



Candwr Solar Farm

Pre Application Consultation

Environmental Statement

Chapter 7: Glint and Glare

2 July 2026



TotalEnergies

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7. Glint and Glare

7.1. Introduction

7.1.1. This draft Chapter provided at Statutory Consultation presents the effects of glint and glare during operation of the Proposed Development.

7.1.2. This chapter should be read in conjunction with **Appendix 7.1 – Solar Photovoltaic Glint and Glare Study**.

7.1.3. The definition¹ 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.

7.2. Assessment Approach

Legislative and Policy Framework

7.2.1. There are no specific government legislative or framework setting out a particular methodological approach to delivering a glint and glare assessment.

National Planning Policy

7.2.2. Welsh specific guidance for glint and glare assessments is high-level. However, glint and glare is mentioned in the following policies:

7.2.3. Future Wales: The National Plan 2040²:

Policies 17 and 18 state:

‘All proposals should demonstrate that they will not have an unacceptable adverse impact on the environment’

...

‘There are no unacceptable adverse impact by way of shadow flicker, noise, reflected light, air quality or electromagnetic disturbance’.

7.2.4. Planning Policy Wales³:

¹ These definitions, as defined in the Pager Power Glint and Glare Guidance Fourth Edition, are aligned with those presented within the National Policy Statement for Renewable Energy Infrastructure (EN-3) – published by the Department for Energy Security and Net Zero and the Federal Aviation Administration in the USA.

² Future Wales: The National Plan 2040, Welsh Government, date: 21 February 2021.

³ Planning Policy Wales – Edition 12, Welsh Government, date: February 2024.

Planning Policy Wales – Edition 12 is relevant in the context of potential glint and glare effects:

‘Prevent glare and respect the amenity of neighbouring land uses’.

7.2.5. The Proposed Development is below the threshold in Wales to be considered an NSIP, however, the glint and glare assessment has been carried out in accordance with the principles contained within the following appropriate policy and legislation:

- The Overarching National Policy Statement for Energy (EN-1)⁴.
- National Policy Statement for Renewable Energy Infrastructure (EN-3)⁵;
- National Planning Policy Framework⁶;
- Guidance for Renewable and Low Carbon Energy⁷;
- Policy paper for UK Solar PV Strategy ⁸; and
- Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.

7.2.6. The National Policy Statement for Renewable Energy Infrastructure (EN-3) states in Sections 2.10.158 and 2.10.159:

“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)”.

“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”.

7.2.7. The NPPF was published by the Ministry of Housing, Communities and Local Government (formerly the Department for Communities and Local Government) in March 2012 and was updated in February 2025. The NPPF sets out the Government’s planning policies and how these should be applied to England, and can be considered

⁴ Department for Energy Security and Net Zero, (2023); ‘Policy paper for Overarching National Policy Statement for energy (EN-1)’.

⁵ Department for Energy Security & Net Zero, (2023); ‘National Policy Statement for Renewable Energy Infrastructure (EN-3)’.

⁶ Ministry of Housing, Communities & Local Government, (2025); ‘National Planning Policy Framework’.

⁷ Ministry of Housing, Communities and Local Government, Ministry of Housing, Communities & Local Government (2018 to 2021) and Department for Levelling Up, Housing and Communities, (2023); ‘Guidance for Renewable and low carbon energy’.

⁸ Department of Energy & Climate Change and The Rt Hon Gregory Barker, (2013); ‘Policy paper for UK Solar PV Strategy’.

by the Secretary of State in the determination of NSIP applications. As the Proposed Development is located in Wales, this document has been used for reference purposes.

- 7.2.8. Chapter 14 of the NPPF 'Meeting the challenge of climate change, flooding and coastal change' sets out at Paragraph 157 that:

"The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure."

- 7.2.9. Paragraph 163 of the NPPF continues to state that, when determining planning applications for renewable and low carbon development, local planning authorities should:

"a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions;

b) approve the application if its impacts are (or can be made) acceptable ..."

- 7.2.10. The guidance for Renewable and Low Carbon Energy states:

"What are the particular planning considerations that relate to large scale ground-mounted solar photovoltaic Farms?"

