Policy consultation response | August 2024

Landscape Institute
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Aviation Lighting and Onshore Wind Turbines

Draft Guidance on Aviation Lighting Impact Assessment

Response from the Landscape Institute

For Scottish Government

Date 23 August 2024

Background for members

This Guidance, published by The Scottish Government, establishes a framework for assessing the landscape and visual impacts of visible aviation warning lighting on onshore wind turbines. It is primarily intended for professionals conducting these assessments, but also serves as a resource for consultees and decision-makers. The need for such assessments has increased with the deployment of larger wind turbines in Scotland, driven by technological advancements and ambitious renewable energy targets.

The Guidance emphasises the importance of night-time Aviation Lighting Impact Assessments, introducing a three-stage evaluation process consistent with GLVIA 3, and encourages the use of available mitigation options. It aligns with existing Scottish guidelines and anticipates that future advancements in lighting technology may reduce the need for extensive assessments.

Developed by the Aviation Lighting Working Group (AvLi) in 2021, the Guidance focuses exclusively on visible aviation lighting and provides practical advice for stakeholders in wind energy development. Although it primarily addresses wind turbines, its principles may also apply to other tall structures requiring aviation lighting.

Finally, the Guidance acknowledges that many key energy-related decisions are made by the UK Government, highlighting areas where the Scottish Government seeks action to maximise the benefits of the energy transition for Scotland.

Landscape Institute response

We are delighted to respond to this consultation and grateful to the work of AvLi in pulling together draft guidance. The guidance has been well received by our members, as evidenced by the numerous positive responses we have received.

This response has been provided by members of the LI affiliated to the LI Scottish Branch (LIS) although we note this guidance may also be useful to UK members.

The guidance is set out in the following format:

- Executive Summary

1. Introduction
2. Context to Aviation Lighting Impact Assessment
3. Lighting Mitigation
4. Approach to Aviation Lighting Impact Assessment
5. Summary

- Appendix 1: Application Submission Checklist
- Appendix 2: Aviation Lighting Policy Context
- Appendix 3: Mitigation Options
- Appendix 4: Supporting Visual and Graphic Materials
- Glossary

Although there are no paragraph numbers in the draft document, we have referred to the page numbering and paragraphs per page. We have also grouped comments for each section below.

Executive Summary

Comments

General Comments:

While the front cover specifies that this guidance on Aviation Lighting Impact Assessment (ALIA) applies exclusively to onshore turbines, it would be helpful to reinforce this limitation within the document itself. Members have enquired whether it would be feasible to extend the guidance to cover offshore turbines. Additionally, there is concern that this guidance could be confused with existing lighting standards for telecommunication masts, older onshore wind farms, or those located near airports (e.g., Middleton Wind Farm), where different aviation lighting specifications are required.

(Page 5, paragraph 3: We would suggest that a caveat be added to clarify that, while this guidance may have broader applicability, different regulations and specifications will be necessary. The perception of lights from modern, lit onshore turbines should not, therefore, be directly compared to other lights within the baseline, which are subject to different regulations and specifications.

An LI member who has experience in this field, has suggested that the study area should be extended to 45km on the basis of observations that have made in relation to other lit structures, but it is not clear if those structures carried the same specification and so there is opportunity for confusion to arise. Although this proposal does not represent a consensus among members, it would be helpful if the guidance could consider this aspect and help to provide greater clarity.

Similarly, we would suggest that the guidance addresses lighting considerations during the construction phase, particularly regarding the use of lighting on cranes. These lights are mobile and differ significantly in nature from other types of lighting. Additionally, several local planning authorities provide guidance on mitigating light pollution, especially for residential developments. Furthermore, structures such as substation control buildings, BESS, and other components of an onshore wind farm application will

have different lighting requirements (e.g., emergency or intruder lighting). Including additional guidance or context on these aspects would be beneficial.

It would be useful for the document to provide further information about AvLi, including whether its members include representatives from the Landscape Institute from both private and public practice, consultees, other relevant groups, and whether technical advice was provided by aviation experts in this field. We would also like to extend our thanks to this group for their efforts in producing this document.

Suggested Clarifications:

Page 2: Please amend “Courtesy of Mike Spence Envision” to read “Courtesy of Mike Spence MSEnvision.”

Page 3, paragraph 2: We would suggest that the 'three-stage process' be clarified in brackets, for example: (Step 1: Defining the lighting proposal; Step 2: Understanding the baseline; and Step 3: Assessing the effects of the aviation lighting).

Page 3, paragraph 3: The term 'onerous' could be replaced with a more positive phrase, such as a 'bolt-on' or an 'additional task incorporated into the end of the LVIA.'

