks are places that preserve their exceptional starry nights for scientific, educational, cultural and public enjoyment.

Some benefits of creating a Dark Sky Park include:

- Science/Education Programmes
- Attracts Tourism
- Reduces energy waste
- Benefits Wildlife /Ecosystems
- Health & Wellbeing (reduce sleep disruption)

Please support Mayo Dark Skies
www.ballycroy.com/mayodarkskies
www.facebook.com/mayodarkskies

Mayo Dark Skies BALLYCROY

LIGHT POLLUTION AFFECTS FAR MORE THAN ASTRONOMY.....

PLEASE TAKE A MOMENT TO READ HOW WE CAN WORK TOGETHER TO REDUCE ITS AFFECT ON OUR DAILY LIVES

SUPPORT MAYO DARK SKIES

SAVE OUR STARS

What is Light Pollution?

The inappropriate or excessive use of artificial light can have serious environmental consequences for humans, wildlife, and our climate.

Components of light pollution include:

Glare – excessive brightness that causes visual discomfort

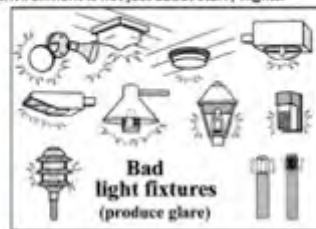
Skyglow – brightening of the night sky over inhabited areas

Light trespass – light falling where it is not intended or needed

Clutter – bright, confusing and excessive groupings of light sources.

How can we work together to achieve Mayo Dark Sky status?

Living near a Dark Sky Park does not mean you have to turn lights off. Rather it is about encouraging the use of high quality eco-friendly lighting, which is not only more effective in shining light where it is needed, but also reduces light pollution and carbon emissions and is also better for nocturnal wildlife. Protecting the night time environment is not just about starry nights.



Residents are encouraged to confine the sp from external lighting to within their proper boundary. That could be done by simply adapting or modifying your existing unit, for instance, by tilting lights down. We may be able to help you replace units which cannot be modified. If you want to erect a new unit consider using a low wattage well shielded bulb

24. Appendix iv

A brief report prepared by Ing. H Spoelstra for Prof Brian Espey about the intercomparison data of SQM against the Dutch NachMeetnet, Arnhem. Brief method and results is attached.



Overview test results

Table 1 Results against five NachtMeetnet SQM's

Reference instruments	5 SQMs of NachtMeetnet	Serial numbers 664, 729, 915, 987, 1368
Intercomparison period	Start date	August 2, 2014
	End date	August 11, 2014
Compared instrument	SQM type	SQM-LU-DL
	Serial number	2634
Regression coefficients	a	1.002
	b	-0.265
Validity range	Minimum	6.12 mags/arcsec ²
	Maximum	20.15 mags/arcsec ²

Table 2 Results against SQM915 Arnhem only

Reference instrument	SQM Arnhem	Serial numbers 915
Intercomparison period	Start date	August 2, 2014
	End date	August 20, 2014
Compared instrument	SQM type	SQM-LU-DL
	Serial number	2634
Regression coefficients	a	0.998
	b	-0.430
Validity range	Minimum	6.17 mags/arcsec ²
	Maximum	20.53 mags/arcsec ²

Intercomparison formula:

$$L_{\text{test}} = a \times L_{\text{ref}} + b$$

In which:

L_{test} - Luminance measured with the instrument under test [mags/arcsec²]

L_{ref} - Average luminance of 5 NachtMeetnet instruments (reference) measured at the same location [mags/arcsec²]

For the conversion of the readings of the instrument under test to the average of NachtMeetnet the following formula should be used:

$$L_{\text{ref}} = (L_{\text{test}} - b) / a$$

Please note:

This intercomparison is not an absolute calibration. The NachtMeetnet instruments have been operating already several years. An offset will be present when comparing to an absolute calibrated instrument.

Intercomparison SETUP

The instrument under test has been compared against 5 other SQMs of NachtMeetnet simultaneously at the monitoring station Arnhem.



