Great Harmeston Solar Farm

Environmental Statement

Chapter 8 Glint and Glare

Development of National Significance
Pre-Application Consultation

March 2026

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8. Glint and Glare

8.1. Introduction

8.1.1. This chapter assesses the likely significant effects on glint and glare during the construction, operational and decommissioning stages of the Scheme. It outlines measures incorporated to avoid or minimise adverse environmental effects and enhance beneficial effects. The nature and significance of residual effects are reported.

8.1.2. This chapter is supported by the following technical appendices:

- Appendix 8.1 Glint and Glare Report

8.1.3. 'Glint' and 'Glare' are the effects caused by the reflection of sunlight from reflective surfaces such as glazing or solar photovoltaic (PV) panels. The UK Government's National Policy Statement for Renewable Energy Infrastructure (EN-3) published by the Department for Energy Security and Net Zero in November 2023 defines these terms as follows:

- Glint: "*a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel*"; and
- Glare: "*a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel*".

8.1.4. It goes on to say that… " Most commercially available solar panels are designed with anti-reflective glass or are produced with anti-reflective coating and have a reflective capacity that is generally equal to or less hazardous than other objects typically found in the outdoor environment, such as bodies of water or glass buildings".

8.2. Assessment Approach

Legislative and Policy Framework

National Planning Policy

8.2.1. Future Wales: The national Plan 2040.

8.2.2. Future Wales: The National Plan 2040 sets national planning policy for Wales, requiring solar developments to demonstrate they will not create unacceptable glint and glare impacts.

8.2.3. Policies 17 and 18 are of relevance to the topic of Glint and Glare.

8.2.4. Policy 17: *"Applications for large-scale wind and solar will not be permitted in National Parks and Areas of Outstanding Natural Beauty and all proposals should demonstrate that they will not have an unacceptable adverse impact on the environment."*

8.2.5. Policy 18: *"Proposals for renewable and low carbon energy projects … will be permitted subject to policy 17 and the following criteria: … 6. There are no unacceptable adverse impacts by way of … reflected light …"*

8.2.6. Applications for solar developments should therefore demonstrate they do not induce an unacceptable adverse impact as a result of glint and glare. This policy has been addressed by the production of a glint and glare assessment with mitigation recommendation to reduce for any significant adverse impact (see Appendix 8.1).

Local Planning Policy

8.2.7. There is no known local policy relevant to Glint and Glare.

Guidance

Aviation Assessment Guidance

8.2.8. The UK Civil Aviation Authority (CAA) issued interim guidance relating to Solar Photovoltaic Systems (SPV) on 17 December 2010 and was subject to a CAA information alert 2010/53. The formal policy was cancelled on September 7th, 2012 however the advice is still applicable until a formal policy is developed. The relevant aviation guidance from the CAA is presented in the section below.

CAA Interim Guidance

8.2.9. This interim guidance makes the following recommendations (p.2-3):

'8. It is recommended that, as part of a planning application, the SPV developer provide safety assurance documentation (including risk assessment) regarding the full potential impact of the SPV installation on aviation interests.

9. Guidance on safeguarding procedures at CAA licensed aerodromes is published within CAP 738 Safeguarding of Aerodromes and advice for unlicensed aerodromes is contained within CAP 793 Safe Operating Practices at Unlicensed Aerodromes.

10. Where proposed developments in the vicinity of aerodromes require an application for planning permission the relevant LPA normally consults aerodrome operators or NATS when aeronautical interests might be affected. This consultation procedure is a statutory obligation in the case of certain major airports, and may include military establishments and certain air traffic surveillance technical sites. These arrangements are explained in Department for Transport Circular 1/2003 and for Scotland, Scottish Government Circular 2/2003.

11. In the event of SPV developments proposed under the Electricity Act, the relevant government department should routinely consult with the CAA. There is therefore no requirement for the CAA to be separately consulted for such proposed SPV installations or developments.

