OAKLANDS FARM SOLAR PARK

Applicant: Oaklands Farm Solar Ltd

Environmental Statement
Chapter 14 – Glint and Glare
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Planning Act 2008
Infrastructure Planning (Application: Prescribed Forms and Procedure) Regulations 2009 - 5(2)(a)

Chapter 14
Glint and Glare

Introduction

14.1 This chapter considers the potential for glint and glare effects from the Proposed Development upon surrounding road users, dwellings, and aviation activity associated with Gangewood Airfield, Sittles Farm Airstrip, Fisherwick Airfield, Streethay Farm Airstrip, and Tatenhill Airfield.

14.2 Glint is defined as "*a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel*" and glare as "*a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel*"[1].

14.3 The glint and glare assessment was undertaken by Pager Power Limited.

14.4 The following appendix is also referred to throughout this chapter:

- **Appendix 14.1 Solar Photovoltaic Glint and Glare Study.**

Scope of the Assessment

Scheme Parameters Assessed

14.5 This assessment is based on the reflector area shown in Figure 15 of **Appendix 14.1 Solar Photovoltaic Glint and Glare Study**. This is a greater area than the extents of the solar PV panels (Work No. 1) on the Work Plans presented in **Appendix 1.3** and as such represents a worst-case assessment. The assessment conclusions would not change if the specific arrangement of solar PV panels within Work No. 1 varied as the worst case/maximum area has been assessed.

[1] Department for Energy Security and Net Zero (2023) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3).

Effects Assessed in Full

14.6 The following effects were identified at the scoping stage for inclusion in this assessment:

- Direct effects from glint and glare during the operational phase[2], and partially during the construction and decommissioning phases (as panels are erected and removed) on:
  - Ground-based receptors (roads and dwellings); and
  - Aviation activity associated with Gangewood Airfield, Sittles Farm Airstrip, Fisherwick Airfield, Streethay Farm Airstrip, and Tatenhill Airfield.
- Cumulative effects during operation from glint and glare on:
  - Ground-based receptors (roads and dwellings); and
  - Aviation activity associated with Gangewood Airfield, Sittles Farm Airstrip, Fisherwick Airfield, Streethay Farm Airstrip, and Tatenhill Airfield.

14.7 Effects during construction and decommissioning phases may be sensitive to variable factors such as where solar PV panels are stored and in what orientation at the Site prior to operation of the Proposed Development. In general terms, as not all panels will be installed, the length and intensity of any solar reflections during the construction and decommissioning phases will be less than or equal to the operational phase. As such only the operational phase has been assessed in this chapter.

Effects Scoped Out

14.8 Indirect effects during construction, operation or decommissioning have been scoped out of this assessment. This is because indirect effects are not possible in the context of glint and glare.

[2] Only glint and glare from the solar PV panels has been assessed because in Pager Power's experience, the solar panels themselves are the leading source of specular reflections which have the potential to cause significant impacts upon safety or amenity. Other infrastructure on site is not considered likely to produce glare.

Assessment Methodology

Legislation, Policy and Guidance

Legislation

14.9 This assessment is carried out in accordance with the principles contained within the following legislation:

- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[3].

Policy

- The Overarching National Policy Statement (NPS) for Energy (EN-1) July 2011[4] and the November 2023 draft NPS for Energy (EN-1)[5] to be designated.
- NPS for Renewable Energy Infrastructure (EN-3) July 2011[6] and the November 2023 draft NPS for Renewable Energy Infrastructure (EN-3)[7] to be designated.
- NPS for Electricity Networks Infrastructure (EN-5) July 2011[8] and the November 2023 draft NPS for Electricity Networks Infrastructure (EN-5)[9] to be designated.

14.10 Only the November 2023 draft NPS EN-3 to be designated refers to glint and glare from paragraph 2.10.102 to 2.10.106, 2.10.134 to 2.10.136 and 2.10.158 to 2.10.159. The relevant excerpts are presented in Appendix A of **Appendix 14.1: Solar Photovoltaic Glint and Glare Study**.

[3] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. SI 572.
[4] Department for Energy and Climate Change (2011) Overarching National Policy Statement for Energy (EN-1)
[5] Department for Energy Security and Net Zero (2023) Draft Overarching National Policy Statement for Energy (EN-1)
[6] Department for Energy and Climate Change (2011) National Policy Statement for Renewable Energy Infrastructure (EN-3)
[7] Department for Energy Security and Net Zero (2023) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)
[8] Department for Energy and Climate Change (2011) National Policy Statement for Electricity Networks Infrastructure (EN-5)
[9] Department for Energy Security and Net Zero (2023) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)

Guidance

14.11 This assessment is carried out in accordance with the principles contained within the following documents:

- Guidance for Renewable and Low Carbon Energy (specifically regarding the consideration of solar farms, paragraph 013), 18 June 2015[10].
- Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports, November 2021[11].
- Pager Power (September 2022) Solar Photovoltaic Glint and Glare Guidance - Fourth Edition.

Consultation

14.12 In undertaking the assessment, consideration has been given to the scoping responses and other consultation which has been undertaken as detailed in **Table 14.1**.