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;*

...

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."

Local Planning Policy

7.2.11. Blaenau Gwent County Borough Council (CBC) and Torfaen CBC, have published a document regarding renewable energy projects:

7.2.12. Blaenau Gwent CBC and Torfaen CBC, Sensitivity and Capacity Study for Renewable Energy Development, 2021:

‘The height, massing and pattern of solar panels and associated infrastructure are key attributes of this type of development. Reflectiveness also needs to be considered as glare from reflective surfaces can travel long distances and prove very eye catching for visual receptors’

Guidance

7.2.13. There is no formal planning guidance for the assessment of solar reflections from solar panels. Pager Power has however produced guidance⁹ for glint and glare and solar photovoltaic developments, which was published in early 2017, with the fourth edition published in 2022. This methodology defines a comprehensive process for determining the impact upon road safety, residential amenity, and aviation activity.

7.2.14. The glint and glare assessment is carried out in accordance with the principles contained within the following documents:

- Guidance for Renewable and Low Carbon Energy,
- Pager Power Glint and Glare Guidance (herein referred to as ‘the Glint and Glare Guidance’)¹⁰.

7.2.15. Pager Power has produced guidance for glint and glare and solar photovoltaic developments and has been adopted for this assessment, which was first published in early 2017, with the fourth edition produced in 2022. This guidance document sets out the methodology for assessing road safety, residential amenity, and aviation safety, with respect to solar reflections from solar panels. This guidance document has also been adopted for previous assessments.

7.2.16. For aviation activity specifically, guidelines for solar developments exist in the UK produced by the Civil Aviation Authority (CAA) and in the USA produced by the Federal Aviation Administration (FAA). The guidelines outlined by both aviation-governing bodies are high-level, and neither prescribes a formal methodology.

7.2.17. The CAA Interim Guidance recommends:

“g. 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 Pager Power Glint and Glare Guidance, Fourth Edition, September 2022.

¹⁰ Pager Power, (2023); ‘Solar Photovoltaic and Building Development – Glint and Glare Guidance: Fourth Edition’.

- 7.2.18. The Air Navigation Order¹¹ (ANO), also published by the CAA, outlines safeguarding concerns for aviation activity in the UK. The specific articles of the ANO state:

“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.

...

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

- 7.2.19. The FAA guidance ‘Technical Guidance for Evaluating Selected Solar Technologies on Airports’¹² is considered the most comprehensive guidelines produced by a regulatory body for the assessment of solar developments near aerodromes. Therefore, it is referred to as industry best practice pertaining to glint and glare, including for developments in the UK. The guidance states:

“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.”

Methodology

- 7.2.20. The methodology for the glint and glare assessment is outlined within the Glint and Glare Guidance set out within **Appendix 7.1 – Solar Photovoltaic Glint and Glare Study**, and the assessment within this chapter is as follows:

- Identify the key receptors in the study area surrounding the Proposed Development, which have been outlined in Sections 7.2.26 – 7.2.35 of this chapter.
- Consider direct solar reflections from the Proposed Development towards the identified receptors by undertaking geometric calculations.
- Based on the results of the geometric calculations, determine whether a reflection can occur, and if so, at what time it will occur.

¹¹ Civil Aviation Authority, Air Navigation Order 2016

¹²Federal Aviation Administration (FAA), (2013); ‘Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports, Department of Transportation’.

- Consider the solar reflection with respect to the published studies and guidance – including intensity calculations where appropriate.
- Determine whether the potential for a significant impact is possible, without consideration of screening. This has been presented as the ‘Likely Significant Effects’ in this chapter.
- The glare scenario takes into account of any screening or mitigating factors that reduce any significant impact identified. This has been presented as the Residual Effects in this chapter.
- Potential effects are classified based on duration, location, relative to an observer’s field of view and intensity as appropriate. Receptor sensitivity and magnitude of impact is evaluated differently for different observer types.

7.2.21. Pager Power’s approach is to undertake geometric reflection calculations and, where a solar reflection is predicted, consider the screening (existing and/or proposed) between the receptor and the reflecting solar panels. The scenario in which a solar reflection can occur for all receptors is then identified and discussed, and a comparison is made against the available solar panel reflection studies to determine the overall impact.

