Heritage, Setting and Visual Impact

Little Gains Farm (LGF) is a non-designated heritage asset (HER MKE83194) which adjoins the DCO order limits.

The Heritage Statement (5.7.8) states that the farmstead originated from the 19th Century.

The farmhouse actually dates from 1627, as marked on the chimney.

The Heritage Statement (5.7.9) states that the setting of LGF is defined by its position off to the north of Frith Road.

In reality the setting of Little Gains Farm is defined by its location on the southern flanks of the Aldington Ridge, which can be seen clearly from the house and its surroundings (Figure 1).

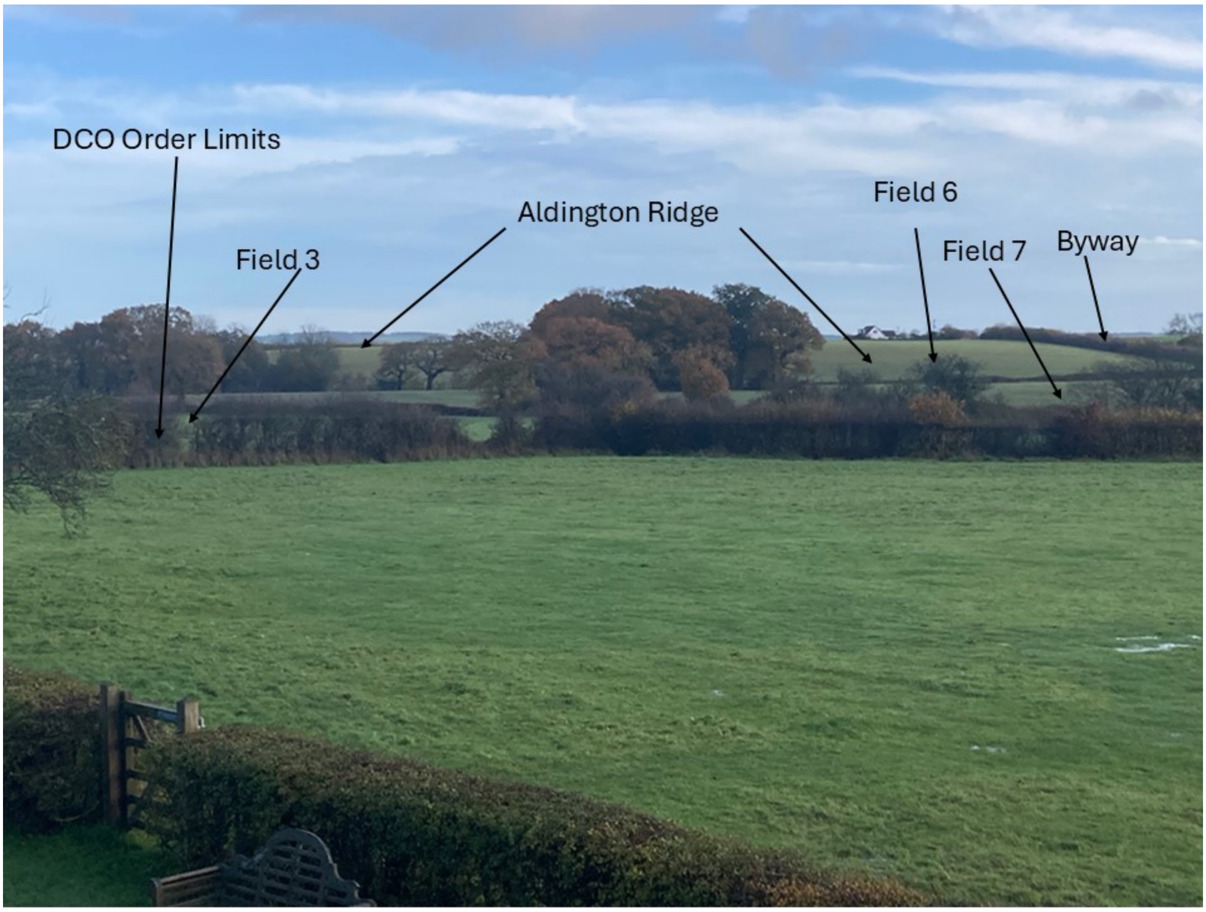

Figure 1 View form Little Gains Farm northwards towards the Aldington Ridge (and across the proposed development)

The setting of LGF on the flanks of the Aldington Ridge can also be appreciated from Byway AE-396 as shown in Figure 2.

The industrial landscape resulting from the scheme would undoubtedly change the setting of LGF considerably and detrimentally.

The Heritage Statement (6.9.10) states

"*None of the parcels of land within the site are historically associated with the building*".

Given that the farm dates from 1627, it is impossible to say this with any confidence and we believe that parts of Fields 3 and 7 have been associated with Little Gains Farm.

Figure 2 View of Little Gains Farm from Byway AE396

Visual Impact

The Heritage Statement (6.9.8) states

"*There is a potential visual impact on the surroundings of the asset, as identified by the ZTV, although the building itself is being screened by woodland and hedgerows, which would reduce the visual impact".*

As demonstrated by photos in Figures 1 and 2 there are clear views of the Aldington Ridge from Little Gains Farmhouse and consequently the proposed development.

These views would be replaced by solar panels, batteries, water towers and the associated glint and glare.

The industrialisation of the views from Little Gains Farm towards the Aldington Ridge plus the presence of fencing and CCTV cameras along our boundary will significantly affect the enjoyment of our property and its surrounding land. In order to mitigate the impact,

screening in the form of tree planting is required along the southern boundary of Fields 3 and 7 (Figure 3). Panels should be removed from the area adjacent to this boundary to accommodate tree planting.

Footpath AE395 and a little biodiversity

Footpath AE385 is planned to be diverted into the southwest corner of Field 3. This corner of the field, at the convergence of ditches, is extremely wet, with water lying on the surface from November to March.

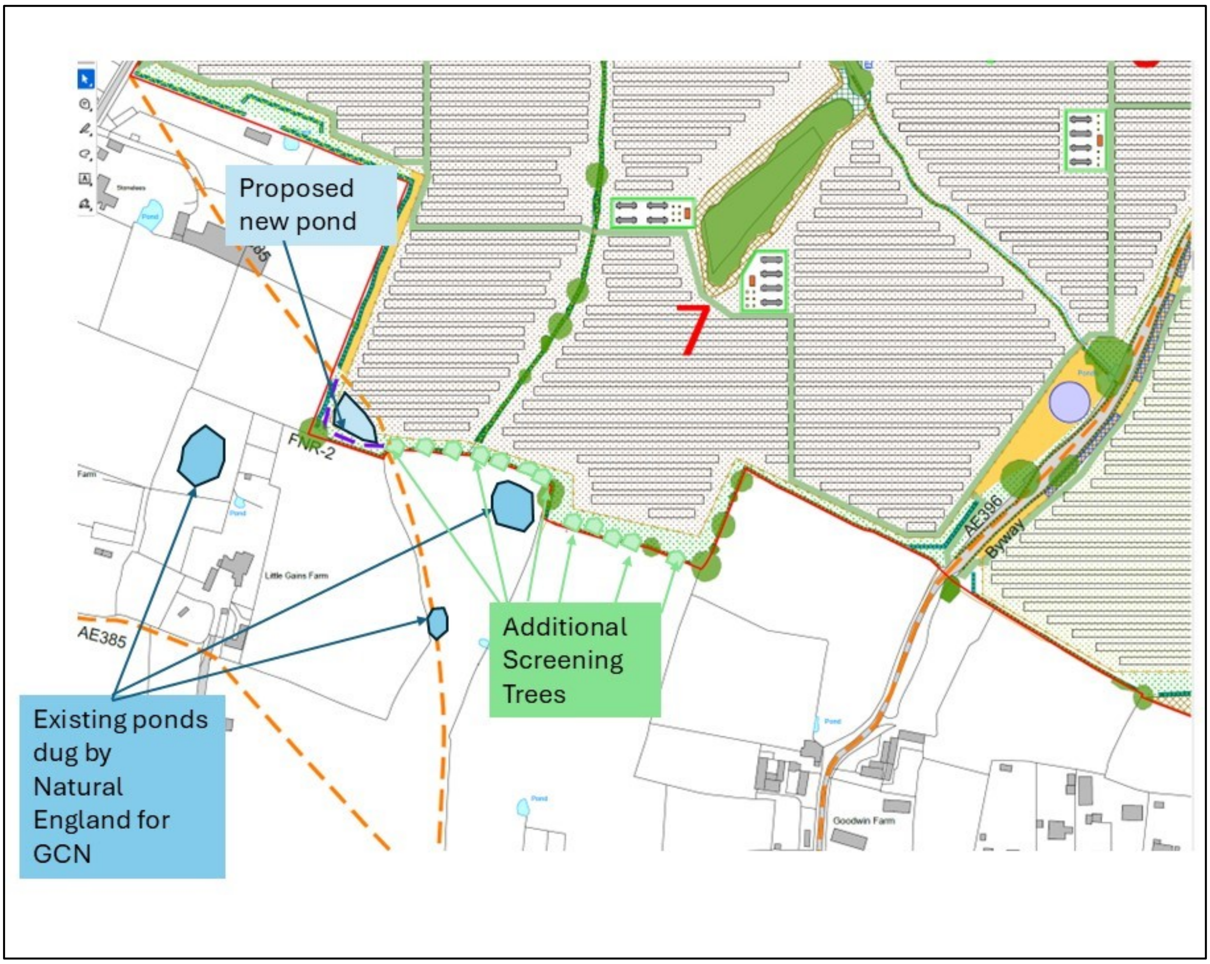

Figure 3 Proposed Screening along the southern boundaries of Fields 3 and 7 and proposed new pond and existing ponds.

