Engineering Report: Assessment of Glint, Glare and Visual Impact from Proposed Green Hill Solar Farm (Green Hill G)

To: Relevant Stakeholders

From: Mark Shepherd CEng/PrEng

Date: 19 October 2025

Subject: Preliminary Opinion Assessment of Glint, Glare and Visual Impact from Proposed Green Hill Solar Farm (Green Hill G)

1.0 Introduction

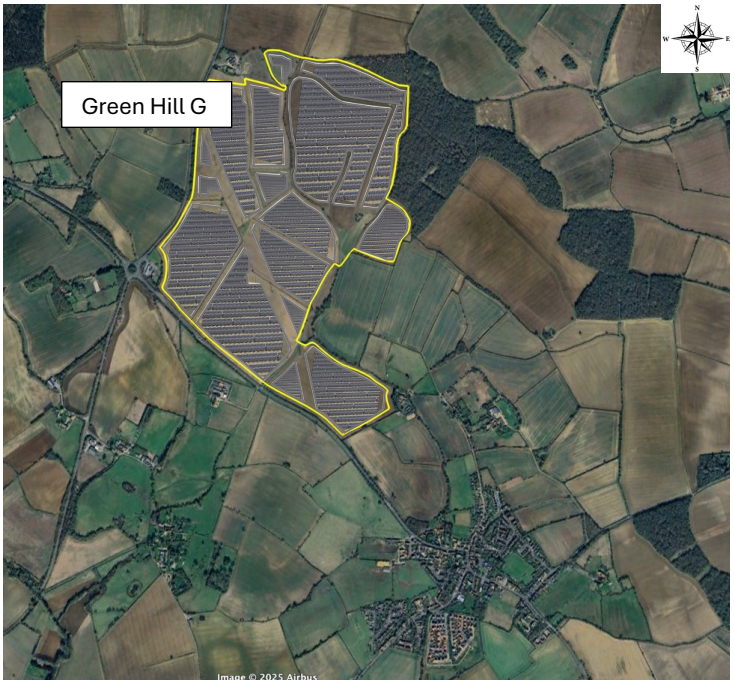
This report presents an engineering opinion of the impact of the glint, glare and visual impact associated with the Green Hill G (Lavendon) section of the proposed Green Hill photovoltaic (PV) solar farm. The opinion herein contains both general concerns that may have already been addressed in the Developer's Reports, as well as some comments specific to the Developer's Reports where omissions or misrepresentations may have provided misleading information to the public, in particular the residents of Lavendon.

The increasing deployment of large-scale photovoltaic (PV) solar farms in rural and countryside locations have raised concerns regarding visual impact, particularly the issue of glint and glare from panel surfaces. While solar technology has advanced significantly in efficiency and coatings to reduce reflection, these effects cannot be fully eliminated. This opinion evaluates the potential impacts of glint and glare, their measurement, the limitations of current photovoltaic manufacturing processes, as well as visual impact matters that may have been omitted from reports.

The analysis is presented from a technical standpoint with a focus on rural siting implications.

2.0 The Proposed Green Hill Solar Farm Site G

The proposed site for the Green Hill Solar Farm that forms the basis of this report is Green Hill G in relation to the Village of Lavendon is as follows:



3.0 Developer's Reports

The following reports have informed the opinions contained in this document:

- EN010170-000045-GH7.16_Design Approach Document
- EN010170-000046-GH7.17_Concept Design Parameters and Principles
- EN010170-000052-GH7.23_Policy Compliance Document
- EN010170-000057-GH7.28_Empirical Evidence on Glint and Glare from Solar PV Installations Near UK Aerodromes
- EN010170-000076-GH6.3.8.1_ES Appendix 8.1_LVIA Methodology_Part 1&2 of 2
- EN010170-000078-GH6.3.8.2_ES Appendix 8.2_Scoping LVIA Receptor Sheets
- EN010170-000168-GH6.3.15.5_ES Appendix 15.5_Green Hill G Ground-Based Receptor Results
- EN010170-000205-GH6.2.8_ES Chapter 8_Landscape and Visual Impact Assessment
- EN010170-000212-GH6.2.15_ES Chapter 15_Glint and Glare
- EN010170-000212-GH6.2.17_ES Chapter 17_Socio-Economics Tourism and Recreation