12. If an installation of SPV systems is planned on-aerodrome (i.e. within its licensed boundary) then it is recommended that data on the reflectivity of the solar panel

material should be included in any assessment before installation approval can be granted. Although approval for installation is the responsibility of the ALH , as part of a condition of a CAA Aerodrome Licence, the ALH is required to obtain prior consent from CAA Aerodrome Standards Department before any work is begun or approval to the developer or LPA is granted, in accordance with the procedures set out in CAP 791 Procedures for Changes to Aerodrome Infrastructure.

13. During the installation and associated construction of SPV systems there may also be a need to liaise with nearby aerodromes if cranes are to be used; CAA notification and permission is not required.

14. The CAA aims to replace this informal guidance with formal policy in due course and reserves the right to cancel, amend or alter the guidance provided in this document at its discretion upon receipt of new information.

15. Further guidance may be obtained from CAA's Aerodrome Standards Department via aerodromes@caa.co.uk.'

FAA Guidance

8.2.10. The most comprehensive guidelines available for the assessment of solar developments near aerodromes has been produced by the United States Federal Aviation Administration (FAA). The first guidelines were produced initially in November 2010 and updated in 2013. A final policy was released in 2021, which superseded the interim guidance.

8.2.11. The 2010 document is entitled 'Technical Guidance for Evaluating Selected Solar Technologies on Airports' , the 2013 update is entitled 'Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports'4, and the 2021 final policy is entitled 'Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports'5.

8.2.12. Key excerpts from the final policy are presented below:

Initially, FAA believed that solar energy systems could introduce a novel glint and glare effect to pilots on final approach. FAA has subsequently concluded that in most cases, the glint and glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features. However, FAA has continued to receive reports of potential glint and glare from on-airport solar energy systems on personnel working in ATCT cabs. Therefore, FAA has determined the scope of agency policy should be focused on the impact of on-airport solar energy systems to federally-obligated towered airports, specifically the airport's ATCT cab.

The policy in this document updates and replaces the previous policy by encouraging airport sponsors to conduct an ocular analysis of potential impacts to ATCT cabs prior to submittal of a Notice of Proposed Construction or Alteration Form 7460-1 (hereinafter Form 7460-1). Airport sponsors are no longer required to submit the results of an ocular analysis to FAA. Instead, to demonstrate compliance with 14 CFR

77.5(c), FAA will rely on the submittal of Form 7460-1 in which the sponsor confirms that it has analyzed the potential for glint and glare and determined there is no potential for ocular impact to the airport's ATCT cab. This process will enable FAA to evaluate the solar energy system project, with assurance that the system will not impact the ATCT cab.

FAA encourages airport sponsors of federally-obligated towered airports to conduct a sufficient analysis to support their assertion that a proposed solar energy system will not result in ocular impacts. There are several tools available on the open market to airport sponsors that can analyze potential glint and glare to an ATCT cab. For proposed systems that will clearly not impact ATCT cabs (e.g., on-airport solar energy systems that are blocked from the ATCT cab's view by another structure), the use of such tools may not be necessary to support the assertion that a proposed solar energy system will not result in ocular impacts.

8.2.13. The excerpt above states where a solar PV development is to be located on a federally obligated aerodrome with an ATC Tower, it will require a glint and glare assessment to accompany its application. It states that pilots on approach are no longer a specific assessment requirement due to effects from solar energy systems being similar to glint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features. Ultimately it comes down to the specific aerodrome to ensure it is adequately safeguarded, and it is on this basis that glint and glare assessments are routinely still requested.

8.2.14. The policy also states that several different tools and methodologies can be used to assess the impacts of glint and glare, which was previously required to be undertaken by the Solar Glare Hazard Analysis Tool (SGHAT) using the Sandia National Laboratories methodology.