The proposed diversion of this footpath provides very little extra land for solar panels, making more sense to leave the footpath as existing and dig a new pond in this wet corner. This would help promote the Great Crested Newt, which is protected under British and European Law.

Natural England have dug three ponds in the land adjoining the DCO Order Limits, in this area (Figure 3), which are not shown on any of the Applicant's maps. These large ponds have increased the population of Great Crested Newts in the area

In addition to improving the habitat for Great Crested Newts, it would help with the enjoyment of the footpath, which will otherwise be degraded by the solar panels and rerouted into the wet ground.

Historic England have also mentioned the southwest corner of the development , regarding Stonelees, a medieval hall, grade 2 * listed property. They suggest reducing the number of solar panels at the south ends of fields 3 and 7 to reduce the harm to Stonelees House. A proposal which would also help with the setting of Little Gains Farm.

Equestrian

Contrary to NPPF paras 96(c), 102 and 104, it seems that this application does not seek to enable or support healthy lifestyles nor protect or enhance local public rights of way, In fact, the opposite. If the Applicant is serious about taking into account equestrian users, a bridleway around the main part of the development, as suggested by the British Horse Society, would go some way to address this.

We have kept horses at Little Gains Farm for more than 20 years and the family enjoys hacking out. Our safest route involves Laws Lane, Bank Road, the Byway (AE-396) and its continuation down Rocky Bourne Road. These routes will effectively be closed, during the construction phase as a result of the six construction traffic crossings off the byway and Laws Lane. The BHS guidelines for Solar Farms calls for alternative routes to be provided by the Applicant, when byways are closed during construction and I believe that a safe, off-road alternative to the byway should be provided for equestrian users.

Glint and Glare

The effects of glint and glare will be greatest on the north and east sides of Little Gains Farmhouse where our kitchen diner, a largely glazed room, to make the most of the current beautiful views, is located. This is the room in which we spend most of our time and the impact on us will be significant.

In the Solar Photovoltaic Glint and Glare desktop study Little Gains Farm has been designated as dwelling 198. The study states that for Dwelling 198

"*Solar Reflections are geometrically possible for more than 3 months per year but less than 60 minutes on any given day*", which they deem to be low impact.

The evaluation carried out for the nearby East Stour Farm (Appendix 1) judges the impact very differently:

- The sensitivity of a static receptor such as a dwelling is considered high.
- Solar reflection impacts of over 30 hours per year or over 30 minutes per day are considered to be high impact.

By these metrics the effects at Little Gains Farm would be considered high impact and thus require mitigation.

The EDF report also provides the following information which the Applicant's report does not

- detail at what time of the day (morning or evening) glint may be experienced
- the number of hours per year that glare may be experienced
- the area of the solar farm from where the glint and glare originates

Without this information it is very difficult to accurately assess the impact of Glint and Glare on Little Gains Farm.

The analysis carried out by the Applicant is restricted to the effects on the ground floor and the report states that for Little Gains Farm

"reflecting panels to the east cannot be entirely ruled out above the ground floor".

Given that the effect of glint and glare is most likely to impact upon a ground receptor when the sun is lowest in the sky, this will include time when we are upstairs and therefore impacted. By excluding the effect of glint and glare on the first floor of Little Gains Farm the impact on our lives has been underestimated.

Glint and Glare for more than 3 months per year but less than 60 minutes on any given day would have a high impact on our lives, as the effects on the 2nd floor have been ignored. Further screening in the form of tree planting along the southern boundaries of Fields 3 and 7 is therefore required to mitigate these effects.

Figure 4. View of Aldington Ridge from approach to Little Gains Farm

Fire Risk and Toxic Fumes

We are genuinely concerned about the health risk associated with the toxic fumes resulting from a battery fire. Modelling has shown that there can be a significant risk of death for people within a few hundred metres of such a fire.

The access for fire engines to the main part of the site requires access via Bank Road or Laws Lane both of which are narrow single-track roads. Access for multiple fire vehicles will therefore be difficult, especially during busy periods. The internal site roads are very tortuous, travel through areas of standing water (Figure 5) and often have significant grade. I am therefore concerned that fire vehicles will be significantly delayed in attending the site of a fire, further increasing the public health risk.

We were not consulted on the decision to locate 26 BESS installations across the proposed site and adjacent to residential properties.

A single compound away from residential properties is considered normal industry practice and has the benefits of:

- Better security
- Better access to water for firefighting
- A single route for fire vehicles
- Reduced public health threat to residential properties

Figure 5 Photograph taken from the proposed southern site entrance on the Byway AE396 looking westwards along the route of a proposed internal access road

Byway AE396

The amenity value of the byway for walkers, cyclists and equestrian users has been ignored by the Applicant but has been treated as a route to facilitate site access. The unpaved surface provides (Figure 6) a good and safe route for all users. Gaps in the hedgerow currently reveal far reaching views westwards towards Colliers Hill and South-westwards towards Romney Marsh (Figures 4 and 6) , which can be enjoyed by all users. It is unfortunate that KCC and adjoining landowners has not properly maintained the hedges in parts recently, but that should not detract from the value of the byway

If the proposed scheme goes ahead, the byway will be flanked by solar panels, battery enclosures, security fencing with CCTV cameras, two vehicle crossings and four site entrances. Whilst the byway will remain open after construction the amenity value will be destroyed.

Figure 6 Approach to the proposed site along Byway AE396

Figure 6 View south-westwards from the Byway AE396

References

Appendix 1 East-Stour-ES-Volume-2a-Chapter-14-Glint-and-Glare.pdf

CHAPTER 14 - GLINT AND GLARE

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INTRODUCTION

14.1 Neo Environmental Ltd has been appointed by Engena on behalf of EDF Renewables (the "Applicant") to undertake a Glint and Glare Assessment for a proposed solar array development (the "Proposed Development") within a series of agricultural fields to the southeast of Ashford, west of Sellindge and northeast of Aldington, near the M20 motorway (the "Application Site").

14.2 For the purposes of this chapter, the site has three distinct areas. These areas can be viewed in **Appendices 14.1, 14.2** and **14.3**.

Proposed Development Description

14.3 The Proposed Development will consist of the construction of PV panels mounted on metal frames, access tracks, storage and welfare containers, combined inverter/transformer units, perimeter fencing and all ancillary grid infrastructure and associated works.

14.4 Please see **Figure 1.2** of overall site layout of the Proposed Development.

Site Description

14.5 The Application Site is located c. 2.22km to the west of the village of Sellindge. Centred for the purposes of this assessment at approximate Grid Reference N137921 E607901, the Application Site covers a total area of c. 103.9 hectares. The Application Site consists of three distinct areas of land.

14.6 The Application Site comprises a single site and the Proposed Development will be accessed from Church Lane. The solar panels will be confined entirely to the Application Site at a height of approximately 3m.

14.7 The Application Site is generally well enclosed and consists of six fields. The site is surrounded by vegetation and adjacent to an existing solar farm. The solar panels and main infrastructure will occupy five fields in the Application Site.

Scope of Study

14.8 Although there may be small amounts of glint and glare from the metal structures associated with the solar farm, the main source of glint and glare will be from the panels themselves and this will be the focus of this assessment.

14.9 Solar panels are designed to absorb as much light as possible and not to reflect it. However, glint can be produced as a reflection of the sun from the surface of the solar PV panel. This can also be described as a momentary flash. This may be an issue due to visual impact and viewer distraction on ground-based receptors and on aviation.

14.10 Glare is significantly less intense in comparison to glint and can be described as a continuous source of bright light, relative to diffused lighting. This is not a direct reflection of the sun, but a reflection of the sky around the sun.

14.11 This chapter concentrates on the effects of glint and glare and its impact on local receptors and will be supported with the following Figures and Appendices;

- **Figure 14.1**: Residential Based Receptors;
- **Figure 14.2**: Road Based Receptors;
- **Figure 14.3**: Rail Based Receptors;
- **Figure 1.2**: Site Layout;
- **Figure 14.4**: Panel Area Labels;
- **Appendix 14.1**: Residential Receptor Glare Results;
- **Appendix 14.2**: Road Receptor Glare Results;
- **Appendix 14.3**: Rail Receptor Glare Results;
- **Appendix 14.4**: Aviation Receptor Glare Results;
- **Appendix 14.5**; Visibility Evidence Assessment; and
- **Appendix 14.6**: Solar Module Glare and Reflectance Technical Memo.

Definitions

14.12 This study examined the potential hazard and nuisance effects of glint and glare in relation to ground-based receptors, this includes the occupants of surrounding dwellings as well as road users. The Federal Aviation Authority (FAA) in their "Technical Guidance for Evaluating Selected Solar Technologies on Airports" have defined the terms 'Glint' and 'Glare' as meaning;

- Glint – "A momentary flash of bright light".
- Glare – "A continuous source of bright light".

14.13 Glint and glare are essentially the unwanted reflection of sunlight from reflective surfaces. This study used a multi-step process of elimination to determine which receptors have the potential to experience the effects of glint and glare. It then examined, using a computer-generated geometric model, the times of the year and the times of the day such effects could occur. This is based on the relative angles between the sun, the panels, and the receptor throughout the year.