7.2.22. The Pager Power methodology is outlined further in **Appendix 7.1 – Solar Photovoltaic Glint and Glare Study**.

Cumulative Effects Assessment Methodology

7.2.23. Cumulative effects have been considered with accepted, consented and existing solar farms as required. The applications for:

- Pentre Bach Solar Farm (DNS/3239190);
- Mynydd Maen Wind Farm (DNS/3276725).

7.2.24. Ground-based receptors (roads and dwellings) are only required to be considered with respect to glint and glare when they are within 1km of a proposed solar panel. The solar farms outlined above are located over 2km from the Proposed Development, therefore they will not share any receptors and as such have been scoped out for cumulative effects.

Criteria for Receptor Sensitivity

7.2.25. The descriptions of the sensitivity of a receptor in general are presented in **Table 7.1** below.

Table 7.1: Criteria for Receptor Sensitivity

Significance Criteria	Description of Criteria
Very High	Receptors with no capacity to experience solar reflections without fundamentally reducing safety or amenity.
High	Receptors with low capacity to experience solar reflections without fundamentally reducing safety or amenity.
Moderate	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.
Very Low	Receptors can experience solar reflections without reduction to safety or amenity.

Road users

7.2.26. 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 a 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.

7.2.27. Road users on local roads are considered **Very Low** sensitivity because they have capacity to experience solar reflections without a reduction to safety, based on Pager Power's professional judgement.

7.2.28. Road users on local roads that have been identified by the planning authority to have particular importance, regional, and national roads are considered **Moderate** sensitivity because they have medium capacity to experience solar reflections without a significant reduction in safety, based on Pager Power's professional judgement.

7.2.29. Road users on major national roads are considered **High** sensitivity because they have low capacity to experience solar reflections without a fundamental reduction in safety, based on Pager Power's professional judgement.

Residential Dwellings

- 7.2.30. Dwelling receptors are considered **Moderate** sensitivity because they have moderate capacity to experience solar reflections without a significant reduction to amenity, based on Pager Power's professional judgement.

Aviation Activity

Approaching Aircraft

- 7.2.31. Approaching aircraft are considered **Moderate** sensitivity because they have medium capacity to experience solar reflections without a significant reduction in safety, based on Pager Power's professional judgement.

Criteria for Magnitude of Change

- 7.2.32. The classifications of magnitude of effect are presented in **Table 7.2** below:

Table 7.2: Criteria for Magnitude of Change

Significance Criteria	Description of Criteria
Large	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.
Small	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.
No change	Solar reflections that is not geometrically possible or will not be experienced in practice due to intervening screening.

Road Safety

- 7.2.33. A **Negligible** magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by a road user.
- 7.2.34. A **Small** magnitude would occur if solar reflections were experienced from outside a road user's primary horizontal field of view (50 degrees either side of the direction of travel), or inside of road user's primary horizontal field of view with sufficient mitigating factors.
- 7.2.35. A **Medium** magnitude would occur if solar reflections were experienced from within a road user's primary horizontal field of view without sufficient mitigating factors.
- 7.2.36. A **Large** magnitude would occur if solar reflections were experienced from directly in front of a road user's direction of travel with no mitigating factors.

Residential Dwellings

- 7.2.37. 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.
- 7.2.38. A **Small** magnitude would occur if solar reflections were experienced for less than three months per year and for less than 60 minutes on any given day, or if solar reflections exceeded one of the thresholds with sufficient mitigating factors.
- 7.2.39. 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 without sufficient mitigating factors.
- 7.2.40. A **Large** 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 Activity

Approach Paths

- 7.2.41. A **Negligible** magnitude would occur if solar reflections are not geometrically possible, or are not predicted to be experienced by a pilot.
- 7.2.42. A **Small** magnitude would occur under the following scenarios:
- Solar reflections originate from outside a pilot's main field of view;
 - The solar reflections have 'low potential for temporary after-image';
 - The solar reflections have 'potential for temporary after-image' with sufficient mitigating factors;
 - The aerodrome has confirmed the level of glare is acceptable.
- 7.2.43. A **Medium** magnitude would occur if the solar reflections have 'potential for temporary after-image' without sufficient mitigating factors.
- 7.2.44. A **Large** magnitude would occur if the solar reflections have 'potential for permanent eye damage'.

