SUBMISSION IN OBJECTION

to An Coimisiún Pleanála

Proposed Maughanaclea Renewable Energy Development

Submitted by	Wild Hideaways Eco Spa Retreat
Address	Wild Hideaways, Mealagh Valley, Co. Cork
Email	info@wildhideaways.ie
ACP Reference	ACP-324165-26
Applicant	Maughanaclea Ltd. (associated company of Enerco Energy Ltd.)
Development	14 wind turbines (169m tip height), substation and associated works, Maughanaclea and adjacent townlands, Co. Cork
Date	May 2026

1. Introduction and Standing of Objectors

Wild Hideaways Eco Spa Retreat, located in the Mealagh Valley, Co. Cork (ITM E506,507 / N553,472) and owned and operated by Amy and John O'Sullivan, submits this objection as a directly and seriously affected business, as part of the local community, and as custodian of a landscape and way of life that this development would irreversibly destroy. The nearest proposed turbine (T14) lies approximately 2km to the north-east, with the southern turbine cluster (T07–T14) ranging from 2.01km to 4.44km from the property. Photographic evidence of the landscape quality and sense of place of Wild Hideaways and the Mealagh Valley is provided at Appendix A.

Wild Hideaways opened in October 2023. Now in our third year of operation, it is a five-star luxury eco retreat comprising six lodges, a sauna, a plunge pool, an onsite spa and yoga room, a professional kitchen, and our newly constructed Wild Sky Dome — a purpose-built stargazing observatory. In 2025 we welcomed 1,000 guests. Our summer occupancy runs at approximately 95%. Our shoulder season occupancy for March 2026 reached 47.5%, improving year on year. We have accumulated 206 five-star Google reviews, the overwhelming majority of which explicitly cite the silence, the dark skies, and the unspoilt landscape as the primary reason for visiting and returning. A selection of these reviews is at Appendix G.

Our business is built entirely on the exceptional natural qualities of the Mealagh Valley. It is currently valued at €1.65–1.7 million and constitutes our family's primary income and the work of our lives. We employ 6 permanent members of staff and 7 freelance therapists and grounds staff — 13 livelihoods in total that depend entirely on Wild Hideaways continuing to offer what it promises: peace, silence, dark skies and an unspoilt natural environment. All 13 of those jobs are directly at risk if this development proceeds.

We are not opposed to renewable energy in principle. When we sought planning permission for Wild Hideaways (ref: 21/00560), Cork County Council required us to demonstrate that our structures blended with the skyline and were in keeping with other rural buildings in the area, and required additional landscaping to shield the development from the road. The planning system held us to the highest standard of visual sensitivity and landscape integration. It is deeply unjust that 169-metre industrial turbines are now proposed for the hills above this valley, assessed under guidelines written in 2006, with no equivalent standard applied. We respectfully urge An Coimisiún Pleanála to refuse permission on the grounds set out below.

2. Description of the Proposed Development

The proposed development (ACP ref: ACP-324165-26) comprises 14 wind turbines with associated substation and all associated works at Maughanaclea and adjacent townlands, Co. Cork, brought forward by Maughanaclea Ltd., an associated company of Enerco Energy Ltd. It was classified as a Strategic Infrastructure Development (SID) by An Coimisiún Pleanála on 9 February 2026, with the planning application submitted on 30 March 2026. The applicant is seeking a ten-year permission and a thirty-five-year operational period for the wind turbines, but a

permanent planning permission for all other works including all roads, hardstands, substation and ancillary infrastructure. The landscape alteration caused by this development would therefore be permanent, irrespective of whether the turbines are eventually decommissioned.

Each turbine reaches a tip height of 169 metres with a rotor diameter of 133 metres. The site lies within Landscape Character Area 15a: Ridged and Peaked Uplands. Cork County Development Plan Policy GL 14-9 explicitly requires the Council to "protect skylines and ridgelines from development." The proposed turbines are sited directly on the Maughanaclea and Shehy Beg ridgelines, in direct conflict with this policy.

Each turbine carries mandatory aviation obstruction warning lights. Across 14 turbines at two lights each, this equates to 28 red flashing lights visible continuously every night. These lights will be directly visible from Wild Hideaways — from our sauna area, our panoramic kitchen windows, and our Wild Sky Dome stargazing facility. The nearest turbine (T14) is 2.01km from Wild Hideaways; the southern cluster is visible in the direct sightline from our property. Brian Espey, Chairperson of Dark Sky Ireland, confirms in his formal letter of 25 June 2025 (Appendix F) that even a single aviation warning light impacts the visual amenity of the surrounding area, and that the combined effect of all lights on an entire farm — including those sited on high ground at 400 metres elevation — is multiplied accordingly.

3. Wild Hideaways: What Is at Stake

Wild Hideaways is not a business that would be inconvenienced by this development. It is a business whose entire existence depends on the very qualities that this development would permanently destroy. We sell silence. We sell serenity. We sell wellness. We sell a connection to nature that people from towns and cities simply cannot find elsewhere. Industrial turbines above this valley — visible from our door, audible at night, their red lights flashing through the darkness — would give our guests the feeling of staying beside a large industrial facility. That is the diametric opposite of what we offer, and it would end our business.

3.1 DarkSky International Approved Lodging Certification

Wild Hideaways holds formal DarkSky International Approved Lodging certification (Certificate ID: DS-LOD-15), issued on 5 March 2026 following a rigorous field inspection on 26 February 2026, valid until 2031. Wild Hideaways is the only DarkSky Approved Lodging in the whole of Europe. The exceptional quality of the night sky at Wild Hideaways is not only confirmed by DarkSky International's own field inspection but is independently recognised by Dark Sky Ireland, the national body for dark sky preservation in Ireland. Brian Espey, its Chairperson, formally confirmed in writing on 25 June 2025 (Appendix F) that "The Mealagh Valley has a near-pristine environment, close to the conditions in Kerry Dark Sky Reserve and Mayo Dark Sky Park — Ireland's internationally accredited dark sky areas." This is an expert assessment from the competent national authority, not merely the business's own claim.

As part of the DarkSky field inspection, objective scientific measurements confirmed a Sky Quality Meter reading of SQM 21.89 magnitudes per arcsecond squared and a Bortle Class 2 designation — among the darkest measurable skies on Earth, where the Zodiacal light is clearly visible, the Milky Way casts visible shadows, and the naked eye detects stars to magnitude 7.1 to 7.5. This certification was obtained just 25 days before Enerco's planning application was submitted. Neither the TIA nor any other chapter of the EIAR acknowledges it.

The 28 mandatory red aviation warning lights would directly violate DarkSky Approved Lodging lighting criteria. Research confirms that medium intensity aviation warning lights appear brighter than Venus at up to 4km and are visible at up to 38km against a dark sky (Bará & Lima, 2024). At 2km, the impact would be severe and certain. Our certification would be at immediate risk of revocation.

3.2 The Economic Value of Dark Sky Designation

The economic value of dark sky designation to rural communities has been independently verified. An economic impact assessment of the Galloway Forest Dark Sky Park in Scotland found that for every £1 spent on dark-sky lighting, there was a return of £1.93 in tourism revenue. After ten years the park generated an estimated £500,000 per year from dark sky tourism, with 77% of surveyed businesses reporting increased bed nights (Forestry Commission Scotland / ekos). Dark sky tourism generates shoulder and off-season revenue — exactly the sustainable, year-round rural tourism that Ireland's policy seeks to develop.

Fáilte Ireland recognised this when welcoming the Kerry International Dark Sky Reserve in 2014, stating: "Achieving dark sky status will allow visitors to view some the exceptional skyscapes of South Kerry, which will create magical moments to treasure and experience along the Wild Atlantic Way." Wild Hideaways sits on the same Wild Atlantic Way corridor. The destruction of its dark sky asset is the destruction of precisely the kind of tourism product that Fáilte Ireland's own policy is designed to protect.

UK parliamentary evidence submitted by DarkSky UK to the Science, Innovation and Technology Committee confirms that 71% of businesses surveyed said an International Dark Sky Places designation was very important or important in attracting visitors to the area or out of season. Dark sky tourism specifically generates stays of two or more nights and boosts shoulder and off-season occupancy — precisely the sustainable, year-round rural tourism that the West Cork Coast DEDP and the Wild Atlantic Way strategy seek to develop. The Wild Sky Dome and dark sky tourism offering at Wild Hideaways is a direct embodiment of this model and its potential has been recognised by DarkSky International, by Airbnb's Rural Tourism Fund, and by Minister of State Christopher O'Sullivan TD.

3.3 The Wild Sky Dome and Dark Sky Tourism

Our Wild Sky Dome is a purpose-built stargazing facility funded by a €10,000 Airbnb Rural Tourism Fund 2025 grant (Appendix E). The grant award and the Wild Sky Dome initiative have been covered by national and local media, confirming the public profile and significance of this project (Appendix J). The dome connects our guests to the astronomical heritage of the Kealkill Stone Circle, approximately one

mile from Wild Hideaways, protected by Preservation Order since 1938 (PO No. 69/1938). The proposed development would destroy every element of this heritage-led tourism experience.

3.4 The Dark Sky Community Application

The Mealagh Valley community is actively pursuing Dark Sky Community accreditation from DarkSky International — the first in Ireland. A formal committee has been established and the application is at an active and advanced stage, as evidenced by the correspondence at Appendix K. Amber Harrison, Dark Sky Places Programme Manager at DarkSky International — the person who administers this programme globally — has been in direct correspondence with Wild Hideaways since October 2025. She confirmed that Cork County Council would need to enact a legally binding outdoor lighting policy for the Mealagh Valley as a condition of accreditation. Deputy Christopher O'Sullivan TD, Minister of State for Nature, Heritage and Biodiversity, engaged personally with this project and confirmed in writing that he had reached out to his ministerial team to assist in progressing the lighting policy with Cork County Council. Georgia MacMillan of Mayo Dark Sky Park — the body that successfully achieved Ireland's first dark sky designation — has been in direct correspondence with Wild Hideaways, offering practical guidance on the accreditation process and confirming that she had been contacted by Minister O'Sullivan's office about the Mealagh Valley proposal.

Critically, Cork County Council's Roads Management division held an active meeting with Wild Hideaways about the Mealagh Valley Dark Sky Community lighting policy, with follow-up correspondence dated 8 May 2026 — just 17 days before the deadline for observations on this planning application. It is noteworthy that Maughanaclea Ltd. bypassed Cork County Council entirely by applying as a Strategic Infrastructure Development directly to An Coimisiún Pleanála, depriving the local authority and the local community of any meaningful role in this decision. Cork County Council — whose CCDP designates this landscape as High/High sensitivity, which refused the adjacent Gortloughra wind farm, and which is actively supporting the Dark Sky Community initiative — has had no decision-making role in this application whatsoever. This makes it all the more important that An Coimisiún Pleanála gives full weight to the evidence of what this landscape means to this community.

The Programme for Government 2025 commits to "promote and encourage an expansion of Dark Sky Ireland national parks and reserves." The mandatory 28 aviation warning lights would permanently preclude this accreditation, directly contradicting that Government commitment. A Feasibility Study commissioned by Fáilte Ireland (CHL Consulting, April 2019) — prepared by the same firm that authored the applicant's TIA — states explicitly: "It is essential to protect, preserve and enhance the quality of the dark skies, without which there can be no tourism product."

3.5 The Applicant's Failure to Consult Wild Hideaways

The Community Engagement Report confirms consultation was restricted to householders within a 2km radius. Wild Hideaways — the only registered tourist accommodation within 5km — received no letter and no invitation to either Public

Information Exhibition. Fáilte Ireland responded to the developer's scoping consultation on 25 October 2024, explicitly requiring that "the impact of the development needs to be fully considered because of the important tourism amenities in the area" and providing their EIA tourism guidelines. The TIA demonstrably failed to comply on every relevant point.

4. MKO's Unilateral Downgrade of a High Value Landscape

One of the most serious deficiencies in the EIAR concerns the landscape sensitivity assessment. The Cork County Development Plan (CCDP 2022–2028) designates Landscape Character Type 15a — the landscape within which the proposed wind farm site sits — with a 'High' Landscape Value and 'High' Landscape Sensitivity, as confirmed in Chapter 13, Section 13.4.1.1.3, pages 13-20 to 13-21 of the EIAR itself.

Despite this democratically adopted designation, MKO — the developer's own planning and environmental consultants — then conducted their own site-level assessment and assigned the proposed wind farm site a sensitivity of 'Medium', downgrading it from the CCDP's High designation. This downgrade is recorded in Chapter 13, Table 13-16, page 13-101. MKO's justification, set out in Chapter 13, pages 13-30 to 13-32, relies on the presence of commercial forestry and agricultural land use on the site to argue that the landscape has 'low susceptibility to change' and is 'highly suitable for accommodating wind energy development.'

This is a self-serving methodology that is fundamentally flawed in two respects. First, commercial forestry is itself an industrial land use imposed on an upland landscape — its presence does not reduce the landscape's inherent sensitivity, it merely records a prior degradation of it. Second, the LVIA methodology page (Chapter 13, page 13-30, reproduced at Appendix L) reveals that MKO's assessment was explicitly framed around 'the capacity of the immediate landscape to absorb the infrastructure of a wind farm development' — a circular methodology that starts from the desired conclusion rather than objectively assessing the landscape's inherent value.

An Coimisiún Pleanála should not accept a developer's consultant's site-level re-assessment that overrides a designation made by the elected planning authority through the democratically adopted County Development Plan. The Supreme Court confirmed in Coolglass Windfarm Limited v An Coimisiún Pleanála [2026] IESC 5 (5 February 2026) that An Coimisiún Pleanála is entitled to presume that a local development plan is in itself compliant with planning objectives, and that planning law is not a simple formula in which climate benefit automatically overrides a development plan. The CCDP says High/High. That designation must be given its full weight.

5. Conflict with Fáilte Ireland Policy and National Tourism Strategy

The Fáilte Ireland West Cork Coast DEDP is a government-mandated tourism strategy. Cork County Development Plan Tourism Objective TO 10-2 requires the Council to promote the Wild Atlantic Way while "having regard for the cultural, built and natural heritage, and environmental impacts." The approval of 14 industrial turbines within this corridor directly contradicts these commitments:

5.1 Slow Travel and Walking Infrastructure

The DEDP commits to strengthening walking infrastructure. The applicant's own TIA contains a direct internal contradiction: in one place it states the project "will not have an impact on the Sheep's Head Way" and in the very next paragraph states it "will have a negative impact on the local section of the Sheep's Head Way" (Chapter 5, Section 5.3.2.3, page 5-28). These statements are irreconcilable.

St Finbarr's Pilgrim Path — one of the five major Pilgrim Paths of Ireland, promoted nationally and internationally — joins the Sheep's Head Way in this area. The turbines would be visible from multiple points along this historic route. Of the other four major Pilgrim Paths in Ireland, none has a wind farm within 25km — the closest being Raheenleagh, approximately 25km from St Kevin's Pilgrim Path. The Maughanaclea development, combined with the conditionally approved Dereenacreenig West and in-planning Curraglass developments, would place three industrial wind farms along a route of profound spiritual, historical and cultural value — permanently undermining its purpose. CCDP Objectives TO 10-7 (Support and promote the development of long-distance walkways) and TO 10-8 (Promote the development of greenways, walking and cycling routes) apply directly.

5.2 Ecotourism and Birdwatching

The DEDP promotes birdwatching ecotourism. University College Cork research at 12 Irish upland wind farms found a 10% reduction in bird numbers close to turbines (Fernández-Bellón, Wilson, Irwin & O'Halloran, Conservation Biology, 2019). The developer's own Ornithology chapter confirms Hen Harrier (Annex I, national importance) and Peregrine Falcon (Annex I) hunting within the site. BirdWatch Ireland gave no consultation response.

5.3 Forest Bathing

The DEDP promotes Forest Bathing. Wild Hideaways offers this experience along the Mealagh Woods Loop. The developer's own LVIA (VP3) rates the visual effect on this route as Moderate from a High sensitivity viewpoint at 1.2km, with turbines spanning the entire 53.5-degree field of view.

5.4 Cultural Heritage

The Kealkill Stone Circle (Preservation Order PO No. 69/1938, approximately one mile from Wild Hideaways) is integral to our dark sky tourism offering. The developer's own Cultural Heritage assessment concedes that "effects on the setting of the sites cannot be mitigated" (Chapter 14, Section 14.4.5, page 14-67) — a direct admission of irreversible harm to a nationally protected monument.

5.5 CCDP Policy Conflicts

CCDP Policy GI 14-14 requires no adverse obstruction of views on scenic routes. Policy ET 13-7 states wind energy is Open to Consideration only where adverse impacts can be avoided. The developer's own LVIA records Significant and Substantial visual effects at multiple viewpoints — meaning the development fails even the threshold for Open to Consideration designation.

6. Deficiencies in the Noise Assessment

6.1 Omission of Wild Hideaways as a Noise Sensitive Location

Wild Hideaways is not included as a Noise Sensitive Location (NSL) in the noise modelling despite meeting the developer's own definition precisely. The applicant's Glossary of Acoustic Terms (Appendix 12-1, page A12-1-1) defines an NSL as "any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels." Wild Hideaways meets this definition unambiguously.

AWN Consulting Ltd assessed 279 NSLs (H001–H279) listed in Appendix 12-3. Wild Hideaways, at ITM E506,507 / N553,472, does not appear anywhere in this list. Every single one of the six noise monitoring locations is further from the southern turbine cluster than Wild Hideaways:

- NML4 (H041) — the nearest monitoring location to Wild Hideaways — is 3,014m from Wild Hideaways, approximately 1km further from the property than the nearest turbine
- NML3 (H015): 3,571m from Wild Hideaways
- NML5 (H031): 4,016m from Wild Hideaways
- NML1 (H014): 5,912m from Wild Hideaways
- NML2 (H003): 7,984m from Wild Hideaways
- NML6 (H018): 8,578m from Wild Hideaways

Wild Hideaways is therefore closer to the turbines than every single noise monitoring location, yet was never assessed. The developer's own noise consultants acknowledge background noise levels in the area are very low (Chapter 12, Section 12.5.3.1, page 12-44). Night-time backgrounds as low as 23.4 dB LA90 were recorded at NML2. Wild Hideaways, in an enclosed valley position further from roads, would almost certainly record even lower backgrounds. At such levels, even a modest turbine noise contribution represents a highly significant proportional increase in the acoustic environment.

Wild Hideaways acknowledges that under current Irish guidelines, commercial accommodation is treated differently from permanent residences for the purposes of noise assessment, as guests have transient rather than permanent exposure. However, this distinction is itself a product of the 2006 Wind Energy Development Guidelines, which were never designed to assess a luxury dark sky wellness retreat whose entire commercial proposition depends on acoustic amenity, and which

generates its income precisely from the absence of noise. The guidelines are outdated and do not capture this category of business. An Coimisiún Pleanála should apply the precautionary principle and require the developer to assess noise at Wild Hideaways before any permission is granted.

6.2 Spring-Only Survey — Not Representative of Peak Season

The noise background survey was conducted exclusively between 28 March and 8 May 2025 (Chapter 12, Table 12-7, page 12-28) — spring only. Wild Hideaways' peak dark sky season is autumn and winter, when guests specifically visit for stargazing, when the Wild Sky Dome is in heaviest use, and when background noise is at its absolute lowest. A spring survey cannot characterise the acoustic conditions that matter most for this business.

6.3 Borrow Pit Noise — A Critical Unassessed Impact

The construction noise assessment contains a fundamental gap in respect of borrow pit operations. AWN assessed borrow pit noise at only one location — NSL H008, which is 300m from Borrow Pit 2 in the northern turbine cluster. H008 is 5,927m from Wild Hideaways. This assessment is entirely irrelevant to the impact of borrow pit operations on Wild Hideaways.

There are four borrow pits in total. Borrow Pits 3 and 4 are located in the southern turbine cluster in the area of T07–T13 — the cluster closest to Wild Hideaways. No noise assessment has been conducted at any receptor for Borrow Pits 3 and 4. The rock breaker noise emission at 10m is 121 dB LAeq (EIAR Table 12-22) — one of the most intense construction noise sources that exists. Basic acoustic calculation indicates that at estimated distances of 2.8–3.7km from Wild Hideaways, rock breaking from the southern borrow pits could produce levels in the region of 69–72 dB LAeq at the property — above the 65 dB construction noise criterion — in open field conditions. In an enclosed valley with sound channelling effects the actual levels could be significantly higher.

Furthermore, AWN state that the valley correction from Section 4.3.9 of the IOA Good Practice Guide "is applied where relevant" (Appendix 12-3, page A12-3-2). Because Wild Hideaways was never assessed, the valley correction — which is most relevant precisely in an enclosed valley receiving sound from turbines on a ridge above — was never applied to the location where it matters most. The Mealagh Valley is a natural acoustic chamber. This has been entirely ignored.

Wild Hideaways has sought to commission an independent acoustic assessment of borrow pit and construction noise at the property but has been unable to do so before the observations deadline due to time constraints. Wild Hideaways formally reserves the right to submit supplementary independent acoustic evidence at any subsequent oral hearing stage, and specifically requests that noise impact on Wild Hideaways be addressed at oral hearing. Wild Hideaways intends to be represented at that hearing with independent acoustic evidence.

6.4 Construction Phase — Business Viability

Construction noise represents an immediate and existential commercial threat to Wild Hideaways that is entirely separate from any operational noise impact. Rock

breaking for turbine foundations and borrow pit excavation will generate intense percussive noise reverberating across the Mealagh Valley throughout an estimated 18 to 24 month construction phase. Wild Hideaways sells silence as its core product to paying guests. A single day of audible rock breaking during a guest stay would be commercially damaging. Across a full construction season it would be commercially catastrophic.

The impacts are specific and foreseeable: cancelled bookings upon publication of a construction programme; negative guest reviews citing construction noise reaching thousands of future potential guests; loss of repeat bookings from guests who choose not to return during the construction period; reputational damage that persists beyond the end of construction. These are not theoretical concerns — they represent the commercial destruction of a business during its most critical growth phase, before any operational turbine noise has begun. The EIAR contains no assessment of construction noise impact on Wild Hideaways as a commercial business and no assessment of the business viability impact of an 18–24 month construction phase on a noise-sensitive tourism operation.

6.5 No Terrain Analysis

There is no mention of “terrain”, “valley” or “hill” anywhere in the Noise and Vibration chapter. Peer-reviewed research demonstrates that sound propagation from ridge wind turbines into valleys below produces complex and variable sound pressure distributions (Van Renterghem, T., 2017, Philosophical Transactions of the Royal Society A, Vol. 375, 20160105). The Mealagh Valley is a classic enclosed valley below a turbine ridgeline. Its acoustic properties have been entirely ignored.

7. Cumulative Impact — A Ring of Industrial Development Around the Mealagh Valley

The developer’s own EIAR identifies 28 wind farms within 25km of the proposed turbines and — in its own Figure 13-16 (Cumulative Context Map) — shows 31 wind farm developments within the LVIA study area comprising existing, permitted and proposed developments. Maughanaclea sits as the central focal point of this entire cluster. West Cork has already absorbed an extraordinary concentration of wind energy development. The cumulative impact on Wild Hideaways has not been assessed at all.

7.1 The Cumulative Wind Farm Cluster Within 5km

The following wind farm developments exist, are permitted, or are conditionally approved within 5km of the nearest proposed Maughanaclea turbine, confirmed in the developer’s own EIAR (Chapter 7, Table 7-12 and Chapter 13, Table 13-15):

- Shehy More Wind Farm — 11 turbines, EXISTING, 2.6km. Already operational on the eastern ridgeline.
- Gortloughra Wind Farm — 8 turbines, REFUSED by Cork County Council, currently under appeal to An Coimisiún Pleanála, 2km. Cork County Council has already determined this landscape cannot absorb it.

- Dereenacreenig West Wind Farm — 3 turbines at 119.3m, CONDITIONALLY APPROVED by Cork County Council on 15 April 2026 (Ref. 25/6052), 3.6km south. No longer a proposed development — a conditionally permitted one.
- Curraglass Wind Farm — 3 turbines, CONDITIONALLY GRANTED by Cork County Council on 09/01/26 (Ref. 25/6398), currently under appeal to An Coimisiún Pleanála, 4km north-west.

If Maughanaclea is approved, the Mealagh Valley would be surrounded by a potential total of 39 turbines on the ridgelines encircling the valley. The developer's own LVIA acknowledges these developments "would cumulatively influence the character of LCT4 in a future receiving environment" (Chapter 13, page 13-101). Cork County Council's refusal of Gortloughra is material evidence that this landscape cannot absorb further wind energy development. Granting Maughanaclea while Gortloughra's appeal is undecided — and while Dereenacreenig West has just been conditionally approved to the south — would compound an already deeply concerning cumulative situation.

7.2 Cumulative Tourism Impact — Unassessed

The cumulative impact on tourism has not been assessed. Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA 2023 require cumulative tourism impacts to be considered. They have not been. Wild Hideaways' guests come for a landscape free from industrial intrusion in every direction. The cumulative scenario of 39 turbines on multiple surrounding ridgelines is existential for Wild Hideaways' tourism product — not merely damaging.

7.3 Cumulative Noise — The Sandwich Effect

A critical cumulative noise impact has not been assessed anywhere in the EIAR. The majority of dwellings and tourism accommodation in the Mealagh Valley would be sandwiched between two wind farms on opposite ridgelines: the Maughanaclea development (T07–T14) on the northern and western ridgelines, and the Dereenacreenig West development — now conditionally approved by Cork County Council on 15 April 2026 — on the southern ridgeline. Residents and guests at Wild Hideaways would experience noise arising from one side or another, or at times from multiple directions simultaneously, leaving no consistently quiet side. This is a fundamentally different acoustic situation to a single wind farm and has not been modelled or assessed.

Peer-reviewed research confirms the health significance of this cumulative noise exposure. A systematic review and meta-analysis of eight observational studies involving 2,433 participants (Onakpoya, O'Sullivan, Thompson & Heneghan, Environment International, 2015) found that exposure to wind turbine noise is associated with an odds ratio of 4.08 for annoyance (95% CI: 2.37–7.04) and an odds ratio of 2.94 for sleep disturbance (95% CI: 1.98–4.37). Four studies found that wind turbine noise significantly interfered with quality of life. Visual perception of wind turbines was also associated with greater frequency of reported negative health effects. For Wild Hideaways — a business whose entire commercial proposition is built on acoustic amenity, sleep quality and landscape freedom — these findings are directly and gravely relevant. [Appendix K-8]

7.4 Cumulative Night-Time Lighting Impact on the Dark Sky

The cumulative night-time impact is entirely absent from the EIAR. Each wind farm in the cluster contributes mandatory aviation warning lights:

- Shehy More (existing) — already contributing aviation lights to the eastern ridgeline
- Maughanaclea (this application) — 28 red flashing lights on the western and northern ridgelines
- Dereenacreenig West (conditionally approved, 3.6km south) — lights on the southern skyline
- Gortloughra (proposed, 2km) — additional lights to the east
- Curraglass (proposed, 4km north-west) — lights to the north-west

The cumulative effect would be a ring of flashing red aviation warning lights encircling the night sky above the Mealagh Valley in every direction. Research confirms aviation warning lights are brighter than Venus at up to 4km (Bará & Lima, 2024). Brian Espey, Chairperson of Dark Sky Ireland, independently confirms this finding (Appendix F) and further states that horizontal illuminance from aviation lights “has been shown to raise light levels above the natural background in dark locations such as the Mealagh Valley to kilometre distances.” This is not a theoretical harm — it is a ground-level, measurable physical impact on the specific location of Wild Hideaways, confirmed by the national authority on dark sky preservation. The cumulative ring of lights from multiple wind farms simultaneously would permanently destroy the Bortle Class 2, SQM 21.89 dark sky that is Wild Hideaways’ most valuable and most legally certified asset, rendering our DarkSky Approved Lodging certification — the only such certification in Europe — permanently invalid.

8. Shadow Flicker — An Unassessed Impact on Wild Hideaways

The shadow flicker assessment (Chapter 5, Section 5.3.6, page 5-13) identifies 79 sensitive receptors within 1,330m of the proposed turbines, of which 31 are predicted to experience shadow flicker. Wild Hideaways is entirely absent from this assessment despite the southern turbine cluster being directly in the sightline from the property.

The following specific areas of Wild Hideaways face in the direction of the southern turbine cluster and are most exposed to shadow flicker: (1) the outdoor sauna area and associated deck and plunge pool, where guests spend extended periods of outdoor amenity particularly in the morning and late afternoon; (2) the panoramic kitchen windows of the main lodge building; and (3) the Wild Sky Dome observatory, which has an unobstructed horizon view toward the turbine cluster. The developer’s own assessment acknowledges that larger windows result in longer shadow flicker durations (Chapter 5, Section 5.2.4, page 5-13). Shadow flicker at a luxury wellness retreat in outdoor amenity areas would be commercially unacceptable even below the guideline threshold of 30 minutes per day.

9. Visual Impact on Wild Hideaways

The proposed turbines will be directly visible from Wild Hideaways — from the sauna area, the panoramic kitchen windows, and the Wild Sky Dome. No photomontage was taken from Wild Hideaways despite it being the only registered tourism accommodation within 5km. The developer's own LVIA records:

- VP3 (Mealagh Valley Loop, 1.2km): Residual effect MODERATE. High sensitivity. Turbines spanning the entire 53.5-degree field of view.
- VP11 (Maughanaclea Valley/R585, 886m): Residual effect SIGNIFICANT. High sensitivity.
- VP12 (R585, 998m): Residual effect SIGNIFICANT. High sensitivity.
- VP16 (Maughanaclea, 1.1km): Residual effect SIGNIFICANT. High sensitivity, SUBSTANTIAL magnitude of change. Turbines comprising 44% of all landscape views.

The conclusion that tourism impact is "not significant" is not credible when the developer's own LVIA records Significant and Substantial visual effects at multiple locations within 1km of the turbines. The night-time visual impact of 28 red aviation warning lights is entirely absent from both the LVIA and TIA.

9.1 No Night-Time Aviation Lighting Impact Assessment

NatureScot (Scottish Natural Heritage) published formal guidance in November 2024 specifically addressing the assessment of aviation lighting impacts from wind turbines: 'Guidance on Aviation Lighting Impact Assessment' (NatureScot, November 2024) [Appendix K-7]. This guidance was published before Maughanaclea Ltd. submitted its planning application on 30 March 2026. It sets out a three-stage assessment process that represents published best practice: Step 1 — defining the lighting proposal; Step 2 — understanding the baseline; Step 3 — assessing the effects of the aviation lighting.

None of these three steps have been carried out at Wild Hideaways. No lighting proposal was defined for night-time impact purposes. No night-time baseline was established at Wild Hideaways — a property holding the only DarkSky Approved Lodging certification in Europe, with a scientifically measured sky quality of SQM 21.89 / Bortle Class 2. No effects on night-time receptors at Wild Hideaways were assessed. The NatureScot guidance explicitly states that receptors at night may differ from those during the day — Wild Hideaways is precisely such a receptor, a business whose commercial proposition is built entirely on the quality of its night environment, and which has fundamentally different sensitivity to night-time impacts than any daytime receptor. The developer's failure to conduct any night-time aviation lighting impact assessment is a fundamental deficiency in the EIAR, contrary to published best practice guidance that was available at the time of submission.

10. The Turbine Model Has Not Been Confirmed

Chapter 12, Section 12.4.5.3 confirms the noise assessment uses a Nordex N133 as a “representative” proxy turbine, explicitly acknowledging that “the exact make and model of the turbine installed on the Proposed Wind Farm site will be dictated by a competitive procurement process.” The entire noise assessment, shadow flicker assessment, visual impact assessment and ornithological collision risk assessment are therefore based on an assumed turbine rather than the actual turbine to be installed. An Coimisiún Pleanála cannot properly assess the environmental impact of a development whose fundamental technical specification remains unconfirmed.

11. Financial and Personal Impact

If Wild Hideaways is forced to close, Amy and John O’Sullivan lose not only their business income but their entire livelihood. Wild Hideaways’ trading data — 1,000 guests in 2025, 95% summer occupancy, 47.5% shoulder season March 2026, and 13 jobs — is summarised at Appendix H. A professional market appraisal by Raymond O’Neill of Sherry FitzGerald O’Neill, dated 13 May 2026 (Appendix I), values the family home at €450,000–€475,000 and confirms an expectation of in excess of €1,200,000 for the commercial business, giving a combined value of approximately €1.65–1.7 million (Appendix I).

A critical planning constraint compounds this financial exposure. Cork County Council’s own planning conditions for Wild Hideaways (Ref. 21/00560, Appendix B) stipulate that the family home cannot be sold separately from the commercial business — they are legally one indivisible asset. Any adverse impact on the value or viability of the business directly and simultaneously affects the value of the family home. There is no means by which Amy and John O’Sullivan could exit the business while retaining their home, or sell their home while retaining the business. These conditions were imposed by Cork County Council — the same authority whose CCDP designates this landscape as High/High sensitivity. The development’s financial impact on this combined indivisible asset is therefore total.

11.1 Property Value Loss

The CERIS paper ‘Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach’ (Gillespie & McHale, University of Galway, CERIS Working Paper WP-2023-01) used the gold standard hedonic pricing methodology across seven west of Ireland counties. It finds a robust and significant reduction in property value of -14.7% within 1km of a turbine, with an aggregate loss of approximately €6.8 million for the case counties. Wild Hideaways is approximately 2km from the nearest proposed turbine — within the range of significant impact. Applied to the combined indivisible asset value of €1.65–1.7 million, even a conservative reduction would represent a loss well in excess of €200,000 — a loss from which Amy and John O’Sullivan cannot protect themselves because Cork County Council’s own planning conditions prevent any partial sale.

The developer dismisses property value concerns using studies with fundamental methodological flaws: data averaged over wide distance bands concealing localised

impacts; pre-169m turbine data; foreign datasets inapplicable to West Cork; scenic premiums ignored; and survivorship bias where homeowners withdraw from the market rather than sell at a loss. The CERIS study uses Irish data, Irish properties, the west of Ireland specifically, and the hedonic pricing methodology — it is the most directly applicable and methodologically robust evidence available.

11.2 Business Trading Value Loss

Entirely separate from, and potentially greater than, the property value loss is the destruction of Wild Hideaways' trading value — the goodwill, DarkSky Approved Lodging certification, occupancy rates, brand reputation and future earning potential. Our DarkSky Approved Lodging certification — the only such certification in Europe — would be at immediate risk of revocation. Our dark sky marketing position, which drives our growing shoulder and off-season occupancy, would be eliminated. The Dark Sky Community accreditation for the Mealagh Valley would be permanently precluded. The Galloway experience demonstrates that dark sky designation generates up to £500,000 per year in tourism revenue after ten years (Appendix K-6) — all of this potential permanently destroyed. The market appraisal at Appendix I confirms an expectation of in excess of €1,200,000 for the commercial element alone, pending preparation of full accounts. This figure does not yet fully capture the trading value of the certified dark sky asset, which has no equivalent anywhere else in Europe.

12. Private Water Supply

Wild Hideaways relies entirely on a private well for all water supply to guests, staff and operations. This well does not appear on the GSI database. The developer dismissed private well risk solely on the basis that "a search of private well locations on GSI well database reveal no mapped private wells within 5km" (Chapter 17). Wild Hideaways' own private well demonstrates precisely the gap in this methodology. The HSE explicitly recommended during scoping that a field survey of private wells be conducted (Chapter 2, page 2-77). It was not. Wild Hideaways' well was consequently never identified, assessed or considered.

This omission is particularly serious given: construction groundworks acknowledged to risk hydrocarbon release into groundwaters (Chapter 5, Section 5.4.2.2.3, page 5-70); hydrocarbon contamination risk rated at risk score 4 during construction (Chapter 16, Section 16.4.1.7); peat slide risk acknowledged with reference to Shass Mountain (2020) and Meenbog (2020) failures (Chapter 8, Section 8.2.15); and no baseline water quality testing conducted at Wild Hideaways. Without a baseline, any future contamination would be impossible to detect, attribute or remedy. An Coimisiún Pleanála should require a full field survey, baseline testing and monitoring plan as conditions of any permission.

13. Biodiversity and Ecological Impacts

The developer's own Biodiversity Chapter admits: a permanent significant residual effect on Upland Blanket Bog (Annex I) even after mitigation; the site sits within the

Mealagh Freshwater Pearl Mussel sensitive catchment; Kerry Slug, Otter and Lesser Horseshoe Bat (all Annex II and IV) confirmed present; Hen Harrier (Annex I, national importance) confirmed hunting within the site with BirdWatch Ireland giving no consultation response; and 2.02 hectares of Wet Heath (Annex I) permanently lost. Wild Hideaways' ecotourism offering depends entirely on the ecological integrity of this landscape.

The EIAR entirely fails to assess the impact of aviation warning lights on biodiversity. Brian Espey, Chairperson of Dark Sky Ireland, specifically highlights this risk (Appendix F): aviation warning lights "can impact migratory birds who depend on their vision in the red part of the spectrum for navigation and can cause more harm in overcast or foggy conditions." Dark Sky Ireland further notes that "the night-time environment has been given insufficient attention to date" but is "becoming more recognised as being important for the well-being of all species — terrestrial, airborne and aquatic" and links this to EU biodiversity obligations under recent EU actions. The EIAR contains no assessment of aviation lighting impacts on nocturnal biodiversity despite this being a recognised and documented harm from a source available to the developer before submission.

14. The Green Energy Paradox: Peatland Carbon

The developer claims a positive climate benefit (Chapter 17, Section 17.2.6, page 17-16) while simultaneously admitting unquantified permanent carbon losses from peatland destruction (Chapter 11, Section 11.4.2, pages 11-23 to 11-24), confirming the carbon model assumes no peatland restoration at decommissioning, and acknowledging roads and hardstands will be left in situ permanently. A permanent planning permission is being sought for all infrastructure. A development that permanently destroys irreplaceable peatland cannot credibly claim full climate neutrality.