General Nature of Reflectance from Photovoltaic Panels

14.14 In terms of reflectance, photovoltaic solar panels are by no means a highly reflective surface. They are designed to absorb sunlight and not to reflect it. Nonetheless, photovoltaic panels have a flat polished surface, which omits 'specular' reflectance rather than a 'diffuse' reflectance, which would occur from a rough surface. Several studies have shown that photovoltaic panels (as opposed to Concentrated Solar Power) have similar reflectance characteristics to water, which is much lower than the likes of glass, steel, snow and white concrete by comparison (See **Appendix 14.6**). Similar levels of reflectance can be found in rural environments from the likes of shed roofs and the lines of plastic mulch used in cropping. In terms of the potential for reflectance from photovoltaic panels to cause hazard and/ or nuisance effects, there have been a number of studies undertaken in respect of schemes in close proximity to airports. The most recent of these was compiled by the Solar Trade Association (STA) in April 2016 and used a number of case studies and expert opinions, including that from Neo. The summary of this report states that "the STA does not believe that there is cause for concern in relation to the impact of glint and glare from solar PV on aviation and airports…" .

Time Zones / Datums

14.15 Locations in this chapter are given in Eastings and Northings using the 'British National Grid' grid reference system unless otherwise stated.

14.16 England uses British Summer Time (BST, UTC + 01:00) in the summer months and Greenwich Mean Time (GMT, UTC+0) in the winter period. For the purposes of this report all time references are in GMT.

LEGISLATION AND GUIDANCE

14.17 A review of relevant legislation has been conducted to ensure the Proposed Development complies with the following:

- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017;
- National Planning Policy Guidance on Renewable and Low Carbon Energy (UK); and
- Planning Guidance for the Development of Large-Scale Ground Mounted Solar PV Systems.

National Planning Policy Guidance (NPPG) on Renewable and Low Carbon Energy (UK)

14.18 Paragraph 013 (Reference ID: 5-013-20150327) sets out planning considerations that relate to large scale ground-mounted solar PV farms. This determines that 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. Considerations to be taken into account by local planning authorities are;

- "the proposal's visual impact, the effect on landscape of glint and glare and on neighbouring uses and aircraft safety; and
- the extent to which there may be additional impacts if solar arrays follow the daily movement of the sun."

Planning Guidance for the Development of Large-Scale Ground Mounted Solar PV Systems

14.19 As outlined within the Building Research Establishment (BRE) document 'Planning Guidance for the Development of Large-Scale Ground Mounted Solar PV Systems':

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

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

The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm."

Interim CAA Guidance – Solar Photovoltaic Systems (2010)

14.20 There is little guidance on the assessment of glint and glare from solar farms with regards to aviation safety. The Civil Aviation Authority (CAA) has published interim guidance on 'Solar Photovoltaic Systems', they also intend to undertake a review of the potential impacts of solar PV developments upon aviation, however this is yet to be published.

14.21 The interim guidance identifies the key safety issues with regards to aviation, including "glare, dazzling pilots leading them to confuse reflections with aeronautical lights." It is outlined that solar farm developers should be aware of the requirements to comply with the Air Navigation Order (ANO), published in 2009. In particular, developers should take cognisance of the following articles of the ANO, including:

- "Article 137 – Endangering safety of an aircraft – A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft.";
- Article 221 - Lights liable to endanger – "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 or from landing at an aerodrome; or
  - b) by reason of its liability to be mistaken for an aeronautical ground light liable to endanger aircraft"; and
- Article 222 – Lights which dazzle or distract – "A person must not in the United Kingdom direct or shine any light at any aircraft in flight so as to dazzle or distract the pilot of the aircraft."

14.22 Relevant studies generally agree that there is potential for glint and glare from photovoltaic panels to cause a hazard or nuisance for surrounding receptors, but that the intensity of such reflections is similar to that emanating from still water. This is considerably lower than for other manmade materials such as glass, steel or white concrete (SunPower – 2009).

14.23 These Articles are considered within the assessment of glint and glare of the Proposed Development.

US Federal Aviation Administration Policy

14.24 The FAA in their Solar Guide (Federal Aviation Authority, 2010) incorporates a chapter on the impact and assessment of glint from solar panels. It concludes that (although subject to revision):

"…evidence suggests that either significant glare is not occurring during times of operation or if glare is occurring, it is not a negative effect and is a minor part of the landscape to which pilots and tower personnel are exposed."

14.25 The current policy (Federal Register, 2013) demands that an ocular impact assessment must be assessed at 1-minute intervals from when the sun rises above the horizon until the sun sets below the horizon. Specifically, the developer must use the 'Solar Glare Hazard Analysis Tool' (SGHAT) tool specifically and reference its results as this was developed by the FAA and Sandia National Laboratories as a standard and approved methodology for assessing potential impacts on aviation interests, although it notes other assessment methods may be considered. The SGHAT tool has since been licensed to a private organisation who were also involved in its development and it is the software model used in this assessment.

14.26 Crucially, the policy provides a quantitative threshold which is lacking in the English guidance. This outlines that a solar development will not automatically receive an objection on glint grounds if low intensity glint is visible to pilots on final approach. In other words, low intensity glint with a low potential to form a temporary after-image would be considered acceptable under US guidance. Due to the lack of legislation and guidance within England, this US document has been utilised as guidance for this assessment.

14.27 The FAA guidance states that for a solar PV development to obtain FAA approval or to receive no objection, the following two criteria must be met:

- No potential for glint or glare in the existing or planned Air Traffic Control Tower (ATCT); and
- No potential for glare (glint) or "low potential for after-image" along the final approach path for any existing or future runway landing thresholds (including planned or interim phases), as shown by the approved layout plan (ALP). The final approach path is defined as 2 miles from 50 feet above the landing threshold using a standard 3-degree glide path.

14.28 The geometric analysis included later in this report, which defines the extent and time at which glint may occur, is required by the FAA as the methodology to be used when assessing glint and glare impacts on aviation receptors. This report follows the methodology required by the FAA as it offers the most robust assessment method currently available.

14.29 The Final Policy was introduced in May 2021 and supersedes the Interim Policy. The main difference between the two is that the FAA has withdrawn its requirement for the SGHAT approach in determining the ocular impact of glare. While still requiring a determination of the ocular impact, it is encouraged through a variety of methods and not just the singular method, as it was previously.

Review of Local Plan

Ashford Borough Local Plan

14.30 The Ashford Adopted Local Plan To 2030 was adopted in February 2019.

14.31 There are no policies contained within the Local Plan which are of relevance to this Glint and Glare assessment.

METHODOLOGY

14.32 A desk-based assessment was undertaken to identify when and where glint and glare may be visible at receptors within the vicinity of the Proposed Development, throughout the day and the year.

Sun Position and Reflection Model

Sun Data Model

14.33 The calculations in the solar position calculator are based on equations from Astronomical Algorithms . The sunrise and sunset results are theoretically accurate to within a minute for locations between +/- 72° latitude, and within 10 minutes outside of those latitudes. However, due to variations in atmospheric composition, temperature, pressure, and conditions, observed values may vary from calculations.

Solar Reflection Model

14.34 The position of the sun is calculated at one-minute intervals of a typical year, in this instance the year being assessed was 2021.

14.35 In order to determine if a solar reflection will reach a receptor, the following variables are required:

- Sun position;
- Observer location, and;
- Tilt, orientation, and extent of the modules in the solar array.

14.36 The model assumes that the azimuth and horizontal angle of the sun is the same across the whole solar farm. This is considered acceptable due to the distance of the sun from the Proposed Development and the minuscule differences in location of the sun over the Proposed Development.

14.37 Once the position of the sun is known for each time interval, a vector reflection equation determines the reflected sun vector, based on the normal vector of the solar array panels. This assumes that the angle of reflection is equal to the angle of incidence reflected across a normal plane. In this instance, the plane being the vector which the solar panels are facing.

14.38 On knowing the vector of the solar reflection, the azimuth is calculated and the horizontal reflection from multiple points within the solar farm. These are then compared with the azimuth and horizontal angle of the receptor from the solar farm to determine if it is within range to receive solar reflections.

14.39 The solar reflection in the model is considered to be specular as a worst-case scenario. In practice the light from the sun will not be fully reflected as solar panels are designed to absorb light rather than reflect it. The text above and **Appendix 14.6** outlines the reflective properties of solar glass and compares it to other reflective surfaces. Although the exact figures in this report could be argued, it is included as a visual guide and it agrees with most other reports, in that solar glass has less reflective properties than other types of glass and that the amount of reflective energy drops as the angle of incidence decreases.

14.40 Most modern panels have a slight surface texture which should have a small effect on diffusing the solar radiation further. Although, this has not been modelled, so as to provide a worst-case scenario assessment.

14.41 The panel reflectivity has been modelled to assume an anti-reflective coating (ARC) which is the industry standard for photo-voltaic panels and further reduces the reflective properties of the PV panels.

Determination of Ocular Impact

14.42 The software used for this assessment is based on the Sandia Laboratories Solar Glare Hazard Analysis Tool (SGHAT). This tool is specifically mentioned in the FAA guidance as the software which should be used in this type of assessment.

14.43 Determination of the ocular impact requires knowledge of the direct normal irradiance, PV module reflectance, size and orientation of the array, optical properties of the PV module, and ocular parameters. These values are used to determine the retinal irradiance and subtended source angle used in the ocular hazard plot.

14.44 The ocular impact of viewed glare can be classified into three levels based on the retinal irradiance and subtended source angle: low potential for after-image (green), potential for after-image (yellow), and potential for permanent eye damage (red).

