Cottam Solar Project

Environmental Statement Chapter 16:
Glint and Glare

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Cottam
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Contents

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Environmental Statement Chapter 16: Glint and Glare

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16 ES Chapter 16: Glint and Glare

16.1 Introduction

16.1.1 Pager Power was commissioned to carry out a Glint and Glare Assessment of the proposed Scheme. A full description of the Scheme Sites and the development proposals subject of the DCO are provided in Chapters 3 The Order Limits **[EN010133/APP/C6.2.3]** and 4 Scheme Description **[EN010133/APP/C6.2.4]** respectively, of this ES.

16.1.2 This Chapter describes the baseline conditions, glint and glare guidelines, methodology, and the potential glint and glare effects from the Scheme with regard to road safety, residential amenity, aviation activity, and railway operations and infrastructure. Public Rights of Way (PRoW) have not been included within the assessment because they are receptors with "low" sensitivity which means the receptor is tolerant to change without detrimental effect, and is of low or local importance.

16.1.3 Pager Power has reviewed documentary sources and aerial imagery to identify if any waterway exists within 1km from the Scheme. No waterway of a size sufficiently large to accommodate navigation has been identified and therefore significant glint and glare impacts towards waterway users are not considered possible. The river Trent is circa 5.4km west of the Scheme (at its closest point). Therefore, if geometrically possible and unscreened, any glint and glare effects will not have a significant impact due to the large separation distance.

16.1.4 The Scheme comprises a number of Sites described as Cottam 1, 2, 3a and 3b which accommodate the solar arrays, grid connection infrastructure and energy storage, and the cable route corridors connecting the solar array sites to the national grid at Cottam Power Station. The Sites are located approximately 6.5km southeast and 4km northeast of Gainsborough in Lincolnshire.

16.1.5 This chapter is supported by **Appendix 16.1**: Solar Photovoltaic Glint and Glare Study **[EN010133/APP/C6.3.16]**.

16.1.6 The chapter has been prepared by Pager Power. Pager Power has undertaken over 900 glint and glare assessments in the UK, Europe and internationally. The company's own glint and glare guidance is based on industry experience and extensive consultation with industry stakeholders including airports and aviation regulators (see Statement of Competence **[EN010133/APP/C6.3.1.1]**).

16.2 Consultation

16.2.1 The aim of the consultation has been discuss the position of the relevant stakeholders towards the Scheme; receptors that should be taken into consideration; glint and glare assessment results; and, if necessary, mitigating strategies. Early consultation has taken place and has been on-going throughout the pre-application stages of the project (feasibility, non-statutory consultation stage, EIA scoping and statutory consultation / PEIR stage).

16.2.2 The table below summarises consultation in respect of Glint and Glare. Key consultees have been Sturgate Airfield and RAF Scampton (Ministry of Defence – MoD) safeguarding teams; as well as Network Rail.

Table 16.1: Consultation Process

Consultee	Comments / Matters Raised	Response / Matters Addressed
RAF Scampton (MoD)	Results of the glint and glare assessment were provided for feedback (PEIR stage)	The MoD does not have any concern regarding the Scheme. The safety manager at the airfield has not requested any mitigation to be implemented.
Sturgate Airfield	Results of the glint and glare assessment were provided for feedback (PEIR stage)	The safeguarding team at Sturgate Airfield does not have any concern regarding the Scheme. The safety manager at the airfield has not requested any mitigation to be implemented.
Network Rail	Request for railway signal receptors(PEIR stage)	No response received.

16.3 Policy Context

16.3.1 The national planning policies that have been considered in carrying out this assessment:

- National Policy Statement for Renewable Energy Infrastructure (EN-3): sets out the primary policy for decisions by the Secretary of State for nationally significant renewable energy infrastructure. The document refers to issue of glint and glare in section 2.52 (see Appendix A of ES **Appendix 16.1**).