8.2.15. In 2018, the FAA released the latest version (Version 1.1) of the 'Technical Guidance for Evaluating Selected Solar Technologies on Airports'6. Whilst the 2021 final policy also supersedes this guidance, many of the points are still relevant because aerodromes are still safeguarding against glint and glare irrespective of the FAA guidance. The key points are presented below for reference:

Reflectivity refers to light that is reflected off surfaces. The potential effects of reflectivity are glint (a momentary flash of bright light) and glare (a continuous source of bright light). These two effects are referred to hereinafter as "glare," which can cause a brief loss of vision, also known as flash blindness .

The amount of light reflected off a solar panel surface depends on the amount of sunlight hitting the surface, its surface reflectivity, geographic location, time of year, cloud cover, and solar panel orientation.

As illustrated on Figure 16 , flat, smooth surfaces reflect a more concentrated amount of sunlight back to the receiver, which is referred to as specular reflection. The more a surface is polished, the more it shines. Rough or uneven surfaces reflect light in a diffused or scattered manner and, therefore, the light will not be received as bright.

Because the FAA has no specific standards for airport solar facilities and potential glare, the type of glare analysis may vary. Depending on site specifics (e.g., existing land uses, location and size of the project) an acceptable evaluation could involve one or more of the following levels of assessment:

A qualitative analysis of potential impact in consultation with the Control Tower, pilots and airport officials;

A demonstration field test with solar panels at the proposed site in coordination with FAA Tower personnel;

A geometric analysis to determine days and times when an impact is predicted.

The extent of reflectivity analysis required to assess potential impacts will depend on the specific project site and system design.

1. Assessing Baseline Reflectivity Conditions – Reflection in the form of glare is present in current aviation operations. The existing sources of glare come from glass windows, auto surface parking, rooftops, and water bodies. At airports, existing reflecting surfaces may include hangar roofs, surface parking, and glassy office buildings. To minimize unexpected glare, windows of air traffic control towers and airplane cockpits are coated with anti-reflective glazing. Operators also wear polarized eye wear. Potential glare from solar panels should be viewed in this context. Any airport considering a solar PV project should first review existing sources of glare at the airport and the effectiveness of measures used to mitigate that glare.

2. Tests in the Field – Potential glare from solar panels can easily be viewed at the airport through a field test. A few airports have coordinated these tests with FAA Air Traffic Controllers to assess the significance of glare impacts. To conduct such a test, a sponsor can take a solar panel out to proposed location of the solar project, and tilt the panel in different directions to evaluate the potential for glare onto the air traffic control tower. For the two known cases where a field test was conducted, tower personnel determined the glare was not significant. If there is a significant glare impact, the project can be modified by ensuring panels are not directed in that direction.

3. Geometric Analysis – Geometric studies are the most technical approach for reflectivity issues. They are conducted when glare is difficult to assess through other methods. Studies of glare can employ geometry and the known path of the sun to predict when sunlight will reflect off of a fixed surface (like a solar panel) and contact a fixed receptor (e.g., control tower). At any given site, the sun moves across the sky every day and its path in the sky changes throughout year. This in turn alters the destination of the resultant reflections since the angle of reflection for the solar panels will be the same as the angle at which the sun hits the panels. The larger the reflective surface, the greater the likelihood of glare impacts.

Facilities placed in remote locations, like the desert, will be far from receptors and therefore potential impacts are limited to passing aircraft. Because the intensity of the light reflected from the solar panel decreases with increasing distance, an

appropriate question is how far you need to be from a solar reflected surface to avoid flash blindness. It is known that this distance is directly proportional to the size of the array in question but still requires further research to definitively answer.

Experiences of Existing Airport Solar Projects – Solar installations are presently operating at a number of airports, including megawatt-sized solar facilities covering multiple acres. Air traffic control towers have expressed concern about glint and glare from a small number of solar installations. These were often instances when solar installations were sited between the tower and airfield, or for installations with inadequate or no reflectivity analysis. Adequate reflectivity analysis and alternative siting addressed initial issues at those installations.

Air Navigation Order (ANO) 2016

8.2.16. In some instances, an aviation stakeholder can refer to the ANO 20167 with regard to safeguarding. Key points from the document are presented below.