Page 3, paragraph 4: When referencing other guidance currently in use in Scotland, it would be helpful to add a reference to the forthcoming LITGN-2024-01 clarification note.

Introduction

Comments

General Comments:

We welcome the acknowledgement and ‘joined up’ connection to other important guidance in this area such as GLVIA3 and NatureScot’s Pre-Application Guidance for Onshore Wind Farms and the sign-posting that other guidance may be updated in due course.

Suggested Clarifications:

Page 4, paragraph 4: We recommend that the guidance refer to 'design' and assessment' (last line) as these aspects are closely related (As acknowledged later in the document).

Page 5, paragraph 3: This should also refer to Landscape Institute guidance.

Context to Aviation Lighting Impact Assessment

Comments

General Comments:
We welcome the guidance on landscape character assessment at night, particularly the recognition of the subtleties, qualities, and perceptual differences between daytime and nighttime landscapes. This addition supports the scope and promotes a consistent approach to this aspect of ALIA.

It is suggested that the guidance clarify the appropriateness and usefulness of using baseline satellite imagery. Some of our members have found this method effective, in conjunction with ILP Guidance Note 1 for the Reduction of Obtrusive Light (https://theilp.org.uk/resources/), which outlines light control zones and the Bortle Dark Sky Scale for characterizing baseline conditions.

Suggested Clarifications:

Page 6, Paragraph 3: Some members have expressed concerns that the sensitivity example of "residents in their homes" may lead to confusion with Residential Visual Amenity Assessments. While we appreciate and respect the choice of residents as an example of highly sensitive receptors, we suggest that the language is reviewed to prevent potential misunderstandings.

Page 6, Paragraph 4: It is suggested that the text be revised to, "The significance of any impact at night will *partly* depend on the sensitivity..." to ensure that the magnitude is also considered in determining the overall level and nature of the effect.

Page 7, Paragraph 7: Some members have raised concerns about the use of the term "a flashing or strobe effect." The term "strobe" is commonly associated with lighting used in music concerts or on emergency vehicles, rather than with wind turbines. To prevent confusion, it would be helpful to clarify this phenomenon within the guidance.

Specifically, it would be useful to indicate whether this effect is subject to perception or if this refers to older turbines below 150m hub height, which rotate at a faster speed and have been lit accordingly. Additionally, it may be worth considering whether this is a likely outcome under current regulations for modern onshore wind turbines, which typically rotate at a slower speed, resulting in an "on...pause...off" pattern rather than a "strobing" or "flashing" effect. Some members have referred to online videos of offshore wind turbines where the lights are both pulsing and there is an 'intermittent effect' as the blade passes the light. Some clarification may be useful as offshore turbines are clearly different from onshore turbines.

Page 8, Paragraph 1: Members have observed that in the case of lit telecommunications masts, artificial lights may already be present in elevated locations within the baseline. It may also be worth noting that, in many instances, wind turbines themselves are visible at night during civil and nautical twilight, often lit by moonlight, for example.

Page 8, Paragraph 5: It may 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.

Lighting Mitigation

Comments

Suggested Clarifications:

Page 9, Paragraph 1: The phrase "must respect minimum operational parameters" could be made more explicit. Elsewhere in the document, it is noted that the specifications and regulations governing this area are legal requirements in the UK. It may be beneficial to reflect this legal obligation more explicitly in the language used here.

Page 9, Paragraph 3: The statement "Expert advice should always be sought from an Aviation specialist" is an important acknowledgment that would benefit from being emphasised in bold. Additionally, it would be useful if the guidance adopted a similar

approach to that of GLVIA3 by recommending that "suitably qualified and experienced landscape professionals should carry out Landscape and Visual Impact Assessments" (also noted concerning Page 12, Paragraph 4). Given their training and expertise in landscape character, designations, and visual amenity, regardless of the time of day or night, landscape professionals are uniquely qualified for this work.

Page 9, Box: We would recommend that the wording from the CAA Policy Statement is amended - The text in the box appears to be a shorthand summary rather than a direct quote from the source, as implied. We welcome that the guidance states the “main light”, and the "spare light" should not be lit concurrently; it would be beneficial to clarify whether this can be made a condition.

Page 10, Paragraph 2: We recommend that the term "cardinal or specific turbines" be used to provide clarity. The term "cardinal turbines" is a recognised industry terminology and would help explain the intended meaning more effectively. It is worth noting that the approach to visible lighting requirements should be considered holistically, as part of the overall wind farm design. For example, the selection of turbine hub heights can influence the number of lights visible along a ridgeline. Additionally, decisions regarding the lighting of cardinal turbines should consider the layout or pattern of the turbines, as well as the visual impact of the lights on the surrounding landscape during daylight hours. This consideration is particularly important for wind farms with linear or clustered layouts.