Significance of Effect

- 7.2.45. The impact significance for environmental effects is presented in **Table 7.3** below. An impact of 'moderate' and greater is considered to be significant for the EIA.

Table 7.3: Significance Matrix

Magnitude of Change	Sensitivity of Receptor					
		Very High	High	Moderate	Low	Very Low
	Large	Major	Major	Major	Moderate	Minor
	Medium	Major	Major	Moderate	Minor	Minor

	Small	Moderate	Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Consultation

7.2.46. **Table 7.4** below summarises how the glint and glare assessment has considered feedback from statutory consultees and the **EIA Scoping Direction (Appendix 2.2)** and describes the consultation that has been undertaken with respect to the assessment of the Proposed Development's likely significant glint and glare effects.

Table 7.4: Summary of Correspondence with Statutory Consultees

Consultee	Summary of Comments	Applicants Response
Planning and Environment Decisions Wales PEDW Screening Direction – June 2025	<i>'During the operational phase there is also potential for redirection of light in terms of glint and glare via the reflective surface of the panels. I note that there are a number of nearby sensitive receptors, such as residential and farm properties. The SR does not provide information on the potential glint and glare impact or any potential mitigation in this respect. Although the SR states that a Glint and Glare Assessment would likely accompany the application, no evidence has currently been provided to demonstrate impacts on amenity of residents would not be significant. I am therefore unable to conclude at this stage that significant effects from glint and glare are unlikely'</i>	A Glint and Glare Assessment (Appendix 7.1) has been undertaken to assess the effects of the Proposed Development on road safety, residential amenity, and aviation activity

PEDW Scoping Direction – February 2026	<i>NCC and PEDW agree with the approach set out in the SR.</i> <i>CSOG highlight the potential impact of glint and glare on helicopters landing at the Grange Hospital. F. Bromfield highlights that seasonal variation and glint/glare implications for nearby dwellings and road users should be considered in the assessment.</i> <i>TCBC highlight that the glint and glare assessment should also assess flight path of bats and birds.</i>	The Applicant notes the comment. Helicopters landing at the Grange Hospital helipad are assessed in this ES chapter. Additionally, the assessment accounts for the potential difference in vegetation screening levels throughout the year. It has been hypothesised that the glare from photovoltaic panels can result in birds confusing a solar farm for a lake, which could affect waterbirds passing overhead by attracting the birds, potentially disrupting migration or leading to collision. However, although this may occur in certain arid areas, a research review did not find strong evidence for the 'lake effect hypothesis' (Anderson et al, 2025). Furthermore, the panels themselves would have a non-reflective coating and would have fixed tilt to the south, which would limit the occurrence of glare As detailed within Chapter 4 – Proposed Development and Alternatives no permanent lighting would
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		be required across the Site; temporary mobile task lighting may be required for maintenance during periods of low light, however, this would be brought onto Site for short periods of time and would not be used routinely. The substation would have inward facing security lighting installed. This would be operated with passive infrared detectors or would be turned on manually for maintenance in low light conditions or in the event of an emergency. As a result, artificial lighting levels will remain low and intermittent. Therefore, significant glint and glare effects are not anticipated, and no adverse effects on bats are predicted as a consequence of the proposed lighting scheme. A sensitive lighting strategy would be secured via the Outline Construction Environmental Management Plan ensuring that features of value for foraging and commuting bats are not subject to additional lighting during the operational lifetime.
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Scoping CriteriaTechnical and Temporal Scope

- 7.2.47. Solar panels will be installed during the construction phase in preparation for the operation phase; however, as panel installation is gradual the duration and glare intensity of solar reflections during the construction phase will be less than or equal to the operational phase. Therefore, only impacts during the operational are assessed.
- 7.2.48. The decommissioning stage will largely be the reverse of the construction phase and therefore this phase will be less than or equal to the assessed operational phase.