[10] Department for Levelling Up, Housing and Communities (June 2015) Renewable and Low Carbon Energy.
[11] Federal Aviation Administration (2021) Review of Solar Energy System Projects on Federally-Obligated Airports. Available at: https://www.federalregister.gov/documents/2021/05/11/2021-09862/federal-aviation-administration-policy-review-of-solar-energy-system-projects-on-federally-obligated [Accessed 11/10/23]

Table 14.1: Consultation Responses

Consultee and Date	Issue Raised	Response/Action Taken
Scoping Consultation Responses		
Planning Inspectorate September 2021	Advised that an assessment of glint and glare should be provided. This should demonstrate the short to medium term effects of the Proposed Development prior to establishment of screening and the effectiveness of such landscape mitigation once established.	The temporary effects prior to and following the establishment of proposed landscaping are presented in the **Residual Operational Effects** section. Ground-based receptors in the study area have been identified in **Appendix 14.1 Solar Photovoltaic Glint and Glare Study**, including elevated viewpoints.
	Advised that potential effects on aviation receptors should be addressed in the Environmental Statement (ES). Advised that the assessment should explain how elevated receptors which may overlook the Site have been considered in the assessment. Receptors should include community uses, Public Rights of Ways (PRoW) and bridleways as well as residential and road users.	This chapter considers the potential effects on community uses, PRoW, bridleways, residential amenity, road safety, and surrounding aviation activity. Consideration is given to community uses and for the reasons set out in paragraph 14.23 below a full assessment is not required.

Consultee and Date	Issue Raised	Response/Action Taken
Derbyshire County Council (DCC) – September 2021	Advised that potential effects on road safety should be addressed in the ES. Advised that glint and glare should be included within the ES.	This chapter considers the potential effects of glint and glare on road safety. Glint and glare has been included within the ES.
Drakelow Parish – August 2021	Recognised a modelling report on glint and glare will be provided and this should form part of the ES.	**Appendix 14.1 Solar Photovoltaic Glint and Glare Study** has been submitted along with the ES.
South Derbyshire District Council – September 2021	Agreed that glint and glare can be scoped out of the ES.	Glint and glare has been included within the ES due to other consultee responses.
PEIR Consultation Responses		
Derbyshire County Council (DCC) and South Derbyshire District Council (SDDC) – June 2022 and 24/03/23 for targeted consultation	This authority does not have the in-house expertise to assess the data included in the PEIR appendices.	Noted.

Study Area

Ground-Based Receptors

14.13 A 1km study area is considered appropriate for glint and glare effects on ground-based receptors, based on extensive project experience. A 1km assessment area is applied for ground-based receptors because of the relatively low-lying nature of solar panels. This means that the likelihood of any visibility beyond the immediate site boundary of a solar farm becomes limited or nonexistent in most cases because terrain and shielding by structures are more likely to obstruct an observer's view at longer distances.

14.14 Where visibility of the solar panels remains for elevated viewpoints, the significance of a reflection decreases with distance due to the proportion of an observer's field of vision taken up by the reflecting area diminishing as the separation distance increases.

14.15 Based on all of the above considerations, an assessment area of 1km boundary is therefore considered conservative when assessing glint and glare.

14.16 Reflections from south facing panels in the northern hemisphere are only geometrically possible towards ground-based receptors to the south of a solar development. Reflections towards ground-based receptors to the north of the panels (such as new residential properties at Drakelow) are not considered geometrically possible and are therefore also removed from the study area.

14.17 The 1km study area applied for ground-based receptors is shown by the orange line in **Plates 1 and 2** on the following page.

Plate 1: 1km assessment area for ground-based receptors with assessed road receptors