Figure 48: Appendix v - Equipment set up

The data were collected automatically through a software program. In fact two sets of intercomparison data with SQM 2634 have been collected. The first set contained the data including the 5 SQMs of NachtMeetnet. This is the main comparison. After the SQMs of NachtMeetnet were reinstalled at their original measuring locations, the SQM 2634 was kept at measuring station Arnhem for two more weeks. The details of the data sets are:

- 1st data set August 2, 2014 - August 11, 2014 Against 5 SQMs of NachtMeetnet
- 2nd data set August 2, 2014 - August 20, 2014 Against the Arnhem SQM 915 only

Intercomparison RESULTS in graphics

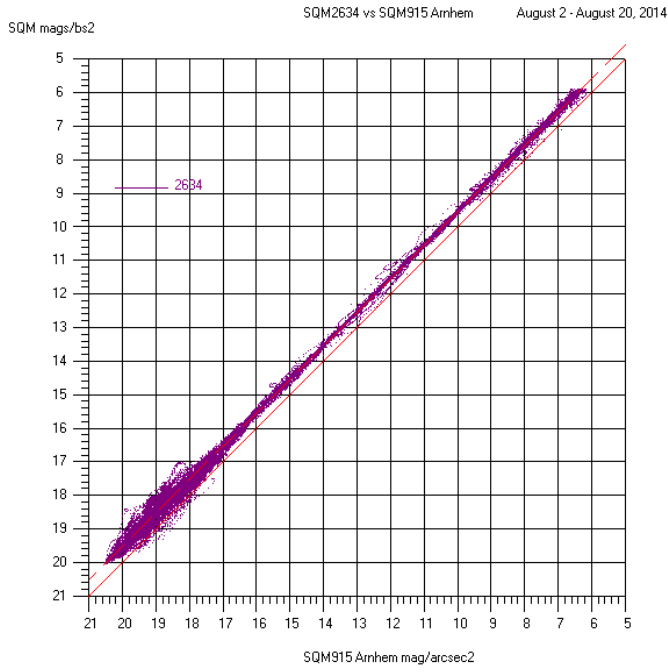


Figure 2 - Comparison of SQM 2634 against the average of five SQM's of NachtMeetnet (August 2 - August 11)



Figure 3 - Comparison of SQM 2634 against the SQM 915 Arnhem (August 2 - August 20)

25. Appendix v

Nephin Wilderness Project
Memorandum of Understanding (MOU)
On the setting aside of lands and management of the
Nephin Wilderness Project

1 Introduction

The concept of an officially designated "wilderness area" has been a part of the North American legal system for almost 60 years following the enactment of the Wilderness Act (1964). While the concept of setting areas aside as wilderness is relatively new in Europe (EU Parliament *Report on Wilderness In Europe*¹) there are moves at European Parliament and Commission level to seek that member states set aside lands to be considered as wilderness and programmes are being considered to facilitate and assist this goal. As part of this DG Environment this year produced guidelines on wilderness within the Life *Natura* programme. NPWS is a member of EUROPARC, which the, was founded in 1973 under the official title "Federation of Nature and National Parks of Europe". EUROPARC acknowledges that in addition to the intrinsic value of wilderness as natural habitats and for biodiversity, these areas also offer wider environmental, social, economic and cultural benefits.

Within this European policy context a project Steering Group comprising representatives from Coillte², National Parks and Wildlife Service and the Forest Service was established in 2011 to develop a definition of wilderness in Ireland and consider, initially, the suitability of the Nephin Forest as a wilderness area.

1.1 Definition of wilderness for Ireland

The project group defined wilderness in an Irish context as follows:-

Wilderness - Ireland

A wilderness is a large, remote, wild (or perceived wild), protected and publicly owned landscape with good visual and natural³ qualities. A

¹ EU Parliament report on Wilderness in Europe – Commission Committee on the Environment, Public Health and Food Safety, Rapporteur: Gyula Hegyi (2008/2210(INI))

² Including some contract specialists taken on to assist with the project.

³ Natural qualities would include important nature conservation or biodiversity sites, land forms, or geology.

wilderness facilitates humans to experience our connections to the larger community of life through the enjoyment of nature, solitude and challenging primitive recreation, without significant human presence or the intrusion of human structures, artefacts or inappropriate activities while supporting a functioning ecosystem.