Assumptions and Limitations to the Assessment

- 7.2.49. The glint and glare assessment considers the operation phase of the Proposed Development, which is considered to be the worst-case for glint and glare.
- 7.2.50. The geometric model considers 100% sunlight during daylight hours which is highly conservative.
- 7.2.51. Only a reflection from the face of the panel will be considered. The frame supporting the panels, or the back of solar panels, has not been considered as a solar reflection from the frame of a smaller surface area will be less significant than from the face of a solar panel with a larger surface area.
- 7.2.52. 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 a break in-between panels to decrease the effects of shadowing upon neighbouring panels. Therefore, the model assumes a highly conservative number of panels and presents a worse-case geometric result.
- 7.2.53. 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, in the majority of cases, will not occur. Therefore, any predicted solar reflection from the face of a solar panel that is not visible to a receptor will not occur in practice.
- 7.2.54. 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 Proposed 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 Site, rather a single point is defined every 10 metres (based on this assessment resolution) with the geometric characteristics of the panel. A panel area is however defined to encapsulate all possible panel locations.
- 7.2.55. The assessment 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.

7.3. Baseline Conditions

Site Description and Context

- 7.3.1. The surrounding area includes existing vegetation, intervening terrain and existing non-residential buildings, that provide a level of mitigation for reflecting panels, and therefore reduce the level of impact upon identified receptors.

Ground-based Receptors

- 7.3.2. There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a technical perspective, there is no maximum distance for potential reflections. However, the significance of a solar reflection decreases with distance. This is because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. In most instances, terrain and shielding by vegetation are also more likely to obstruct an observer's view at greater distances.
- 7.3.3. A 1km assessment area surrounding the Proposed Development is considered appropriate for glint and glare effects on roads and dwellings, based on the details above and industry experience. The following receptors have been identified:
- Regional roads (3.7km section of B4236/ 1.95km section of Usk Road); and
 - Residential dwellings.
- 7.3.4. Technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the Proposed Development that are experienced by a road user along a local road would not be considered significant in the worst-case, in accordance with the assessment methodology. Therefore, local roads are scoped out of assessment of likely effects.
- 7.3.5. In residential areas with multiple layers of dwellings, only the outer dwellings have been considered for assessment. This is because they will mostly obscure views of the solar panels to the dwellings behind them, which will therefore not be impacted by the Proposed Development because line of sight will be removed, or they will experience comparable effects to the closest assessed dwelling.
- 7.3.6. Additionally, in some cases, a single receptor point may be used to represent a small number of separate addresses. In such cases, the results for the receptor will be representative of the adjacent observer locations, such that the overall level of effect in each area is captured reliably.
- 7.3.7. In total, 153 dwelling receptors have been geometrically assessed to model residential properties within 1km of the Proposed Development, as shown in Figure 8 – Overview of dwelling receptors of **Appendix 7.1 – Solar Photovoltaic Glint and Glare Study**.
- 7.3.8. Reflections towards ground-based receptors located further north than the panels are highly unlikely for south-facing panels, such as the configuration of the Proposed Development. Therefore, receptors north of the Site have not been modelled, and the study area has been designed accordingly as a 1km study area, excluding the area to the north of the northern-most areas of the Site.

Aviation Receptors

- 7.3.9. Glint and glare assessment for aviation receptors are typically undertaken for licensed aerodromes within 10km of a proposed solar development. Geometric modelling for general aviation unlicensed aerodromes is typically required within 5km of a solar development proposal. At ranges of 10–20km, the requirement for assessment is much less common for unlicensed aerodromes, with typically assessment only being undertaken for licensed aerodromes at these ranges as per industry best practice. The assessment of any aviation effects for developments over 20km from a solar development proposal is not common.
- 7.3.10. A 10km assessment area surrounding the Proposed Development is considered appropriate for glint and glare effects on aviation activity. The following aerodromes have been identified:
- Park Farm Airfield;
 - Croes-Carn-Einion Farm Airfield;
 - Kemeys Commander Airfield;
 - Upfield Farm Airfield.
- 7.3.11. Figure 3 – Park Farm Airfield in relation to the proposed development and Figures 24 to 26 of **Appendix 7.1 – Solar Photovoltaic Glint and Glare Study** show the identified aerodromes relative to the Site

7.4. Assessment of Likely Significant Effects

- 7.4.1. The following sections provide an assessment of the identified receptors based on the geometric modelling result during the operational phase.