14.45 Green glare can be ignored when looking at ground based and some aviation receptors. Green glare does not cause temporary flash blindness and happens at an instant with very slight disturbance. As per FAA guidelines mitigation is only required for green glare when affecting an Air Traffic Control Tower, but not for when affecting pilots. Therefore, it can be assumed that green glare is acceptable for ground-based receptors.

14.46 The subtended source angle represents the size of the glare viewed by an observer, while the retinal irradiance determines the amount of energy impacting the retina of the observer. Larger source angles can result in glare of high intensity, even if the retinal irradiance is low.

Relevant Parameters of the Proposed Development

14.47 The photovoltaic panels are oriented in a southwards direction to maximise solar gain and will remain in a fixed position throughout the day and during the year (i.e. they will not rotate to track the movement of the sun).

The panels will face south and will be inclined at an angle of 20 degrees.

14.48 The height of the panels above ground level is a maximum of 3m and points at the top of the panels are used to determine the potential for glint and glare generation.

Identification of Receptors

Study Areas

14.49 A 1km study area from the panels was deemed appropriate for the assessment of ground-based receptors as this seemed to contain a good spread of residential and road receptors in most directions from the Proposed Development. The further distance a receptor is from a solar farm, the less chance it has of being affected by glint and glare due to scattering of the reflected beam and atmospheric attenuation, in addition to obstructions from ground sources, such as any intervening vegetation or buildings. These study areas can be viewed in **Figure 14.1, 14.2** and **14.3**.

14.50 Buffer zones to identify aviation assets vary depending on the safeguarding criteria of that asset. All aerodromes within 30km will be identified, however generally the detailed assessments are only required within 20km for large international aerodromes; 10km for military aerodromes; and 5km for small aerodromes.

Ground Based Receptors

14.51 Glint is most likely to impact upon a ground-based receptor close to dusk and dawn when the sun is at its lowest in the sky. Therefore, any effect would likely occur early in the day or late in the day, reflected to the west at dawn and east at dusk.

14.52 A 1km study area from the panels was deemed appropriate for the assessment of ground-based receptors as this seemed to contain a good spread of residential and road receptors in most directions from the Proposed Development. The further distance a receptor is from a solar farm, the less chance it has of being affected by glint and glare due to scattering of the reflected beam and atmospheric attenuation, in addition to obstructions from ground sources, such as any intervening vegetation or buildings

14.53 An observer height of 2m was utilised for residential receptors, as this is a typical height for a ground-floor window. With regards to road users, a receptor height of 1.5m was employed as this is typical of eye level. Rail driver's eye level was assumed to be 2.75m above the rail for signal signing purposes and therefore this is the height used for assessment purposes.

14.54 An assessment was undertaken to determine zones where solar reflections will never be directed near ground level.

14.55 Where there are several residential receptors within close proximity, a representative dwelling or dwellings is/are chosen for full assessment as the impacts will not vary to any significant degree. Where small groups of receptors have been evident, the receptors on either end of the group have been analysed in detail with the worst-case impacts attributed to that receptor.

Aviation

14.56 Glint is only considered to be an issue with regards to aviation safety when the solar farm lies within close proximity to a runway, particularly when the aircraft is descending to land. En-route activities are not considered an issue as the flight will most likely be at a higher altitude than the solar reflection.

14.57 Should a solar farm be proposed within the safeguarded zone of an aerodrome then a full geometric study may be required which would determine if there is potential for glint and glare at key locations, most likely on the descent to land.

Sensitivity

14.58 All receptors within this chapter will be deemed as having a High sensitivity. In reality, the sensitivity of a static receptor such as a dwelling, will have a lower sensitivity than a road user, due to the safety aspect. However, it is considered that categorising all receptors as High is the best option to present a worst case scenario in respect of glint and glare impacts.

Magnitude of Impact

Static Receptors

14.59 Although there is no specific guidance set out to identify the magnitude of impact from solar reflections, the following criteria has been set out for the purposes of this report:

- High - Solar reflections impacts of over 30 hours per year or over 30 minutes per day;
- Medium - Solar reflections impacts between 20 and 30 hours per year or between 20 minutes and 30 minutes per day;
- Low - Solar reflections impacts between 0 and 20 hours per year or between 0 minutes and 20 minutes per day; and
- None - Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Moving Receptors (Road and Rail)

14.60 Again, no specific guidance is available to identify the magnitude of impact from solar reflections on moving receptors except in aviation, however it is thought that a similar approach should be applied to moving receptors as aviation, based on the ocular impact and the potential for after-image.

14.61 The FAA guidance states that for a solar PV development to obtain FAA approval or to receive no objection the following criteria must be met:

- No potential for glare (glint) or "low potential for after-image (Green Glare)" along the final approach path for any existing or future runway landing thresholds (including planned or interim phases), as shown by the approved layout plan (ALP).

14.62 The FAA produced an evaluation of glare as a hazard and concluded in their report that:

"The more forward the glare is and the longer the glare duration, the greater the impairment to the pilots' ability to see their instruments and to fly the aircraft. These results taken together suggest that any sources of glare at an airport may be potentially mitigated if the angle of the glare is greater than 25 deg from the direction that the pilot

is looking in. We therefore recommend that the design of any solar installation at an airport consider the approach of pilots and ensure that any solar installation that is developed is placed such that they will not have to face glare that is straight ahead of them or within 25 deg of straight ahead during final approach."

14.63 It is reasonable to assume that although this report was assessing pilots' vision impairment, it can be also applied to drivers of other vehicles. Therefore, the driver's field of view will also be analysed where required and if the glare is greater than 25 degrees either side of their line of sight, then any impacts will reduce to low.

14.64 Based on the above, the following criteria has been set out for the purpose of this report when assessing the magnitude of impact on Road or Rail receptors:

- High –Yellow Glare impacts upon the receptors that are within 25 degrees either side of the receptors field of view;
- Low – Green Glare impacts or Yellow Glare impacts outside the receptors 25-degree field of view; and
- None - Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Moving Receptors (Aviation)

APPROACH PATHS

14.65 Each final approach path which has the potential to receive glint is assessed using the SGHAT model. The model assumes an approach bearing on the runway centreline, a 3-degree glide path with the origin 50ft (15.24m) above the runway threshold.

14.66 The computer model considers the pilot's field of view. The azimuthal field of view (AFOV) or horizontal field of view (HFOV) as it is sometimes referred, refers to the extents of the pilot's horizontal field of view measured in degrees left and right from directly in front of the cockpit. The vertical field of view (VFOV) refers to the extents of the pilot's vertical field of view measured in degrees from directly in front of the cockpit. The HFOV is modelled at 90 degrees left and right from the front of the cockpit whilst the VFOV is modelled at 30 degrees.

14.67 The FAA guidance states that there should be no potential for glare or 'low potential for after-image' at any existing or future planned runway landing thresholds for the Proposed Development to be acceptable.

14.68 Based on the above, the following criteria has been set out for the purpose of this report:

- **High** – Any Yellow Glare impacts upon the receptors that are within 25 degrees either side of the receptors field of view;
- **Low** – Green Glare impacts or Yellow Glare impacts outside the receptors 25-degree field of view; and.
- **None** - Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Air Traffic Control Tower (ATCT)

14.69 An air traffic controller uses the visual control room to monitor and direct aircraft on the ground, approaching and departing the aerodrome. It is essential that air traffic controllers have a clear unobstructed view of the aviation activity. The key areas on an aerodrome are the views towards the runway thresholds, taxiways, and aircraft bays.

14.70 The FAA guidance states that no solar reflection towards the ATCT should be produced by a proposed solar development, however this should be assessed on a site by site case and will depend on the operations at a particular aerodrome.

14.71 In order to determine the impact on the ATCT, the location and height of the tower will need to be fed into the SGHAT model and where there is a potential for 'low potential for After-Image' or more, then mitigation measures will be required.

14.72 Based on the above, the following criteria has been set out for the purpose of this report:

- **High** – Any Glare impacts upon the receptors; and
- **None** - Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening.

Significance of Effects

14.73 The significance of effects has been defined in accordance with the criteria outlined within **Table 14.1** below. The sensitivity of the attribute and the magnitude of the potential impact have been combined to identify the significance of the effect. Where **Table 14.1** is shaded red (Major), it identifies a significant effect.

Table 14.1 - *Rating of Significant Environmental Impacts*

Magnitude of Impact	Sensitivity of Receptor		
	High	Medium	Low
High	Major	Moderate	Minor
Medium	Moderate	Moderate	Minor
Low	Minor	Minor	Minor

Assessment Limitations

14.74 Below is a list of assumptions and limitations of the model and methods used within this report:

- The model does not consider obstacles (either man-made or natural) between the observation points and the prescribed solar installation that may obstruct observed glare, such as trees, hills, buildings, etc;
- The model does not rigorously represent the detailed geometry of a system; detailed features such as gaps between modules, variable height of the PV array, and support structures may impact actual glare results;
- Due to variations in atmospheric composition, temperature, pressure and conditions, observed values may vary slightly from calculated positions; and
- The model does not account for the effects of diffraction; however, buffers are applied as a factor of safety.
- The model assumes clear skies at all times and does not account for meteorological effects such as cloud cover, fog, or any other weather event which may screen the sun.

14.75 Due to these assumptions and limitations the model overestimates the number of minutes of glint and glare which are possible at each receptor and presents the worst-case scenario. Where glint and glare are predicted, a visibility assessment is carried out to determine a more accurate, real-world prediction of the impacts.

BASELINE CONDITIONS

Ground Based Receptors Reflection Zones

14.76 Based on the relatively flat topography in the area, solar reflections between five degrees below the horizontal plane to five degrees above it are described as near horizontal. Reflections from the proposed solar farm within this arc have the potential to be seen by receptors at or near ground level.

