BEACON FEN ENERGY PARK

Planning Inspectorate Reference: EN010151

Chapter 13 – Glint & Glare

Document Reference: 6.2 ES Volume 1, 6.2.13 Chapter 13

April 2025

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572) – Regulation 14

Quality Information

PREPARED BY	CHECKED BY	VERIFIED BY	APPROVED BY
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13. Glint and Glare

13.1 Introduction

13.1.1 This assessment considers the potential glint and glare effects from solar photovoltaic (PV) arrays associated with the Solar Array Area of the Beacon Fen Energy Park ('the Proposed Development') on land at Beacon Fen. It considers the potential for likely significant effects of glint and glare caused by the PV array elements of the Proposed Development on ground-based receptors, including road, rail and local residential dwellings. In addition, glint and glare effects on aircraft operating in the surrounding area have also been considered.

13.1.2 This Chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the front end of this Environmental Statement (ES) (Chapters 1 – 5) and particularly to the description of the Proposed Development in **Chapter 2 Proposed Development (Document Ref: 6.2 ES Vol.1, 6.2.2)**, which includes details about the Site, the design parameters and construction methodology, as well as **Chapter 19 Summary of Environmental Effects Proposed Development (Document Ref: 6.2 ES Vol.1, 6.2.19)**.

13.1.3 This chapter is accompanied by the following appendices and figures:

- Appendix 13.1 Legislation, Policy and Guidance **(Document Ref: 6.3 ES Vol.2, 6.3.88)**;
- Appendix 13.2a ForgeSolar Glint and Glare Report: Road, Railway & Aviation **(Document Ref: 6.3 ES Vol.2, 6.3.89)**;
- Appendix 13.2b ForgeSolar Glint and Glare Report: Observation Points **(Document Ref: 6.3 ES Vol.2, 6.3.90)**; and
- Appendix 13.3 Mathematical Equations **(Document Ref: 6.3 ES Vol.2, 6.3.91)**.

13.2 Legislation and Policy

13.2.1 The legislation and policy considered relevant to the assessment of glint and glare are listed, below, with details provided in **Appendix 13.1 (Document Ref: 6.3 ES Vol.2, 6.3.88)**.

Planning Policy

13.2.2 The main applicable planning policy includes:

- **Published National Policy Statements**
  - Overarching National Policy Statement for Energy (NPS EN-1), January 2024;
  - National Policy Statement for Renewable Energy (NPS EN-3), January 2024.
- **Other National Policy**
  - National Planning Policy Framework (NPPF) December 2024;
  - Planning Practice Guidance (for Town & Country planning applications).

- **Local Planning Policy**

  - Central Lincolnshire Local Plan (adopted April 2023);
  - Southeast Lincolnshire Local Plan 2011-2036 (adopted March 2019).

Guidance

13.2.3 Other relevant guidance documents include:

- Building Research Establishment (BRE): Site Layout Planning for Daylight and Sunlight: A guide to good practice
- Civil Aviation Authority (CAA) Interim Guidance on Solar Photovoltaic Systems (2010 – subsequently cancelled as formal guidance)
- The CAA Civil Aviation Publication (CAP) 738: Safeguarding of Aerodromes (Oct 2020)
- Combined Aerodrome Safeguarding Team (CAST), 'Aerodrome Safeguarding Advice Note 5: Renewable Energy Developments', (February 2024)
- '14CRF Part 77' - FAA Policy: Review of Solar Energy System Projects on Federally Obligated Airports

13.3 Consultation & Scope of Assessment

Consultation Undertaken to Date

13.3.1 Consultation has been ongoing throughout the preparation of the Development Consent Order (DCO) application and can broadly be divided into the following key stages:

- EIA Scoping;
- Early Non-Statutory Consultation;
- Statutory Consultation and
- Direct Topic-Specific Consultation.

13.3.2 Reference should be made to section 5.3 of **Chapter 5 Consultation (Document Ref: 6.2 ES Vol.1, 6.2.5)** for the timescales of this consultation.

13.3.3 Table 13.1 provides a summary of the consultation activities undertaken in support of the preparation of this Chapter.

Table 13.1 Summary of Consultation Undertaken to Date

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
EIA Scoping			
The Planning Inspectorate (PINS) (Scoping Opinion)	25th May 2023	Provided that sufficient information be provided in the application and Construction Environmental Management Plan (CEMP) in relation to locations of construction compounds and working practices to minimise any effects of glint and glare, the Inspectorate agrees to scope out the matter of glare	Noting the Planning Inspectorate's comment that receptors should be identified based on the potential for likely significant effects to occur rather than an arbitrary fixed distance from the Site, consideration has been given to sensitive ground-based receptors based on the methodology described in section 13.3.6 below. Given the distance and screening present,

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
		effects during construction/ decommissioning. It was unclear whether the assessment of glint on fixed point receptors will only consider a 5km study area. The Applicant should consider the potential for glint and glare effects to occur beyond 5km.	no specific receptors at a greater distance with potential to experience significant effects have been identified.
Boston Borough Council (BBC)	11th May 2023	Any potential for glint and glare on local receptors, such as Boston Aerodrome should be considered.	Local receptors, such as Boston Aerodrome and other civilian airfields, as well as Royal Air Force (RAF) bases at Coningsby and Cranwell have been considered within the glint and glare assessment. Other sensitive local receptors included in the study are roads, rail and public rights of way, and residential buildings.
Lincolnshire County Council (LCC)	16th May 2023	Council agrees that the matter of glint and glare should be 'scoped in' and appropriate assessment included as part of the Environmental Statement (ES).	Glint and glare have been 'scoped in' and included in PEIR and ES Chapter.
North Kesteven District Council (NKDC)	18th May 2023	The Council have stated that the proposed scope includes airfields within 15km of the Solar Array Area and that this study area is consistent with standard practice and hard limits within the modelling software. However, they have considered that this should be clarified and agreed with the relevant aviation and defence consultees as necessary.	Relevant aviation consultees have been included, and a suitable study area range has been established. All airfields within 25km have been identified, however, distance from the Solar Array Area means that receptors between 15 and 25 km from the Solar Array Area are of low sensitivity and as a result can be discounted from further assessment. Airfields within 15km have been included in the assessment. Dialogue was opened with National Air Traffic Services (NATS) and the Defence Infrastructure Organisation (DIO) with the relevant study scope and parameters agreed (see below).
West Lindsey County Council (WLDC)	15th May 2023	Cumulative effect of Beacon Fen Energy Park with these other solar farm projects and any other solar parks in the nearby area, such as Heckington Fen and Springwell Solar Farm, also within the North Kesteven District must be considered.	Cumulative effect of Solar Array Area of the Beacon Fen Energy Park with other solar farm projects and any other solar parks in the nearby area, such as Heckington Fen and Springwell Solar Farm, also within the North Kesteven District have been considered.

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
		These four large scale solar projects (Nationally Significant Infrastructure) to be applied for through a Development Consent Order need to be considered. These are: • 600MW Cottam Solar Project; • 500MW Gate Burton Solar Project; • 480MW West Burton Solar Project; and • 500mw Tillbridge Solar Project.	The four large scale solar projects (Nationally Significant Infrastructure Project (NSIP)) to be applied for through a DCO have been considered in the cumulative section. These include: • 600MW Cottam Solar Project; • 500MW Gate Burton Solar Project; • 480MW West Burton Solar Project; • 500mw Tillbridge Solar Project.
Direct Topic-Specific Consultation			
National Air Traffic Services (NATS)	9th August 2023	The Site is at a distance that it does not need to be considered.	As the Solar Array Area is 20+km from any NATS installation, there were no comments.
Defence Infrastructure Organisation (DIO)	8th August 2023	Initial consultation letter sent but no response received.	
	12th March 2024	In response to the PEIR glint and glare report, DIO confirmed that the "*need to consider final approach flight paths out to 2 miles is identified. However, it will be necessary for any glint and glare impact assessment to also take account of standard landing and take-off routes, as well as other standard aviation procedures and circuit patterns for all permanent runways at the two MOD aerodromes that are to be considered.*"	In response, to the DIO comments, Wardell Armstrong (WA) undertook additional consultation with the DIO to try to understand what approach paths required modelling. The DIO confirmed that modelling of additional routes or circuit patterns was not required as part of this assessment.
		It further concluded "*it would be appropriate to also include a third category of impact, to account for the possible occurrence of high intensity impacts with the potential to cause long-lasting or permanent retinal damage. If an impact will affect critical stages of air traffic movement, then this should be considered to be a significant effect.*"	The analysis software does include all three categories, but red glare is only possible where there is concentrated light focused on a single point. This will not be the case for a fixed frame solar farm, however, noting the comments from the DIO, red glare has been included in the definitions and table of significance.
	17th October 2024	In relation to glint and glare, DIO confirmed that it did not require any additional work to be undertaken as its internal assessment had determined	A glint and glare assessment considering straight-line final approach paths to all runways has been conducted anyway as part of the assessment process,

ORGANISATION	DATE	SUMMARY OF CONSULTEE RESPONSE	HOW THIS HAS BEEN ADDRESSED
		that there would be no operational impact. However, this is based on the parameters that they have assessed, and any changes would require further consideration	but it is noted that there are no specific requirements to model additional visual flight paths or overhead circuits.

