GREEN HILL
SOLAR FARM

Green Hill Solar Farm
Preliminary Environmental Information Report

Chapter 15
Glint and Glare

Prepared by: Mabbett & Associates Ltd

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Contents

15 Glint and Glare

15.1 Introduction

15.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) undertaken to date concerning the potential impacts of the Scheme on Glint and Glare during the construction, operation and maintenance, and decommissioning phases. The following aspects will be considered within the Glint and Glare assessment process:

- Road users – specifically drivers of motor vehicles;
- Occupants of nearby residential dwellings;
- Aviation activity at nearby airfields;
- Community uses (e.g. horse facilities), Public Rights of Way (including all users e.g. cyclists, equestrians, walkers); and
- Waterways.

15.1.2 For more details about the Scheme, refer to **Chapter 4: Scheme Description** of this PEIR.

Appendices and Figures

15.1.3 This chapter is supported by the following appendices in **PEIR Volume 3**:

- **Volume 3, Appendix 15.1** Glint and Glare Assessment Legislation and Methodology;
- **Volume 3, Appendix 15.2** Glint and Glare Site A and A.2 Results;
- **Volume 3, Appendix 15.3** Glint and Glare Site B Results;
- **Volume 3, Appendix 15.4** Glint and Glare Site C, D and E Results;
- **Volume 3, Appendix 15.5** Glint and Glare Site F Results; and
- **Volume 3, Appendix 15.6** Glint and Glare Assessment G Results.

15.1.4 This chapter is supported by the following tables:

- **Table 15.1:** Summary of Consultation and Responses;
- **Table 15.2:** Receptor Sensitivity; and
- **Table 15.3:** Significance of Effects.

15.2 Consultation

15.2.1 An EIA Scoping Report was submitted to the Planning Inspectorate (PINS) in July 2024, with a formal request for Scoping Opinion. PINS subsequently issued the Scoping Opinion on the proposed scope on 30th August 2024. Consultation undertaken throughout the pre-application and scoping phase for the Scheme has informed the approach to the Glint and Glare assessment and the information provided within this chapter.

15.2.2 A summary of consultation and responses to the Scoping Report are outlined below in **Table 15.1**.

Table 15.1: Summary of Consultation and Responses

Consultee and Date	Comment	Outcome and any further steps anticipated
Sywell Aerodrome, 15/03/2024, 31/05/2024, 16/07/2024	Sywell Aerodrome have raised concerns about the effect of the Scheme towards operations at the aerodrome. A meeting is to be arranged to	Effects towards Sywell Aerodrome is assessed as part of this PEIR Report, as detailed in Section 15.8.

Consultee and Date	Comment	Outcome and any further steps anticipated
	discuss all queries and safety requirements relating to Glint and Glare	
Tower Farm Airfield, 02/05/2024, 16/07/2024	Tower Farm Airfield replied saying that they have no concerns about the effect of the proposed Scheme on the airfield.	Effects towards Tower Farm Airfield is assessed as part of this PEIR Report, as detailed in Section 15.8.
Easton Maudit Airfield, 16/07/2024, 31/07/2024	Easton Maudit Airfield have raised concerns about the effect of the Scheme towards operations at the aerodrome. An online meeting has as o be arranged to discuss all queries and safety requirements relating to Glint and Glare.	Effects towards Easton Maudit Airfield is assessed as part of this PEIR Report, as detailed in Section 15.8.
Pitsford Airfield, 16/07/2024, 31/07/2024	There has been no reply to any written communication from Pitsford Airfield.	Effects towards Pitsford Airfield is assessed as part of this PEIR Report, as detailed in Section 15.8.
William Pitt Airfield, 16/07/2024, 31/07/2024	There has been no reply to any written communication from William Pitt Airfield.	Effects towards William Pitt Airfield is assessed as part of this PEIR Report, as detailed in Section 15.8.
The Planning Inspectorate, 30/08/2024	The Planning Inspectorate agreed to scope out Railways from the Glint and Glare Assessment, as well as the construction and decommissioning phases of the Scheme as per 3.10.1 and 3.10.2 of the Scoping Opinion.	Railways and the construction and decommissioning phases of the report have been scoped out and emitted from the report.
	The Planning Inspectorate states that due to lack of adequate justification, the Inspectorate is not content to scope Public Right of Ways or Horse Facilities out of the ES, as per 3.10.3 of the Scoping Opinion. The Inspectorate considers that this matter should be subject to further assessment in the ES, or supporting evidence should be provided demonstrating the absence of LSE and agreement with the relevant consultation bodies.	Further justification demonstrating the LSE is provided in Chapter Section 5.4 of this PEIR report.
	As per 3.10.4 of the Scoping Opinion, the Planning Inspectorate considers that given the current rural nature of the surrounding area, the ES should assess other receptors such as users of vessels on waterways within the ZTV, agricultural workers including when using farm machinery, and ecological receptors in addition to those already identified.	There are no waterways large enough for vessels within 1km of the solar arrays. Consideration towards agricultural workers, including when using machinery is found in Section 15.5.1. It is noted that there is no evidence in Glint and Glare guidance or wider literature to suggest that there are ecological impacts of glint

Consultee and Date	Comment	Outcome and any further steps anticipated
		and glare not mentioned within this report.
	As per 3.10.4 of the Scoping Opinion, the Planning Inspectorate states that the assessment should also consider the implications of these users being at varying heights from ground level, as for example, a horse rider would experience glint and glare at a different angle than a pedestrian.	It is highlighted in Section 15.5.1 that Public Right of Ways is to encompass all users (e.g. cyclists, walkers, equestrians), and the potential sensitivity and magnitude of impact is discussed in Section 15.5.4.

15.3 Legislation, Planning Policy and Guidance

15.3.1 This section provides an overview of the legislation, planning policy and guidance against which the Scheme will be considered for Glint and Glare.

Planning Policy

National Planning Policy

National Policy Statement for energy (EN-1) (2023) (Ref.1)

15.3.2 The National Policy Statement for energy (EN-1) sets out the overarching policy for decisions by the Secretary of State for nationally significant energy infrastructure. It is noted that Glint and Glare is not specifically mentioned within EN-1.

15.3.3 Section 5.5 of EN-1 sets out the primary policy for the relationship between aviation and new energy:

"5.5.1 All aerodromes, covering civil and military activities, as well as aviation technical sites, meteorological radars and other types of defence interests (both onshore and offshore) can be affected by new energy development.

Collaboration and co-existence between aviation, defence and energy industry stakeholders should be strived for to ensure scenarios such that neither is unduly compromised."

...

"5.5.5 UK airspace is important for both civilian and military aviation interests. It is essential that new energy infrastructure is developed collaboratively alongside aerodromes, aircraft, air systems and airspace so that safety, operations and capabilities are not adversely affected by new energy infrastructure. Likewise, it is essential that aerodromes, aircraft, air systems and airspace operators work collaboratively with energy infrastructure developers essential for net zero. Aerodromes can have important economic and social benefits, particularly at the regional and local level, but their needs must be balanced with the urgent need for new energy developments, which bring about a wide range of social, economic and environmental benefits."

...

"5.5.7 The approaches and flight patterns to aerodromes can be irregular owing to a variety of factors including the performance characteristics of the aircraft concerned and the prevailing meteorological conditions. It may be possible to adapt flight patterns to work alongside new energy infrastructure without impacting on aviation safety."

...

"5.5.55 Lighting must also be designed in such a way as to ensure that there is no glare or dazzle to pilots and/or ATC, aerodrome ground lighting is not obscured and that any lighting does not diminish the effectiveness of aeronautical ground lighting and cannot be confused with aeronautical lighting. Lighting may also need to be compatible with night vision devices for military low flying purposes."