15. Outdated Guidelines and Planning Context

This development is assessed under Wind Energy Development Guidelines (DoEHLG, 2006) written nearly 20 years ago for turbines approximately half the height now proposed. These guidelines set no maximum height, contain no dark sky provisions, no private well framework, and no mechanism for assessing commercial tourism facilities as acoustic sensitive receptors.

Cork County Council refused the nearby Gortloughra wind farm (175m turbines, Statkraft) — confirming this landscape cannot absorb further wind energy development. The Supreme Court in Coolglass Windfarm Limited v An Coimisiún Pleanála [2026] IESC 5 confirmed that An Coimisiún Pleanála must balance climate objectives against development plan policies, and cannot treat climate benefit as automatically overriding a development plan. The CCDP High/High landscape designation must be given its full weight. The Maughanaclea site is designated Open to Consideration only — the developer has not discharged the burden of demonstrating that adverse impacts can be avoided. Local media has observed that

West Cork may have reached a “tipping point” for wind energy development given the scale of cumulative development already in place or in planning.

Maughanaclea Ltd. applied as a Strategic Infrastructure Development, bypassing Cork County Council entirely. This deprived the local community and its elected representatives of any role in this decision. The local authority responsible for this landscape — which designated it as High/High sensitivity in the CCDP, which refused the adjacent Gortloughra wind farm, and which is actively engaged in supporting the Mealagh Valley Dark Sky Community application — has had no decision-making function whatsoever. An Coimisiún Pleanála is therefore the sole arbiter of a decision that will permanently affect this community, and bears the full weight of that responsibility.

16. Summary of EIAR Deficiencies

The EIAR is materially deficient in the following specific respects:

- Wild Hideaways not included as an NSL despite meeting the developer’s own definition (Appendix 12-1, page A12-1-1). All 279 assessed NSLs (H001–H279) are further from the southern turbine cluster than Wild Hideaways.
- No background noise monitoring conducted at Wild Hideaways. The nearest monitoring location (NML4) is 3,014m from Wild Hideaways — 1km further than the nearest turbine.
- Spring-only noise survey (28 March–8 May 2025) not representative of peak dark sky season (Chapter 12, Table 12-7, page 12-28).
- Borrow Pits 3 and 4 (southern cluster) assessed at no receptor. AWN’s borrow pit assessment used H008, which is 5,927m from Wild Hideaways (Chapter 12, page 12-49).
- No terrain analysis of valley acoustic chamber effect despite Van Renterghem (2017) demonstrating complex sound pressure distributions from ridge turbines into valleys.
- Wild Hideaways not assessed for shadow flicker (Chapter 5, Section 5.3.6, page 5-13) despite sauna area, panoramic kitchen windows and Wild Sky Dome facing the turbine direction.
- No photomontage or visual assessment conducted from Wild Hideaways.
- TIA does not acknowledge DarkSky Approved Lodging certification DS-LOD-15 (issued 5 March 2026, only certification in Europe), predating the application by 25 days.
- TIA does not assess 28 aviation warning lights’ impact on DarkSky certification or on the Mealagh Valley Dark Sky Community application.
- Cumulative night-time lighting impact from all surrounding wind farms entirely absent from EIAR.
- Cumulative tourism impact not assessed contrary to Fáilte Ireland’s scoping requirement and EIA guidelines.
- Wild Hideaways not consulted during community engagement despite being the only registered tourism accommodation within 5km.

- Turbine model unconfirmed — entire noise, shadow flicker and visual assessment based on proxy Nordex N133 subject to competitive procurement (Chapter 12, Section 12.4.5.3).
- Private well risk dismissed on incomplete GSI database (Chapter 17). No field survey conducted despite HSE recommendation (Chapter 2, page 2-77). No baseline water quality testing conducted.
- TIA direct internal contradiction on Sheep's Head Way (Chapter 5, Section 5.3.2.3, page 5-28).
- Kealkill Stone Circle setting impacts admitted as unmitigatable (Chapter 14, Section 14.4.5, page 14-67) yet conclusion claims no significant effects (Chapter 14, Section 14.7, page 14-69).
- MKO unilaterally downgraded CCDP-designated High/High landscape to Medium sensitivity (Chapter 13, Table 13-16, page 13-101) using a methodology framed around capacity to absorb development rather than objective landscape value assessment.
- The EIAR makes no reference to CCDP Policy Objective BE 15-13(d), which requires the minimisation and control of light pollution having regard to Dark Sky principles, nor to the CCDP's explicit recognition that dark skies and unpolluted night skies are an asset to the County (CCDP Volume 1, Section 15.11.3, page 346). The proposed aviation warning lights directly violate this adopted development plan policy.
- The cumulative noise impact of Maughanaclea and Dereenacreenig West simultaneously operating on opposite ridgelines — leaving no consistently quiet side to dwellings and tourism accommodation in the Mealagh Valley — has not been assessed. Peer-reviewed research (Onakpoya et al., 2015) confirms odds ratios of 4.08 for annoyance and 2.94 for sleep disturbance from wind turbine noise exposure.
- NML4 was described as a "quiet garden location" yet was sited within approximately 100m of an active dairy farm with daily cattle movement, rock breaking and chainsawing during the 2025 monitoring period — sources not contextualised in the monitoring report. Elevated background noise at NML4 would result in permissive turbine noise limits for the entire valley.
- Curraglass Wind Farm has been conditionally granted by Cork County Council on 09/01/26 (Ref. 25/6398) and is now under appeal to An Coimisiún Pleanála — not merely "in planning" as represented in the EIAR. The cumulative picture is therefore worse than the EIAR states.
- Dereenacreenig West Wind Farm (conditionally approved by Cork CC, 15 April 2026) and cumulative impact of 39 turbines within 5km not fully assessed.
- Property and trading value impacts dismissed without reference to the CERIS/University of Galway study finding -14.7% property value loss within 1km.
- No construction noise assessment for borrow pits 3 and 4 at any receptor, and no business viability assessment for an 18–24 month construction phase on a noise-sensitive tourism operation.

17. Personal Statement

I have worked so hard to create a business that respects this land, this community, and the environment. Sustainability is at the heart of everything we do at Wild Hideaways. I believe in renewable energy — but I believe firmly that these enormous turbines in this beautiful, fragile, irreplaceable landscape are not the right answer.

When we sought planning permission for Wild Hideaways, Cork County Council required us to demonstrate that every structure blended with the skyline and was in keeping with the rural character of the area. We had to install additional landscaping to ensure the development was shielded from the road. The planning system held us to the highest possible standard of visual sensitivity. And yet 169-metre industrial turbines are proposed for the ridgeline above our valley, assessed under 20-year-old guidelines, with no equivalent requirement applied.

We have achieved a DarkSky Approved Lodging certification — the only one in the whole of Europe — because we took the quality of our night skies seriously enough to be formally inspected and certified. The sky above Wild Hideaways has been scientifically measured and confirmed as Bortle Class 2 with an SQM of 21.89 — among the darkest skies on Earth. Our guests come here specifically for this extraordinary darkness. A joint announcement with DarkSky International is imminent. We received an international grant to build a stargazing dome. We have connected that dome to the Kealkill Stone Circle so that our guests can stand under the same stars that the builders of that ancient monument used as their guide. We are pursuing Dark Sky Community accreditation that would make the Mealagh Valley the first of its kind in Ireland.

All of that would be gone. Our business, which employs 13 people and supports their families, would not survive. We would have to leave this valley. The silence that our guests call the best sleep of their lives would be broken. The dark skies certified as the finest in Europe would be lit by a ring of flashing red lights on every ridgeline. Our guests sit at our kitchen windows looking out at rolling hills and clear night sky — those same windows would look out at industrial turbines. Our guests relax in our sauna watching the sun set over unspoilt landscape — that view would be dominated by 169-metre machines. The wild and unspoilt character of this valley, which the planning system required us to protect when we built here, would be permanently and irreversibly destroyed.

I am asking An Coimisiún Pleanála to see what we have built here, to understand what would be lost, and to refuse this application. — Amy O’Sullivan, Wild Hideaways.

18. Conclusions and Request for Refusal

For the reasons set out above, we respectfully submit that the proposed Maughanaclea Renewable Energy Development should be refused planning permission. The grounds for refusal are:

1. The development would destroy Wild Hideaways Eco Spa Retreat — the only DarkSky Approved Lodging in Europe, holding a scientifically verified Bortle

Class 2 / SQM 21.89 dark sky — by introducing 28 red aviation warning lights directly visible from the property, in direct violation of DarkSky lighting criteria, and would permanently preclude Dark Sky Community accreditation for the Mealagh Valley, directly contradicting the Programme for Government 2025. No night-time aviation lighting impact assessment was conducted contrary to NatureScot's published best practice guidance (November 2024).

2. MKO unilaterally downgraded the CCDP-designated High/High landscape to Medium sensitivity using a circular methodology framed around capacity to absorb development. The democratically adopted CCDP designation must be given its full weight. The Supreme Court in Coolglass [2026] IESC 5 confirmed that An Coimisiún Pleanála must balance climate benefit against development plan policies.
3. The noise assessment is materially deficient: Wild Hideaways excluded as an NSL; no monitoring conducted near Wild Hideaways; spring-only survey; borrow pits 3 and 4 assessed at no receptor; valley terrain entirely ignored; no business viability assessment for construction phase.
4. Wild Hideaways not assessed for shadow flicker despite being within direct sightline of the southern turbine cluster, with the sauna area, panoramic kitchen windows and Wild Sky Dome all facing the turbine direction.
5. The cumulative impact of 39 turbines encircling the Mealagh Valley — including Dereenacreenig West now conditionally approved by Cork CC on 15 April 2026 — has not been assessed for tourism impact, and the cumulative night-time lighting impact on the only DarkSky Approved Lodging in Europe has not been assessed at all.
6. The entire noise, shadow flicker and visual assessment is based on an unconfirmed proxy turbine model subject to competitive procurement. An Coimisiún Pleanála cannot assess what will actually be built.
7. Wild Hideaways' private well was never identified, assessed or considered, contrary to the explicit HSE scoping recommendation. No baseline water quality testing conducted.
8. The TIA is materially deficient: it fails to acknowledge DarkSky certification, fails to assess night-time lighting impact, contains a direct internal contradiction on the Sheep's Head Way, and was prepared in breach of Fáilte Ireland's scoping requirement for full tourism consideration including cumulative impact.
9. The development directly conflicts with the Fáilte Ireland West Cork Coast DEDP, the Wild Atlantic Way Regional Tourism Development Strategy 2023–2027, and CCDP Policies GL 14-9, GI 14-14, ET 13-7 and TO 10-2.
10. The development will cause permanent, irreversible harm to the setting of the Kealkill Stone Circle (Preservation Order PO 69/1938), which the developer's own assessment admits cannot be mitigated.
11. The professional market appraisal at Appendix I (Sherry FitzGerald O'Neill, 13 May 2026) confirms a combined asset value of approximately €1.65–1.7 million. Cork County Council's own planning conditions (Appendix C) prevent the family home from being sold separately from the commercial business — a single legally indivisible asset. The CERIS/University of Galway (2023) study finds a robust -14.7% property value reduction within 1km. Applied to this indivisible combined asset, even a conservative reduction represents a loss well in excess of €200,000 with no partial exit available. The full trading value loss — including DarkSky certification, dark

sky tourism potential and established goodwill — is additional and potentially far greater.

12. The development would destroy 13 local jobs, force the closure of a €1.65–1.7 million combined asset that Cork County Council's own planning conditions make legally indivisible, and require Amy and John O'Sullivan to leave the valley they have invested their lives in — all on the basis of an EIAR that is in multiple respects factually incomplete, internally contradictory, based on an unconfirmed turbine model, and assessed under guidelines nearly 20 years out of date. Cork County Council refused the adjacent Gortloughra development. Cork County Council is actively supporting the Mealagh Valley Dark Sky Community initiative. Cork County Council designated this landscape as High/High sensitivity in its own Development Plan. Yet Cork County Council had no role whatsoever in this decision because Enerco bypassed it entirely. An Coimisiún Pleanála bears the full weight of that responsibility.

Addendum to Section 3.4

Letter of Support — received after finalisation of body

Subsequent to the finalisation of the main body of this Submission in Objection, Wild Hideaways received a formal written Letter of Support for the Mealagh Valley Dark Sky Park initiative from Deputy Christopher O'Sullivan TD, Minister of State for Nature, Heritage and Biodiversity at the Department of Housing, Local Government and Heritage.

This letter constitutes a written statement of ministerial support that supersedes and formalises the earlier email correspondence described in Section 3.4 of this submission ("The Dark Sky Community Application").

In his letter, the Minister:

- expresses his support for the Wild Hideaways and community initiative to develop an accredited Dark Sky Park within the Mealagh Valley;
- identifies reduction of light pollution and protection of the natural night sky for the benefit of both people and wildlife as core goals;
- recognises the potential of Dark Sky tourism for sustainable rural tourism development outside the typical summer season;
- describes Wild Hideaways' approach to the proposal as "innovative and forward-thinking" and recognises the wide community engagement undertaken;
- states that Dark Sky Park accreditation would be "a very positive addition to the region."

The Minister's formal letter is reproduced in full as Item 1 of Appendix K.

The 28 mandatory red aviation warning lights that would be installed under the proposed development would permanently preclude every one of the outcomes that the Minister's letter identifies as desirable for the region.

This Submission in Objection respectfully invites An Coimisiún Pleanála to consider the Minister's letter as direct ministerial evidence of (a) the substantive value of the Mealagh Valley dark sky asset and the planned Dark Sky Park accreditation, and (b) the alignment of the Mealagh Valley initiative with Government policy on dark sky tourism, sustainable rural development and protection of the natural night sky for both people and wildlife.

References

Airbnb Rural Tourism Fund (2025). Confirmation of €10,000 grant to Dark Skies Community, Mealagh Valley. 29 September 2025. [Appendix E]

Bará, S. & Lima, R.C. (2024). Quantifying the visual impact of wind farm lights on the nocturnal landscape. Journal of Quantitative Spectroscopy and Radiative Transfer, Vol. 329, 109203. DOI: 10.1016/j.jqsrt.2024.109203. [Appendix K-1]

CHL Consulting Company Ltd. (2019). Feasibility Study for Maximising the Tourism Potential of Dark Sky Assets. Fáilte Ireland. [Appendix K-3]

Coolglass Windfarm Limited v An Coimisiún Pleanála [2026] IESC 5. Supreme Court of Ireland, 5 February 2026.

Cork County Development Plan 2022–2028. [Policies GL 14-9, GI 14-14, ET 13-7, TO 10-2]

Dark Sky Ireland (2025). Letter, Brian Espey, Chairperson, 25 June 2025. [Appendix F]

DarkSky International (2014). Kerry International Dark Sky Reserve announcement. Fáilte Ireland statement: “Achieving dark sky status will allow visitors to view some the exceptional skyscapes of South Kerry, which will create magical moments to treasure and experience along the Wild Atlantic Way.”

DarkSky International (2026). DarkSky Approved Lodging Certificate DS-LOD-15, issued 5 March 2026. [Appendix B]

DarkSky International (2026). Night Sky Quality Data, Wild Hideaways. SQM 21.89, Bortle Class 2. [Appendix D]

ekos for Forestry Commission Scotland (2012). Galloway Forest Dark Sky Park Economic Impact Assessment. [Appendix K-6]

Fáilte Ireland (2023). West Cork and Kenmare Destination and Experience Development Plan.

Fáilte Ireland (2023). Guidelines for the Treatment of Tourism in an EIA 2023.

Fernández-Bellón, D., Wilson, M.W., Irwin, S. & O’Halloran, J. (2019). Conservation Biology, Vol. 33, No. 2, pp. 413–422. DOI: 10.1111/cobi.13239. [Appendix K-5]

Government of Ireland (2025). Programme for Government 2025.

Maughanaclea Ltd. / MKO Ireland (2026). EIAR, all chapters and appendices. March 2026.

Van Renterghem, T. (2017). Sound propagation from a ridge wind turbine across a valley. Philosophical Transactions of the Royal Society A, Vol. 375, 20160105. DOI: 10.1098/rsta.2016.0105. [Appendix K-4]

Harrison, A. (DarkSky International, Dark Sky Places Programme Manager). Correspondence with Wild Hideaways, October 2025 – December 2025, re: Mealagh Valley International Dark Sky Community application. [Appendix K]

Keogh, J. (Cork County Council, Assistant Engineer, Roads Management). Correspondence with Wild Hideaways, 8 May 2026, re: Mealagh Valley Dark Sky Community designation and lighting policy mapping. [Appendix K]

MacMillan, G. (Mayo Dark Sky Park). Correspondence with Wild Hideaways, October 2025 – February 2026, re: Dark Sky Community accreditation process and Mealagh Valley application. [Appendix K]

NatureScot (2024). Guidance on Aviation Lighting Impact Assessment. November 2024. Sets out three-stage best practice process for assessing wind turbine aviation lighting impacts on landscape and visual resources. [Appendix K-7]

Onakpoya, I.J., O'Sullivan, J., Thompson, M.J. & Heneghan, C.J. (2015). The effect of wind turbine noise on sleep and quality of life: A systematic review and meta-analysis of observational studies. Environment International, Vol. 82, pp. 1–9. DOI: 10.1016/j.envint.2015.04.014. Finding: OR 4.08 for annoyance, OR 2.94 for sleep disturbance from wind turbine noise exposure. [Appendix K-8]

O'Sullivan, C. TD, Minister of State for Nature, Heritage and Biodiversity. Correspondence with Wild Hideaways, October – December 2025, re: International Dark Sky Community application for the Mealagh Valley. [Appendix K]

Wild Hideaways Planning Permission, Cork County Council, Ref: 21/00560. [Appendix C]

Wind Energy Development Guidelines (DoEHLG, 2006).

List of Appendices

- Appendix A — Wild Hideaways Eco Spa Retreat: Sense of Place — Photographic evidence of landscape quality and tourism amenity value
- Appendix B — DarkSky International Approved Lodging Certificate (DS-LOD-15, 5 March 2026)
- Appendix C — Wild Hideaways Planning Permission, Cork County Council, Ref: 21/00560
- Appendix D — Night Sky Quality Map and Measurement Data — SQM 21.89, Bortle Class 2
- Appendix E — Airbnb Rural Tourism Fund 2025 Grant Confirmation Email (29 September 2025)
- Appendix F — Dark Sky Ireland Letter (Brian Espey, Chairperson, 25 June 2025)
- Appendix G — Selection of Guest Reviews referencing silence, dark skies and unspoilt landscape
- Appendix H — Wild Hideaways Occupancy and Guest Data Summary (2025)
- Appendix I — Wild Hideaways Market Appraisal (Sherry FitzGerald O'Neill, 13 May 2026)
- Appendix J — Media Coverage — Airbnb Grant and Wild Sky Dome initiative
- Appendix K — Dark Sky Community Application Correspondence — Amber Harrison (DarkSky International Programme Manager), Georgia MacMillan (Mayo Dark Sky Park), Cork County Council Roads Management (8 May 2026), and Minister of State Christopher O'Sullivan TD
- Appendix K-1 — Bará & Lima (2024) — Aviation lighting research
- Appendix K-3 — CHL Consulting / Fáilte Ireland Dark Sky Feasibility Study (2019)
- Appendix K-4 — Van Renterghem (2017) — Ridge turbine valley sound propagation
- Appendix K-5 — Fernández-Bellón et al. (2019) — Bird density reduction at Irish wind farms
- Appendix K-6 — ekos / Forestry Commission Scotland (2012) — Galloway Dark Sky Park economic impact
- Appendix K-7 — NatureScot (2024) — Guidance on Aviation Lighting Impact Assessment, November 2024
- Appendix K-8 — Onakpoya et al. (2015) — Wind turbine noise, sleep disturbance and quality of life: systematic review and meta-analysis. Environment International, Vol. 82, pp. 1–9
- Appendix L — MKO LVIA Methodology Page (EIAR Chapter 13, page 13-30) — evidencing landscape sensitivity assessment framing

Signed:

Amy O'Sullivan & John O'Sullivan
Wild Hideaways Eco Spa Retreat, Mealagh Valley, Co. Cork

info@wildhideaways.ie
May 2026

APPENDIX

Wild Hideaways Eco Spa Retreat Sense of Place

A

The following photographs were taken at Wild Hideaways Eco Spa Retreat and in the Mealagh Valley, Co. Cork. They are submitted to give An Coimisiún Pleanála a direct sense of the exceptional landscape quality and tourism amenity value that the proposed development would destroy.

CONTENTS OF THIS APPENDIX

Wild Hideaways Eco Spa Retreat — Lodges, plunge pool and the Maughanaclea ridgeline

The green ridgeline visible on the horizon behind the lodges is the Maughanaclea ridgeline — the ridgeline on which the proposed 14 turbines at 169 metres would be sited.

The Mealagh Valley — Bantry Bay panorama with the Caha Mountains beyond

The wider landscape context of Wild Hideaways. Cork County Development Plan designates this landscape as High Value, High Sensitivity — LCT 15a Ridged and Peaked Uplands.

Sunset over Wild Hideaways — the Maughanaclea ridgeline as natural backdrop

The ridgeline silhouetted against the evening sky is where the proposed turbines would be sited. Guests experience this view from the lodges, outdoor areas and sauna.

The view from Wild Hideaways — Bantry Bay and Caha Mountains

This panoramic view of Bantry Bay, rolling farmland and the Caha Mountains is visible from the kitchen windows and outdoor areas of Wild Hideaways.

APPENDIX

DarkSky International Approved Lodging Certification

B

Certificate ID: DS-LOD-15 | Issued: 5 March 2026 | Valid to: 2031

Field inspection: 26 February 2026

Wild Hideaways is the only DarkSky Approved Lodging in Europe

Obtained 25 days before Maughanaclea Ltd. submitted its planning application

CONTENTS OF THIS APPENDIX

DarkSky

DarkSky Approved Lodging

Wild Hideaways

Cork, Ireland

DarkSky certifications are awarded only after a field inspection confirms full compliance with the lighting criteria outlined in the DarkSky Approved Lodging Program guidelines.

The successful field inspection for this project was completed on February 26, 2026.

Thank you for being a valued part of the DarkSky Approved Lodging Program—ensuring quality lighting that protects dark skies and preserves the nighttime environment. These efforts safeguard a shared cultural heritage and keep our stars shining bright.

Ruskin K. Hartley
Executive Director

DarkSky Approved
Lodging Experience

James Brigagliano
Lighting Program Manager

Issued: 2026-03-05

Valid until 2031-03-05

ID#: DS-LOD–15

Gmail Amy O'Sullivan <info@wildhideaways.ie>

DarkSky Approved Lodging - Wildhideaways, IRE

1 message

James Brigagliano <james.brigagliano@darksky.org> Thu, Mar 5, 2026 at 9:27 PM
To: Amy O'Sullivan <info@wildhideaways.ie>
Cc: Drew Reagan <drew.reagan@darksky.org>

Hi Amy,

Congratulations!

Your lodging/accommodation has proven compliance with the criteria of the DarkSky Approved Lodging Program. Your dedication to providing guests with the opportunity to experience pristine night skies, free from poor lighting, supports the mission of the Lodging Program.

We hereby confirm that Wild Hideaways is now officially a DarkSky Approved Lodging.

Approval means that Wild Hideaways:

- Preserves the night sky resource
- Follows responsible lighting practices
- Protects sensitive habitats
- Raises awareness about light pollution

As part of the DarkSky Approved designation, you will be provided with the following:

1. DarkSky Approved certificate
2. DarkSky Approved plaque/sign designs (coming soon)
3. DarkSky Logo
4. Page on the DarkSky website
5. Press announcement about your site's certification
6. Location on the DarkSky GIS map of DarkSky places

Please fill out the attached form with webpage and announcement info and return it to James.Brigagliano@darksky.org. It typically takes 2-3 weeks for DarkSky to complete the webpage and announcement from the time we receive the completed form.

Best,

James Brigagliano LC, MIES, LEED Green Assoc.
Lighting Program Manager
DarkSky International

DarkSky

Learn more about DarkSky One at ***DarkSkyMotors.com***

---

3 attachments

Approved Lodging - Certificate - Wildhideaways, IRE_2026-03.05.pdf
207K

DarkSky Approved Lodging Experience logo vectors v2.1.pdf
1159K

Approved Lodging - Page + Announcement Template_2026-03.05.docx
20K

APPENDIX

Wild Hideaways Planning Permission

C

Cork County Council Planning Reference: 21/00560

This appendix demonstrates the full planning history of Wild Hideaways, showing that Cork County Council imposed strict landscape and visual sensitivity conditions which Wild Hideaways was required to satisfy in full.

CONTENTS OF THIS APPENDIX

John & Amy O'Sullivan
c/o Diarmuid McCarthy & Associates
The Warner Centre
Marino Street
Bantry
Co. Cork

BY REGISTERED POST

01/10/2021

Re: 21/00560
(i) Installation of 6 no. camping pods, (ii) construction of a service building, (iii) installation of waste water treatment system and (iv) all associated site works
At: Laharanshermeen, Bantry, Co. Cork

Dear Sir/Madam,

I refer to your planning application which was lodged with the Planning Authority on the 10/08/2021.

It is considered that the information submitted with the application is not sufficient to enable the Planning Authority to plan in this case, for the following reasons:-

- Serious concerns with regard to the landscape impact, the regimental stepped arrangement of the six pods seemingly dictated by 6.0 metre separation distances, the number of pod units on the site, the 6.0 metre proximity of the pods from each other to provide a reasonable standard of amenity, the site layout, the introduction of a "*sea of cars*" at the front of the site, the absence on an integrated and coherent landscaping plan and structured planting at the northern boundary of the site and to some degree at the entrance.

- Concerns with regard to the pod design, scale, harsh materials and the number of pods.

- Concerns with regard to the siting, the design, and the very small scale and limited size of the amenity building proposed.

- Concerns with regard to road safety.

- Concerns with regard to waste water disposal, ground conditions and the seasonal use of the proprietary treatment tank that suggest that drainage may be seasonably problematic, as well an uncertainty with regard to the proposed water supply.

- No details have been submitted for water availability for fire fighting and other measures for firefighting purposes.

- Uncertainty with regard to signage.

- Uncertainty with regard to external lighting and potential light pollution.

- Uncertainty with regard to waste disposal and bin storage area.

Therefore, to enable the Planning Authority give further consideration to your application, you are requested to submit **six copies** of the following further information:-

1. The layout of this site for pod development requires radical reconsideration including the number of pods, the sighting of pods, the regimental staggered layout and front car parking area immediately adjacent to the road. Reconsider the entire site layout together with a coherent strategy for comprehensive landscaping of the site and relocate the parking area to the north of the site and set back from the road. Full details should be submitted of the separation distance between each pod which should be increased from 6.0 metres and the overall standard of amenity and privacy provided improved upon, together with comprehensive landscaping of the site in particular the northern boundary as well as some planting in around the main entrance to the site. Accordingly submit carefully considered and revised plans for the number of pod units on the site with an amended site layout and landscaping in this regard and with regard to the pod design (point 2 below) and the proposed amenity building (point 3 below).

2. The pod design at just under 30 metres is much larger than the norm. Overall there is a distinct impression of overdevelopment of the site with too many pods and the introduction of harsh grey metal cladding for the pods, rather than timber. In conjunction with point 1 above reconsider the number, size and design and materials of the proposed pods.

3. The proposed amenity building and its' small scale and design provides the most basic of facilities and would be well below the standard that would be reasonably anticipated in order to provide quality tourist accommodation. The amenity provided in this building is too small (20.60 square metres), too basic and compares most unfavorably with other approved pod development throughout West Cork. Accordingly, in conjunction with point 1 and 2 above, reconsider the siting, scale, design and size of this amenity building and the facilities to be provided for the proposed pod development and submit amended plans.

4. The submitted site layout plan (Drawing Number 003 Rev PO1) does not specify the emerging sightlines. Accordingly, submit an amended site layout plan indicating the provision of 80.00 metre sightlines from a 2.40 metres set back from a recessed entrance. Provide full details of any wingwalls and location of signage at the proposed entrance.

5. The bored well is greater than 15 metres upgradient from the proposed disposal system and there is a potential public health risk. Accordingly, submit a report and provide for the following details:-

    a) The approximate depth to aquifer.
    b) The measures to be put in place to protect the well head and well protection measures.

c) The measures to be put in place to ensure water supplied to facility users complies with EU Drinking water Regulations, and evidence the water is currently of a potable standard (E.coli, pH and Nitrate analysis shall suffice). A competent report should be submitted to ensure that the amount of water required for the development to the appropriate standard can be provided for the proposed pod development.

6. Normally it is the case that the minimum separation distance between each pod is 6.0 metres and while this separation distance has been indicated on the submitted site layout plan, it is also leads to a poor overall layout, (point 1 and 2 and 3 above) and requires to be reconsidered as above. It is the norm for smoke detectors, fire blankets, 4.5kg multi-purpose dry powder fire extinguisher and a water supply system capable of maintaining a minimum flow of 100 litres per minute and a running pressure of not less than 2 bar at the highest reel with any hose reels in accordance with BS 5306 Part1:2006. Submit full details that indicates those measures that will be put in place to address fire risk that have the agreement of the relevant Fire Officer, having regard to the requirements of the National Guidance Document on the Provision of Water for Fire Fighting, 3rd Edition published on 24/01/07 (This National Guidance Document is published jointly by the Local Government Association and Water UK).

7. Submit full details including scaled plans of all signage including at the entrance, including the material and dimensions.

8. Clarify the extent of external lighting and provide full details of external lighting within the site, if any, to be provided.

9. Provide details of waste disposal at the site from the occupants of the proposed pods including the area and number of bin storage facilities to be provided.

This request for further information is without prejudice to any decision the Council may take, either to refuse permission or to grant permission, with or without conditions. Please note that your application shall be declared to be withdrawn if all of the further information as required above is not submitted **within 6 months** of the date of this letter, or within such additional period, not exceeding 3 months, as may be agreed by the Planning Authority in accordance with Article 33 (3) of the Planning and Development Regulations 2001 as amended.

Please further note that where the Planning Authority considers that the further information request has not been fully complied with and requires clarification, the 4 weeks for making a decision (or 8 weeks in the case of an application accompanied by an EIS), does not begin until this clarification has been provided and the request for further information has been fully complied with.

Where Cork County Council collects any personal information from you in its role as a Planning Authority, such information will be processed in line with our privacy statement which is available to view on our website.

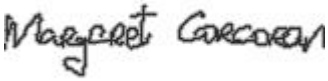
Please note that all information / supporting documentation submitted will be publicly available online and at the Planning Authority offices. Therefore, you should ensure that any personal information (i.e. PPSN, Bank Account numbers, date of birth, etc.) is removed from the documentation before it is submitted as part of the planning application.

In addition, where, as part of your response you submit any special categories of personal data relating to an individual, the person to whom the special categories of data refers **MUST** give their explicit consent to the use of this data by Cork County Council in processing your planning application.

Further consideration of your application is deferred pending receipt of the information requested.

Any response to this letter should clearly state that it is a response to a request for further information in connection with 21/00560 and be addressed to: - Planning & Development Department West, Norton House, Skibbereen, Co. Cork.

Yours faithfully,



Margaret Corcoran
Senior Staff Officer

John & Amy O'Sullivan
c/o DMCA Consultants
8 Marino Street
Bantry
Co. Cork

BY REGISTERED POST

09/02/2022

Re: ***21/00560***
(i) Installation of 6 no. camping pods, (ii) construction of a service building, (iii) installation of waste water treatment system and (iv) all associated site works

At: ***Laharanshermeen, Bantry, Co. Cork***

Dear Sir/Madam,

I refer to your planning application which was lodged with the Planning Authority on the **10/08/2021**, as amended on **14/01/2022**.

It is considered that the information submitted with the application is not yet sufficient to enable the Planning Authority to make a decision in this case for the following reasons:-

- Concerns with regard to the pod design.
- Concerns with regard to the design of the amenity building proposed.
- Concerns with regard to the proposed water supply.

Therefore, to enable the Planning Authority give further consideration to your application, you are requested to submit **six copies** of the following further information:-

1. In terms of the pod design you have indicated (letter dated 14th January 2022) that you are "*very keen to not emulate the round pod design of other parks in the area as our offerings are radically different"*.....That may be the case and the Planning Authority does not necessarily wish to prohibit good design and/or originality of pods which are 25 square metres in size. However, it is not accepted that the revised pod design now advanced, Drawing Number 004 Revision PO2, with a near flat roof i.e. 2 degree pitch and a large front *"picture window*" constitutes good design and would appear alien, out of place and

of limited aesthetic quality. Accordingly, submit amended plans for an amended design and appearance for the six pods and specify the floor area.

2. The proposed amenity building in terms of scale and siting is deemed appropriate subject to proper landscaping arrangements. It is observed that an amenity building has now been proposed of a much greater size than originally envisaged i.e. 48.76 square metres in size as opposed to 20.60 square metres as originally proposed. However, the design of that building as set out in Drawing Number 005 Revision P02 is a rectangular shaped box with a flat roof and is not conducive to amenity with limited aesthetic qualities as required by Objective G 6-1. Accordingly, submit amended plans for the design of the amenity building and omit the flat roof of the building.

3. The agents' letter dated 14th January 2022 states that "*we attached herewith a competent report from Water Technology Ltd confirming the adequacy of the water supply".* However, having perused all documents received on the 14th January 2022 that report was not enclosed, rather a "*sketch - well head*" which is not a report. Accordingly, submit the said report from Water Technology Limited.

Please note that your application shall be declared to be withdrawn if all of the information required above, is not submitted within 6 months of the date of the original further information letter dated 01/10/2021 OR one month from the date of this clarification of further information letter, whichever is the later.

The Council hereby agrees to this additional period for clarification, in accordance with Article 33 of the Planning and Development Regulations 2001, as amended by Article 33(3) of the Planning and Development Regulations 2006.

Where Cork County Council collects any personal information from you in its role as a Planning Authority, such information will be processed in line with our privacy statement which is available to view our website.

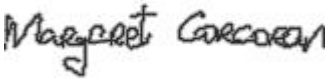
Please note that all information / supporting documentation submitted will be publicly available online and at the Planning Authority offices. Therefore, you should ensure that any personal information (i.e. PPSN, Bank Account numbers, date of birth, etc.) is removed from the documentation before it is submitted as part of the planning application.

In addition, where, as part of your response you submit any special categories of personal data relating to an individual, the person to whom the special categories of data refers **MUST** give their explicit consent to the use of this data by Cork County Council in processing your planning application.

Further consideration of your application is deferred pending receipt of the information requested.

Any response to this letter should clearly state it is a response to a request for clarification, in connection with Planning Reg. No. 21/00560, and be addressed to: Planning & Development Department West, Norton House, Skibbereen, Co. Cork.

Yours faithfully,



Margaret Corcoran
Senior Staff Officer

C O R K C O U N T Y C O U N C I L
Planning & Development Acts 2000 – 2010 as amended

John & Amy O'Sullivan
c/o Diarmuid McCarthy & Assocs.
The Warner Centre
Marino Street
Bantry
Co. Cork

Planning Register No: 21/00560

Application by: John & Amy O'Sullivan

Of: c/o Diarmuid McCarthy & Assocs., The Warner Centre, Marino Street, Bantry, Co. Cork

On: 10/08/2021, as amended on 10/09/2021, as amended on 15/11/2021, as amended on 14/01/2022, as amended on 21/02/2022, as amended 04/03/2022, as amended on 09/03/2022, as amended on 24/03/2022

For: (i) Installation of 6 no. camping pods, (ii) construction of a service building, (iii) installation of waste water treatment system and (iv) all associated site works

At: Laharanshermeen, Bantry, Co Cork

Further to Notice dated the 20/04/2022 Cork County Council hereby conveys a grant of **Permission** for the application described above subject to the conditions set out in the schedule attached to the said Notice dated 20/04/2022 of its intention to grant **Permission**

Signed on behalf of Cork County Council

Peter Varian
DATE: 24/05/2022

NOTE FOR GUIDANCE OF DEVELOPERS

A grant of Planning Permission or Permission Consequent on the grant of Outline Permission does NOT of itself empower a person to carry out a development unless that person is otherwise legally entitled to do so. Unless otherwise stated or unless it is revoked a Permission or Permission Consequent on the Grant of Outline Permission is valid for a period of five years.

Any development which takes place prior to the payment of a financial contribution required by any of the conditions attached to a Permission or Permission Consequent on the grant of Outline Permission will be unauthorized until compliance with the condition or conditions.

Please note that there is an onus on developers to ensure that there is no danger to the public as a result of the proposed development.

John & Amy O'Sullivan
c/o Diarmuid McCarthy & Assocs.
The Warner Centre
Marino Street
Bantry
Co. Cork

24/05/2022

Re: ***(i) Installation of 6 no. camping pods, (ii) construction of a service building, (iii) installation of waste water treatment system and (iv) all associated site works***

At: ***Laharanshermeen, Bantry, Co Cork***

Reg. No. 21/00560

A Chara,

I enclose grant of **Permission** in connection with the above.

Your attention is drawn to Condition No.3 and no.25 of the **Permission**, which requires that before any work commences on the site, you pay financial contributions and/or a bond to the Council. Otherwise, the **Permission** granted is of no effect.

It should be noted that the amount of the contribution is calculated in accordance with the Council's Development Contributions Scheme.

