

Steeple Renewables Project

Chapter 16: Glint and Glare

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Chapter 16: Glint and Glare

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16. Glint and Glare

16.1 Introduction

16.1.1 This Chapter presents the effects of glint and glare during operation of the Proposed Development.

16.1.2 This chapter should be read in conjunction with **Appendix 16.1 -Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]**.

16.1.3 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.

16.1.4 Details of the lead author of this Chapter are set out in **Appendix 1.4 - EIA Statement of Competence [EN010163/APP/6.3.1]**.

16.2 Legislation and Planning Policy

16.2.1 There are no specific government guidelines setting out a particular methodological approach to delivering a glint and glare assessment.

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

16.2.3 The CAA Interim Guidance recommends:

“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.”

16.2.4 The Air Navigation Order² (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—

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 Civil Aviation Authority, Air Navigation Order 2016

(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."

- 16.2.5 The FAA guidance 'Technical Guidance for Evaluating Selected Solar Technologies on Airports'³ is considered the most comprehensive guidelines available 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."

- 16.2.6 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 Strategy⁸; and

³Federal Aviation Administration (FAA), (2013); 'Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports, Department of Transportation'.

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'.

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

16.2.7 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”.

16.2.8 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 by the Secretary of State in the determination of NSIP applications.

16.2.9 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.”

16.2.10 Paragraph 163 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 ...”

16.2.11 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.”

16.3 Assessment Methodology

16.3.1 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.

16.3.2 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,

⁹ Pager Power Glint and Glare Guidance, Fourth Edition, September 2022.

- Pager Power Glint and Glare Guidance (herein referred to as ‘the Glint and Glare Guidance’)¹⁰.
- 16.3.3 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.
- 16.3.4 The methodology for the glint and glare assessment is outlined within the Glint and Glare Guidance, and the assessment within this chapter is as follows:
- 16.3.5 Identify the key receptors in the study area surrounding the Proposed Development, which have been outlined in Sections 16.3.15 – 16.3.28.
- 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.
 - 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.
- 16.3.6 Each effect is assessed based on its magnitude of change and the sensitivity of the affected receptor.

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

- 16.3.7 The guidance also presents a review of relevant guidance and independent studies with regard to glint and glare issues from solar panels. The overall conclusions from the available studies are as follows:
- Specular reflections of the sun from solar panels are possible.
 - The measured intensity of a reflection from solar panels can vary from 2% to 30% depending on the angle of incidence.
- 16.3.8 Published guidance¹¹ shows that the intensity of solar reflections from solar panels are equal to or less than those from water. It also shows that reflections from solar panels are significantly less intense than many other reflective surfaces, which are common in an outdoor environment.
- 16.3.9 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.
- 16.3.10 The Pager Power methodology is outlined further in **Appendix 16.1 - Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]**.

Solar Panel Technical Information

- 16.3.11 The Proposed Development will consist of solar panels orientated to face the south (azimuth angle of 180°) and inclined between 10° and 30° above the horizontal. This assessment has considered conservative modelling parameters by modelling both 10° and 30° inclinations, and geometrically modelled solar panels without the use of antireflective coating. A reflector point has been considered at the midpoint (1.90m) of the panels between the lowest (0.80m) and highest (3.00m) above ground level.
- 16.3.12 The receptors identified below and assessed are not subject to change and therefore any impacts would be comparable to those identified in this assessment.

¹¹ Evan Riley and Scott Olson, (2011); 'A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems', ISRN Renewable Energy, vol. 2011, Article ID 651857, doi:10.5402/2011/651857

Study Areas and Receptor Identification

- 16.3.13 The location of the Proposed Development is rural, surrounded by roads, dwellings, railway operations and infrastructure, and aerodromes. The key receptors are outlined in the following sections.
- 16.3.14 Cumulative effects are considered with accepted, consented and existing solar farms as required. The consented 'Land North West And South Of Field Farm Wood Lane Sturton Le Steeple Nottinghamshire – planning reference 20/00117/FUL'. Further detail is outlined in Section 16.10.

Ground-based Receptors

- 16.3.15 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.
- 16.3.16 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:
- Local roads (i.e. Main Street, Leverton Road and Wheatley Road);
 - Regional roads (200m section of A156/Gainsborough Road); and
 - Residential dwellings.
- 16.3.17 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 (Section 16.3.2). Therefore, local roads are scoped out of assessment of likely effects.
- 16.3.18 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.

- 16.3.19 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.
- 16.3.20 In total, 212 dwelling receptors have been geometrically assessed to model residential properties within 1km of the Proposed Development, as shown in Figure 11 – Overview of dwelling receptors of **Appendix 16.1 - Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]**. The modelled reflector area is used to indicate the areas of solar panels for geometric modelling purposes only, and does not accurately represent all infrastructure present within the Proposed Development as shown on **Figure 2.1 – Indicative Site Layout [EN010163/APP/6.4.2]**.
- 16.3.21 Reflections towards ground-based receptors located further north than the parameters set out in **Figure 2.1 – Indicative Site Layout [EN010163/APP/6.4.2]** 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.