National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023) (Ref.2)

15.3.4 The National Policy Statement for Renewable Energy Infrastructure (EN-3) sets out the primary policy for decisions by the Secretary of State for nationally significant renewable energy infrastructure and dictates how glint and glare should be considered within the decision.

15.3.5 Sections 2.10.27 and 2.10.102-2.10.106 outline the potential impact of glint and glare that the applicants may consider:

"2.10.27 Utility-scale solar farms are large sites that may have a significant zone of visual influence. The two main impact issues that determine distances to sensitive receptors are therefore likely to be visual amenity and glint and glare. These are considered in Landscape, Visual and Residential Amenity (paragraphs 2.10.93 - 2.10.101) and Glint and Glare (paragraphs 2.10.102 – 2.10.106) impact sections below."

...

2.10.102 Solar panels are specifically designed to absorb, not reflect, irradiation. However, solar panels may reflect the sun's rays at certain angles, causing glint and glare. Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor.

2.10.103 Applicants should map receptors to qualitatively identify potential glint and glare issues and determine if a glint and glare assessment is necessary as part of the application.

2.10.104 When a quantitative glint and glare assessment is necessary, applicants are expected to consider the geometric possibility of glint and glare affecting nearby receptors and provide an assessment of potential impact and impairment based on the angle and duration of incidence and the intensity of the reflection.

2.10.105 The extent of reflectivity analysis required to assess potential impacts will depend on the specific project site and design. This may need to account for 'tracking' panels if they are proposed as these may cause differential diurnal and/or seasonal impacts.

2.10.106 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, although the glint and glare of the frames and supports is likely to be significantly less than the panels."

15.3.6 Sections 2.10.134-2.10.136 outline the potential mitigations for glint and glare impacts that the applicants may consider:

"2.10.134 Applicants should consider using, and in some cases the Secretary of State may require, solar panels to comprise of (or be covered with) anti-glare/anti-reflective coating with a specified angle of maximum reflection attenuation for the lifetime of the permission.

2.10.135 Applicants may consider using screening between potentially affected receptors and the reflecting panels to mitigate the effects.

2.10.136 Applicants may consider adjusting the azimuth alignment of or changing the elevation tilt angle of a solar panel, within the economically viable range, to alter the angle of incidence. In practice this is unlikely to remove the potential impact altogether but in marginal cases may contribute to a mitigation strategy."

15.3.7 Sections 2.10.158-2.10.159 outlines further detail on the potential glint and glare impacts that the Secretary of State may consider as part of their decision making:

"2.10.158 Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes, motorists, public rights of way, and aviation infrastructure (including aircraft departure and arrival flight paths).

2.10.159 Whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farms results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms."

Local Planning Policy

West Northampton Joint Core Strategy Local Plan (Dec 2014) (Ref.3)

15.3.8 The West Northampton Joint Core Strategy sets out the long-term vision and objectives for the whole area covered by the former Daventry District, Northampton Borough, and South Northamptonshire Councils for the plan period up to 2029, including strategic policies for steering and shaping development.

15.3.9 In relation to Glint and Glare, paragraph 5.106 describes how visual intrusion from renewable energy developments should be limited:

"5.106 When considering planning applications for low carbon and renewable energy, an assessment will need to take account of impacts on landscape, townscape, natural, historical and cultural features and areas and nature conservation interests. Proposals should also use high quality design to minimise impacts on the amenity of the area, in respect of visual intrusion, noise, dust, and odour and traffic generation."

North Northamptonshire Joint Core Strategy (July 2016) (Ref.4)

15.3.10 The North Northamptonshire Joint Core Strategy provides the strategic planning policies for the future development of the area from 2016 to 2031.

15.3.11 Policy 26: Renewable and Low Carbon Energy states the following:

"The siting of development does not significantly adversely affect the amenity of existing, or proposed, residential dwellings and/or businesses, either in isolation or cumulatively, by reason of noise, odour intrusion, dust, traffic generation, visual impact or shadow flicker;"

MK:Plan (2016-2031) (March 2019) (Ref.5)

15.3.12 The MK:Plan (2016-2031) sets out the vision and framework for the future development of the area from 2015 to 2031.

15.3.13 Policy SC3: Low Carbon and Renewable Energy Generation states the following regarding glint and glare:

"A. The Council will encourage proposals for low carbon and renewable energy generation developments that are led by, or meet the needs of local communities.

B. Planning permission will be granted for proposals to develop low carbon and renewable energy sources (including community energy networks) unless there would be:

1. Significant harm to the amenity of residential area, due to noise, traffic, pollution or odour;

2. Significant harm to wildlife species or habitat;

3. Unacceptable landscape and visual impact on the landscape, including cumulative impacts;

4. Unacceptable harm to the significance of heritage assets; and

5. Unacceptable impact on air safety.

C. In addition to the above criteria, wind turbines should avoid unacceptable shadow flicker and electro-magnetic interference and be sited an appropriate distance away from occupied properties, consistent with the size and type of the turbine. Proposals to develop solar PV farms should avoid unacceptable visual impact from the effect of glint and glare on the landscape, on

neighbouring uses and aircraft safety. Proposals for large scale renewable energy in the open countryside should be informed by a satisfactory landscape and visual impact assessment."

MK City Plan 2050 (July 2024) (Ref 6)

15.3.14 The MK City Plan 2050 sets out the strategy for growth through to 2050 related to need for homes, creating jobs and supporting businesses, transport around the city, climate change, the natural and built environment, design of streets, and the places which support everyday living (i.e. schools and shops).

15.3.15 Policy CEA6: Low and Zero Carbon Energy Provision states the following regarding low carbon and renewable energy developments:

"2. Proposals to development low carbon and renewable energy sources (including community energy networks) and infrastructure needed to facilitate the green energy transition (e.g. grid and sub-station upgrades) will be supported, unless there would be

a. Conflict with other policies within the development plan.

b. Unacceptable harm on air safety, in terms of the risk of incidents on approaches/departures from local airfields/airports, as well as radar interference."

Guidance

The National Planning Practice Guidance for 'Renewable and Low Carbon Energy (June 2015) (Ref.7)

15.3.16 The National Planning Practice Guidance for 'Renewable and Low Carbon Energy' sets out the factors that local planning authorities will need to consider in regard to the deployment of large-scale solar farms and states the following:

"The deployment of large-scale solar farms can have a negative impact on the rural environment, particularly in undulating landscapes. However, the visual impact of a well-planned and well-screened solar farm can be properly addressed within the landscape if planned sensitively.

Particular factors a local planning authority will need to consider include:

...the proposal's visual impact, the effect on landscape of glint and glare (see guidance on landscape assessment) and on neighbouring uses and aircraft safety;

The extent to which there may be additional impacts if solar arrays follow the daily movement of the sun;...

Great care should be taken to ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting. As the significance of a heritage asset derives not only from its physical presence, but also from its setting, careful consideration should be given to the impact of large-scale solar farms on such assets. Depending on their scale, design and prominence, a large-scale solar farm within the setting of a heritage asset may cause substantial harm to the significance of the asset;

The potential to mitigate landscape and visual impacts through, for example, screening with native hedges;…

The approach to assessing cumulative landscape and visual impact of large-scale solar farms is likely to be the same as assessing the impact of wind turbines. However, in the case of ground mounted solar panels it should be noted that with effective screening and appropriate land topography the area of a zone of visual influence could be zero."