- EN010170-000297-GH6.4.8.6.5_ES Figure 8.6.5_Landscape Receptors Green Hill G
- EN010170-000298-GH6.4.8.6_ES Figure 8.6_Landscape Receptors
- EN010170-000303-GH6.4.8.7.5_ES Figure 8.7.5_Visual Receptors Green Hill G
- EN010170-000304-GH6.4.8.7_ES Figure 8.7_Visual Receptors
- EN010170-000345-GH6.4.8.10.5_ES Figure 8.10.5_Viewpoint Locations Green Hill G
- EN010170-000346-GH6.4.8.10_ES Figure 8.10_Viewpoint Locations

4.0 Nature of Glint and Glare

Glint and glare refer to the unwanted reflection of sunlight from the surfaces of solar panels. Glint is a brief, intense flash of reflected light, often associated with specific geometries between the sun, panel, and observer. Glare is a sustained reflection that can cause visual discomfort or impairment.

While solar modules are generally designed with anti-reflective coatings to maximize absorption, reflection is unavoidable to some degree because no surface can absorb 100% of incident light across all wavelengths and angles. Current reflection values for PV panels are typically between 2–10% of incoming solar radiation.

5.0 PV Panels and Light Absorption

The Developer's reports do not appear to state the type or manufacture of the proposed PV panels.

It is not known whether Anti-Reflective (AR) coatings, surface texturing or Interdigitated Back Contact (IBC) cells will be used – there appears to be no investigation into the pros and cons of different solar panels, nor any recommendations in this regard, included in the technical reports, just some general statements. The choice of the actual panel itself may prove to be important, and certainly necessary in order for a more accurate representation of the impact of the proposed solar panels.

It is acknowledged that no current photovoltaic panel can completely absorb all incident light. The theoretical maximum efficiency of a single-junction silicon solar cell

is limited by the Shockley-Queisser limit, which caps efficiency at approximately 33.16%. The remaining energy is lost as heat or is reflected. While manufacturers have reduced reflectance to as little as 2% for some panels under specific conditions, a small amount of reflection is inherent in the physics of light-matter interaction. Complete absorption would violate fundamental principles of thermodynamics and optics.

6.0 Measurement and Assessment Methodology

While light output is commonly expressed in lumens or lux, these units do not fully capture the specific visual impacts of glare. Regulatory assessments instead use luminance (cd/m²) and geometric solar modelling (such as the Federal Aviation Administration's Solar Glare Hazard Analysis Tool, which is also referenced in UK planning contexts).

It is not clear if this method of determining the extent of light output has been included in the Developer's reports.

7.0 Time-of-Day and Seasonal Effects

In a rural UK context:

- Morning glint from east-facing arrays will coincide with peak commuting periods and agricultural operations.
- Evening glare from west-facing panels may affect highways and rural residences during sunset, raising potential for visual hazard.
- During winter months, when the solar path is lower in the sky, the risk of glare is materially increased.

These factors raise legitimate planning concerns under the National Planning Policy Framework (NPPF) Paragraph 185, which requires that new development "avoid noise and other adverse impacts on health and quality of life" — including light pollution.

8.0 Panel Degradation and Long-Term Risk

Anti-reflective coatings applied to PV modules are not permanent and deteriorate over time due to:

- Weathering and abrasion from rain, frost, and windborne particles;

- Soiling from dust, pollen, and agricultural activity;
- Panel discolouration and surface micro-cracking over the lifespan of the installation.

Such degradation can increase stray reflections, both specular and diffuse, thereby worsening glare impacts as the development ages. This raises compliance concerns with NPPF Paragraph 55, which requires developments to be “sustainable for the lifetime of the development,” not merely at the point of installation.

As per comments in Section 4.0 there appears to be no investigation into the pros and cons of different solar panels, nor any recommendations in this regard, included in the technical reports.

