

**7000Acres Response to Environmental Statement  
Volume 3, Appendix 15-D: Glint and Glare Assessment**

Deadline 2 Submission – 8 August 2023

## **Executive Summary**

The Applicant is required to demonstrate that the impact of glint and glare is minimal.

The US Federal Aviation Authority (FAA) assessment methodology selected by the Applicant has been misapplied. This results in an underestimation of the actual impact of glint and glare.

In particular, the Applicant has clearly not understood the two assessment criteria in the FAA methodology. The Applicant has used short term exposure (up to 1 minute) criteria, deemed acceptable for pilots, to receptors who will view for a longer period.

The Applicant has not taken account of actual observer heights, such as the upstairs window of a residence, so underestimating the impact of glint and glare.

The Applicant has not taken account of the cumulative effect of glint and glare, in accordance with Advice Notice Seventeen.

The Applicant has not taken account of any viewers outside 1km from the development.

The Applicant has not taken account of receptors with common eyesight conditions.

The Applicant has used Google Earth to conduct a desktop assessment of screening. This does not provide a valid assessment of the actual screening available, as rural views on Google Earth are frequently out of date, and certainly will not take account of seasonal variations in vegetation.

The Applicant takes no account of the impact on livestock and equestrian activities, which are a feature of this area.

Recommendations are made on how to correct this narrow and deficient assessment.

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## 1. Introduction

Glint and glare can be created by solar panels. The Applicant is required to assess the impact of glint and glare by National Policy Statement EN-3 paragraph 3.10.93: the policy does not provide an assessment methodology.

The Applicant has chosen to disregard any significant glint and glare created by the metal structures associated with the solar farm, even though EN-3 3.10.97 states that:

*“ When a glint and glare assessment is undertaken, the potential for solar PV panels, frames and supports to have a combined reflective quality may need to be assessed”.*

For another issue, the Applicant references the “BRE Planning Guidance for the Development of Large Scale Ground Mounted Solar PV Systems”<sup>1</sup>; the Applicant chooses to ignore paragraph O) that states:

*“The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm.”*

The Applicant has chosen to assess a limited range of cases, not representative of all the relevant receptors. In particular, it has only assessed the potential for glint and glare within 1km of the development site despite the development being visible from a greater distance. Furthermore, the Applicant has chosen not to take account of the cumulative effect of the glint and glare produced by this development and the adjacent West Burton, Cottam, and Tillbridge solar NSIPs. By ignoring the other solar NSIPs, the Applicant has not taken account of Advice Notice Seventeen. For example, all four solar NSIPs are visible from The Cliff and have potential to impact receptors living in that location, and drivers using the roads overlooking the area. By

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<sup>1</sup> [bregroup.com/solar/KN5524\\_Planning\\_Guidance\\_reduced.pdf](http://bregroup.com/solar/KN5524_Planning_Guidance_reduced.pdf)

adopting their methodology, the Applicant has underestimated the true impact of glint and glare.

The Applicant has applied aviation assessment criteria, although neither author of the Applicant's report appears to have any aviation expertise. In contrast, this rebuttal by 7000Acres has been conducted by an aviation expert; a brief biography is shown in Annex A. In particular, the Applicant has chosen to apply US Federal Aviation Authority (FAA) criteria without a clear understanding of the difference between the criteria applied to pilots (short term viewing) and air traffic control staff (medium to longer term viewing).

## 2. Applicant's Assessment Methodology

The Applicant has chosen to use the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT), which is noted in FAA guidance material<sup>2</sup>. The FAA guidance requires mitigation for green glare when affecting an Air Traffic Control (ATC) Tower, but not for when affecting pilots. The guidance states:

*"The FAA has learned that glint and glare from solar energy systems could result in an ocular impact to airport traffic control tower (ATCT) personnel working in the tower cab, and compromise the safety of the air transportation system."*

The criterion for pilots takes account of the short-term nature of their exposure due to the speed of passing through an area susceptible to glint and glare. In particular, the guidance requires a pilot assessment for the final approach path, defined as being:

*"two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath".*

At a standard approach speed of 120 miles per hour, two miles would take 1 minute to fly through. Although the FAA refers to professional roles, the actual differentiation between pilots and Air Traffic Control (ATC) staff is based on the period of exposure,