BRE Planning guidance for the development of large-scale ground mounted solar PV panels (Oct 2013) (Ref.8)

15.3.17 The BRE Planning guidance for the development of large-scale ground mounted solar PV panels sets out guidance relating to different planning application considerations. In relation to Glint and Glare, the guidance states:

"Glint may be produced as a direct reflection of the sun in the surface of the solar PV panel. It may be the source of the visual issues regarding viewer distraction. Glare is a continuous source of brightness, relative to diffused lighting. This is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint.

Solar PV panels are designed to absorb, not reflect, irradiation. However the sensitivities associated with glint and glare, and the landscape/ visual impact and the potential impact on aircraft safety, should be a consideration. In some instances it may be necessary to seek a glint and glare assessment as part of a planning application. This may be particularly important if 'tracking' panels are proposed as these may cause differential diurnal and/or seasonal impacts.

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 UK Highway Code (Ref.9)

15.3.18 The UK Highway Code states that a road users should be aware of particular hazards such as glare from the sun, and should slow down and, if necessary stop, if dazzled by bright sunlight.

CAA CAP 738 (Ref.10)

15.3.19 CAA CAP 738 links to The Interim Civil Aviation Authority (CAA) – Solar PV Systems guidance. The Interim CAA guidance recommends that solar PV developments in the vicinity of or within an aerodrome's boundaries should provide safety assurance documentation (e.g. glint and glare assessment) regarding the full potential impact of the proposed installation on aviation interests, as part of the relevant planning application. It is further suggested that this information should be consulted with the CAA, particularly if the proposed development is within aerodrome boundaries, and during the installation process the developer should liaise with the affected aerodrome. Beyond these recommendations, no specific methodology or frame of reference are defined for assessing the impact of glint and glare on aviation infrastructure.

15.3.20 Volume 3, Appendix C of CAA CAP 738 states:

"1. In 2010 the CAA published interim guidance on Solar Photovoltaic Cells (SPCs). At that time, it was agreed that we would review our policy based on research carried out by the Federal Aviation Authorities (FAA) in the United States, in addition to reviewing guidance issued by other National Aviation Authorities. New information and field experience, particularly with respect to compatibility and glare, has resulted in the FAA reviewing its original document 'Technical Guidance for Evaluating Selected Solar Technologies on Airports', which is likely to be subject to change, see link;

Combined Aerodrome Safeguarding Team (CAST) Aerodrome Safeguarding Guidance Note (July 2023) (Ref.11)

15.3.21 The Combined Aerodrome Safeguarding Team (CAST) Aerodrome Safeguarding Guidance Note aims to provide safeguarding advice in relation to solar photovoltaic developments.

15.3.22 Section 2 'Safety Considerations' outlines the following safety considerations that must be assessed for the design of the planned solar photovoltaic development. Points 1 and 2 are relevant to glare assessment:

▪ *"ATS personnel – The control tower (if applicable) is the most important location for visual surveillance across an aerodrome for monitoring operations on the ground as well as in the air. It is therefore of critical importance that the development of solar photovoltaic developments does not significantly hinder the view from a control tower's visual control room (VCR). This may be from redesigning the layout and design of the proposed solar development to avoid glare from the solar panels or by avoiding the physical blocking of key viewpoints.*

▪ *Pilot – A pilot's ability to safely navigate the airspace around an aerodrome is paramount. A pilot is required to look for other aircraft and obstructions on the ground, as well as navigate towards a runway or reference points. This applies to both pilots of fixed wing aircraft and*

helicopters in the air, and sometimes on the ground. The standard operations that should be considered are:

pilots on approach

pilots in a visual circuit

pilots on the ground (departing and taxiing aircraft).

…"

15.3.23 Section 3.1 'Safety impacts - Glint & Glare' states:

"A key safety concern when considering a solar photovoltaic panel development on- or off-aerodrome is related to the reflection of sunlight off the photovoltaic panels commonly referred to as glint and glare. 'Glint and glare' is the general term used to describe the reflection of sunlight from a reflective surface, typically one that is capable of producing specular solar reflections. The definition of glint and glare is as follows:

▪ *Glint – a momentary flash of bright light typically received by moving receptors or from moving reflectors.*

▪ *Glare – a continuous source of bright light typically received by static receptors or from large reflective surfaces.*

Typical surfaces that are considered with respect to glint and glare are glass, metallic structures e.g. roofs, and solar PV panels. The orientation of a solar panel (azimuth and elevation angle) as well as its height will determine whether glint and glare effects are possible towards the assessed receptors.

The receptors that should be considered are usually ATS personnel in a control tower and pilots of aircraft within a suitable distance of an aerodrome. It is essential to conduct a glint and glare assessment when a reflective surface is to be located on or immediately adjacent to an aerodrome. In most cases, an assessment should be undertaken for a solar PV development which is being proposed within a specific distance (indicated by the aerodrome authority) from an aerodrome. For many aerodromes, 5km is the distance of choice but it could be considered out to 10km. In exceptional circumstances, assessments may be required beyond 10km.

The UK CAA and US FAA have produced guidance with respect to glint and glare however neither of them mandates a specific methodology for assessing the effects of glint and glare.

The effects of glare may mean that some solar PV developments are unacceptable, however layout modifications (such as changes to panel tilt and elevation angle) can often alleviate these concerns and overcome objections. The benefit of early consultation with the aerodrome authority cannot be understated."

15.3.24 Section 4 'Aerodrome Operator Safety Assurance' states:

"The aerodrome operator in conjunction with any ATS personnel should, as part of the change management process in their safety management system, consider all the potential hazards posed by solar photovoltaic developments / BESS on or in the vicinity to their aerodrome and within the aerodrome's physical and technical safeguarded areas, in order to ensure the safety of the overall operation. The developer should provide the aerodrome with a safety survey which should include:

- *a glint and glare survey when a development is within a distance specified by the aerodrome from an Aerodrome Reference Point (ARP) (5km in most cases) …*

The aerodrome operator should also ensure both impact and safety assessments are undertaken to provide assurance that any on- or off-aerodrome planned development does not introduce unacceptable hazards to aircrew, ATS personnel, RFFS and aerodrome vehicle operators undertaking their tasks.

As part of the aerodrome and or ATS change management process, safety assurances should take into account any potential adverse effect to critical ATS infrastructure and equipment.

The assessment must also consider any impacts to aircraft utilising instrument flight procedures and aircraft in the visual circuit.

Developers should apply the same principals for safety assurance for unlicensed aerodromes and airfields as required by this policy that are not officially safeguarded.

The developer in conjunction with the aerodrome operator, ATS personnel, RFFS and aerodrome operations should develop adequate mitigation to mitigate any risks identified.

Should risk mitigation or agreement not be possible, the aerodrome operator should follow Local Planning Authority procedures and lodge an objection regarding the development under their statutory obligations."

US Federal Aviation Administration (FAA) Policy (Ref.12)

15.3.25 The US Federal Aviation Administration (FAA) Policy sets out the standards for measuring ocular impact, and the appropriate methodology for glint and glare assessments.

The British Horse Society Advice on Solar farms near routes used by equestrians (Ref.13) and Advice on Solar Farms (Ref.14)

15.3.26 The British Horse Society Advice on Solar farms near routes used by equestrians and Advice on Solar Farms sets out that potential impact on equestrian businesses should be considered. The British Horse Society guidance note states the following:

"Any reflection is unlikely to be a direct problem to horses, riders or carriage-drivers because of the angles and distances involved."

"For riders or carriage drivers out hacking, glare is unlikely to present a direct problem because they are moving unless their route is directly towards the arrays at an elevation and time of day where glare is possible."

There is no guidance, national or local, which outlines methodology or acceptable impacts when it comes to glint and glare toward horses.