Please note that payment of development contributions can be made by electronic funds transfer using the following details: -

Bank Name:	A.I.B.
Bank Address:	66 South Mall, Cork, Ireland
IBAN:	IE37 AIBK 9341 7880 9190 18
BIC:	AIBKIE2D

Please quote the PLANNING REFERENCE, followed by PC as the narrative to your payment. You should also e-mail planning.contributions@corkcoco.ie to confirm your credit transfer. Payment by CASH or CREDIT CARD may only be made at the PAYMENTS OFFICE, COUNTY HALL. Payment by CHEQUE *(non-business customers only)*/BANK DRAFT etc. can be accepted at Planning Department West, Norton House, Skibbereen, Co. Cork.

Is mise, le meas,

P. Vaire

_____

Peter Varian
Senior Staff Officer

Important Notice for Developers – Conditions Precedent

The enclosed grant of permission may not automatically entitle you to commence the authorised development. This is because many permissions contain "Conditions Precedent" i.e. conditions which must be complied with before development commences. (Such conditions usually contain the phrase 'before development commences' and may require further details to be submitted to and agreed with the Planning Authority). If there are such conditions on your permission please read on.

1) **Early Submission Of Details**

   Where compliance proposals are required by condition you should make them as far in advance of your anticipated commencement date as possible. This is to enable adequate time for the Planning Authority to consider and, when satisfactory, agree the details. Such proposals may need to be revised before agreement can be reached or, in the absence of agreement, may need to be referred to An Bord Pleanala. These potential delays to starting a development can be mitigated by early submission of proposals in the first instance.

   Please note that all points of detail to be agreed are to be submitted in writing. These are to be submitted in hard copy to the Compliance Section (Norton House or County Hall as appropriate). All correspondence must include the planning application reference number and condition number to which the document(s) relate.

2) **Development Commenced In Advance of Compliance Proposals/Agreements**

   Any development commenced in advance of full compliance with such conditions (including conditions requiring financial contributions, bonds, securities) is unauthorised and leaves a developer liable to **enforcement proceeding** and **heavy penalties**. Simply submitting a proposal may not in itself be sufficient compliance if the condition also requires the Agreement/Approval of the Planning Authority. This will also apply where the Planning Authority becomes aware that a development is about to start (e.g. Commencement Notice) and conditions precedent have not been complied with.

3) **Submission Should Be Addressed As Follows:**

   Compliance with Conditions
   Planning Department West, Norton House, Skibbereen, Co. Cork.

The above information is intended for your assistance and guidance in avoiding a situation of unauthorised development and the Planning Authority wishes you every success with the development.

John & Amy O'Sullivan
c/o Diarmuid McCarthy & Assocs.
The Warner Centre
Marino Street
Bantry
Co. Cork

24/05/2022

Re: Planning Reg. No.21/00560

A Chara,

I refer to the above and in particular to Condition No.25.

I wish to confirm that in the event, that the Mortgage Company is forced to foreclose on the mortgage within seven years of the date of completion of the dwelling house proposed to be constructed, the Planning Authority will agree not to insist upon the compliance with Condition No.25.

Is mise, le meas,

P. Varian

Peter Varian
Senior Staff Officer

<u>Important:</u> - Please retain this document as it may be required by your lending agency

APPENDIX

Night Sky Quality Map & Measurement Data

D

DarkSky International field inspection, February 2026

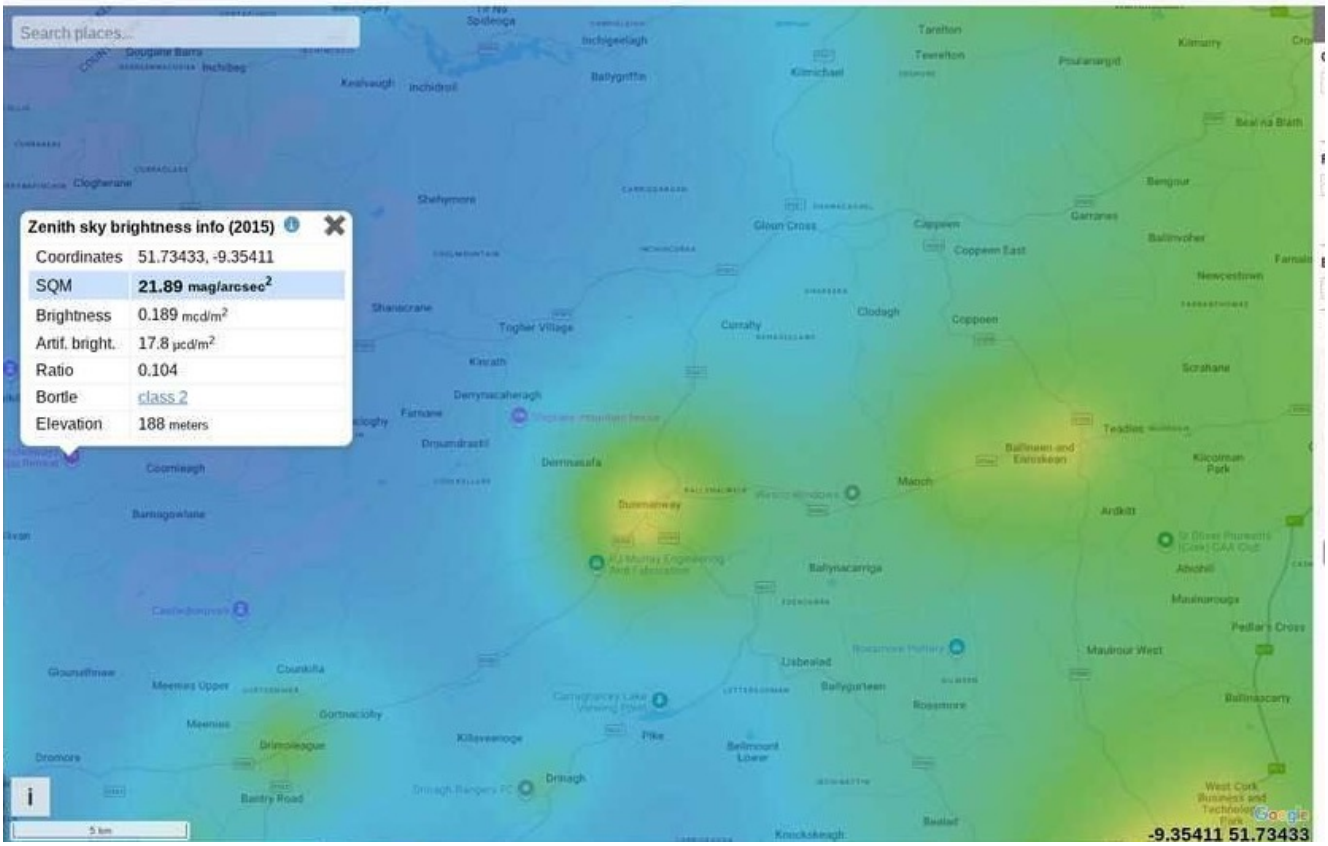
Sky Quality Meter reading: SQM 21.89 magnitudes per arcsecond squared

Bortle Class 2 — among the darkest measurable skies on Earth

Milky Way casts visible shadows. Naked eye stars to magnitude 7.1–7.5

CONTENTS OF THIS APPENDIX

1. Night Sky Quality Map and SQM measurement data
2. Aurora Borealis photograph — Wild Hideaways, October 2024, facing north
3. West-facing dark sky photograph — new moon conditions, November 2025
4. East-facing dark sky photograph — Milky Way visible above Maughanaclea ridgeline



Night Sky Quality Map — SQM 21.89 magnitudes per arcsec squared, Bortle Class 2

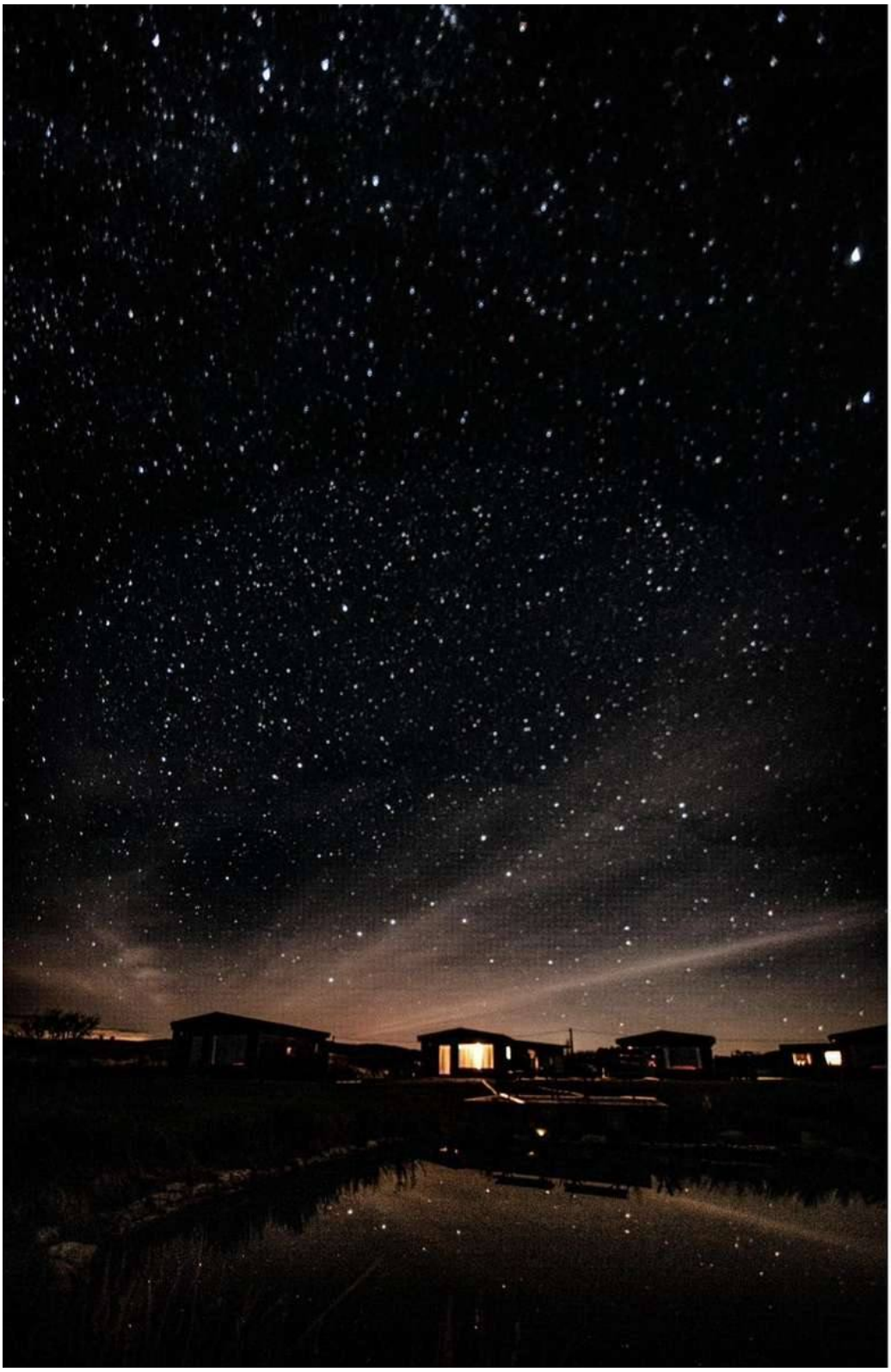
Zenith sky brightness data for the Mealagh Valley (coordinates 51.73433, –9.35411, elevation 188m). The reading falls within the darkest measurable band on the World Atlas of Artificial Sky Brightness. Map source: lightpollutionmap.info, Falchi et al. World Atlas data 2015.

Aurora Borealis above Wild Hideaways Eco Spa Retreat, Mealagh Valley

Facing north, October 2024. Plunge pool and lodges visible in foreground. Visible aurora at this latitude requires near-pristine dark sky conditions — evidence of the exceptional night sky quality at Wild Hideaways.

Night sky above Wild Hideaways Eco Spa Retreat, facing west

New moon conditions, November 2025. Western horizon — the direction of the proposed turbines T07–T14. Naked-eye stars to magnitude 7+ are clearly visible from Wild Hideaways under these conditions.



Night sky above Wild Hideaways Eco Spa Retreat, facing east

New moon conditions. Milky Way visible. Maughanaclea ridgeline in foreground — the ridgeline on which the proposed turbines would be sited and on which 28 mandatory aviation warning lights would be located.

APPENDIX

Airbnb Rural Tourism Fund 2025 Grant Confirmation

E

Email from Eleanor, Airbnb Rural Tourism Fund

Dated: 29 September 2025

€10,000 grant awarded to Dark Skies Community initiative, Mealagh Valley

Confirming international recognition of Wild Hideaways dark sky project

Referenced in submission Section 3.3

Gmail

Amy O'Sullivan <info@wildhideaways.ie>

Congratulations! Rural Tourism Fund Announcement

Eleanor Mason <eleanor.mason@ext.airbnb.com> Mon, Nov 10, 2025 at 5:45 PM

Hi,

I hope you all had lovely weekends.

Thank you so much to those who attended the event - we had a fabulous evening celebrating, and we hope you did too. We really appreciate you making the trip to Dublin - it was great to meet you all in person.

Congratulations! Today, we're thrilled to finally announce your initiative as one of eleven Rural Tourism Fund winners.

Please find attached a media toolkit with everything you will need for your own announcement - including campaign link, downloadable images from the Celebration of Rural Event, and suggested social copy.

If you'd like help reviewing your post, accessing event photos, or need any additional assets, please just get in touch.

I will contact you separately this week to continue the payment process for all initiatives.

Many thanks,
Eleanor

--

airbnb

Eleanor Mason
Advocacy and Policy Media Associate
London
Pronouns: she/her

Sent with Mixmax

Rural Tourism Fund Toolkit.pdf
77K

APPENDIX

Dark Sky Ireland Letter of Confirmation

F

From: Brian Espey, Chairperson, Dark Sky Ireland

Dated: 25 June 2025

Formal confirmation that the Mealagh Valley has a near-pristine dark sky environment and that wind farm aviation lights cause measurable harm

CONTENTS OF THIS APPENDIX

Brian Espey
Chairperson, Dark Sky Ireland
2 Acres Grove Newport F28 YD74
info@darksky.ie
25th June 2025

Dear Terrie & Michael,

Thank you for bringing the potential impact of windfarm lighting to your local area to our attention. The Mealagh Valley has a near-pristine environment, close to the conditions in Kerry Dark Sky Reserve and Mayo Dark Sky Park – Ireland's internationally accredited dark sky areas. Indeed, Ireland has the only such Gold Tier (highest quality) Dark Sky Reserve in Europe, maximising its tourist potential and leading to promotion by Failte Ireland, Discover Ireland and Wild Atlantic Way advertising, amongst others. Dark sky areas have been shown to provide a significant boost to local economies, providing an extra strand to environmental holidays and leading to extra income in shoulder and off-season for local B&Bs and guesthouses. As such, the area should be protected for future tourism development.

Research shows that even a single aviation warning light can impact on the visual amenity of the surrounding area, particularly given their siting on wind turbines over 100 metres tall. Calculations show that medium intensity lighting can be appear brighter than Venus – the brightest planet – out to distances of 4 km or so and, against a dark sky, such lights can be seen up to distances of tens of kilometres. The visual effect is, of course, multiplied by the combined effect of all the lights of the entire farm, including those sited on high ground 400 metres high.

Unless the lights are very directional, light falling on the ground (horizontal illuminance) has been shown to raise light levels above the natural background in dark locations such as the Mealagh Valley to kilometre distances, with the potential to affect ground-dwelling species. While the impact as seen from ground level is one aspect, these lights are obviously intended to be visible from the air where they can also impact migratory birds who depend on their vision in the red part of the spectrum for navigation and can cause more harm in overcast or foggy conditions. We are endeavouring to engage with the Irish Aviation Authority on the topic of windfarm lighting and note that representatives have taken part in European meetings regarding the environmental impact.

Dark Sky Ireland notes that preservation of biodiversity as required by recent EU actions. Although the night-time environment has been given insufficient attention to date, this is changing as it is becoming more recognised as being important for the well-being of all species – terrestrial, airborne and aquatic. This has also been recognised in the current Programme for Government's plans to "Promote and encourage an expansion of Dark Sky Ireland national parks and reserves" under the "Protecting Heritage and Nature" section of the document.

I hope that this is of use to you. Please let us know if we can be of further assistance.

With best regards,

Brian Espey
Chairperson, Dark Sky Ireland

References

Salvador Bará, Raul C. Lima, “Quantifying the visual impact of wind farm lights on the nocturnal landscape,” Journal of Quantitative Spectroscopy and Radiative Transfer, Volume 329, 2024, 109203, ISSN 0022-4073, https://doi.org/10.1016/j.jqsrt.2024.109203

Programme for Government 2025 – Securing Ireland’s Future https://7358484.fs1.hubspotusercontent-na1.net/hubfs/7358484/Programme%20for%20Government%20-%20New.pdf

Nature Scot Information note - The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures https://www.nature.scot/doc/information-note-effect-aviation-obstruction-lighting-birds-wind-turbines-communication-towers-and

APPENDIX

Selection of Guest Reviews

G

Drawn from 206 five-star Google reviews of Wild Hideaways

Reviews selected specifically referencing:

silence, dark skies, unspoilt landscape, and peace

Demonstrating that these qualities are the primary commercial draw

APPENDIX G · INTRODUCTION

Selection of Guest Reviews

Drawn from 206 five-star Google reviews of Wild Hideaways

The reviews reproduced in this appendix are drawn from the public Google Business Profile of Wild Hideaways Eco Spa Retreat, which carries 5.0 stars across 206+ reviews.

The reviews selected are those which explicitly reference silence, dark skies, unspoilt landscape, tranquillity, and the natural setting — the very qualities that the proposed development would permanently destroy. They are reproduced in date order, most recent first.

The full set of reviews can be verified on the public Google listing at the link below.

PUBLIC GOOGLE BUSINESS PROFILE

https://www.google.ie/travel/hotels/entity/CgsIqoypuZe9oYXkARAB

Owner replies to each review are omitted here for brevity but are visible on the public listing.

Hayley Bates

Holiday · Couple · 4 days ago

★★★★★

Highly recommend Wild Hideaways, lovely, quiet and scenic escape. Enjoyed watching the clouds roll in and out, from the comfort of bed during a storm. The convenience of ordering items ahead of time to the cabin. Setting up the fire pit and watching the starry sky to enjoying an outdoor seaweed bath at the side of your cabin and listening to the birds and not to forget the sauna onsite too. Really was a lovely relaxing break.

Selina Gee

Holiday · Couple · 1 week ago

★★★★★

Absolutely beautiful lodges surrounded with breathtaking views. The lodges have everything you need. The beds are as comfortable and lodge as cosy. The sauna and outdoor bath were fabulous. The owners have thought of absolutely everything. The breakfast hamper was delicious. My only regret is that we didn't book for longer than one night. I did not want to leave. So peaceful and relaxing. Can't wait to return. Probably one of the nicest places I've stayed in ever.

Brendan Halpin

19 weeks ago

★★★★★

A wonderful place to stay, extremely well considered and finished, right down to a pair of sliders to slip on so we don't walk in mud. We loved the seaweed bath, the sauna, the home-made pizza we ordered to be ready for our arrival, the sound of birds and the wide-open landscape outside our window.

Mairead Murphy

Holiday · 19 weeks ago

★★★★★

Rooms were spacious yet cosy and everything was spotless. The facilities were top class, and the sense of tranquil isolation, like we were the only ones on the mountain, was exactly what we were looking for, can't wait for our next trip.

Toby Bentley

Holiday · Couple · 20 weeks ago

★★★★★

Location deserves six stars! It's an incredible setting with an awe-inspiring view. Opening your curtains in the morning is pretty special. We loved the sauna and cold plunge too. The perfect place to spend an evening — and would have stayed longer if we'd had the time. Beautiful.

Tiffany Goh

Holiday · Couple · 20 weeks ago

★★★★★

We haven't had a holiday in a while and decided to treat ourselves to a 2 night stay at Wild Hideaways. We were the only guests on the compound as it was during the off peak season and on a weekday. The views were stunning, so serene and peaceful! We were so spoilt waking up in the mornings with the lovely view through the huge glass window. The alfresco bath was so relaxing and at night, we saw so many stars and even a few shooting stars! The amenities in the lodge were great. We ordered the dinner for 2 and it was amazing! The best part of it all was that we had Charlie our golden retriever with us :) We really did not want to leave! Highly recommend and will definitely stay again!

Georgina Mitchell

Holiday · Couple · 23 weeks ago

★★★★★

We are just back from a wonderful weekend at Wild Hideaways. The lodges are stunning and so cosy. It's so quiet and relaxing here and we had lovely walks with our dog Bruce who's loved it here. We went for the Relax package which gave us delicious scones on arrival which was needed after our long drive. We had the Antipasti platter for dinner which was incredible, highly recommend. The next day we had a great wonderful Irish breakfast and pizzas that night, these were also fab. We used the sauna and then when the rain finally died down we lit the fire pit which was amazing. They have everything you need and have thought of everything.

Alexis Steenekamp

Holiday · Couple · 29 weeks ago

★★★★★

We had the best stay at Wild Hideaways and we can't wait to come back soon!! We thoroughly enjoyed our fire & marshmallows, sauna & our outside bath — everything was 10/10!

Anne

Holiday · 29 weeks ago

★★★★★

The rooms are absolutely beautiful and the setting is really tranquil — even with the bad weather we had, sitting on the bed looking through the picture window is so peaceful. A lovely place to unwind — and our dog loved it too.

Deirdre Fahy

32 weeks ago

★★★★★

You cannot find a negative review about Wild Hideaways, and it's no wonder! Having just stayed, I'm delighted to add my rave review to all the others! The location is only a valley away from my parents' house, so I'm used to the scenic landscape, but still felt an amazing sense of escape, and walked roads and loops that were new to me. The second you walk in, you notice all the welcoming touches — an infuser gives a beautiful scent of essential oils, fresh scones, tea and (excellent) coffee, a cute bag of treats for the dog. The sauna with a view and the outdoor seaweed bath were pure bliss and the 90 minute full body massage was in the nicest treatment room I've ever been in — a huge space surrounded by plants and candles makes you feel like royalty. The therapist, Ciara, was so gifted, specialising in sports deep tissue massage. She left me with zero tension, ready for a phenomenal night's sleep. There's great WiFi, which is important for quickly looking something up, e.g. a walking route or weather outlook, but I say put that phone away, tuck into a great book, and enjoy the perfect recharge. Good hotels can be a lovely treat, but this is in a different league! Already plotting when I can go back!

Charlotte Miley

Holiday · Family · 36 weeks ago

★★★★★

This was our first visit to Wild Hideaways Retreat and we cannot praise it enough. A wonderful location giving spectacular views from bed! Sunrise and sunset affording great opportunities for photography. Both myself and my daughter were delighted with the organisation of the Lodge while still maintaining a cosy feel. Home produce beautifully prepared and wrapped ready in the fridge on arrival. A great way to unwind from the travails of modern daily life. We shall return.

Stacie Blyth

Holiday · 47 weeks ago

★★★★★

Amazing spot. Highly recommend. Beautiful views and really central basically in the heart of Bantry Bay. Amy was so warm and welcoming. We loved our trip so much we're considering doing it again.

Pierre

47 weeks ago

★★★★★

Great location with a stunning view and surrounded by nature. The cabins are new and well decorated. This is a fantastic spot to disconnect, relax and recharge! I would definitely recommend it!

Mark Chu Holiday · Couple · 9 Jan 2025

★★★★★

Our short break in West Cork @wild.hideaways coincided with what Met Éireann called a “multi weather hazard event”, so our walks were short and we retreated into our cozy cabin and the sauna (weather was too extreme to try the outdoor bath!), but the sky cleared on the second night and, with barely any light pollution, the night sky was fantastic. The following morning we got to enjoy the view, with the bonus of snow on the mountains. Our antipasti and red wine were fantastic and, given the weather, Amy contacted us to see if we needed anything. The cabin was beautifully set up and warm and comfortable, notwithstanding the extreme weather. We had brought our dog’s bed in the car and he was content to lie in front of the picture window. Beautiful setting, great accommodation and wonderful hosts.

APPENDIX

Occupancy & Guest Data Summary

H

Wild Hideaways trading data, 2023–2026

1,000 guests in 2025 | 95% summer occupancy

47.5% shoulder season occupancy, March 2026

206 five-star Google reviews | 13 jobs

WILD HIDEAWAYS

Financial performance, reputation and local impact

Year to date, January to May 2026, with like-for-like comparison to the same window in 2025.

Mealagh Valley, Bantry, West Cork
Wild Atlantic Way, Ireland

Submission detail

Sources verified from Cloudbeds property management system and platform review feeds

Wild Hideaways Eco Spa Resort

SECTION ONE

Financial performance, like for like

Revenue, Jan to May 2026

€74,621

+52.6% vs 2025

Room nights sold **354**

+40.5% vs 2025

Occupancy

39.1% +11.2 pts vs 2025

RevPAR

€82.39 +52.3% vs 2025

Like for like comparison, Jan to May

METRIC	2025	2026	CHANGE
Revenue	€48,890	€74,621	**+52.6%**
Room nights	252	354	**+40.5%**
ADR	€194.01	€210.79	**+8.6%**
Occupancy	27.9%	39.1%	**+11.2 pts**
RevPAR	€54.10	€82.39	**+52.3%**

Source: Cloudbeds property management system, reports generated 11 May 2026. Same five-month window used for both years. Figures are accommodation revenue only and exclude spa, retreats, and extras.

What the numbers show

Wild Hideaways grew revenue **52.6 percent** against the same five-month period in 2025, with room nights up **40.5 percent** and rate strengthening **8.6 percent** to €210.79.

The growth is structurally significant. Shoulder season demand, January through May, is harder to win than peak summer. Strengthening it indicates the brand is pulling guests outside the obvious window, reducing seasonality risk for a small operator.

RevPAR, the industry standard measure of how efficiently a property converts available rooms to revenue, rose from **€54.10 to €82.39**. That is a **52.3 percent improvement** delivered without discounting.

This pattern continues the trajectory established in 2023 to 2025, when annual revenue scaled from €115,000 to €350,000 at a two-year compound growth rate of approximately 74 percent.

SECTION TWO

Reputation and guest love

75 reviews — Superhost July 2025 to June 2026 **What this tells us**

AIRBNB

4.89 ★

BOOKING.COM **9.6** / 10 74 reviews

GOOGLE
5.0 ★

Three independent platforms, three near-perfect scores, across **360 reviews**. The volume matters as much as the score: this is not a small sample. It is a sustained signal that guests find the experience worth the price and worth recommending.

Airbnb Superhost status has been held continuously since April 2024 and renewed for the current period to June 2026. Booking.com 9.6 places Wild Hideaways in the top tier of Irish self-catering properties on the platform. The Google rating of 5.0 across 211 reviews is consistently above ratings typical for the category in West Cork.

Why this matters for the submission. The qualities guests single out, in their own words, are the same qualities the proposed development threatens: **dark skies, quiet, remoteness, and the unaltered character of the Mealagh Valley**. These are not incidental features of the product. They are the product.

GUEST SENTIMENT, VERIFIED GOOGLE REVIEWS

"We saw so many stars and even a few shooting stars." — Google review

"Location deserves six stars. It's an incredible setting with an awe-inspiring view." — Toby Bentley, Google review

"Setting up the fire pit and watching the starry sky, really was a lovely relaxing break." — Hayley Bates, Google review

"The sense of tranquil location, like we were the only ones on the mountain, was exactly what we were looking for." — Mairead Murphy, Google review

SECTION THREE

Local economic impact and brand development

People and partners supported

Part-time employees, all local **6** Local contractors **7** Experience partners **5** Food producers **3** Spa product suppliers **3** Local spend share **78%**

Brand and operational developments since 2025

Estimated local spend, 2026 YTD **€20,371**
January to May 2026

Cumulative since opening **€208,741**
2023 to date

Local spend methodology consistent with the original 2023 to 2025 submission: 35 percent of stayed revenue assumed as supplier spend, of which 78 percent is local. Applied to verified Cloudbeds revenue figures. Cumulative figure adds 2026 year to date to the previously reported €188,370 covering 2023 to 2025.

Stargazing experience

Transparent heated dome, capacity 12

A purpose-built structure for ceremonies, breakout sessions and stargazing. Approximately 28 to 30 square metres. The first retreat using the dome is scheduled for 22 May 2026.

Dark Sky Lodging accreditation

Formally awarded 28 February 2026

Independent accreditation recognising Wild Hideaways' lightscape management and the night-sky quality of the site. The accreditation reflects both the site's intrinsic darkness and an ongoing Lightscape Management Plan governing outdoor lighting.

The Wild Sky Dome

Launching late May 2026

A new guest experience built around the Dark Sky accreditation and the Wild Sky Dome, directly monetising the dark-sky quality of the site.

Summary. Wild Hideaways is an established and growing rural tourism business with verified financial performance, top-tier guest reputation, and direct dependence on the dark-sky and landscape qualities of the Mealagh Valley. Recent operational investment, including formal Dark Sky Lodging accreditation and the launch of a dedicated stargazing experience, reflects the centrality of these qualities to the commercial product.

APPENDIX

Wild Hideaways Market Appraisal

I

Sherry FitzGerald O’Neill | Raymond O’Neill MIPAV REV

Dated: 13 May 2026

Professional market appraisal of Wild Hideaways Eco Spa Retreat

Mealagh Valley, Co. Cork

CONTENTS OF THIS APPENDIX

1. Family home valued at €450,000–€475,000 in current market
2. Commercial business expected to exceed €1,200,000, subject to preparation of accounts — combined value €1.65–1.7 million
3. Cork County Council planning conditions (Appendix C) prevent family home from being sold separately from the commercial business

CLO260155

13th May 2026

Sherry FitzGerald O'Neill

2 Western Road, Clonakilty,
Co. Cork, P85 R893
T: +353 (0) 2388 33995
37 North Street, Skibbereen,
Co. Cork, P81 X370,
T: +353 (0) 28 21404
Wolfe Tone Square, Bantry,
Co. Cork, P75 XW50
T: +353 (0) 27 31030
E: info@sfoneill.ie
www.sfoneill.ie

Ms Amy O'Sullivan
Wild Hideways
Moonlands
Laharanshermean
Bantry
P75 P599

Re: Wild Hideways, Moonlands, Laharanshermean, Bantry, P75 P599

Dear Amy

Thank you very much for inviting us to value the above property. I am writing to confirm the main points discussed at our meeting and our views as to the appropriate asking price, proposed marketing investment and also to outline our fee structure.

In the first instance I congratulate on your superb eco business, set in the Meelagh Valley. The work to date is impressive in that the whole concept is exceptional.

Your family home could achieve a price in the region of €450,000 to €475,000 in the current market.

The commercial area is more problematic in that the market sentiment for commercial property is generally poor. The Banks following the 2008 crash are not helpful to this viewpoint. Before proceeding further, I suggest that you request your Acccountant to prepare an extract of accounts for the previous years in business. Ideally this would include income less costs. Usually staff costs are excluded as these are dependent on a purchasers intentions with regard to how the business is operated going forward.

I note that you expect to achieve a price in excess of €1,200,000 for the business. We can assess once the accounts are available.

Method of Sale

In general, we recommend that the property be offered for sale by Private Treaty. In consultation with you, we will arrange and conduct all viewings of your property throughout the sales process. We can provide this service by day, by evening and at weekends in order to reach as wide an audience as possible.

Marketing & Finding the Buyer

When selling your property, it is important to have clear objectives. Only a well thought out strategy will sell your property at the highest possible price and it is our job to help you achieve this.

Our marketing strategy will involve matching your property to the requirements of our registered buyers and also marketing your property to a wider buyer audience by using other marketing efforts such as advertising boards, web listings and newspaper advertising.

We can prepare a marketing proposal once we have the necessary information.

Our Fees

Our fee for selling your property on a sole agency basis is 1.5% (plus VAT @ the standard rate 23%)

Building Energy Rating Certificate

From the 1st January 2009, all qualifying dwellings offered for sale or rent will require, by law, a Building Energy Rating (BER) Certificate. It is essential to have this certificate when your property comes to the market.

For your convenience, we would recommend an assessor or alternatively, you could contact Sustainable Energy Ireland, at www.sei.ie/ber.

I note based on our discussion that you may already have up to date BER Certs for both properties.

Summary

As Ireland's leading property advisors, we believe that we can offer you a standard of service that is unbeatable. We always search for fresh ways to get the result that you want; the best price achievable in the shortest time possible. Furthermore, we strive to do it in such a way as to earn your complete trust because we have built our reputation on being fair and transparent at all times.

Thank you once again for this opportunity to advise you on the sale of your property. We hope to hear positive news from you soon. In the meantime, if there is anything else I can help you with please do not hesitate to contact me on 027 31030 or ray@sfoneill.ie.

Yours sincerely

Raymond O'Neill

Raymond O'Neill
Sherry FitzGerald O'Neill

APPENDIX

Media Coverage

J

Published coverage of:

Airbnb Rural Tourism Fund grant award to Wild Hideaways

Wild Sky Dome initiative, Mealagh Valley

Demonstrating public profile and national recognition of the dark sky tourism project

APPENDIX J · MEDIA COVERAGE

Airbnb Rural Tourism Fund Award — Coverage

Published coverage of the €10,000 grant for the Mealagh Valley Dark Skies Community

AIRBNB NEWSROOM · OFFICIAL PRESS RELEASE *14 November 2025*

Airbnb awards €100k to communities across Ireland to support rural tourism

Direct statement from Airbnb identifying Wild Hideaways as one of eleven recipients nationally and the Dark Skies Park initiative in the Mealagh Valley as the funded project.

https://news.airbnb.com/en-ie/airbnb-awards-e100k-to-communities-across-ireland-to-support-rural-tourism/

THE CORK.IE *14 November 2025*

Two Cork organisations awarded grants from Airbnb's €100,000 rural tourism fund

Regional coverage of Wild Hideaways and Ludgate / Skibbereen's Painted Past as the two Cork recipients.

https://www.thecork.ie/2025/11/14/two-cork-organisations-awarded-grants-from-airbnbs-e100000-rural-tourism-fund/

THE SOUTHERN STAR *November 2025*

Rural tourism funding boost

West Cork regional newspaper coverage identifying the Mealagh Valley Dark Skies Community as one of two West Cork projects funded.

https://www.southernstar.ie/news/rural-tourism-funding-boost-4346839

TRAVEL EXTRA *November 2025*

Airbnb celebrates rural tourism fund winners 2025

Industry trade publication coverage identifying Bantry / Wild Hideaways' Dark Skies Park as one of the 2025 recipients.

https://www.travelextra.ie/airbnb-rural-tourism-fund-winners-2025/

THE IRISH TIMES · SUBSCRIPTION *11 November 2025*

Airbnb awards remind us that short-term lets are a double-edged sword

National newspaper commentary referencing the eleven Rural Tourism Fund award winners. Subscription required to view in full.

https://www.irishtimes.com/business/2025/11/11/airbnb-awards-remind-us-that-short-term-lets-are-a-double-edged-sword/

APPENDIX

Dark Sky Community Application Correspondence

K

This appendix contains correspondence evidencing the active and advanced status of the Mealagh Valley Dark Sky Community application to DarkSky International — which would be the first Dark Sky Community in Ireland, and which the proposed development would permanently preclude.

CONTENTS OF THIS APPENDIX

1. Formal Letter of Support from Deputy Christopher O’Sullivan TD, Minister of State for Nature, Heritage and Biodiversity
2. Email correspondence with Deputy Christopher O’Sullivan TD’s office, October 2025 — February 2026
3. Amber Harrison, DarkSky International — confirming application progress and criteria
4. Georgia MacMillan, Mayo Dark Sky Park — confirming engagement and support
5. Cork County Council Roads Management — correspondence dated 8 May 2026 on lighting policy mapping

APPENDIX · ITEM 1

Formal Letter of Support

Deputy Christopher O’Sullivan TD

Minister of State for Nature, Heritage and Biodiversity
TD for Cork South-West

K. 1

The letter overleaf constitutes a formal written statement of support for the Mealagh Valley Dark Sky Park initiative from Deputy Christopher O’Sullivan TD, Minister of State for Nature, Heritage and Biodiversity at the Department of Housing, Local Government and Heritage.

It is reproduced here in advance of the related email correspondence with the Minister’s office, because it formalises in writing the ministerial support that the email exchange describes in process.

The Minister expressly identifies the goals of dark sky designation — reducing light pollution, protecting the natural night sky, and developing sustainable rural tourism outside the typical summer season — as values he supports and as outcomes the Mealagh Valley initiative is positioned to achieve.

The mandatory 28 aviation warning lights that would be installed under the proposed development would permanently preclude every one of those outcomes.

Christopher O'Sullivan TD

Minister for Nature, Heritage and Biodiversity. TD for Cork South–West.

Dear Amy,

I am delighted to have the opportunity to express my support for the initiative being undertaken by Wild Hideaways and the local community to develop an accredited Dark Sky Park within the Mealagh Valley, County Cork.

The goal of a Dark Sky Park is to raise awareness of the need to reduce light pollution and promote responsible lighting solutions, in order to protect the natural night sky for the benefit of both people and wildlife.

I am also conscious that it brings the potential for the development of rural tourism products outside the typical summer season. Dark Sky tourism is a growing sector internationally, attracting visitors who are seeking experiences rooted in nature, heritage and wellbeing, and promoting sustainable rural development and tourism diversification.

Wild Hideaways have demonstrated an innovative and forward-thinking approach with this proposal, and I understand they have engaged widely with the local community. I believe that Dark Sky Park accreditation would be a very positive addition to the region and I wish them the best of luck with this work.

Kind Regards,

Christopher O'Sullivan T.D.