Scope of the Assessment

13.3.4 The scope of the assessment includes consideration of effects on aviation in the vicinity of the Solar Array Area, motorists using local roads and any effects on buildings and the railway. It also includes the assessment of inter-cumulative effects of other solar sites in planning in the area.

13.3.5 While there is potential for the Proposed Development to affect access to public rights of way (PRoWs), as noted in EN-3 section 2.10.40, the low sensitivity of PRoWs means they have been excluded from this assessment.

Effects not considered within the Scope

13.3.6 Table 13.2, below, highlights matters that are not within the scope of the assessment. In addition, receptors that lie outside the Zone of Theoretical Visibility (ZTV)[1] are not considered within the scope. The ZTV is a computer model used to determine visibility to the Solar Array Area and allows for the streamlining of receptor identification and classification. The technology of this is discussed in section 13.6.14. Beyond 5km, ground-based receptors have very limited visibility due to the flat terrain and cumulative screening from buildings and vegetation, so in most cases can be safely discounted. In cases where there is some uncertainty, checking for visibility using tools such as Google Earth allows for confirmation of this screening. It should be noted that consideration of the proposed onsite mitigation screening has also been included, although that screening will obviously not be present in images of the Solar Array Area at this stage. Due to their sensitivity and the increased visibility gained from higher elevation, aviation receptors have been assessed to larger distances than 5km.

Table 13.2 Matters to be Scoped out of the Assessment

PROJECT PHASE	RATIONALE	COMMENTARY
Construction	The installation works are temporary, and although there is a slight risk of reflections from steel mounting structures prior to mounting the panels on top, the surface area of the steel is considerably smaller than the panels. Furthermore, the time between the installation of the mounting structures and the mounting of the panels will be minimised so as to limit the chance of reflections. As a result, the risks are limited and not expected to cause significant glint and glare effects. Consideration is, therefore, given to the	The Planning Inspectorate agreed that this could be scoped out of the assessment provided sufficient information is included in the CEMP

[1] Note, this ZTV is specific to the glint and glare assessment and differs to that used in the Landscape Chapter (Chapter 6). The glint and glare ZTV accounts for surface features such as buildings and vegetation, whereas the landscape assessment uses a 'bare earth' model.

	effects, but detailed calculation of duration or glint and glare intensity is not deemed necessary and is therefore not provided.	
Decommissioning	The decommissioning works will be virtually the mirror of installation. No different effects are expected to be present and all will be temporary.	The Planning Inspectorate agreed this could be scoped out of the assessment provided sufficient information is included in the CEMP / Decommissioning Environmental Management Plan (DEMP).

Limitations & Exclusions

13.3.7 The assessment relies on information provided by third-party software suppliers. Algorithms used in the analysis were originally developed by Sandia National Laboratories in the US on behalf of the Federal Aviation Administration (FAA) and are now available under licence from Forge Solar.

13.3.8 The computer model used can only directly assess effects for cumulative solar sites that are located within 5km of the centre of the proposed Solar Array Area.

13.3.9 It is important to understand the definitions for glint, glare and dazzle. These terms are often used interchangeably but are defined in this report as described in Table 13.3, below. They are consistent with the EN-3 definitions.

Table 13.3 Definitions of Glint, Glare and Dazzle.

TERM	DESCRIPTION
Glint	Glint is a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel.
Glare	Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor.
Dazzle	This is an effect caused by intense glint and glare, which can cause distraction, and if strong enough, reduce the ability of the receptor (pilot or driver, or otherwise) to distinguish details and objects.
Specular reflections	Specular reflections are direct reflections of the Sun's light off smooth surfaces, such as glass, steel and calm water.
Diffuse reflections	Diffuse reflections are scattered reflections of light produced from rougher surfaces such as concrete, tarmac and vegetation.

13.3.10 Different organisations define glint, glare and dazzle differently. For example, the Sandia National Laboratories defines glint as the 'specular direct reflection of sunlight off smooth materials', such as solar panels and does not account for the diffuse component. The US FAA on the other hand defines glint as a 'momentary flash of bright light' and glare as a 'continuous source of bright light'. The UK Building Research Establishment makes use of the terms glint and dazzle when referring to reflected sunlight from a glazed façade.

13.3.11 In all cases, reflected sunlight can be either in the form of specular reflections, which are caused by reflections from smooth surfaces or diffuse reflections, which are reflections from rough surfaces. The terminology that will be applied in the assessment does not in itself distinguish between or imply the duration of effect (as

momentary or prolonged), but rather the assessment will consider all events and comment on the expected duration of those events. The assessment, therefore, encompasses all effects, as identified in the industry standard Forge Solar software.

13.3.12 An assessment will be undertaken of the likely significant effects of the Proposed Development on the environment with respect to 'glare'. For the purposes of this report, the term 'glare' is used as an umbrella term to cover both glint and glare effects.

13.3.13 For the assessment of glare, there are a number of limitations associated with the modelling that it is important to be aware of. These are summarised, below.

13.3.14 The model calculates results based upon the geometric relationship between the observation point at a specific height, the reflective plane at height (panels) and the position of the sun at each time interval. It therefore takes no account of any screening features whatsoever, and consequently the results predicted are a conservative prediction of glare effects. In reality, the occurrence of glare at receptors will be less than predicted.

13.3.15 Glare can only occur when direct sunlight can reach the solar panels. Diffused lighting, caused by such weather conditions as cloud, fog and mist cannot cause glare due to the low energy intensity of the light incident on the panels. However, the software assumes it is sunny, at the maximum intensity possible given the season, 365 days per year. The computer model suggests where and when glare can happen as opposed to the instance in which it will happen. Hence further interpretation by the assessor is important.

13.3.16 The results have been interpreted in the context of the wider assessment and the methods and limitations discussed. These have been further refined to account for local weather conditions, as well as climactic considerations.

13.4 Assessment Methodology & Significance Criteria

Extent of the Study Area

13.4.1 A general study area of 5km from the Solar Array Area of the Site has been applied for motorists, buildings and railways due to glare intensity diminishing with distance from the source and general ground-level visibility to low-lying objects (3.5m agl[2]) being minimal at distances greater than 5km.

13.4.2 Aerodromes within 15km of the Proposed Development have been considered. This is in agreement with the guidance document produced by The Combined Aerodrome Safeguarding Team (CAST) that relates to solar photovoltaic development, which states: '*For many aerodromes, 5km is the distance of choice but it could be considered out to 10km. In exceptional circumstances, assessments may be required beyond 10km*[3]*'.*

13.4.3 In most cases, aerodromes located more than 5km away will be unaffected by glare effects although, since air traffic control towers (ATCT) are often much taller than their surroundings, they tend to have better visibility. Final approach flightpaths are assumed to extend 2 miles (~3.2km) from the runway threshold so pilots at the start

[2] Above ground level.
[3] [redacted]

of this approach could be much closer to the Solar Array Area than the aerodrome, itself.

Assessment Methodology

13.4.4 The method of baseline data collection and assessment is in accordance with current guidance and industry best practice.

13.4.5 Applicable guidance, particularly in relation to aviation, is summarised below and expanded upon in **Appendix 13.1 (Document Ref: 6.3 ES Vol.2, 6.3.88)**. There is no formal guidance for assessing glare impacts on other ground-based receptors, so best practice applies some of the concepts from the aviation.

- Aviation Guidance - Civil Aviation Authority (CAA);
- Aviation Guidance - Federal Aviation Administration (FAA); and
- Aviation Guidance - Combined Aerodrome Safeguarding Team (CAST).

Significance Criteria

13.4.6 The criteria used to determine the significance of effects in this chapter differs slightly from the approach used in other chapters. The magnitude of change (i.e. magnitude of impact) is determined by the intensity of the glare, which is classified by the computer model into discrete categories. Further detail on the sensitivity of the receptor, the magnitude of change and the significance of effect, is provided below.

Sensitivity

13.4.7 For the purposes of this assessment, the sensitivity of the receptor is judged based on the likely consequence of a negative effect. For example, the potential consequence of a motorist or train driver being dazzled by glare could be (in a worst-case scenario) a collision or major accident.

13.4.8 A receptor that is considered to have potential to experience a possible health and safety risk is allocated as having a ‘High’ sensitivity. A receptor that has little or no potential for physical harm, but where people could experience nuisance, such as glare being visible from a property, is allocated as a ‘Medium’ sensitivity. A receptor that is uninhabited and irregularly frequented, or a building that does not have windows, such as a substation or warehouse, is allocated as a ‘Low’ sensitivity. A place where people are not usually present, such as an agricultural field with no public access, is considered to have ‘Negligible’ sensitivity (i.e. it is unlikely to cause any issues even if glare were to be visible).