Railway Receptors

- 16.3.22 A railway stakeholder, such as Network Rail, may request further information regarding the potential effects of glint and glare from reflective surfaces when a development is located adjacent to a railway line (typically 50-100m from its infrastructure). The request may depend on the scale, percentage of reflective surfaces and the complexity of the nearby railway, for example.
- 16.3.23 A 500m assessment area surrounding the Proposed Development is considered appropriate for glint and glare effects on railway infrastructure and operations, based on industry experience. The following receptors have been identified:
- A section of the Network Rail Eastern Region – North and East Route
 - Five trackside, two ground-mounted and two cantilever railway signals.
- 16.3.24 Figure 7 – Assessed train driver receptors of **Appendix 16.1 - Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]** shows the sections of railway within 500m of the Proposed Development geometrically modelled. The east-to-

west section of railway is understood not to be operational; however, it has been included for completeness in the event it is used again in the future.

- 16.3.25 Figure 8 – Assessed trackside signal of **Appendix 16.1 - Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]** shows the locations of the signals (illustrated by white markers) identified.

Aviation Receptors

- 16.3.26 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.

- 16.3.27 A 15km assessment area surrounding the Proposed Development is considered appropriate for glint and glare effects on aviation activity. The following aerodromes have been identified:

- Carr Farm Airfield.
- Darlton Gliding Club.
- Forwood Farm Airfield.
- Grove Farm Airfield.
- Headon Airfield.
- RAF Scampton.
- Retford Gamson Airport.
- Robin Hood Doncaster Sheffield Airport.
- Stow Airfield.
- Sturgate Airfield.
- West Burton Airfield.
- Willow Farm Airfield.

- 16.3.28 Figure 3 - Identified aerodromes relative to Proposed Development and Figure 12 Identified aerodromes for high-level assessments **of Appendix 16.1 - Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]** show the identified aerodromes relative to the Site.

Sensitivity of Receptors

Road Users

- 16.3.29 Roads 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 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.
- 16.3.30 Local roads would be considered as ‘Low’ sensitivity. Regional, National, and Major National roads would be considered of ‘Medium’ sensitivity.
- 16.3.31 The magnitude of effect upon road user receptors is dependent on the following factors:
- Whether a solar reflection is predicted to be experienced in practice.
 - 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 field-of-view, which is defined as 50 degrees either side relative to the direction of travel.
 - The distance between the receptor and the panel area.
- 16.3.32 A ‘Negligible’ magnitude would occur if solar reflections are not geometrically possible or are not predicted to be experienced by a road user.
- 16.3.33 A ‘Low’ magnitude would occur if solar reflections would all originate from outside a road user’s main field of view. Reflections originating within a road user’s main

field of view can be of 'Low' magnitude based on consideration of the following mitigating factors:

- Whether the solar reflection originates with a road user's field-of-view.
- Whether visibility is likely for elevated drivers (relevant to dual carriageways and motorways).
- 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.
- Whether a solar reflection is fleeting in nature - small gap/s in screening, e.g. an access point to the site, may not result in a sustained reflection for a road user.
- The position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not.

16.3.34 A 'Medium' magnitude would occur if solar reflections were experienced from within a driver's main field of view and there are insufficient mitigating factors.

16.3.35 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

Residential Dwellings

16.3.36 Residential dwellings would be considered as 'Low' sensitivity as they are of local importance.

16.3.37 The magnitude of effect upon residential dwelling receptors is dependent on the following factors:

- Whether a solar reflection is predicted to be experienced in practice.
- The duration of effects, relative to the thresholds of three months per year and sixty minutes per day.
- The distance between the receptor and the panel area.

16.3.38 A 'Negligible' magnitude would occur if solar reflections were not geometrically possible or are not predicted to be experienced by an observer within a residential dwelling.

16.3.39 A 'Low' magnitude would occur if solar reflections would be experienced for less than three months per year and for less than sixty minutes per day, or outside of these limits based on consideration of the following mitigating factors:

- 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 area – factors that restrict potential views of a reflecting area reduce the level of impact. 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 distance between the receptor and the panel area.
 - The position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not.
- 16.3.40 A 'Medium' magnitude would occur if solar reflections were experienced for more than three months per year or for more than sixty minutes per day and there are insufficient mitigating factors.
- 16.3.41 A 'High' magnitude would occur if solar reflections were experienced for more than three months per year and for more than sixty minutes per day with no mitigating factors.
- Public Rights of Way (ProW), Bridleways and Waterways*
- 16.3.42 Significant effects from glint and glare are not possible upon pedestrians/observers along PROWs, bridleways and waterways. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance due to:
- The typical density of pedestrians at these locations is usually low.
 - 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 to the safety of road users.
 - Glint and glare effects towards receptors on PROWs, bridleways and waterways are transient, and time and location sensitive whereby a pedestrian could move beyond the solar reflection zone with ease with little impact upon safety or amenity.
 - There is no safety hazard associated with reflections towards an observer on a footpath. Any observable solar reflection to users of the PROW would be of

similar intensity to those experienced whilst navigating the natural and built environment on a regular basis.