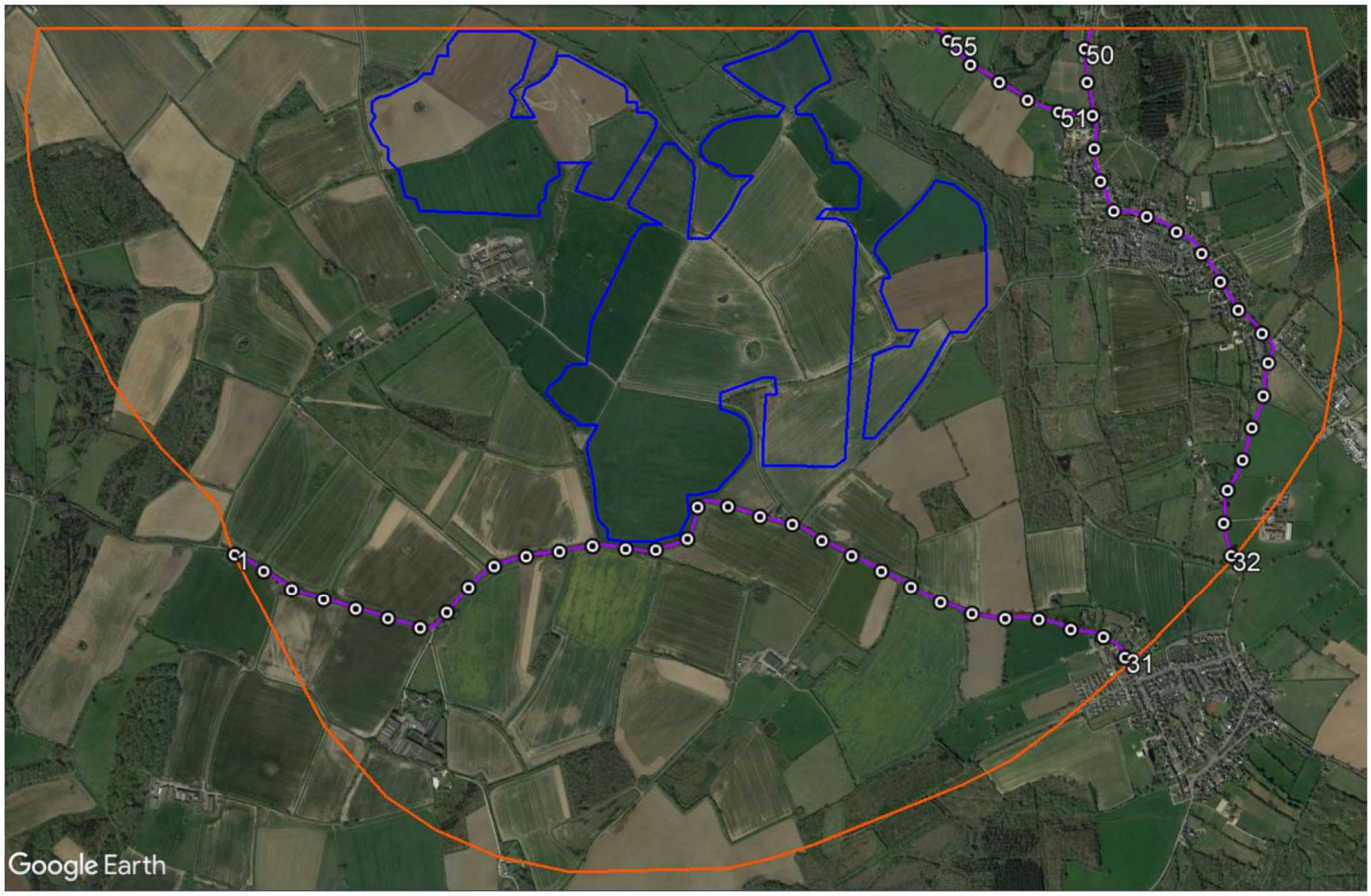
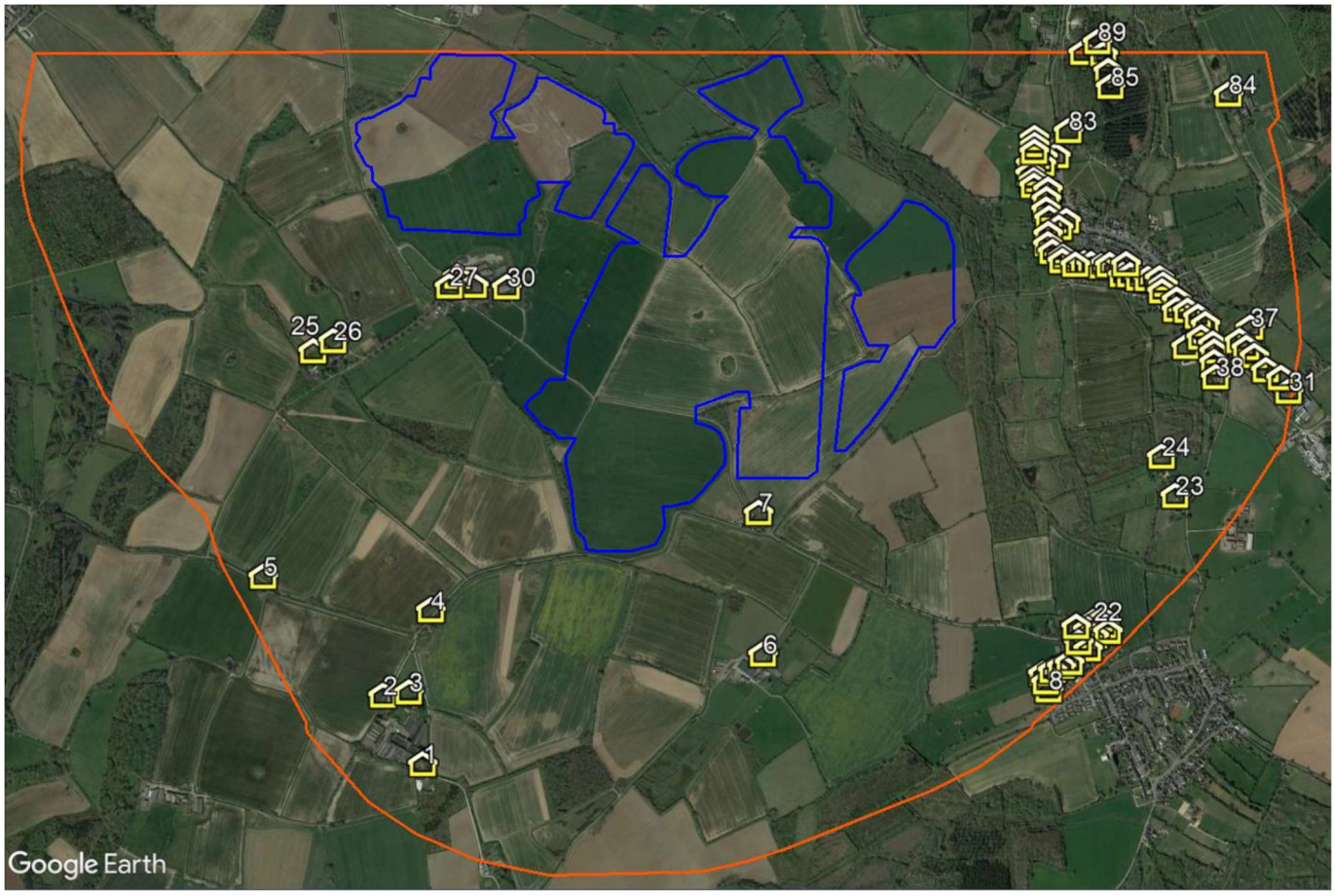