Magnitude

13.4.9 As described above, the magnitude of change is primarily based on the output of the computer model, which, if any glare is visible, provides discrete results for standard glare effects.

13.4.10 Where there is no visibility to any glare, the magnitude is taken to be zero. Green glare is low intensity glare with low potential for temporary after image. In this context ‘after image’ is the residual effect that remains temporarily visible after glancing towards and then away from a very bright light source. Yellow glare is medium intensity glare that does have some potential for temporary after image. The highest glare intensity possible in the software model, ‘red’ glare, can only be present where concentrated light from multiple sources is focused onto a single receptor. Red glare

can lead to permanent retinal damage. It is not possible to experience red glare from any of the fixed solar panels included in the Proposed Development, as they have common orientations and inclinations so do not focus light on to a fixed point.

13.4.11 Further context for the magnitude of change is provided by the duration of effect and the time of the day that it occurs.

13.4.12 The computer model predicts glare effects in the absence of any consideration of screening and it assumes optimum sunlight conditions persist throughout the year. It does not recognise whether there is any intervisibility between the solar panels and the receptor and does not of its own accord account for changing weather. These elements of assessment require human intervention to consider whether, in reality, visibility to panels capable of reflecting light is possible.

13.4.13 The magnitude of change is determined by the combination of the direct output of the model, alongside consideration of the visibility of the Solar Array Area from the receptor. It is important to understand that the model output may predict glare at a particular receptor, but if there is no visibility due to intervening screening, then the magnitude of effect would still be assessed as None. The model will predict a specific number of theoretical glare minutes, based on an assumption that there is line of sight, but if these effects cannot be actively observed, they cannot produce any adverse effects.

Significance

13.4.14 This assessment focuses on receptors of High and Medium sensitivity. It is considered that yellow glare received at these receptors should be considered to be Significant. If yellow glare is predicted in the Forge Solar model (which does not account for screening), but in reality, the receptor is already screened and there is no visibility or if visibility to potential glare effects will be removed by mitigation, effects at these receptors will be considered to be Not Significant.

13.4.15 In general, low intensity green glare is considered to be Not Significant, unless the receptor in question happens to be an ATCT, which is not permitted to tolerate green glare, resulting in it being considered Significant.

13.4.16 Table 13.4 illustrates the ‘magnitude of change’ (i.e. magnitude of impact) and the ‘sensitivity of the receptor’, which is used to classify each receptor.

Table 13.4 Significance of Effect Matrix

MAGNITUDE OF CHANGE	SENSITIVITY OF RECEPTOR				
		High	**Medium**	**Low**	**Negligible**
	Red Glare	Major	Major	Moderate	Minor
	Yellow Glare	Moderate to Major	Minor to Moderate	Negligible	Negligible
	Green Glare	Minor*	Negligible	Negligible	Negligible
	No Glare Visible	None	None	None	None

**Except for an ATCT where no glare can be tolerated, and green glare would be considered ‘Major’*

13.4.17 Ultimately, a statement of whether any identified harm does or does not represent a significant effect is provided in respect of each glare receptor using the following terminology: 'Significant' or 'Not Significant'. Where the conclusion from Table 13.4 is 'Major' or 'Moderate', the receptor would be classified as 'Significant', and with a conclusion of 'Minor' decreasing to 'None', classified as 'Not Significant'.

13.5 Baseline Conditions

Current Baseline Conditions

13.5.1 There will already be some baseline glare at receptors due to the presence of multiple reflective surfaces in the local area, such as other solar farms, glasshouses, waterbodies, agricultural polythene, windows in houses and windscreens in vehicles.

Baseline Survey Information

13.5.2 A baseline survey was conducted using desktop survey analysis.

13.5.3 The Grantham to Skegness Line, managed by East Midlands Railway, runs to the south of the Solar Array Area, between Sleaford and Heckington, at a distance of approximately 2.4km (see Figure 13.1 Road and Rail Receptors). It passes to the south of Heckington with most of the track further than 5km away. The Peterborough to Lincoln Line runs from Lincoln to the north southwards via Sleaford and on towards Spalding. Train drivers operating trains on these tracks are important receptors and form part of the baseline.

13.5.4 There are numerous roads and small country lanes within the 5km study area of the Solar Array Area (also shown on Figure 13.1). Not all these roads will need to be assessed as many lie outside of the area within which effects could theoretically be received. Studies have, therefore, focused on receptors lying within the ZTV and the area within which reflections are geometrically possible. Where route receptors, such as roads, cross areas within the ZTV, only those sections within the area predicted to have capacity to receive glare have been assessed. There are 12 route receptors that have been considered in the assessment and form part of the existing baseline. These include the following:

- Route 1 – A17;
- Route 2 – B1395;
- Route 3 – Howell Fen Drove;
- Route 4 – Heckington Road (south of Howell);
- Route 5 – Heckington Road (north of Howell);
- Route 6 – Thorpe Road;
- Route 7 – Lane connected to Thorpe Road;
- Route 8 – Field Lane;
- Route 9 – Littleworth Drove;
- Route 10 – Star Fen Road;
- Route 11 – Church Lane; and
- Route 12 – Cow Drove.

13.5.5 There are several airfields within 15km of the Solar Array Area. These include the following:

- Anwick (Old Manor Farm)[4];
- Bloxholm[5];
- Boston (Wyberton)[6];
- Decoy farm[7].
- Griffins Farm Airstrip[8]
- Pointon[9];
- RAF Barkston Heath[10];
- RAF Coningsby[11];
- RAF Cranwell[12];
- RAF Waddington[13]
- Sempringham Fen[14]; and
- Whaley Farm[15]; and
- Wilsford (Hanbeck Farm)[16].

13.5.6 Figure 13.2 Aviation Receptors illustrates the aviation receptors within 15km of the Solar Array Area. The aviation receptors within this proximity of the Solar Array Area include Royal Air Force (RAF) Coningsby, RAF Cranwell, the airstrip at Anwick (Old Manor Farm) and the airstrip at Boston airfield.

13.5.7 The closest major aviation receptor is RAF Coningsby, which is located approximately 9.5km north of the Solar Array Area boundary.

13.5.8 There are also a number of dwellings and commercial premises within the study area and within the ZTV, as shown in Figure 13.3 Observation Point Receptors **(Document Ref: 6.4 ES Vol.3, 6.4.70)**. In some cases, the identified receptor is considered representative of several discrete receptors in close proximity. For the purposes of this report these receptors are referred to as Observation Points (OP) and include the following:

- OP1 – Westmoorland Farm;
- OP2 – Residential properties in Howell;
- OP3 – The Farm Kitchen and residential property;
- OP4 – Residential properties in Ewerby Thorpe;
- OP5 – Residential properties Ewerby (east);
- OP6 – Residential properties Ewerby (north);
- OP7 – Residential properties Ewerby (south);
- OP8 – Individual residential property on Asgarby Road, to the south of Ewerby;
- OP9 – Boughton;
- OP10 – The Picnic Bar Café;
- OP11 – Heckington MOT Centre;
- OP12 – Garwick Café;

[4] Anwick (Old Manor Farm) - Airfields of Britain Conservation Trust UK, [redacted]
[5] Bloxholm - Airfields of Britain Conservation Trust UK, [redacted]
[6] Boston (Wyberton) - Airfields of Britain Conservation Trust UK [redacted]
[7] Decoy Farm - Airfields of Britain Conservation Trust UK, [redacted]
[8] Griffins Farm Airstrip, UK Airfields and Airports, [redacted]
[9] Pointon - Airfields of Britain Conservation Trust UK, [redacted]
[10] Royal Air Force, RAF Barkson Heath, [redacted]
[11] Royal Air Force, RAF Coningsby, [redacted]
[12] Royal Air Force, RAF Cranwell, [redacted]
[13] Royal Air Force, RAF Waddington, [redacted]
[14] Sempringham Fen, Airfields of Britain Conservation Trust UK, [redacted]
[15] Whaley Farm - Airfields of Britain Conservation Trust UK, [redacted]
[16] Wilsford - Airfields of Britain Conservation Trust UK, [redacted]

- OP13 – Lincolnshire Pride Magazine;
- OP14 – Wilson Prestige Vehicle Repairs;
- OP15 – Garthwest;
- OP16 – Cluster of properties along the B1395;
- OP17 – Residential properties north of cluster;
- OP18 – Residential property on the B1395;
- OP19 – Cluster of houses on Littleworth Drove;
- OP20 – Vine Cottage, Littleworth Drove;
- OP21 – Farmstead, Littleworth Drove;
- OP22 – Houses on Littleworth Drove, to the west of Star Fen Road;
- OP23 – Court Row Farm, Littleworth Drove;
- OP24 – Farm, east of Star Fen Road;
- OP25 – Cluster of houses on Star Fen Road;
- OP26 – Barworth Research;
- OP27 – Large complex on the B1395;
- OP28 – Bungalow with farm buildings on the B1395;
- OP29 – 91 Clay Bank;
- OP30 – House and farm on Clay Bank road;
- OP31 – Farm estate on Clay Bank;
- OP32 – Residential area on Low Road;
- OP33 – Residential properties – west South Kyme;
- OP34 – Farm on Church Lane;
- OP35 – Farm on Cow Drove;
- OP36 – White House Farm;
- OP37 – Gashes Barn;
- OP38 – Copperhill Kennels Cattery; and
- OP39 – Property off Halfpenny Toll Lane.