Clonakilty Office:
40 Ashe St,
Clonakilty,
Co. Cork, P85V308
Tel: (023) 8811 011

Bandon Office:
Market Buildings,
New Road Bandon,
Co. Cork, P72K738
Tel: (023) 8811 011

Dail Éireann:
Leinster House,
Kildare Street,
Dublin 2.
Tel: 01 618 3000

Email: christopher.osullivan@oireachtas.ie

Fianna Fáil
THE REPUBLICAN PARTY

International Dark Skies Project for West Cork

1 message

Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie> Thu 9 Oct 2025 at 11:12
To: Amy O'Sullivan <info@wildhideaways.ie>

Dear Amy,

Thank you for your email.

From what I could understand from the guidelines, an application must be a legally organized community or have the backing of one. This legally organized community must have jurisdiction and must be able to enact legally binding outdoor-lighting policy that applies to the area.

A qualifying criterium is that effective policy must be put in place to make sure that outdoor lighting in the area is controlled, and only the local authority would be able to achieve this.

The application packet must include a map of the community's legal boundaries and a supporting letter from the local authority.

Please advise if you have engaged with the council already. I will engage with the council and see what we can do from our end.

In the meantime, please do not hesitate to reach out if you have any questions.

Kind Regards,

Giovanna on behalf of Christopher O'Sullivan, TD

Minister of State - Nature, Heritage and Biodiversity.

From: Amy O'Sullivan <info@wildhideaways.ie>
Sent: Wednesday 8 October 2025 13:50
To: Christopher O'Sullivan <christopher.osullivan@oireachtas.ie>
Subject: International Dark Skies Project for West Cork

Hi Chris,

I hope you're doing well.

I'm Amy O'Sullivan from Wild Hideaways, an eco-accommodation business in the Mealagh Valley, just outside Bantry. You kindly assisted us with our planning in 2023, and I'm pleased to report that we are now a fully established and successful business.

We are embarking on a community project in partnership with members of the Mealagh Valley community to gain International Dark Sky accreditation for our area. Currently, the only accredited areas in Ireland are Mayo and Kerry, and we are eager to put West Cork on the Dark Sky map.

Our project has secured a €10,000 grant from the Airbnb rural grant scheme. This funding will support the Mealagh Valley in becoming an International Dark Sky Community and Wild Hideaways in becoming Dark Sky Approved Lodging. Specifically, the grant will help us create a stargazing area, a car park, and signage at Wild Hideaways. We have also established a small committee to address the community requirements for enforcing quality lighting policies, dark sky education, and fostering citizen support for dark skies.

I've received an email from Dark Skies International regarding our accreditation eligibility, but I'm having difficulty understanding the legal terminology. I was hoping you might be able to offer your support by helping me interpret the requirements outlined below. I believe they indicate the need for Cork County Council's involvement, but I'm not entirely certain.

According to the 2018 IDSC Guidelines, the sole eligibility requirement is that the *Community must have some type of legal organization that is officially recognized by outside groups. This can be in the form of a town, city, municipality, or other legally organized community (such as urban neighborhoods and subdivisions), but need not be an incorporated entity. Unincorporated or otherwise informally organized communities are eligible for IDSC status if their governing jurisdictions enact public policy consistent with the requirements of "Minimum Requirements For All Communities" (below) that are legally binding in at least the territory of the Community.*

If the governing jurisdiction of the “rural neighborhood” can enact a public policy, this site may qualify. Can a legal policy be enacted for at least the governing territory?

Any assistance you could provide would be greatly appreciated.

Best regards,

Amy O'Sullivan

Amy O'Sullivan

Founder and Managing Director

wildhideaways.ie

mob: +353872121675

Our meeting yesterday re: Dark Skies

7 messages

Amy O'Sullivan <info@wildhideaways.ie> Sat 1 Nov 2025 at 13:05
To: Christopher O'Sullivan <christopher.osullivan@oireachtas.ie>

Hi Christopher,

Thank you for taking the time yesterday to discuss our Dark Skies application for The Mealagh Valley and Wild Hideaways.

As we discussed, Wild Hideaways is collaborating with the community to preserve one of our region's most beautiful and peaceful natural assets. We are currently awaiting accreditation as a Dark Skies approved Lodging, which will make us the first in Europe to achieve this. Our accommodation will feature low-level lighting and offer outreach and education programs. Having recently received a regional grant, we will also construct a heated, weatherproof stargazing dome, providing a comfortable space for visitors to observe our pristine dark skies. By working with the community, we aim to extend Dark Skies accreditation to the entire valley. This will give both locals and visitors the opportunity to experience the natural night sky while promoting sustainable tourism in West Cork. Becoming a Dark Skies Community will establish The Mealagh Valley as a place dedicated to preserving natural resources, educating the public, and supporting the local economy through tourism.

While obtaining the Dark Skies approved Lodging accreditation for our private enterprise was relatively straightforward, achieving Dark Skies Community status presents more challenges, particularly regarding the requirement for a legal lighting policy enacted by Cork County Council. After speaking with Georgia from Mayo, she suggested that we could potentially align our request with existing council heritage policies or a local development plan, rather than asking the council to create and enforce a new policy specifically for this initiative.

This is where our project will need the most support, and I hope you can offer some help and guidance.

Best regards,
Amy O'Sullivan
--

Amy O'Sullivan
Founder and Managing Director
wildhideaways.ie
mob: +353872121675

Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie> Mon 3 Nov 2025 at 10:52
To: Amy O'Sullivan <info@wildhideaways.ie>

Good Morning Amy,

Thank you for the below email.

I will bring this to Christopher’s attention and revert.

Kind Regards,

Lynda Piper Parliamentary Assistant to Christopher O'Sullivan, TD

Minister of State - Nature, Heritage and Biodiversity.

[Quoted text hidden]

Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie> Mon 1 Dec 2025 at 17:14
To: Amy O'Sullivan <info@wildhideaways.ie>

Hi Amy,

Please accept my apologies for the delayed response.

I have reached out to Christopher's ministerial team to see if they can assist with the below and how best to approach the local authority.

Once I have any updates I will let you know.

Kind Regards,

Lynda Piper Parliamentary Assistant to Christopher O'Sullivan, TD

Minister of State - Nature, Heritage and Biodiversity.

From: Amy O'Sullivan <info@wildhideaways.ie>
Sent: Saturday 1 November 2025 13:05
To: Christopher O'Sullivan <christopher.osullivan@oireachtas.ie>
Subject: Our meeting yesterday re: Dark Skies

Hi Christopher,

[Quoted text hidden]

[Quoted text hidden]

Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie> Tue 10 Feb 2026 at 17:17
To: Amy O'Sullivan <info@wildhideaways.ie>

Good Afternoon Amy,

I trust this email finds you well.

I noted that Christopher reached out to Georgia MacMillian, Mayo Dark Sky, in relation to your application and she contacted us with the below response. She would be able to talk you through the process and also offered to pop in and see you on the next visit she has down in this direction.

I am hoping this information is of assistance to you. Please do let me know how you get on.

Always great to hear the Minister is keen to support dark sky initiatives and Mealagh Valley is a super spot for dark skies. I think I may have been in touch with someone from that constituency late last year, it was around the time of the ALAN International Conference in Westport. In a voluntary capacity, I'm on the board of Dark Sky Ireland so happy to follow up on that to support in any way we can and feel free to pass on my number. I'm tentatively heading down to Kerry to do a talk late April as part of my role as Mayo Dark Sky Development officer so I could look at tying that in with a visit to the site if that would be helpful.

Here's my mobile number so if you wanted to pass it along, I'd be happy to talk them through the accreditation process.

086 859 5166

With kindest regards,

Georgia.

Kind Regards,

Lynda Piper Parliamentary Assistant to Christopher O'Sullivan, TD

Minister of State - Nature, Heritage and Biodiversity.

[Quoted text hidden]
[Quoted text hidden]

Amy O'Sullivan <info@wildhideaways.ie> Tue 10 Feb 2026 at 17:28
To: Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie>

Hi Lynda,

Thank you for following up. I have already been in contact with Georgia and have received plenty of helpful advice from her.

In terms of the next steps, I would like to request Christopher's assistance in his capacity as TD. We need practical support in getting our lighting policy adopted and sanctioned by Cork County Council. At present, the Council appears unwilling to take our Dark Skies community application seriously, and your guidance on how to navigate this would be invaluable.

Best regards,

Amy O'Sullivan

[Quoted text hidden]

Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie> Tue 10 Feb 2026 at 17:50
To: Amy O'Sullivan <info@wildhideaways.ie>

Thank you Amy. I have chased a response from Christopher's ministerial team on the below as they are also helping with getting some information and guidance for you.

In the meantime, would you have you a copy of what was submitted to the council so I can ask Christopher to review. I have checked the other emails and have not noted any attachment?

Kind Regards,

Lynda Piper Parliamentary Assistant to Christopher O'Sullivan, TD

Minister of State - Nature, Heritage and Biodiversity.

[Quoted text hidden]
[Quoted text hidden]

Amy O'Sullivan <info@wildhideaways.ie> Tue 10 Feb 2026 at 18:09
To: Christopher O'Sullivan <Christopher.OSullivan@oireachtas.ie>

I will forward on the email
[Quoted text hidden]

image002.png
635 KB

Gmail

Amy O'Sullivan <info@wildhideaways.ie>

Wild Hideaways and The Mealagh Valley - Dark Sky Community inquiry

9 messages

amber@darksky.org <amber@darksky.org> Tue, Oct 7, 2025 at 10:28 PM
To: info@wildhideaways.ie

Amy,

I am responding to your inquiry about getting Wild Hideaways and the Mealagh Valley certified as an International Dark Sky Community (IDSC). We appreciate your patience in waiting for our reply.

The Dark Sky Places Program application process begins with an eligibility check for the selected category.

First, an IDSC is defined as – *a town, city, municipality or other similar political entity that has shown exceptional dedication to the preservation of the night sky through the implementation and enforcement of quality lighting policies, dark-sky education, and citizen support of the ideal of dark skies.*

According to the 2018 IDSC Guidelines, the sole eligibility requirement is that the *Community must have some type of legal organization that is officially recognized by outside groups. This can be in the form of a town, city, municipality, or other legally organized community (such as urban neighborhoods and subdivisions), but need not be an incorporated entity. Unincorporated or otherwise informally organized communities are eligible for IDSC status if their governing jurisdictions enact public policy consistent with the requirements of "Minimum Requirements For All Communities" (below) that are legally binding in at least the territory of the Community.*

If the governing jurisdiction of the “rural neighborhood” can enact a public policy, this site may qualify. Can a legal policy be enacted for at least the governing territory?

To your question - *Is it possible to combine the two certifications?*

If the community does not meet this requirement, the site will not qualify for IDSC certification; however, the glamping facility may be a good candidate for the DarkSky Approved Lodging program. If the site can enact a legal policy, you may apply for both programs; however, they will be separate applications, as they are distinct programs.

I encourage you to review the IDSC Guidelines linked above for more information about the certification requirements. Please reach out to my colleague, James Brigagliano, for further details regarding the Lodging program.

Please let me know if you have any questions as you explore your options. I look forward to hearing from you.

Thank you,

Amber Harrison | she/her
Dark Sky Places Program Manager
DarkSky International
+1520-347-6363 office

DarkSky

We have a new name and logo
After 30+ years, we are now DarkSky. Learn more

Amy O'Sullivan <info@wildhideaways.ie> Fri, Oct 10, 2025 at 12:18 PM
To: amber@darksky.org

Hi Amber
Thank you for your email. The Mealagh Valley is in the municipality of Cork County Council. We had a meeting with the county council yesterday and they are in the process of looking at the guidelines to create and enforce a lighting policy that covers The Mealagh Valley.
Kind regards
Amy

[Quoted text hidden]

---

amber@darksky.org <amber@darksky.org> Tue, Dec 30, 2025 at 12:03 AM
To: info@wildhideaways.ie

Amy,

I am following up to see if you are still interested in participating in the Dark Sky Places program. Please let us know how you'd like to proceed when you're ready.

I look forward to hearing back from you.

Thank you,

Amber Harrison | she/her
Dark Sky Places Program Manager
DarkSky International
+1520-347-6363 office

DarkSky

We have a new name and logo
After 30+ years, we are now DarkSky. Learn more

On Thu, Oct 16, 2025 at 04:55 PM amber@darksky.org wrote:

> Amy,
>
> That is great. Please let me know how it goes and whether or not you'd like to pursue the Dark Sky Community certification or if you have questions about it.
>
> Thank you!
>
> **Amber Harrison** | she/her
> Dark Sky Places Program Manager
> DarkSky International
> +1 520-347-6363 Ext. 103 office
>
> 
>
> Explore the agenda and sessions at conference.darksky.org
> Register today | November 7-8, 2025

[Quoted text hidden]

Amy O'Sullivan <info@wildhideaways.ie> Tue, Dec 30, 2025 at 12:20 AM
To: amber@darksky.org

Hi Amber
I have already applied and been accepted on the dark skies lodging program. The community is still very interested in becoming a dark sky community, we are currently exploring ways to get the lighting policy enacted by our local council.
Kind regards
Amy
[Quoted text hidden]

---

amber@darksky.org <amber@darksky.org> Fri, Jan 2, 2026 at 9:27 PM
To: info@wildhideaways.ie

Amy,

Thank you for the reply, and that's great news on both fronts. Will keep an eye out for new developments from the community side.

Thank you,

Amber Harrison | she/her
Dark Sky Places Program Manager
DarkSky International
+1520-347-6363 office

We have a new name and logo
After 30+ years, we are now DarkSky. Learn more

[Quoted text hidden]

Amy O'Sullivan <info@wildhideaways.ie> Tue, Jan 27, 2026 at 9:32 PM
To: amber@darksky.org

Hi Amber
We have found this excerpt from our county development plan (Cork county Council is our municipality)

While artificial lighting is essential for a safe and secure night-time environment, the Council recognises the impacts light pollution (glare, skyglow, light trespass, clutter and spillage) can have on the visual, wildlife and residential amenities of surrounding areas. Dark skies and unpolluted night skies are an asset to the County. The Planning Authority will explore how best to identify and manage areas of dark sky/unpolluted sky in the County during the lifetime of the Plan. In general lighting should:

Only be on when needed;

Only light the area that needs it;

Be no brighter than necessary;

Minimise blue light emissions;

Be fully shielded and pointing downward.

Would this be what you would class a public policy?

Kind regards
Amy
[Quoted text hidden]

Amber Harrison <amber@darksky.org> Tue, Jan 27, 2026 at 11:35 PM
To: Amy O'Sullivan <info@wildhideaways.ie>

Amy

That's not a full policy (great principles to start with, though!). An outdoor lighting policy, also known as a lighting ordinance, is a formal, enforceable set of rules and guidelines adopted by a community's governing body and administered by the local authority. It regulates how outdoor lighting is designed, installed, and operated to meet safety and functional needs while minimizing glare, light trespass, energy waste, ecological impacts, and degradation of the night sky.

They vary a bit between communities, but you can see an example in this certification application for the City of Bisbee, AZ. See p. 18-27.

Please let me know if you have any questions.

Thank you,

Amber Harrison | she/her
Dark Sky Places Program Manager
DarkSky International
+1 520-347-6363 Ext. 103 office

Explore how you can support DarkSky conservation efforts worldwide.
Learn more and **give today.**

[Quoted text hidden]

Amy O'Sullivan <info@wildhideaways.ie> Wed, Jan 28, 2026 at 5:51 AM
To: Amber Harrison <amber@darksky.org>

Hi Amber,
Thanks for sending that over. Do you have any examples that aren't American? Perhaps UK, or even better, Ireland? Our municipalities here are much, much larger. I noticed on the example you have that the city of Bisbee municipality boundaries consist of 5.17 square miles. In comparison, The Mealagh Valley which is around 20 square miles belongs to the municipality of Cork County Council which consists of 2900 square miles. I'd like to learn how a large municipality has adopted a policy for a small area within its boundaries.
Many thanks
Amy
[Quoted text hidden]

Amber Harrison <amber@darksky.org> Thu, Jan 29, 2026 at 8:29 PM
To: Amy O'Sullivan <info@wildhideaways.ie>

Amy,

The size or geographic area of a community does not determine how an outdoor lighting policy applies. Instead, the policy applies to the full area under the jurisdiction of the governing body that adopts it (such as a city council, county authority, or similar body).

In practice, this means that whether the jurisdiction covers a compact town or a very large, sparsely populated area with a single community, the outdoor lighting policy applies uniformly across that entire jurisdiction. All outdoor lighting that is owned, installed, approved, or otherwise administered by the governing body must comply with the policy's requirements. The example I provided shows the language and provisions required. That wouldn't be differnt for a larger area.

An example of a much larger area is Teton County. It's in the US and has a fairly complex structure, but it offers another example that covers 2,000+ sq km. I hope this helps answer your questions. If you'd like to submit another pre-application, you can do so and provide maps and other information so I can better understand your area and advise accordingly.

Thank you,

Amber Harrison | she/her
Dark Sky Places Program Manager
DarkSky International
+1 520-347-6363 Ext. 103 office

Explore how you can support DarkSky conservation efforts worldwide.
Learn more and **give today.**

[Quoted text hidden]

Dark Skies Community accreditation

10 messages

Amy Osullivan <amyosullivan1975@gmail.com> Fri 10 Oct 2025 at 14:24
To: mayodarksky@gmail.com <mayodarksky@gmail.com>

Hi there
We are a small community in the heart of West Cork called the Mealagh Valley. We are trying to get accredited as a Dark Skies Community with Dark Skies International.
I was hoping there was someone in your organisation who could offer us some guidance on getting support from the local council. To become accredited our community must get the council to enact a lighting policy. I'm wondering if you had to do the same for the Dark Sky Park, and if so how you went about it? Our project is obviously on a much smaller scale than yours, we are a very small community who want to preserve our pristine skies for future generations.The Mealagh Valley doesn't have any public lighting so we are a step ahead on those grounds at least. We have a letter from Brian Espey from Dark Sky Ireland confirming that The Mealagh Valley has near pristine conditions similar to that of Kerry dark Sky reserve and we have reached out to Cork Astronomy to see if they might help with sky quality measures. How did you go about your sky quality measures? I'm also wondering how you approached the council? Did you form a committee first, and approach them as an established group, or was it done by just one person? Did you come up against any roadblocks from them? How long did the council process take? Any help you could offer us would be greatly appreciated.

kind regards
Amy O'Sullivan

Georgia MacMillan <mayodarksky@gmail.com> Sat 11 Oct 2025 at 11:29
To: Amy Osullivan <amyosullivan1975@gmail.com>

Dear Amy

Thanks so much for connecting. Lovely to hear from you. Mealagh Valley sounds fabulous, I can't recall if I have been there but I'll make a point of it next time I'm heading down your way. Yes it is a long road and we looked at this process from the longer term vision right at the start so ....ten years later we are still working very hard with voluntary hours going in but dark skies is now far more 'acceptable' to the norm and therefore I think you will be pushing an open door with the local authority. I believe that some Cork county Council members are coming up to the Artificial Light at Night Conference later this month so it's worth reaching out to them to let them know your plans. I'd try your biodiversity officer as a first port of call as we have done some training with them and the Heritage Council funds their positions. Our community dark sky group here in Mayo has worked with the Heritage Council now since 2017 and they were our first real supporter so again, I think they'd be helpful to you.

Enacting policy in the local authority for dark skies is a little subjective and you can get support on your initiative through local development plans to support your lighting plans, rather than have a separate lighting policy embedded in the local authority. It might be easier if you want to give me a buzz and I'd be happy to explain what we did and if there is a way we can help you or collaborate in the future. We're working on several exemplars here for different designations (including DS Community) that will be transferable options to replicate and it is always easier if there is a local roadmap.

My number is 086 859 5166.

Warm wishes,
Georgia.
[Quoted text hidden]

Georgia MacMillan <mayodarksky@gmail.com> Thu 26 Feb 2026 at 15:01
To: Amy Osullivan <amyosullivan1975@gmail.com>

Hi Amy

Just wanted to check in with you as I got a message form Minister O'Sullvan's office on your proposal for Mealagh. It sounds like you have made progress with Dark Sky International which is great but if you need help on the process, please don't hesitate to let me know. I'm travelling today from a Dark Sky event in York which was really 'enlightening', pardon the pun, but I'll be back at the desk tomorrow.

Look forward to hearing how your project is moving along.

Kind regards

Georgia.
[Quoted text hidden]

Amy Osullivan <amyosullivan1975@gmail.com> Thu 26 Feb 2026 at 15:09
To: Georgia MacMillan <mayodarksky@gmail.com>

Thanks Georgia. We are still stuck on the council support for the lighting plan, which is where Ive asked Chris O'Sullivan to step in to help. Cork County Council isnt answering my emails or offering any support in anyway atm.
[Quoted text hidden]

Georgia MacMillan <mayodarksky@gmail.com> Thu 26 Feb 2026 at 15:44
To: Amy Osullivan <amyosullivan1975@gmail.com>

Have you tried the biodiversity, heritage and tourism officers?

I'll see what contacts we have in Cork CC. I'm doing a talk in April for local authorities in south west, might be good timing to link them in more if not already on board.

Best wishes
G

> On 26 Feb 2026, at 15:10, Amy Osullivan <amyosullivan1975@gmail.com> wrote:
>
> [Quoted text hidden]

Georgia MacMillan <mayodarksky@gmail.com> Wed 18 Mar 2026 at 17:26
To: Amy Osullivan <amyosullivan1975@gmail.com>

Hi Amy

Just checking in to see if you had any luck since with the support from the County Council? I looked back through my contacts but they are more to do with the City than County (Lighting engineers), but I must say they've always been helpful.

Alan McCarthy is listed as the Cork Co Co biodiversity officer. Have you tried to contact him?
alan.mccarthy@corkcoco.ie

The talk that I referred to in April is specifically for Munster Local Authority staff and the day is dedicated to Artificial Light t so I will try and connect with some of the Cork County Council folk then.

Kind regards
Georgia.

[Quoted text hidden]

Amy Osullivan <amyosullivan1975@gmail.com> Wed 18 Mar 2026 at 18:06
To: Georgia MacMillan <mayodarksky@gmail.com>

Hi Georgia,
Your message is very timely, we actually had a meeting with the council lighting planners today! They were very positive and are looking into the lighting policy for us. We have previously been in contact with Alan Mccarthy, he's also keen to get on board, the lighting planners are going to liaise with him and I'm going to set up a meeting with him and our committee in the next few weeks.
Christopher O'Sullivan TD is also now on board and is giving us support, so things are moving forward at least!
In other exciting news, Wild Hideaways (my accommodation business) has been awarded Dark Skies accreditation. We are keeping it under wraps at the moment until the media announcement is prepared, as we are the first lodging to obtain accreditation in Europe, so please keep this news between us for the time being.
Thanks for keeping us in mind.
Warmly
Amy O'Sullivan
[Quoted text hidden]

Georgia MacMillan <mayodarksky@gmail.com> Wed 18 Mar 2026 at 19:02
To: Amy Osullivan <amyosullivan1975@gmail.com>

Congratulations Amy that's brilliant news! Look forward to hearing more about it!

I'm literally heading out the door now to bring a group out stargazing tonight, my partner Ged runs high end tours for dark skies in ireland so when you're up and running let us know as it might be something he can link on a north / south route (check out terrafirmaireland.com)

Congratulations again, delighted for you.

Kind regards
Georgia

> On 18 Mar 2026, at 18:07, Amy Osullivan <amyosullivan1975@gmail.com> wrote:
>
> [Quoted text hidden]

Amy Osullivan <amyosullivan1975@gmail.com> Wed 18 Mar 2026 at 19:11
To: Georgia MacMillan <mayodarksky@gmail.com>

Oh perfect, that's exactly the kind of thing we're trying to attract here at Wild Hideaways. I'll definitely be in touch. We are building a large star gazing dome on the property for cozy night sky viewing.
Warmly,
Amy
[Quoted text hidden]

Amy Osullivan <amyosullivan1975@gmail.com> Thu 9 Apr 2026 at 11:30
To: Georgia MacMillan <mayodarksky@gmail.com>

Hi Georgia,

I hope you are well. I am writing to you following our correspondence regarding the Dark Skies Community application for the Mealagh Valley, Co. Cork, and to ask for your support with an urgent planning matter.

A planning application has been submitted to An Coimisiún Pleanála by Maughanaclea Ltd. (an associate company of Enerco Energy Ltd.) for 14 wind turbines of 169 metres tip height at Maughanaclea, Co. Cork (ACP reference PCX04.321826). The deadline for public submissions is 5.30pm on Monday 25th May 2026.

As you know, Wild Hideaways has recently achieved DarkSky International Approved Lodging certification (Certificate DS-LOD-15, issued 5th March 2026) — we are now the only DarkSky Approved Lodging in the whole of Europe. We are also in the active process of applying for Dark Sky Community accreditation for the Mealagh Valley, which would make it the first Dark Sky Community in Ireland. The experience and knowledge you have shared with us from the Mayo Dark Sky Park has been an enormous help in understanding what this accreditation could mean for our community.

The proposed wind farm would directly and permanently destroy both of these achievements. The 14 turbines would carry 28 mandatory red aviation warning lights, visible from approximately 1km from Wild Hideaways throughout every night. These lights are fundamentally incompatible with DarkSky Approved Lodging criteria and would permanently preclude Dark Sky Community accreditation for the Mealagh Valley.

I am preparing a formal objection submission to An Coimisiún Pleanála and would be enormously grateful if the Mayo Dark Sky Park would be willing to provide a short letter of support for inclusion with my submission. It would be particularly valuable if the letter could:

— Confirm the incompatibility of mandatory aviation warning lights with DarkSky accreditation standards;
— Note the economic and tourism value that dark sky designation brings to rural communities, drawing on Mayo's own experience;
— Confirm the significance of Wild Hideaways' DarkSky Approved Lodging certification as the only such certification in Europe; and
— Express support for the Mealagh Valley's Dark Sky Community application and concern that this development would permanently preclude it.

If it would be helpful, I am very happy to provide a draft text for your consideration.

Given the submission deadline of 25th May, I would be very grateful to receive a letter by Friday 16th May if at all possible.

Thank you so much for everything you have shared with us. The experience of Mayo Dark Sky Park is a powerful example of what the Mealagh Valley could achieve — and your support would make a real difference in protecting that future.

warmly,
Amy
[Quoted text hidden]

International dark skies accreditation for The Mealagh Valley

1 message

Amy O'Sullivan <info@wildhideaways.ie> Fri 10 Oct 2025 at 12:20
To: danny.collins@cllr.corkcoco.ie

Hi Danny,

Thank you for meeting with me yesterday.

I am writing to you on behalf of the Mealagh Valley Dark Skies Community Committee. The Mealagh Valley is working to become an International Dark Sky Community (IDSC) accredited by Dark Skies International. An IDSC is defined as "a town, city, municipality, or other similar political entity that has shown exceptional dedication to the preservation of the night sky through the implementation and enforcement of quality lighting policies, dark sky education and citizen support of ideal dark skies." Our community wishes to preserve the pristine night skies in the Mealagh Valley for future generations.

At present, there are only two International Dark Skies accredited areas in Ireland:
Mayo - International Dark Skies Park
Kerry - International Dark Skies Reserve

We hope to put West Cork on the map by being the first International Dark Skies Community in Ireland.

Wild Hideaways, my accommodation business in the valley, is supporting this initiative by providing a weatherproof stargazing area, a car park, and signage for use by community members, the public, and our guests. We have secured €10,000 in funding from the Airbnb Rural Communities Grant to implement these measures. Please keep this information confidential as Airbnb plans to launch a media campaign soon, and the grant has not yet been publicly announced.

We also have the support of Fáilte Ireland, and our committee operates under the umbrella of the long-established Mealagh Valley Hall Committee.

To achieve IDSC accreditation, we need the support of our local council in preparing and enacting a public lighting policy for the Mealagh Valley. Since our area has no established street lighting or sports grounds, we believe this process will be simpler than in a town, as the policy will primarily address future permissions rather than retrofitting existing infrastructure.

The lighting policy requirements for becoming a Dark Skies Community, taken from the 2018 IDSC Guidelines are as follows:

1. A quality comprehensive lighting policy like the IDA-IES Model Lighting Ordinance (MLO) that includes all of the following minimum standards for permanent lighting installations:
A) Full shielding of all lighting fixtures over 1,000 initial lamp lumens.
B) A limit on the emission of short-wavelength light through one of the following restrictions:
The correlated color temperature (CCT) of lamps must not exceed 3000 kelvins; or
Allowed lighting must not emit more than 25% of its total spectral power at wavelengths <550 nanometers; or
The scotopic-to-photopic (S/P) ratio of allowed lighting must not exceed 1.3.
C) A restriction on the total amount of unshielded lighting, such as a limit on lumens per net acre or a total site lumen allowance in unshielded fixtures (or equivalent wattages).
D) A policy to address over-lighting. This may be accomplished by limiting the average illuminance for any outdoor application, over the entire task area, to no more than 10% over the light levels recommended by, for example, the Illuminating Engineering Society (North America), the Society of Light and Lighting (United Kingdom), or other similar organization.
E) Regulations of new installations of publicly owned outdoor lighting:
A provision that clearly indicates where, when, and under what circumstances new publicly owned outdoor lighting, including street lighting, is warranted and will be permitted; and
A provision that requires that adaptive controls and/or curfews be employed in all future installations of public outdoor lighting.
F) Restrictions on the installation and operation of illuminated signs, including all of the following:
Luminance levels for operation between sunset and sunrise shall not exceed 100 nits (100 candelas per square meter, cd/m2) as measured under conditions of a full white display; and
During the first hour after sunset and during the last hour immediately preceding sunrise, sign luminance shall not exceed 100 nits (100 candelas per square meter, cd/m2); and
Signs may only be illuminated while the associated activity is taking place; for businesses, sign illumination must be extinguished completely during the hours the business is closed; and
The luminous or illuminated surface area of an individual sign must not exceed 18.6 square meters (200 square feet).
G) Outdoor recreational and/or athletic field lighting may be exempted from the strict shielding and short-wavelength emission requirements above provided that all of the following conditions are met:
Illuminating Engineering Society (IES) lighting guidelines (RP-6) are followed according to the appropriate class of play.

Field lighting is provided exclusively for illumination of the surface of play and viewing stands, and not for any other applications.
 Illuminance levels must be adjustable based on the task (e.g., active play vs. field maintenance).
 Off-site impacts of the lighting will be limited to the greatest practical extent possible.
 A strict curfew requirement (e.g., lights must be extinguished by 10 PM (2200 h) or one hour after the end of play, whichever is later) is observed.
 Timers must be installed to prevent lights being left on accidentally overnight by automatically extinguishing them.
H) An amortization period, applicable to all publicly and privately owned lighting, to end not more than 10 years from the effective date of the outdoor lighting policy, after which all non-conforming lighting extant at the time of enactment must be brought into compliance with the policy.

We look forward to discussing how the council can support us in this initiative.
--

WILD HIDEAWAYS

Amy O'Sullivan
Founder and Managing Director
wildhideaways.ie
mob: +353872121675

Mealagh Valley Dark Sky Community

2 messages

Joseph Keogh <Joseph.Keogh@corkcoco.ie> Fri 8 May 2026 at 15:36
To: Amy O'Sullivan <info@wildhideaways.ie>
Cc: Brian Lawlor <Brian.Lawlor@corkcoco.ie>

Good afternoon Amy,

Further to our meeting regarding the proposed Dark Sky Community designation for the Maelagh Valley have you had the opportunity to find maps that may help identify the area in question?

I note your colleague on the call stated that she may have mapping available.

Thanks.

Kind regards,

Joseph Keogh | Innealtóir Cúnta | Bóithre (Bainistíocht agus Forbairt)

Comhairle Contae Chorcaí | Annabella | Mala | P51 Y6YT | Éire

T +353-(0)22-30432

joseph.keogh@corkcoco.ie | www.corkcoco.ie

Tairseach na gcustaiméirí: www.yourcouncil.ie

Joseph Keogh | Assistant Engineer | Roads (Management and Development)

Cork County Council | Annabella | Mallow | P51 Y6YT | Ireland

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Amy O'Sullivan <info@wildhideaways.ie> Fri 8 May 2026 at 16:35
To: Joseph Keogh <Joseph.Keogh@corkcoco.ie>

Hi Joseph
Yes, we have sourced a map through the heritage keepers society. The lady in question has been away and has promised to attend to our request on Tuesday upon her return.
Kind regards
Amy
[Quoted text hidden]

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image001.png
6 KB

APPENDIX

Bará & Lima (2024)

Aviation Lighting Research

K-1

Journal of Quantitative Spectroscopy and Radiative Transfer, Vol. 329, 109203
DOI: 10.1016/j.jqsrt.2024.109203

KEY FINDINGS

Aviation warning lights appear brighter than Venus at up to 4km
Visible at up to 38km against a dark sky
Referenced in submission Sections 3.1, 6.3 and 7.3

Journal of Quantitative Spectroscopy & Radiative Transfer 329 (2024) 109203

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journal homepage: www.elsevier.com/locate/jqsrt

Quantifying the visual impact of wind farm lights on the nocturnal landscape

Salvador Bará [a], Raul C. Lima [b,c,*]

[a] Former profesor titular (retired) at Universidade de Santiago de Compostela (USC), Santiago de Compostela, 15782 Galicia, Spain, European Union
[b] Física, Escola Superior de Saúde, Politécnico do Porto, Portugal
[c] IA – Instituto de Astrofísica e Ciências do Espaço, Univ Coimbra, Portugal

ARTICLE INFO

Keywords:
Light pollution
Wind farms
Nocturnal landscape
Environmental impacts assessment
Naked eye astronomy
Atmospheric extinction

ABSTRACT

Wind farm lights are a conspicuous feature in the nocturnal landscape. Their presence is a source of light pollution for residents and the environment, severely disrupting in some places the aesthetic, cultural, and scientific values of the pristine starry skies. In this work we present a simple model for quantifying the visual impact of individual wind turbine lights, based on the comparison of their brightness with the brightness of well-known night sky objects. The model includes atmospheric and visual variables, and for typical parameters it shows that medium-intensity turbine lights can be brighter than Venus up to ~4 km from the turbine, brighter than α CMa (the brightest star on the nighttime sky) until about ~10 km, and reach the standard stellar visibility limit for the unaided eye ($m_v = +6.00$) at ~38 km. These results suggest that the visual range of wind farms at nighttime may be significantly larger than at daytime, a factor that should be taken into account in environmental impact assessments.

1. Introduction

The need to reduce dependence on fossil fuels has fostered the development of renewable energy sources. This process has been accelerated in the last years due to the pressing urgence to address anthropogenic climate change and achieve higher levels of energy sovereignty. Among renewable sources, wind power energy is nowadays a crucial player.

The installation of new wind power facilities, both onshore and offshore, has not come without problems. Wind farms generate a wide range of environmental impacts [42,64], including but not limited to serious avian [30,34,50], and bat fatalities due to collisions [37,62,66,73] as well as changes in habitat use [41,67]. The sustainability of large offshore wind farms, planned or in construction, has been subjected to critical review in some recent European evaluations [20,45].

Besides their effects on biodiversity, wind farms also affect humans through the combined impacts of noise, lights (direct obstruction lights and stroboscopic effects of rotating blade shadows), and visual landscape degradation [48]. The annoyance produced by wind farm lights on neighboring communities has deserved growing attention in recent times [11,58,59,63].

The visual landscape degradation produced by wind farms has been evaluated mostly for daytime, based on turbine visibility estimates (limited by the contrast luminance thresholds in daylight) combined with different spatial aggregation metrics, see e.g. [31,36]. Comparatively less attention has been given to the deleterious effects of wind farm lights on the nighttime landscape (Fig. 1). The nightscape is an essential element of the human experience, whose cultural, social, scientific, and aesthetic values are assets of the intangible heritage of humankind [49]. As set forth by the Natural Sounds and Night Skies Division of the USA National Parks Service "a naturally dark night sky is more than a scenic canvas; it is part of a complex ecosystem that supports both natural and cultural resources" [56]. Borrowing from Rich and Longcore [61] on conservation planning, it can certainly be said that daytime landscapes are "only half the story–the daytime story".

In this work we present a model for quantifying the primary visual effect of wind farm lights on the nocturnal landscape. It is based on considering wind farm lights as artificial stars and applying to them the metrics used in visual astronomy to quantify their perceived brightness. That way they can be compared with the stars and other natural bodies present on the sky, facilitating an easy and intuitive evaluation of the disruption caused to the pristine nightscape. The model incorporates atmospheric and perceptual parameters. Although it is formulated in terms of human-based photometric (in lighting engineering language) or

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Available online 25 September 2024

visual band (in astronomical language) quantities, its generalization for arbitrary spectral distributions and observation bands is immediate. Wildlife shows a rich variety of spectral response curves [46], and several species have been reported to be able to use celestial cues, including individual stars, for orientation during the night (for a review, see [22]). The visibility model here developed provides the basic building block from which overall visual impact assessments can be derived with the help of different spatial aggregation metrics.

2. Methods

2.1. Retinal images of resolved and unresolved objects

The visual brightness of an object depends on several radiometric and anatomical factors, besides the physiological and neural ones. The basic inputs to the visual system are the photon catches of the retinal photoreceptor cells. The number of photons captured by an individual photoreceptor in each wavelength interval $[\lambda, \lambda + \Delta\lambda]$ during the time Δt is proportional to $S(\lambda)E'(\lambda)\Delta\lambda\Delta t$, where $S(\lambda)$ is the spectral sensitivity of the photoreceptor and $E'(\lambda)$ is the spectral irradiance of the object's retinal image at the photoreceptor location. Wavelength values are here referred to vacuum. Hereafter we explicitly make reference to human eyes. However, the basic equations described below can also be applied to "camera-like" eyes of other species, many examples of which exist in nature (for a review, see [38]), by adapting the corresponding geometrical, optical, and spectral sensitivity parameters.