Railway Operations and Infrastructure

- 16.3.43 Railway operations and infrastructure are considered to be of ‘Medium’ sensitivity because they are of regional to national importance with a low to moderate capacity to absorb change.
- 16.3.44 The magnitude of impact is dependent on the following factors:
- Whether a solar reflection is predicted to be experienced in practice.
 - The location of the reflecting panels relative to a train drivers’ main field-of-view; defined as 30 degrees either side of the railway line with respect to the direction of travel.
 - The contrast of sensitivity.
 - Significance of location relative to switch points, stations, signals and pedestrian crossing points.
 - The duration of solar reflections.
 - Whether the solar development is in keeping with the surrounding environment.
- 16.3.45 A ‘Negligible’ magnitude would occur if solar reflections were not geometrically possible or are not predicted to be experienced by a train driver.
- 16.3.46 A ‘Low’ magnitude would occur if solar reflections would all originate from outside a train drivers’ main field-of-view. Reflections originating within a train drivers’ main field of view can be of ‘Low’ magnitude based on consideration of the following mitigating 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 – effects that coincide with direct sunlight appear less prominent than those that do not.
- 16.3.47 A ‘Medium’ magnitude would occur if solar reflections were experienced from within a train drivers’ main field of view and there are insufficient mitigating factors.
- 16.3.48 A ‘High’ magnitude would occur if solar reflections were experienced from directly in front of a train drivers’ direction of travel with no mitigating factors.

Aviation Activity

- 16.3.49 Aviation receptors are typically considered to be of ‘Medium’ sensitivity because they are of regional to national importance with a ‘low’ to ‘moderate’ capacity to absorb change. The interim CAA guidance does not specifically address glint and glare.
- 16.3.50 The magnitude of effect depends on the type of aviation receptor and the glare intensity.
- 16.3.51 Aviation receptors include airborne receptors such as approach paths and circuits, and receptors used to consider views from the Air Traffic Control (ATC) Tower. Additional sensitive viewpoints can also be considered, as are specifically defined by the aerodrome.
- 16.3.52 Glare intensity can generally be categorised as solar reflections having a:
- ‘Low potential for temporary after-image’ referred to as ‘green’ glare
 - ‘Potential for temporary after-image’ referred to as ‘yellow’ glare
 - ‘Potential for permanent eye damage’ referred to as ‘red’ glare

Air Traffic Control (ATC) Towers

- 16.3.53 Solar reflections of any kind towards ATC Towers were formerly not permissible under the interim guidance provided by the FAA. This FAA guidance from 2013 has since been superseded by the FAA guidance in 2021, whereby airports are tasked with determining safety requirements themselves. This guidance is considered industry best practice, and is applicable for solar developments in the UK.
- 16.3.54 The sensitivity of the receptor is considered ‘High’ due to being of international or national importance with little ability to absorb change.
- 16.3.55 For ATC Towers, the magnitude of effect is dependent on the following factors:
- Whether a solar reflection is predicted to be experienced in practice.
 - Proportion of an observer’s field-of-view (relative to a 210-degree azimuth range) that is taken up by the reflecting area.
 - The glare intensity and duration - a reflection of greater intensities and prolonged time periods have a higher impact upon ATC Tower personnel.

- Glare location relative to key operational areas – a solar reflection originating near sensitive areas such as the runway threshold will have a higher impact upon the ATC Tower personnel.

- 16.3.56 A ‘Negligible’ magnitude would occur if solar reflections were not geometrically possible, or are not predicted to be experienced by ATC personnel.
- 16.3.57 A ‘Low’ magnitude would occur if solar reflections were experienced by ATC personnel but there are sufficient mitigating factors, or the aerodrome have confirmed the glare scenario is operationally accommodatable, or the level of glare is accommodatable.
- 16.3.58 A ‘Medium’ magnitude would occur if solar reflections were experienced by ATC personnel and effects occasionally and marginally affected the safeguarding operations.
- 16.3.59 A ‘High’ magnitude would occur if solar reflections were experienced by ATC personnel and the safeguarding operations were regularly and substantially affected.

Approach Paths

- 16.3.60 The magnitude of effect upon aircraft approaching a runway (referred to as an approach path) is dependent of the following factors:
- Whether a solar reflection is predicted to be experienced in practice.
 - The location of the reflecting panels relative to a pilot’s main field-of-view, which is defined as 50 degrees either side of the approach bearing.
 - 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 aerodrome will be operational such that pilots can be on the approach at these times;
 - The duration of any predicted glare – glare that occurs for low durations throughout the year is less likely to be experienced than glare that occurs for longer durations throughout the year;
 - The location of the source of glare relative to the position of the Sun at the times and dates in which solar reflections are geometrically possible – effects that coincide with direct sunlight appear less prominent than those that do not;

- 16.3.61 The level of predicted effect relative to existing sources of glare – a solar reflection is less noticeable by pilots when there are existing reflective surfaces in the surrounding environment.
- 16.3.62 The sensitivity of the receptor is considered ‘High’ due to being of international or national importance with little ability to absorb change.
- 16.3.63 A ‘Negligible’ magnitude would occur if solar reflections were not geometrically possible.
- 16.3.64 A ‘Low’ magnitude would occur under the following scenarios:
- Solar reflections originate from outside a pilot’s main field-of-view.
 - Solar reflections have a ‘low potential for temporary after-image’.
 - Solar reflections have ‘potential for temporary after-image’ with sufficient mitigating factors.
 - The aerodrome has confirmed the glare scenario is acceptable.
- 16.3.65 A ‘Medium’ magnitude would occur if solar reflections have ‘potential for temporary after-image’ without sufficient mitigating main factors.
- 16.3.66 A ‘High’ magnitude would occur if solar reflections have ‘potential for permanent eye damage’.
- 16.3.67 The descriptions of the sensitivity of a receptor in general are presented in Table 16.1 below.