Lights liable to endanger

224. (1) A person must not exhibit in the United Kingdom any light which—

(a) by reason of its glare is liable to endanger aircraft taking off from or landing at an aerodrome; or

(b) by reason of its liability to be mistaken for an aeronautical ground light is liable to endanger aircraft.

(2) If any light which appears to the CAA to be a light described in paragraph (1) is exhibited, the CAA may direct the person who is the occupier of the place where the light is exhibited or who has charge of the light, to take such steps within a reasonable time as are specified in the direction—

(a) to extinguish or screen the light; and

(b) to prevent in the future the exhibition of any other light which may similarly endanger aircraft.

(3) The direction may be served either personally or by post, or by affixing it in some conspicuous place near to the light to which it relates.

(4) In the case of a light which is or may be visible from any waters within the area of a general lighthouse authority, the power of the CAA under this article must not be exercised except with the consent of that authority.

Lights which dazzle or distract

225. A person must not in the United Kingdom direct or shine any light at any aircraft in flight so as to dazzle or distract the pilot of the aircraft.'

The document states that no 'light', 'dazzle' or 'glare' should be produced which will create a detrimental impact upon aircraft safety.

Endangering safety of an aircraft

240. A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft.

Endangering safety of any person or property

241. A person must not recklessly or negligently cause or permit an aircraft to endanger any person or property.

Civil Aviation Authority consolidation of UK Regulation 139/2014

8.2.17. The Civil Aviation Authority (CAA) published a consolidating document of UK regulations, (Implementing Rules, Acceptable Means of Compliance and Guidance Material), in 2023. A summary of material relevant to aerodrome safeguarding is presented below:

(a) The aerodrome operator should have procedures to monitor the changes in the obstacle environment, marking and lighting, and in human activities or land use on the aerodrome and the areas around the aerodrome, as defined in coordination with the CAA. The scope, limits, tasks and responsibilities for the monitoring should be defined in coordination with the relevant air traffic services providers, and with the CAA and other relevant authorities.

(b) The limits of the aerodrome surroundings that should be monitored by the aerodrome operator are defined in coordination with the CAA and should include the areas that can be visually monitored during the inspections of the manoeuvring area.

(c) The aerodrome operator should have procedures to mitigate the risks associated with changes on the aerodrome and its surroundings identified with the monitoring procedures. The scope, limits, tasks, and responsibilities for the mitigation of risks associated to obstacles or hazards outside the perimeter fence of the aerodrome should be defined in coordination with the relevant air traffic services providers, and with the CAA and other relevant authorities.

(d) The risks caused by human activities and land use which should be assessed and mitigated should include:

obstacles and the possibility of induced turbulence;

the use of hazardous, confusing, and misleading lights;

the dazzling caused by large and highly reflective surfaces;

sources of non-visible radiation, or the presence of moving, or fixed objects which may interfere with, or adversely affect, the performance of aeronautical communications, navigation and surveillance systems; and

non-aeronautical ground light near an aerodrome which may endanger the safety of aircraft and which should be extinguished, screened, or otherwise modified so as to eliminate the source of danger.

Technical Guidance

8.2.18. Welsh and UK planning guidance does not provide a specific methodology for assessing the impact of glint and glare. However, the following guidance is regularly applied to assessments in the UK and together is considered to provide a reasonable and robust approach:

- Measurement and Assessment of Light Immissions1;
- Rail Industry Standard (RIS) RIS-0737-CCS2;
- Renewable Energy Developments: Solar Photovoltaic Developments3; and
- Review of Solar Energy System Projects on Federally-Obligated Airports (2013 Interim Policy and 2021 Update)4.

Methodology

Study Area

8.2.19. The Study Areas for each relevant receptor (Sections 4 of Appendix 18.1) are based on the potential for significant impacts to occur based on past project experience as well as Pager Power's Glint and Glare Guidance, which establishes best practice for the assessment of glint and glare.