The spectral irradiance is defined as the radiant flux (photons·s^{-1}) per unit surface and unit wavelength interval, and is measured in photons·s^{-1}·m^{-2}·nm^{-1}. The spectral irradiance $E'(\lambda)$ at each retinal location can be approximately described by:

$$E'(\lambda) = T_e(\lambda)\, L(\lambda)\, \Omega \frac{A_p}{A_i} \cos\theta \tag{1}$$

where $T_e(\lambda)$ is the spectral transmittance of the ocular media (unitless), $L(\lambda)$ is the object radiance (photons·s^{-1}·m^{-2}·sr^{-1}·nm^{-1}), Ω is the solid angle (sr) subtended by the object as seen from the observer, A_p is the area of the input pupil of the eye (m^2), A_i is the area of the retinal image (m^2), and θ is the angle between the direction in which the object lies and the line perpendicular to the eye pupil. Eq. (1) can be equivalently rewritten in terms of $E(\lambda) = L(\lambda)\Omega\cos\theta$, the spectral irradiance produced by the object on the eye pupil, as:

$$E'(\lambda) = T_e(\lambda)\, E(\lambda)\, \frac{A_p}{A_i} \tag{2}$$

In a perfect imaging system, according to geometrical optics, the image would be an exact scaled replica of the object. The area of the image would be proportional to the solid angle subtended by the object, Ω, such that $A_i = \kappa\Omega$, being κ a constant (units m^2) independent from the object. For a perfect imaging system, then, the object feature that determines the input to the photoreceptor cells is its spectral radiance, $L(\lambda)$, since the solid angle Ω cancels out in Eq. (1):

$$E'(\lambda) = T_e(\lambda)\, L(\lambda)\, \frac{A_p}{\kappa} \cos\theta \tag{3}$$

and the remaining factors only depend on the eye.

Human eyes, however, are not perfect optical instruments. The eye optics deforms the ideal images to a bigger or lesser extent due to diffraction by the finite size of the eye pupil [13], refractive errors including both classical ametropies and high-order optical defects [15,28,43,44,47,53,54,55,60,69,70], and intraocular scattering due to small-scale inhomogeneities of the eye media [8,71,72]. The retinal image in a real eye is no longer an exact scaled replica of the object itself.

The actual image of an object on the human retina is given by the two-dimensional convolution of the ideal geometric image with the point-spread function of the eye, PSF [25]. The PSF is the function that describes how the eye optics deforms the image of an ideal point source. Human eyes present a high variability of PSF sizes and shapes. This convolution gives rise to a new irradiance distribution that combines the features of the convolved functions. The retinal image can be interpreted as a 'blurred' version of the perfect geometrical image, in which each point has been replaced by a PSF proportional to the object radiance at that point and the resulting irradiances have been added up.

In the limiting case of *well resolved objects*, that is, when the angular size of the object is much larger than the angular size of the PSF, the result of the convolution is a slightly blurred version of the ideal geometrical image, and Eq. (3) still approximately applies.

Conversely, when the angular size of the object viewed by the observer is substantially smaller than the angular size of the eye's PSF, as it happens e.g. with a star or distant streetlight, the retinal image is essentially equal to the PSF itself. In such cases, one may speak of *unresolved objects*. The retinal images of unresolved objects located in different directions of the central visual field are just replicas of the PSF centered in different retinal points. All these images have the same shape and size, only differing in brightness [4,54,55].

This result has important visual consequences. One of them is that the main physical factor determining the perceived brightness of an unresolved object is not the intrinsic object's radiance, as in the well-resolved case, but the irradiance $E(\lambda)$ it produces on the eye pupil. This happens because the area of the retinal image is no longer proportional to the object's solid angle, as in case of a perfect system ($A_i =$

Fig. 1. Nigthtime landscape with wind farm obstruction lights in Miranda do Corvo, Serra da Lousã, Portugal (40°02′42.98″N, 8°16′30.84″ W). Image credit: Raul C. Lima.

$$k = k_m(0) + k_a(0) = \frac{\tau_m}{H_m} + \frac{\tau_a}{H_a} \quad (12)$$

Regarding the airmass factor, for zenith angles not extremely close to the horizon its value can be calculated as $M(z) = 1/\cos z$. The number of air masses increases very quickly at angles close to the horizon, for which more accurate expressions shall be used [33]. For the zenith, $M(0^\circ) = 1$.

The atmospheric transmittance in Eq. (9) can be expressed as an equivalent extinction value $m_{ext}(z)$in magnitudes. The magnitude $m_v(z)$ of a star observed from ground at a zenith angle z (angle above the horizon $90^\circ - z$) is:

$$m_v(z) = -2.5\log_{10}\left[\frac{T_{atm}(z)\ E_v}{E_{v,ref}}\right] = -2.5\log_{10}\left(\frac{E_v}{E_{v,ref}}\right) - 2.5\log_{10}[T_{atm}(z)] \quad (13)$$

that can be rewritten as

$$m_v(z) = m_v + m_{ext}(z) \quad (14)$$

being m_v the extra-atmospheric magnitude given by Eq. (7), and $m_{ext}(z)$ the extinction term $m_{ext}(z) = 2.5M(z)\tau\ \log_{10}(e)$. Recall that larger (= more positive) values of $m_v(z)$ correspond to dimmer objects, due to the negative sign of the log scale magnitude definition.

The brightness of the wind farm lights can also be expressed in astronomical magnitudes, allowing that way comparing them with the natural stars. This could be done in a naïve way by directly applying Eq. (7) to the illuminance produced by the lights on the observer's eye pupil, $E_v(r)$, given in Eq. (6). There is, however, an issue that shall be kept in mind. Whereas the astronomical magnitudes refer to the irradiance produced by a celestial object *at the top* of the atmosphere, the light from wind farms reaches the observer after propagating some finite distance nearly horizontally *at the bottom* of the atmosphere. Furthermore, the brightness of a star seen from ground is not constant, but depends on its altitude above the horizon, or, equivalently, on its corresponding zenith angle z as set forth in Eq. (13). Comparing the visual appearance of wind farm lights with the appearance of stars requires choosing first a reference altitude above the horizon at which the comparison stars are seen.

Once the reference zenith distance z is chosen, one can easily assign to the wind farm light the extra-atmospheric magnitude m_v of a star whose brightness at this z would be the same as the brightness of the wind farm light perceived by the observer. According to Eqs. (6) and (7) this magnitude is:

$$m_v = -2.5\log_{10}\left[\frac{I_v\ e^{-kr}}{r^2\ T_{atm}(z)\ E_{v,ref}}\right] \quad (15)$$

Note that the transmittance $T_{atm}(z)$ is in the denominator, since we are calculating the extra-atmospheric irradiance that would result in the irradiance $E_v(r)$ at ground level after propagating through the atmosphere at a zenith angle z. This can alternatively be interpreted as using a reduced $T_{atm}(z)E_{v,ref}$ reference illuminance for establishing the 'zero point' of a new magnitude scale defined on irradiances at ground level, not at the top of the atmosphere.

Regarding the choice of z, comparing the wind farm lights with stars at the zenith (altitude 90°, $z = 0^\circ$, $M(0^\circ) = 1$) is always an option, although to perform in practice this comparison the observers should successively direct their gaze horizontally to the wind farm and vertically to the zenith sky, because the possibility of simultaneous viewing (although theoretically possible, given the size of the monocular field of view of the human eye along the vertical axis, $\sim 60^\circ$ upward and $\sim 75^\circ$ downward) would require that both light sources were imaged in diametrally opposed locations of the peripheral retina. Comparing wind farm lights with stars at the horizon would neither be a practical choice, since the attenuation of starlight in that direction is usually extremely high excepting for very clear atmospheres ($\tau \ll 0.05$), due to the large number of air masses, $M(90^\circ) \approx 38$ [33]. For instance, for $\tau = 0.2$ the extinction at the horizon is of order $m_{ext}(90^\circ) = +8.25$ magnitudes. For our present purposes an intermediate altitude above the horizon, well within the visual field of an observer looking horizontally at the lights, is appropriate. For the following sections we will use a reference altitude of 30° ($z = 60^\circ$, $M(60^\circ) = 2.0$). The conversion of our results for other possible choices of the altitude above the horizon of the comparison stars is immediate.

3. Results

Fig. 2 shows the equivalent top-of-the-atmosphere (TOA) astronomical magnitude m_v of a wind farm light (for a reference altitude of 30° degrees above horizon, $z = 60^\circ$, $M(60^\circ) = 2.0$), as a function of the distance to the viewer, r. The atmospheric parameters are $\tau_m = 0.10$, $\tau_a = 0.20$, $H_m = 8000$ m and $H_a = 1500$ m. The results were calculated for nighttime obstruction lights of medium-intensity, $I_v = 2000$ cd, and for two levels of low-intensity, $I_v = 200$, and $I_v = 40$ cd [1,32]. The extinction coefficient at ground level is $k = 1.46 \times 10^{-4}$ m^{-1}, corresponding to a daytime visual range of ~26 km. The horizontal lines show the astronomical magnitudes in the Johnson-Cousins V band [9] of several conspicuous objects on the sky, namely the Moon, $m_v = -12.73$ (full Moon at mean distance from Earth, near opposition but not including the opposition surge, [3] p. 144), Venus, $m_v = -4.22$ (mean magnitude of Venus at maximum elongation, [3] p. 144), and the star Sirius (α CMa), $m_v = -1.45$ ([3] p. 240). The standard human star visibility limit with the unaided eye, $m_v = +6.00$, is also shown. In the Johnson-Cousins V band the magnitude of the star Vega (α Lyr) is usually set at $m_v = +0.03$. Fig. 2(a) shows the magnitude values within the 0.01–50 km distance range, whereas Fig. 2(b) shows an enlarged view of the first 5 km from the lights.

It can be seen in Fig. 2 that the nighttime lights of $I_v = 2000$ cd widely used in wind turbines of height between 100 and 150 m [1] can be brighter than Venus up to 4 km from the turbine, brighter than α CMa up to about 10 km, and reach the visibility limit $m_v = +6.00$ at 38 km. These results suggest that the visual range of wind farms at nighttime in pristine sites (limited by the luminous intensity of the lamps and the atmospheric attenuation) may be significantly higher than at daytime (limited by the luminance contrast thresholds applied to sunlight scattered into the line of sight [12]).

Fig. 3 shows the magnitudes m_v for lights of constant luminous intensity ($I_v = 2000$ cd) and three different aerosol optical depths, $\tau_a = 0.1$, 0.2 and 0.3, corresponding to daytime visual ranges of 49 km, 26 km, and 18 km, respectively, the remaining parameters being the same as in Fig. 1. During the first kilometers from the lamps the change in visual magnitude is dominated by the geometrical factor $1/r^2$ in Eq. (15), with little influence of the horizontal-path atmospheric attenuation e^{-kr}, so the m_v curves for different AOD are very close to each other. As the distance increases, the horizontal atmospheric attenuation becomes dominant and the values of m_v increase almost linearly with r. The overall behavior is also function of the value of $T_{atm}(z = 60^\circ)$, the atmospheric attenuation for an equivalent star seen at 30° above the horizon (here, two air masses), the reason behind the fact that the curves do not fully overlap in the first few km from the sources.

Fig. 4 shows the horizontal ground illuminance (in lx) produced by a single light of intensity 2000 cd located on a nacelle at 115 m above ground, with isotropic angular emission, and under the same atmospheric conditions as in Fig. 2. This illuminance is calculated using Eq. (5), by reinterpreting the angle θ as the zenith angle of the light source seen from the observer location. The constant, dotted line corresponds to the illuminance produced by a typical moonless starry sky in conditions of astronomical night, ~0.001 lx [51,52]. It can be seen that the horizontal ground illuminance produced by this mid-intensity light surpasses that of the moonless starry sky within the first 580 m from the base of the turbine, becoming two orders of magnitude smaller at a distance of 2.5 km. Recall that, unlike the retinal illuminances of non-overlapped lights perceived as individual objects, the ground

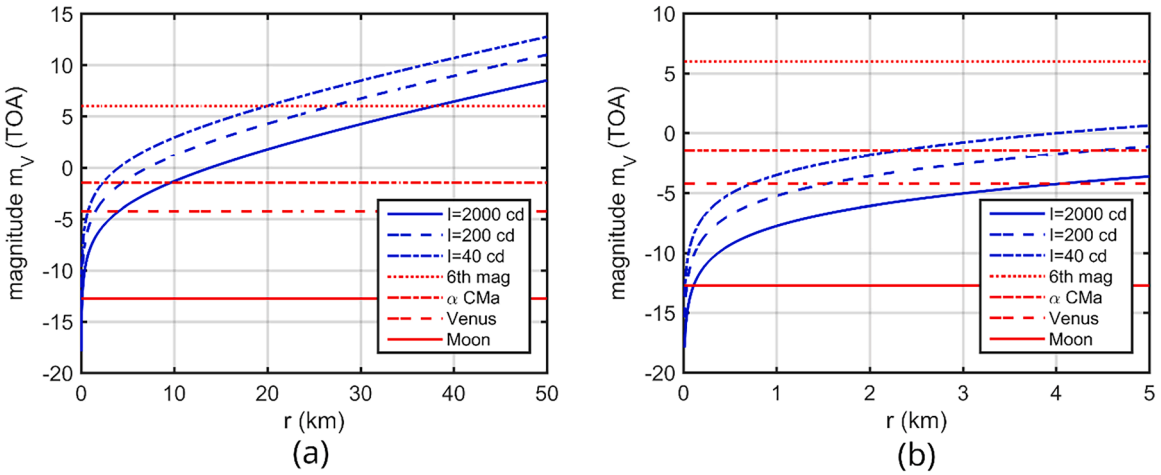

Fig. 2. Equivalent top-of-the-atmosphere (TOA) astronomical magnitude m_v of wind turbine lights seen from distances r, Eq. (15), for lamps of luminous intensities I_v = 2000, 200, and 40 cd, and an atmosphere with AOD τ_a = 0.2 (see text for details). (a) range 0.01–50 km, (b) enlarged view of the range 0.01–5.0 km.

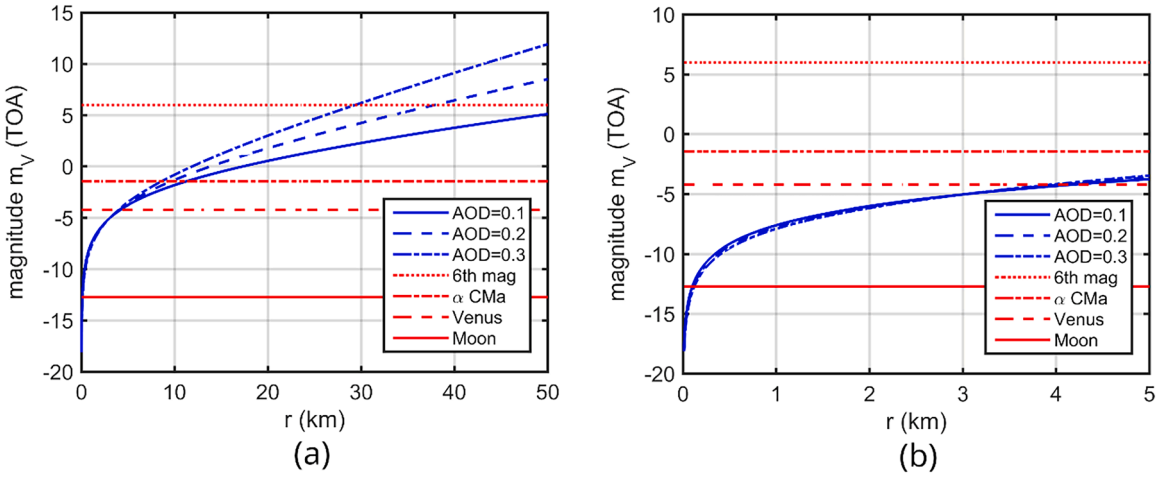

Fig. 3. Equivalent top-of-the-atmosphere (TOA) astronomical magnitude m_v of wind turbine lights seen from distances r, Eq. (15), for lamps of luminous intensity I_v = 2000 cd and atmospheres with AODs τ_a = 0.1, 0.2, and 0.3 (see text for details). (a) range 0.01–50 km, (b) enlarged view of the range 0.01–5.0 km.

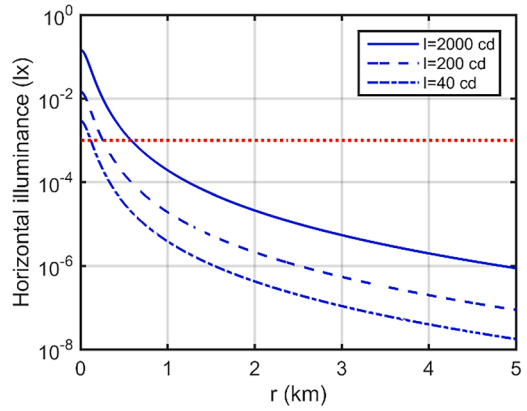

Fig. 4. Horizontal ground illuminance (in lx) produced by a single light of intensity 2000 cd located on a nacelle at h_n =115 m above ground, with isotropic angular emission and under the same atmospheric conditions as in Fig. 2. The horizontal, dotted line corresponds to the illuminance produced by a typical moonless starry sky in conditions of astronomical night, ~0.001 lx. The variable r in this figure corresponds to the horizontal distance from the base of the turbine, such that the total distance from the lamp to the ground observation point is $(r^2 + h_n^2)^{1/2}$.

illuminance produced by several lights is accumulative, hence the total ground illuminance at any point in the neighborhood of a wind farm shall be calculated as the sum of the contributions of all lamps. The direct luminous intensity of a single lamp, however, elicits significant visual responses up to much longer distances (see Fig. 2 and 3, and Section 4).

The fraction of territory within the visual range from which the windfarm lights can be seen depends on the local topography and on the height of the lights above ground level. While in flat areas the direct line of vision may be mostly unblocked across wide spans of territory, in mountainous regions it is generally limited by shadowing effects. However, since windfarms tend to be located on the highest elevations of mountain ridges, this fraction is generally very large. An example of the latter is shown in Fig. 5, where the visibility maps of four windfarm projects in the Eastern Mountains of Galicia (historic nationality and autonomous community in the kingdom of Spain, European Union) are displayed as graylevel rasters with the number of wind turbines from each windfarm that can be seen from each pixel. The red lines around each windfarm show the 4 km, 10 km, and 38 km range areas. These four windfarms are located relatively close to each other. Each one has particular visibility impacts, but the affected fraction of territory is in all cases remarkable. Their aggregated effect is shown in Fig. 6, at a spatial scale that allows discerning the variable but widespread visual impacts

APPENDIX

CERIS / University of Galway (2023)

Wind Turbines and House Prices Along the West of Ireland

K-2

Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach

Gillespie, T. & McHale, P. | CERIS Working Paper WP-2023-01 | University of Galway, 2023

KEY FINDINGS — HEDONIC PRICING ACROSS 7 WEST OF IRELAND COUNTIES

"The analysis finds a robust and significant reduction in property value of –14.7% within 1km"

"Aggregate loss of approximately €6.8 million for houses within 1km of a turbine"

Irish data, Irish properties, west of Ireland — most directly applicable study available

Referenced in submission Section 11 (Financial and Personal Impact)

[redacted]

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ON INCLUSIVITY AND SUSTAINABILITY

Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach

Working Paper Series 2023/01

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Turbine height impt.
No. of turbines
Location

Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach

Tom Gillespie and Patrick McHale, University of Galway

Abstract

Wind energy will become the dominant source of electricity in Ireland, with the most ideal sites for wind electricity generation located along the west and southern coast. Despite the benefits associated with wind energy, wind turbines impose undesirable externalities on residents mainly through aural and visual pollution. In this paper, I perform a preliminary evaluation on the effect of wind turbines on listed house prices in Ireland. I employ a unique dataset of exact turbine locations with housing and amenity data in seven counties along the west and southern coast of Ireland. With this I conduct a hedonic pricing analysis incorporating spatial and temporal fixed effects. The analysis finds a robust and significant reduction in property value of -14.7% within 1km of a turbine. The effect increases with turbine height, count, and level of urban influence. However, there is evidence that the price effect decays over time, becoming insignificant after 10 years. Furthermore, exhibited effects likely persist beyond 1km, although they are not significant in this analysis. In short, the results presented in this paper are consistent with existing European studies, enforcing the recommendation that turbines should be constructed in highly remote areas to minimise impacts on residents.

Introduction

As global CO_2 emissions from fossil fuels and industry reach unprecedented levels (Forster et al., 2023), governments are under increasing pressure to limit emissions to prevent disruptive future climate scenarios (IPCC, 2023). One promising avenue towards reaching carbon neutrality is the decarbonisation of the electricity system, by advancing an unparalleled level of renewable electricity (European Commission, 2019). However, a growing body of evidence suggests that the widespread development of renewable electricity production presents new drawbacks in the form of undesirable externalities (Zerrahn, 2017).

Despite high rates of global acceptance for wind energy, there is an enduring attitude gap between wind power and wind turbine development (Wolsink, 2007). Wind turbines are often fiercely opposed at a local level (Devine-Wright, 2005), mainly due to imposed negative effects on wildlife (Barclay et al., 2007), noise emissions (Wang and Wang, 2015), deterioration of the surrounding visual aesthetics (Zerrahn, 2017), and flicker caused by the spinning blades (Phylip-Jones and Fischer, 2013).

It is necessary to quantify these effects two main reasons. Firstly, effects are highly localised; hence they are not appropriately distributed amongst the population who benefit from renewable electricity (Droes and Koster, 2021). Secondly, there is disagreement in the existing literature on the perceived level of undesirable externalities, with many studies finding insignificant effects. Evidence indicates that factors such as the degree of community engagement and compensation from developers can reduce the absolute magnitude of impacts (Heintzelman et al., 2017). This implies spatial heterogeneity at both an international and local level (Parsons and Heintzelman, 2022). Therefore, studies from other countries may not be applicable in an Irish context.

Literature review

Parsons and Heintzelman (2022) provide a detailed meta-analysis of the 18 key papers investigating wind power and property values. A study is considered "key" only if it matches most of a defined set of properties. These include use of hedonic pricing or repeated sales analysis, controlling for unobserved variables, and including a sufficient sample size of houses

close to turbines.[1] Studies outside of this subset suffer from drawbacks such as insufficient sample size or lack of robustness checking.

As mentioned, there is mixed empirical consensus amongst the 18 key papers. While all European based studies consistently find significant negative impacts on residences near turbines, studies based in North America and Canada often report insignificant results. In studies with significant results, the authors demonstrate that impacts are non-linear over distance, using categorical distance bands or log transformations. In many cases, distance is employed as a proxy for all effects (Heintzelman and Tuttle, 2012; Hoen et al., 2015; Hoen and Atkinson-Palombo, 2016; Skenteris et al., 2019). Distance to turbine is highly correlated with both noise and visual disturbance. However, it introduces measurement error from unobserved variables, such as houses that are visually unaffected due to other obstructions.

Turbine impact measures can be improved with the inclusion of other accessible measurements associated with turbines. Dröes and Koster (2021) evaluate the effect of turbine height, finding significantly greater effects from turbines taller than 150m compared to turbines shorter than 50m, up to 2.5km away. Dröes and Koster (2016) evaluate the temporal behaviour of effects. They find that house prices remain significantly lower within 2km of turbines up to 8 years post-construction. Jensen et al. (2018) employ a weighted measure of turbine density. When accounting for the number of turbines up to 3km away from houses, they find that higher concentrations of turbines have significantly greater impacts on property values.

Recent analyses incorporate a view parameter to control for properties that are proximally close, but not visually affected by turbines (Parsons and Heintzelman, 2022). Some of these studies utilise a binary parameter calculated through a topographical viewshed analysis (Sunak and Madlener, 2015; Jarvis, 2021) and interact it with the distance variable to isolate effects. Other studies employ a non-binary measure, accounting for the degree of impact using categories ranging from "no-view" to "dominating" (Lang et al., 2014; Sunak and Madlener, 2015).

Of the 10 key studies in Europe, results consistently indicate significant negative reductions in house values within 2km of turbines. The magnitude of effect ranges from -25% (Sunak and Madlener, 2015) to -2% (Dröes and Koster, 2016). Price effects are greatest at close proximity to turbines and decrease non-linearly as distance increases. Most studies report insignificant

[1] See Parsons and Heintzelman (2022) for the full list of criteria.

effects beyond 4km (Parsons and Heintzelman, 2022). Studies that include a view parameter find it has either insignificant effects (Dröes and Koster, 2016), or significant negative effects similar in magnitude to models that only employ distance controls (Sunak and Madlener, 2015). In the case of Dröes and Koster (2016), the insignificant result is attributed to a large measurement error. However, there is no obvious explanation as to why the effect is not increased with view control, considering houses that are visually unaffected are removed (Parsons and Heintzelman, 2022).

In contrast, almost all key studies conducted in North America find insignificant or mixed effects despite applying best practices (Hoen et al., 2011; Heintzelman and Tuttle, 2012; Vyn and McCollough, 2014; Lang et al., 2014; Hoen et al., 2015; Hoen and Atkinson-Palombo, 2016; Heintzelman et al., 2017; Vyn, 2018). There are several possible explanations for the difference in results between North America and Europe. Firstly, it is believed that residential sorting is more commonplace in North America than Europe due to increased mobility (Parsons and Heintzleman, 2022). Buyers with a preference for living close to turbines will replace the residents that are opposed to turbines (Tiebout, 1956). Other reasons include data quality, wind farm prevalence (Parsons and Heintzelman, 2022), and community compensation from developers (Heintzelman et al., 2017).

Overview

The aim of this paper is to investigate the impact of wind turbines on house prices in counties along the west coast of Ireland, including one neighbouring county on the southern coast (Cork). I apply a revealed preference method to the first comprehensive dataset of wind turbines in Ireland, combined with precise data of house prices and characteristics. While a difference-in-differences approach is a preferred method of potentially causal analysis in the literature (Jensen et al., 2018; Bishop et al., 2020; Dröes and Koster, 2021), I utilise a cross-sectional approach with spatial and temporal fixed effects due to sample size concerns. This method is used in similar studies to yield robust results (Jensen et al., 2018; Parsons and Heintzelman, 2022). Furthermore, I follow the recommended best practices detailed by Bishop et al. (2020) to provide plausible results.

In this paper I explicitly focus on the effect of proximity to wind turbines on listed property values in the case area. Without access to noise or viewshed information, distance to nearby turbines is a good proxy of all negative effects imposed by wind turbines (Dröes and Koster, 2016).

Secondly, I measure the magnitude of effect on house price over time. Considering the typical life of a wind farm can range from 20 to 25 years (IWEA, 2019), it is important to understand whether discount effects attenuate or persist over time.

Thirdly, I investigate the influence of turbine height in conjunction with proximity on property value. Dröes and Koster (2021) demonstrate that taller turbines have a larger magnitude of effect and impact at greater distances. Replicating this in an Irish context is of direct relevance for siting decisions.

Finally, this paper is the first to draw comparisons between future wind development zoning and existing wind turbines as a form of robustness checking.

The results of this analysis indicate a loss in house value of approximately 14.7% within 1km of a turbine, with greater impact from taller turbines, that are more recently connected, in rural areas of moderate to high urban influence. Furthermore, effects are dependent on the number of proximal turbines, with greater effects associated with a higher density of turbines. Finally, effects appear to dissipate over time, becoming insignificant after 10 years. These results are validated through several checks including a novel test for the impact on house price from living in proximity to an area zoned for wind development that features no turbines. This robustness test indicates that areas zoned for wind development do not feature a significant pre-existing price differential compared to the control areas.

The remainder of this paper is organised as follows; I first discuss the policy context surrounding wind energy development and the relevance of the hedonic pricing approach. I then describe the data and methods used in the analysis. I then present my findings and describe the robustness checks. Finally, I provide a discussion on the limitations of this analysis and outline avenues for future research.

Policy context

Despite the existence of similar analyses across Europe, there is a key difference that makes an Irish-based study necessary: wind energy is Ireland's primary source of renewable electricity, contributing 80% of the renewable electricity produced (IWEA, 2020a). Moreover, it will continue to dominate the renewables sector in Ireland beyond 2030 (IWEA, 2020a, 2020b). The number of connected wind farms in Ireland has grown from 112 in 2010, to over 300 since 2020 (SEAI, 2023), with the number of turbines exceeding 2000 (see Figure 2). In comparison,

wind energy contributes less than 50% of renewable electricity in most countries where previous analyses have been conducted (see Figure 1). Only Denmark maintains a high proportion of wind penetration but still substantially lower than Ireland.

Ireland intends to meet 80% of its electricity demand with renewable sources by 2030 (Government of Ireland, 2021). Wind energy will contribute the majority share of this electricity with more than a threefold increase in wind generated electricity, from 4GW in 2019, to 13.3GW in 2030. For comparison, by 2030 solar will account for only 2.5GW. This generation will come from a combination of onshore and offshore turbine development (IWEA, 2020a, 2020b).

The counties along the west and south coast of Ireland are of substantial importance for wind energy development. Not only do the seven observed counties contain over half of the current stock of wind turbines, approximately 1200, but these counties boast the greatest frequency of onshore sites in the country with an annual mean wind speed at 100m greater than 10m/s (SEAI, 2022). This indicates that these counties may be more lucrative and desirable for wind energy development going forward.

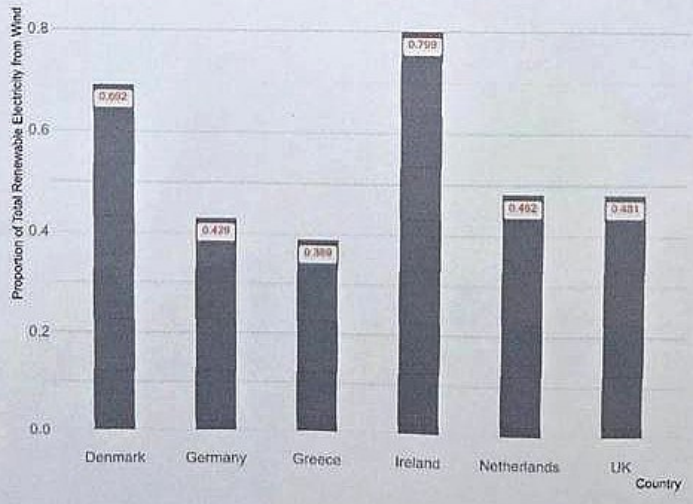

Figure 1: Mean proportion of wind produced electricity out of total renewable electricity in comparison countries, 2021-2023. Source: IEA (2023), own illustration.

Initially, the wind energy sector was supported through the Renewable Energy Feed-In Tariff (REFIT) scheme.[2] The REFIT scheme was subsequently replaced in 2020 by a competitive bidding process known as the Renewable Energy Support Scheme (RESS) (gov.ie, 2019). While feed-in tariffs have proven hugely successful in catalysing wind development (Dong, 2012), efficient producers collect a rent at the cost of the consumer. The competitive bidding process is designed to remove this additional rent. However, this can reduce the incentive for developers (Bhattacharya, 2019).

As development continues to increase, the most ideal sites for wind turbines are utilised first, leading developers to construct wind farms in possibly more controversial and contested locations (Parsons and Heintzelman, 2022). Not only are wind turbines becoming more commonplace in the Irish landscape, but modern turbines also boast increased hub heights and blade diameters. These turbines are visible from greater distances and loom larger when close by (Jensen et al., 2014; Jensen et al., 2018).

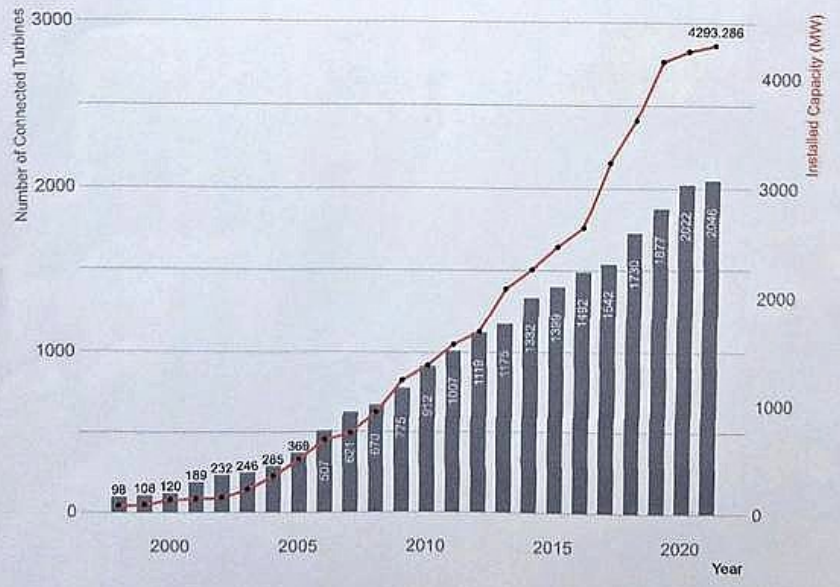

Figure 2: Cumulative number of connected turbines, and cumulative installed capacity, in Ireland 1998 - 2021. Source: SEAI Wind Atlas (2022), own data.

[2] See Doherty and O'Malley (2011) for a full breakdown of the REFIT scheme in Ireland.

Theoretical background

Intuitively, local distaste towards the negative externalities of wind turbines is likely to be capitalised into the values of nearby houses. As such, a popular approach, to valuing the localised negative effects, is the hedonic pricing method.

The hedonic pricing method is a prevalent revealed preference approach for valuing environmental amenities, and disamenities, that do not have dedicated markets. It assumes that the overall value of a good is a function of the values of each characteristic of the good (Lancaster, 1966). In the context of the housing market, each individual house represents a unique combination of characteristics. The value of a house can be decomposed into the values of its individual attributes (Rosen, 1974). Therefore, the value of the disamenity can be isolated from the total value of the property. There are three key assumptions of hedonic pricing theory; markets are in equilibrium, people are knowledgeable of all available information and freely mobile, and buyers can purchase at continuous levels of each characteristic (Bishop et al., 2020).

The hedonic pricing method is frequently used to value environmental amenities or disamenities. This method has been implemented to identify the effects on house prices from air pollution (Harrison and Rubinfeld, 1978), noise pollution (von Graevenitz, 2018), flood risk (Bin et al., 2008; Gillespie et al., 2020), and sea views (Bin et al., 2008). Importantly, the hedonic pricing approach is becoming popular in analyses of renewable energy facilities including wind energy (Parsons and Heintzelman, 2022) and solar parks (Dröes and Koster, 2021).

negative pre-existing price differential. However, houses in the 1-2km band show a significantly greater value to the 5-15km band, 16.2%. Note there are only 96 observations in this group.

Figure 5 visualises the effect of proximity to turbines on house price. From the illustration there is a clear nonlinear relationship between distance to turbine and impact on price. Furthermore, we see that the log inverse distance measure captures a similar effect.

All baseline regressions use the same controls, these can be found in Appendix 2. The coefficients on the control variables are consistent with expectations. For example, bedrooms and bathrooms have positive impacts on price, and bungalows maintain significantly higher value than apartments. I perform a robustness test on the effect of the control variables on the variable of interest by excluding similar groups of controls. The effect of proximity to turbines remains consistent upon controlling for ED fixed effects and housing characteristics (see Appendix 2).

Time effects

Table 3 outlines the estimated effect of proximity to the nearest turbine given the property listing is updated within a given time post-connection of its nearest turbine. These results show a significant effect of -6.8% within 2-3km if the property listing is updated within 5 years of the connection of the turbine, and -20.4% if the property is within 1km. If the property listing is updated within 5-10 years of the turbine's connection date the only significant effect is in the 0-1km band, -14.7%. There is no significant effect if the property listing is updated beyond 10 years of the connection date. However, there remains a negative coefficient on the distance bands up to 3km. Note that the estimates within 1km are not significantly different from each other.

While these results indicate that effects on house price diminish over time there is a strong relationship between the age of a windfarm and turbine height. Older windfarms typically have shorter turbines that may be less pervasive on the landscape and may be better located (Dröes and Koster, 2021). Indeed, when I assess the effect of turbine height on house price, I find no significant effects from turbines shorter than 90m (see Table 4). Unfortunately, the sample is too small to control for both turbine height and timing of listing. The independent effect of each factor is unknown.

Height is an impt factor. over 90m. but no reliable sample size

17

Table 3: The effect of duration of turbine connection on house price.

0-5 years	0-1km	1-2km	2-3km	3-4km	4-5km	5-15km
Estimate	-0.204	-0.058	-0.068	-0.018	-0.010	Base
SE	0.067	0.044	0.028	0.023	0.020	
	***		**			
5-10 years						
Estimate	-0.147	-0.031	0.002	-0.001	-0.013	Base
SE	0.057	0.055	0.030	0.026	0.019	
	***					
10+ years						
Estimate	-0.099	-0.023	-0.020	0.015	0.015	Base
SE	0.066	0.043	0.030	0.024	0.025	
***=99%	**=95%	*=90%				

Height effects

From Table 4, turbine height is influential on house price within 1km, with turbines taller than 125m incurring a greater discount (-22.9%) compared to medium sized turbines (-14.4%). Turbines shorter than 90m have no significant effect on house price but maintain a negative coefficient. While the negative effects of turbines above 125m persist up to 5km and effects for shorter turbines attenuate beyond 3-4km, these effects are not statistically significant. Furthermore, there is an unobserved relationship between turbine height and age that was discussed previously.

Table 4: The effect of turbine height on house price.

<90m	0-1km	1-2km	2-3km	3-4km	4-5km	5-15km
Estimate	-0.064	-0.020	-0.017	0.022	0.008	Base
SE	0.072	0.042	0.027	0.027	0.024	
90m-125m						
Estimate	-0.144	0.011	-0.055	-0.046	0.024	Base
SE	0.055	0.036	0.042	0.032	0.027	
	***					
>125m						
Estimate	-0.229	-0.084	-0.034	-0.010	-0.027	Base
SE	0.069	0.068	0.035	0.030	0.021	
	***					
***=99%	**=95%	*=90%				

APPENDIX

CHL Consulting / Fáilte Ireland

Dark Sky Feasibility Study (2019)

K-3

Feasibility Study for Maximising the Tourism Potential of Dark Sky Assets
Prepared for Fáilte Ireland by CHL Consulting Company Ltd., April 2019

KEY FINDING

"It is essential to protect, preserve and enhance the quality of the dark skies, without which there can be no tourism product."