Table 16.1: Sensitivity of Receptor

Sensitivity	Description
High	The receptor has little ability to absorb change without fundamentally altering its present character or is of international or national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character or is of low or local importance.

Sensitivity	Description
Negligible	The receptor has little ability to absorb change without fundamentally altering its present character or is of negligible importance.

Magnitude of Effects

16.3.68 The classifications of magnitude of effect are presented in Table 16.2 below:

Table 16.2: Magnitude of Change

Magnitude of Effect	Criteria
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.

Impact Significance for Environmental Effects

16.3.69 The impact significance for environmental effects is presented in Table 16.3 below. An impact of 'Moderate' and greater is considered to be significant for the EIA.

Table 16.3: Impact of Significance of Environmental Effects

Magnitude of Effect	Sensitivity of Receptor			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor Adverse	Minor Adverse	Moderate Adverse
Medium	Negligible	Moderate Adverse	Moderate Adverse	Moderate Adverse

Magnitude of Effect	Sensitivity of Receptor			
	Negligible	Low	Medium	High
High	Negligible	Major Adverse	Major Adverse	Major Adverse

Scoped Out Effects

- 16.3.70 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.
- 16.3.71 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.

16.4 Assessment Assumptions and Limitations

- 16.4.1 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.
- 16.4.2 The geometric model considers 100% sunlight during daylight hours which is highly conservative.
- 16.4.3 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.
- 16.4.4 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.
- 16.4.5 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.
- 16.4.6 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.

- 16.4.7 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.

16.5 Stakeholder Engagement

- 16.5.1 Table 16.4 below summarises how the glint and glare assessment has considered the feedback from the EIA Scoping Opinion (see **Appendix 1.2 – Steeple Renewables EIA Scoping Opinion [EN010163/APP/6.3.1]**):

Table 16.4: Response to EIA Scoping Opinion

Consultee and Date	Summary of Consultation	How this is addressed within this Chapter
Planning Inspectorate (PINS) June 2024	<i>“The ES should justify the proposed assessment area of 1km as appropriate, explaining how elevated receptors which may overlook the site have been considered in the assessment. Receptors should include PRowS and bridleways as well as residential and road users.”</i>	<p>There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. The 1km assessment area is based on industry experience and best practice concerning ground-based receptors (roads and dwellings).</p> <p>Considerations to elevated observers (i.e. HGV drivers and residential properties with floors above ground level) are considered when determining the predicted impact.</p> <p>Public Rights of Way (PRowS) and bridleways have been considered within this assessment, with further detail included in Section 16.7.</p>

Consultee and Date	Summary of Consultation	How this is addressed within this Chapter
Planning Inspectorate (PINS) June 2024	<i>“The Scoping Report highlights that only railway receptors within 500m of the solar panel area will be included within the assessment based on a previous consultation with Network Rail. The ES should justify the study area, explaining why no significant effects would occur beyond 500m.”</i>	The assessment area is informed by previous consultation with Network Rail, and industry experience. No significant impacts beyond this distance would occur due to the fleeting nature of trains (i.e. train drivers) and reduced horizontal field-of-view for a train driver. Further detail is included in Section 16.7.
Planning Inspectorate (PINS) June 2024	<i>“The Applicant is advised to use the ZTV developed for the LVIA to identify sensitive receptors with potential views of the site that may be affected by glint and glare. Effort should be made to agree the sensitive receptors with relevant consultation bodies. The locations of the sensitive receptors should be shown on an accompanying plan.”</i>	The Zones of Theoretical Visibility (ZTV) has been used to inform the assessment within this Chapter upon PRoW.
Canal & River Trust February 2025	<i>“The proposed assessment area should include river users on the River Trent, to ascertain whether the potential impact of glint and glare may give rise to LSEs. The Applicant’s attention is directed to the comments from the Canal and River</i>	The assessment has assessed the potential impact upon river users at a high-level without being geometrically modelled. Further detail is included in Section 16.7.9

Consultee and Date	Summary of Consultation	How this is addressed within this Chapter
	<i>Trust in Appendix 2 on this matter.”</i>	

- 16.5.2 Since the EIA Scoping Stage, there has been engagement with the relevant stakeholders, including West Burton Airfield, Grove Farm Airfield and Forwood Farm Airfield.
- 16.5.3 Railway infrastructure pertaining to Network Rail has been identified via their Automated Intelligent Video Review (AIVR) to ascertain further information regarding signals and assets that have been included in the **Appendix 16.1 – Solar Photovoltaic Glint and Glare Study [EN010163/APP/6.3.16]**.
- 16.5.4 Table 16.5 below summarises how the glint and glare assessment has considered the feedback from the Statutory Consultation:

Table 16.5: Responses to Statutory Consultation

Consultee and Date	Summary of Consultation	How this is addressed within this Chapter
Canal & River Trust March 2025	“The Glint and Glare Assessment should specifically consider the potential effect on vessels navigating along the river in order to determine whether the proposed development would give rise to LSEs and, if so, identify how they are to be mitigated”	The assessment has considered the potential impact upon vessels navigating along the river as waterways. Further detail is presented in section 16.7.12.
North Leverton with Hablethorpe Parish Council March 2025	We have the RAF from RAF Waddington, RAF Coningsby and aircraft from Gamston Airport, Sandtoft Airport, and the potential reopening of Doncaster Sheffield Airport. There needs to be further significant research undertaken before we can sign off on this	The assessment has assessed the potential impact upon aviation activity for aerodromes within 16km of the Proposed Development. Further detail is included in Section 16.7.8

Consultee and Date	Summary of Consultation	How this is addressed within this Chapter
Network Rail March 2025	Since your proposal would involve interaction with Network Rail's operational railway, it is strongly advised that you take all potential areas of concern to Network Rail into account, in their documentation for consideration at planning. Therefore, it is imperative that Network Rail's Asset Protection team in the eastern region be consulted directly by you, to ensure that all risks to our railway infrastructure are safely managed from all construction-related activities associated with your proposed development.	Receptors such as assets and signals to be included in the glint and glare assessment had been identified via the Automated Intelligent Video Review (AIVR) Network Rail portal. Further detail is included in Section 16.3.2

16.6 Baseline Conditions

- 16.6.1 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.

16.7 Assessment of Likely Significant Effects

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

Road Safety

- 16.7.2 Solar reflections are geometrically possible towards a 200m section of the A156/Gainsborough 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.

- 16.7.3 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 200m section of the A156/Gainsborough Road, such that effects from the Proposed Development would be **'negligible'**, which is **not significant**.

Residential Amenity

- 16.7.4 A 'medium' magnitude of change is geometrically possible towards all 212 residential dwelling receptors. This is due to solar reflections occurring for more than three months per year but less than sixty minutes on any given day. Based on the geometric result, the resulting impact significance of effect would be a 'moderate adverse' due to the low 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 built form on and around the Site) are taken into account.
- 16.7.5 Considering the baseline conditions of the Site, screening in the form of existing vegetation, non-residential buildings and intervening terrain is predicted to obstruct views of reflecting panels for 200 residential dwellings, such that effects arising from the Proposed Development would be **'negligible'**, which is **not significant**. For 12 residential dwellings, marginal views are considered possible in tandem with sufficient mitigating factors, such that the resulting impact significance will be **'minor adverse'** and **not significant**.

Railway Operations and Infrastructure

- 16.7.6 A 'medium' magnitude of change upon the sections of railway is geometrically possible due to solar reflections occurring within a train driver's main field-of-view (defined as 30 degrees either side of the direction of travel). Based on the geometric result, 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 built form on and around the Site) are taken into account.

- 16.7.7 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 train drivers, such that effects arising from the Proposed Development would be ‘negligible’, which is **not significant**.

Aviation Activity

- 16.7.8 Solar reflections towards West Burton Airfield and Grove Farm Airfield have glare intensities with ‘potential for temporary after-image’ (i.e., ‘yellow’ glare). The glare intensity is greater than the accepted threshold of glare intensity for aviation receptors. Based on the geometric result, 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, and is therefore considered to be significant. The glare scenario is considered in context of the activity at the airfield and is deemed operationally accommodatable (i.e. the glare scenario not impacting operations carried out at the aerodrome due to training exercises understood not to occur at the aerodromes (for example)), which is **not significant**. Engagement with the relevant stakeholders will continue to determine if the effects would be ‘significant’ in the context of their own operations.
- 16.7.9 Solar reflections towards Forwood Farm Airfield occur outside a pilot’s main field-of-view (defined as 50 degrees either side of the runway approach relative to the approach bearing). 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. This is considered to be **not significant**.
- 16.7.10 Solar reflections towards Carr Farm Airfield, Darlington Gliding Club, Headon Airfield, Retford Gamson Airfield, Stow Airfield, Sturgate Airfield, Willow Farm Airfield and RAF Scampton have solar reflections of intensities of ‘low potential for temporary after-image’ (‘green’ glare). The glare intensity 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 receptor and low magnitude of change. The effect is considered temporary and direct in nature. This is considered to be **not significant**.
- 16.7.11 Solar reflections towards the ATC Tower at RAF Scampton, Retford Gamson Airport and Robin Hood Doncaster Sheffield Airport will be obstructed by existing

vegetation, buildings and intervening terrain. Therefore, impacts are . The effect is considered permanent and indirect in nature. Considering the high sensitivity of the receptor and negligible magnitude of change, the resulting impact significance of effect would be ‘negligible’ and **not significant**.

PRoW, Bridleways and Waterways

- 16.7.12 The sensitivity of PRoW, bridleways and waterways is considered to be low as they are of local importance and tolerant to change without detriment to its character. The magnitude of change would be considered low and not require mitigation. This is justified by Paragraph 16.3.38 of this chapter that sets out that, for example, glint and glare effects towards receptors on PRoWs, bridleways and waterways are transient, and time and location sensitive, whereby a pedestrian could move beyond the solar reflection zone with ease. Additionally, screening in the form of existing vegetation and intervening terrain will reduce the visibility of reflecting panels towards these receptors and therefore further mitigate any impact. The resulting impact significance is ‘minor adverse’ and considered **not significant**.