8.2.20. The Study Areas are derived from industry experience and previous consultation with safeguarding bodies (such as National Highways and Network Rail) when developing an assessment methodology for glint and glare assessments in general. In conjunction with this, the Study Areas also consider a case-by-case basis to identify receptors that may need to be included even if not identified within the Study Areas.

8.2.21. Whilst there is no geometric limit for solar reflections, beyond these limits reflections would be of lesser intensity and are more likely to be screened by obstructions or intervening terrain. Any impacts upon receptors outside of the Study Areas would be

[1] Ministry for the Environment, Health and Consumer Protection (2014). Light Guidelines (Leitlinie des Ministeriums für Umwelt, Gesundheit und Verbraucherschutz zur Messung und Beurteilung vonm Lichtimmissionen,
[2] Rail Industry Standard (RIS) RIS-0737-CCS 'Signal Sighting Assessment Requirements'
[3] CAA (2023). Solar photovoltaic Developments CAST Aerodrome Safeguarding Guidance Note
[4] Federal Aviation Administration (2021) Review of Solar Energy System Projects on Federally-Obligated Airports.

considered a low impact in the worst-case scenario and considered not significant in EIA terms.

8.2.22. The Study Areas for the following receptors are outlined below:

- Major national, national, and regional roads within 1km of the panel areas
- Residential dwellings within 1km of the panel areas
- Railway receptors within 500m of the panel areas
- Aerodromes within 10km of the panel areas

Desk Study

8.2.23. Baseline conditions for the study area were informed by reviewing the following information sources:

- Ordnance Survey Terrain 50 Digital Terrain Model – Terrain height dataset of Great Britian, used to determine heights of panels, receptors, and intervening terrain above sea level
- Google Earth – Aerial, 3D, and Streetview imagery, used to identify potential receptors for assessment and review screening
- Pager Power's database of aviation installation and infrastructure – used to identify aviation receptors within study areas
- NATS Aeronautical Information Publication (AIP) – Database of airports, flight procedures, airspace, and aviation infrastructure within the UK

Surveys

8.2.24. No surveys have been conducted.

Modelling

8.2.25. Geometric modelling of the reflective surfaces of the solar panels has been conducted carried out using Pager Power's bespoke modelling software. Secondary calculations are carried out for aviation receptors using the ForgeSolar software.

Cumulative Effects Assessment Methodology

8.2.26. The assessment of cumulative effects identifies, for each receptor or receptor group, where the predicted effects of the Scheme may interact with those arising from other plans or developments. This assessment considers interactions on the same receptor or receptor group, based on spatial and temporal overlaps.

Assessment of Significance

Criteria for Receptor Sensitivity

8.2.27. Table 8.1 sets out the receptor sensitivity descriptors used in the glint and glare assessment.

Table 8.1: Criteria for Receptor Sensitivity

Receptor Sensitivity	Description of Criteria
High	Receptors with low capacity to experience solar reflections without fundamentally reducing safety or amenity.
Medium	Receptors with moderate capacity to experience solar reflections without significantly reducing safety or amenity.
Low	Receptors with a high capacity to experience solar reflections without reduction to safety or amenity.
Negligible	Receptors can experience solar reflections without reduction to safety or amenity.

Criteria for Magnitude of Impact

8.2.28. Table 8.2 sets out the magnitude of impact descriptors used in the glint and glare assessment.

Table 8.2: Criteria for Magnitude of Impact

Magnitude of Impact	Description of Criteria
High	Solar reflection durations / intensities that exceed the maximum allowable levels representing a fundamental safety or amenity impact.
Medium	Solar reflection durations / intensities that exceed the maximum allowable levels, and the glare scenario is considered one which could cause a material safety or amenity impact.
Low	Solar reflection durations / intensities that are within the maximum allowable levels, or where the glare scenario is such that safety or amenity will not be materially impacted.
Negligible	Solar reflections that is not geometrically possible or will not be experienced in practice due to intervening screening.