Prepared by the same firm (CHL & Associates) that authored the applicant's TIA

FEASIBILITY STUDY FOR MAXIMISING THE TOURISM POTENTIAL OF DARK SKY ASSETS

A Report

prepared for

Fáilte Ireland

by

CHL Consulting Company Ltd.

April, 2019

Feasibility Study for

Maximising the Tourism Potential of Dark Sky Assets

- Report April, 2019

CONTENTS

Page No.

 There is now a need to evaluate the scale and nature of the potential of Dark Skies tourism for the Wild Atlantic Way, and to recommend solutions for its development.

2. International Context (ref. page 17)

 Internationally, countries that are established centres for astronomy, such as Chile and the Canaries, attract the greatest volume of astro-tourists. The core assets of regularly clear night skies and the presence of observatories support the development of astro-tourism in these destinations.

 However, other destinations are also benefitting from lower-scale demand, e.g. the UK.

 The market potential of the niche scientific and amateur astronomer markets is small, from a tourism perspective.

 But Dark Sky tourism can meet the needs of mainstream tourists with an interest in shared cultural or nature-based experiences – and this is where the larger share of the market can be found.

 And there is also potential to develop event-specific tourism.

 Existing Dark Sky destinations internationally offer a wide variety of related experiences, including night-time tours and activities, planetarium and observatory visits, talks, workshops, festivals and more.

 The three comparators selected for detailed review - Lapland/Iceland, the Canaries and the UK - all provide useful examples for Ireland to learn from in relation to product development and management.

 There are also good examples in many destinations of innovation in visitor experience development, particularly in relation to adapting accommodation for tourists interested in astronomy, and in relation to integrating other nature-based activities.

 The availability of high-quality dark skies is a valuable asset for destinations

that have it, as it is being threatened in modern countries because of light pollution. There is increasing need to preserve what is available not only for tourism but for a variety of health and wildlife reasons due to current low levels of demand.

3. Position of Dark Skies on the Wild Atlantic Way (ref. page 34)

 The Wild Atlantic Way has a unique position on the edge of Europe - facing out to sea and with limited urban development - and is well-positioned geographically to develop tourism experiences associated with unpolluted night skies.

 There are currently two International Dark-Sky designated sites in Ireland - in Kerry and Mayo. A third site, at Lough Gur in Co. Limerick, is working towards IDA designation.

 A wide range of Dark Sky assets are currently available in the Kerry and Mayo sites, but many are offered only in a very limited way.

 In addition, the weather is a factor that needs to be considered in developing Dark Skies experiences for visitors along the Wild Atlantic Way.

 A wide variety of complementary products, services and facilities are also available right along the Wild Atlantic Way that hold the potential to be adapted for Dark Sky tourism. These include static assets, such as destination-level visitor attractions and Wild Atlantic Way Discovery Points, as well as soft assets such as outdoor activity providers and rural accommodation.

 Dark Sky tourism has already harnessed a considerable number of relevant stakeholders, including local authorities and development agencies, third level institutions, state landowners/agencies, community groups and tourism trade. These - and more - have a role to play in further developments.

 There is also potential to develop other locations along the Wild Atlantic Way

as areas from Clear Island, Co. Cork, up to North Mayo in particular, have high night darkness ratings.

 In order to develop the interest from communities and tourism potential in these areas, it is essential to protect the existing core assets – which include the international designations and the lack of light pollution.

4. Gap Analysis for Dark Skies on the Wild Atlantic Way (ref. page 48)

 Dark Sky tourism in Ireland is currently in its infancy and, not surprisingly, has a number of identifiable gaps and weaknesses, including a deficit in supports that would cater for a more mainstream tourism market. It also has opportunities and strengths that can be capitalised on.

Asset/Activity/Support Available Internationally Available on Wild Atlantic Way?

 Regular clear night skies Limited

 Observatory No

 Educational outreach programmes Yes, in designated areas

 Active national marketing and development support/direction Yes

 Co-ordinated destination-level marketing Only at individual area level

 Guided astronomical night-time tours with transport Yes – limited

 Guided, related, night-time activities Very limited

 Related day-time activities Yes – limited

 Educational programmes for tourists Only in association with festivals

 Equipment for hire No

 Related specialist programmes, e.g. astrophotography Only in association with festivals

 Annual festival Yes

 Regular programme of smaller star-gazing events Offered by astronomy groups

 Designated star-gazing locations Yes, but not signed

 On-site signage for independent star-gazers No

APPENDIX

Van Renterghem (2017)

Ridge Turbine Valley Sound Propagation

K-4

Sound propagation from a ridge wind turbine across a valley
Philosophical Transactions of the Royal Society A, Vol. 375, 20160105
DOI: 10.1098/rsta.2016.0105

KEY FINDING

Ridge turbines produce complex amplified sound distributions in valleys below
Directly applicable to the Maughanaclea ridge / Mealagh Valley scenario

PHILOSOPHICAL TRANSACTIONS A

rsta.royalsocietypublishing.org

Research

Cite this article: Van Renterghem T. 2017 Sound propagation from a ridge wind turbine across a valley. *Phil. Trans. R. Soc. A* **375**: 20160105.
http://dx.doi.org/10.1098/rsta.2016.0105

Received: 17 June 2016
Accepted: 29 September 2016

One contribution of 11 to a theme issue 'Wind energy in complex terrains'.

Subject Areas:
computational physics, atmospheric science, environmental engineering, acoustics

Keywords:
outdoor sound propagation, wind turbine, undulating terrain, parabolic equation method

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Sound propagation from a ridge wind turbine across a valley

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Sound propagation outdoors can be strongly affected by ground topography. The existence of hills and valleys between a source and receiver can lead to the shielding or focusing of sound waves. Such effects can result in significant variations in received sound levels. In addition, wind speed and air temperature gradients in the atmospheric boundary layer also play an important role. All of the foregoing factors can become especially important for the case of wind turbines located on a ridge overlooking a valley. Ridges are often selected for wind turbines in order to increase their energy capture potential through the wind speed-up effects often experienced in such locations. In this paper, a hybrid calculation method is presented to model such a case, relying on an analytical solution for sound diffraction around an impedance cylinder and the conformal mapping (CM) Green's function parabolic equation (GFPE) technique. The various aspects of the model have been successfully validated against alternative prediction methods. Example calculations with this hybrid analytical–CM–GFPE model show the complex sound pressure level distribution across the valley and the effect of valley ground type. The proposed method has the potential to include the effect of refraction through the inclusion of complex wind and temperature fields, although this aspect has been highly simplified in the current simulations.

This article is part of the themed issue 'Wind energy in complex terrains'.

1. Introduction

In order to fulfil the renewable energy targets that have been set in many countries, the number of wind turbines

THE ROYAL SOCIETY PUBLISHING

is expected to increase significantly in the near future. Among the different environmental impacts associated with wind turbines (such as landscape and visual impact, shadow flicker, impact on wildlife, electromagnetic interference and climate change [1]), noise issues remain the key environmental factor controlling the extent of a wind farm's development [2]. Even at low A-weighted sound pressure levels, there is a substantial negative perception towards wind turbine noise [3–8]. Therefore, noise impact assessments are commonly required during the planning phase.

Positioning wind turbines on ridges can potentially intensify momentum extraction from the wind flow [9], caused by the so-called wind speed-up effect [10–12]. Parameters of relevance include hill shape, the terrain upwind of the hill, atmospheric stability and whether or not the hill is forested [9–12].

However, there is little research, to the author's knowledge, regarding sound propagation from a ridge-mounted wind turbine to receptor locations across an adjacent valley, although the measurement-based studies of Evans & Cooper [13] have highlighted the importance of topography, including valleys, for wind turbine noise propagation. Established knowledge from other types of environmental noise sources cannot be easily transferred to the present case due to the unique positioning of the source high above a ridge. Physical phenomena that could be relevant to the present case include amplification of sound due to the valley (potentially mediated or intensified by the valley shape and its acoustic ground impedance), partial shielding by the ridge, and atmospheric refraction and turbulent scattering of sound waves due to the complex flow fields that are expected in such a geometry. Both the hilly topography and the presence of a turbine will add to the complexity of the flow. In this work, some of these aspects are studied by means of numerical sound propagation modelling.

Study of the foregoing expected sound propagation effects demands an advanced outdoor sound propagation technique. However, consideration additionally needs to be given to the computational cost, and therefore also the practical applicability of any such advanced techniques. Meta-analysis of (perception) studies with regard to wind turbine noise annoyance [14] state that, below 35 dBA, negative effects are generally not found. Logically, the latter defines the distance of concern. For large horizontal-axis wind turbines, with total source power levels easily exceeding 100 dBA when operating near their maximum power production, a propagation distance of minimum 1 km from the source should be attained. Knowing that wind turbine noise emission spectra typically show a maximum near the octave band of 1 kHz [15,16], and given that sufficiently detailed wave propagation techniques need sub-wavelength discretization, the numerical problem becomes challenging regarding spatio-temporal discretization.

An interesting candidate is the parabolic equation (PE) method (see e.g. [17,18]). The simplification to one-way sound propagation allows efficient solving of the governing sound propagation equations. In addition, a refracting atmosphere can be accounted for in detail. For many cases involving long-distance sound propagation, reasonably accurate predictions can be made with this methodology. Of specific interest is the Green's function parabolic equation (GFPE) method [19,20], as this allows forward stepping at multiples of the wavelength, in contrast to the sub-wavelength step spacing of most other advanced techniques.

The GFPE, however, cannot be readily used to model sound propagation from a ridge-mounted wind turbine. The inclusion of undulating terrain will be discussed in this work, and a number of specific problems will be dealt with. Focus is on accurately accounting for the effect of terrain undulation in the case of a source positioned high above a ridge. In addition, some example calculations are provided to show the potential of the proposed model.

In this paper, the specific wind and temperature fields near a ridge wind turbine are not considered. Only a highly simplified approach is used to model downwind sound propagation, although more complex flow fields could be rather easily included in the GFPE methodology. Turbulence scattering and coherence loss are also not considered in this work. Note that, although there is strong progress in computational fluid dynamics modelling, providing detailed flow fields in the case of a ridge-mounted wind turbine still remains highly challenging.

2. The Green's function parabolic equation method in undulating terrain

(a) Basic stepping equation

The two-dimensional stepping equation of the GFPE method is summarized by equation (2.1). Some basic features of this technique are discussed below, but a detailed derivation and analysis can be found elsewhere [17,19,20]. In this forward propagation approach, the vertical array of pressures p at range $r + \mathrm{d}r$ is extrapolated from the previous column at range r. Thus

$$p(r+\mathrm{d}r,z) = \exp(-\mathrm{i}\mathrm{d}r k_0)\overbrace{\exp(\mathrm{i}\mathrm{d}r(k-k_0))}^{\text{refraction term}} \times \overbrace{\left\{\frac{1}{2\pi}\int_{-\infty}^{\infty}\exp\left(\mathrm{i}\mathrm{d}r\sqrt{k_0^2-k_z^2}\right)\exp(\mathrm{i}k_z z)\,\mathrm{d}k_z\int_0^{\infty}\exp(-\mathrm{i}k_z z')p(r,z')\,\mathrm{d}z'\right.}^{\text{direct wave}} + \overbrace{\frac{1}{2\pi}\int_{-\infty}^{\infty}R(k_z)\exp\left(\mathrm{i}\mathrm{d}r\sqrt{k_0^2-k_z^2}\right)\exp(\mathrm{i}k_z z)\,\mathrm{d}k_z\int_0^{\infty}\exp(\mathrm{i}k_z z')p(r,z')\,\mathrm{d}z'}^{\text{ground-reflected wave}} + \overbrace{\left.2\mathrm{i}\frac{k_0}{Z}\exp\left(-\mathrm{i}\frac{k_0}{Z}z\right)\exp\left(\mathrm{i}\mathrm{d}r\sqrt{k_0^2-(k_0/Z)^2}\right)\int_0^{\infty}\exp\left(-\mathrm{i}\frac{k_0}{Z}z'\right)p(r,z')\,\mathrm{d}z'\right\}}^{\text{surface wave}}, \quad (2.1)$$

with i the imaginary unit, (r, z) the position in, respectively, the horizontal and vertical direction with $\mathrm{d}r$ and $\mathrm{d}z$ their spatial discretization steps, Z the ground impedance normalized to that of (unbounded) air ($=\rho_0 c_0$, with ρ_0 the mass density of air and c_0 the sound speed; local reaction approximation), k_0 the reference wavenumber (at the ground surface), k the height-dependent wavenumber ($k = 2\pi f/c$, with f the sound frequency under consideration) and k_z the wavenumber in the (vertical) spatial (Fourier) domain.

Some distinct contributions in equation (2.1) can be identified, namely the direct wave, the ground-reflected wave and a surface wave. Refraction can be efficiently approached by a phase correction due to wavenumber variations with height. Temperature (and to a lesser extent humidity) variations with height are directly linked to changes in sound speed [17,18] involving no approximations. The horizontal components of the wind speed (parallel to the ground) can be approached by an equivalent increase in the sound speed (i.e. the so-called 'effective sound speed' approach [17,18]). This stepwise calculation of the acoustic fields allows both the sound speed profile and the ground parameters to be made range-dependent.

The integrals appearing in the direct and ground-reflected wave terms can be efficiently calculated by relying on the Fourier transform and its inverse, for which numerically very efficient algorithms are commonly available, such as the fast Fourier transform.

In order to represent the wind turbine noise source as a point source, the calculations will rely on the equivalence between (coherent) line source propagation (i.e. the two-dimensional solution) and point source propagation (i.e. the three-dimensional solution) when expressing sound pressure levels relative to free-field sound propagation [21] (see §4).

(b) Including terrain undulations

Various approaches for introducing undulating terrain in the PE method can be found, like the general terrain PE (GTPE) [22], the rotated reference frame approach [23–25] (GFrPE), a stair-step terrain approach using Kirchoff's method [26] and the conformal mapping (CM) method [17,27,28].

The GTPE can be seen as a generalization of the Crank–Nicolson PE (CNPE) method. This method is applicable to arbitrary terrain profiles and uses terrain-following coordinates. However, analysis has shown that the local slope angles should not exceed roughly 30° [17].

In addition, the CNPE is much less efficient than the GFPE, as stepping in the propagation direction needs sub-wavelength discretization.

The rotated reference frame approach is applicable to the GFPE. The curved ground is treated as a succession of flat zones with different slope angles. The sound field in each domain starts from an array of pressure values, orthogonal to the local slope, as calculated from the previous domain. A number of reduced propagation steps are thus needed near the interface to accurately construct the next domain's starting field, which can strongly increase computing times [25]. Sudden slope changes along the propagation path are difficult to handle.

The stair-step approach might be attractive due to its simplicity. The terrain profile is reduced to a succession of best-fitting steps that are each treated as small vertical barriers. The part of the sound field covered by each step is then set to zero. This method further needs a vertical coordinate shift to continue propagation from the top of the next step. Combining the foregoing approach with variable step widths provides great flexibility in describing terrain profiles. However, only reflection on horizontal surfaces is modelled. This means that waves reflected obliquely in the direction of sound propagation cannot subsequently interfere along the propagation path. Only part of the acoustic energy will be sent in that direction due to diffraction at step corners, thereby potentially resulting in a significant loss in accuracy.

In this study, the CM method will be used, which is a computationally highly efficient approach to account for undulating terrain. The CM method is based on the theoretically perfect analogy between a circularly curved ground surface with radius R_c and a refracting atmosphere with the following exponential sound speed profile c:

$$c = c_0 e^{z/R_c}, \tag{2.2}$$

with $R_c > 0$ for concave ground and $R_c < 0$ for convex ground, z the height above the ground and c_0 the reference sound speed.

The shielding caused by convex terrain can thus be approached by sound propagating over flat terrain in an upwardly refracting atmosphere, while concave ground is simulated by a downwardly refracting atmosphere. A change in sound speed profile comes at almost no additional computational cost in the PE model. Note that such artificially refracting atmospheres due to ground curvature are typically much stronger than those observed due to real wind flows in the atmospheric boundary layer. The latter, however, can be superimposed on the artificial profile due to ground curving, thus allowing account to be taken of both terrain undulation and atmospheric refraction.

The main limitation here is the need for simplification to circularly curved terrain segments. Care is needed to account for the coordinate transform between the real (curved ground) system and the artificially refractive flat PE domain.

3. Hybrid analytical–conformal mapping–Green's function parabolic equation model

When applying the GFPE to the specific case of sound propagation across a valley from a ridge-mounted wind turbine, two fundamental problems appear.

Firstly, a direct application of the CM approach would actually mean that the source becomes oriented perpendicular to the curved ground. Clearly, such a configuration, as schematically illustrated in figure 1*a*, deviates strongly from a typical wind turbine case. A more realistic scenario, still consistent with the CM approach, can be achieved by placing two circular ground segments in series [17,27] (figure 1*b*). The geometry of interest is thus idealized to sound propagation over a small convex circular segment representing the ridge (with artificial upward refraction), followed by sound propagation over part of a large concave cylinder representing the valley (with artificial downward refraction).

A second fundamental problem when using the PE method for such a case is that sound propagation can only be accurately described in a relative small cone, horizontally centred around

APPENDIX

Fernández-Bellón et al. (2019)

Irish Wind Farm Bird Study

K-5

Effects of wind energy development on bird densities in upland areas
Conservation Biology, Vol. 33, No. 2, pp. 413–422 | DOI: 10.1111/cobi.13239
University College Cork

KEY FINDING

10% reduction in bird numbers at 12 Irish upland wind farms
Irish research, Irish wind farms, Cork-based researchers

Conserv Biol. 2019 Apr;33(2):413-422. doi: 10.1111/cobi.13239. Epub 2018 Nov 20.

Effects of development of wind energy and associated changes in land use on bird densities in upland areas

Darío Fernández-Bellon [1], Mark W Wilson [1 2], Sandra Irwin [1], John O'Halloran [1]

Affiliations

PMID: 30346052 DOI: 10.1111/cobi.13239

Abstract in English, Spanish, Chinese

Wind energy development is the most recent of many pressures on upland bird communities and their habitats. Studies of birds in relation to wind energy development have focused on effects of direct mortality, but the importance of indirect effects (e.g., displacement, habitat loss) on avian community diversity and stability is increasingly being recognized. We used a control-impact study in combination with a gradient design to assess the effects of wind farms on upland bird densities and on bird species grouped by habitat association (forest and open-habitat species). We conducted 506 point count surveys at 12 wind-farm and 12 control sites in Ireland during 2 breeding seasons (2012 and 2013). Total bird densities were lower at wind farms than at control sites, and the greatest differences occurred close to turbines. Densities of forest species were significantly lower within 100 m of turbines than at greater distances, and this difference was mediated by habitat modifications associated with wind-farm development. In particular, reductions in forest cover adjacent to turbines was linked to the observed decrease in densities of forest species. Open-habitat species' densities were lower at wind farms but were not related to distance from turbines and were negatively related to size of the wind farm. This suggests that, for these species, wind-farm effects may occur at a landscape scale. Our findings indicate that the scale and intensity of the displacement effects of wind farms on upland birds depends on bird species' habitat associations and that the observed effects are mediated by changes in land use associated with wind-farm construction. This highlights the importance of construction effects and siting of turbines, tracks, and other infrastructure in understanding the impacts of wind farms on biodiversity.

Keywords: bird guilds; cambio de uso de suelo; campos eólicos; desplazamiento; displacement; gremios de aves; habitat modification; land-use change; modificación de hábitat; tierras altas; turbinas de viento; uplands; wind farms; wind turbines; 土地利用变化; 山地; 生境改造; 被迫迁徙; 风力涡轮机; 风电场; 鸟类同资源种团.

Related information

GEO Profiles

LinkOut - more resources

Full Text Sources

Ovid Technologies, Inc.
Wiley

APPENDIX

Galloway Dark Sky Park

Economic Impact Assessment

K-6

ekos for Forestry Commission Scotland

UK’s first DarkSky Park — proven economic benchmark for dark sky designation

KEY FINDINGS

£1.93 return for every £1 invested in dark-sky friendly lighting

77% of surveyed businesses reported increase in bed nights

£500,000 per year generated from dark sky tourism after ten years

Written evidence submitted by DarkSky UK (AST001)

Submission of evidence for UK astronomy

1. This is the submission of written evidence from DarkSky UK to the Science, Innovation and Technology Committee inquiry into how well placed the UK astronomy sector is to showcase the UK as a science superpower and maximise its leadership in international programmes.
2. DarkSky UK is the British chapter of DarkSky International (formerly the International Dark-Sky Association), the world's oldest organisation dedicated to restoring the nighttime environment and protecting communities from the harmful effects of light pollution through outreach, advocacy, and conservation.
3. This written evidence was shaped by input from our leadership team and advocates across the UK in cooperation with DarkSky International.
4. We do not believe there are any prejudicial conflicts of interest to declare.
5. As an organisation dedicated to the preservation and restoration of the natural night, we will primarily be responding to the importance of the night sky for people and nature and the ways that astronomy has shaped humans and other life, biologically and creatively, as well as the opportunities that the night sky offers to the wider UK economy, particularly in the form of astrotourism (tourism to experience the science of astronomy), dark sky tourism (to experience naturally dark nights in protected places) and nocturnal tourism (to experience the nighttime environment including wildlife experience).

Summary

6. The stars and the night sky have been part of life on Earth since the dawn of time. Humans have drawn inspiration from the stars and celestial objects both artistically and scientifically for centuries, with some of our greatest works of literature, art and music – from Shakespeare to Coldplay – inspired by the night sky. Access to the night sky and visions of space exploration have driven young people into STEM for decades and continue to do so. As Osborne and Collins concluded in their 2000 study[1] of attitudes to science in school, 'The one topic [among the sciences] that generated universal enthusiasm was any study of astronomy'. Astronomy plays a crucial role not just in our scientific endeavours, but also in our creative lives.
7. 'Astrotourism', or tourism specifically to enjoy the night sky, stargazing, astronomy and the nocturnal environment, is a growing form of tourism – a key contributor to the UK economy. Protection of our night skies from light pollution through the certification of International Dark Sky Parks (IDSPs), Reserves and Sanctuaries has spurred growth in this sector, as more people living in big cities seek out the peace, refuge and access to nature that a night-sky tourism experience can offer.
8. There is potential for multiple high-revenue tourism streams from astronomy, some of which are already being explored in the UK's 20 certified International Dark Sky Places. These include:
    a. luxury package tours
    b. dark-sky group tours
    c. glamping & astronomy-themed inns
    d. stargazing excursions, 'star trails' & themed itineraries
    e. nighttime activities such as nocturnal walking/camping
    f. nocturnal wildlife tours
    g. astrophotography tours
    h. stargazing events like 'star parties' and dark sky festivals
    i. lectures/workshops/classes, astronomy conferences
    j. developing public astronomical centres, such as the hugely popular Kielder Observatory
9. These open up many attractive destination marketing and PR opportunities, campaigns and products that utilise the UK's rich heritage as a centre for astronomy.
10. Astrotourism increases off-season and shoulder-season tourism revenue, as stargazing and astronomy rely on dark, clear skies, which are best in winter, autumn and spring when tourism is traditionally quieter. It also necessitates overnight stays and longer tours, with many astrotourists staying 2+ nights. Astrotourism also provides reliable, predictable yearly income boosts during annual astronomical events like eclipses, transits and meteor showers.

11. An Economic Impact Assessment looked at the impact on local business a year after Galloway Forest Park (the UK's first IDSP) in Scotland became a certified DarkSky Park. For every £1 spent on installing dark-sky friendly lighting in the area, there was a return on investment of £1.93, due to an increase in tourism, and it concluded that the economic benefits are probably much more. After 10 years, the park generated an estimated £500,000 a year from astronomy-related and dark-sky tourism.[2]
12. New lighting schemes also reduce CO2 emissions, potentially saving councils money on energy, and have improved the nocturnal ecosystem. 71% of local businesses stated that the IDSP was very important/important in attracting visitors to the area or out of season. The cumulative output over the ten-year period was £2.25m for the growth and £6.5m for the total output.
13. In Northumberland, a 2018 survey into the impact of dark sky tourism showed £25 million in economic benefit, a 15% increase in 'business performance' and support for 450 local jobs. Kielder Observatory alone brought in over £1 million in associated expenditure to the region.[3]
14. Astronomy centres with public events, such as those at Kielder Observatory, Battlesteads Observatory and others, do crucial work in engaging the public about the importance of astronomical science, offering young people a critical avenue into STEM. They also increase public awareness about the importance of the nighttime environment and wildlife, as well as the urgent issue of light pollution, which is increasing at a rate of 10% every year – contributing to excessive energy waste, council and household spending and CO2 emissions driving the climate crisis.
15. Astronomy centres thus help to protect our countryside, wildlife and natural environment by providing a necessary impetus for light pollution mitigation and better infrastructure and planning.
16. To conclude, there is enormous economic potential from UK astronomy and dark skies activities, centres and protected areas, which also provide crucial public appreciation for the environment and encourage uptake in the sciences.

22 September 2023

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[1] Osborne, Jonathan & Collins, Sue (2000). 'Pupils' and Parents' Views of the School Science Curriculum', Kings College London. https://www.kcl.ac.uk/archive/website-resources/education/web-files2/news-files/ppt.pdf

[2] 'A decade of the UK's first Dark Sky Park in Galloway', BBC News, 16 Nov 2019. https://www.bbc.co.uk/news/uk-scotland-south-scotland-50405389

[3] Research into the Economic Impact of Dark Sky Tourism – Northumberland International Dark Sky Park, 2018. https://www.bowe.co.uk/wp-content/uploads/2020/11/Dark-Skies-Research-Summary-v4-002.pdf

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APPENDIX

NatureScot (2024)

Guidance on Aviation Lighting Impact Assessment

K-7

NatureScot (Scottish Natural Heritage), November 2024

Published before Maughanaclea Ltd. submitted its planning application

Sets out a three-stage best-practice process for assessing aviation lighting impacts from wind turbines on landscape and visual resources.

THREE-STAGE ASSESSMENT PROCESS SET OUT IN THIS GUIDANCE

1. Defining the lighting proposal
2. Understanding the baseline night-time environment
3. Assessing the effects of the aviation lighting on receptors

None of these three steps were applied at Wild Hideaways in the Maughanaclea EIAR. No night-time aviation lighting impact assessment was conducted.

Guidance on Aviation Lighting Impact Assessment

https://www.nature.scot/doc/guidance-aviation-lighting-impact-assessment

Published: November 2024

Contents

Background

The purpose of this Guidance is to bring consistency to the assessment and illustration of effects on the landscape and visual resource from visible aviation lighting located on onshore wind turbines. It is intended to assist developers in bringing clarity to the level of detail and content that is expected in support of planning applications for onshore wind farms, while providing decision makers and consultees with a framework for assessing impacts. The Guidance has been written on the basis of experience gained in Scotland and its application in other parts of the UK may need to be tailored to reflect local circumstances and policies.

Acknowledgements

Special thanks is given to members of the Aviation Lighting Working Group who have informed the preparation of this Guidance, including representatives of public and private sector organisations.

Executive Summary

1 While the principles set out in this Guidance may apply to other types of development, the relevant regulatory framework applicable to aviation warning lighting on other structures (e.g. such as offshore wind turbines) should be properly considered before this Guidance is used in relation to other forms of development. Assumptions should not be made about the nature and specification of other baseline aviation lighting in the absence of this consideration.

2 The Guidance explains why night-time Aviation Lighting Impact Assessments are needed and it sets down a three-stage process for evaluating and illustrating the effects (Step 1: Defining the lighting proposal; Step 2: Understanding the baseline; and Step 3: Assessing the effects of the aviation lighting), which is consistent with GLVIA 3. The Guidance is concerned with long term lighting effects, rather than short term effects during construction. Mitigation options can provide significant means of reducing lighting effects at night, and a key aim of the Guidance is to encourage developers to explore the whole suite of mitigation options that is currently available, as well as those that may become commercially available in the future.

3 It is expected that night-time Aviation Lighting Impact Assessments should form a natural extension to the day-time assessments that are regularly produced in LVIA for onshore wind projects, rather than being an additional task incorporated into the end of the LVIA. However, it is recognised that receptors at night may differ from those during the day. It is important that the scope of the night-time Aviation Lighting Impact Assessment is proportionate to the likely effects, and the EIA scoping process should help to guide focused assessments, in agreement with the relevant Determining Authorities and Consultees.

4 The Guidance needs to be applied in conjunction with other guidance currently in use in Scotland, including Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3) , Notes and Clarifications on Aspects of GLVIA 3 – Technical Guidance Note LITGN-2024-01 and NatureScot's Visual Representation of Wind Farms, Version 2.2, February 2017, together with any updates to these guidance documents. As with LVIA, the night-time Aviation Lighting Impact Assessment should be carried out by suitably trained and experienced landscape, planning or other environmental professional(s).

5 It is evident that the onshore renewables industry is committed to finding a long-term solution to minimising effects arising from visible aviation lighting, potentially through the introduction of 'transponder-activated lighting', or other advanced technological solutions. If progress can be made in that direction, the need for this Guidance and the scope of assessment it describes is likely to reduce.

Introduction

6 This Guidance sets out a process to assess the landscape and visual impacts arising from visible aviation warning lighting on onshore wind turbines. It does not cover the assessment of other potential impacts arising from turbine lighting, such as ecological impacts, which are addressed in NatureScot pre-application guidance for onshore wind farms. In particular, information on the effects of aviation lighting on birds is provided in our guidance note The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures.

7 It is primarily intended for those carrying out assessments of visible aviation lighting, but should be helpful to others, including consultees and decision makers agreeing the approach and scope of a lighting assessment.

8 The need for visible aviation lighting stems from international and national standards that govern civil aviation. In the UK the Civil Aviation Authority (CAA) interprets these international standards and, unless otherwise agreed, requires obstacles including wind turbines at, or above, 150 metres in height to display visible aviation lighting to meet air safety requirements. The standard visible lighting requirement for turbines of 150m or taller is for 2000 candela (cd) medium-intensity steady red aviation warning lights to be fitted at the top of the nacelle/ hub, and additionally, for 32 cd lights to be fitted on the turbine tower at an intermediate level of half the nacelle height. An overview of the International and National Policy Context relating to visible aviation lighting is set out in Appendix 2.

9 Whilst not a new requirement, familiarity of aviation warning lights in the landscape has tended to be confined to other very large vertical infrastructure such as transmitter and telecommunication masts (e.g. Black Hill transmitting station, in North Lanarkshire). Larger turbines of 150m and above, are now more commonly being deployed in Scotland, to reflect technical advancement, market availability and in response to the ambitious Scottish Government targets for onshore wind energy generation set out in the Onshore Wind policy statement 2022 . Turbines of less than 150m may also require visible lighting depending on their location and proximity to both civil and military aviation interests. Therefore, a consistent approach to the design and assessment and understanding of potential landscape and visual impacts arising from visible aviation warning lighting will be helpful.

10 An Aviation Lighting Working Group ('AvLi') was established by the Scottish Government in Autumn 2021, bringing together individuals with experience in aviation, planning, landscape and visual impact assessment (LVIA), and wind energy development. The Group's key purpose has been to produce practical guidance on aviation lighting assessment for onshore wind energy stakeholders, such as the renewables sector, relevant agencies and local planning authorities.

11 In developing this Guidance, the AvLi has considered a range of relevant matters including the need to understand the night-time baseline, identifying a proportionate approach to assessment, the application of a suite of appropriate mitigation measures, and the production of accompanying materials and representative visualisations.

12 The Guidance only addresses visible aviation lighting requirements, as opposed to infra-red lights, which are not seen by the naked human eye. All references to lighting in the Guidance refer only to visible lighting emissions from aviation lighting sources.

13 The Guidance supports the raft of existing best practice in the assessment of landscape and visual effects from onshore wind turbines, produced by NatureScot and the Landscape Institute. Although this guidance provides some information on producing photomontage visualisations, further detailed advice on the visual representation of aviation lighting may also be produced as part of an update to NatureScot's existing Visual Representation guidance, or through guidance published by the Landscape Institute.

14 While this Guidance focuses on aviation lighting fitted to onshore wind turbines, it may also provide a useful basis for evaluating effects from aviation lighting fitted to other tall structures, such as telecommunications masts and tall buildings.

15 Please note that an 'Application Submission Checklist' is provided in Appendix 1 of this Guidance. The checklist provides a summary of key information requirements and key considerations for those undertaking Aviation Lighting Impact Assessment.

Context to Aviation Lighting Impact Assessment

16 A night-time Aviation Lighting Impact Assessment evaluates the potential impact on the qualities of the landscape (as an environmental resource in its own right), and the views and visual amenity of visual receptors (people) from the introduction of artificial visible aviation warning lighting. Night-time Aviation Lighting Impact Assessments – for visible aviation lighting – are a relatively new aspect of LVIA within the Environmental Impact Assessment (EIA) process. Techniques and approaches are still being refined, as industry, consultants and consultees continue to develop their awareness and understanding.

17 A night-time Aviation Lighting Impact Assessment is not the same as a more technical, and often quantitative, lighting assessment carried out by lighting engineers, lighting specialists or aviation specialists. It will normally be carried out by Chartered Landscape Architects, based on the principles set out within GLVIA3.

18 This type of assessment is different from the assessment of day-time impacts. The receptors to be assessed and their sensitivity to potential lighting impacts cannot necessarily be mapped across from the day-time assessment of a proposed development, but instead may require careful reconsideration to determine how sensitive receptors may be to lighting effects at night. For example, while residents are among the highest sensitivity visual receptors in a day-time assessment, the influence of baseline lighting at home, and in towns and villages, is likely to reduce sensitivity for those same receptors at night. Conversely, people visiting a recognised or designated Dark Sky Park at night are likely to have increased sensitivity as they seek to appreciate the night sky.

19 The significance of any impact at night will depend partly on the receptor and the magnitude of change to that receptor. In relation to visual receptors, sensitivity will be influenced by why and where they are in the landscape at night, as well as the activity being undertaken. For example, activities at night might include star/sky gazing/ photography, dog walking, hill walking, wild camping, adventure sports (mountain biking, running, climbing), fishing and farming/ estate management.

20 Many activities in the rural landscape at night involve some form of personal light for safety, unless the enjoyment of darkness is the basis for the activity, e.g. star gazing, and this will affect how other lights are perceived in the dark, due to the optical process called ‘dark adaptation’. An individual’s eyesight can take time to adjust to darkness, and intensify, especially during dusk. On brighter nights people may however walk without torches and can also often just take time to stand and appreciate the night sky.

21 This Guidance recognises the importance of distinctive landform as a factor in shaping the appearance of important skylines at twilight and dawn. As daylight fades, our perception of key characteristics and features changes, altering the baseline conditions. Some characteristics are weakened by darkness and are ultimately no longer present, as they are less visible, such as evidence of cultural settlement, variations in landcover and habitats, or an appreciation of key vistas. Other perceptual characteristics can however be strengthened, such as the apparent absence of development, or the profile of an important skyline. Whilst lighting itself can in some instances be a key positive characteristic - defining a place at night – a frequently valued characteristic of many parts of the UK, and particularly Scottish countryside, is its dark skies and a general absence of visible lighting.

22 Where special qualities are identified for a designated landscape, there is often limited reference to how the special qualities are experienced at night-time within existing baseline descriptions. For example, while 'Dark Skies' is identified as a component of the Visual and Sensory special landscape quality in the Cairngorms National Park, no guidance is provided as to how it is experienced by visitors to the Park at night: "At night, even the complete absence of colour, a pitch black sky bespeckled only with the light of the stars, is a distinctive feature as dark skies become increasingly rare in Britain."

23 As part of the night-time baseline assessment, the underlying characteristics which are strengthened after dark should be identified and evaluated.

24 As many landscape features become less distinct in low light conditions, at twilight, during the night and at dawn - with only natural ambient lighting from the setting sun, moon and stars - perceptions of darkness and remoteness may become heightened as constituent elements of landscapes, where they are uninterrupted by artificial light. These elements are implicit in the enjoyment and appreciation of many rural settings, where the natural beauty of the night sky is often important.

25 The hours of twilight and darkness vary considerably in Scotland. Daylight is at its longest on 21 June where, for example, on Shetland sunrise occurs at 03:38 and sunset at 22:34, without any full darkness being achieved. In contrast, on the shortest day on 21 December in the Scottish Borders, sunrise is at 08:38 and sunset at 15:47, where darkness may last for approximately 16 hours. Aviation lighting effects can therefore vary with the time of year and geographic location. The image below illustrates these stages of twilight.

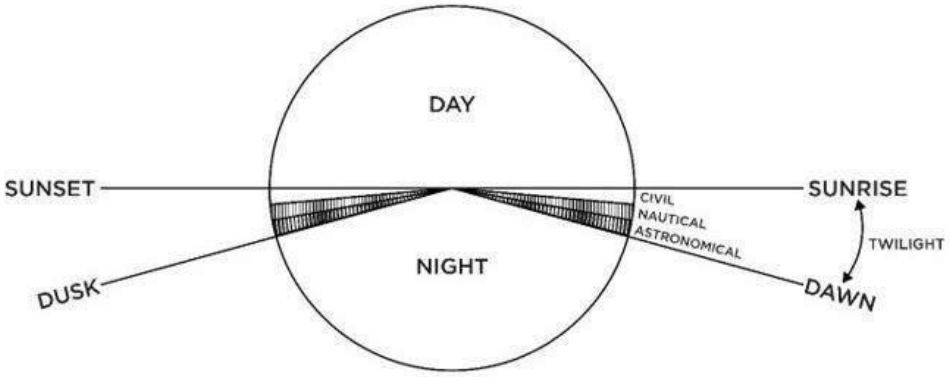

Figure 1. Stages of twilight

26 The principal effect of aviation warning lighting comes from visibility of the aviation light emissions from the nacelle and mid-tower mounted lights. This type of lighting will not cause sky glow, but can contrast with natural darkness, and can draw attention. Aviation lights are generally seen as points of red light, especially where there is a high degree of contrast in the view (i.e. the lights are seen against a dark sky or dark landmass) or where there is little or no existing artificial light source present.