16.3.2 The author is not aware of any local planning policy that quantifies acceptable levels of glare or requisite methodologies for its characterisation. Therefore, Pager Power has considered the following policy:

- Renewable and low carbon energy, Ministry of Housing, Communities & Local Government, date: 18 June 2015, accessed on: 08/12/2022.
- Pager Power Glint and Glare Guidance, Fourth Edition, September 2022.
- Source: Signal Sighting Assessment Requirements, June 2016. Railway Group Guidance Note. Last accessed 08/12/2022.
- Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports, November 2021. Guidelines exist in the UK (produced by the Civil Aviation Authority) and in the USA (produced by the Federal Aviation Administration) with respect to solar developments and aviation activity. The UK CAA guidance is relatively high-level and does not

prescribe a formal methodology, therefore the FAA guidance is used for Aviation Receptors.

16.3.3 Further information regarding the policies and guidance considered in the glint and glare assessment can be found in Appendix A of ES **Appendix 16.1**.

16.4 Assessment Methodology

16.4.1 No process for determining and contextualising the effects of glint and glare are provided in available guidance. Additionally, there are no specific guidelines for assessing the impact of solar reflection upon surrounding roads, byways, public rights of way and dwellings. The glint and glare assessment methodology adopted in the Chapter has been derived from the information obtained through consultation with stakeholders and by reviewing any relevant guidance and studies. Information relating to the methodology adopted in this assessment is provided further in section 16.7 below; and in Section 5 and in Appendix A to F of ES **Appendix 16.1**.

16.4.2 Pager Power is not aware of any local planning policy that quantifies acceptable levels of glare or requisite methodologies for its characterisation. Therefore, Pager Power has taken the following approach:

- Identify receptors in the area surrounding the Scheme.
- Consider direct solar reflections from the Scheme towards the identified receptors by undertaking geometric calculations.
- Consider the visibility of the panels from the receptor's location. If the panels are not visible from the receptor then no reflection can occur (the effectiveness of screening in the form of vegetation is considered across all seasons).
- If the reflective area is visible, consider whether impacts are possible and whether they are significant and require mitigation.

16.4.3 The criteria used to determine glint and glare significance differs depending on the type of receptors affected. These criteria are outlined in section 16.7 below and Appendix D of ES **Appendix 16.1**.

16.5 Baseline Conditions

16.5.1 It is not common practice to assess the impact of glint and glare upon waterway users unless specifically requested. As part of the glint and glare assessment Pager Power has reviewed the available imagery to identify if any waterway exists in the proximity of the Site. No waterway of a size sufficiently large to accommodate navigation has been identified and therefore glint and glare impacts towards waterway users are not considered possible

16.5.2 The Scheme is located in a rural area. The review of the available imagery shows no presence of other solar farms of a similar size or large reflective surfaces (such as bodies of water).

16.5.3 In terms of potential receptors, the following have been identified near to the Scheme: roads (major national / national / regional local), residential dwellings, railway line (see Section 5 of **ES Appendix 16.1**) and licenced and unlicensed airfields. Receptors within the respective study areas for each site, considered in the glint and glare assessment, are listed below:

- Cottam 1: 171 residential receptors; 46 road receptors for road B1241 (national/regional) and Till Bridge Lane (regional).
- Cottam 2: 53 residential receptors, 27 road receptors for road A631(national/regional).
- Cottam 3a: 59 residential receptors, 61 road receptors for road Laughton Road, Kirton Road and Station Road (regional).
- Cottam 3b: 61 residential receptors, 49 road receptors for roads Laughton Road, Kirton Road and Station Road (regional), 26 railway receptors (train driver between Gainsborough Central to Kirton Lindsey).

16.5.4 Receptors are shown in section 5 and Appendix D of **ES Appendix 16.1**.

16.5.5 From a glint and glare perspective changes to the current baseline scenario are not predicted in the event the project is not going to proceed.

16.6 Embedded Mitigation

16.6.1 Following the findings of the initial impact assessment, the Applicant has decided to include embedded mitigation to reduce impacts of the Scheme to acceptable levels. These embedded mitigation options are screening in the form of vegetation; or instant screening for ground base receptors if necessary (in this case the developer will implement an interim mitigation measure likely to be opaque fencing). For the tracker panels system a further embedded mitigation option is a change in backtracking angle which can be modified to project solar reflections away from receptors.

16.7 Identification of Likely Significant Effects

16.7.1 This section considers the likely significant environmental effects of glint and glare generated by the Scheme.

16.7.2 The most reflective and visible component of a solar development is the upper surface of the solar panel. Furthermore, panels are the component with the largest footprint.