Pager Power Solar Photovoltaic and Building Development – Glint and Glare Guidance (Sep 2022) (Ref.16)

15.3.27 The Pager Power glint and glare guidance is best practice guidance that includes methodology for assessing Glint and Glare.

15.4 Assessment Methodology

15.4.1 The methodologies described in the following section have been developed in line with the relevant planning policy, industry good practice and guidance and professional judgement for assessing potential effects of the Scheme on Glint and Glare.

15.4.2 Solar panels may generate glint and glare effects at the Scheme Sites. The length and intensity of solar reflections in the construction or decommissioning phase will be less than or equal to the operational phase as not all panels will be deployed during these phases.

15.4.3 The operational phase represents the worst-case scenario for all development phases of the Scheme. On this basis, this assessment has therefore only considered Operational Effects, in accordance with the Scoping Opinion.

Study Area

15.4.4 The most reflective component of the proposed Scheme is the glass surface of the solar panel. Whilst a solar panel's frame and structure may be reflective, the potential glare is much less significant than the total panel area. Other infrastructure within the Scheme such as inverters and substations are not expected to be a source of glint and glare due to the lack of reflective materials present. No solar panels will be installed on Green Hill BESS, and as such, no sources of glint and glare are expected on this site.

15.4.5 Additionally, the Cable Route between the Sites and the Point of Connection will be laid underground and are therefore not a source of glint and glare. As such, the Study Area for this assessment is based on the Sites used for solar PV panels only.

15.4.6 In general, light-sensitive receptors with view of a solar PV development have potential to experience solar panel glare. There are no technical distance limit/thresholds reported within which glare is possible for such receptors. However, the potential or significance of a reflection decreases with distance. This is due to an observer's decreasing field of vision capability with increasing distance, as well as possible obstructions such as shielding caused by terrain and vegetation.

15.4.7 In the absence of U.K. government guidance, industry good practice guidance published by Pager Power (Ref.15), states that a 1km buffer is appropriate for assessing glint and glare effects on local dwellings and road users. For aviation receptors, updated Civil Aviation Authority guidance states that 5km is the screening distance of choice, although aerodromes could be considered out to 10km. As such, a 5km screening distance has been applied unless specifically requested by the aerodrome.

15.4.8 As such, the following study areas have been applied:

- 1km study area for residential dwellings;
- 1km study area for road users;
- 1km study area for Public Rights of Ways (PRoW);
- 1km study area for horse facilities;
- 1km study area for navigable waterways; and
- 5km for aviation infrastructure.

15.4.9 It should be noted that there are no waterways large enough for vessels within 1km of the Sites on which solar panels will be located. As such, navigable waterways are not considered further within this chapter.

Impact Assessment Methodology

15.4.10 The following methodology is derived from good practice considerations whilst incorporating relevant guidance for undertaking this assessment:

1. Light-sensitive receptors will be identified in the area surrounding the Scheme.
2. The visibility of the panels from the identified receptors will be considered. If the panels are not visible from the receptors, then no glint or glare can occur.
3. The potential for glint and glare from solar panels at the Sites towards the identified receptors will be identified by undertaking geometric modelling calculations.
4. Where glint or glare is predicted, factors such as the duration, time of day, and, for aviation receptors, the glare intensity will be considered to determine the magnitude of impact.
5. Mitigating factors will also be considered e.g. expected cloud cover in the area or if effects would only be experienced during winter.
6. Determination will be made of the significance of the effect and whether this is a significant effect.

Sensitivity of Receptors

15.4.11 The sensitivity of receptors can be defined as below in Table 15.2.

Table 15.2 Table of Sensitivity

Sensitivity	Definitions
High	The receptor or resource has little ability to absorb the change without fundamentally altering its present character or it is of international or national importance.
Medium	The receptor or resource has moderate ability to absorb the change without significantly altering its present character or is of high and more than local importance.
Low	The receptor or resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor or resource is not affected by glare.

Dwellings

15.4.12 The sensitivity of dwellings is categorised as 'Medium' sensitivity because the receptor has moderate capacity to absorb change without significantly altering its present character.

Roads

15.4.13 Roads are generally categorised according to the road type, which is defined by the number of carriageways, speed, and traffic density.

- Major National – fast-moving vehicles (up to 70 mph) on busy roads with a minimum of two carriageways.
- National - fast-moving vehicles (up to 60 or 70 mph) on busy roads with one or more carriageways.
- Regional - fast-moving vehicles (up to 60 mph) on moderately busy to busy roads comprising single carriageways.
- Local – variable speed vehicles on less busy roads.

15.4.14 Major National, National, and Regional roads are considered to be of 'Medium' sensitivity due to having higher traffic volumes than local roads. As such, the receptor has moderate capacity to absorb change without significantly altering its present character. Local roads are considered to be of 'Low' sensitivity due to traffic volumes predicted to be low. As such, the receptor is tolerant to change without detriment to its character.

Aviation

15.4.15 The sensitivity of aviation receptors is categorised as 'Medium' due to the receptor having moderate capacity to absorb change without significantly altering its present character.

PRoWs and Horse Facilities

15.4.16 The sensitivity of PRoWs and Horse Facilities is categorised as 'Low' because the receptor is tolerant to change without detrimental effect and are of local importance. Other reasons for this include:

- The typical density of users on a PRoW and at a Horse Facility is low in a rural environment;
- Relative to other receptor types, there is less risk to safety. For example, solar glare toward a road network can be much more serious to safety, owing to the high travel speeds and higher density of users;
- Receptors on a PRoW and at a Horse Facility are transient, and time and location sensitive, whereby a PRoW user or user at a Horse Facility could move beyond the solar reflection zone with ease and with little impact upon safety or amenity.

Agricultural Workers (including when using machinery)

15.4.17 The sensitivity of Agricultural Workers is categorised as 'Low' because the receptor is tolerant to change without detrimental effect and are of local importance. Other reasons for this include:

- The typical density of Agricultural Workers in a location is low;
- Relative to other receptor types, there is less risk to safety. For example, solar glare toward a road network can be much more serious to safety, owing to the high travel speeds and higher density of users;
- Agricultural Workers are transient, and time and location sensitive, whereby a worker could move beyond the solar reflection zone with ease and with little impact upon safety or amenity.

Magnitude of Impacts

15.4.18 The magnitude of impact is determined using different factors dependent on the type of receptor being assessed, as set out below. While there is no specific guidance on glint and glare impact magnitude evaluation, the adopted approach is in line with industry best practice.

Dwellings

15.4.19 The magnitude of glare impacts upon dwellings receptors is predominantly dependent on the following characteristics:

- Distance between the panel area and the receptor (1km screening distance applied).
- Whether glare is geometrically possible.
- The daily and annual duration of the predicted impact.

15.4.20 Where glare is not predicted to be experienced at a dwelling observation point or is not geometrically possible, no impact would occur and the magnitude is reported as 'None'.

15.4.21 Where glare is predicted to be experienced for less than one hour per day and less than three months per year at a dwelling observation point a 'Low' magnitude impact is designated and no mitigation is required. 'Low/Minor' impacts may also be determined following consideration of mitigating factors such as:

- Separation distance from panel area to dwelling observation point – the proportion of an observer's field of view that is affected by glare reduces with increased separation distance.
- The sun's position relative to the panel area – Effects that coincide with direct sunlight appear less prominent than those that do not as the sun is a far more significant source of light than reflecting panels. This factor is important at sunset and sunrise where the sun is lowest in the sky.
- The extent to which cloud cover and glare impacts coincide – cloud cover varies across a year with overcast or mostly cloudy conditions ranging from 51-79% of the year across the UK. This is of particular significance for interpretation of annual glare duration results, derived from models which assume clear, sunny skies all year-round.
- The location of the main living space within the dwelling – ground floor rooms are typically the most occupied part of residential dwelling during daylight hours and have a greater amenity significance than upper floors.
- Dwelling windows facing the solar arrays – where there are no windows facing the solar arrays, the impact magnitude reduces.