16.8 Mitigation and Enhancement

- 16.8.1 The significant effects upon ground-based receptors such as roads and residential dwellings, and railway operations and infrastructure can be reduced to a lower impact by various mitigation strategies – the most common being, for example, the provision of screening along the boundary of the Proposed Development to obstruct views of potentially reflecting panels, as shown on **Figure 6.9 – Outline Landscape Mitigation Strategy [EN010163/APP/6.4.6]**.
- 16.8.2 The iterative design of the Proposed Development has considered what mitigation is to be implemented for the relevant receptors outlined, for example the appropriate management of existing and new planting on the Site, in order to minimise the potential for significant effects and ensure a satisfactory level of environmental protection. The landscape management measures are secured in **Appendix 7.14 – Outline Landscape and Ecological Management Plan [EN010163/APP/6.3.7]**. Following its implementation, no significant impacts upon the receptors are predicted.
- 16.8.3 Further to the impact upon West Burton Airfield and Grove Farm Airfield which is deemed operationally accommodatable and not significant, the Applicant is engaging stakeholders that have been identified to incur likely significant effects arising from the Proposed Development, to ascertain if the effects would actually

be 'significant' in the context of their operations, which would identify any further mitigation, such as changes to the layout or panel configuration (if required). Initial emails for consultation were sent in October 2024 and a response is yet to be received. Engagement will continue throughout the submission and examination periods.

16.9 Residual Effects

- 16.9.1 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. Given that no significant effects are likely upon ground-based receptors (roads, dwellings and railway infrastructure), the residual effects will be **negligible** and **not significant**.

16.10 Cumulative and In-combination Effects

Cumulative Effects

- 16.10.1 Cumulative effects are considered possible when receptors for the Proposed Development coexist within the study areas as defined in 16.3.15 – 16.3.28 for existing, approved or consented schemes.
- 16.10.2 Table 16.6 below summarises the schemes considered for cumulative effects, the approximate distances from the Site and the possibility of a cumulative effect.

Table 16.6: Cumulative Other Developments for Assessment

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
Cottam Solar Project Limited (EN0101330 Status - consented (Solar energy generation and battery storage in excess of 50MW.)	3km south	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 3km separation distance is greater than the study area of 1km.

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
<p>Gate Burton Energy Park Ltd (EN010131)</p> <p>Status – consented</p> <p>(Solar energy generating scheme in excess of 50MW)</p>	1.8km east	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 1.8km separation distance is greater than the study area of 1km.
<p>Tillbridge Solar Limited (EN010142)</p> <p>Status – submitted</p> <p>(Solar energy generating scheme and battery storage in excess of 50MW)</p>	3km south	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 3km separation distance is greater than the study area of 1km.
<p>West Burton C Power Station - EDF Energy (Thermal Generation) Limited (EN010088)</p> <p>Status- consented</p> <p>(Power station (peaking plant) capable of generating up to 299MW of electrical generation capacity)</p>	Adjacent to the north-east of the site	Glint and glare impacts are not considered for a power station. Therefore, a cumulative impact would not be considered possible.
<p>West Burton Solar Project Limited (EN010132)</p> <p>Status – consented</p> <p>(Solar energy generating scheme and battery storage in excess of 50MW)</p>	The cable corridor traverses the site	Glint and glare impacts are not considered for the cable corridor. Therefore, a cumulative impact would not be considered possible.

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
<p>Heckington Fen Energy Park - Ecotricity (Heck Fen Solar) Limited (EN010123)</p> <p>Status – consented</p> <p>(Solar energy generating scheme and energy storage in excess of 50MW)</p>	55km southeast	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 55km separation distance is greater than the study area of 1km.
<p>Bumblebee Solar Farm -Enso Green Holdings A Limited (22/00358/FUL)</p> <p>Status - consented</p> <p>(Solar energy generating scheme and energy storage under of 50MW)</p> <p>24/01358/FUL proposes to extend the cable route by continuing off Gainsborough Road into the West Burton Power station site to connect to the existing substation.</p>	2.5km north	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 2.5km separation distance is greater than the study area of 1km.
<p>Wood Lane Solar Farm -Elgin Energy ESCO LTD (20/00117/FUL)</p> <p>Status – consented</p> <p>(Solar energy generating scheme under 50MW)</p>	Adjacent to the west	Considering the distance between the scheme and Site, a cumulative impact would be considered possible.
<p>West Burton C Battery Storage -West Burton C Ltd (22/01713/FUL)</p> <p>Status – consented</p> <p>(Battery storage scheme up to 500MW)</p>	Adjacent to the north	Glint and glare impacts are not considered for a BESS. Therefore, a cumulative impact would not be considered possible.