13.5.9 There is currently one operational solar development present within the immediate vicinity of the Proposed Development, which is Grange Farm located approximately 3.7km to the southwest of the Solar Array Area. There are several solar farms currently seeking planning consent in the vicinity of the Solar Array Area. The closest is Heckington Fen, which is another DCO solar application, located approximately 3.2km southeast of the Solar Array Area

13.5.10 It is not possible to accurately quantify the full level of existing glare currently experienced by receptors in the vicinity of the Solar Array Area, as there are a huge variety of sources, wide spread of receptors and some reflections could arise from mobile sources such as moving vehicles. For the purposes of this assessment it is, therefore, presumed that no baseline glare currently occurs at these receptors, meaning that the assessed change in glare from the introduction of the solar panels into the environment represents the largest possible change in glare compared to the status quo.

Sensitive Receptors

13.5.11 In summary, the key sensitive receptors within the study area comprise the following:

- Motorists: driving on local roads;
- Railway line: effects for the train driver;
- Aerodromes in the area: pilots and air traffic control; and
- Occupants of residential/commercial properties.

Future Baseline Conditions

13.5.12 The likely evolution of the current baseline without the implementation of the Proposed Development would be the continuation of agricultural practices. Overall, the future baseline will broadly reflect that of the current baseline.

13.6 Assessment of Effects

Assessment Parameters

13.6.1 This assessment is based on the following parameters:

- Solar PV panels and modular ground-mounting structures;
- Panels will be fixed (i.e., static) with a south-facing orientation;
- Panels will be at a height of up to 3.9m (in fields to the east of the Solar Array Area) and up to 3.5m[17] (in fields to the west, south and an isolated field in the north of the Solar Array Area); and
- Panel angle of inclination is fixed at 15 degrees. The modelling in this Chapter is based on an assumed panel angle of 15° from horizontal, which was selected to accord with the layout for the Solar Array Area shown on the **Figure 4.1 - Indicative Site Layout Plan (Document Ref 6.4 ES Vol.3, 6.4.4)**. This is the panel angle most likely to be adopted at the detailed design stage of the Project and accords with the typical panel angles utilised on other constructed solar photovoltaic projects. Given the present stage of detailed design, the final adopted angle may vary (for some or all of the panels) within a range of 10° - 45° to the horizontal. In such case the effects at individual receptors will likely vary slightly (e.g. timings, durations, and possibly glare intensity could be subject to some differences). However, the significance of effects across the full aggregated set of receptors would be unlikely to differ materially from the significance of effects concluded in this Chapter.

13.6.2 Embedded mitigation was designed based on these parameters and the modelling from these.

Embedded Mitigation

13.6.3 Design work for the Solar Array Area of the Beacon Fen Energy Park has taken potential glare effects into account and the layout aims to reduce the effects at sensitive receptors as far as practically possible.

13.6.4 The design includes using embedded mitigation in the form of proposed new planting. This planting will help to screen the Proposed Development from nearby receptors such as roads and dwellings. The extent of planting is as shown on the Landscape Strategy Plan (Figure 6.31). Currently, the combination of existing and proposed planting provides a high degree of screening around much of the Solar Array Area boundary.

13.6.5 The choice of fixed panels over tracking panels and the heights of panel arrays are design decisions that affect the amount of glare possible at specific receptors. The use of an anti-reflective coating (ARC) on the panels reduces their reflective properties. These factors, as well as other technical constraints have been important parts of the design evolution.

[17] Based upon the results of the flood risk assessment (Appendix 11.1).

13.6.6 Should the embedded mitigation, which is assumed to present from the outset, be found to be insufficient and result in Significant effects being assessed, then additional mitigation will be proposed to try and reduce effects to Not Significant. Residual effects are reported below.

Construction Phase

13.6.7 In its Scoping Opinion (**Appendix 1.2 – Scoping Opinion (Document Ref 6.3 ES Vol.2, 6.3.2)**) the Planning Inspectorate agreed with the Applicant's proposal that glare effects during construction be scoped out of the assessment, provided that glint and glare is minimised through project working practices.

13.6.8 During the initial phase of ground preparation, there are not likely to be any reflections present other than potentially from the windscreens of vehicles used in the preparation works. There will be relatively few vehicles moving around within the construction areas at any particular time, and the potential for reflections from glass windshields in those vehicles is likely no greater than from baseline activity (e.g. a tractor carrying out routine agricultural practices or cars using the existing local road network). No specific working practices are therefore envisaged.

13.6.9 Once construction is underway, there will be some potential for the mounting structures for the solar panels to reflect sunlight in the period of time between their erection and the installation of the panels. However, the surface area of such structures is considerably smaller than the panels and the scattering of light off the structures would not be consistent, such that the potential for glare is limited. Other than these structures and the panels, there will be limited surfaces that could reflect sunlight.

13.6.10 In constructing the Solar Array Area in accordance with standard construction practices, the time between the erection of the mounting structures and the installation of the panels would be minimised, reducing the time that the mounting structures are exposed to sunlight. Additionally, as the Solar Array Area is constructed completed sections will help provide screening from ongoing construction activities. See **Appendix 2.4 - Outline Construction Environmental Management Plan (OCEMP) (Document Ref 6.3 ES Vol.2, 6.3.7).**

13.6.11 As construction nears completion and more panels are deployed, the potential for glare will progressively approach that predicted for the operational phase, which is assessed below.

Operational Phase

13.6.12 During the operational phase, the angle of incident sunlight will differ during the course of each year as the sun attains different heights in the sky and its intensity will vary with the weather patterns. This assessment assumes a worst-case scenario, where the intensity of sunlight is at a maximum throughout the day.

13.6.13 The operational phase is considered across a number of receptors, separately. These include rail and road receptors, observation points (representative of dwellings in the surrounding area) and aviation receptors.

13.6.14 A ZTV has been modelled to show which areas potentially have visibility to the panels (see Figure 13.4 Zone of Theoretical Visibility). It is important to note that the ZTV is based on a Digital Surface Model (DSM) that introduces surface features into the analysis rather than just using a bare earth model. This is helpful in allowing a better representation of screening. However, it also means that it predicts visibility

as if receptors were located on top of those surface features, rather than just beside them at ground level. The methodology used to avoid this is described below. In any event, because the ground is so flat in this area, the ZTV suggests that many places around the Solar Array Area have theoretical line of sight to the panels.

13.6.15 The ZTV is a computer model that determines whether any part of the Site is visible from land surrounding the Site based on local topography. In this case, the ZTV is formed using Light Imaging Detection and Ranging (LiDAR) terrain data and accounts for screening from surface obstacles (e.g. trees, hedgerows, and buildings). The ZTV is calculated as described below and is an effective tool used to reduce the study area and eliminate receptors that have no risk of experiencing glare.

13.6.16 The Environment Agency is responsible for the collection of a high-resolution LiDAR dataset, made available through the 'Open Government Licence'. The data is gathered by aircraft equipped with the necessary scanning laser that is used to measure the distance from the aircraft to the obstruction. This produces a 3D image of the earth's surface and accounts for high standing, non-terrain-based objects that are not accounted for in Digital Terrain Models (DTM), which only account for landform. The relevant data produced from this technique is called a Digital Surface Model (DSM). This is useful due to the increased accuracy that can be obtained during the production of a ZTV. Since the 3D profile of the necessary area is known, screening can be accounted for when the ZTV is produced.

13.6.17 A selection of sample points are identified on the Solar Array Area boundary and on land contained within the Solar Array Area. Sample points are chosen as it is unfeasible to perform this calculation on every surface onsite. The DSM forms the basis for determining whether the Solar Array Area could be visible at local receptors. The DSM comprises a grid of cells where each cell has a given height value, and the GIS allows this data to be displayed graphically.

13.6.18 The ZTV produced by the DSM will flag the obstructions themselves (e.g. trees) as having visibility as it assumes the receptor height is added on top of this. Non-terrain objects can be eliminated as receptors use the DSM in tandem with a DTM. The DTM height is subtracted from the DSM, and this forms the Canopy Height Model (CHM). Following this, highlighted non-terrain objects that will theoretically have visibility can be manually removed as potential receptors.