The overall contribution of deterioration to glare is complex and can be both mitigating (due to diffusion) and exacerbating (due to coating breakdown or damage). Precise documented and studied long-term data on this phenomenon is limited and would require site-specific modelling over the lifetime of the project. This has not been acknowledged in the Developer’s reports

9.0 Implications for Countryside Deployment

In rural environments, glint and glare have several implications. In our village’s country trails, particularly the Three Shires Way, horses are ridden and cyclists, athletes and hikers are drawn to the country atmosphere and natural beauty. To have a recreational facility whose attractiveness would be severely negatively affected by an unnatural intrusion and exacerbated light intensity during peak reflection times appears not to have been taken into consideration.

From a landscape character perspective, we have concerns with strong reflective flashes being incongruent with natural countryside settings.

Given that glare is most prominent during sunrise and sunset—times when rural populations may be commuting, working in fields, or engaging in outdoor activity—the potential impact may be more pronounced than in urban or industrial settings.

It appears as though no modelling has been undertaken for users of the Three Shires Way (TSW) – despite high usage and narrow path making glare unavoidable. Equine safety risks specifically have been glossed over. The Developer’s reports comparisons to natural reflections are inaccurate, and guidance from the British Horse Society

misapplied. This constitutes a misrepresentation of facts and avoidance of relevant guidance – this needs to be investigated correctly and included in the Developer's reports for completeness and transparency.

A personal rendering of the impact of the proposed PV panels on horse-riding along the Three Shires Way is as follows:

10.0 Visual Impact

10.1 Visual Impact

The Developer's reports on Glint and Glare, Visual Receptors Green Hill G and Landscape and Visual Impact Assessment provide misleading evidence and have omitted significant assessments that are relevant to the assessment of the proposed development.

A summary of the viewpoints used for Green Hill Site G have been shown below. What is entirely misleading is that the viewing points have been taken from the boundaries of the development only, not from the perspective of the village.

From VP40, the following images were provided (2/3 of a 360° view pointing inwards to the development):

From VP41, the following image was provided (2/3 of a 360° view pointing inwards to the development). Only one spliced photo has been included, completely misrepresents the actual situation, and totally ignores a viewpoint that includes Three Shires Way:

What is concerning is that all the visual receptor points have been taken from the edges of the development, pointing inwards, which doesn't actually represent reality and provides a very misleading documentation of visual impact.

A far more representative perspective that captures the actual visual impact has to be from our village itself, not from the perimeter of the development as demonstrated below:

The extent of Green Hill Site G has been captured in polygons and overlaid in Google Earth. Site lines have been created from the Village of Lavendon at different angles towards the development and the elevation profiles captured (included in Annexure A).

Google Street View has been used on these site lines from the perspective of the village and images captured in Annexure B. The white and yellow lines visible in the images is the location of the PV panels in Site G.

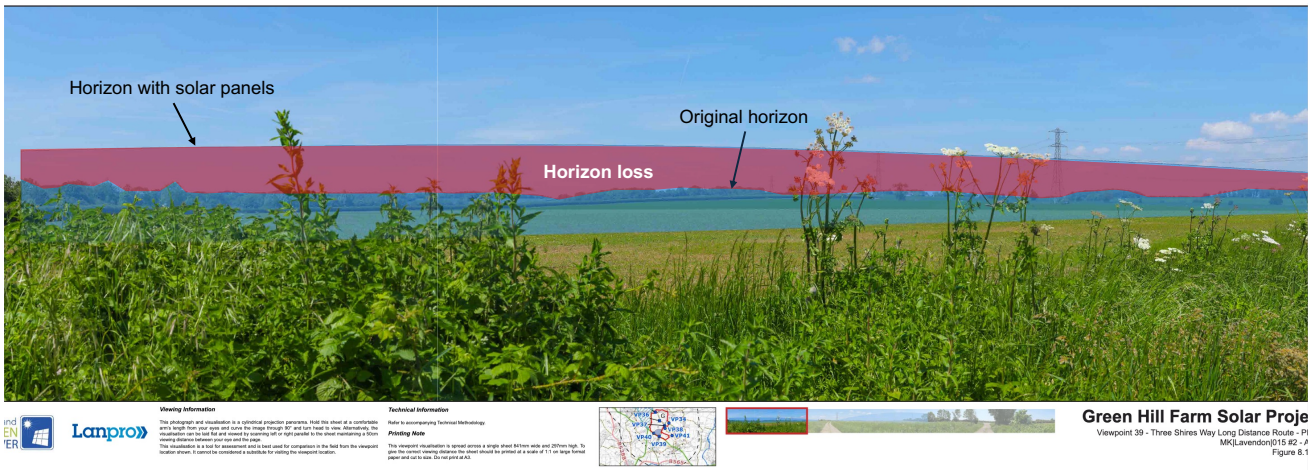
Using this information, the following area would be directly visible from the Village of Lavendon (this type of assessment appears to be lacking in the Developer's reports):