27 Due to the location of the aviation light fitting on the turbine nacelles, relative to the rotating blades, a flashing or flickering effect can be caused by the intermittent screening effect of blades as they travel past the light. At closer range it may also be possible to detect light glancing along the rotor blades through this interaction. These effects are dependent upon the rotation speed of the blades, wind direction (turbines face into the wind), the location of the receptor and prevailing atmospheric conditions. Where a number of lit turbines are present in a view, including other wind farms with visible lights, this effect may appear uncoordinated/ asynchronous.

28 In many circumstances aviation lights can be seen uncharacteristically elevated in views, or within upland areas in the view, compared with the typical experience of artificial lights being situated in more lowland areas or along valley floors. They can be perceived as incongruous when seen as red points with little or no structural or spatial reference.

Perception of Light

29 Different people (visual receptors) perceive and experience light in different ways, particularly at night. The observed illuminance (brightness or brilliance) of lights seen at night is influenced by a range of factors, and therefore observations are rarely experienced consistently. This is an important consideration in any assessment of effects arising from visible aviation lighting.

30 The effects of aviation lighting at night can vary depending on range of factors, which may include:

- the number and perceived intensity of visible aviation lights
- the distance and angle of view to the lights
- the prevailing atmospheric conditions
- the changing illumination that results from the different phases of the moon
- the saturation of darkness and seasonality changes
- the appearance of other baseline lighting in the landscape

31 In perfectly clear weather, with excellent visibility, to a person, the same light located twice the distance away would appear a quarter as bright as the nearer light. Further attenuation of light due to intervening material (e.g. mist, dust, pollen etc.) will make more distant sources of light fainter than this, but as a rule of thumb it is a good first guide. Another way to express this is to say how far away an aviation warning light at 200 cd would be compared to other more common red lights. The simplest of these to envisage in most locales is a car's rear brake lights since these are similarly red in colour. These vary slightly in intensity but are typically about 80 cd.

32 Therefore, for a brake light to appear to an observer as the same intensity as a 200 cd aviation warning light it would need to be at roughly 0.6 times the distance (this factor is just the square root of the ratio of the two intensities). For example, an aviation warning light seen at 200 cd at 10km would be the same as a car brake light at 6.3km in clear weather. It is worth noting that red lights are not perceived as being as bright as other colours at the same intensity; however, they are among the most noticeable colours, which is why they are commonly used for warning lights. There is not a direct correlation between the brightness of the light and how noticeable it is to people.

APPENDIX

Onakpoya et al. (2015)

Wind Turbine Noise, Sleep & Quality of Life

K-8

The effect of wind turbine noise on sleep and quality of life: A systematic review and meta-analysis of observational studies

Onakpoya, O'Sullivan, Thompson & Heneghan

Environment International, Vol. 82, pp. 1–9 (2015) | DOI: 10.1016/j.envint.2015.04.014

KEY FINDINGS — BASED ON 8 STUDIES, 2,433 PARTICIPANTS

Odds ratio of 4.08 for annoyance (95% CI: 2.37–7.04)

Odds ratio of 2.94 for sleep disturbance (95% CI: 1.98–4.37)

4 studies found significant interference with quality of life

Visual perception of turbines associated with greater negative health effects

Referenced in submission Section 7.3 (Cumulative Noise — The Sandwich Effect)

Environment International 82 (2015) 1–9

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The effect of wind turbine noise on sleep and quality of life: A systematic review and meta-analysis of observational studies

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ABSTRACT

Noise generated by wind turbines has been reported to affect sleep and quality of life (QOL), but the relationship is unclear. Our objective was to explore the association between wind turbine noise, sleep disturbance and quality of life, using data from published observational studies. We searched Medline, Embase, Global Health and Google Scholar databases. No language restrictions were imposed. Hand searches of bibliography of retrieved full texts were also conducted. The reporting quality of included studies was assessed using the STROBE guidelines. Two reviewers independently determined the eligibility of studies, assessed the quality of included studies, and extracted the data. We included eight studies with a total of 2433 participants. All studies were cross-sectional, and the overall reporting quality was moderate. Meta-analysis of six studies ($n = 2364$) revealed that the odds of being annoyed is significantly increased by wind turbine noise (OR: 4.08; 95% CI: 2.37 to 7.04; $p < 0.00001$). The odds of sleep disturbance was also significantly increased with greater exposure to wind turbine noise (OR: 2.94; 95% CI: 1.98 to 4.37; $p < 0.00001$). Four studies reported that wind turbine noise significantly interfered with QOL. Further, visual perception of wind turbine generators was associated with greater frequency of reported negative health effects. In conclusion, there is some evidence that exposure to wind turbine noise is associated with increased odds of annoyance and sleep problems. Individual attitudes could influence the type of response to noise from wind turbines. Experimental and observational studies investigating the relationship between wind turbine noise and health are warranted.

1. Introduction

The last few decades have seen governments attempting to decrease greenhouse gas emissions (Olander et al., 2012). This response – to changes in the earth's temperature – has seen the rise of wind power (Leithead, 2007). This alternative energy source, generated by wind turbines, is one tool being employed to generate cleaner energy.

Wind turbine generators (WTGs) are devices that convert wind power into kinetic energy, and are regarded as one of the most important renewable sources of power (Leithead, 2007). Energy generated from WTGs can be used to produce electricity and drive machinery (Caduff et al., 2012; Chang Chien et al., 2011; Li and Chen, 2008). It is thought that large scale utilization of these devices can improve global climate by extracting energy from the atmosphere and altering the pattern of gaseous flow in the earth's atmosphere (Keith et al., 2004).

More recently, exposure to noise from WTGs has been reported to have negative effects on human health (Jeffery et al., 2013). People living near WTGs have reportedly experienced sleep disturbances and a reduction in the quality of life; it has been suggested that a combination of turbine noise, infrasound (sounds with frequency <20 Hz) and ground currents (stray current from electrical equipment which passes through the earth) could be responsible for these symptoms (Havas and Colling, 2011). Cases of litigation because of the unwanted health effects allegedly caused by the noise from WTGs have been reported both in the UK (Daily Mail, 2011) and the US (Oregon Herald, 2013). Very recently, the UK parliament passed a bill restricting the number, height and location of WTGs in England (UK House of Commons Library, 2015).

Studies investigating the effects of wind turbines on sleep and quality of life in individuals living in their proximity have been conducted. While the findings from a pooled meta-analyses of three studies suggested a relationship between exposure to WTG noise and annoyance (Janssen et al., 2011), a more recent review concluded that there was no evidence of a consistent relationship between WTG noise and adverse health effects (Merlin et al., 2013). Therefore, the objective of this systematic review was to explore the association between wind turbine noise, annoyance, sleep and quality of life, and also explore

Abbreviations: WTG, wind turbine generator; ESS, Epworth Sleepiness Scale; PSQI, Pittsburgh Sleep Quality Index.

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the influence of other moderating factors on these outcomes, using data from published observational studies.

2. Methods

We conducted electronic searches in the following databases: Medline, Embase and Global health. Each database was searched from inception till June 2014. MeSH terms used included wind turbine, wind energy, clean energy, annoyance, sleep, and quality of life (a MEDLINE search strategy is included as a web Appendix 1). We also searched Google Scholar for relevant conference proceedings, and hand searched the bibliography of retrieved full texts. An updated search of the databases was conducted on November 28, 2014. Case–control, cross-sectional, and cohort studies were considered for inclusion. To be included in the review, studies had to report annoyance, sleep or quality of life as outcomes in subjects living in proximity with wind turbines. Studies not comparing participants based on the proximity of their homes to WTGs were excluded. No age, language or time restrictions were imposed. Where necessary, contact with study investigators was made to request additional data.

The reporting quality of included studies was evaluated using a checklist adapted from the STROBE (Strengthening of Reporting of Observational Studies in Epidemiology) guidelines (von Elm et al., 2007). Data was systematically extracted by two reviewers [IJO and JOS] using a piloted spreadsheet of pertinent variables including baseline demographics, study location, distances of homes from wind turbines, SPLs, assessment of exposure and outcome. These were independently cross-checked by two other reviewers [MJT and CJH]. Disagreements were resolved through consensus. Our main outcomes were annoyance, sleep disturbance and quality of life (QOL). We also examined the influence of other background noise, visual perception and socio-economic factors on reported outcomes.

Odds ratios (ORs) were used to measure associations between wind turbine noise and annoyance or sleep disturbance. Using the random-effects model of the software for meta-analyses (Review Manager, Version 5.3 (2011)), we calculated the ORs and 95% confidence intervals (CI) for the studies which had sufficient data for statistical pooling. We used sound pressure level (SPL) reference ranges of <40 dB for lower exposure and >40 dB for higher exposure to wind turbine noise in the analyses; these limits correspond to the World Health Organisation (WHO) guideline recommendations for indoor community noise levels suitable for night-time sleep (Berglund et al., 1999). Where SPLs were not available, we used the reported near ("near group") and far ("far group") distances from WTGs for high and low SPLs respectively. Subgroup analyses by SPLs or distances from WTGs were used to test the robustness of overall analyses. Sensitivity analyses by meta-analysing studies with larger sample sizes or with higher respondent rates (≥50%) were used to investigate heterogeneity using the I^2 statistic; values of 25%, 50%, and 75% indicated low, medium, and high statistical heterogeneity respectively. Where statistical combination of reported data was considered inappropriate, such data was reported narratively.

2.1. Definitions

For the purpose of this review, annoyance was defined as a constellation of psychosocial and/or psychological symptoms — "feelings of being bothered, exasperation at being interrupted by noise, and symptoms such as headache, fatigue and irritability" (Anonymous, 1977). Sleep disturbance was defined as any interruption of an individual's normal sleep–wake pattern (Cormier, 1990). A change in an individual's quality of life was measured based on their own perceptions, with regard to their own goals, expectations, standards and concerns (WHO, 1997).

3. Results

Our electronic searches returned 148 non-duplicate citations, out of which 18 potentially eligible articles were identified (Fig. 1). One article (Ambrose et al., 2012) was excluded because the study was conducted in only one residential apartment and another two (Maffei et al., 2013; Van Renterghem et al., 2013) because they were virtual experimental studies conducted in subjects not residing within the vicinity of WTGs. Two articles (Verheijen et al., 2011; Pedersen and Larsman, 2008) were excluded because they were modelling studies, the latter of which used results from two studies already included in the review. One article was excluded because it explored the effects of road traffic noise using data from a study included in the review (Pedersen et al., 2010) and another two because they did not distinguish subjects by distance from WTGs or SPLs (Harry, 2007; Morris, 2012). Two articles (Nissenbaum et al., 2011; Pedersen et al., 2009) were excluded because more complete versions of their reports were included in the review. Thus eight studies (Bakker et al., 2012; Krogh et al., 2011; Magari et al., 2014; Nissenbaum et al., 2012; Pawlaczyk-Łuszczyńska et al., 2014; Pedersen and Persson Waye, 2004, 2007; Shepherd et al., 2011) with a total of 2433 participants were included in the review. The key details of the studies are shown in Tables 1, 2a and 2b.

All included studies were of cross-sectional design (Table 1). Seven studies reported appropriate recruitment and sampling strategies, and all used objective and validated measures to compute outcome variables. The studies also used appropriate statistical methods to compare groups, but only half (50%) adequately reported sample size calculations. All studies reported adequate statistical analysis, and baseline demographics for participants in the high and low exposure groups were generally similar. The response rate for questionnaires ranged from 37% to 93%.

Annoyance was measured on a 5-point scale (ranging from did not notice to very annoyed) using questionnaires that enquired about attitudes towards wind turbines; one study (Pawlaczyk-Łuszczyńska et al., 2014) used a 6-point scale that included "extremely annoyed" variable after "very annoyed". In all the studies, annoyance from exposure to WTG noise implied being rather annoyed, very annoyed or extremely annoyed. Sleep disturbance (defined in the studies as interruption of normal sleep patterns) was assessed from the general questionnaire administered in seven studies (Bakker et al., 2012; Krogh et al., 2011; Magari et al., 2014; Pawlaczyk-Łuszczyńska et al., 2014; Pedersen and Persson Waye, 2004, 2007; Shepherd et al., 2011), and measured by Pittsburgh Sleep Quality Index (PSQI) in the eighth (Nissenbaum et al., 2012) — this same study assessed daytime sleepiness using the Epworth Sleepiness Scale (ESS). Quality of life was measured in three studies by general health questionnaire (GHQ) (Bakker et al., 2012; Pawlaczyk-Łuszczyńska et al., 2014), short form 36 (SF-36v2) (Nissenbaum et al., 2012), and health-related quality of life (HRQOL) (Shepherd et al., 2011). Two studies used unspecified masked questionnaires that addressed health and general well-being (Pedersen and Persson Waye, 2004, 2007); these questionnaires were described as validated. One study (Krogh et al., 2011) did not use a validated questionnaire to assess quality of life and another (Magari et al., 2014) did not report quality of life as an outcome.

The study locations ranged from rural to semi-rural and metropolitan built-up areas (Table 2a), with varying population densities and terrain. The distance of homes from WTGs varied between 0 and 8 km, and the number of WTGs in the individual studies ranged from 16 to 1846. The emission levels for the WTGs in the studies were measured using A-weighted scales (a filtering method aimed at mimicking responses to sound by the human ear) with 8 m/s downwind, and power generated from the turbines ranged between 0.15 and 2300 kW.

The mean age of the respondents across all the studies was 46 to 58 years (Table 2b). One study (Krogh et al., 2011) did not report the socio-economic status of respondents, while another (Bakker et al.,

Table 2a
Main characteristics of studies investigating the association between wind turbine noise, sleep and quality of life.

Study ID	Study location & site topography	Number of participants	SPLs & distance from WTGs	Power & number of WTGs	Outcomes	Tools used to measure outcomes
Bakker et al. (2012)	1. Rural area (with no major road within 500 m from the closest wind turbine) 2. Rural area with a major road within 500 m from the closest wind turbine 3. More densely populated built up area Flat terrain	725	21–54 dB (average: 35 dB) 0–2.5 km	≥500 kW (0.5 MW); 1846	Annoyance, sleep disturbance, psychological stress	Annoyance: 5-point ordinal scale & 2 Likert scales. Sleep disturbance: Frequency
Krogh et al. (2011)	5 WTG areas with anecdotal reports of adverse health effects	109	0.35–2.4 km	1.65 MW: 5 WTG project areas	Sleep disturbance	WindVOiCe Survey Questionnaire
Magari et al. (2014)	1. Rural area 2. 5 receptor locations within wind turbine park; two locations outside the park as comparator	62	0.4–4 km	1.5 MW; 84	Annoyance, health effects	Validated general questionnaire
Nissenbaum et al. (2012)	2 rural areas — 'low-lying, tree-covered island.' Flat terrain	79	32–57 dB 0.4–6.6 km	1.5 MW; 31	Sleep quality, mental health	Sleep disturbance: PSQI & ESS QOL: (SF-36v2)
Pawlaczyk-Łuszczyńska et al. (2014)	1. 3 populated areas in Central & Northwest Poland 2 Flat terrain 3. Mainly agricultural, but railroads and/or roads also present	156	30–50 dB 0.24–2.5 km	0.15, 1.5 & 2 MW; total number of wind turbines 108	Annoyance, mental health	Annoyance: 5-point ordinal scale Sleep and QOL: GHQ
Pedersen and Persson Waye (2004)	5 wind turbine areas; flat terrain	351	<30 to >40 dB 0.15–1.2 km	14 WTGs: 600–650 kW; 2 WTGs: 150 & 500 kW	Noise perception, annoyance, sleep disturbance	Validated general questionnaire: Annoyance: unipolar annoyance scale Sleep disturbance: presence or absence
Pedersen and Persson Waye (2007)	7 wind turbine areas; different landscapes in terrain and urbanisation (flat and 'complex'–rocky or altitude); suburban and rural	754	31.4–38.2 dB (mean: 33.4). 0.6–1 km (mean: 0.78 km)	>500 kW; 478	Perception, annoyance, sleep quality, quality of life	Validated general questionnaire Annoyance: unipolar annoyance scale Sleep disturbance: presence or absence
Shepherd et al. (2011)	2 semi-rural coastal areas differentiated by their proximity to wind turbines; hilly terrain	197	20–50 dB <2 to 8 km	2300 kW; 66	Annoyance, sleep disturbance, quality of life (health)	Questionnaire with subcomponents: Annoyance: 7-item scale Sleep: 7-item scale QOL: HRQOL

Abbreviations: SPLs: sound pressure levels; WTGs: wind turbine generators; dB: decibels; km: kilometres; kW: kilowatts; MW: megawatts; PSQI: Pittsburgh Sleep Quality Index; ESS: Epworth Sleepiness Scale; QOL: quality of life; GHQ: general health questionnaire; HRQOL: health-related quality of life.

included road traffic noise, noises from birds and household pets, and other machinery.

One study (Pedersen and Persson Waye, 2004) was funded by a grant from a research foundation, while four (Bakker et al., 2012; Magari et al., 2014; Pawlaczyk-Łuszczyńska et al., 2014; Pedersen and Persson Waye, 2007) were funded by government grants. The authors in two studies (Nissenbaum et al., 2012; Shepherd et al., 2011) failed to declare their sources of funding. The authors in all studies were affiliated with public institutions, except in two studies (Magari et al., 2014; Nissenbaum et al., 2012) where authors were affiliated to public health consultancy firms. One study (Krogh et al., 2011) was not funded by any entity.

3.1. Relationship between wind turbine noise and annoyance

Two studies (Krogh et al., 2011; Nissenbaum et al., 2012) did not report annoyance as an outcome. Meta-analysis of the remaining six studies ($n = 2364$; Fig. 2) revealed a significant increase in the odds of being rather annoyed, annoyed or very annoyed by wind turbine noise (OR: 4.08; 95% CI: 2.37 to 7.04; $I^2 = 63\%$; $p < 0.00001$). Subgroup analyses by SPLs or distance from WTG did not change the direction of the results (Fig. 2). Sensitivity analysis of three studies with larger sample sizes ($n = 1793$) revealed that the odds of being annoyed by wind turbine noise is significantly increased with higher SPLs (OR: 6.94; 95% CI: 4.36 to 11.03; $I^2 = 10\%$; $p < 0.00001$). Meta-analysis of four studies with higher respondent rates ($n = 1313$) revealed that the odds of being annoyed by living close to wind turbines is statistically significant (OR: 3.00; 95% CI: 1.87 to 4.80; $I^2 = 0\%$; $p < 0.00001$).

3.2. Relationship between wind turbine noise and sleep disturbance

Two studies (Nissenbaum et al., 2012; Shepherd et al., 2011) did not provide suitable data for statistical pooling. One of these (Nissenbaum et al., 2012) reported the "near group" as having significantly worse sleep scores for both PSQI ($p = 0.046$) and ESS ($p = 0.03$); and two subjects in the "near group" were diagnosed with insomnia compared to none in the "far group". In the second study (Shepherd et al., 2011), participants with greater exposure to WTG noise reported significantly worse sleep scores ($p = 0.0006$). For the remaining six studies which provided suitable data, three (Bakker et al., 2012; Pedersen and Persson Waye, 2004, 2007) used low SPL values of <30 dB as controls, while two (Krogh et al., 2011; Magari et al., 2014) compared groups based on the distances of respondents' from WTGs. Meta-analysis revealed a significant increase in the odds of reporting sleep disturbances with greater exposure to noise from WTGs (OR 2.94; 95% CI: 1.98 to 4.37; $I^2 = 0\%$; $p < 0.00001$; Fig. 3). Subgroup analysis by SPLs or distance did not result in a change in the direction of the results. A similar result was observed when five studies with higher respondents' rates ($n = 810$) were meta-analysed (OR: 2.76; 95% CI: 1.65 to 4.62; $I^2 = 0\%$; $p = 0.0001$). Sensitivity analyses of studies with larger sample sizes

APPENDIX

L

MKO LVIA Methodology Page

EIAR Chapter 13, page 13-30

Reproduced to evidence MKO’s landscape sensitivity assessment framing

Assessment framed around capacity to absorb wind farm development rather than objective assessment of intrinsic landscape value

> *Supports argument that CCDP High/High designation must take precedence*

13.3.3 Visibility in Close Proximity: Route Screening Analysis (RSA)

In this LVIA, Route Screening Analysis (RSA) was carried out within a 3km radius of the proposed turbines and on major roads (and Scenic Routes, Views and Prospects) extending to 5km. RSA was conducted to comprehensively demonstrate the varying characteristics of the degree of visual screening existent along the local road network and to record the actual visibility of the proposed turbines in comparison to the theoretical visibility indicated by ZTV mapping. The full methodology is outlined in *Appendix 13-1: LVIA Methodology* (Section 1.5.3: On-Site Visibility Appraisal: RSA).

The RSA visual screening categories are:

- **'Little/No'** visual screening: areas of the road that are mainly open with open views in the direction of the proposed turbines (see example below in Plate 13-1);
- **'Intermittent/Partial'** visual screening: areas of the road where there are intermittent or partial views in the direction of the proposed turbines (see Plate 13-2);
- **'Dense/Full'** visual screening: areas of the road with dense visual screening, sufficient to block views in the direction of the proposed turbines (see Plate 13-3).

Below, Figure 13-4 shows the extent to which each visual screening classification is present on all public roads within 3km of the proposed turbines, and on major roads extending to 5km, using the following colour scheme: Little/None (green); Intermittent/Partial (blue); Dense/Full (orange).

13.3.3.1 RSA Summary and Visibility Appraisal

Summary of RSA Results

'Little/No' visual screening was recorded along 57% of the surveyed roads and was the most common class recorded. 'Intermittent/Partial' visual screening was recorded along 25% of the roads. 'Dense/Full' visual screening was recorded for 18% of roads.

The RSA map depicted below in Figure 13-4 shows little or no visual screening on the roads at higher elevations where there are open views across the upland landscape. Whereas Partial and Full visual screening mostly occurs within lower lying lands within small valleys surrounding the Proposed Wind Farm site where vegetation is more prevalent.

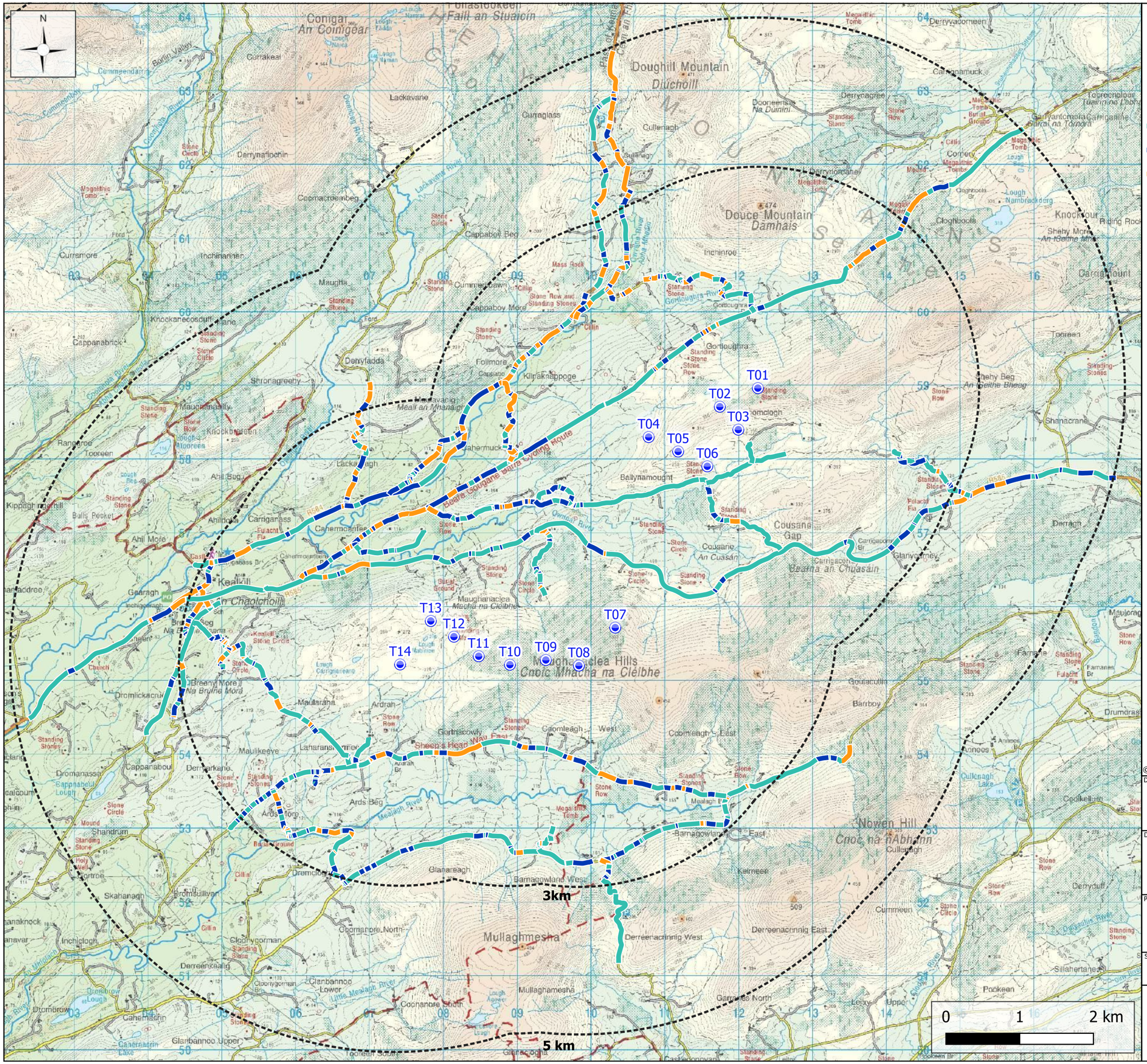
Given that there is at least some level of visual screening present along the majority (43% = Intermittent + Dense screening combined) of all public roads within 3km and those extending to 5km, this demonstrates that the widespread theoretical visibility indicated on the ZTV in close proximity to the proposed turbines is not fully representative of the actual on-the-ground visibility of the proposed turbines.

An overview of the visual screening recorded during the RSA along prominent transport routes within 5km of the proposed turbines is presented below in Table 13-1, followed by discussion.

Plate 13-1 Example of 'Little/No' Visual Screening

Plate 13-2 Example of 'Partial/Intermittent' Visual Screening

Plate 13-3 Example of 'Full/Dense' Visual Screening



Map Legend

- RSA Extent
- Proposed Turbines

Route Screening Analysis

- Little / No Visual Screening
- Intermittent / Partial Visual Screening
- Dense / Full Screening

Drawing No.

Figure 13-4

Drawing Title

Route Screening Analysis

Project Title

Maughanaclea Renewable Energy Development

Scale	Project No.	Date	Drawn By	Checked By
1:50,000	240225	09.03.2026	GL	JW

Table 13-1: Distribution of Roadside Visual Screening Recorded during RSA

Visual Screening Class	Length of Road Mapped in Figure 13-4	Percentage Distribution of Visual Screening on Surveyed Roads
'Little/No'	52km	57%
'Intermittent/Partial'	22.6km	25%
'Dense/Full'	16.7km	18%

C-SR29 Scenic Route (R585 Regional Road)

The C-SR29 Scenic Route, located along the R585 Regional Road travels in a west-east direction traversing the northern and southern turbine clusters of the Proposed Wind Farm. The majority of the route is characterised by 'Little/No' visual screening with small stretches of 'Intermittent/Partial' and 'Dense/Full' visual screening.

C-SR28 Scenic Route / Beara Gougane Barra Cycling Route (R-584 Regional Road, L-8776, L-8544, L-8779, L-8780 Local Roads)

Within 5km from the nearest proposed turbine, the R584 Regional Road travels from a north to south-west direction and includes a section of the C-SR28 Scenic Route. The route has a variety of visual screening, with some prolonged stretches of 'Intermittent/Partial' and 'Little/No' visual screening towards the settlement of Kealkill.

The Beara Gougane Barra Cycling Route, which loops within 5km of the nearest proposed turbines, primarily experiences 'Little/No' visual screening along the L-8776 Local Road. Other sections of the route exhibit a mosaic patten of visibility, including 'Little/No', 'Intermittent/Partial' and 'Dense/Full' visual screening.

Views from the Bearra Gougane Barra Cycling Route and the C-SR28 scenic route are assessed in this Chapter, represented by VP7 and VP14.

Sheep's Head Way Recreational Route and other local roads (L-8777, L-8773, L-4718, L-4717 local roads)

The local roads south of the southern turbine cluster, which form part of the 'Sheep's Head Way' recreational route and other recreational routes, primarily experience prolonged stretches of 'Little/No' visual screening. These roads, within the immediate vicinity of the proposed turbines will have the most open views towards the proposed turbines. Views from these local roads are assessed in this chapter, discussed in Section 13.7 below.

13.4 Landscape Baseline

The Landscape Baseline section details relevant policies pertinent to this LVIA, as well a description of the receiving landscape of the Proposed Project site and its wider setting.

13.4.1 Landscape Designations and Policy Context

This section provides an overview of local planning policy and identifies landscape and visual protections, designations and spatial zoning for wind energy development relevant to the LVIA of the Proposed Project. The Proposed Project is located in Co. Cork, therefore the Cork County Development Plan 2022–2028 (hereafter 'CCDP') was the primary document used to inform this exercise.

13.4.1.1 County Cork Development Plan 2022-2028 (CCDP)

Volume 1 comprises the main policy material of the CCDP. Chapter 14 of Volume 1 is called 'Green Infrastructure and Recreation' and includes the following sections specifically relating to landscape and visual amenity:

- Section 14-7: Landscape.
- Section 14-8: Landscape Character Assessment of County Cork.
- Section 14-9: Landscape Views and Prospects.

Volume 6 of the CCDP includes a link to a webmap browser comprising spatial data that illustrates the geography of different landscape and visual designations in the CCDP.

13.4.1.1.1 *General Landscape Policy*

Section 14-8 of the CCDP references the Landscape Character Assessment of County Cork (hereafter, the LCACC), which includes an *"evaluation of each landscape character type in terms of its Landscape Value, Sensitivity and Importance".* The LCACC is contained in the *'Draft Cork County Landscape Strategy 2007'* (hereafter, the *Draft Landscape Strategy*) which identifies Landscape Character Types (LCTs) and Landscape Character Areas (LCAs).

Section 14-8 of the CCDP contains the following general landscape policies and objectives:

> **"GL 14-9 *Landscape:***
> *a) Protect the visual and scenic amenities of County Cork's built and natural environment.*
>
> *b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.*
>
> *c) Ensure that new development meets high standards of siting and design.*
>
> *d) Protect skylines and ridgelines from development.*
>
> *e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.*
>
> **GL 14-10 *Draft Landscape Strategy*:**
> *Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimise the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required.*
>
> **GL 14-11 *Draft Landscape Strategy, Land Use Plans and Policy Guidance*:**
> *Have regard to the Draft Cork County Landscape Strategy (2007) in the preparation of plans and other policy guidance being prepared during the lifetime of the Plan.*
>
> *Review and update the Draft Cork County Landscape Strategy as soon as is practicable following the publication of a National Landscape Character Assessment as well as taking into account any associated guidelines.*
>
> *Whilst advocating the protection of such scenic resources the Plan also recognises the fact that all landscapes are living and changing, and therefore in principle it is not proposed that this should give rise to the prohibition of development along these routes, but development, where permitted, should not hinder or obstruct these views and prospects and should be designed and located to minimise their*

impact. This principle will encourage appropriate landscaping and screen planting of developments along scenic routes."

The following subsections address the specific elements covered by this planning policy including the designations of the landscape character assessment, the designated Views and Prospects, as well as the High Value Landscapes.

13.4.1.1.2 County Cork Landscape Character Assessment

The Landscape Character Assessment of County Cork is contained in the *Draft Landscape Strategy 2007* and identifies 76 designated Landscape Character Areas (LCAs). The LCAs were then amalgamated into a set of 16 generic Landscape Character Types (LCTs) based on similar physical and visual characteristics. The *Draft Landscape Strategy 2007* designates Landscape Character Types as "*bigger, generic units with similar physical and visual characteristics."*

As there is very little detail on the Co. Cork LCAs, it is assumed that the LCTs are to be viewed as the equivalent to LCAs identified in other counties of Ireland. Therefore, for the purposes of this LVIA, assessment of landscape character considers the LCT designations instead of the LCAs as they are more detailed and contain specific landscape value and sensitivity designations in the CCDP and are therefore most appropriate for use. LCTs are assigned 'sensitivity' and 'importance' ratings in the *Draft Landscape Strategy*, as well as in Volume 1 of the CCDP. Therefore, the LCTs are used in the LCACC for the assessment of effects on landscape character in this LVIA.

The LCTs which are located within the 15km LCA Study Area are outlined below:

- **LCT 4 –** Rugged Ridge Peninsulas (Castletownbere-Bantry-Schull)
- **LCT 6a –** Broad Fertile Lowland Valleys (Blarney – Ballincollig – Carrigaline – West Dunmanway)
- **LCT 7a** – Rolling Patchwork Farmland (Bandon – Clonakilty – Leap and Environs)
- **LCT 9 –** Broad Marginal Middleground and Lowland Basin
- **LCT 10a –** Fissured Fertile Middleground (South of the Gearagh)
- **LCT 12a –** Rolling Marginal and Forested Middleground (Ballyvourney Gaeltacht)
- **LCT 12b –** Rolling Marginal and Forested Middleground
- **LCT 13a** – Valleyed Marginal Middleground (Macroom and Environs)
- **LCT 15a –** Ridged and Peaked Upland (Mullaghanish to Millstreet)
- **LCT 16a –** Glaciated and Forested Cradle Valley (Gouganne Barra)
- **LCT 16b –** Glaciated and Forested Cradle Valley (Cullenagh Lake)
- **LCT 16c –** Glaciated and Forested Cradle Valley (Foilanumera)

These LCTs located within the LVIA Study Area are shown in Figure 13-10 and Figure 13-11 below and outlined in the sub-sections below. The Proposed Wind Farm itself is located within LCT 15a – Ridged and Peaked Upland (Mullaghanish to Millstreet). The *Draft Landscape Strategy* describes this LCT as:

"The ridged, peaked and forested upland landscape type flanks much of the mid-western boundary of County Cork, from the vicinity of Bantry in the south to Millstreet in the north. This landscape type has been glaciated and comprises a fairly rugged and rolling mountainous topography at a relatively high elevation."

A full description of the key characteristics of LCTs scoped in for further assessment below in Section 13.4.3.2 are included in the LCT impact assessment tables comprising Appendix 13-2.

As stated above, the LCTs described in the *Draft Landscape Strategy* contain a mixture of sensitivities and values. The sensitivity of the landscapes within County Cork are discussed in the following sub-section.

13.4.1.1.3 Landscape Sensitivity Designations

Section 1.1 of the *Draft Landscape Strategy* defines Landscape Sensitivity as *"the measure of a landscape's ability to accommodate change or intervention without suffering unacceptable effects to its character and values."*

Section 14.8.3 of the CCDP discusses the values and sensitivities assigned for LCTs in the *Draft Landscape Strategy* and states that each landscape character type is valued in terms of its *"Landscape Value, Sensitivity and Importance"* and defines the 'value' as *"the environment or cultural benefits, including services and functions, which are derived from various landscape attributes"*; thus value in this LVIA is evaluated in terms of its Landscape Value, Sensitivity and Importance according to the CCDP.

Section 14.8.4 defines the 'sensitivity' of each character type as *"the ability to accommodate change or intervention without suffering unacceptable effects to its character and values."* The sensitivity of the different LCTs in County Cork are categorised into four classes: *Low, Medium, High, and Very High*. These sensitivity classes are assigned to each LCT, along with a landscape importance of *"Local, County, or National"* value within the *Draft Landscape Strategy.*

The Proposed Wind Farm is located within LCT 15a – Ridged and Peaked Upland (Mullaghanish to Millstreet). *Appendix F* of the CCDP designates LCT 15 with a 'High' Landscape Value, 'High' Landscape Sensitivity and level of 'Local' Importance.

According to the CCDP, High Sensitivity Landscapes are defined as:

> *"[V]ulnerable landscapes with the ability to accommodate limited development pressure. In this rank, landscape quality is at a high level, landscape elements are highly sensitive to certain types of change. If pressure for development exceed the landscape's limitations the character of the landscape may change."*

Section 14.8.8 of the CCDP notes that "*Landscape Character Types which have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes and therefore are designated as High Value Landscapes (HVL)."* These are shown in *Figure 14.2* of the CCDP. LCT 15 is not designated as an HVL, as noted in *Figure 14.2* of the CCDP.

There are 16 LCTs in County Cork, which are further subdivided into A, B, and C variants, giving a total of 27 LCTs. Each LCT is assigned a combination of Landscape Value, Landscape Sensitivity, and an Importance rating, as discussed in Section 13.4.1.1.3 previously, these range from Very Low to Very High, with Importance defined as being of Local, County, or National significance.

As summarised in the *Summary Table of the Landscape Character Assessment of County Cork* (Appendix F of the CCDP), Landscape Value and Landscape Sensitivity pairings occur consistently as Very High / Very High, High / High, Medium / Medium, or Low / Low. Within this hierarchy, High / High is the second highest on this scale.