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
<p>Site clearance (demolition) of West Burton A Power Station – EDF (23/00485/DEM)</p> <p>Status - consented</p>	Adjacent to the north	<p>Glint and glare impacts are not considered for a demolition of a power station. Therefore, a cumulative impact would not be considered possible.</p>
<p>Sturton le Steeple Quarry -Lafarge Aggregates Limited (now being implemented by Aggregate Industries) (V/4386)</p> <p>Status – consented/Access track under construction</p> <p>(Sand and gravel extraction).</p>	Adjacent to the south-east	<p>Glint and glare impacts are not considered for sand and gravel extraction. Therefore, a cumulative impact would not be considered possible.</p>
<p>Bole Ings Ash Disposal Site - EDF (F/3581, and V/4079 (variation of conditions 11, 13, and 53 of planning permission 1/18/00234/CDM)</p> <p>Status – operational/under construction</p> <p>(Full ash recovery at the West Burton Power Station site, and use of ash processing equipment).</p>	2km north	<p>Glint and glare impacts are not considered for a power station. Therefore, a cumulative impact would not be considered possible.</p>

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
<p>Commercial Development at land at Skellingthorpe Road - Stirlin Developments (140696)</p> <p>Status – consented</p> <p>(Outline planning application for the material change of use of land, erection of buildings and associated development for employment uses falling within any of use classes B1 Business, B2 General Industrial and B8 Storage and Distribution and associated infrastructure)</p>	11.2km south-east	<p>Glint and glare impacts are not considered for material change of use of land, erection of buildings and associated development for employment. Therefore, a cumulative impact would not be considered possible.</p>
<p>New 400 kilovolt (kV) electricity transmission connection - North Humber to High Marnham -National Grid Electricity Transmission (EN020034)</p> <p>Status – proposed</p> <p>(Reinforcement of the National Grid transmission network (i.e., a new ~90km transmission line)).</p>	Overhead lines are currently proposed to traverse the western portion of the Site.	<p>Glint and glare impacts are not considered for a transmission line. Therefore, a cumulative impact would not be considered possible.</p>
<p>Great North Road Solar and Biodiversity Park -Elements Green Trent Limited (EN010162)</p> <p>Status – proposed</p> <p>(Solar energy generating scheme and battery storage in excess of 50MW)</p>	13km south	<p>Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as a 13km separation distance is greater than the study area of 1km.</p>

Development description and Reference Number	Approximate Distance from Site	Possibility of a Cumulative Effect
One Earth Solar Farm (EN010159) Status - proposed (Solar energy generating scheme and battery storage in excess of 50MW)	8km south	Considering the distance between the scheme and Site, a cumulative impact would not be considered possible as an 8km separation distance is greater than the study area of 1km.
Land at Apleyhead Junction A1, Worksop - Caddick Developments (24/01186/FUL) Status – submitted (Use Class B8 Development (Logistics and Distribution))	12km southwest	Glint and glare impacts are not considered for a logistics and distribution development. Therefore, a cumulative impact would not be considered possible.

- 16.10.3 The assessment areas as outlined in Sections 16.3.15 – 16.3.28 are considered for the consented¹² 'Wood Lane Solar Farm, Sturton Le Steeple Nottinghamshire – planning reference 20/00117/FUL' development. Where the same receptors exist for the Proposed Development and consented development, a cumulative effect is considered possible.
- 16.10.4 Cumulative effects are considered geometrically possible with the consented¹² Wood Lane Solar Farm, Sturton Le Steeple Nottinghamshire – planning reference 20/00117/FUL' solar development, located adjacent west to Site (hereafter referred to as the 'consented development'). No significant effects are predicted upon roads and railway infrastructure by the consented scheme and Proposed Development in isolation, therefore **no significant cumulative effect** is considered possible.
- 16.10.5 Cumulative impacts upon the A156/Gainsborough Road are not predicted, as no impact is predicted from the consented development.
- 16.10.6 Cumulative impacts upon West Burton Airfield and Grove Farm Airfield are considered geometrically possible. Solar reflections from the consented development coincide with the Proposed Development, and therefore the glare

¹² 20/00117/FUL - Installation and operation of a solar farm comprising an array of ground mounted solar PV panels with associated infrastructure including housing for inverters a substation compound, point of connection mast, fencing, security cameras, cabling, access tracks and a temporary construction compound. Application Approved August 2020.

scenario does not worsen (such as glare occurring at the same time of the day and therefore not considered to effect operations). As such, the impact significance is not predicted to change (i.e. worsen) than the Proposed Development in isolation.

16.10.7 **No significant cumulative effects** are considered possible.

In -Combination Effects

16.10.8 Regarding in-combination effects, given that the residual effects associated with the construction, operational and decommissioning phases of the Proposed Development are predicted to be not significant, it is not anticipated for there to be any significant in-combination effects on receptors of glint and glare effects with other environmental disciplines assessed.

16.10.9 Climate change could have an effect of increased solar duration and intensity, thus impacting glint and glare effects. The consequence is considered to be low and a ‘**minor**’ and **not significant**. Additionally, the potential for in-combination effects from glint and glare and landscape and visual effects on overlapping receptors are anticipated to be **not significant** with screening in place.

16.10.10 **No significant in-combination effects** are predicted.

16.11 Summary

Introduction

16.11.1 The possible glint and glare impacts of the Proposed Development upon road safety, residential amenity, railway infrastructure and operations, aviation activity, public rights of way, bridleways and waterways have been assessed.

Baseline Conditions

16.11.2 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.

Likely Significant Effects

16.11.3 No significant impacts upon road safety, residential amenity, railway infrastructure and operations, public rights of way, bridleways and waterways are predicted when considering the baseline conditions.