10.2 Horizon Distortion

Apart from the visual impact assessment, it is not clear if the issue of horizon loss or horizon distortion has been included. Horizon loss or horizon distortion is the adverse aesthetic or perceptual impact that occurs when an introduced artificial structure (such as a building, solar array or wind turbine) intercedes or obstructs the natural, uninterrupted line of sight to the horizon, sky, or continuous natural ground plane.

It is a form of visual degradation where the perceived boundary between land (or water) and sky is broken, flattened, or replaced by a human-made element, thereby reducing the sense of spaciousness, visual clarity, and scenic quality.

Type of Loss	Description	Effect on User Experience
Loss of Continuous Skyline	A tall structure (like a block of housing or industrial facility) visually chops the horizon into pieces or replaces the natural crest of a hill with a straight, artificial roofline	Diminishes Scale: The viewer loses the sense of vastness and feels hemmed in or confined
Foreground Dominance	A structure placed too close to a viewing point (like a trail) becomes the dominant visual element. The viewer is forced to focus on the near-field development instead of the distant, natural landscape.	Destroys Immersion: The scene changes from a view into the countryside to a view of the building, negating the escape experience
Visual Scarring	The structural or material texture of the artificial element (e.g., metal panels, concrete, sheer walls) contrasts sharply with the soft, organic textures of the natural environment, creating a jarring interruption.	Breaks Harmony: The experience of nature is replaced by an awareness of the adjacent human development and its permanence.



11.0 Policy and Regulatory Context

UK planning decisions must consider the following:

- NPPF Paragraphs 152–158: Renewable energy is supported but must balance environmental benefits against localised impacts.
- NPPF Paragraph 185: Requires that new developments avoid unacceptable visual disturbance and light pollution.
- Town and Country Planning (Environmental Impact Assessment) Regulations 2017: Require assessment of visual, residential, and transport safety effects.
- CAA Guidance (CAP 764): Requires formal glare assessments where aviation or visual navigation could be compromised.

In this context, failure to adequately mitigate glint and glare effects would render the proposed development inconsistent with UK planning policy.

12.0 Conclusion

From the Developer's reports made available it appears as though certain aspects of the visual impact assessment have been misrepresented and/or omitted which require further and comprehensive investigation.

On technical and regulatory grounds, the proposed solar farm presents a material risk of glint and glare impacts as well as visual impedance which cannot be fully mitigated by current technology.

Key points include:

- Degradation of panels over time is likely to increase reflective hazards, contrary to the NPPF requirement for sustainable, long-term mitigation.
- No current or foreseeable PV manufacturing process can eliminate glare entirely.
- Glare is most intense during sunrise and sunset, coinciding with high levels of rural activity and commuting.
- Countryside settings with open sightlines exacerbate the distance and duration of impact.
- Loss of continuous skyline and visual scarring has a material and tangible manifestation in terms of horizon distortion
- Visual impact from the perspective of the village has not been considered.

The available report content and conclusions in their current form do not provide sufficient evidence that the Developer has adequately addressed all aspects of the impact of the development. On these grounds I have an objection to the Developer's evidence and reports concluding that glint and glare and visual impact will not have a negative impact to the surrounds.

Submitted in my personal capacity as Mark Shepherd on 19 October 2025.