A wilderness is therefore generally free from human management and manipulation and is an area which allows natural processes take place or where, through a process of rewilding, such natural processes are progressively restored, leading to increased stages of naturalness. A wilderness can include modified landscapes that no longer support long term human occupation and/or a viable managed landscape.

A wilderness should be a minimum of 2000ha offering opportunities for solitude and primitive recreation.

1.1 Suitability of the Nephins as a Wilderness Area

The project group developed a series of tests and applied them to the Nephin Forest property and the adjacent National park lands to ascertain the suitability or otherwise of the Nephin forest block and the adjacent lands for inclusion in a Wilderness Area (as defined above). The forest block was found to exhibit the necessary characteristics to allow the area develop as a wild landscape if set aside and protected as a wilderness resource.

1.2 Candidate Wilderness area

In November of 2011 the Coillte Group Executive Team (GET) agreed to set the area aside as a **candidate wilderness area** pending the development of a conversion plan. It is recognised by the GET that the setting aside of the area as a wilderness will have long term implications for the commercial exploitation of this forest into the future. For the avoidance of doubt the setting aside of the area as a wilderness will mean that all exploitation will cease post conversion and be seriously constrained during the conversion period.

1.3 The value of wilderness

The wilderness project is an innovative project that can deliver considerable benefits on a number of levels. The project will set aside a unique landscape in an Irish context with the potential to re-wild the landscape to provide important habitats, biodiversity improvement, adventurous and challenging recreation within a protected landscape of significant scale. This project has potential to deliver environmental, social and economic benefits to the

wider community in the hinterland of the wilderness while "improving" access to a unique and challenging landscape for recreation and scientific uses. This project will assist the NPWS with the management of their IUCN Class 2 lands in particular through:-

- The improvement of public access by walking or hiking to the entire eastern portion of the National Park through the Coillte forest;
- The development of sustainable walking routes on both Coillte owned lands and national park lands to alleviate pressure on sensitive habitats within the national park;
- Future habitat and species enhancement projects that will further enhance the biodiversity of the National Park and the forest.

2 Memorandum of Understanding

This Memorandum of Understanding is exchanged between Coillte Teoranta ("the Company") and National Parks and Wildlife Service ("the NPWS") for the purpose of protecting, developing and ultimately managing the Nephin Forest areas and adjacent National Park lands as a wilderness area.

The Memorandum of Understanding sets out the general parameters under which the management and development of the Nephin Forest and the adjacent national park lands as a wilderness area can be taken forward.

This document is not legally binding and the parties to this MoU acknowledge that each party has come to this process in a spirit of collaboration; that the basis of the MoU is partnership and that consensus should be the basis on which all decisions are taken and all progress made.

2.1 The Partners

2.1.1 Coillte

Coillte is the commercial state forestry company established under The Forestry Act 1988 ("the Act") to manage the country's forest estate on a commercial basis. Furthermore the Act obliges the company to have regard to the amenity use of the estate. In this regard Coillte recognises that it has a key part to play in the provision of outdoor recreation and that partnerships are a vehicle to meet recreational and related objectives, delivering social and economic benefits to local communities⁴. The Nephin Wilderness project recognises the core company value of *attracting people to nature* and

⁴ Recreation Policy – Healthy Forests, Healthy Nation. Section 8 Partnerships

sustaining the earth's natural resources. The project represents an opportunity for Coillte to make a significant contribution to landscape protection, biodiversity and nature conservation enhancement and outdoor recreation in Ireland through the set aside of their part of this unique landscape.

Coillte enters into partnerships with suitably constituted entities where:

- The project is consistent with Company / Forest Management Unit plans,
- There is agreement on resources to develop the project

And

- There is agreement on resources to maintain and manage the project in the long term.

Coillte believes that these requirements are met by this project and that a partnership process is the best way forward.

2.1.2 The Department of Arts Heritage and the Gaeltacht (National Parks and Wildlife Service)

The mandate of the Department of Arts, Heritage and the Gaeltacht is to promote access and participation in the arts by all sections in Irish society and to support our national cultural institutions in their work to preserve, protect and present our moveable heritage and cultural assets. The Department also has responsibilities in relation to the protection, conservation, management and presentation of Ireland's built and natural heritage, in supporting and promoting the Irish language, and assisting in the sustainable development of the Gaeltacht and the populated offshore islands. In summary, the Department's purpose is:

- to promote and support Ireland's world-class artistic and cultural strengths, at home and abroad;
- to foster, promote, conserve and present our heritage and culture, including the Irish language; and
- To support the economic and social development of our offshore islands.