13.6.19 Multi-storey receptors may be difficult to assess accurately. It is possible that glare may be received from a certain floor and above, but this would not be picked up by the ZTV that is assessing visibility at a fixed height above ground level and, therefore, requires manual intervention to determine the true extent of the glare within taller buildings. Consideration of glare effects from the upper floors of buildings is included as part of this assessment.

When can glare occur?

13.6.20 Glare can only occur when direct sunlight can reach the solar panels. Diffused lighting, caused by weather conditions (e.g. cloud, fog and mist) cannot cause glare due to the low energy intensity of the light incident on the panels.

13.6.21 Figure 13.5 Number of Daylight and Sunshine Hours shows the total number of daylight hours available each month (red) based on the regional variation for the Site. Also shown is the average number of hours of sunshine each month (blue) taken from the Meteorological Office data recorded at Waddington (the closest

active weather station to the Site for which historic sunshine data is available). Waddington is approximately 21km north-west from the Site boundary and is expected to be broadly representative of the weather conditions that the Site will experience.

13.6.22 Figure 13.5 also shows the ratio of sunshine to daylight displayed as a percentage (green) for each month at the Site. As can be seen, the sunniest month on average was May, with 201 hours of sunshine. Even then, conditions suitable for glare events to occur are only expected to be present approximately 41% of the theoretical maximum. This is because the ratio of sunshine to daylight is approximately 41% at this time. During less sunny months, glare events may occur for as little as 22% of the theoretical maximum because the ratio of sunshine to daylight is much less at these times.

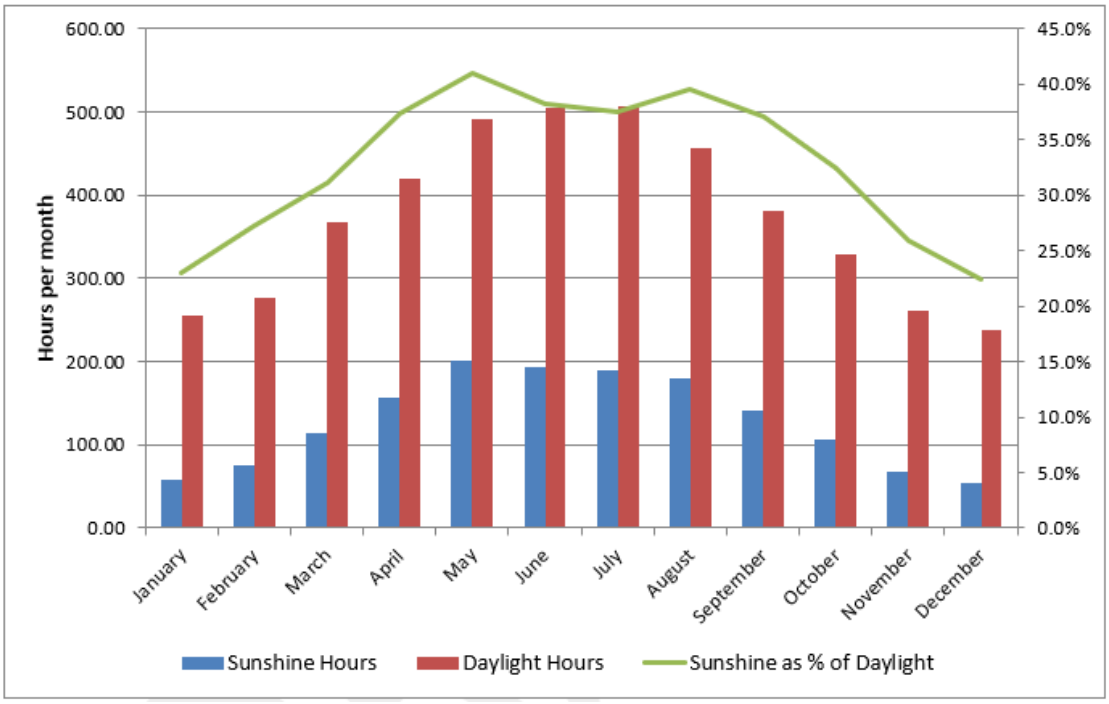

Figure 13.5 - Number of Daylight and Sunshine Hours per Month in Waddington

Railways

13.6.23 Railway receptors are considered to have a high sensitivity. The main rail receptor runs to the south of the Solar Array Area, between Sleaford and Heckington, at approximately 2.4km. It passes to the south of Heckington with most of the track further than 5km away. A small section of the line lies within the 5km buffer and within the ZTV and, as such, has been assessed. For the purpose of the assessment, it is assumed that the driver of the train would be sat at a height 2.75m above ground level. The model, therefore, considers whether glare effects would be observable to the driver and could compromise their ability to safely control the train.

13.6.24 There is one section of track that has been considered in the glare assessment, as shown in Figure 13.1 Road and Rail Receptors. It should be noted that several railway lines are more than 5km from the Solar Array Area and, at this distance, there are not expected to be any significant glare effects, regardless of the panel specifications being used.

Results for Rail Receptors

13.6.25 With fixed solar panels at heights of 3.5m and 3.9m and at 15 degrees, there was some glare predicted along the railway line. A total of 942 minutes of green glare was predicted at the railway annually, but no yellow glare was detected. The lower intensity of green glare means that it is not considered to cause significant effects, as per the significance matrix in Table 13.4. Screening from trees, hedgerows and the village of Heckington will prevent visibility to any glare expected from the railway. Other railway lines are present at a distance of 8km or more. In reality, at these distances, there will be no visibility due to the low height of the Proposed Development within a relatively flat landscape, which will quickly lead to screening from hedgerows and tree lines. Glare intensity also diminishes with distance, so at larger distances any glare effects would be so weak that they can be ignored.

Roads

13.6.26 There are a number of roads within the study area comprising national, regional and local roads. There are no motorways. Motorists are, as a matter of routine, used to driving towards the sun, which provides a much more intense source of light than glare. Modern vehicles are equipped with tinted glazing and sun shading bands at the top of windscreens. Notwithstanding this, roads within the immediate vicinity of the Solar Array Area have been assessed for glare effects.

13.6.27 Stretches of road within the ZTV have been identified and selected for computer simulation. Although the dates and times when glare has the potential to be visible for specific stretches of the road may vary, the results reported are expected to be representative of the road in general. It should be noted that the glare results reported (dates and times) do not account for screening, which will limit or eliminate the potential for glare effects. The results reported should, therefore, be placed in context with the discussion of screening, which is provided for each road. The durations reported are the extents of when glare could be geometrically possible, but glare would not occur continuously during that period.

13.6.28 Each road that has been assessed is shown in **Appendix 13.2a Forge Solar Glint and Glare Report: Road, Railway & Aviation (Document Ref: 6.3 ES Vol.2, 6.3.89)**. The roads modelled are those closest to the Solar Array Area and more likely to receive glare. All the roads modelled are at least partially or completely within the ZTV and within 5km of the Solar Array Area.

Results for Road Receptors

13.6.29 The A17 is considered to be the only road in the Study Area and within the ZTV where cars might be travelling at higher speeds. As such, it is considered to have a High sensitivity, whereas the other routes under consideration have been classified as having Medium sensitivity.

13.6.30 The model predicts yellow glare being visible along several of the routes, but it is important to reiterate that the model does not account for any existing screening features or weather conditions.

13.6.31 For example, in the ‘bare earth model’ there is predicted to be 55,029 minutes of glare along Route 7 per year, ‘Halfpenny Toll Lane’, on the western side of the Site, where current screening from hedgerows and vegetation is minimal. However, **Figure 6.31 Landscape Strategy Plan (Document Ref: 6.4, ES Vol.3, 6.4.42)** within **Chapter 6 Landscape and Visual (Document Ref: 6.2, ES Vol.1, 6.2.6)** of this **Environmental Statement (Document Ref: 6.2, ES Vol.1, 6.2)** incorporates screening features into the design. This includes extensive native hedgerow

planting, as well as retention and enhancement of existing hedgerows. Since this mitigation is considered to be embedded, the assessment of effects considers the post-screening scenario.

13.6.32 It must be recognised that some of the screening may take some time to mature. While this process occurs, glare effects cannot be discounted entirely. In this instance, the lane is small, and cars will not be travelling along it at any speed so even if there is some visibility, the risks to road users are considered to be minor and temporary.

13.6.33 The durations of theoretical yellow glare (highlighted in yellow) for each road receptor are given in Table 13.5 Summary and Assessment of Significance for Road Receptors, below.