16.7.3 While panel's frame and structure can also be a source of glare it is unlikely that will be visible. Furthermore, their total potentially reflective surface is much smaller when compared to the total panel area their area. Therefore, no assessment is required.

16.7.4 Other components such as substation or energy storage are not a source of solar reflections due to the lack of reflective materials which can be covered and are

usually smaller components compared to the solar development layout. Therefore, no assessment is required.

16.7.5 The cables that export the electricity generated by the solar farm are buried underground and therefore do not require to be considered in the Glint and Glare Assessment.

16.7.6 The predicted significance of the effect is determined through a standard method of assessment based on professional judgement (a combination of stakeholder consultations and previous assessment experience on over 900 projects) and Pager Power guidance (Pager Power, 2022), which considers both sensitivity and magnitude of change as detailed in Table 16.2 below.

16.7.7 Glint and glare effects can occur from any solar panels that are installed at the Scheme Sites. However, as not all panels will be deployed during the construction or decommission phase, the length and intensity of any solar reflections will be less than or equal to the operational phase.

16.7.8 This assessment has therefore only considered Operational Effects, which represents the worst-case scenario for all development stages of the Scheme.

16.7.9 The sensitivity of road users is discussed in section 7.2 of ES **Appendix 16.1**, and is summarised as follows:

- Low Sensitivity: Local roads would be considered as 'low' sensitivity because traffic volumes are predicted to be low, Therefore, the receptor is tolerant to change without detriment to its character.
- Medium Sensitivity: Regional, National, and Major National roads would be considered as 'medium' sensitivity because they have higher level of traffic compared to local roads. Therefore, the receptor has moderate capacity to absorb change without significantly altering its present character.

16.7.10 Dwellings are considered of 'medium' sensitivity because the receptor has moderate capacity to absorb change without significantly altering its present character (discussed in section 7.1 of ES **Appendix 16.1**).

16.7.11 Train drivers are considered 'medium' sensitivity because the receptor has moderate capacity to absorb change without significantly altering its present character (discussed in section 7.3 of ES **Appendix 16.1**).

16.7.12 Aviation receptors (Air Traffic Control Towers and Approaching aircrafts) are considered 'medium' sensitivity because the receptor has moderate capacity to absorb change without significantly altering its present character.

Table 16.2: Criteria for Assessing Sensitivity of Receptors

Sensitivity	Definition

High	The receptor or resource has little ability to absorb the change without fundamentally altering its present character or it is of international or national importance.
Medium	The receptor or resource has moderate capacity to absorb the change without significantly altering its present character or is of high and more than local (but not national or international) importance.
Low	The receptor or resource is tolerant of change without detrimental effect, is of low or local importance.

16.7.13 Pager Power uses different definitions to determine the magnitude of the impact (discussed in Appendix D of ES **Appendix 16.1**). These definitions and their equivalent in this ES chapter (see table 16.3) are as follows:

- No Impact: Neutral Magnitude
- Low Impact: Negligible and Minor Magnitude
- Moderate Impact: Moderate Magnitude
- High Impact: Major Magnitude

16.7.14 The magnitude of effect upon dwelling receptors (discussed in Section 7.1 and Appendix D of ES Appendix 16.1) is predominantly dependent on the following factors:

- whether a solar reflection is predicted to be experienced; and
- the duration of the predicted effects, relative to thresholds of three months per year and sixty minutes on any given day.

16.7.15 The magnitude of effect upon road users (discussed in Section 7.2 and Appendix D of **ES Appendix 16.1**) is predominantly dependent on the following factors:

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

16.7.16 The magnitude of effect upon train drivers (discussed in Sections 7.3 and Appendix D of ES **Appendix 16.1**) is predominantly dependent on the following factors:

- whether a solar reflection is predicted to be experienced;
- the location of the reflecting panel relative to a train driver's direction of travel and the presence of existing mitigating factors

16.7.17 The magnitude of effect upon aviation receptors will depend on the receptor type:

- For Air Traffic Control (ATC) Tower receptors, it is predominantly dependent on the following factors: whether a solar reflection is predicted to be experienced, the glare intensity, the glare duration, proportion of an

observer's field of vision that is taken up by the reflecting area and the glare location relative to key operational areas – a solar reflection originating near sensitive areas such as the runway threshold will have a higher impact upon the ATC Tower personnel.