Furthermore, at a broader regional and national scale, LCT 15a is noted as being at the lower end, recognised as being of 'Local Importance', and it is not identified as one of the most highly valued landscapes within the county. There are 9 other Co. Cork LCTs (approx. 34.5% of all Cork LCTs) with higher in combination sensitivity, value and importance ratings, with 2 others having the same rating combination (approx. 11% of all Cork LCTs) and 14 having a lower sensitivity rating (approx. 54% of all Cork LCTs). This LVIA has due regard for the county level designations in the CCDP. However, as per the methodology set out in Section 1.7.3 of Appendix 13-1, this LVIA assesses LCA sensitivity in the context of wind energy development, calibrated within a regional and national context.

Co. Cork Designated 'High Value Landscapes' - HVL

The *Draft Landscape Strategy* designates a landscape value to each LCT, stating that *"value represents aesthetic, ecological, historical, socio-cultural, religious and other characteristics of the LCA"* and that the Landscape Type Values are defined on the basis of Landscape Area Values. The *Draft Landscape Strategy* notes further that the *"overall value of the landscape types represents evaluation on a larger scale for the wider generic areas."*

The *Draft Landscape Strategy* establishes value classifications of *'Very Low, Low, Medium, High or Very High'.*

As noted previously, *Section 18.8.8* of the CCDP notes that "*Landscape Character Types which have a very high or high landscape value and high or very high landscape sensitivity and are of county or national importance are considered to be our most valuable landscapes and therefore are designated as High Value Landscapes (HVL)".*

Section 14.8.9 of the CCDP states further that:

> *"Within these High Value Landscapes, considerable care will be needed to successfully locate large-scale developments without them becoming unduly obtrusive. Therefore, the location, siting and design of large-scale developments within these areas will need careful consideration and any such developments should generally be supported by an assessment including a visual impact assessment which would involve an evaluation of visibility and prominence of the Proposed Project in its immediate environs and in the wider landscape."*

As noted previously, while LCT 15a (containing the Proposed Wind Farm) is of 'High Landscape Value' and has a 'High Landscape Sensitivity' in the *CCDP*, it is only assigned of 'Local' Importance, therefore it **is not** designated as an HVL.

There are three Landscape Character Types (LCTs) classified as High Value Landscapes within the LVIA Study Area. They are:

- **LCT 4 –** Rugged Ridge Peninsulas (Castletownbere-Bantry-Schull)
- **LCT 16a –** Glaciated and Forested Cradle Valley (Gouganne Barra)
- **LCT 8 –** Hilly River and Reservoir Valleys

These LCTs are assessed in Appendix 13-2 as Landscape Character Types in their own right. However, due to their high sensitivity, these High Value Landscape LCTs are also assessed as sensitive landscape receptors in terms of their sensitive landscape value in *Section 13.7 – Likely Significant Landscape and Visual Effects*, as per **Policy GL 14-10** quoted above.

13.4.1.1.4 Scenic Routes, Views and Prospects

The CCDP designates specific Scenic Routes consisting of important and valuable Views and Prospects within the county. The CCDP contains the following relevant policy objectives within *Section 14.9* in relation to Scenic Routes, Views and Prospects:

> *"GI 14-12: General Views and Prospects*
> *Preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognized in the Draft Landscape Strategy.*
>
> *GI 14-13: Scenic Routes*
> *Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this Plan. The scenic routes identified in this Plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Heritage and Amenity Chapter 5 Scenic Routes of this Plan.*

GI 14-14: Development on Scenic Routes

a) Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and landscaping of the Proposed Project must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area.

b) Encourage appropriate landscaping and screen planting of developments along scenic routes (see Chapter 16 Built and Cultural Heritage)."

GI 14-15: Development on the Approaches to Towns and Villages

Ensure that the approach roads to towns and villages are protected from inappropriate development, which would detract from the setting and historic character of these settlements."

There are 118 designated Scenic Routes, Views and Prospects across the County and 32 are located within the LVIA Study Area. These Scenic Routes, Views and Prospects are detailed in full in *Table 2.5.1* of Volume 2 of the CCDP and are shown on Figure 13-5 – Landscape Baseline. As these 32 No. scenic amenity designations are of a visual nature, they are comprehensively addressed in Section 13.5 of this Chapter – Visual Baseline, where ZTV mapping and on-site appraisals determine the likely visibility of the proposed turbines from each route. The 32 Scenic Routes, Views and Prospects located within the LVIA Study Area are discussed in further detail below in Section 13.5.1.1.

13.4.1.1.5 Wind Energy Strategy

The Wind Energy Strategy of County Cork is contained in *Section 13.6.3* of Volume 1. This section states that:

"the Cork County Council developed a wind energy strategy for County Development Plan 2014 using the guidance provided in the "Planning for Wind Energy Development Guidelines 2006" and the SEAI Manual 'A Methodology for Local Authority Renewable Energy Strategies' April 2013"

Section 13.6.5 also contains the following relevant planning objectives in relation to wind energy developments:

"ET 13-4: Wind Energy:

"In order to facilitate increased levels of renewable energy production consistent with national targets on renewable energy and climate change mitigation as set out in the National Energy and Climate Plan 2021-2030, the Climate Action Plan 2021, and any updates to these targets, and in accordance with Ministerial Guidelines on Wind Energy Development, the Council will support further development of on-shore wind energy projects including the upgrading, repowering or expansion of existing infrastructure, at appropriate locations within the county in line with the Wind Energy Strategy and objectives detailed in this chapter and other objectives of this plan in relation to climate change, biodiversity, landscape, heritage, water management and environment etc.

ET 13-5: Wind Energy Projects:

On-shore wind energy projects should focus on areas considered 'Acceptable in Principle' and 'Areas Open to Consideration' and generally avoid "Normally Discouraged" areas as well as sites and locations of ecological sensitivity.

ET 13-9: National Wind Energy Guidelines:

Development of on-shore wind should be designed and developed in line with the 'Planning Guidelines for Wind Farm Development 2006' and 'Draft Wind Energy Development Guidelines 2019" and any relevant update of these guidelines."

The CCDP identifies and designated different areas of the landscape of Co. Cork into 4 No. classifications relating to their suitability for wind energy development:

- Urban Areas
- Areas Open to Consideration
- Areas Acceptable in Principle
- Areas Normally Discouraged

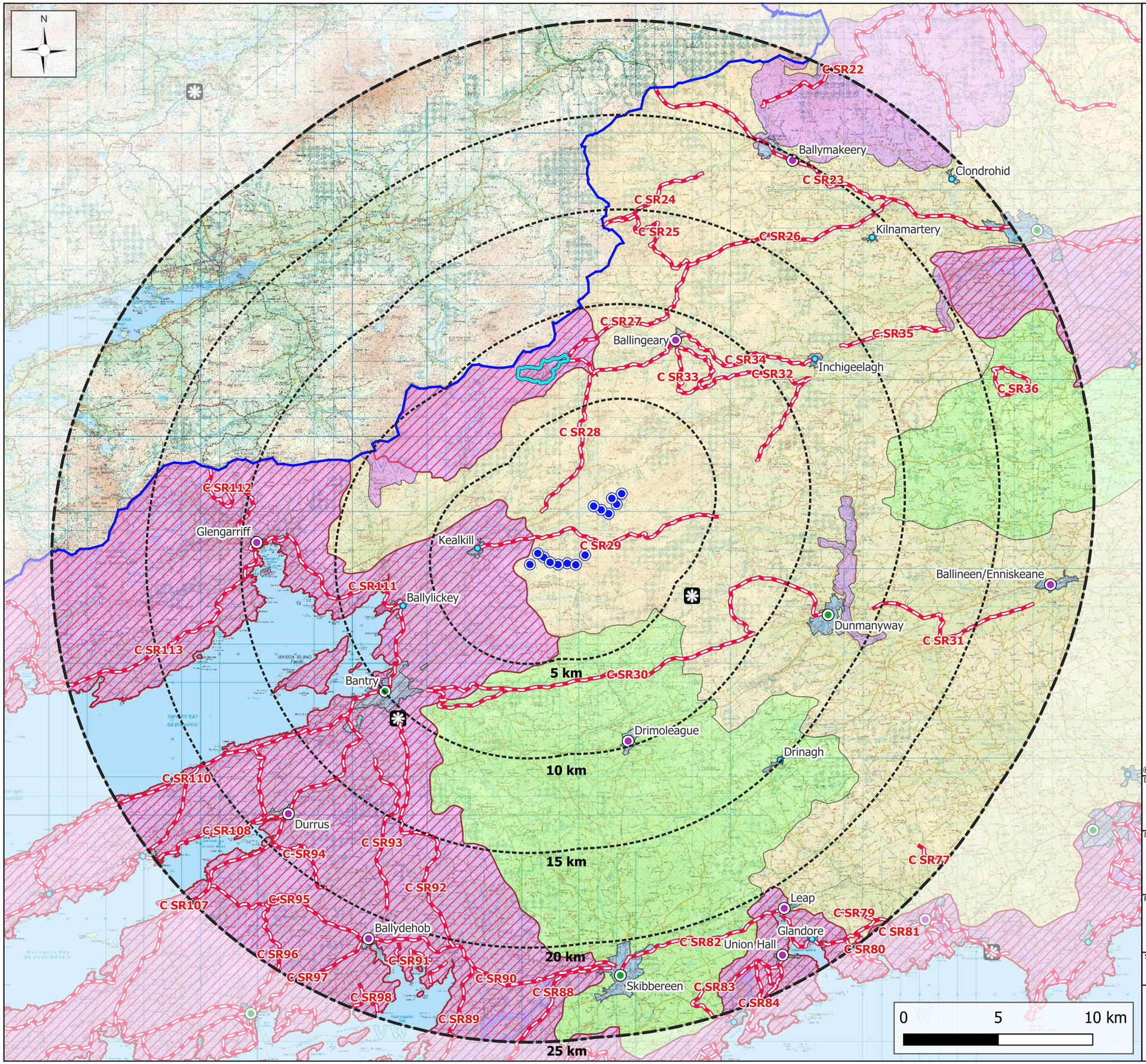
These designations are shown in *Figure 13.3* of the CCDP and are reproduced in Figure 13-5 below. The proposed turbines of the Proposed Wind Farm are located within an area designated as 'Open to Consideration', which the CCDP states that:

> *"This area comprises almost 50% of the County area. Within these areas there are locations that may have potential for wind farm developments but there are also some environmental issues to be considered. This area has variable wind speeds and some access to the grid. Urban areas, metropolitan/town green belts, and Natural Heritage Areas (NHA's) within this area are not generally considered suitable for wind farm developments. The area excludes Natura 2000 sites. Any proposals within Freshwater Pearl Mussel Sub Basin Catchments or in other sensitive catchments must be able to demonstrate that they have been designed in a manner which prevents any risk of peat slippage or erosion; and ensures the ongoing protection of water quality and the maintenance of natural hydrological processes. The cumulative effect of wind energy developments with regard to landscape and visual impacts and also impacts on Natura 2000 sites will also be a consideration. High design standards in terms of environmental protection measures are likely to be required to be included in projects located in sensitive catchments."*

The CCDP has the following objective in relation to areas designated as *"Open to Consideration":*

> **ET 13-7: Open to Consideration:**
>
> *"Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:*
>
> - *Residential amenity particularly in respect of noise, shadow flicker and visual impact;*
> - *Urban areas and Metropolitan/Town Green Belts;*
> - *Natura 2000 Sites (SPA's and SAC's), Natural Heritage Areas (NHA's), proposed Natural Heritage Areas and other sites and locations of significant ecological value.*
> - *Architectural and archaeological heritage;*
> - *Visual quality of the landscape and the degree to which impacts are highly visible over wider areas*
> - *In planning such development, consideration should also be given to the cumulative impacts of such proposals."*

This LVIA addresses the visual impacts on local residential receptors, effects on visual qualities of the landscape, and cumulative and landscape visual effects.



Map Legend

- LVIA Study Area
- County Border
- Proposed Turbines

Co. Cork Settlement Hierarchy

- Key Village
- Main Town
- Village

Landscape Receptors

- Co. Cork Scenic Routes
- Gougane Barra
- Co. Cork High Value Landscapes
- OSi Viewing Points

Co. Cork Wind Energy Strategy

- Urban Area
- Open to Consideration
- Acceptable in Principle
- Normally Discouraged

Drawing No.

Figure 13-5

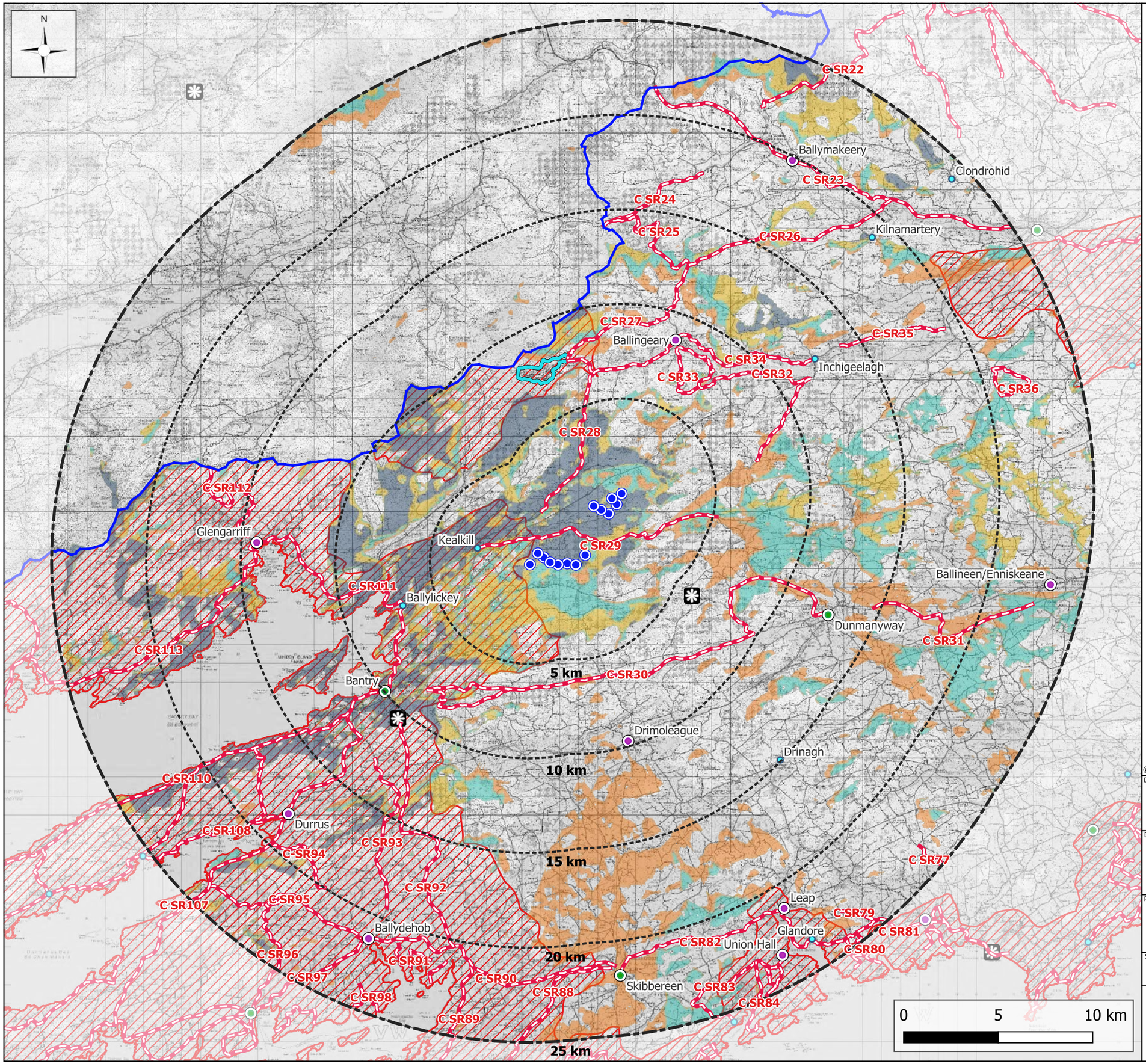
Drawing Title

Landscape Policy Context

Project Title

Maughanaclea Renewable Energy Development

Scale	Project No.	Date	Drawn By	Checked By
1:195,000	240225	09.03.2026	GL	JW



Map Legend

- LVIA Study Area
- County Border
- Proposed Turbines

Co. Cork Settlement Hierarchy

- Key Village
- Main Town
- Village

Landscape Receptors

- Co. Cork Scenic Routes
- Gougane Barra
- Co. Cork High Value Landscapes
- OSi Viewing Points

Half-Blade Zone of Theoretical Visibility

- 1-3 Turbines Theoretically Visible
- 4-7 Turbines Theoretically Visible
- 8-11 Turbines Theoretically Visible
- 12-14 Turbines Theoretically Visible

Drawing No.

Figure 13-6

Drawing Title

Landscape Policy Context & ZTV

Project Title

Maughanaclea Renewable Energy Development

Scale	Project No.	Date	Drawn By	Checked By
1:195,000	240225	09.03.2026	GL	JW

13.4.2 Landscape Character of the Proposed Wind Farm site

Landscape character refers to the distinct, recognisable, and consistent pattern of elements that occur in a particular type of landscape and how people perceive this. It reflects particular combinations of natural components such as geology, landform, soils, cultural perception, and vegetation with human influence such as land use and human settlement. The identification of landscape character as outlined in the Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities' (hereafter, Landscape Assessment Guidance (DoEHLG, 2000)), comprises the identification of primarily physical units (areas defined by landform and landcover) and, where appropriate, of visual units.

The Proposed Wind Farm site was visited multiple times during the years 2022, 2024 and 2025 where a preliminary assessment of landscape character was conducted in conjunction with other LVIA surveys. Information gathered during these visits have informed the following descriptions for the Site.

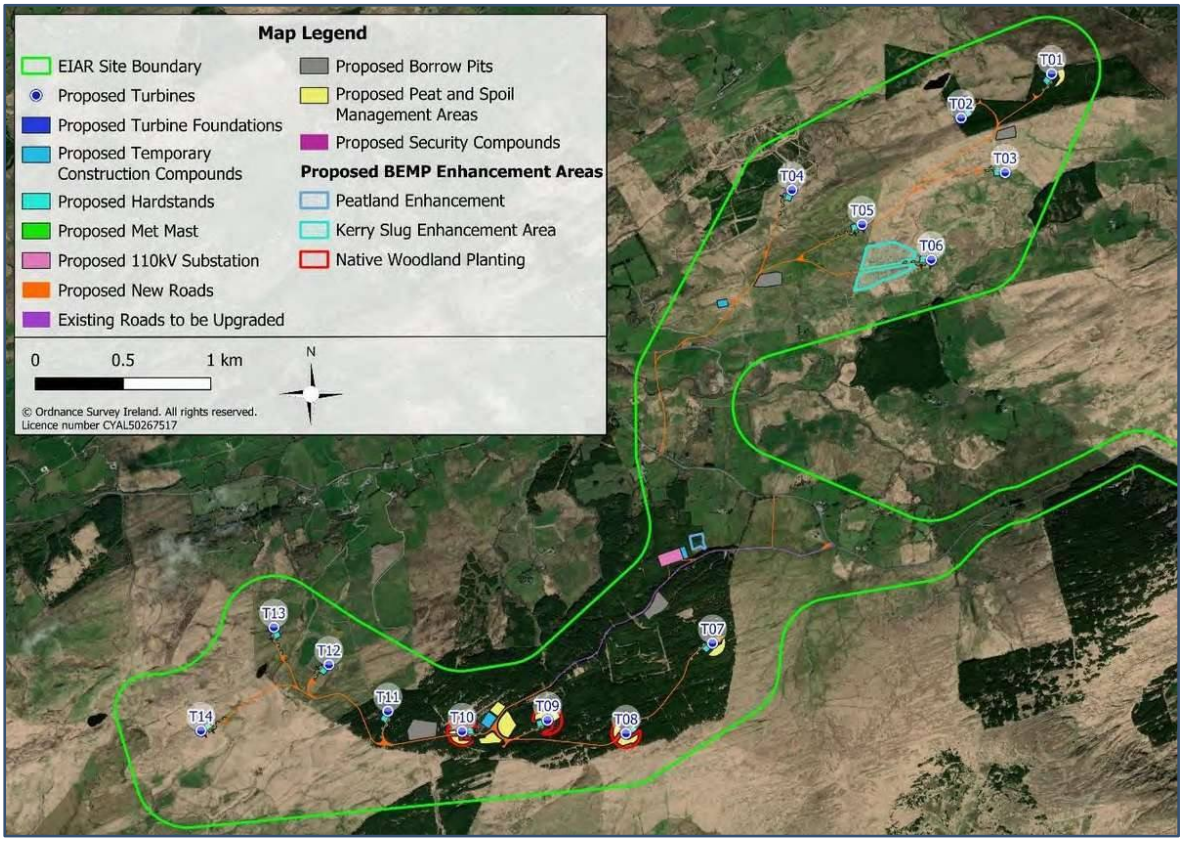


Figure 13-7 Aerial View of the Proposed Wind Farm site

The Proposed Wind Farm is located within a remote, sparsely populated, marginal upland landscape, characterised by a mosaic of landcover of agricultural fields, moorland, and commercial forestry. The nearest settlement is the village of Kealkill, located approximately 3km east to the nearest proposed turbine. The wider landscape surrounding the proposed turbines is defined by a patchwork of agricultural land, commercial forestry, local road networks within a relatively remote, hilly landscape.

A shown in the topography map below, the southern turbine cluster is located on the foothills of the Maughanaclea Hills, whereas the northern turbine cluster lies at the base of the Shehy Beg Mountains. The well-defined ridgelines and landforms of the Maughanaclea Hills and Shehy Beg Mountains, and the undulating nature of neighbouring ridgelines effectively encloses the proposed turbines within these distinctive topographical features, and limits visibility from very large areas, as illustrated in Figure 13-1 (ZTV map) previously.

The Owenbeg River, located to the west of the proposed turbines, and the Mealagh River, situated to the south of the southern turbine cluster, follow the river valleys formed by the natural contours of the landscape. These rivers contribute to the area's undulating terrain.

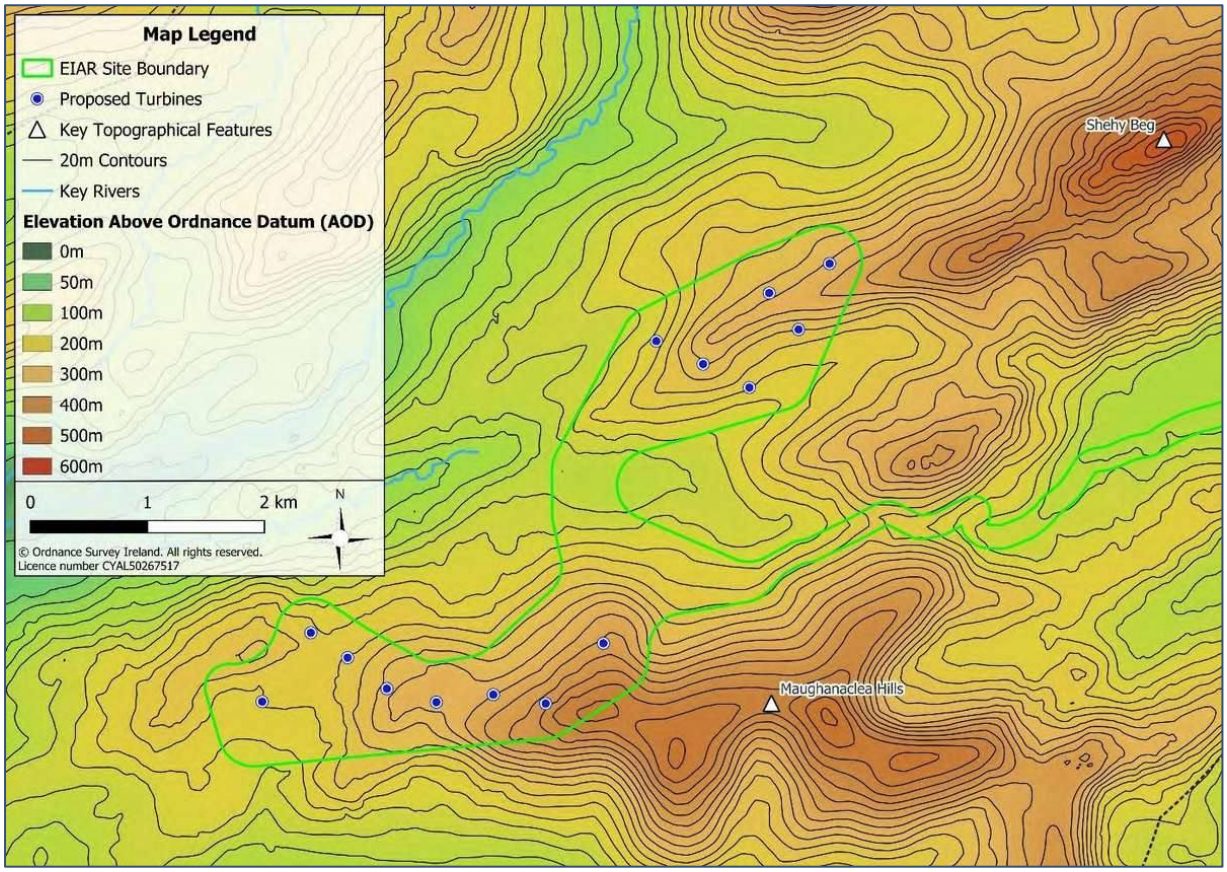


Figure 13-8 Topography of the Proposed Wind Farm site

Landcover is the term used to describe the combinations of vegetation and land-use that cover the land surface. It comprises the more detailed constituent parts of the landscape and encompasses both natural and man-made features.

The proposed turbines are located along the ridgelines of an upland moorland landscape interspersed with patches of heath, agricultural pastures, and commercial forestry. The Maughanaclea Valley, situated between the two turbine clusters is a sparsely settled upland landscape, defined by a mix of agricultural fields, boundary vegetation, interspersed with a very small number of rural dwellings.

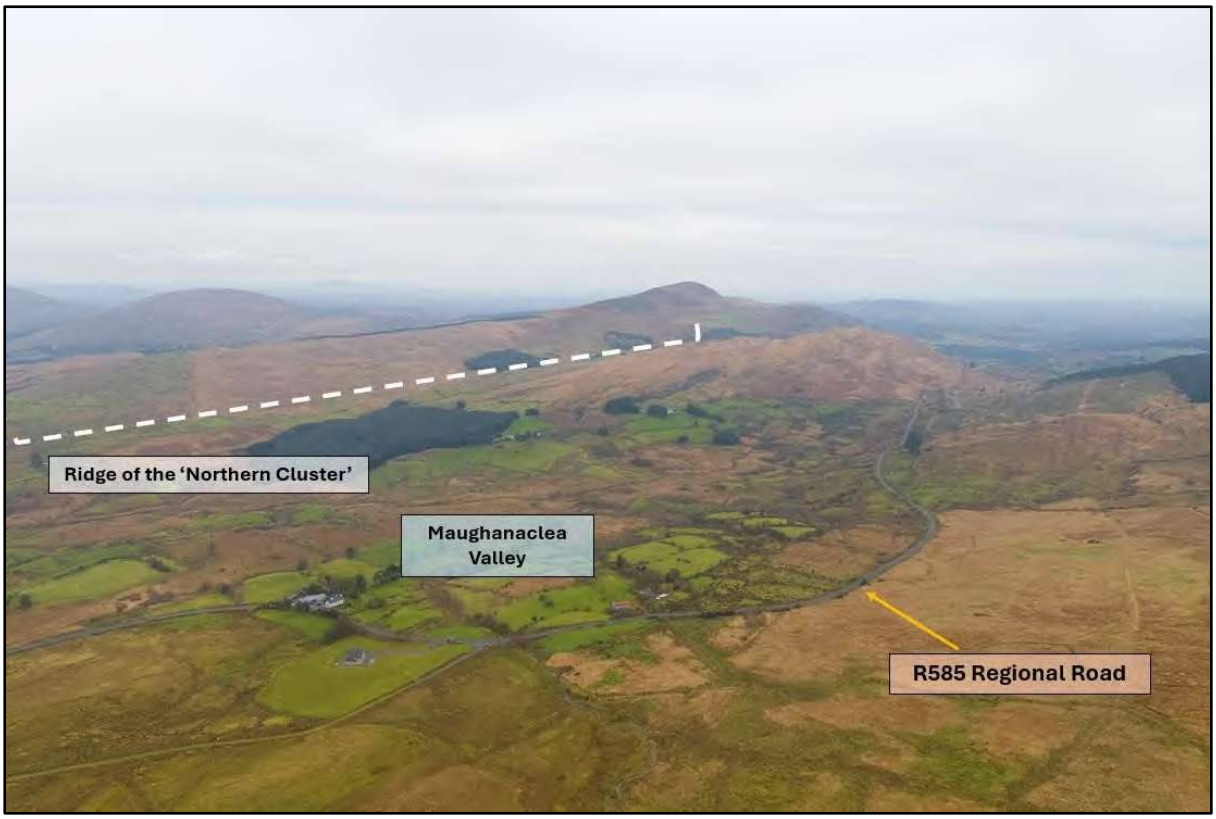


Plate 13-4 Drone Image of views North towards the northern turbine cluster from the southern turbine cluster

Overall, both turbine clusters are set within a marginal landscape characterised by a combination of moorland, agriculture, and commercial forestry.

Plate 13-5 Views north from the northern turbine cluster towards tracts of commercial forestry, approx. 195m east of turbine T4

There is a sense of remoteness and isolation with few residential buildings within the landscape. There are some views of scenic quality from elevated vantage points within the Proposed Wind Farm site itself. As seen in Plate 13-6 below, long-ranging views extend across the ridgelines and undulating landforms in the direction of the High Value Landscape (HVL 4) which is visible in the distance to the west.

Plate 13-6 Views south-west from the northern turbine cluster, approx. 135m west from turbine T5

Landscape Character of the Proposed 110kV onsite Substation

The proposed 110kV onsite substation is situated within an area of commercial forestry, adjacent to a private road in the southern turbine cluster. The strategic placement of the proposed substation within this tract of forestry, a location enclosed and visually contained by prominent landforms ensures that the substation will not be visible from nearby receptors such as the residents and the R585 Regional Road (C-SR-29 Scenic Route).

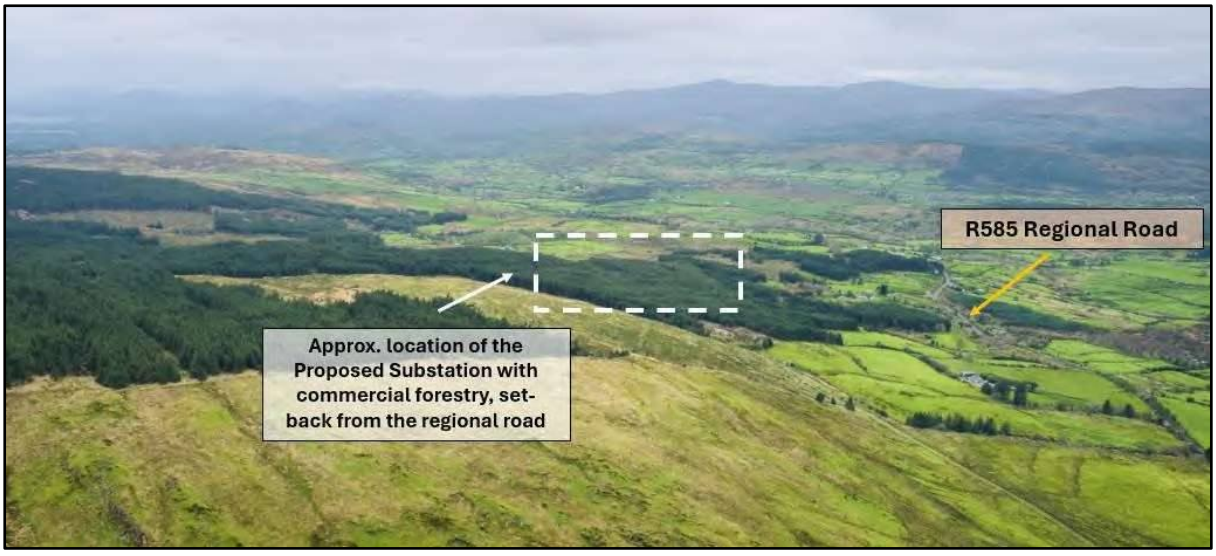


Plate 13-7 Drone Image of views westward over the Proposed Substation

Landscape Character of the Proposed Grid Connection

As discussed in detail in Chapter 4, it is proposed to connect the proposed 110kV onsite substation to the existing Dunmanway 110kV substation in the townland of Ballyhalwick, located approximately 15km east of the proposed 110kV onsite substation via an underground cabling route, as seen in Figure 13-9 below.

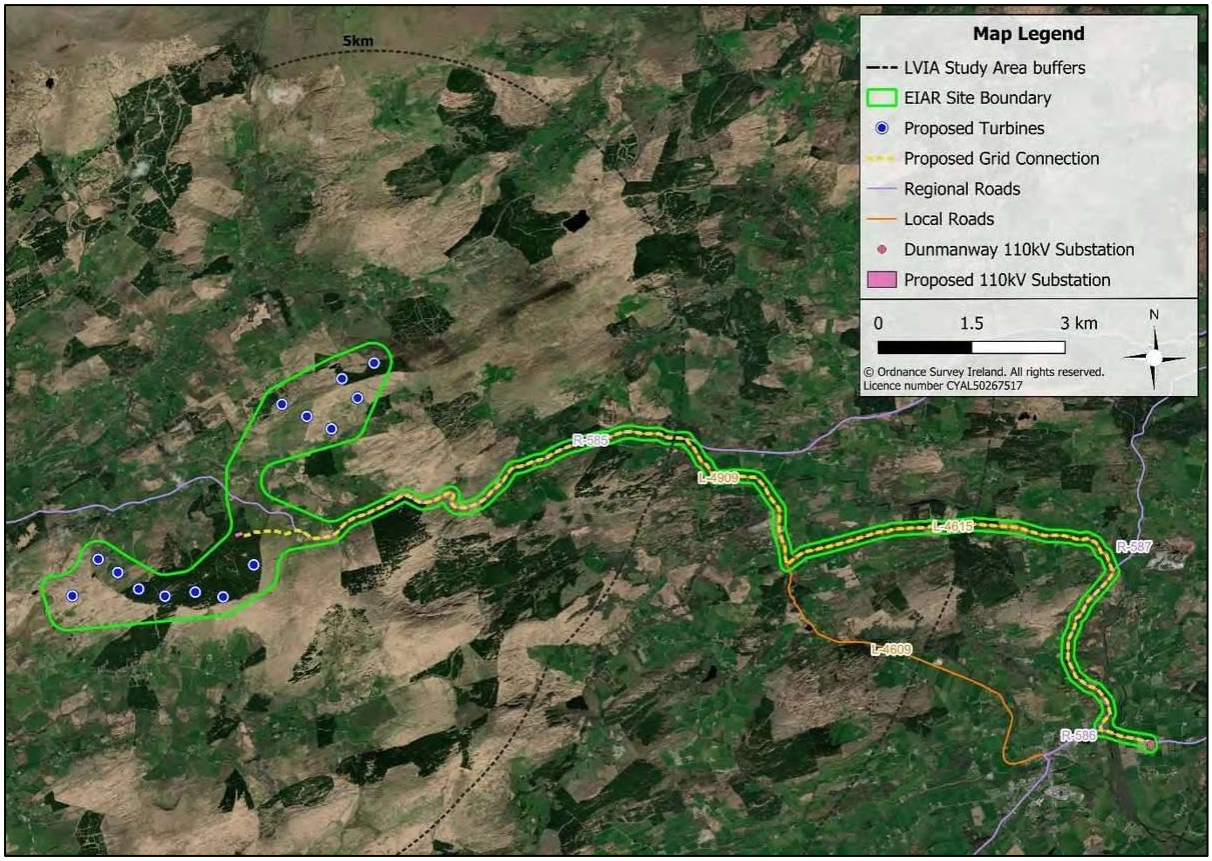


Figure 13-9 Proposed Grid Connection route

The route of the Proposed Grid Connection from the Proposed Wind Farm site to the Dunmanway 110kV substation follows a network of local and regional roads, including the R585 Regional Road, and eventually connects with the L-4909, L-4609, L-4615 local roads and the R587, and R586 regional roads. This route traverses through a rural landscape, characterised by agricultural fields and residential areas.

13.4.3 Sensitivity of the Proposed Wind Farm site: Landscape Value & Susceptibility to Change

Landscape 'Value' was assessed in order to determine the landscape 'Sensitivity' of the Proposed Wind Farm site as well as the wider landscape setting and establish the capacity of the immediate landscape in which the Proposed Project will be built, as is prescribed by best practise guidance (GLVIA3, LI & IEMA, 2013, p.80):

> *'...as part of the baseline description the value of the potentially affected landscape should be established'.*

Comprehension of the landscape Value and landscape 'Susceptibility to Change' (to wind farm development) enables determination of the sensitivity of the landscape at a micro-level (meaning, the landscape of the Proposed Wind Farm site) and its capacity to absorb the infrastructure of a wind farm development.

The table below considers the collective appraisal of seven indicators of landscape Value in the LVIA guidance (listed below). Landscape Value and Susceptibility to Change are then combined to assign an overall Sensitivity rating of the Proposed Wind Farm site.

The determination of landscape Value takes into consideration the scenic amenity designations and landscape sensitivity and value designations found in the local landscape policy, as well as other indications of landscape value attached to undesignated landscapes.