Table 13.5 Summary and Assessment of Significance for Road Receptors

ROUTE	SCREENING PRESENT AND PROPOSED PLANTING	THEORETICAL MINUTES OF GLINT (ANNUAL)	SITE VISIBILITY	SCREENED MAGNITUDE *(INC. EXISTING AND EMBEDDED MITIGATION)*	SENSITIVITY	SIGNIFICANCE
Route 1 – A17	This route is very well screened from the Solar Array Area as it is majority lined with trees, hedgerows and other vegetation.	1,996	Very limited to no visibility	0	High-	None (**Not Significant**)
Route 2 – B1395	The existing screening on the B1395 varies, with a large part of the road having no hedgerows or vegetation lining its western side, facing the Solar Array Area. There is some intervening screening in the form of residential properties, farms and farm buildings but there is not continuous, complete screening to the Solar Array Area. The embedded mitigation includes the planting of perimeter screening which will assist in preventing glare effects.	4,295	No visibility with embedded mitigation in place	0	Medium	Minor to Negligible (**Not Significant**)
Route 3 – Howell Fen Drove	This road runs to Westmoorland Farm and lines the southern boundary of the Solar Array Area. The boundary has hedgerows lining the road, with clusters of trees. There are only some gaps in the boundary where there is space to turn vehicles and enter the fields. Some sections have less mature hedgerow but there is little visibility at the height when seated in a car. This road is not a through road and only leads to Westmoorland Farm and to access points into the fields. As part of the embedded mitigation, the existing hedgerow will be allowed to grow in height to provide increased screening along the southern boundary.	12,394	Limited to specific areas i.e. turnings into the field	0	Medium	Minor to Negligible (**Not Significant**)
Route 4 – Heckington Road (south of Howell)	Heckington Road runs north-south to the west of the Solar Array Area and makes up a section of the Solar Array Area's western boundary. This section of the route connects the hamlet of Howell to the A17 and the Heckington. This route is not predicted to experience any glare.	0	Limited to no visibility	0	Medium	None (**Not Significant**)

ROUTE	SCREENING PRESENT AND PROPOSED PLANTING	THEORETICAL MINUTES OF GLINT (ANNUAL)	SITE VISIBILITY	SCREENED MAGNITUDE *(INC. EXISTING AND EMBEDDED MITIGATION)*	SENSITIVITY	SIGNIFICANCE
Route 5 – Heckington Road (north of Howell)	This section of the route begins to the north of Howell and runs along the site boundary up to Ewerby Thorpe. Along this section there are breaks in the hedgerow so there is direct visibility to the Solar Array Area with screening that is not constant across the boundary. As part of the embedded mitigation, the western boundary of the Solar Array Area will be allowed to grow in height to provide increased screening, and any gaps in the existing boundary, other than for exit and entry, will be infilled.	6,949	Limited visibility with enhanced existing screening and proposed planting	0	Medium	Minor to Negligible (**Not Significant**)
Route 6 – Thorpe Road	Thorpe Road is to the west of the Solar Array Area and is near to one section of the western Solar Array Area boundary in Ewerby Thorpe. The section closer to the Solar Array Area has some slight visibility along the road into the Solar Array Area and looks down the site access track, where most of the panels will be screened from view by the proposed hedgerow planting. The western section of the road that is closer to Ewerby has little to no visibility of the Solar Array Area.	7,052	Minimal visibility with proposed planting in place	0	Medium	Minor to Negligible (**Not Significant**)
Route 7 – Halfpenny Toll Lane connected to Thorpe Road	This lane links Thorpe Road, to what becomes Black Drove, which leads to the farm in the centre of the Solar Array Area. This road makes up some of the western and all of the northern boundary of the Solar Array Area. The western section currently has visibility into the Solar Array Area as there is minimal hedgerow or other types of screening. However, the proposed embedded mitigation includes planting along most of the extent of this boundary, meaning that there will be very limited visibility, if any. Although this planting will take time to mature, the glare effects prior to this are not expected to cause adverse effects on road users due to the low sensitivity of the road. The northern section of the road will only see the backs of the panels so there will be no glare.	55,029	Limited to no visibility with the proposed planting in place.	0	Medium	Minor to Negligible (**Not Significant**)
Route 8 – Field Lane	Field Lane is a road off of Main Street in Ewerby. It is also the location of OP6. The section of the road to the east is only partly screened so, prior to any planting there is some potential for visibility to the Solar Array Area.	4,852	No visibility to glare with planting in place.	0	Medium	Negligible (**Not Significant**)

ROUTE	SCREENING PRESENT AND PROPOSED PLANTING	THEORETICAL MINUTES OF GLINT (ANNUAL)	SITE VISIBILITY	SCREENED MAGNITUDE *(INC. EXISTING AND EMBEDDED MITIGATION)*	SENSITIVITY	SIGNIFICANCE
	However, after the proposed planting has been included, the visibility will be limited.					
Route 9 – Littleworth Drove	This road is to the south of the Solar Array Area and connects the A17 and the B1395 through Heckington Fen. The route has various levels of screening due to the presence of residential properties and farms, and trees lining the road. The eastern section of the route has less screening and is surrounded by more open, low-lying lands. There is some potential for distant (>2km) visibility to the Solar Array Area. However, the existing hedgerows will be allowed to grow in height to provide increased screening, and any gaps in the existing boundary, other than for exit and entry, will be infilled..	4,294	Some potential for distant visibility but with various screening features in intervening landscape	0	Medium	Minor to Negligible (**Not Significant**)
Route 10 – Star Fen Road	Star Fen Road creates a loop to the north of Littleworth Drive and connects to this road. Again, the screening is varied and is linked to the presence of residential properties and farms and other features. Overall, the route is well screened but there are gaps which expose low lying fields that allow small portions of visibility to the Solar Array Area. As with Route 9, the proposed embedded mitigation will provide a good degree of screening and eliminate nearly all visibility.	3,980	As with Route 9, limited to no visibility to most of the Site	0	Medium	None (**Not Significant**)
Route 11 – Church Lane	This lane runs to the east of the Solar Array Area and connects the church to the village of South Kyme. There is some screening due to the presence of trees and hedgerows.	278	Limited to no visibility to the Site	0	Medium	Minor to Negligible (**Not Significant**)
Route 12 – Cow Drove	This lane runs to the south and southeast of the Solar Array Area. It becomes a private road leading to White House Farm. There is limited existing screening as the surrounding land is flat, low lying with minimal trees or hedgerows.	3,114	Limited visibility with the proposed hedgerow planting along the eastern solar farm boundary.	0	Medium	Minor to Negligible (**Not Significant**)

** Note, the yellow or green shading of the cell indicates the maximum intensity of glare visible across the whole year. A yellow shaded cell means that the model predicts that that receptor will be capable of receiving some yellow glare. It does not indicate that the full duration shown would all be at this intensity. Further information about the breakdown of glare intensity throughout the year can be found in **Appendix 13.2a (Document Ref: 6.3 ES Vol.2, 6.3.89)** .*

Observation Points

13.6.34 Owing to the size of the Solar Array Area, it is necessary to consider a large number of observation points around the perimeter of the Proposed Development to properly assess the likely effects.

13.6.35 A total of 39 observation point receptors have been identified and assessed for likely glare effects based on the use of the fixed panels. Of these, 32 observation points represent residential dwellings, 5 being associated with commercial premises and 2 churches.

13.6.36 In many cases, the receptors selected are intended to represent more than one property in the immediate area. Although the levels of screening differ slightly for the different receptors, in general the level of glare recorded will be similar for surrounding properties.

13.6.37 It is important to understand the level of intervisibility between the receptor and the Solar Array Area as this will determine whether any glare is able to arrive at the receptor. As shown in **Appendix 13.2a (Document Ref: 6.3 ES Vol.2, 6.3.89)**, nearly all of the 5km buffer around the Solar Array Area boundary falls within the visible area according to the ZTV, but this does not fully account for the level of surface feature screening present at each receptor, nor the proposed embedded planting around the Solar Array Area itself.

13.6.38 For the fixed panel layout, the glare effects will be visible to the east and west of the Solar Array Area, when the sun is low in the sky, with a small amount visible to the south. It will not be possible for reflections to reach receptors located towards the north of the panels as the south facing pitches of the arrays will prevent this from happening.

13.6.39 Table 13.6 Review of Observation Points includes commentary on the visibility of the Solar Array Area from the receptor locations and notes the results of the modelling in terms of the duration and predicted intensity of glare effects (i.e. whether green glare or yellow glare would be present).