14.77 Further analysis showed that this will only occur between the azimuth of 238.15 degrees and 298.73 degrees in the western direction (late day reflections) and 64.76 degrees and 129.14 degrees in the eastern direction (morning reflections) and therefore any ground-based receptor outside these arcs will not have any impact from solar reflections.

14.78 **Figures 14.1, 14.2** and **14.3** show the respective study areas whilst also subtracting from this the areas where solar reflections will not impact on ground-based receptors due to the reasons set out in **paragraphs 14.75 to 14.76**.

Residential Receptors

14.79 Residential receptors located within 1km of the Application Site have been identified (**Table 14.2**). Glint was assumed to be possible if the receptor is located within the ground-based receptor zones outlined previously.

14.80 There are 26 residential receptors (Receptors 37 – 62) which are within the no-reflection zones and are clearly identifiable in **Figure 14.1**. The process of how these are calculated is explained in **paragraphs 14.75 to 14.76** of this report.

Table 14.2 - *Residential Receptors*

Receptor	Easting	Northing	Glint and Glare Possible
1	606888	139141	Yes
2	606836	139087	Yes
3	606961	139063	Yes
4	606949	138995	Yes
5	606821	138979	Yes
6	606732	139007	Yes
7	606919	138445	Yes
8	606639	137693	Yes
9	606425	137577	Yes
10	606418	137541	Yes
11	606634	137352	Yes
12	606568	137268	Yes
13	606572	137216	Yes
14	607499	136768	Yes
15	607513	136838	Yes
16	607555	137140	Yes
17	607646	137124	Yes
18	607708	137277	Yes
19	608173	137786	Yes
20	608855	137498	Yes
21	609339	137210	Yes
22	609416	137114	Yes
23	609456	138041	Yes

Receptor	Easting	Northing	Glint and Glare Possible
24	609047	138497	Yes
25	608972	138520	Yes
26	608857	138492	Yes
27	608783	138615	Yes
28	608834	138731	Yes
29	608901	138791	Yes
30	608939	138812	Yes
31	608195	138857	Yes
32	608154	138855	Yes
33	608088	139091	Yes
34	608018	139038	Yes
35	607913	139057	Yes
36	607960	139130	Yes
37	607473	139924	No
38	607461	139910	No
39	607451	139893	No
40	607326	139746	No
41	607344	139676	No
42	607295	139625	No
43	607250	139567	No
44	607233	139526	No
45	607143	139561	No
46	607421	139519	No
47	607363	139487	No

Receptor	Easting	Northing	Glint and Glare Possible
48	607465	139278	No
49	607716	139202	No
50	607089	139328	No
51	607046	139305	No
52	606743	139425	No
53	606828	139452	No
54	606894	139498	No
55	606864	139575	No
56	606773	139608	No
57	606729	139754	No
58	608141	136822	No
59	608019	136467	No
60	607955	136421	No
61	607562	136433	No
62	607509	136476	No

Road / Rail Receptors

14.81 There are seven roads within the 1km study area that require a detailed Glint and Glare Assessment; Bower Road, Church Lane, Station Road, Goldwell Lane, Haringe Lane, the M20 and Hythe Road (A20). There are some minor roads which serve dwellings; however, these have been excluded from assessment as vehicle users of these roads will likely be travelling at low speeds and therefore, there is a negligible risk of safety impacts resulting from glint and glare of the Proposed Development.

14.82 The ground receptor no-reflection zones are clearly identifiable on **Figure 14.2** and the process of how these are calculated is explained in **paragraphs 14.75 to 14.76** of this report.

14.83 **Table 14.3** shows a list of assessed receptor points within the study area which are 200m apart.

Table 14.3 - *Road Based Receptors*

Receptor	Easting	Northing	Glint and Glare Possible
1	606445	139109	Yes
2	606618	139010	Yes
3	606773	139042	Yes
4	606785	138849	Yes
5	606793	138651	Yes
6	606728	138462	Yes
7	606605	138337	Yes
8	606506	138198	Yes
9	606400	137804	Yes
10	606522	137674	Yes
11	606634	137562	Yes
12	606624	137362	Yes
13	606605	137163	Yes
14	609260	136636	Yes
15	609277	136835	Yes
16	609353	137018	Yes
17	609362	137214	Yes
18	609386	137411	Yes
19	609429	137606	Yes
20	609422	137805	Yes
21	609523	137977	Yes
22	609332	138037	Yes
23	609146	138109	Yes

Receptor	Easting	Northing	Glint and Glare Possible
24	608964	138192	Yes
25	608786	138283	Yes
26	608613	138384	Yes
27	608442	138489	Yes
28	608271	138591	Yes
29	608095	138687	Yes
30	607918	138781	Yes
31	607740	138870	Yes
32	607558	138953	Yes
33	607737	139161	Yes
34	607915	139070	Yes
35	608094	138980	Yes
36	608272	138890	Yes
37	608449	138797	Yes
38	608620	138692	Yes
39	608791	138587	Yes
40	608973	138505	Yes
41	608252	138431	Yes
42	608110	138301	Yes
43	608157	138114	Yes
44	608200	137950	Yes
45	608143	137759	Yes
46	608030	137594	Yes
47	607885	137458	Yes

Receptor	Easting	Northing	Glint and Glare Possible
48	607751	137313	Yes
49	607675	137128	Yes
50	607576	136970	Yes
51	607568	136770	Yes
52	607491	139970	No
53	607357	139822	No
54	607224	139672	No
55	607168	139489	No
56	607049	139330	No
57	606483	139475	No
58	606642	139354	No
59	606816	139255	No
60	606999	139174	No
61	607186	139101	No
62	607373	139029	No
63	607559	139253	No
64	607379	139340	No
65	607199	139428	No
66	607020	139518	No
67	606843	139611	No
68	606669	139709	No
69	607548	136571	No

14.84 There are two parallel and immediately adjacent railway lines within the 1km study area that pass from east to west between the North Array and the Central Array (see **Figure 14.4**) which requires a detailed assessment – the two lines have been assessed as a single receptor.

14.85 The ground receptor no-reflection zones are clearly identifiable on **Figure 14.3** and the process of how these are calculated is explained in **paragraphs 14.75 to 14.76** of this report.

14.86 **Table 14.4** shows a list of assessed receptors points within the study area which are 200m apart.

Table 14.4 - *Rail Based Receptors*

Receptor	Easting	Northing	Glint and Glare Possible
1	606366	138568	Yes
2	606554	138501	Yes
3	606745	138443	Yes
4	606939	138392	Yes
5	607134	138349	Yes
6	607331	138313	Yes
7	607527	138276	Yes
8	607724	138240	Yes
9	607922	138204	Yes
10	608118	138167	Yes
11	608315	138131	Yes
12	608513	138096	Yes
13	608709	138059	Yes
14	608906	138022	Yes
15	609103	137986	Yes
16	609300	137951	Yes
17	609496	137915	Yes

Aviation Receptors

14.87 Aerodromes within 30km of the Proposed Development can be found in **Table 14.5**.

Table 14.5 - *Airfields within Close Proximity*

Airfield	Distance	Use
Haringe Court Farm	0.85km	Small grass strip
Pent Farm	4.90km	Small grass strip
Monks Field Airfield	8.51km	Small grass strip
Coldharbour Farm	13.69km	Small grass strip
Challock Airfield	13.80km	Small grass strip
Clipgate Farm	15.29km	Unlicensed small grass strip
Lydd Airport	15.29km	Licensed aerodrome
Waldershare Park Airfield	22.10km	Small grass strip
Headcorn Aerodrome	22.43km	Licensed small grass strip
Maypole Airfield	28.18km	Small grass strip

14.88 There is one aerodrome, Pent Farm, which requires a detailed assessment due to this airfield being within its respective safeguarding buffer zones outlined in **paragraph 14.49**.

HARINGE COURT FARM

14.89 Haringe Court Farm is a Visual Flight Rules (VFR) only aerodrome. It is located approximately 4.5NM (8.33km) northwest of Folkestone.

14.90 The elevation of the aerodrome is 279ft (85m). It has one grass strip runway, details of which are given in **Table 14.6**.

Table 14.6 - *Runways at Haringe Court Farm*

Runway Designation	True Bearing(⁰)	Length (m)	Width (m)
02	018	370	10
20	198	370	10

Table 14.7 - *Runway Threshold Locations and Heights*

Runway Designation	Threshold Latitude	Threshold Longitude	Height AOD (m)
02	51° 05' 25.32" N	000° 59' 17.01" E	88
20	51° 05' 36.72" N	000° 59' 23.05" E	84

Table 14.8 - *Runways at Pent Farm*

Runway Designation	True Bearing(⁰)	Length (m)	Width (m)
05	51	800	20
23	231	800	20

Table 14.9 - *Runway Threshold Locations and Heights*

Runway Designation	Threshold Latitude	Threshold Longitude	Height AOD (m)
05	51° 06' 27.22" N	001° 02' 58.45" E	81
23	51° 06' 41.91" N	001° 03' 31.72" E	90

14.91 The threshold location and height of the runway at Haringe Court Farm are given in **Table 14.7**.

14.92 There is no Airport Reference Point (ARP) or air traffic control tower (ATCT) at Heringe Court Farm.

Pent Farm

14.93 Pent Farm is a Visual Flight Rules (VFR) only aerodrome. It is located approximately 4.5NM (8.33km) northwest of Folkestone.