8.2.29. Table 8.3 outlines the approach used to determine the significance of effect. Assessing the significance of glint and glare effects requires professional judgement; therefore, the matrix allows for a degree of flexibility when evaluating the magnitude of an impact in relation to the sensitivity of the receptor.

Table 8.3: Significance Matrix

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

8.2.30. Effects classified as moderate or major are considered 'Significant', while those classified as minor or negligible are considered 'Not Significant.'

Consultation

8.2.31. No consultation has been undertaken for glint and glare.

Scoping Criteria

Technical Scope

8.2.32. Potential effects during the construction and decommissioning phases are scoped out of the assessment with the following rationale. Glint and glare effects occur due to the presence of the solar panels, during construction and decommissioning the number of solar panels will be no greater than during the operation phase. Therefore, effects during the construction and decommissioning phase will be no greater than those during the operation phase. Mitigation however will be designed to ensure effects during the construction and decommissioning phases are suitably captured.

8.2.33. This assessment therefore considers effects during the operational phase of the Scheme only.

Receptors

Ground-Based Receptors

8.2.34. The following receptors have been identified within the associated study areas and are shown in Section 4 of the Technical Appendix 8.1 - Solar Photovoltaic Glint and Glare Study:

- Major, National and Regional roads (Separate 2.5km, 300m and 2.9km sections of the A4076, Bulford Road Bypass and the A477); and
- 2.6km of railway line and two signals; and
- 51 residential dwellings.

Aviation Receptors

8.2.35. A 10 km study area surrounding the Proposed Development is considered appropriate for glint and glare effects on aviation activity. The following aerodromes have been identified:

- Rosemarket Airfield (1.7km)
- Haverfordwest Airport (9.1km)

Temporal Scope

8.2.36. Glint and glare effects occur as a result of the presence of solar panels which act as reflective surfaces. Effects will endure for the duration of the project's lifetime but cease once the panels are removed.

8.2.37. All effects within this assessment are therefore temporary (until the lifetime of the project is expended and the Scheme is decommissioned).

8.2.38. No permanent effects are predicted or considered within this assessment.

Assumptions and Limitations to the Assessment

8.3. The following is a list of assumptions and limitations associated with the model:

- The geometric model considers 100% sunlight during daylight hours. This assumption provides a conservative assessment of potential effects and a worst-case scenario

- Only reflections from the face of the panel are considered. The frame supporting the panels, or the back of solar panels, has not been considered as the frame will be obstructed from view by the face. Where view of the frame are possible, a solar reflection from the frame is from of a smaller surface area will be less significant than from the face of a solar panel with a larger surface area

- The geometric model has assumed panels within the entirety of the indicated areas of the parameter plan. In actual practice, rows and arrays of solar panels will include spacing between panels to decrease the effects of shadowing upon neighbouring panels. Therefore, the model assumes a highly conservative number of panels and presents a worst-case geometric result

- The model assumes that a receptor can view the face of every panel (i.e. 'point', defined in the following paragraph) within the Site whilst in reality this will not occur, as rows of panels will obstruct views of panels behind them except in areas of varying terrain. Therefore, any predicted solar reflection from the face of a solar panel that is not visible to a receptor will not occur in practice

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

- The geometric modelling does not account for any existing screening in the form of vegetation and buildings that could obstruct views of reflecting panels. Therefore, the assessment of likely significant effects portrays the 'worst-case scenario' for the Proposed Development during the operational phase. Visibility of views in practice is considered within the desk-based analysis which follows the geometric modelling

8.4. Baseline Conditions

Site Description and Context

8.4.1. The surrounding area includes existing vegetation and intervening terrain that provide a level of mitigation for reflecting panels and therefore reduce the level of impact upon identified receptors Baseline Survey Information.

Future Baseline

8.4.2. There are no known proposed changes to the future baseline within the ground-based receptor study area.

8.5. Assessment of Likely Significant Effects

Effects during Operation

Road Safety

8.5.1. Solar reflections are geometrically possible towards 1.8km section of the A4076, 300m section of the Bulford Road Bypass, and a 1.5km section of the A477. Solar reflections occur within a road user's primary field-of-view (defined as 50 degrees either side of the direction of travel) for some receptors.