15.4.22 Where unmitigated glare is predicted to occur for more than one hour per day or more than three months per year, a 'Medium' magnitude impact is designated. This magnitude may be reduced following consideration of mitigating factors, as set out above.

15.4.23 Where unmitigated glare is predicted to occur for more than one hour per day and more than three months per year, a 'High' magnitude impact is designated.

Roads

15.4.24 The magnitude of impact upon road user receptors is predominantly dependent on the following factors:

- Distance between the solar arrays and the receptor (1 km screening distance applied).
- Whether glare is geometrically possible.
- Whether glare is within the main field of view of a road vehicle driver travelling along a road (50 degrees either side of direction of travel) – glare within the main field of view of a driver is considered to be more hazardous than glare outside this range.

15.4.25 Where glare is not predicted toward a road vehicle driver or is not geometrically possible, no impact would occur and the magnitude is reported as 'None'.

15.4.26 Where glare is predicted but it is outside a road vehicle driver's main field of view (50 degree either side of direction of travel), a 'Low' magnitude impact is designated.

15.4.27 Where glare is predicted within a road vehicle driver's main field of view, 'Medium' magnitude impact may be determined following consideration of mitigating factors such as:

- Separation distance from solar array to road vehicle driver observation point – the proportion of an observer's field of view that is affected by glare reduces with increased separation distance.
- The sun's position relative to the solar array – Effects that coincide with direct sunlight appear less prominent than those that do not as the Sun is a far more significant source of light than reflecting panels. This factor is important at sunset and sunrise where the sun is lowest in the sky.

15.4.28 Where glare is predicted within a road vehicle driver's main field of view and there are no mitigating factors, the magnitude of impact is 'High'.

Aviation - Air Traffic Control (ATC) Tower

15.4.29 The magnitude of glare impact toward ATC Tower personnel is dependent on the following factors:

- Whether glare is geometrically possible.
- Location of origin of the solar panel glare relative to the ATC Tower – glare predicted outside the ATC personnel's view of the aerodrome key operational areas (runway threshold) has less of an effect.
- Separation distance from the solar array to ATC Tower – the proportion of an observer's field of view that is affected by glare reduces with increased separation distance.
- The predicted intensity of the solar panel glare.
- Solar panel glare duration per day.
- Number of days solar panel glare is geometrically possible per year.
- The time of day when solar panel glare is geometrically possible.

15.4.30 Where glare is not predicted toward an ATC Tower personnel or is not geometrically possible, no impact would occur and the magnitude is reported as 'None'.

15.4.31 Where glare is predicted toward an ATC Tower personnel but there are sufficient mitigating factors or the aerodrome confirms the glare is acceptable, a 'Low' magnitude impact is designated.

15.4.32 Where glare is predicted toward an ATC Tower personnel that would occasionally and marginally affect aerodrome safeguarding operations, a 'Medium' magnitude impact is designated.

15.4.33 Where glare is predicted toward an ATC Tower personnel that would regularly and substantially affect aerodrome safeguarding operations, a ‘High' magnitude is designated.

Aviation - Approach Paths

15.4.34 The magnitude of impact upon aircraft pilots in flight on approach to a runway (termed "approach paths") is dependent on the following main factors:

- Whether glare is geometrically possible.
- The relative position and visibility of the reflecting panels relative to final approach path and whether the glare is within the main field of view of the pilots.
- The extent to which impacts coincide with effects of direct sunlight. Effects that coincide with direct sunlight appear less prominent than those that do not as the sun is a far more significant source of light than reflecting panels.
- Reflectors in the existing environment. Where there are existing reflective surfaces in the surrounding environment, solar panel glare is less noticeable for pilots.
- Solar panel glare duration per day.
- Number of days a solar panel glare is geometrically possible per year.
- The time of day when solar panel glare is possible.
- The length of the section of the final approach that is potentially affected by glare.

15.4.35 Where glare is not predicted toward approach paths or is not geometrically possible, a ‘No magnitude impact would occur.

15.4.36 Under the following scenarios ‘Low’ magnitude impact may be designated:

- Glare is predicted but it is outside a pilot’s main field of view.
- Glare has a “low potential for after-image” (green glare).
- Glare has a “potential for after-image” (yellow glare) with sufficient mitigating factors.
- Aerodrome has confirmed the level of glare is acceptable.

15.4.37 Where unmitigated glare with ‘potential for temporary after-image’ (yellow glare) is predicted to occur without sufficient mitigating factors, a ‘Medium' magnitude impact is designated.

15.4.38 Where unmitigated glare with ‘potential for permanent eye damage' (red glare) is predicted to occur without sufficient mitigating factors, a ‘High' magnitude impact is designated.

PRoWs and Horse Facilities

15.4.39 The maximum magnitude of impact for PRoWs and Horse Facilities is considered to be ‘Low’ because:

- It is likely that the existing and the proposed screening will obstruct line of sight between the reflecting arrays and users of PRoWs and at Horse Facilities.
- Where screening does not obstruct line of sight, reflections typically coincide with direct sunlight. Impacts that coincide with direct sunlight appear less prominent than those that do not as the sun is a far more significant source of light than reflecting panels.
- The reflection intensity for solar panels is similar to common outdoor sources of solar reflection (e.g. still water or car windows). Therefore, solar panel glare is likely to be comparable to that from common outdoor sources whilst navigating the natural and built environment on a regular basis.
- The stationary characteristics of fixed panels and the slow-moving nature of tracker panels means there won’t be sudden, unexpected movement which would typically spook horses.

15.4.40 As such, due to the 'Low' sensitivity and the maximum magnitude of impact of PRoWs and Horse Facilities being 'Low', the maximum significance of impact is considered 'Minor'. As such, PRoWs and Horse Facilities are not considered further within the assessment.

Agricultural Workers

15.4.41 The maximum magnitude of impact for Agricultural Workers is considered to be 'Low' because:

- It is likely that the existing and the proposed screening will obstruct line of sight between the reflecting arrays and Agricultural Workers.
- Where screening does not obstruct line of sight, reflections typically coincide with direct sunlight. Impacts that coincide with direct sunlight appear less prominent than those that do not as the sun is a far more significant source of light than reflecting panels.
- The reflection intensity for solar panels is similar to common outdoor sources of solar reflection (e.g. still water or car windows). Therefore, solar panel glare is likely to be comparable to that from common outdoor sources whilst navigating the natural and built environment on a regular basis.

15.4.42 As such, due to the 'Low' sensitivity and the maximum magnitude of impact of Agricultural Workers being 'Low', the maximum significance of impact is considered 'Minor'. As such, Agricultural Workers are not considered further within the assessment.

Assessment of Significance

15.4.43 The significance of any environmental effects is determined by the combination of the magnitude of any impacts and the sensitivity of the receptors, as seen below in Table 15.3. Effects deemed as moderate or greater are deemed to be "significant effects" in EIA terms.

Table 15.3: Significance of Impact

Sensitivity / Magnitude	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate
Medium	Major	Moderate	Moderate	Minor
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

15.5 Assessment Assumptions and Limitations

15.5.1 This preliminary assessment is based on baseline and Scheme design information available at the time of writing this chapter. A full assessment is being undertaken as part of the EIA, the assessment will be developed and refined following statutory consultation and as additional information becomes available, the final assessment presented within the ES.