In delivering on this broad mandate, the Department will work with a wide range of individuals, groups and with other relevant stakeholders. It will seek to promote a co-ordinated and coherent approach, not only across the range of measures for which it has direct responsibility, but also with Departments

and agencies whose work impacts on Ireland's rich culture, heritage and language, and on other aspects of the Department's remit.

The National Parks and Wildlife Service, as part of the Department of Arts, Heritage and the Gaeltacht, is tasked with the conservation and management of Ireland's unique natural heritage for the benefit of present and future generations, as a support to economic renewal and sustainable employment, and in compliance with legal obligations. The role of NPWS includes the following:-

- To secure the conservation of a representative range of ecosystems and maintain and enhance populations of flora and fauna in Ireland,
- To implement the provisions of the *Wildlife Acts, 1976 to 2000*, the *EU Habitats Directive*, and the *EU Birds Directive*,
- To make the necessary arrangements for the implementation of National and EU legislation and policies and for the ratification and implementation of the range of international Conventions and Agreements relating to the natural heritage
- To designate and protect Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), having particular regard to the need to consult with interested parties,
- To implement the National Biodiversity Plan and to promote the making of Local Biodiversity Plans,
- To promote nature conservation through education and awareness programmes,
- To consider potential impacts on nature conservation due to development and or proposed development and to advise accordingly, and
- To manage, maintain and develop State-owned National Parks and Nature Reserves.

Thus from a NPWS perspective the proposed Nephin Wilderness Project is very desirable as it will afford the opportunity to:-

- Conserve, and where possible enhance the ecological value of all natural and semi-natural habitats and features in Ballycroy National Park.
- Maintain the conservation status of natural ecosystems, flora and fauna within the Park.
- Maintain and protect the wilderness value of the National Park.
- Encourage recreational and educational use of the National Park in areas managed for visitor use

- Enhance visitor experience through the provision of information and facilities
- Improve public awareness of its natural and cultural heritage.
- Undertake or facilitate research

2.2 The Parties Agree:

2.2.1 Conversion Plan

The parties agree to develop a master plan for the Nephin Forest and the adjacent national park lands which sets out all the issues relating to the development and subsequent management of the site as a wilderness area.

2.2.2 Conversion process

The parties will jointly agree on the conversion process for the forests lands to include harvesting, reforestation and or habitat restoration. This process will be subject to agreement with the Forest Service.

The creation of a very large area of wilderness land involving the NPWS and Coillte with biodiversity as one of the three⁵ prime objectives will provide a significant opportunity to enhance biodiversity generally. It would be the first landscape sized biodiversity area to be created and could host a number of habitats and species linked projects; such large tracts of land are keystone areas for the restoration of biodiversity. The willingness of the land owners to engage in re-wilding, ecological restoration and biodiversity enhancement and the concept of low intervention management are important elements of the Nephin Wilderness project.

2.2.3 Access and Use Policy

The parties will jointly agree on the access and use policy for both Coillte and NPWS lands in line with the recommendations in the feasibility study, the conservation objectives of the National Park and the regulations relating to the Special Area of Conservation/Special Protection Area.

2.2.4 Appropriate developments

The parties will jointly agree on the appropriate level of development of facilities in or adjacent to the wilderness area in line with the feasibility study.

⁵ The three objectives of wilderness include, wild landscape protection, provision of sustainable outdoor recreation and the enhancement and protection of nature conservation and biodiversity values.

Proposals for any works within the boundary of the wilderness will be brought to the management group for discussion and agreement.

2.2.5 Conservation initiatives

The parties will jointly agree on the appropriate conservation initiatives in the wilderness area.

2.2.6 Set-a-side agreement Coillte

Coillte agrees to set aside the forest area categorised as primitive or semi primitive (4,193.41 ha) as a wilderness area free from all human exploitation on completion of the 15 year conversion programme.

In the intervening period the parties agree that all works in the area will be agreed by the partnership. Limited exploitation will be allowed in the natural developed zones subject to overall agreement by the partners of proposed works.