Page 12, Paragraph 3: When referring to the Guidelines for Landscape and Visual Impact Assessment (3rd Edition) (GLVIA3), it would be helpful to also provide clarification on LITGN-2024-01.

Page 12, Paragraph 4: It is suggested that the word "separate" be removed, as it may be interpreted as requiring an entirely new section. Instead, the guidance could emphasise that the only requirement is a brief explanation within the overall LVIA methodology.

Approach to Aviation Lighting Impact Assessment

Comments

Suggested Clarifications:

Page 14, Paragraph 6: One of our members has suggested that the term "susceptible" may be more appropriate than "sensitive" in this context. Consideration of this terminology could help clarify the intended meaning.

Page 14, Paragraph 6, 3rd Bullet: A member has raised the possibility that a different approach may be required in response to Wild Land Areas (WLAs), in light of the planning advice provided by NPF4. However, it is likely that this is primarily a planning-related matter. An assessment should therefore be conducted impartially, with a focus on promoting design and mitigation strategies while providing information that supports decision-makers.

Page 15, Paragraph 1: We welcome the inclusion of guidance on Health and Safety to ensure the protection of our members and others involved in this area of work. No individual should feel compelled to attend sites with difficult or dangerous conditions that may pose a risk to their safety. Appropriate risk assessments should be conducted, and we support the approach of mitigating risks where they may be deemed unacceptable. Additionally, we advocate for the appropriate use and consideration of safer alternatives. It is also crucial to recognise the diversity of our workforce and ensure that individuals from various backgrounds and abilities do not feel excluded from work for these reasons. We note that this topic is explored further on Page 39.

Some members have advised that night-time photography may only allow one or two viewpoints to be recorded per day and that for health and safety reasons two personnel may be required to attend a viewpoint (remote locations or urban areas may be considered in this category according to the risk assessment for the specific location). There are advantages in that two observers can comment on the subjective nature of the assessment. These practical and health and safety measures will also have a cost implication.

Page 15, Paragraph 1: The need for proportionate recording of baseline conditions at safe locations is noted as an area requiring further attention. In particular, the identification of special qualities that apply to various landscapes at night is often under-assessed in baseline source material. For example, "dark skies" may be listed as a quality without further elaboration. It may be beneficial to develop an example baseline field survey/record sheet (similar to the Natural England Character Assessment Guidance 2014), which could list physical, aesthetic, and perceptual qualities to be considered at night.

Page 16, Table, Last Row: In reference to "People undertaking informal and organised recreation," it is recommended to add "where the main focus is the landscape/night sky," following GLVIA3. Without this clarification, the description might incorrectly imply that individuals playing football on a floodlit pitch at night could be considered highly sensitive. Additionally, providing a range or example of "medium" sensitivity could be useful.

Page 17, Paragraph 2: It may be worthwhile to mention Dark Sky Discovery sites in addition to general references to dark skies at night.

Page 17, Paragraph 6: The guidance rightly emphasises that *"the assessment should also make clear any assumptions being made, such as only one aviation light being illuminated per nacelle concurrently and an 'appropriate control device' being used so that the lights are switched off during the day or when illuminance is at 500 LUX or above."* To ensure clarity, it would be helpful if the guidance specified which option should be assessed as the "worst case" scenario, assuming that the level of specification has been agreed upon pre-application. Alternatively, if the assessor has discretion to choose, provided that the choice is clearly explained, confirmation of this approach would be appreciated.

Page 18, Paragraph 4: The current guidance does not address whether dimming over distance, as discussed on Page 8, should be shown. It would be beneficial to explicitly address this point in relation to dimming as an embedded mitigation strategy. Additionally, further discussion on perceived brightness and guidance on how brightness diminishes with distance would be valuable, as this is often a key area of uncertainty in assessing and interpreting lighting impacts.

Summary

Comments

No comments on this section.

Appendix 1: Application Submission Checklist

Comments

Suggested Clarifications:

Page 21, Last Row, 1st Bullet under Recommendations: It is recommended that the guidance allows for greater flexibility in this area, rather than expressing a preference for all assessment details to be included within the main chapter or prescribing the layout and presentation of the assessment. A more effective approach would be to ensure that both daytime and nighttime assessments are proportionate, appropriate, comprehensive, clear, and transparent.

Page 23, Last Bullet: The guidance currently advises against the use of manipulated daytime photography; however, it may be clearer and more practical to frame this technique as a "last resort" to ensure that health and safety considerations are adequately addressed. The current wording suggests that this method should be avoided entirely, without acknowledging that in certain scenarios, it could mitigate high-risk activities.