15.5.2 Where the Scheme designs and details are either not yet known or incomplete at this stage, either assumptions have been made based on professional judgment, or, in the event that it is not possible to make any assumptions, no attempt at a full assessment has been made. This assessment is an iterative process and will be both expanded and made more specific as survey data is collected, analysed and reported on, and designs are further developed. This process will be carried out in conjunction with relevant consultees and third parties as necessary to achieve the most robust outcome.

15.5.3 The methodology for the Glint and Glare assessment has incorporated the following:

One option for solar panels is being considered: Fixed Panels. The use and distribution of both Fixed Panels and Tracking Panels across the Sites will be subject to further consideration as the

design of the Scheme progresses. At the time of PEIR, only Fixed Panels have been assessed and considered within the Glint and Glare Assessment.

15.6 Baseline Conditions

15.6.1 This section describes the baseline environmental characteristics for the Scheme and surrounding areas with specific reference to Glint and Glare.

Existing Baseline

15.6.2 The existing baseline conditions are derived from complete desk-based studies, the methodologies of which are given separately in Section 1.4.

Green Hill A and Green Hill A.2

Dwellings

15.6.3 As per best practice guidance and recommendations (Ref.12), residential dwellings were identified within the 1km screening distance of the Sites through a review of mapping and aerial photography of the region. 52 residential dwellings have been identified within this area for glare modelling consideration.

Roads

15.6.4 In accordance with good practice guidance (Ref.12), technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Scheme that are experienced by a road user along a local road would be considered 'Low' impact magnitude.

15.6.5 Given the 'Low' sensitivity of local road users and the maximum corresponding 'Low' impact magnitude, any glare experienced by a road user along a local road would be considered not significant in the worst-case scenario.

15.6.6 Kettering Road (A43) (national road) was identified as being within the screening distance of Green Hill A.2. A screening review indicated that there is a potential line of sight from A43 road users and the proposed panels such that this road will require technical modelling.

Aviation

15.6.7 Hold Farm Airfield, Pitsford Airfield and William Pitt Airfield were identified within 5km and will require technical modelling.

15.6.8 Sywell Aerodrome, Rothwell Airfield and Wold Lodge Airfield were identified within 10km and as such will be discussed qualitatively within the assessment but not included within the technical modelling for Green Hill A and Green Hill A.2. Sywell Aerodrome, Rothwell Airfield and Wold Lodge Airfield have not requested a modelling assessment for Green Hill A or Green Hill A.2.

Green Hill B

Dwellings

15.6.9 As per best practice guidance and recommendations (Ref.12), residential dwellings were identified within the 1km screening distance of the Sites through a review of mapping and aerial photography of the region. 23 residential dwellings have been identified within this area for glare modelling consideration.

Roads

15.6.10 In accordance with good practice guidance (Ref.12), technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Scheme that are experienced by a road user along a local road would be considered 'Low' impact magnitude.

15.6.11 Given the 'Low' sensitivity of local road users and the maximum corresponding 'Low' impact magnitude, any glare experienced by a road user along a local road would be considered not significant in the worst-case scenario.

15.6.12 Kettering Road (A43) (national road) was identified within the screening distance of Green Hill B. A screening review indicated that the line of sight is obstructed between the road users and reflecting panels by existing vegetation and terrain. As such, road receptors will be discussed qualitatively within the assessment but not included within the technical modelling.

Aviation

15.6.13 Pitsford Airfield, Sywell Aerodrome, William Pitt Airfield and Hold Farm Airfield were identified within 5km and will require modelling.

15.6.14 No additional aviation receptors were identified within 10km of Green Hill B.

Green Hill C, D and E

Dwellings

15.6.15 As per best practice guidance and recommendations (Ref.12), residential dwellings were identified within the 1km screening distance of the Sites through a review of mapping and aerial photography of the region. 85 residential dwellings have been identified within 1km of Sites C-E for glare modelling consideration.

Roads

15.6.16 No major national, national or regional roads were identified within 1km of Green Hill C.

15.6.17 In accordance with good practice guidance (Ref.12), technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Scheme that are experienced by a road user along a local road would be considered 'Low' impact magnitude.

15.6.18 Given the 'Low' sensitivity of local road users and the maximum corresponding 'Low' impact magnitude, any glare experienced by a road user along a local road would be considered not significant in the worst-case scenario.

15.6.19 No major national, national or regional roads were identified within 1km of Green Hill C and Green Hill D.

15.6.20 The A4500 (national road) and B573 (regional road) were identified within the screening distance of Green Hill E. A screening review indicated that the potential line of sight between road users on the A509 and the proposed panels is obstructed by vegetation and terrain. As such, the A509 will be discussed qualitatively within the assessment but not included within the technical modelling. A screening review indicated that there is a potential line of sight from A4500 and B573 road users and the proposed panels such that these roads will require technical modelling.

Aviation

15.6.21 Sywell Aerodrome, William Pitt Airfield and Hold Farm Airfield were identified within 5km of Site C and will require technical modelling. Sywell Aerodrome is also adjacent to Green Hill C.

15.6.22 Pitsford Airfield and Tower Farm Airfield were identified within 10km and as such will be discussed qualitatively within the assessment but not included within the technical modelling for Green Hill C. Pitsford Airfield and Tower Farm Airfield have not requested a modelling assessment for Green Hill C.

15.6.23 Sywell Aerodrome, William Pitt Airfield and Hold Farm Airfield were identified within 5km of Site D and will require technical modelling.

15.6.24 Pitsford Airfield, Tower Farm Airfield and Easton Maudit were identified within 10km and as such will be discussed qualitatively within the report but not included within the technical modelling for Green Hill D. Pitsford Airfield, Tower Farm Airfield and Easton Maudit have not requested a modelling assessment for Green Hill D.

15.6.25 Sywell Aerodrome, William Pitt Airfield, and Hold Farm Airfield were identified within 5km of Site E and will require technical modelling.

15.6.26 Pitsford Airfield, Tower Farm Airfield and Easton Maudit Airfield were identified within 10km and as such will be discussed qualitatively within the assessment but not included within the technical modelling for Green Hill E. Pitsford Airfield, Tower Farm Airfield and Easton Maudit have not requested a modelling assessment for Green Hill E.

Green Hill F

Dwellings

15.6.27 As per best practice guidance and recommendations (Ref.12), residential dwellings were identified within the 1km screening distance of the Sites through a review of mapping and aerial photography of the region. 133 residential dwellings have been identified within the study area of Site F for glare modelling consideration.

Roads

15.6.28 In accordance with good practice guidance (Ref.12), technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Scheme that are experienced by a road user along a local road would be considered 'Low' impact magnitude.

15.6.29 Given the 'Low' sensitivity of local road users and the maximum corresponding 'Low' impact magnitude, any glare experienced by a road user along a local road would be considered not significant in the worst-case scenario.

15.6.30 The A509 (national road) was identified within the screening distance of Green Hill F. A screening review indicated that there is a potential line of sight from A509 road users and the proposed panels such that it will require technical modelling.

Aviation

15.6.31 Easton Maudit Airfield and Tower Farm Airfield were identified within 5km and will require technical modelling.

15.6.32 New Farm Airfield, William Pitt Airfield and Sywell Aerodrome were identified within 10km and as such will be discussed qualitatively within the assessment but not included within the technical modelling for Green Hill F. New Farm Airfield, William Pitt Airfield and Sywell Aerodrome have not requested a modelling assessment for Green Hill F.

Green Hill G

Dwellings

15.6.33 As per best practice guidance and recommendations (Ref.12), residential dwellings were identified within the 1km screening distance of the Sites through a review of mapping and aerial photography of the region. 49 residential dwellings have been identified within the study area of SIte G for glare modelling consideration.