8.5.2. For a 100m section of the A477 and a 100m section of Bulford Road Bypass, no significant screening has been identified when considering the baseline conditions of the site, such that effects from the Proposed Development would be direct, long-term (temporary), local, and of 'moderate' adverse significance, which is **significant**.

8.5.3. For the remaining sections of road, considering the baseline conditions of the Site, reflections are either predicted to be outside of a road user's primary field-of-view (50 degrees horizontally either side the direction of travel), or screening in the form of existing vegetation is predicted to obstruct views of reflecting panels for the remaining sections of road, such that effects from the Proposed Development would be direct, long-term (temporary), local, and of 'negligible' or 'minor' adverse significance, which is **not significant**.

Residential Amenity

8.5.4. When considering the baseline conditions of the Site including the existing screening, in the form of existing vegetation, it is predicted that views of reflecting panels for all 51 residential dwellings will be obstructed. As a result the effects arising from the Proposed Development for these all residential dwellings would be direct, long-term (temporary), local, and of 'negligible' adverse significance, which is **not significant**.

Railway operations and infrastructure

8.5.5. Solar reflections are geometrically possible towards 2.6km of railway and two signals. Solar reflections occur within a train drivers primary field-of-view (defined as 30 degrees either side of the direction of travel) for some receptors.

8.5.6. Considering the baseline conditions of the Site, screening in the form of existing vegetation is predicted to obstruct views of reflecting panels for the sections of railway and the signals, such that effects from the Proposed Development would be direct, long-term (temporary), local, and of 'negligible' or 'minor' adverse significance, which is **not significant.**

Aviation Activity

8.5.7. Solar reflections towards Rosemarket Airfield pilot receptors have glare intensities with 'potential for temporary after-image' (i.e 'yellow glare'). The duration and position of the glare, as well as the Proposed Development's size, distance between the aerodrome, and industry experience have been considered during the assessment. The resulting impact significance of effect would be a 'minor adverse' due to the **medium** sensitivity of the receptor and low magnitude of change. The effect is considered temporary and direct in nature. The significance of impact is direct, long-term (temporary), local, and 'minor' adverse. This is considered to be **not significant**.

8.5.8. Solar reflections towards Haverfordwest Airport are expected to not exceed intensities of 'low potential for temporary after-image' (i.e. 'green glare') or are predicted to occur outside a pilot's primary field of view. The significance of impact is direct, long-term (temporary), local, and 'minor' adverse. This is considered to be **not significant**.

Summary of Significance of Effects (Before Mitigation).

Table 8.4: Significance of Effects (before Mitigation)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact (Permanent/ Temporary)	Effect and Significance
OPERATION				
Road users	Medium	Medium	Local (Temporary)	Moderate and significant
Residential amenity	Medium	Negligible	Local (Temporary)	Negligible and not significant
Railway operations and infrastructure	Medium	Negligible	Local (Temporary)	Negligible and not significant
Aviation activity	Medium	Low	Local (Temporary)	Minor and not significant

8.6. Mitigation, Enhancement and Residual Effects

Mitigation by Design

8.6.1. No mitigation by design has been incorporated with respect to glint and glare.

Additional Mitigation.

8.6.2. The significant effects upon ground-based receptors such as roads and residential dwellings, can be reduced to a lower impact by various mitigation strategies – the most common being, for example, the provision of landscape screening along the boundary of the Proposed Development to obstruct views of potentially reflecting panels. A potential location for the screening has been identified within Appendix 8.1 – Solar Photovoltaic Glint and Glare Study.