13.0 Professional Disclaimer

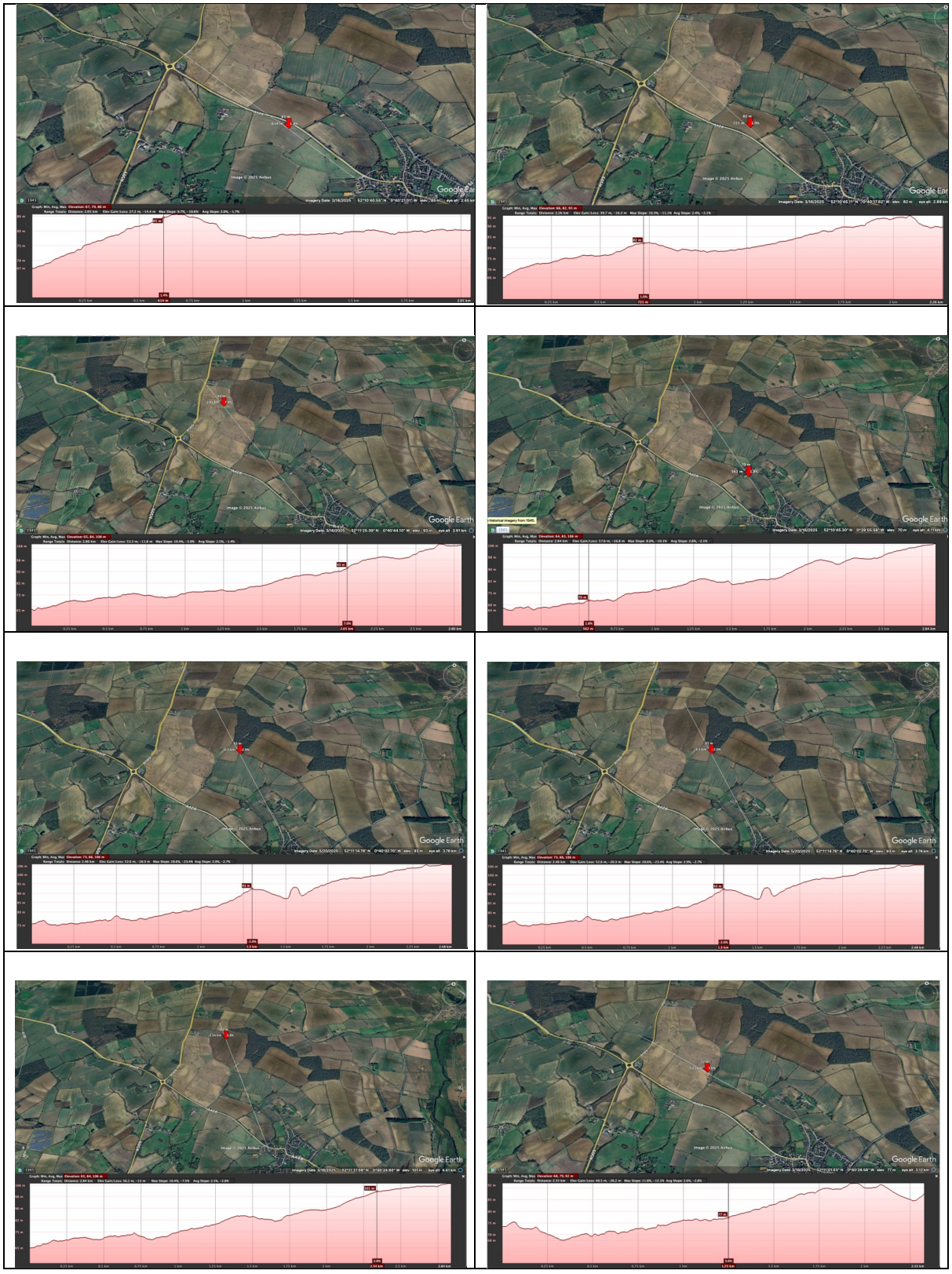
The comments and observations contained within this document (or memorandum/submission) are provided solely by the undersigned in their individual and personal capacity. These comments are based on the Author's general professional experience as an engineer and are intended purely to provide supplemental, informational context.

These comments do not constitute, and should not be construed as, a formal critique, professional review, validation, or independent check of the original reports drafted by consultants on behalf of the Developer.

Specifically, the Author has not been retained to perform a due diligence review, verify underlying data, or assume any professional duty or liability for the original reports' conclusions. The information and opinions expressed herein are strictly non-binding, non-certifiable, and are offered without the customary duty of care or professional liability that would attach to a formal, paid engineering review.

Annexure A

Elevation Profiles and Sight Lines



Annexure B

View Points from Lavendon Village


Google Earth
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