2.2.7 Set-a-side agreement NPWS

NPWS agrees to set aside the area categorised as primitive or semi primitive as a wilderness area free from all human intervention subject to the conservation objectives of the National Park and the regulations relating to the Special Area of Conservation/Special Protection Area.

2.3 Use of the lands

The Company has consented to the inclusion of its Nephin Forest (area 4,193.41 ha and delineated on **Map 1** attached to this agreement and marked in red) as part of wilderness area and allow public access in line with its company wide recreation policy and overall recreation policy agreed for the wilderness .

The company's policy on access to lands for recreational use is clear – it allows access on foot to responsible users. This is set out in its Recreation Policy – Healthy Forests; Healthy Nation

See: http://www.coillte.ie/about_coillte/publications/other_publications/other_publications/.

public
It is not envisaged that motorised or other vehicle access will be allowed in the wilderness area.

The NPWS has consented to the inclusion of lands (delineated on **Map 2** attached to this agreement and marked in red) in the national park as part of wilderness area and will promote and facilitate public access for primitive

recreation and the development of sustainable and appropriate recreation infrastructure in line overall recreation policy agreed for the wilderness, and subject to the conservation objectives of the National Park and the regulations relating to the Special Area of Conservation/Special Protection Area..

2.3.1 The parties will agree to the erection of appropriate signage of appropriate design on the site for the purposes of identifying the site as a wilderness area managed under partnership by the two organisations.

2.3.2 Coillte and the NPWS have consented to set aside for a period of a minimum of 50 years lands required to constitute their part of the wilderness post conversion. The NPWS and Coillte will retain ownership of their lands and the right to manage their lands, subject to the provisions of this set aside agreement.

2.4 Funding/Resources.

2.4.1 The parties shall provide professional, technical, and other support that is available from normal resources to assist in the achievement of the objectives of the wilderness project

2.4.2 Where necessary and practical the partners agree to jointly explore sources of funding for exceptional costs associated with the wilderness project.

2.5 Management

2.5.1 The parties agree to establish the Nephin Wilderness Partnership Board under this agreement to oversee the development and long term management of the project.

2.5.2 The Nephin Wilderness Partnership Board shall be responsible for the management of the site to provide safe, enjoyable and sustainable recreation experiences for visitors and protect and enhance nature conservation and landscape values .

2.5.3 In addition to ongoing regular and routine contact there will be a minimum of two formal meetings of the Nephin Wilderness Partnership

Board held each year to consider project management issues and associated resource requirements.

2.5.4 Membership of the Nephin Wilderness Partnership Board

Each party shall be entitled to a maximum of two voting representatives on the board of the Wilderness project. Other members or organisations maybe co-opted or invited to join by mutual agreement of the two partner organisations. The Chair of the partnership shall rotate amongst the organisations on a biannual basis.

3 Other objectives, considerations and constraints

3.1 New developments

- 3.1.1 The Partnership may initiate and deliver projects/works where deemed appropriate.
- 3.1.2 The Partnership will consult with stakeholders and interest groups, on approaches and methods to be agreed at inception of each project.

3.2 Legal and environmental constraints

- 3.2.1 Coillte is obliged to comply with legislation relating to habitats and species, the Forestry Acts, National Monuments Acts and compliance with environmental obligations under the Forest Stewardship Certification (FSC) process. These may constrain the actions that Coillte or the partnership can take in the development of this project.
- 3.2.2 The operations of the Partnership must be in keeping with the remit of the National Parks and Wildlife Service as set out at 2.1.2 above and cannot be involved in anything that might inhibit the NPWS in exercising its powers or fulfilling its responsibilities.

4 Duration of Commitment

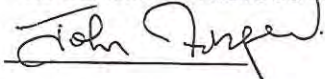
4.1 The commitment of the parties to this MOU is for a period of 50 years with a review of management arrangements after 5 years.

Signed

Coillte Teoranta

A handwritten signature in blue ink, appearing to read "David Gunn", written over a horizontal line.

National Parks and Wildlife Service

A handwritten signature in blue ink, appearing to read "John F. [unclear]", written over a horizontal line.

Dated the day of 1st MARCH 2013