Plate 2: 1km assessment area for ground-based receptors with assessed dwelling receptors

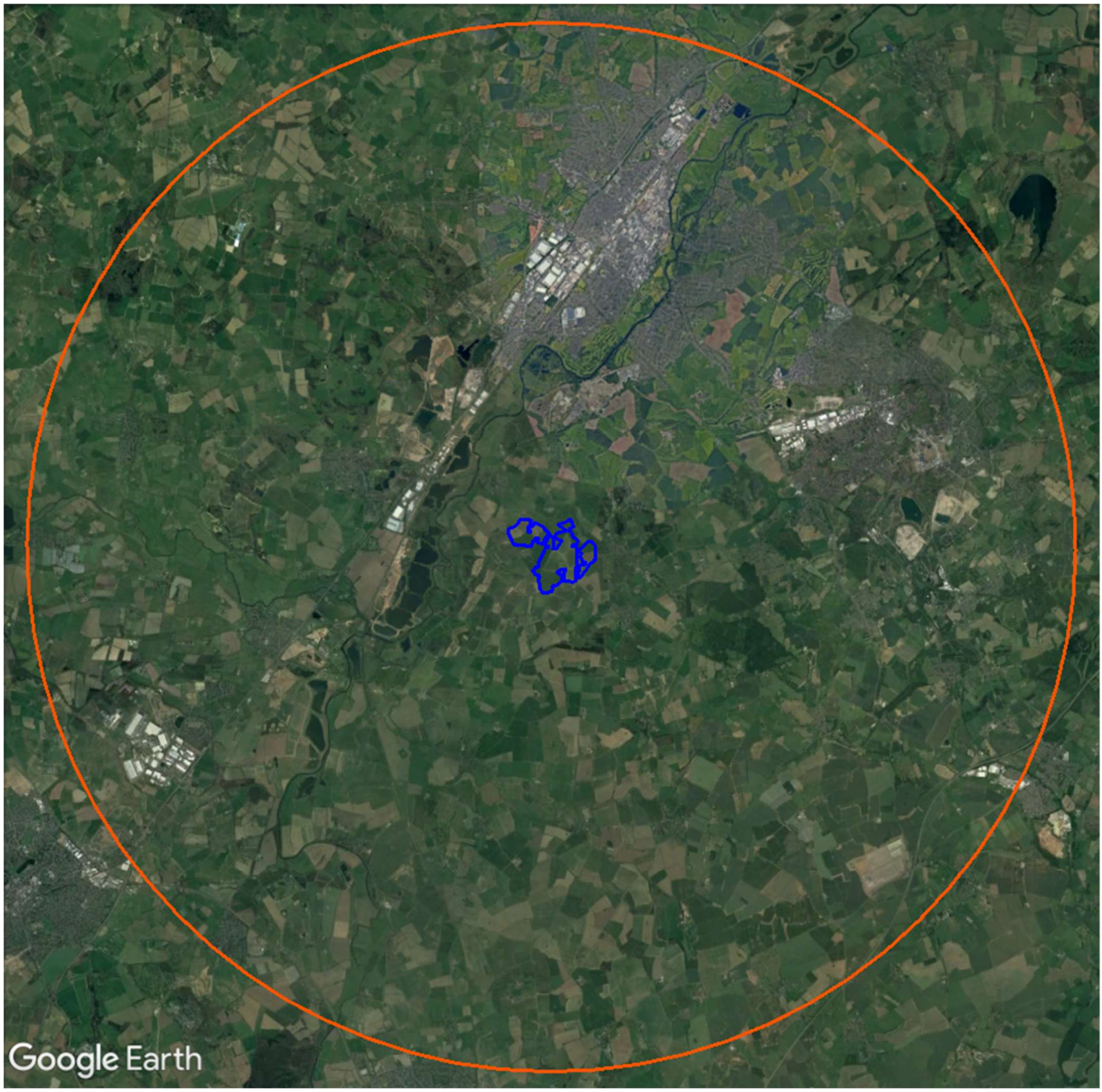


Aviation Receptors

14.18 Glint and glare assessment for aviation receptors are typically undertaken for aerodromes within 10km of a proposed solar development. At ranges of 10-20km, the requirement for assessment is much less common, with assessment only typically being undertaken for licensed aerodromes at these ranges.

14.19 A 10km study area is considered appropriate for glint and glare effects on aviation receptors in this instance. One licensed aerodrome (Tatenhill) is located within 10km of the Site. All other licensed aerodromes beyond 10km and within 20km of the Site are of a size, scale and geographic relationship to the Site that no further consideration is necessary. The 10km study area applied for aviation infrastructure is presented in **Plate 3**.

Plate 3: 10km assessment area for surrounding aerodromes



Desk Based Research and Data Sources

14.20 The following data sources have informed the assessment:

- Online aerial and street view imagery.
- Ordnance Survey Digital Terrain Model 50.
- Aeronautical charts.