Table 13.6 Review of Observation Points

OBSERVATION POINT	SCREENING PRESENT	SITE VISIBILITY	PROCEEDED TO FURTHER ASSESSMENT
OP1 - Westmoorland Farm	This farm complex, which is located at the south-eastern corner of the Solar Array Area, has woodland vegetation directly to the west, but there is less screening between it and the panels to the north. There is also another complex of farm buildings that would potentially screen the house but would be open to glare themselves.	Yes	Yes
OP2 - Residential properties in Howell	This OP represents the residential dwellings in Howell, which is adjacent to the southwestern corner of the Solar Array Area. This corner of the Solar Array Area has minimal screening with low to no hedgerow. However, the houses themselves are screened by trees and vegetation on the individual property's own site. There is limited visibility, but slight potential from higher levels.	Limited	Yes
OP3 - The Farm Kitchen and residential properties	This cluster of residential properties and commercial site is to the west of the Solar Array Area in Ewerby Thorpe. There is limited existing screening around the perimeter of the Solar Array Area at this point, The embedded mitigation includes the planting of a substantial hedgerow in this area so visibility of the panels is likely to be restricted to upper floors, which may overlook the hedgerows, or be at oblique angles looking towards the northeast. The residential properties do have some existing screening in the form of trees and hedgerows, but it is not continuous around the property. There is limited visibility on the entrance side of The Farm Kitchen site complex, but the rear of the property has minimal screening and will have visibility to the panels.	Limited	Yes
OP4 - Residential properties in Ewerby Thorpe	The properties to the west of OP3, along Thorpe Road which make up Ewerby Thorpe are well screened and have no visibility to the Solar Array Area. There are large clusters of trees and thick vegetation that line Thorpe Road, which act as screening to all the residential properties in this area, west of the bend in the road towards the Solar Array Area.	No	No
OP5 - Residential properties Ewerby (east)	Again, along Thorpe Road but further west from the Solar Array Area towards Ewerby, there are residential properties on both sides of the road with dense vegetation. It is not expected that there will be any visibility to the Solar Array Area, but there is a very small chance from upper floor levels.	No	No
OP6 – Residential properties Ewerby (north)	This point represents residential properties on Field Lane, which is to the north of Ewerby, off of Main Steet. The properties have thick vegetation to the backs of them providing screening to the Solar Array Area. There is one isolated property to the north of the track that has limited screening and potentially has visibility to the Solar Array Area, especially from upper floors.	Limited	Yes
OP7 - Residential properties Ewerby (south)	This point is a dwelling on Main Street and represents residential properties in the south of the village. There is a lot of screening in the area with most of the residential properties surrounded by trees and hedgerow. The extent of screening around the individual properties varies but low visibility is expected due to intervening vegetation between the village and the Solar Array Area, including the proposed embedded mitigation.	Very limited	No
OP8 - Individual residential property on Asgarby Road, to the south of Ewerby	This property is situated on Asgarby Road and is to the west of the Solar Array Area. On the property there is an extensive mix of trees, hedgerows and other vegetation providing screening. There is a gap in one section which exposes the house to the road and potentially the Solar Array Area. It is more likely that the upper levels may have some visibility to the Solar Array Area, although this will be limited due to the surrounding vegetation.	Limited, potentially from upper floors	Yes

OBSERVATION POINT	SCREENING PRESENT	SITE VISIBILITY	PROCEEDED TO FURTHER ASSESSMENT
OP9 - Boughton	This point represents two properties in Boughton to the southwest of the Solar Array Area. The road these properties are situated on has very high hedgerows, providing screening to the Solar Array Area. However, the property on the north side of the road does not have as much screening to the back of the property so there is potential for the upper levels to have some visibility towards the Solar Array Area.	Yes	Yes
OP10 – The Picnic Bar Café	This receptor represents a café in a layby off the A17 to the south of the road. The area is well screened as the café is situated in an area with thick vegetation and trees. The café also faces south and acts as screening to customers. There is no visibility to the Solar Array Area.	No	No
OP11 – Heckington MOT Centre	This OP is also situated along the A17 to the south of the road. It is a mixture of commercial and residential buildings. Although there is not much screening in the form of trees or hedgerows, the buildings themselves act as screening to other parts of the complex and the vegetation in fields to the north provide screening to the Solar Array Area. Overall, there is very limited to no visibility of the Solar Array Area at this distance.	Very limited	No
OP12 – Garwick Café	Garwick Café is situated in a layby off the A17 to the north of the road. The cluster of buildings that make up the café and adjoining residential area is well screened due to thick tall trees to the rear of the properties, screening the area from visibility to the Solar Array Area. On either side of the café there are also trees and vegetation present to provide screening to the layby. There is no visibility to the Solar Array Area.	No	No
OP13 – Lincolnshire Pride Magazine	This OP represents a couple of residential buildings on the A17. There is limited screening in the immediate vicinity of the property, however there are dense hedgerows and trees between the property and the Solar Array Area. As such, there is no visibility to the Solar Array Area.	No	No
OP14 – Wilson Prestige Vehicle Repairs	This receptor also lies on the A17 and represents a residential property and outbuildings. As with OP13, the distance and screening from the Solar Array Area to this property means there is no visibility to the Solar Array Area.	No	No
OP15 - Garthwest	OP15 is situated on the A17 opposite the junction to the B1395. It is a commercial complex, screened to the road by thick hedgerows and trees. Woodland areas lie either side of the receptor, also providing screening. There is no visibility to the Solar Array Area.	No	No
OP16 - Cluster of properties along the B1395	These properties are situated along the B1395 and are the first set of houses as you turn off the A17. They are a fair distance away from the Solar Array Area, so any visibility is unlikely due to the distance but there is also screening present. The individual houses have their own hedgerows and trees that surround their gardens and between this receptor and the Solar Array Area, other intervening features such as buildings, houses and farmsteads provide screening to the Solar Array Area. There is no visibility of the Solar Array Area.	No	No
OP17 - Residential properties north of cluster	These properties are just to the north of OP16 but are two properties that are slightly isolated and to the east of the road. Both houses are surrounded by hedgerow, providing screening of the ground floor level of the properties. There are no hedgerows lining the road, there is vegetation, but it is not at significant growth. There is visibility across fields towards the direction of the Solar Array Area, but at this distance and due to other fields lined with hedgerows and trees. There is no visibility to the Solar Array Area.	No	No

OBSERVATION POINT	SCREENING PRESENT	SITE VISIBILITY	PROCEEDED TO FURTHER ASSESSMENT
OP18 - Residential property on the B1395	This property is surrounded by screening in the form of hedgerows, trees and vegetation. It lies to the west of the B1395 and so the rear of the house and garden face in the direction of the Solar Array Area. However, due to the distance and level of screening, visibility will be minimal.	Limited	Yes
OP19 – Cluster of houses on Littleworth Drive	Littleworth Drove Road is off the B1395 and runs roughly east-west to the south of the Solar Array Area. This area is known as Heckington Fen. This OP represents a cluster of houses at the east section of the road. The houses have varying levels of screening, but all have some form of hedgerow surrounding them. Most screening available caters for the ground floors so there is potential for visibility of the Solar Array Area from upper levels of the houses. The houses are situated to the north of the road so it is the rear sections of the properties that may have potential views of the Solar Array Area. There are minimal intervening features in the land between these houses and the Solar Array Area as the fields are flat and low-lying.	Limited	Yes
OP20 - Vine Cottage, Littleworth Drove	Similar to OP19, this cluster of houses are situated on Littleworth Drove and lie to the west of OP32. Vine Cottage sits on the road, but the adjacent property is set back from the road down a private track. Both properties have vegetation, hedgerows and trees surrounding them and they are unlikely to have visibility to the Solar Array Area, but there could be glimpses at higher levels.	Limited	Yes
OP21 - Farmstead, Littleworth Drove	This farmstead is situated on the south side of Littleworth Drove and the front of the house faces north. There is not a lot of screening surrounding the property but there are trees and tall, grown hedgerows that lie in fields opposite the house that provide screening to the Solar Array Area. There is no visibility of the Solar Array Area.	No	No
OP22 - Houses on Littleworth Drove, to the west of Star Fen Road	Both houses, which are situated on both sides of the road are well screened. The gated area and properties to the south of the road have tall trees which line the road, providing screening and so there is no visibility of the Solar Array Area. The property to the north of the road has a garden with several mature trees and dense hedgerows, providing screening to the Solar Array Area. There is very limited potential for glimpses from the rear, upper-level windows in this property, but for the most part, the surrounding vegetation completely screens the Solar Array Area from view.	Very Limited	No
OP23 - Court Row Farm, Littleworth Drove	This OP represents Court Row Farm. The area is well screened with dense trees. There are some breaks in the line of trees on the opposite side of the road, but there is limited to no visibility of the Solar Array Area due to hedgerows and trees.	Limited	Yes
OP24 - Farm, east of Star Fen Road	This receptor represents a farm on the quite lane of Star Fen Road which runs parallel to the north of Littleworth Drove. There are surrounding trees and vegetation, but it is not continuous at the back of the property that faces the Solar Array Area so there could be some visibility of the Solar Array Area.	Limited	Yes
OP25 - Cluster of houses on Star Fen Road	This OP represents several houses on Star Fen Road. One is a bungalow and is surrounded by high hedgerows. It is unlikely that there is any visibility to the Solar Array Area. Other properties in the cluster are multi story and even with trees and vegetation, there could still be some visibility of the Solar Array Area from upper floors.	Limited	Yes
OP26 - Barworth Research	This receptor represents Barworth Research Centre and the farms that surround it. They lie on Star Fen Road on the section of the road that curves round to the south to link back to Littleworth Drove. The farms and research centre are well screened due to the presence of trees and hedgerows. There is no visibility to the Solar Array Area	No	No