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<sup>2</sup> [federalregister.gov/documents/2021/05/11/2021-09862/federal-aviation-administration-policy-review-of-solar-energy-system-projects-on-federally-obligated](https://www.federalregister.gov/documents/2021/05/11/2021-09862/federal-aviation-administration-policy-review-of-solar-energy-system-projects-on-federally-obligated)

with the pilot case being up to 1 minute, with longer than 1 minute for ATC staff. The Applicant has not considered the period of exposure to glint and glare. The Applicant's report paragraph 4.13 states:

*“As per FAA guidelines mitigation is only required for green glare when affecting an Air Traffic Control Tower, but not for when affecting pilots. Therefore, it can be assumed that green glare is acceptable for residential receptors.”*

No logic is given for applying pilot (short term) criteria to residential receptors. Applying pilot criteria (exposure time up to 1 minute) is clearly incorrect, as residential receptors are static viewers, like ATC staff. Static viewers should be protected from green glare, or worse, as their exposure will be for longer than 1 minute. Therefore, the Applicant has not applied the correct assessment criterion to residential receptors. In a similar way, slow moving receptors, such as pedestrians, cyclists and equestrians should be assessed using the ATC criteria, as their exposure may be longer than 1 minute. It is also necessary to apply ATC criteria to driving along roads where the receptor will be exposed to glare for more than 1 minute.

By adopting their tactic of applying only pilot criteria from the FAA guidance to local receptors, the Applicant has underestimated the true impact of glint and glare.

## **2.1 Observation Height**

The Applicant has only considered a limited number of observer heights. For example paragraph 4.20 applies a 2m observer height for residential receptors, stating it was a typical height for a ground floor window. The Applicant must take account of residents viewing the development from an upstairs window, so additional points at 10m must be assessed. Some residents may work from home, where typically upstairs bedrooms are used as home offices. Glint and glare affecting an upstairs viewing point would limit the period of time a resident could look out of their upstairs window before their eyesight was affected.

In a similar manner, the Applicant has only considered a road user's viewing point of 1.5m, despite a large number of agricultural tractors using the area, where

observation height will be greater (up to 4m). In a similar way, the observer height of an equestrian will be greater than 1.5m. By limiting the observer heights assessed to as low as possible, the Applicant has not adequately assessed the potential for glint and glare affecting typical local receptors. In addition, the Applicant has not taken any account of the impact on elevated receptors in the area, such as The Cliff. By adopting their methodology, the Applicant has underestimated the true impact of glint and glare.

When the true observer height of receptors is taken into account, the glare identified in Tables 6-1, 6-2 and 6-3 will increase. Additionally, the only mitigation quoted in the Report, vegetation, will be less effective.

## **2.2 Vegetation**

Where the Applicant has found impact, they have quickly dismissed it based on a Google Earth assessment of any vegetation between the site and a receptor. In a rural area the images on Google Earth can be several years out of date. The Applicant has only considered low observer heights not typical of local receptor viewing points, so the potential screening of higher observers is not assessed. The Applicant has not confirmed whether any of the screening vegetation is due for removal during construction. Finally, the Applicant appears to have taken no account of seasonal variation in vegetation. By adopting their methodology, the Applicant has underestimated the true impact of glint and glare.

Vegetation is not an acceptable mitigation, as tall vegetation will also have an adverse effect on the character of the landscape. In addition, tall vegetation will take years to grow, leaving the receptor unprotected. Reducing the height of the solar panels will be the only immediate and effective mitigation for glint and glare.

## **2.3 Health**

The FAA guidelines implicitly take account of receptors having healthy eyesight, as pilots and ATC staff are subject to annual medical assessments, including an eye test. The Applicant has not taken account of the affect of glint and glare on receptors with sub-optimal eyesight, such as those suffering from glaucoma, cataracts and

other ocular disabilities. By not taking account of the additional requirements of those with eyesight deficiencies, the Applicant is discriminating against that population group, who are frequently elderly.

## **2.4 Non-Human Receptors**

The Applicant takes no account of non-human receptors, such as livestock, horses and birds. The safety impact of glint and glare on equestrian activities has not been assessed. Relevant Representations include reference to equestrian activity in the region. The combined impact of this and other local NSIPs may render the whole region unsafe for equestrian activities, such as hacking along minor roads and in the countryside. In a similar manner, some local fields may be rendered unusable by livestock as glint and sustained glare could result in distress.