Field Survey

14.21 A field survey was undertaken on the 13th of June 2022 to ascertain visibility at key ground-based receptors and confirm the results of the technical assessment. The weather was cloudy, and conditions were dry.

Assessing Significance

Sensitivity

14.22 Sensitivity has been determined based on the following classifications.

Table 14.2: Defining Sensitivity of Receptor

Sensitivity	Description
High	The receptor has little capacity to experience solar reflections without resulting in a significant reduction in safety or amenity, or is of international or national importance.
Medium	The receptor has moderate capacity to experience solar reflections without resulting in a significant reduction in safety or amenity, or is of high importance.
Low	The receptor is able to experience solar reflections without resulting in a significant reduction in safety or amenity, or is of low or local importance.

Users of Community Uses, Public Rights of Way and Bridleways

14.23 Significant impacts on pedestrians or horse riders in community uses or along the PRoW and bridleways are not predicted due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be low. This is because:

- The typical density of pedestrians in community uses or on a PRoW, and horse riders on a bridleway, is low in a rural environment.
- Any resultant effect is much less serious and has far lesser consequences than, for example, solar reflections experienced towards a road network whereby the resultant impacts of a solar reflection can be much more serious.
- Glint and glare effects towards receptors at a community use on a PRoW and a bridleway are transient, and time and location sensitive whereby an observer could move beyond the solar reflection zone with ease with little impact upon safety or amenity.
- Any observable solar reflection to users of a community use or the PRoW and bridleways would be of similar intensity to those experienced whilst navigating the natural and built environment on a regular basis.
- There is no safety hazard associated with reflections towards an observer at a community use or on a PRoW or bridleway.

14.24 Community uses, PRoW and bridleways have not been discussed further within this chapter.

Road Users

14.25 To determine the sensitivity of road users, it is relevant to consider that road types can generally be categorised as:

- Major National – Typically a road with a minimum of two carriageways with a maximum speed limit of up to 70mph. These roads typically have fast moving vehicles with busy traffic.
- National – Typically a road with one or more carriageways with a maximum speed limit of up to 60mph or 70mph. These roads typically have fast moving vehicles with moderate to busy traffic density.

- Regional – Typically a single carriageway with a maximum speed limit of up to 60mph. The speed of vehicles will vary with a typical traffic density of low to moderate.
- Local – Typically roads and lanes with the lowest traffic densities. Speed limits vary.

14.26 Local roads would be considered as 'low' sensitivity because they are of less significance to road networks. This is primarily due to the road type typically having the lowest traffic densities, which means the potential impact of a distraction or degradation to safety and/or operation due to a solar reflection is low.

14.27 Regional, National, and Major National roads would be considered as 'medium' sensitivity because a road user on these roads requires a greater level of concentration to safely travel along busy roads at high speeds, compared to the level of concentration required to safely travel along empty roads at slower speeds. Road users, however, have some capacity to experience solar reflections without causing a distraction and a degradation to safety.

Dwellings

14.28 Dwellings are considered 'medium' sensitivity because there is some capacity for observers to experience solar reflections for certain durations throughout the year or on any given day without causing a significant reduction in residential amenity but are of high importance to individual residents.

Aviation

14.29 Aviation receptors are considered as 'medium' sensitivity because they are of high importance and approaching aircraft have some capacity to experience solar reflections without causing a distraction and a degradation to safety. This can be in relation to the glare intensity being sufficiently low or because the solar reflection can be operationally accommodated.

Magnitude

14.30 The magnitude of change has been assessed based on the following classifications.

Table 14.3: Defining Magnitude of Change

Magnitude of Change	Criteria for Assessing Effect
High	Total loss or substantial alteration to key features of the baseline conditions such that receptor attributes will be fundamentally changed.
Medium	Loss or alteration to one or more key features of the baseline conditions such that receptor attributes will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the alteration will be discernible but not material. The underlying attributes of the baseline condition will be largely unchanged.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Road Users

14.31 The magnitude of change upon road user receptors is predominantly dependent on the following factors (Pager Power, 2022[12]):

- Whether a solar reflection is predicted to be experienced.
- The type of road – in the context of traffic speeds and likely densities.
- The location of the reflecting panels relative to a road user's direction of travel – a solar reflection directly in front of a driver is more hazardous than a reflection from a location off to one side.

14.32 A 'negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by a road user.

14.33 A 'low' magnitude would occur if solar reflections would all originate from outside a road user's primary horizontal field of view (50 degrees either side of the direction of travel).

[12] Pager Power (September 2022) Solar Photovoltaic Glint and Glare Guidance - Fourth Edition

Reflections originating within a road user's primary horizontal field of view can be of 'low' magnitude based on consideration of the following factors:

- Whether visibility is likely for elevated drivers (applicable to dual carriageways and motorways only) – there is typically a higher density of elevated drivers (such as HGVs) along dual carriageways and motorways compared to other types of road.
- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare.
- The position of the Sun – the Sun is a far more significant source of light and therefore effects that coincide with direct sunlight appear less prominent than those that do not.
- Whether the solar reflection originates from directly in front of a road user – a solar reflection directly in front of a road user is the most significant location with respect to road safety.

14.34 A 'medium' magnitude would occur if solar reflections were experienced from within a driver's primary horizontal field of view and the glare scenario is considered significant.

14.35 A 'high' magnitude would occur if solar reflections were experienced from directly in front of a road user's direction of travel with no mitigating factors.