14.94 The elevation of the aerodrome is 279ft (85m). It has one grass strip runway, details of which are given in **Table 14.8**.

14.95 The threshold location and height of the runway at Pent Farm are given in **Table 14.9**.

14.96 There is no Airport Reference Point (ARP) or air traffic control tower (ATCT) at Pent Farm.

IMPACT ASSESSMENT

14.97 Following the methodology outlined earlier in this chapter, geometrical analysis comparing the azimuth and horizontal angle of the receptors from the Proposed Development and the solar reflection was conducted. Although this assessment did not take into account obstructions such as vegetation and buildings, discussion on the potentially impacted receptors is provided where necessary.

Ground Based Receptors

Residential Receptors

14.98 **Table 14.10** identifies the receptors that could potentially experience solar reflections based on solar reflection modelling and whether the reflections will be experienced in the morning (AM), evening (PM), or both.

14.99 The 26 receptors which were within the no-reflection zones outlined previously have been excluded from the detailed modelling as they will never receive any glint and glare impacts from the Proposed Development.

14.100 **Appendix 14.1** shows the analysis with the solar panels at a tilt angle of 20 degrees and a height of 3m. **Table 14.10** shows the worst-case impact at each receptor.

Table 14.10 - *Potential for Glint and Glare impact on Residential Receptors*

Receptor	Glint Possible from Site		Potential Glare Impact (per year)		Magnitude of Impact	Significance of Effect
	AM	PM	Minutes	Hours		
1	No	No	0	0	None	None
2	No	No	0	0	None	None
3	No	No	0	0	None	None
4	Yes	No	161	2.68	High	Major
5	Yes	No	298	4.97	High	Major
6	Yes	No	102	1.70	High	Major
7	Yes	No	33	0.55	High	Major
8	Yes	No	3013	50.22	High	Major
9	Yes	No	2921	48.68	High	Major
10	Yes	No	2932	48.87	High	Major
11	Yes	No	3103	51.72	High	Major
12	Yes	No	3110	51.83	High	Major
13	Yes	No	3209	53.48	High	Major
14	Yes	No	1056	17.60	High	Major
15	Yes	No	1552	25.87	High	Major
16	Yes	No	2566	42.77	High	Major
17	Yes	No	2668	44.47	High	Major
18	Yes	No	2273	37.88	High	Major
19	No	Yes	2971	49.52	High	Major
20	No	Yes	4952	82.53	High	Major
21	No	Yes	4989	83.15	High	Major

Receptor	Glint Possible from Site		Potential Glare Impact (per year)		Magnitude of Impact	Significance of Effect
	AM	PM	Minutes	Hours		
22	No	Yes	4501	75.02	High	Major
23	No	Yes	3279	54.65	High	Major
24	No	Yes	1687	28.12	High	Major
25	No	Yes	1722	28.70	High	Major
26	No	Yes	1362	22.70	High	Major
27	No	Yes	1622	27.03	High	Major
28	No	Yes	1429	23.82	High	Major
29	No	Yes	1040	17.33	High	Major
30	No	Yes	964	16.07	High	Major
31	No	Yes	485	8.08	High	Major
32	No	Yes	560	9.33	High	Major
33	No	No	0	0	None	None
34	No	No	0	0	None	None
35	No	No	0	0	None	None
36	No	No	0	0	None	None

14.101 As can be seen in **Table 14.10**, there is a predicted High impact at 29 receptors, including two residential areas, and no impact for the remaining seven receptors. **Appendix 14.1** shows detailed analysis of when the glare impacts are possible, whilst also showing which parts of the solar farm the solar glare is reflected from.

14.102 **Appendix 14.4** shows Google Earth images that give an insight into how each receptor will be impacted by glint and glare from the Proposed Development. There is a mixture of images used, which include aerial, ground level and street level. The aerial images show the location of the receptor with the solar farm drawn as a white polygon and can be seen on the images when the solar farm is theoretically visible. The area of the solar farm from where reflections may be possible has been drawn as a yellow polygon. The ground level terrain is based on the height data of the surrounding land showing no intervening vegetation or buildings. The white and yellow polygons can be seen in this view also. The street view gives a good indication as to whether the area of the solar farm where reflections are theoretically possible will be visible from the receptor point.

RECEPTORS 4 - 6

14.103 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.5** shows that reflections from a small northwest corner of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.104 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to **None** with the significance of effect being **None**.

RECEPTOR 7

14.105 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from a central section of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.106 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTORS 8 - 13

14.107 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from all of the South Array and a northwest section of the East Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.108 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards Proposed

Development. These images confirm that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTORS 14 AND 15

14.109 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from southeast sections of the East Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.110 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTORS 16 AND 17

14.111 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the East Array (see **Figure 14.4**) except a small northwest corner and a small southeast corner in the Proposed Development can potentially impact on the receptor.

14.112 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 18

14.113 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the East Array (see **Figure 14.4**) except a small northwest corner and a small southeast corner in the Proposed Development can potentially impact on the receptor.

14.114 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 19

14.115 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from a central section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.116 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development, and the location from which the second, third and fourth images were taken (red pin). The second image is a street view image with a view towards Receptors. This image confirms that the vegetation is insufficient to screen all views of the Proposed Development where glint and glare is possible. The third and fourth images are ground level images with a view towards the Proposed Development showing the position of the sun 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTORS 20

14.117 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the South Array except a northern section and northern sections of the East Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.118 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTORS 21 AND 22

14.119 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the South Array except a northern section and most of the East Array except a small northeast section (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.120 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 23

14.121 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from all of the North Array and the northern half of the East Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.122 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTORS 24 - 27

14.123 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from all of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.124 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 28

14.125 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the North Array except a southern section (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.126 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None

RECEPTOR 29

14.127 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from most of the North Array except a southern section (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.128 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 30

14.129 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from the northern half of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.130 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Proposed Development. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTORS 31 AND 32

14.131 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.1** shows that reflections from a small northern section of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptors.

14.132 The first image in **Appendix 14.5** is an aerial image showing the position of the receptors (yellow pins) in relation to the Proposed Development, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptors. This image confirms that the vegetation is sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RESIDENTIAL AREA 1

14.133 This encompasses a number of residential receptors including those at Receptors 4 – 6 (assessed previously) (See **Figure 14.1**). Each receptor assessed represents multiple receptors as they are in close proximity of each other, so the worst-case scenario is assumed for the impact of glint and glare. All receptors were considered within the visibility analysis, and it was concluded their impacts were similar. As per the assessments of these ten receptors, the impacts on the other receptors within this area are assessed as being None with the significance of effect being None (worst case scenario).

RESIDENTIAL AREA 2

14.134 This encompasses a number of residential receptors including those at Receptors 11 – 13 (assessed previously) (See **Figure 14.1**). Each receptor assessed represents multiple receptors as they are in close proximity of each other, so the worst-case scenario is assumed for the impact of glint and glare. All receptors were considered within the visibility analysis, and it was concluded their impacts were similar. As per the assessments of these ten receptors, the impacts on the other receptors within this area are assessed as being None with the significance of effect being None (worst case scenario).

Road Receptors

14.135 **Table 14.11** shows a summary of the modelling results for each of the Road Receptor Points whilst the detailed results and ocular impact charts can be viewed in **Appendix 14.2**.

14.136 The 17 receptors within the no-reflection zones outlined previously have been excluded from the detailed modelling as they will never receive glint and glare impacts from the Proposed Development.

Table 14.11 - *Potential for Glint and Glare impact on Road Based Receptors*

Receptor	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)	Magnitude of Impact	Significance of Effect
1	0	0	0	None	None
2	0	71	0	High	Major
3	0	0	0	None	None
4	0	1281	0	High	Major
5	0	3357	0	High	Major
6	0	2659	0	High	Major
7	1	2786	0	High	Major
8	0	1	0	High	Major
9	11	1843	0	High	Major
10	3	2974	0	High	Major
11	128	3031	0	High	Major
12	331	3124	0	High	Major
13	261	3278	0	High	Major
14	0	0	0	None	None
15	0	1080	0	High	Major
16	0	3227	0	High	Major
17	2	4611	0	High	Major
18	54	3015	0	High	Major
19	77	2546	0	High	Major
20	55	3108	0	High	Major
21	70	3173	0	High	Major
22	32	3164	0	High	Major
23	15	3101	0	High	Major
24	14	3055	0	High	Major
25	0	2921	0	High	Major
26	19	3048	0	High	Major
27	1	2846	0	High	Major

Receptor	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)	Magnitude of Impact	Significance of Effect
28	0	3046	0	High	Major
29	0	2109	0	High	Major
30	0	1801	0	High	Major
31	0	1224	0	High	Major
32	0	361	0	High	Major
33	0	0	0	None	None
34	0	0	0	None	None
35	0	24	0	High	Major
36	0	261	0	High	Major
37	18	472	0	High	Major
38	4	1459	0	High	Major
39	33	1904	0	High	Major
40	88	1910	0	High	Major
41	0	1927	0	High	Major
42	0	2333	0	High	Major
43	0	1592	0	High	Major
44	0	6865	0	High	Major
45	0	2145	0	High	Major
46	0	2976	0	High	Major
47	0	18886	0	High	Major
48	0	1873	0	High	Major
49	3	2772	0	High	Major
50	1	2314	0	High	Major
51	0	1020	0	High	Major

14.137 As can be seen in **Table 14.11**, there are 46 receptor points which have potential glare impacts with the “potential for after-image” (yellow glare), which is a High impact. **Appendix 14.3** shows detailed analysis of when the glint and glare impacts are possible, whilst also showing from which parts of the solar farm the solar glint is reflected from.