## **2.5 Magnitude of Impact**

7000 Acres agrees with the Applicant's criteria for identifying the magnitude of impact from solar reflections, Applicant's Report paragraph 4.26:

- High - Solar reflections impacts of over 30 hours per year or over 30 minutes per day;
- Medium - Solar reflections impacts between 20 and 30 hours per year or between 20 minutes and 30 minutes per day;
- Low - Solar reflections impacts up to 20 hours per year or up to 20 minutes per day; and
- None - Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening

## **3. Recommendations**

Due to the Applicant's narrow and deficient assessment of the effects of glint and glare, the following course of action is strongly recommended. The Applicant should:

1. Modify their assessment to apply the ATC staff (green glare) requirement on all static or slow-moving receptors, such as residents, pedestrians, cyclists and equestrians.

2. Broaden their assessment to take account of actual observer heights. These should include the upstairs windows for residential receptors (10m), tractors (4m), and equestrians (2m).
3. Take account of the combined reflective capacity of all of the materials used in the construction of the solar PV farm.
4. Comply with Advice Notice Seventeen and assess the combined glint and glare affects of all solar farms in the region.
5. Take account of the glint and glare of viewers beyond 1km from the development, such as residents and receptors on The Cliff.
6. Take account of the actual vegetation available to screen the solar panels for all four seasons, and not rely on Google Earth.
7. Take account of the affects of glint and glare of all receptors with eyesight diseases or deficiencies.
8. Take account of the effect on livestock and equestrian activities, using an equestrian expert.
9. After reassessing the potential for glint and glare, the mitigation applied by the Applicant for all receptors subject to High and Medium impact should be reducing the height of the PV panels until the impact is no longer significant.
10. For impact lower than High and Medium, where the effects of glint and glare are not clearly demonstrated to be negligible, ("Low" in the Applicant's report) the Applicant must follow Draft EN-3 Mitigation 2.52.3:

*"Applicants should consider using, and in some cases the Secretary of State may require, solar panels to be of a non-glare/ non-reflective type and the front face of the panels to comprise of (or be covered) with a non-reflective coating for the lifetime of the permission."*

## **Annex A: Summary Biography of Mark Prior**

The author of this assessment is competent to apply the FAA aviation assessment criteria based on the following qualifications and experience:

- Experience as an operational military and civil pilot 1979-2016.
- A graduate of the French Test Pilot School (EPNER). An experimental test pilot, initially in the RAF and then as a civilian test pilot 1992-2016.
- Held a CAA then EASA Air Transport Pilots Licence and a Class 1 Flight Test Rating 1998-2016.
- Flown over 70 types of helicopters, aeroplanes, a tiltrotor, gliders and airships.
- Since 2016, an independent aviation consultant undertaking work for the UK CAA, UK Ministry of Defence, Scottish Crown Office, General Lighthouse Boards, Irish Coastguard and Icelandic Coastguard.

- A present and/or past member of rulemaking groups belonging to the Joint Aviation Authority(JAA), European Aviation Safety Agency (EASA), International Civil Aviation Organisation (ICAO), Radio Technical Committee for Aeronautics (RTCA) and the European Organisation for Civil Aviation Equipment (EUROCAE). Currently Secretary (representing the UK CAA) to EUROCAE Working Group 110/RTCA Special Committee 237, developing standards for Helicopter Terrain Awareness Warning Systems (HTAWS). A member of the ICAO Helicopter Sub-Committee.
- Expert Witness for the Scottish Crown Office for two Fatal Accident Inquiries.  
<https://www.scotcourts.gov.uk/docs/default-source/cos-general-docs/pdf-docs-for-opinions/2019fai46.pdf>  
[https://www.scotcourts.gov.uk/docs/default-source/cos-general-docs/pdf-docs-for-opinions/2020fai34.pdf?sfvrsn=3b655add\\_0](https://www.scotcourts.gov.uk/docs/default-source/cos-general-docs/pdf-docs-for-opinions/2020fai34.pdf?sfvrsn=3b655add_0)
- Current Chair of the Royal Aeronautical Society Rotorcraft Specialist Group.
- Supporting aviation research conducted by the Aerospace Division of the University of Liverpool. This includes conducting flight tests in the University's research flight simulator in support of PhD and post-Doctoral research.