16.11.4 The impact upon West Burton Airfield and Grove Farm Airfield is deemed operationally accommodatable and not significant. Engagement with relevant stakeholders will identify any further mitigation to minimise effects as practicable

Mitigation and Enhancement

- 16.11.5 The iterative design of the Proposed Development has considered what mitigation is to be implemented for the relevant receptors outlined, for example the appropriate management of existing and new planting on the Site, in order to minimise the potential for significant effects and ensure a satisfactory level of environmental protection. The landscape management measures are secured in **Appendix 7.14 – Outline Landscape and Ecological Management Plan [EN010163/APP/6.3.7]**. Following its implementation, no significant impacts upon the receptors are predicted

Cumulative and In-Combination Effects

- 16.11.6 Cumulative effects with the consented ‘Land North West And South Of Field Farm Wood Lane Sturton Le Steeple Nottinghamshire– planning reference 20/00117/FUL’ development. The consented and Proposed Development are not considered to have a significant effect on ground-based receptors (roads, dwellings, railway infrastructure and operations, public rights of way, bridleways and waterways) insolation and therefore no significant cumulative impacts are considered possible.

Conclusion

- 16.11.7 The Proposed Development is considered to have **no significant** glint and glare impacts upon road safety, residential amenity, railway infrastructure and operations, aviation activity, public rights of way, bridleways and waterways.

Table 16.7: 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								
Users of Regional Roads (200m section of A156 / Gainsborough Road)	Solar reflection upon vehicle drivers on roads	Temporary Direct	Medium	Medium	District	Negligible (Not Significant)	The retention of and appropriate management of existing vegetation around the Site (where feasible), and provision of screening (vegetation) along the boundary of the Site to obstruct views of potentially reflecting panels.	Negligible (Not Significant)
Residential Dwellings	Reflection of sunlight from panels in array. Nuisance caused by glint	Temporary Direct	Low	Medium	Local	Minor adverse (Not significant)	The retention of and appropriate management of	Negligible (Not Significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation/ Enhancement Measures	Residual Effects
	reflections visible from inside of house.						existing vegetation around the Site (where feasible), and provision of screening (vegetation) along the boundary of the Site to obstruct views of potentially reflecting panels, where required.	
Railway receptor (train drivers operating trains within the railway inside of / adjacent to the western portion of the Site)	Reflection of sunlight from panels in array. Potential issue from driver dazzle.	Temporary Direct	Medium	Medium	Regional	Minor adverse (Not Significant)	The retention of and appropriate management of existing vegetation (where feasible), and provision of screening (vegetation) to obstruct views of potentially	Negligible (Not Significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation/ Enhancement Measures	Residual Effects
							reflecting panels towards train operators.	
Aviation Receptors (West Burton Airfield, Grove Farm Airfield, and Forward Farm Airfield)	Reflection of sunlight from panels in array. Potential safety issue from pilot dazzle or air traffic control dazzle.	Temporary Direct	Medium	'Medium	National	Moderate Adverse (significant)	Consideration to the aerodrome's operations deem the glare scenario operationally accommodatable, and therefore not significant. The Applicant has begun to engage with the relevant stakeholders to identify mitigation measures (if required).	. Minor adverse (not significant)
Aviation Receptors (Carr Farm Airfield,	Reflection of sunlight from panels in array. Potential safety issue	Temporary Direct	Medium	'Low	National	Minor Adverse (not significant)	N/A	Minor Adverse (Not Significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation/ Enhancement Measures	Residual Effects
Darlington Glint Club, Headon Airfield, Retford Gamson Airfield, ow Airfield, Sturgate Airfield, Willow Farm Airfield, RAF Scampton and Robin Hood Doncaster Sheffield Airport)	from pilot dazzle or air traffic control dazzle.							
Aviation Receptors (ATC Towers at RAF Scampton, Retford Gamson Airport and Robin Hood Doncaster Sheffield Airport)	Reflection of sunlight from panels in array. Potential safety issue from pilot dazzle or air traffic control dazzle.	Temporary Direct	Medium	Negligible	National	Negligible (Not Significant)	N/A	Negligible (Not Significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation/ Enhancement Measures	Residual Effects
Public Rights of Way, Bridleways and Waterways	Reflection of sunlight from panels in array. Nuisance caused by reflections / potential safety issue to those navigating on waterways in the vicinity of the Site	TEmporary Direct	Low	Low	Local	Minor Adverse (Not Significant)	The retention of and appropriate management of existing vegetation (where feasible) and the provision of new planting	Negligible (Not Significant)
Cumulative Effects								
N/A Land North West And South Of Field Farm Wood Lane Sturton Le Steeple Nottinghamshire	Reflection of sunlight from panels in array in conjunction with the Proposed Development	Temporary direct	Low	Low	Local	Minor adverse	The consented development is not considered to have an adverse impact due to its own mitigation measures. Mitigation measures for the Proposed Development (e.g., the retention of and appropriate	Negligible (Not Significant)

Receptor/ Receiving Environment	Description of Effect	Nature of Effect	Sensitivity Value	Magnitude of Effect	Geographical Importance	Significance of Effects	Mitigation/ Enhancement Measures	Residual Effects
							management of existing vegetation (where feasible) and the provision of new planting)	
In Combination Effects								
No significant in-combination effects identified.								