14.138 **Appendix 14.5** shows Google Earth images that give an insight into how each receptor will be impacted by glint and glare from the Proposed Development. There is a mixture of images used, which include aerial, ground level and street level. The aerial images show the location of the receptor with the solar farm drawn as a white polygon and can be seen on the images when the solar farm is theoretically visible. The area of the solar farm from where reflections may be possible has been drawn as a yellow polygon. The ground level terrain is based on the height data of the surrounding land showing no intervening vegetation or buildings. The white and yellow polygons can be seen in this view also. The street view gives a good indication as to whether the area of the solar farm where reflections are theoretically possible will be visible from the receptor point.

14.139 As can be seen in **Appendix 14.5**, views of the Proposed Development from all receptors, except Receptors 5, 16 and 43 – 47 are blocked by a mixture of intervening vegetation, topography and buildings. Therefore, impacts upon these receptors reduce to **None** with the significance of effect being **None**. Ground level images taken at 18:00 UTC on May 1st and July 1st respectively confirm that the sun is the main source of glint and glare at Receptor 16. Therefore, impacts upon this receptor reduce to **Low**.

Rail Receptors

14.140 **Table 14.12** shows a summary of the modelling results for each of the Rail Receptor Points whilst the detailed results and ocular impact charts can be viewed in **Appendix 14.3**.

14.141 There are no receptors within the no-reflection zones outlined previously, therefore none have been excluded from the detailed modelling.

Table 14.12 - *Potential for Glint and Glare impact on Rail Receptors*

Receptor	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)	Magnitude of Impact	Significance of Effect
1	0	3	0	High	Major
2	9	2025	0	High	Major
3	0	2711	0	High	Major
4	0	2708	0	High	Major
5	0	2720	0	High	Major
6	0	1426	0	High	Major
7	0	0	0	None	None
8	0	0	0	None	None
9	0	1060	0	High	Major
10	0	2032	0	High	Major
11	0	2381	0	High	Major
12	0	2716	0	High	Major
13	0	2894	0	High	Major
14	0	2909	0	High	Major
15	11	2987	0	High	Major
16	39	3089	0	High	Major
17	71	3101	0	High	Major

14.142 As can be seen in **Table 14.12**, there are 15 receptor points which have potential glare impacts with the "potential for after-image" (yellow glare), which is a High impact. **Appendix 14.2** shows detailed analysis of when the glint and glare impacts are possible, whilst also showing from which parts of the solar farm the solar glare is reflected from.

14.143 **Appendix 14.5** shows Google Earth images that give an insight into how each receptor will be impacted by glint and glare from the Proposed Development. There is a mixture of images used, which include aerial, ground level and street level. The aerial images show the location of the receptor with the solar farm drawn as a white polygon and can be seen on the images when the solar farm is theoretically visible. The area of the solar farm from where reflections may be possible has been drawn as a yellow polygon. The ground level terrain is based on the height data of the surrounding land showing no intervening vegetation or buildings. The white and yellow polygons can be seen in this view also. The street view gives a good indication as to whether the area of the solar farm where reflections are theoretically possible will be visible from the receptor point.

RECEPTOR 1

14.144 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from a small northwest section of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.145 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver, and the location from which the second image was taken (red pin). The second image is a street view image taken with a view towards the Receptor. This image confirms that the vegetation and topography are sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 2

14.146 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from most of the North Array (see **Figure 14.4**) except a small southern section in the Proposed Development can potentially impact on the receptor.

14.147 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver, and the location from which the second image was taken (red pin). The second image is a street view image taken with a view towards the Receptor. This image confirms that the vegetation and topography are sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 3

14.148 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from most of the North Array (see **Figure 14.4**) except the northwest corner and a small southern corner in the Proposed Development can potentially impact on the receptor.

14.149 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation and topography are sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 4

14.150 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from most of the North Array (see **Figure 14.4**) except the northwest corner in the Proposed Development can potentially impact on the receptor.

14.151 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 06:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 5

14.152 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from the southeast half of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.153 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second image is a ground level image taken from the position of the receptor with a view towards the Proposed Development. This image confirms that the topography is sufficient to screen all views of the Proposed Development where glint and glare are possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 6

14.154 The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from a small southeast section of the North Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.155 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second image is a ground level image taken from the position of the receptor with a view towards the Proposed Development. This image confirms that the topography is sufficient to screen all views of the Proposed Development where glint and glare are possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 9

14.156 The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from a small southern corner of the North Array and a small northern section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.157 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 10

14.158 14.164.The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from a small southern corner of the North Array and a small northern section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.159 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 11

14.160 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from a small southern corner of the North Array and a northern section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.161 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 12

14.162 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from a southern section of the North Array and a small northern section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.163 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 13

14.164 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from a southern section of the North Array and a northern section of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.165 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 14

14.166 The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from the southern half of the North Array and the northern half of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.167 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 15

14.168 The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from the southern half of the North Array and the northern half of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.169 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver. The second and third images are ground level images taken from the position of the receptor with a view towards the Proposed Development showing the position of the sun at 18:00 UTC on April 1st and July 1st respectively. These images confirm that the sun is the main source of glint and glare at the receptor. Therefore, the impact reduces to Low with the significance of effect being Minor.

RECEPTOR 16

14.170 The ‘Glare Reflections on PV Footprint’ chart in **Appendix 14.3** shows that reflections from most of the North Array except a northern section and the northern half of the South Array (see **Figure 14.4**) in the Proposed Development can potentially impact on the receptor.

14.171 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation and topography are sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

RECEPTOR 17

14.172 The 'Glare Reflections on PV Footprint' chart in **Appendix 14.3** shows that reflections from most of the North Array except a northern section and most of the South Array (see **Figure 14.4**) except a southern section in the Proposed Development can potentially impact on the receptor.

14.173 The first image in **Appendix 14.5** is an aerial image showing the position of the receptor (yellow pin) in relation to the Proposed Development and visibility cones from the perspective of the train driver, and the location from which the second image was taken (red pin). The second image is a street view image with a view towards the Receptor. This image confirms that the vegetation and topography are sufficient to screen all views of the Proposed Development where glint and glare is possible. Therefore, the impact reduces to None with the significance of effect being None.

Aviation Receptor

14.174 **Table 14.13** shows a summary of the modelling results for the Pent Farm runway approach paths as well as the ATCTs whilst the detailed results and ocular impact charts can be viewed in **Appendix 14.4**.

14.175 As can be seen in **Table 14.13**, green glare is expected to impact Runway 23 at Pent Farm. Green glare is described as 'Low Potential for After Image' which is an acceptable impact when pilots are approaching runways/helipads, according to FAA guidance. The impact on approach at this runway is therefore deemed as not significant.

14.176 As can be seen in Table 14.13, no glare is expected to impact aviation receptors at Haringe Farm. Therefore, the impact is None.

14.177 The impact on aviation receptors is Low resulting in the significance of effect being Minor for aviation receptors. Therefore, the effects are not significant.

Table 14.13 - *Summary of Glare Results*

Component	Green Glare (mins)	Yellow Glare (mins)	Red Glare (mins)
Pent Farm			
Runway 05	0	0	0
Runway 23	397	0	0
Haringe Farm			
Runway 02	0	0	0
Runway 20	0	0	0

GROUND BASED RECEPTOR MITIGATION

14.178 Mitigation is required to be put in place when there are potentially significant effects from High and Medium impact views into the Proposed Development.

14.179 Mitigation is required to ensure the High impact views from Road Receptors 5 and 43 – 47 into the Proposed Development are screened. This includes (please refer to **Figure 11.9** of ES Volume 3, Figures):

- Native hedgerows/woodland to be planted/infilled along a central section of the western boundary of the North Array. When implemented this will initially reduce views intermittently and reduce the impact to Low and significance of effect to Minor. Once established this will screen views from Road Receptor 5. Therefore, reducing the impact to None and significance of effect to None.
- Native hedgerows/woodland to be planted/infilled along the western edge of Church Lane adjacent to the South Array, and along the eastern edge of the East Array and maintained to a height of at least 3m. When implemented this will initially reduce views intermittently and reduce the impact to Low and significance of effect to Minor. Once established this will screen views from Road Receptors 43 – 47. Therefore, reducing the impact to None and the significance of effect to None.

14.180 **Table 14.14, Table 14.15** and **Table 14. 16** show the impacts at each stage of the glint and glare analysis, with the final residual impacts considered once the mitigation is in place.