Appendix 2: Aviation Lighting Policy Context

Comments

No comments on this section.

Appendix 3: Mitigation Options

Comments

Page 30, Paragraph 3: The guidance suggests that assessments could be based on worst-case assumptions of 2000 cd (or 200 cd where dimming is proposed), while separately indicating how vertical directional intensity might mitigate effects through an assumed light fitting. If this is the case, the expectation should still be to include vertical directional intensity mitigation as part of the submitted lighting scheme when seeking to discharge planning conditions.

Some of our members have discussed this aspect, particularly questioning the requirement to produce only 2000 cd montages. The text indicates that if automatic dimming is in place, there is no need for additional montages showing both 2000 cd and 200 cd, unless agreed with consultees and in specific circumstances. Clarification on this point would be beneficial, particularly in confirming the accepted "worst case" for assessment purposes, subject to specific requirements and specifications.

Page 30, Paragraph 5: The guidance recommends against attempting to portray the resultant light intensity reductions in photomontages, due to the challenge of achieving accurate representation and the commitment to a specific bulb type at the application stage. This clarification, along with the recognition that photomontages are "essentially artist's impressions of the light emission" (Page 37, Paragraph 4), is a welcome addition.

Page 31: It would be helpful if the example table could be linked to a specific source or manufacturer - This would allow members to determine whether the example is still current or if it requires updating at a later date.

In addition to the ADS example, it would be useful to include an example of an enforceable planning condition for onshore lighting, with specifications that can be recorded and monitored. Additionally, monitoring lighting schemes post-construction and comparing them against the ALIA/visualisations could be another option, though various caveats should be noted.

Appendix 4: Supporting Visual and Graphic Materials

Comments

Page 34, Paragraph 4: We welcome the announcement that the *"Working Group has agreed that any further guidance on aviation lighting visualisations will be published in due course as an update or addendum to the NatureScot (2017) Visual Representation of Wind Farms Guidance – Version 2.2. Any such update will be advanced by NatureScot and will include consultation with industry and relevant stakeholders."*

The clarification that photomontages are "essentially artist's impressions of the light emission" (Page 37, Paragraph 4) is appreciated, as is the guidance on Page 38, Paragraph 7, that illustrations and visualisations should be *"caveated as being only a reasonable indicative illustration of the lighting effects."* This acknowledgment is helpful, reinforcing that ALIA will draw from multiple assessment sources and baseline field surveys, and should not be construed as merely a simple description or reference to a single nighttime visualisation.

Page 38, Paragraph 6: The advice that the timing of photography may need to vary to suit specific conditions is welcomed. However, one of our members has noted that the document could benefit from additional guidance on how to generate photomontages of aviation lighting, and that no example illustrations are provided. While these may be considered "artist's impressions," it could be beneficial to include further information on the process undertaken by landscape technicians. We acknowledge, however, that NatureScot plans to provide guidance on this aspect as part of their updates to the *NatureScot (2017) Visual Representation of Wind Farms Guidance – Version 2.2.*

As noted in our response to the aviation lighting assessment approach, some members have suggested that night-time photography may be limited to capturing only one or two viewpoints per day. Additionally, due to health and safety considerations, two personnel might be required to attend each viewpoint, particularly in remote locations or urban areas, depending on the specific location's risk assessment. Having two observers offers the advantage of providing multiple perspectives on the subjective aspects of the assessment. However, these practical measures and health and safety requirements will also have cost implications.

Glossary

Comments

The draft document currently includes only a list of abbreviations. It may be beneficial to expand this section to reference GLVIA3 and include additional terminology. For

example, terms such as "illuminance," which is partially defined in the text, could be explicitly listed. Other useful examples might include "sky glow," "light emissions," "sunset," and "sunrise" (both referring specifically to the periods connected with the sun's passage relative to the horizon, rather than a general time period), as well as the various stages of twilight, among others.

About the Landscape Institute

The Landscape Institute (LI) is the chartered body for the landscape profession. We are an educational charity that promotes the art and science of landscape practice.

The LI's aim, through the work of our members, is to protect, conserve, and enhance the natural and built environment for the public benefit.

The LI provides a professional home for all landscape practitioners including landscape architects, landscape managers, landscape planners, landscape scientists, and urban designers.

About LI policy and research

The LI undertakes research, builds networks, and provides policy advice to local and national policymakers, regulators, and stakeholders. We seek to demonstrate how landscape and green infrastructure can deliver maximum benefits for society, the environment, and the economy.

The work of the LI policy team is overseen by the LI Policy and Communications Committee (PCC), one of three standing committees that report to the LI's Board of Trustees.

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