Table 8.5: Mitigation

Ref	Measure to avoid, reduce or manage any adverse effects and/or to deliver beneficial effects	How measure would be secured		
		By Design	By S.106	By Condition
1	Provision of screening	X		

Enhancements

8.6.3. There are no embedded enhancements when considering glint and glare.

Residual Effects

Table 8.6: Residual Significance of Effects (with Mitigation)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact (Permanent/ Temporary)	Residual Effect and Significance
OPERATION				
Road users	Medium	Low	Local (Temporary)	Minor and not significant
Residential amenity	Medium	Negligible	Local (Temporary)	Negligible and not significant
Railway operations and infrastructure	Medium	Negligible	Local (Temporary)	Negligible and not significant
Aviation activity	Medium	Low	Local (Temporary)	Minor and not significant

8.7. Cumulative Effects

Cumulative Effects

8.7.1. For all receptors shared between the proposed and existing developments, no impact is predicted from the proposed development due to significant screening blocking views of the proposed development from the shared receptors. Therefore, no significant adverse effects are predicted.

In-Combination Effects

8.7.2. In-combination effects related to glint and glare effects and the effects of other environmental disciplines for the Proposed Development are not expected to be greater than that provided for each individual environmental discipline considered in isolation. Where the highest and most direct effects from other topics are predicted, the overall magnitude of in-combination effects would not be expected to increase as a result of concurrent glint and glare effects.

8.8. Summary

Baseline Conditions

8.8.1. The following receptors have been identified within the associated study areas:

- Major, National and Regional roads (Separate 2.5km, 300m and 2.9km sections of the A4076, Bulford Road Bypass and the A477);
- 2.6km of railway line and two signals; and
- 51 residential dwellings;
- Rosemarket Airfield.

Likely Significant Effects

8.8.2. A medium magnitude of impact is predicted upon road users due to reflections occurring within the primary field-of-view without existing screening to obstruct views. Considering a receptor sensitivity of Medium, the significance of the effect is **Moderate**, which is **significant**.

8.8.3. A negligible magnitude of impact is predicted upon residential amenity due to the presence of existing screening. Considering a receptor sensitivity of Medium, the significance of the effect is **negligible**, which is **not significant**.

8.8.4. A negligible magnitude of impact is predicted upon railway operations and infrastructure due to the presence of existing screening. Considering a receptor sensitivity of Medium, the significance of the effect is **negligible**, which is **not significant**.

8.8.5. A **low** magnitude of impact is predicted upon aviation activity as solar reflections are predicted to be within acceptable limits and accommodatable. Considering a receptor sensitivity of Medium, the significance of the effect is minor, which is **not significant**.

Mitigation, Enhancement, Residual Effects

8.8.6. Screening to be implemented to reduce the residual effect to upon road receptors to **Minor or negligible**.

8.8.7. Residual effects upon residential amenity, railway operations and infrastructure, and aviation activity are at worst **minor adverse**, which is **not significant**.

Cumulative Effects

8.8.8. No cumulative effects are predicted.

Conclusion

8.8.9. **No significant** adverse residual effects are predicted.

8.8.10. **Table 8.7** provides a summary of effects, mitigation and residual effects.

Table 8.7: Summary of Effects, Mitigation and Residual Effects

Receptor / Receiving Environment	Description of Effect	Nature of Effect *	Sensitivity Value**	Magnitude of Effect**	Geographical Importance ***	Significance of Effects ****	Mitigation / Enhancement Measures	Residual Effects ****
Operation								
Road users	Glare towards road receptors	Direct and Temporary	Medium	Medium	Borough/District	Moderate	Provision of screening along the boundary of the Proposed Development to obstruct views of potentially reflecting panels	Minor and not significant
Residential Amenity	Glare towards Aviation receptors	Direct and Temporary	Medium	Negligible	Local	Negligible and not significant	None required	Negligible and not significant
Railway operations and infrastructure	Glare towards Aviation receptors	Direct and Temporary	Medium	Negligible	County or Borough/District	Minor and not significant	None required	Minor and not significant

Aviation activity	**Glare towards Aviation receptors**	**Direct and Temporary**	**Medium**	**Minor**	**County or Borough/District**	**Minor and not significant**	**None required**	**Minor and not significant**