Roads

15.6.34 In accordance with good practice guidance (Ref.12), technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Scheme that are experienced by a road user along a local road would be considered 'Low' impact magnitude.

15.6.35 Given the 'Low' sensitivity of local road users and the maximum corresponding 'Low' impact magnitude, any glare experienced by a road user along a local road would be considered not significant in the worst-case scenario.

15.6.36 The A428 and the A509 (national roads) were identified within the screening distance of Green Hill G. A screening review indicated that there is a potential line of sight from road users along the A428 and A509 and the proposed panels such that it will require technical modelling.

Aviation

15.6.37 Easton Maudit Airfield was identified within 5km and will require technical modelling.

15.6.38 New Farm Airfield, Tower Farm Airfield and Top Farm Airfield were identified within 10km and as such will be discussed qualitatively within the assessment but not included within the technical modelling of Green Hill G. New Farm Airfield, Tower Farm Airfield and Top Farm Airfield have not requested a modelling assessment for Green Hill G.

Future Baseline

15.6.39 This section considers changes to the baseline conditions, described above, that might occur in the absence of the Scheme and during the time period over which the Scheme would be in place. The future baseline scenarios are set out in **Chapter 2: EIA Process and Methodology**.

15.6.40 In absence of the Scheme, it is considered there will be no change to the future baseline for Glint and Glare. The baseline details as presented above are not anticipated to change in the absence of the Scheme.

15.7 Embedded Mitigation Measures

15.7.1 The way that potential environmental impacts have been or will be prevented, avoided or mitigated to reduce impacts to a minimum through design and/or management of the Scheme is outlined in this section and will be considered as part of the assessment of the potential effects.

15.7.2 The following embedded mitigation measures for operation have been incorporated into the available Scheme's design information, with detailed proposals and locations to be submitted with the DCO application.

Embedded Operation Mitigation Measures

15.7.3 The Applicant has included the following embedded mitigation in this preliminary assessment to reduce glint and glare effects from the Scheme to acceptable levels. These embedded mitigation options include screening in the form of vegetation, or instant screening for ground-based receptors if necessary whilst vegetation becomes established (in this case the Applicant will implement an interim mitigation likely to be opaque fencing). Where a tracker panels system is proposed, a further embedded mitigation option is a change in backtracking angle which can be modified to project solar reflections away from receptors (both ground-based receptors and aviation); this will be considered further as part of the assessment of tracker panels within the ES. Where embedded mitigation has been factored into the preliminary assessment, this is set out below.

15.8 Assessment of Likely Impacts and Effects

15.8.1 Considering the embedded mitigation measures, and the potential for the Scheme to generate effects was assessed using the methodology as detailed in Section 15.4 of this Chapter. In the sections below, associated impacts and effects during the operation phase of the Scheme are discussed.

Significance of Effect

Green Hill A and A.2

15.8.2 Geometric modelling shows that a moderate effect is possible at 27 of the 52 dwellings modelled. However, at these receptors a combination of proposed and existing screening is predicted to obstruct the line of sight such that the effects are predicted to be low. For the remaining dwelling receptors, effects are predicted to be lower. Further details are provided in **Volume 3, Volume 3, Appendix 15.2.**

15.8.3 Glare is predicted towards road users along a section of approximately 400m length of the A43. However, following line of sight analysis, the majority of the glare predicted towards the modelled receptors will be outside the 50-degree line of sight of road users. As such, a minor effect is predicted towards these receptors. For the remaining road receptors effects are predicted to be lower. As such, the residual effect is non-significant at all modelled receptors. Further details are provided in **Volume 3, Volume 3, Appendix 15.2.**

15.8.4 A moderate effect is predicted for modelled aviation receptors at Hold Farm Airfield. A minor/negligible effect is predicted at Pitsford Airfield and as such is non-significant. Additionally, minor/negligible effects are predicted towards Sywell Aerodrome, William Pitt Airfield, and Rothwell Airfield and is not significant. Further details are provided in **Volume 3**, **Volume 3, Appendix 15.2**.

15.8.5 Due to the intensity and duration of glare predicted towards approach paths, and upon consideration of mitigation factors and proposed embedded mitigation, moderate, and therefore significant, effects are predicted at Hold Farm Airfield.

15.8.6 Community uses, PRoW and bridleways are located in the surrounding area. Reflections towards observers at these community uses or along these PRoW and Bridleways could therefore be experienced under certain conditions (typically when the Sun is low in the sky beyond the panels). Significant impacts on pedestrians/observers at community uses or along PRoW and bridleways due to glint and glare effects from the proposed development are not predicted. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance.

Green Hill B

15.8.7 Geometric modelling shows that a moderate effect is possible at 6 of the 22 dwellings modelled. However, at these receptors a combination of proposed and existing screening is predicted to obstruct the line of sight such that the effects are predicted to be low. For the remaining dwelling receptors effects are predicted to be lower. Further details are provided in **Volume 3**, **Volume 3, Appendix 15.3**.

15.8.8 A negligible effect is predicted towards road users along the A43. As such, the residual effect is non-significant at all modelled receptors. Further details are provided in **Volume 3, Volume 3, Appendix 15.3.**

15.8.9 A moderate effect is predicted for modelled aviation receptors at Pitsford Airfield. For the remaining modelled receptors at Sywell Aerodrome, Hold Farm Airfield and William Pitt Airfield, effects are predicted to be lower, and as such are non-significant. Further details are provided in **Volume 3, Volume 3, Appendix 15.3.**

15.8.10 Due to the intensity and duration of glare predicted towards approach paths, and upon consideration of mitigation factors and proposed embedded mitigation, moderate, and therefore significant, effects are predicted at Pitsford Airfield.

15.8.11 Community uses, PRoW and bridleways are located in the surrounding area. Reflections towards observers at these community uses or along these PRoW and Bridleways could therefore be experienced under certain conditions (typically when the Sun is low in the sky beyond the panels). Significant impacts on pedestrians/observers at community uses or along PRoW and bridleways due to glint and glare effects from the proposed development are not predicted. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance.

Green Hill C, D and E

15.8.12 Geometric modelling shows that a moderate effect is possible at 50 of the 85 dwellings modelled. However, at these receptors a combination of proposed and existing screening is predicted to obstruct the line of sight such that the effects are predicted to be low. For the remaining dwelling receptors effects are predicted to be lower. Further details are provided in **Volume 3, Appendix 15.4.**

15.8.13 Glare is predicted towards road users along a section of approximately r is predicted towards road users along a section of approximately a is predicted towards road users along a section of approximately l is predicted towards road users along a section of approximately .2km length of the A4500. However, following line of sight analysis, the majority of the glare predicted towards the modelled receptors will be outside the 50-degree line of sight of road users. As such, a minor effect is predicted towards these receptors.For the remaining road receptors effects are predicted

to be lower. As such, the residual effect is non-significant at all modelled receptors. Further details are provided in **Volume 3, Appendix 15.4.**

15.8.14 A moderate effect is predicted for modelled aviation receptors at Sywell Aerodrome and William Pitt Airfield. For the remaining modelled receptors at Hold Farm Airfield, effects are predicted to be lower and as such are non-significant. Further details are provided **in Volume 3, Appendix 15.4.**

15.8.15 Due to the intensity and duration of glare predicted towards approach paths, and upon consideration of mitigation factors and proposed embedded mitigation, moderate, and therefore significant, effects are predicted at Sywell Aerodrome and William Pitt Airfield.