Dwellings

14.36 The magnitude of effect upon dwelling receptors is predominantly dependent on the following factors (Pager Power, 2022[12]):

- Whether a solar reflection is predicted to be experienced.
- The duration of the predicted effects, relative to thresholds of three months per year and sixty minutes per day.

14.37 A 'negligible' magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by an observer within a dwelling.

14.38 A 'low' magnitude would occur when a solar reflection would be experienced for less than three months per year and for less than 60 minutes on any given day. Reflections occurring for more than three months per year or for more than 60 minutes on any given day can be of 'low' magnitude based on consideration of the following factors:

- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare.
- The position of the Sun – the Sun is a far more significant source of light and therefore effects that coincide with direct sunlight appear less prominent than those that do not.
- Whether visibility is likely from all storeys – the ground floor is typically considered the main living space and has a greater significance with respect to residential amenity.
- Whether the dwelling appears to have windows facing the reflecting areas. An observer may need to look from a wide angle to observe the reflecting areas.

14.39 A 'medium' magnitude would occur if solar reflections were experienced for more than three months per year or for more than 60 minutes on any given day and the glare scenario is considered significant.

14.40 A 'high' magnitude would occur if solar reflections were experienced for more than three months per year and for more than 60 minutes on any given day.

Aviation

14.41 Aviation receptors are most easily separated into two types:

- Ground level receptors – most typically the Air Traffic Control (ATC) Tower.
- Airborne receptors – most typically the approach paths and aircraft using visual circuits.

14.42 The magnitude will differ depending on the type of receptor.

ATC Tower

14.43 The magnitude of effect upon the ATC Tower receptors is dependent on the following main factors (Pager Power, 2022[12]):

- Whether a solar reflection is predicted to be experienced.
- The glare intensity, relative to the thresholds of:
  - Glare with 'low potential for temporary after-image' (green glare).
  - Glare with 'potential for temporary after-image' (yellow glare)
  - Glare with 'potential for permanent eye damage' (red glare).
- Whether a reflection is predicted to be operationally significant in practice.

14.44 A ‘negligible’ magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by ATC personnel.

14.45 A ‘low’ magnitude would occur if solar reflections with intensities of no greater than ‘low potential for temporary after-image’ were experienced by ATC personnel but the aerodrome confirmed the level of glare is acceptable, and based on consideration of the following factors:

- The likely traffic volumes and level of safeguarding at the aerodrome. Licensed aerodromes typically have higher traffic volumes and are formally safeguarded.
- The time of day at which glare is predicted and whether the ATC Tower is operational at these times.
- The duration of any predicted glare – glare that is experienced for low durations throughout the year is less significant than longer durations.
- Glare location relative to key operational areas such as runway thresholds and taxi areas.
- The relative size of the reflecting panel area and whether the reflecting area takes up a large percentage of a controller’s horizontal field-of-view[13].
- The position of the Sun – the Sun is a far more significant source of light and therefore effects that coincide with direct sunlight appear less prominent than those that do not.
- The level of predicted effect relative to existing sources of glare – a solar reflection is less noticeable to ATC personnel when there are existing reflective surfaces in the surrounding environment.

14.46 A ‘medium’ magnitude would occur if solar reflections with intensities of no greater than ‘low potential for temporary after-image’ were experienced by ATC personnel and the glare scenario is considered significant, or if solar reflections with intensities of no greater than ‘potential for temporary after-image’ are experienced.

14.47 A ‘high’ magnitude would occur if solar reflections with intensities of ‘potential for permanent eye damage’ were experienced by ATC personnel.

[13] 210 degrees azimuth field of view

Airborne Receptors

14.48 The magnitude of effect upon airborne aircraft on final approach (also referred as approach paths), or on the final section of a visual circuit or join is dependent on the following main factors (Pager Power, 2022[12]):

- Whether a reflection is predicted to be experienced.
- The location of glare relative to a pilot's primary horizontal field of view (50 degrees either side of the approach bearing).
- The glare intensity, relative to the thresholds of:
  - Glare with 'low potential for temporary after-image' (green glare)
  - Glare with 'potential for temporary after-image' (yellow glare)
  - Glare with 'potential for permanent eye damage' (red glare).
- Whether a reflection is predicted to be operationally significant in practice.

14.49 A 'negligible' magnitude would occur if solar reflections are not geometrically possible.

14.50 A 'Low' magnitude would occur under the following scenarios:

- Solar reflections originate from outside a pilot's main field of view.
- The glare has a 'low potential for temporary after-image'.
- The glare has a 'potential for temporary after-image' with sufficient mitigating factors.
- The aerodrome has confirmed the level of glare is acceptable.

14.51 A 'medium' magnitude would occur if the glare has 'potential for temporary after-image' without sufficient mitigating factors.

14.52 A 'high' magnitude would occur if the glare has 'potential for permanent eye damage'.

Significance

14.53 The predicted significance of the effect was determined through a standard method of assessment based on professional judgement and Pager Power guidance[12], considering both sensitivity and magnitude of change as detailed in **Table 14.4** below. Major and moderate effects are considered significant.

Table 14.4: Significance Criteria.

Magnitude of Change	Sensitivity of Receptor		
	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Moderate
Low	Moderate	Minor	Minor
Negligible	Negligible	Negligible	Negligible

Table 14.5: Duration of Effects

Duration of Effect	Criteria for Assessing Effect
Permanent	Effects are possible for the entire lifetime of the Proposed Development.
Temporary	Effects are possible for a restricted period following introduction of the Proposed Development.