Effects during OperationRoad Safety

- 7.4.2. Solar reflections are geometrically possible towards a 2.8km section of the B4236, and the whole 1.95km section of Usk Road. Solar reflections occur within a road user's main field-of-view (defined as 30 degrees either side of the direction of travel). Based on the geometric result (i.e. not considering the existing screening), the resulting impact significance of effect would be a 'moderate adverse' due to the medium sensitivity of the receptor and medium magnitude of change. The effect is considered temporary and direct in nature. This is considered to be significant before the baseline conditions of the Site (e.g., existing vegetation and intervening terrain) are taken into account.
- 7.4.3. Considering the baseline conditions of the Site, screening in the form of existing vegetation and intervening terrain is predicted to obstruct views of reflecting panels for the entire 2.8km section of the B4236 and 1.95km section of Usk Road, such that

effects from the Proposed Development would be '**negligible**', which is **not significant**, due to the medium sensitivity of the receptor and negligible magnitude of change.

Residential Amenity

- 7.4.4. Solar reflections are geometrically possible towards 132 of the 153 assessed dwellings.
- 7.4.5. For all 126 dwellings, the worst-case magnitude of change is medium due to solar reflections predicted to occur for more than three months of the year, but less than 60 minutes in any given day. This is considered to be significant before the baseline conditions of the Site (e.g., existing vegetation and intervening terrain) are taken into account
- 7.4.6. Considering the baseline conditions of the Site and other 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, the level of impact is significantly reduced. The worst-case significance of impact is therefore **minor** and **not significant** due to the medium sensitivity of the receptor and small magnitude of change

Aviation Activity

- 7.4.7. Solar reflections towards Park Farm Airfield, Croes-Carn-Einion Airfield, Upfield Farm Airfield, and Kemeys Commander Airfield have glare intensities with 'low potential for temporary after-image' (i.e., 'green' glare). This is considered acceptable in accordance with industry best practice and therefore the resulting impact significance of effect would be a '**minor adverse**' due to the medium sensitivity of the receptors and low magnitude of change. The effect is considered temporary and direct in nature This is considered to be **not significant**.

Summary of Significance of Effects (Before Mitigation)

- 7.4.8. No significant effects are predicted towards road, dwelling, and aviation receptors.

Table 7.5: Significance of Effects (before Mitigation)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact (Permanent/ Temporary)	Effect and Significance
OPERATION				
Road Safety	Medium	Negligible adverse	Temporary	Negligible (not significant)
Residential Amenity	Low	Minor adverse	Temporary	Minor (not significant)
Aviation Activity	Medium	Minor adverse	Temporary	Minor (not significant)

7.5. Mitigation, Enhancement and Residual Effects

Mitigation

- 7.5.1. The maximum predicted effect on assessed receptors is **Minor (not significant)**, mitigation is therefore not required.

Enhancements

- 7.5.2. Any proposed planting as part of the wider **Indicative Landscaping Strategy (Figure 5.5)** will provide additional layers of screening for the surrounding ground-based receptors.

Residual Effects

- 7.5.3. The iterative design of the Proposed Development, stakeholder engagement, and the incorporation of any required mitigation, such as the retention of and appropriate management of existing vegetation (where feasible) and the provision of new planting on the Site have all been considered to determine the residual effects. Given that no significant effects are likely upon ground-based receptors (roads and dwellings) and aviation receptors, the residual effects will be **minor** and **not significant**.

Table 7.6: Residual Significance of Effects (with Mitigation)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact (Permanent/Temporary)	Residual Effect and Significance
OPERATION				
Road Safety	Moderate	Negligible adverse	Temporary	Negligible (not significant)
Residential Amenity	Low	Minor adverse	Temporary	Minor (not significant)
Aviation Activity	Moderate	Minor adverse	Temporary	Minor (not significant)

7.6. Cumulative Effects

Cumulative Effects

- 7.6.1. Cumulative effects are considered possible when receptors for the Proposed Development coexist within the study areas as defined in paragraph 7.2.36 for existing, approved or consented schemes.
- 7.6.2. **Table 7.7** below summarises the schemes considered for cumulative effects, the approximate distances from the Site and the possibility of a cumulative effect.