15.8.16 Community uses, PRoW and bridleways are located in the surrounding area. Reflections towards observers at these community uses or along these PRoW and Bridleways could therefore be experienced under certain conditions (typically when the Sun is low in the sky beyond the panels). Significant impacts on pedestrians/observers at community uses or along PRoW and bridleways due to glint and glare effects from the proposed development are not predicted. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance.

Green Hill F

15.8.17 Geometric modelling shows that a moderate effect is possible at 109 of the 133 dwellings modelled. However, at these receptors a combination of proposed and existing screening is predicted to obstruct the line of sight such that the effects are predicted to be low. For the remaining dwelling receptors effects are predicted to be lower. Further details are provided in **Volume 3, Appendix 15.5.**

15.8.18 Glare is predicted towards road users along a section of approximately 550m length of the A509. However, following line of sight analysis, the majority of the glare predicted towards the modelled receptors will be outside the 50-degree line of sight of road users. As such, a minor effect is predicted towards these receptors. For the remaining road receptors effects are predicted to be lower. As such, the residual effect is non-significant at all modelled receptors. Further details are provided in **Volume 3, Appendix 15.5.**

15.8.19 A moderate effect is predicted for modelled aviation receptors at Easton Maudit Airfield. For the remaining modelled receptors at Tower Farm Airfield, effects are predicted to be lower and as such are non-significant. Further details are provided in **Volume 3, Appendix 15.5.**

15.8.20 Due to the intensity and duration of glare predicted towards approach paths, and upon consideration of mitigation factors and proposed embedded mitigation, moderate, and therefore significant, effects are predicted at Easton Maudit Airfield.

Green Hill G

15.8.21 Upon consideration of modelling results and the proposed embedded mitigation, there are no significant effects from Green Hill G.

15.8.22 Geometric modelling shows that a moderate effect is possible at 21 of the 49 dwellings modelled. However, at these receptors a combination of proposed and existing screening is predicted to obstruct the line of sight such that the effects are predicted to be low. For the remaining dwelling receptors effects are predicted to be lower. Further details are provided in **Volume 3, Appendix 15.6.**

15.8.23 Glare is predicted towards road users along a section of approximately 550m length of the A509, and along a section of approximately 1.9km length of the A428. However, following line of sight analysis, the majority of the glare predicted towards the modelled receptors will be outside the 50-degree line of sight of road users. As such, a minor effect is predicted towards these receptors. For the remaining road receptors effects are predicted to be lower. As such, the residual effect is non-significant at all modelled receptors. Further details are provided in **Volume 3, Appendix 15.6**.

15.8.24 A minor effect is predicted for modelled aviation receptors at Easton Maudit Airfield and as such, is non-significant. Further details are provided in **Volume 3, Appendix 15.6**.

15.8.25 Community uses, PRoW and bridleways are located in the surrounding area. Reflections towards observers at these community uses or along these PRoW and Bridleways could therefore be experienced under certain conditions (typically when the Sun is low in the sky beyond the panels). Significant impacts on pedestrians/observers at community uses or along PRoW and bridleways due to glint and glare effects from the proposed development are not predicted. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance.

15.9 Additional Mitigation Measures

15.9.1 The following additional mitigation measures for the operation phase has been incorporated into the Scheme design, with detailed proposals and locations to be submitted with the DCO application.

15.9.2 The following additional mitigation measures have been identified so to reduce impact on ground-based and aviation receptors.

15.9.3 Opaque fencing – It is expected that the embedded mitigation will take time to reach maturity such that it is tall and dense enough to obstruct line of sight between affected ground-based receptors and reflecting arrays. As such, opaque fencing is proposed during this period.

15.9.4 Backtracking Panels – It is proposed that where possible, backtracking panels will be utilised such that significant glint and glare is not predicted towards ground-based and aviation receptors.

15.9.5 Where necessary, opaque fencing will be implemented/installed and confirmed through CEMP, and modelling will be undertaken to confirm the use of backtracking panels.

15.9.6 The residual effect at ground-based receptors following the implementation of opaque fencing is considered to be minor. Modelling will be undertaken to confirm the residual effect on aviation receptors following the potential implementation of backtracking panels.

15.10 Residual Effects

15.10.1 Whilst at this stage of the PEIR residual effects have not been fully assessed, it is anticipated that mitigation measures such as vegetation and backtracking (if applicable), will result in no significant residual adverse effects towards ground-based receptors.

15.10.2 Moderate effects are predicted at Hold Farm Airfield, Pitsford Airfield, Sywell Aerodrome, William Pitt Airfield, and Easton Maudit Airfield.

15.11 Cumulative Effects

15.11.1 The ES will give consideration to potential cumulative effects of the Scheme and other relevant projects within the vicinity of the Scheme on a single receptor/resource.

15.11.2 A list of cumulative projects can be found in **Volume 3, Appendix 2.2** of the PEIR, the list will be reviewed and refined in preparation of the DCO application submission through further consultation and will be presented and assessed in the ES. Cumulative effects will be listed within **Chapter 25: Cumulative Effects** of the ES.

15.11.3 Cumulative effects that could arise from nearby solar projects within screening distances of ground-based receptors.

15.11.4 **Cumulative effects**

15.11.5 Cumulative effects are possible when other solar farms are located within the 1km study area of ground-based receptors.

15.11.6 Cumulative effects are not possible for aviation receptors, as magnitude of impact is derived from the intensity of glare predicted, not duration. Intensity is not cumulative, and as such cumulative effects are not possible.

15.11.7 It is noted that Sywell Solar Farm is located within 1km of some of the modelled receptors for Green Hill Solar Farm. Therefore, when within 1km of receptors, it has been included within the modelling assessment.

15.11.8 Results show that receptors are not predicted to be affected by Glint and Glare at both Sywell Solar Farm and Green Hill Solar Farm simultaneously.

15.11.9 As such, there are considered to be no cumulative effects in conjunction with other similar developments or as the combined effect of a set of developments following respective mitigation that would cumulatively impact the Scheme.

In-combination effects

15.11.10 The in-combination effect interaction is the effect over and above the individual effects assessed in other chapters and is described as the difference between the change caused to a receptor from one effect alone and the change caused to the receptor from all effects combined.

15.11.11 The assessment of in-combination effect interactions has concluded that there is no potential for significant effect interactions as a result of the Scheme.

15.12 Summary

15.12.1 This chapter of the PEIR has identified the existing environment in relation to Glint and Glare and the assessment work that has been undertaken to date including glare modelling assessments for Green Hill A to G to assess impacts on nearby residential, road and aviation receptors. The proposed development is predicted to have a moderate effect on nearby sensitive receptors at worst, though once glare mitigation measures have been applied, effect is predicted to be low or negligible.

15.12.2 Preliminary mitigation measures including a landscaping plan involving additional planting at required areas around the boundary of the proposed development are being explored and have been described with potential residual effects outlined.

15.12.3 Further assessment on the Scheme will be carried out for the ES. Consultation will be sought from aerodromes that have the potential to be significantly affected, including Sywell Aerodrome, William Pitt Airfield, Easton Maudit Airfield, Pitsford Airfield and Hold Farm Airfield. If safeguarding concerns are raised by the aerodromes, additional assessment will be carried out to implement any requested mitigation.

15.12.4 At this stage the low effect for residential and road receptors is based on expectation of additional glare mitigation in the form of planting. These mitigation measures will also be thoroughly assessed, primarily which areas of the boundary will require additional planting to keep residual effects low.

15.12.5 At this stage the low effect for residential and road receptors is based on expectation of additional glare mitigation in the form of planting. These mitigation measures will also be thoroughly assessed, primarily which areas of the boundary will require additional planting to keep residual effects low.

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