Table 14.14 - *Potential Residual Glint and Glare Impacts on Residential Receptors*

Receptor	Magnitude of Impact			
	After Geometric Analysis	After Visibility Analysis	Residual Impacts Following Mitigation	Residual Effect (When Mitigation Established)
1	None	None	None	None
2	None	None	None	None
3	None	None	None	None
4	High	None	None	None
5	High	None	None	None
6	High	None	None	None
7	High	None	None	None
8	High	None	None	None
9	High	None	None	None
10	High	None	None	None
11	High	None	None	None
12	High	None	None	None
13	High	None	None	None
14	High	None	None	None
15	High	None	None	None
16	High	None	None	None
17	High	None	None	None
18	High	None	None	None
19	High	Low	Low	Minor
20	High	Low	Low	Minor

Receptor	Magnitude of Impact			
	After Geometric Analysis	After Visibility Analysis	Residual Impacts Following Mitigation	Residual Effect (When Mitigation Established)
21	High	None	None	None
22	High	None	None	None
23	High	None	None	None
24	High	None	None	None
25	High	None	None	None
26	High	None	None	None
27	High	None	None	None
28	High	None	None	None
29	High	None	None	None
30	High	None	None	None
31	High	None	None	None
32	High	None	None	None
33	None	None	None	None
34	None	None	None	None
35	None	None	None	None
36	None	None	None	None

Table 14.15 - *Potential Residual Glint and Glare Impacts on Road Receptors*

Receptor	Magnitude of Impact			
	After Geometric Analysis	After Visibility Analysis	Residual Impacts Following Mitigation	Residual Effect (When Mitigation Established)
1	None	None	None	None
2	High	None	None	None
3	None	None	None	None
4	High	None	None	None
5	High	High	None	None
6	High	None	None	None
7	High	None	None	None
8	High	None	None	None
9	High	None	None	None
10	High	None	None	None
11	High	None	None	None
12	High	None	None	None
13	High	None	None	None
14	None	None	None	None
15	High	None	None	None
16	High	Low	Low	Minor
17	High	None	None	None
18	High	None	None	None
19	High	None	None	None
20	High	None	None	None
21	High	None	None	None
22	High	None	None	None
23	High	None	None	None
24	High	None	None	None
25	High	None	None	None

Receptor	Magnitude of Impact			
	After Geometric Analysis	After Visibility Analysis	Residual Impacts Following Mitigation	Residual Effect (When Mitigation Established)
26	High	None	None	None
27	High	None	None	None
28	High	None	None	None
29	High	None	None	None
30	High	None	None	None
31	High	None	None	None
32	High	None	None	None
33	None	None	None	None
34	None	None	None	None
35	High	None	None	None
36	High	None	None	None
37	High	None	None	None
38	High	None	None	None
39	High	None	None	None
40	High	None	None	None
41	High	None	None	None
42	High	None	None	None
43	High	High	None	None
44	High	High	None	None
45	High	High	None	None
46	High	High	None	None
47	High	High	None	None
48	High	None	None	None
49	High	None	None	None
50	High	None	None	None
51	High	None	None	None

Table 14.16 - *Potential Residual Glint and Glare Impacts on Rail Receptors*

Receptor	Magnitude of Impact			
	After Geometric Analysis	After Visibility Analysis	Residual Impacts Following Mitigation	Residual Effect (When Mitigation Established)
1	High	None	None	None
2	High	None	None	None
3	High	None	None	None
4	High	Low	Low	Minor
5	High	None	None	None
6	High	None	None	None
7	None	None	None	None
8	None	None	None	None
9	High	Low	Low	Minor
10	High	Low	Low	Minor
11	High	Low	Low	Minor
12	High	Low	Low	Minor
13	High	Low	Low	Minor
14	High	Low	Low	Minor
15	High	Low	Low	Minor
16	High	None	None	None
17	High	None	None	None

Table 14.17 - *Solar Reflections: Residential Receptors*

Magnitude	Theoretical Visibility	Actual Visibility (No Mitigation)	Actual Visibility with Mitigation
High	29	0	0
Medium	0	0	0
Low	0	2	2
None	7	34	34

- **High** – Solar reflections impacts of over 30 hours per year or over 30 minutes per day
- **Medium** – Solar reflections impacts between 20 and 30 hours per year or between 20 minutes and 30 minutes per day
- **Low** – Solar reflections impacts between 0 and 20 hours per year or between 0 minutes and 20 minutes per day
- **None** – Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening

Table 14.18 - *Solar Reflections: Road Receptors*

Magnitude	Theoretical Visibility	Actual Visibility (No Mitigation)	Actual Visibility with Mitigation
High	46	6	0
Medium	0	0	0
Low	0	1	1
None	5	44	50

- **High** – Solar reflections impacts of over 30 hours per year or over 30 minutes per day
- **Medium** – Solar reflections impacts between 20 and 30 hours per year or between 20 minutes and 30 minutes per day
- **Low** – Solar reflections impacts between 0 and 20 hours per year or between 0 minutes and 20 minutes per day
- **None** – Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening

Table 14.19 - *Solar Reflections: Rail Receptors*

Magnitude	Theoretical Visibility	Actual Visibility (No Mitigation)	Actual Visibility With Mitigation
High	15	0	0
Medium	0	0	0
Low	0	8	8
None	2	9	9

- **High** – Solar reflections impacts of over 30 hours per year or over 30 minutes per day
- **Medium** – Solar reflections impacts between 20 and 30 hours per year or between 20 minutes and 30 minutes per day
- **Low** – Solar reflections impacts between 0 and 20 hours per year or between 0 minutes and 20 minutes per day
- **None** – Effects not geometrically possible or no visibility of reflective surfaces likely due to high levels of intervening screening

CUMULATIVE ASSESSMENT

14.181 The Proposed Development is adjacent to an existing solar farm which adjoins the Proposed Development to the north of the East Array (see **Figure 14.4**). Impacts are currently Low impacts upon Residential Receptors 19 and 20 and Rail Receptors 4, 9 – 15. However, upon review of the actual visibility of the existing solar farm development, it has been concluded that this will not be visible from Residential Receptor 20 and Rail Receptors 4, 9 - 15. Regarding Residential Receptor 19, as noted in the Ashford Council Report of Development Control Managers Planning Committee , Glint and Glare impacts upon Bested House from the existing solar farm would not result in harm to residential amenity. Therefore, it is anticipated that there will not be any cumulative effects on ground-based receptors as a result of the construction of the Proposed Development.

14.182 Impacts are currently Low upon Runway 23 at Pent Farm. These impacts will remain Low when taking into account the existing solar farm development as the glint and glare impacts only occur from the North Array (See **Figure 14.4**), and not the arrays that are adjacent to the existing solar farm. Therefore, it is anticipated that there will not be any cumulative effects on aviation receptors as a result of the construction of the Proposed Development.

14.183 Within the Application Site boundary there will be a Battery and Energy Storage System (BESS) planning application submitted by Pivot Power (Part of EDF). This future BESS application will not add any additional Glint and Glare impacts as there will not be any additional panels as a result of this future BESS application. Therefore, it is anticipated that there will not be any cumulative effects on receptor as a result of the construction of the Proposed Development.

CONCLUSION

14.184 There is little guidance or policy available in the UK at present in relation to the assessment of glint and glare from proposed solar farm developments. However, it is recognised as a potential impact which needs to be considered for a proposed solar farm development, therefore this assessment considers the potential impacts on ground-based receptors such as roads, rail, and residential dwellings as well as aviation assets.

14.185 This assessment considers the potential impacts on ground-based receptors such as roads, rail and residential dwellings as well as aviation assets. A 1km study area around the Application Site is considered adequate for the assessment of ground-based receptors, whilst a 30km study area is chosen for aviation receptors. Within 1km of the Application Site, there are 62 residential receptors, 69 road receptors and 17 rail receptors which were considered. As per the methodology section, where there are a number of residential receptors within close proximity, a representative dwelling or dwellings is/are chosen for full assessment as the impacts will not vary to any significant degree. Where small groups of receptors have been evident, the receptors on either end of the group have been assessed in detail. 26 residential receptors and 18 road receptors were dismissed as they are located within the no reflection zones. 15 aerodromes are located within the 30km study area; one of which, Pent Farm, required an assessment due to the Proposed Development falling within its respective safeguarding buffer zone, which is outlined in **paragraph 14.50**.

14.186 Geometric analysis was conducted at 36 individual residential receptors, 51 road receptors and 17 rail receptors, as well as one runway at Haringe Court Farm and one runway at Pent Farm.

14.187 The assessment concludes that:

- Solar reflections are possible at 29 of the 36 residential receptors assessed within the 1km study area. The initial bald-earth scenario identified potential impacts as High at 29 receptors and None at the remaining seven receptors. Upon reviewing the actual visibility of the receptor, glint and glare impacts reduce to Low at two receptors and None at 34 receptors. The effects from the Proposed Development are therefore not significant.
- Solar reflections are possible at 46 of the 51 road receptors assessed within the 1km study area.

The initial bald-earth scenario identified potential impacts as High at 46 receptors and None at the remaining five receptors. Upon reviewing the actual visibility of the receptors, glint and glare impacts remain High at six receptors and reduce to Low at one receptor and None at all remaining receptors. Once mitigation measures were considered all impacts reduce to Low at one receptor and None at all remaining receptors. The effects from the Proposed Development are therefore not significant.

- Solar reflections are possible at 15 of the 17 rail receptors assessed within the 1km study area. The initial bald-earth scenario identified potential impacts as High at 15 receptors and None at the remaining two receptors. Upon reviewing the actual visibility of the receptors, glint and glare impacts reduce to Low at eight receptors and None at all remaining receptors. The effects from the Proposed Development are therefore not significant.
- Green glare impacts are predicted on the approach path for Runway 23 at Pent Farm. According to FAA guidance, green glare impacts are acceptable on runway approach paths. The effects from the Proposed Development are therefore not significant.

14.188 Mitigation is required to ensure the High impact views from Road Receptors 5 and 43 - 47 into the Proposed Development are screened. This includes native hedgerows/woodland to be planted/infilled along a central section of the western boundary in the North Array and native hedgerows to be planted/infilled along the eastern and western edges of the South Array and the East Array respectively and maintained to a height of at least 3m.

14.189 The effects of glint and glare and their impact on local receptors has been analysed in detail and the impact on all receptors is predicted to be Low impacts upon aviation, residential and rail receptors. Impacts upon road receptors are None once mitigation has been considered. Residual effects on road receptors is None, whilst residual effects are Minor for aviation, residential and rail receptors. Therefore, the effects are not significant.

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