Table 7.7: Cumulative Other Developments for Assessment

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
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Pentre Bach Solar Farm (DNS/3239190) Status – Approved subject to conditions	4km southwest	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 4km separation distance is greater than the study area of 1km. For aviation, the distance means the glare intensity is not considered cumulatively.
Mynydd Maen Wind Farm (DNS/3276725) Status – In Progress	6.5km west	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 6.5km separation distance is greater than the study area of 1km. For aviation, the distance means the glare intensity is not considered cumulatively.

- 7.6.3. Cumulative impacts upon the B4236, Usk Road, identified dwellings, or identified airfields, are not predicted as no cumulative impacts have been assessed.

In-Combination Effects

- 7.6.4. 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.

7.7. Summary

Introduction

- 7.7.1. The possible glint and glare impacts of the Proposed Development upon road safety, residential amenity, and aviation activity have been assessed.

Baseline Conditions

- 7.7.2. The surrounding area of the Proposed Development is considered rural, with existing vegetation, non-residential buildings and intervening terrain predicted to mitigate the impact upon the receptors identified.
- 7.7.3. A 1km assessment area surrounding the Proposed Development is considered appropriate for glint and glare effects on roads and dwellings, based on industry experience. The following receptors have been identified:
- Regional roads (3.7km section of B4236/ 1.95km section of Usk Road); and
 - Residential dwellings.
- 7.7.4. Glint and glare assessment for aviation receptors are typically undertaken for licensed aerodromes within 10km of a proposed solar development. Geometric modelling for general aviation unlicensed aerodromes is typically required within 5km of a solar

development proposal. At ranges of 10–20km, the requirement for assessment is much less common for unlicensed aerodromes, with typically assessment only being undertaken for licensed aerodromes at these ranges as per industry best practice. The assessment of any aviation effects for developments over 20km from a solar development proposal is not common.

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

- Park Farm Airfield;
- Croes-Carn-Einion Farm Airfield;
- Kemeys Commander Airfield;
- Upfield Farm Airfield.

Likely Significant Effects

7.7.6. No significant impacts upon road safety, residential amenity, and aviation activity are predicted when considering the baseline conditions.

Mitigation, Enhancement, Residual Effects

7.7.7. No mitigation is proposed for glint and glare purposes but any additional planting will further reduce visibility.

Cumulative Effects

7.7.8. Cumulative impacts upon the B4236, Usk Road, identified dwellings, or identified airfields, are not predicted due to the distances between the Proposed Development and the surrounding projects.

Conclusion

7.7.9. The Proposed Development is considered to have **no significant** glint and glare impacts upon road safety, residential amenity, and aviation activity.

7.7.10. **Table 7.8** provides a summary of effects, mitigation and residual effects.

Table 7.8: 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								
Users of Regional and national Roads (B4236 and Usk Road)	Solar reflection upon vehicle drivers on road	Temporary Direct	Medium	Medium	District	Negligible (not significant)	No mitigation has been recommended. Any proposed planting as part of the wider landscaping strategy will provide additional layers of screening for the surrounding ground-based receptors	Negligible (not significant)
Residential Dwellings	Reflection of sunlight from panels in array. Nuisance caused by	Temporary Direct	Low	Medium	Local	Minor adverse (Not significant)	No mitigation has been recommended. Any proposed planting as part of the	Minor (Not Significant)

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	glint reflections visible from inside of house.						wider landscaping strategy will provide additional layers of screening for the surrounding ground-based receptors	
Aviation Receptors (Park Farm, Croes-Carn-Einion Farm Airfield, Upfield Airfield, and Kemeys Commander Airfield)	Reflection of sunlight from panels in array. Potential safety issue from pilot dazzle	Temporary Direct	Medium	Minor	National	Minor Adverse (significant)	N/A	Minor adverse (not significant)
Cumulative Effects								
No cumulative effects identified								
In-Combination Effects								

No significant in-combination effects identified