Assessment Assumptions and Limitations

14.54 The glint and glare model considers 100% sunlight during daylight hours which presents the worst-case.

14.55 Coordinates of the Proposed Development and that of the identified receptors are based on the available imagery as shown in **Appendix 14.1: Solar Photovoltaic Glint and Glare Study** and the Works Plans presented in **Appendix 1.3: Work Plans**.

14.56 The altitude at each reference point is based on OS Terrain 50 DTM. An additional figure is then added to represent the solar panel height above ground level. The same process has been undertaken for receptor locations.

14.57 It is assumed that the assessed panel elevation angle accurately represents the installed elevation angle for all of the panels within each solar panel area defined. Updating the elevation

angle within the defined range[14] is predicted to slightly change the time in the day in which reflections occur and is not predicted to change duration of effects or the intensity of any reflections.

14.58 It is assumed that the assessed panel azimuth angle[15] accurately represents the installed azimuth angle for all of the panels within each solar panel area defined.

14.59 Only a reflection from the face of the panel has been considered. The frame or the reverse of the solar panel has not been considered because the face of the panel is the overriding source of specular glare and any reflections from the reverse will be orientated downwards.

14.60 The model assumes that a receptor can view the face of every panel within the proposed development area whilst in reality this, in the majority of cases, will not occur because panels will obstruct views of the panels behind them. Therefore, any predicted solar reflection from the face of a solar panel will only occur from the parts of the panel that are visible to a receptor.

14.61 A finite number of points within each solar panel area defined is chosen based on an assessment resolution so that a comprehensive understanding of the entire development can be formed. This determines whether a solar reflection could ever occur at a chosen receptor. The model does not consider the specific panel rows or the entire face of the solar panel within the development outline, rather a single point is defined every 20m with the geometric characteristics of the panel. A panel area is however defined to encapsulate all possible panel locations.

14.62 A single reflection point is chosen for the geometric calculations. This suitably determines whether a solar reflection can be experienced at a receptor location and the time of year and duration of the solar reflection. Increased accuracy could be achieved by increasing the number of heights assessed however this would only marginally change the results and is not considered necessary as it would not significantly alter the assessment results.

14.63 Any screening in the form of trees, buildings etc. that may obstruct the Sun from view of the solar panels is not considered within the modelling. Screening between the reflection and receptor is considered after the modelling.

[14] Panels will be south facing (fixed) with horizontal tilting between 15 and 22 degrees
[15] Horizontal facing in relation to the Equator

14.64 Overall, the impact of these limitations is minimal due to their influence on the overall result and/or the inherently conservative approach taken within the assessment, which has followed industry best-practice.

Baseline Conditions

14.65 The 1km study area for ground-based receptors surrounding the Proposed Development is semi-rural with some residential areas, regional roads and local roads.

14.66 The 10km assessment area for aviation infrastructure surrounding the Proposed Development contains the following aviation infrastructure:

- Grangewood Airfield – located approximately 4.4km east-south-east of the Proposed Development.
- Sittles Farm Airfield – located approximately 6.8km south-west of the Proposed Development.
- Fisherwick Airfield – located approximately 8.2km south-south-west of the Proposed Development.
- Streethay Farm Airstrip – located approximately 9.7km south-west of the Proposed Development.
- Tattenhill Airfield – located approximately 8.8km north-west of the Proposed Development.

14.67 The existing Drakelow Solar Farm is located approximately 2.7km north of the Proposed Development.

14.68 The main source of irradiance is the sun, which is deemed to be a more significant source of irradiance than solar reflections. Road users are already made aware of safety when driving when the sun is out on a clear day. Dwellings will experience the most significant source of irradiance at sunset and sunrise.

Future Baseline in the Absence of the Proposed Development

14.69 The baseline is expected to remain the same in relation to glint and glare, in the absence of the Proposed Development.

14.70 No change to the baseline conditions in relation to glint and glare is predicted due to the projections using the UK Climate Change Projections 2018 (UKCP18).

Design Considerations and Embedded Mitigation

14.71 No design considerations were made in relation to glint and glare, however the separation of residential properties from the solar panels for visual reasons also helps reduce glint and glare impacts.

Assessment of Operational Effects

14.72 The assessment of effects is based on the project description as outlined in **Chapter 4: Project Description** and the Work Plans presented in **Appendix 1.3**, recreated in Figure 1 in **Appendix 14.1: Solar Photovoltaic Glint and Glare Study**. Unless otherwise stated, potential effects identified are considered to be negative.

Predicted Operational Effects

Road Users

14.73 Figure 4 in **Appendix 14.1: Solar Photovoltaic Glint and Glare Study** (also shown as **Plate 1** in this chapter) identifies the assessed road receptors. The magnitude of effect upon two sections of an unnamed regional road (north-west from Coton-in-the-Elms) (**medium** sensitivity) totaling approximately 300m, and approximately 300m of Coton Road, is classified as **high** due to effects occurring directly in front of a road user and the lack of any mitigating factors. The resulting significance of impact is **major adverse** and **significant**.

14.74 The worst-case magnitude of effect upon the remaining sections of road (**medium** sensitivity) is **low** due to the presence of mitigating factors, such as the separation distance from the panel area, that will sufficiently reduce the level of impact. The resulting significance of impact is **minor adverse** and **not significant**.