- For Approach Paths receptors, it is predominantly dependent on the following factors: whether a reflection is predicted to be experienced, the glare intensity, the location of glare relative to the approach bearing – a solar reflection directly in front of a pilot is more hazardous than a reflection from a location off to one side, the likely traffic volumes and level of safeguarding at the aerodrome – licensed aerodromes typically have higher traffic volumes and are formally safeguarded, the position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not, existing reflecting surfaces – a solar reflection is less noticeable by pilots when there are existing reflective surfaces in the surrounding environment.

Table 16.3: Criteria for Assessing Magnitude of Impacts (positive or negative)

Magnitude	Definition
Major	The total loss or major change/substantial alteration to key elements/features of the baseline (pre-development) conditions, such that the post development character/composition/attributes will be fundamentally changed
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions, such that post development character/composition/attributes of the baseline will be materially changed
Minor	A minor shift away from baseline condition. As change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation
Negligible	Very little change from baseline conditions. The change will be barely distinguishable and approximating to a non-change situation
Neutral	No change from baseline conditions.

16.7.1 The significance of any environmental effects is determined by the interaction of the magnitude of any impacts and the sensitivity of the receptor.

16.7.2 Effects deemed as moderate or greater are deemed to be "**significant effects**" in EIA terms.

Table 16.4: Criteria for Assessing the Significance of Effects

Sensitivity / Magnitude	High	Medium	Low
High	Major	Major	Moderate

Moderate	Major	Moderate	Moderate
Low	Moderate	Minor	Negligible
Negligible	Moderate	Minor	Negligible
Neutral	Neutral	Neutral	Neutral

16.8 Assessment of Potential Effects

16.8.1 Adverse effects (Moderate effect or higher) should be considered for mitigation and specific mitigation measures put in place where practical.

16.8.2 Considering the baseline scenario, sensitivity of receptors and magnitude of impact, the glint and glare assessment for the Scheme has concluded the following:

- Fixed and tracking panel systems have been assessed for each site (with a tracking system having a larger study area expanded 1km north of the Site)
- A Moderate Adverse effect is predicted for 13 dwellings (if a fixed mounting system is implemented) or 14 dwellings (if a tracking mounting system is implemented). For the remaining dwelling receptors effects are predicted to be lower. Further details are provided in Section 7.1 and Appendix D of ES **Appendix 16.1**).
- A Moderate Adverse effect is predicted for a section of 2.2km Kirton Road - B1205 (if a fixed mounting system is implemented) or a section of 2.4km Kirton Road - B1205 (if a tracking mounting system is implemented). For the remaining road receptors effects are predicted to be lower. Further details are provided in Section 7.2 and Appendix D of ES **Appendix 16.1**).
- A Moderate Adverse effect is predicted towards train driver receptors (for both types of mounting system). For the remaining railway receptors effects are predicted to be lower. Further details are provided in Section 7.3 and Appendix D of ES **Appendix 16.1**.

16.8.3 Minor/Negligible Adverse effects are predicted in respect of aviation receptors. The assessment relating to all other receptors has concluded that the worst case scenario effects will likely be Minor/Negligible Adverse (for either the fixed or tracker options) see Section 3 of ES **Appendix 16.1**.

16.9 Mitigation Measures

16.9.1 The Applicant has proposed embedded mitigation in the form of vegetation; and opaque fencing (if required), to significantly reduce the visibility of the reflective area from those receptors which are predicted to experience a Moderate Adverse. Once the mitigation has been implemented and obstructs the reflecting panels from view, the overall magnitude of impact will be Minor/Negligible.

16.9.2 The adopted mitigation for the receptors predicted to experience a Moderate Adverse impact is set out below. The provision of vegetation mitigation measures is included in the Outline Landscape and Ecological Management Plan

[EN010133/APP/C6.2.3] which is secured by Requirement in the draft DCO. The provision of opaque fencing, if it is required, is included in the Outline Operational Management Plan **[EN010133/APP/C7.16]** which is secured by Requirement in the draft DCO:

- Dwelling receptors: for all dwellings where a Moderate Adverse impact is predicted the developer has proposed screening in the form of vegetation (and opaque fencing if necessary as an interim measure). This will be effective irrespective of the type of panel mounting system used. Further details are provided in Section 7.1 and Appendix D of ES **Appendix 16.1**. For tracker panels, backtracking is also a mitigation option (instead of vegetation or opaque fencing).
- Road receptors: for all sections of road where a Moderate Adverse impact is predicted the developer has proposed screening in the form of vegetation (and opaque fencing if necessary as an interim measure). This will be effective irrespective of the type of panel mounting system used. Further details are provided in Section 7.2 and Appendix D of ES **Appendix 16.1**. For tracker panels, backtracking is also a mitigation option (instead of vegetation or opaque fencing).
- Railway receptors: for all sections of railway where a Moderate Adverse impact is predicted towards a train driver the developer has proposed immediate screening in the form of opaque fencing (this will be effective irrespective of the type of panel mounting system used). Further details are provided in Section 7.3 and Appendix D of ES **Appendix 16.1**. For tracker panels, backtracking is also a mitigation option (instead of vegetation or opaque fencing).

16.9.3 Where Glint and Glare cannot be mitigated through panel tilt and would require instant screening a temporary 3m wooden solid hoarding may be required until adjacent planting has matured. This is included for in the Outline Operational Management Plan **[EN010133/APP/C7.16]** which is secured by Requirement in the draft DCO.

16.10 Cumulative Effects

16.10.1 The cumulative glint and glare effect of West Burton Solar Project, Gate Burton Energy Park and Tillbridge Solar have been considered. These proposed solar developments are sufficiently close to the Scheme to share some of the receptors identified and assessed in the glint and glare report. The cumulative assessment aim is to identify any potential cumulative impact see Section 8 and Appendix D of **ES Appendix 16.1**.

16.10.2 Gate Burton Energy Park, West Burton 1 and Tillbridge Solar are sufficiently close (within 2km from the Scheme) to Cottam 1 to share multiple receptors, and this is also true for Tillbridge Solar and Cottam 2 see Section 8.1.1 and Appendix D of **ES Appendix 16.1**.

16.10.3 Shared receptors are either unlikely to concurrently have visibility of multiple areas (Cottam, Gate Burton Energy Park and West Burton 1) or, if visibility is possible, (Cottam 1 and 2 and Tillbridge Solar) no significant impact is predicted due to the presence of significant mitigating factors. Therefore, cumulative effects are possible however the impact is predicted to be Minor/Negligible Adverse see Section 8.1.2 and Appendix D of **ES Appendix 16.1**.

16.11 Inter-related Effects

16.11.1 Cumulative effects are possible when two or more sites or schemes are located sufficiently close to share some receptors. A receptor might be within the study area of multiple Sites therefore cumulative glint and glare impacts are possible.

16.11.2 The only two Sites that have shared receptors are Cottam 3a and Cottam 3b (see Sections 7.1.2.5 and 7.2.2.5 of ES **Appendix 16.1**). The high-level assessment has concluded the following:

- 32 dwellings can have some visibility of both Sites and the relevant reflective area. However, the existing and the proposed screening is likely to significantly reduce the visibility of both sites (see Sections 7.1.2.5 of ES **Appendix 16.1**). Overall Minor/Negligible Adverse impact is predicted.
- Some road receptors (Station Road and Kirton Road) can have some visibility of both Sites and the relevant reflective area. However, the proposed mitigation is likely to remove the visibility of both Sites from the road (see Sections 7.2.2.5 of ES **Appendix 16.1**). Overall Minor/Negligible Adverse impact is predicted.

16.12 Residual Effects

16.12.1 Once the mitigation referred to in Section 16.9 is in place, the overall magnitude of impact will be Minor Adverse as follows:

- Dwelling receptors (Medium Sensitivity): would be subject to a maximum impact of Minor/Negligible Magnitude which would result in a Minor/Negligible Adverse Significance of Effect, which is Not Significant in EIA terms.
- Road receptors (Medium Sensitivity): would be subject to a maximum impact of Minor/Negligible Magnitude which would result in a Minor/Negligible Adverse Significance of Effect, which is Not Significant in EIA terms.
- Railway receptors (Medium Sensitivity): would be subject to a maximum impact of Minor/Negligible Magnitude which would result in a Minor/Negligible Adverse Significance of Effect, which is Not Significant in EIA terms.