Dwellings

14.75 Figure 5 in **Appendix 14.1: Solar Photovoltaic Glint and Glare Study** (also shown as **Plate 2** in this chapter) identifies the assessed residential receptors. The worst-case magnitude of effect upon the surrounding residential dwellings (**medium** sensitivity) is **low** due to the

presence of mitigating factors such as visibility being limited to above the ground floor, the separation distance to the panel area, and/or the position of the Sun, that will sufficiently reduce the level of impact. The significance of impact is **minor adverse** and **not significant**.

Aviation

14.76 The magnitude of effect upon Grangewood Airfield (**medium** sensitivity) is classified as **low** due to solar reflections with a maximum intensity of 'low potential for temporary after-image' being predicted towards pilots using the final approaches, base legs, or base leg joins. The resulting significance of impact is **minor adverse** and **not significant**.

14.77 The magnitude of effect upon Sittles Farm Airstrip, Fisherwick Airfield, Streethay Farm Airstrip, and Tatenhill Airfield (**medium** sensitivity) is classified as **low** due to effects being acceptable in accordance with the associated guidance (Pager Power, 2022[12]) and industry best practice. The resulting significance of impact is **minor adverse** and **not significant**.

Proposed Mitigation

14.78 A mitigation requirement has been identified for two sections of the unnamed regional road and a section of Coton Road, totaling approximately 600m.

14.79 To eliminate the significant effects to road users, mitigation in the form of new planting, hedgerow enhancement and hedgerow infilling has been included within the Outline Landscape and Ecological Management Plan (**Appendix 5.6: Outline Landscape and Ecological Management Plan**) and will be implemented by the Applicant to obscure the reflecting solar panels from view. It is good practice to ensure the surrounding existing vegetation is maintained at a height and density such that it provides adequate screening to the surrounding road users and dwellings.

14.80 Temporary screening will be utilised where new planting is proposed to obscure the reflecting solar panels from view prior to the new planting reaching maturity.

Residual Operational Effects

14.81 Once the mitigation measures have been implemented and obstruct views of the reflecting solar panels, the magnitude of effect for the 300m section of the unnamed regional

road and 300m section of Coton Road will reduce to **negligible.** The resulting significance of impact is **negligible** and **not significant**.

14.82 The worst-case residual effect upon the remaining sections of road, residential dwellings, Grangewood Airfield, Sittles Farm Airstrip, Fisherwick Airfield, Streethay Farm Airstrip, and Tatenhill Airfield would remain **low** because no mitigation will be implemented. The resulting significance of impact would be **minor adverse** and **not significant**.

Cumulative Effects

14.83 This assessment has considered the following schemes due to their potential to cause glint and glare:

- Haunton Solar Farm (Under construction).

14.84 Any developments from the cumulative list in Chapter 2 which do not appear in the bullet list above are not considered further in this chapter due to their lack of potential to cause glint and glare, or the lack of potential for glint and glare from the Proposed Development to impact the schemes.

Predicted Cumulative Effects during Operation

14.85 No cumulative effects are predicted upon road users and dwellings because any receptor which is predicted to experience solar reflections from the Proposed Development is not predicted to have inter-visibility of the Haunton Solar Farm.

14.86 No cumulative effects are predicted upon aviation activity because the Haunton Solar Farm is outside the ranges of which significant cumulative effects are considered appropriate for aviation receptors[16].

Proposed Mitigation

14.87 No mitigation is required as no cumulative effects are predicted.

[16] The panel areas only need to have between 50m-100m separation to not be considered cumulatively from an aviation perspective

Residual Cumulative Effects

14.88 As above, no cumulative impacts are predicted.

Combined Effects

14.89 No combined effects have been identified in relation to glint and glare.

Further Survey Requirements and Monitoring

14.90 It is recommended that the temporary screening and proposed planting, identified in **Appendix 5.6: Outline Landscape and Ecological Management Plan**, is monitored throughout the lifetime of the Proposed Development to ensure views of the Site are significantly obstructed.

Summary of Effects

14.91 Table 14.6 below summarises the predicted effects of the Proposed Development from glint and glare.

Table 14.6: Summary of Effects

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
Operation			
Unnamed regional road, two sections totaling 300m from the north-west of Coton-in-the-Elms	Major adverse (significant)	Hedgerow maintenance and gap filling to obstruct the reflecting panels from view. Temporary screening where necessary prior to new planting reaching maturity.	Negligible (not significant)

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
		See **Appendix 5.6: Outline Landscape and Ecological Management Plan**.	
Coton Road, 300m section from the north-west of Coton-in-the-Elms	Major adverse (significant)	New hedgerow planting to obscure the reflecting panels from view. Temporary screening where necessary prior to new planting reaching maturity. See **Appendix 5.6: Outline Landscape and Ecological Management Plan**.	Negligible (Not significant)
Other sections of road identified in Figure 4 of **Appendix 14.1**	Minor adverse (Not significant)	None	Minor adverse (Not significant)
Residential Dwellings	Minor adverse (Not significant)	None	Minor adverse (Not significant)
Aviation Infrastructure	Minor adverse (Not significant)	None	Minor adverse (Not significant)
Cumulative Construction			
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Predicted Effect	Significance	Mitigation	Significance of Residual Effect
Cumulative Operation			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
Combined Construction			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
Combined Operation			
Not Applicable	Not Applicable	Not Applicable	Not Applicable