OBSERVATION POINT	SCREENING PRESENT	SITE VISIBILITY	PROCEEDED TO FURTHER ASSESSMENT
OP27 - Large complex on the B1395	This receptor lies to the east of the road and is set back from the road. The buildings themselves act as screening to other parts of the complex. The residential section of the property is partly screened by thick, tall trees, however there is a gap with low fencing up to the gate into the property. From this distance there is minimal visibility to the Solar Array Area , but there could be glimpses at upper levels.	Limited	No
OP28 - Bungalow with farm buildings on the B1395	This bungalow is well screened from the Solar Array Area as it is surrounded by a wall with vegetation and has farm buildings to the west of it, screening the Solar Array Area from view. There is no visibility of the Solar Array Area.	No	No
OP29 - 91 Clay Bank	This receptor represents several houses on Clay Bank road. There is minimal screening and so visibility of the Solar Array Area is likely, especially at upper levels.	Limited	Yes
OP30 - House and farm on Clay Bank road	This receptor represents an area of Clay Bank road where there is a house to the west of the road and a farm set back from the road along a private track. The farm is well screened and has no visibility of Clay Bank road or the Solar Array Area. The rear of the property faces in the direction of the Solar Array Area and although there is some screening in the form of trees and hedgerows, there is likely to be visibility of the Solar Array Area from upper levels.	Limited	Yes
OP31 - Farm estate on Clay Bank	OP31 represents a large farm estate on Clay Bank road to the south of South Kyme. The estate is set back from the road and is well screened. There is no visibility to the Solar Array Area.	No	No
OP32 - Residential area on Low Road	This receptor is representing the residential area to the south of South Kyme. The area is well screened due to other residential buildings and woodlands to the west of the village. There is no visibility to the Solar Array Area.	No	No
OP33 - Residential properties – west South Kyme	OP33 represents houses to the west of South Kyme. The area is well screened due to dense trees and hedgerows. There is no visibility to the Solar Array Area.	No	No
OP34 - Farm on Church Lane	This OP is representative of a farmstead on Church Road which is near the St Mary's and All Saints Church. It is surrounded by vegetation, hedgerows and trees which line the River Slea that runs to the south and west of the property. Some sections of the farm property may have visibility to the Solar Array Area although, overall, it is well screened.	Limited	Yes
OP35 - Farm on Cow Drove	This receptor represents a farm approximately 900m to the east of the Solar Array Area, along Cow Drove. The property is fairly well screened from the Solar Array Area due to the presence of woodland to the west of the property but some glimpses may still be possible.	Limited	Yes
OP36 - White House Farm	This receptor also represents a farm to the east of the Solar Array Area, along Cow Drove. It can only be accessed via a private road. It has minimal screening, with the surrounding land very low lying so visibility of the Solar Array Area is likely.	Yes	Yes

OBSERVATION POINT	SCREENING PRESENT	SITE VISIBILITY	PROCEEDED TO FURTHER ASSESSMENT
OP37 - Gashes Barn	In the centre of the northern section of the Solar Array Area, there is a property surrounded by land. The Solar Array Area is not fully adjacent to the buildings within the property but does surround the Solar Array Area. There is minimal screening with no woodland or thick trees. There are some hedgerows present around some of the property boundaries, but it is not extensive. Visibility of the proposed panels is likely.	Yes	Yes
OP38 – Copperhill Kennels Cattery	This receptor represents a property adjacent to the Solar Array Area on the west side, providing kennel boarding for cats and dogs. There are surrounding trees and vegetation at the north of the property, but it is not continuous at the south of the property, which faces the Solar Array Area, so there could be some visibility of the Solar Array Area.	Yes	Yes
OP39 – Property off Halfpenny Toll Lane	This OP is a house set back from Halfpenny Toll Lane, reachable via a track. Fields surround the property, with the borders of such fields being hedgerows and vegetation that are likely to provide screening. The property is a converted bungalow, so there may be some Solar Array Area visibility from the upper floors.	Limited	Yes

13.6.40 There is a more than de minimis possibility of glare at OPs 1, 2, 3, 6, 8, 9, 18-20, 23-25, 29, 30, 34-39. As such, detailed computer modelling results are only presented for these OPs. The further analysis that has been undertaken on these OPs is presented in Table 13.7 Modelling Results for Local Properties, below, and then the significance of effect is assessed in Table 13.8 Table 13.8 Significance of each Observation Point.

13.6.41 The level of visibility of the Solar Array Area from the remaining OPs is deemed negligible and glare is not expected in amounts that could have a material impact on receptors. As a result, they are scoped out from further assessment.

13.6.42 Visibility to the Solar Array Area is potentially greater within buildings that have multiple levels. Upper storeys will have greater chance of visibility than ground floor windows, but views from inside buildings will (to some extent) be restricted by walls. Generally, effects from upper storey windows will be lower simply because bedrooms tend to be less frequented during the daylight hours and, in most houses, these rooms will not hold the primary views.

13.6.43 The results of the computer modelling are shown in Table 13.7, below. It should be noted that the results show when glare can occur based on the sun's path and relative locations of the panels and receptors. No consideration of screening is provided in the results. The presence of features such as trees, hedgerows, buildings, intervening topography and other obstacles will reduce the dates, times and durations when glare is predicted to occur.

13.6.44 The dates and times shown in Table 13.7 are representative of daylight hours in 2025. However, it can be assumed that the conclusions drawn from this data are also representative of years following, due to similarities in daylight hours year on year. The availability and accuracy of data for 2025 made it the most appropriate year to use in the assessment.

13.6.45 As shown in Figure 13.5 Number of Daylight and Sunshine Hours per Month in Waddington, direct sunshine is only likely to be present for approximately 41% of the daylight hours during summer and even less during winter months due to inclement weather. The durations shown in Table 13.7 assume it is always sunny and do not account for any variations in local weather conditions so represent an extreme worst-case scenario.

13.6.46 The computer model used is of industry standard, approved and recommended by regulators in the US and aviation authorities around the world. The model is regularly upgraded to account for technological progression and to improve accuracy. Details of the calculations used by the computer model can be found in **Appendix 13.3 Mathematical Equations (Document Ref: 6.3 ES Vol.2, 6.3.91)**.

Table 13.7 Modelling Results for Local Properties

OBSERVATION POINT	MAXIMUM ANNUAL DURATION* (MINUTES)	EARLIEST START TIME	LATEST START TIME	EARLIEST START DATE	LATEST FINISH DATE
OP1 - Westmoorland Farm	5.945	17:46	19:12	21/03	22/09
OP2 - Residential properties in Howell	3,530	04:53	05:55	21/04	20/08

OBSERVATION POINT	MAXIMUM ANNUAL DURATION* (MINUTES)	EARLIEST START TIME	LATEST START TIME	EARLIEST START DATE	LATEST FINISH DATE
OP3 - The Farm Kitchen and residential property	4,890	05:18	06:37	11/03	02/10
OP4 – Residential properties in Ewerby Thorpe	4,812	05:19	06:27	11/03	02/10
OP6 - Residential properties Ewerby (north)	2,922	05:19	06:26	16/03	26/09
OP8 - Individual residential property on Asgarby Road, to the south of Ewerby	3,095	05:18	06:25	17/03	26/09
OP9 – Boughton	1,566	05:05	05:45	13/05	31/07
OP18 - Residential property on the B1395	3,069	18:08	19:02	13/04	30/08
OP19 - Cluster of houses on Littleworth Drove	3,910	18:03	19:03	04/04	07/09
OP20 - Vine Cottage, Littleworth Drove	3,450	18:07	19:02	12/04	31/08
OP23 - Court Row Farm, Littleworth Drove	0	-	-	-	-
OP24 - Farm, east of Star Fen Road	1,324	18:18	18:48	02/05	10/08
OP25 - Cluster of houses on Star Fen Road	2,856	18:10	19:03	16/04	27/08
OP29 – 91 Clay Bank	3,520	17:44	19:02	19/03	24/09
OP30 - House and farm on Clay Bank road	1,543	17:43	19:02	20/03	24/09
OP34 – Farm on Church Lane	0	-	-	-	-
OP35 – Farm on Cow Drive	3,555	17:44	19:03	19/03	23/09
OP36 – White House Farm	4,023	17:43	19:03	20/03	23/09
OP37 – Gashes Barn	5,368	05:18	19:11	19/03	23/09
OP38 – Copperhill Kennels Cattery	5,563	05:03	06:33	25/03	16/09

OBSERVATION POINT	MAXIMUM ANNUAL DURATION* (MINUTES)	EARLIEST START TIME	LATEST START TIME	EARLIEST START DATE	LATEST FINISH DATE
OP39 – Property off Halfpenny Toll Lane	3,082	05:03	06:21	20/03	23/09

** Note, the yellow or green shading of the cell indicates the maximum intensity of glare visible across the whole year. A yellow shaded cell means that the model predicts that that receptor will be capable of receiving some yellow glare. It does not indicate that the full duration shown would all be at this intensity. Further information about the breakdown of glare intensity throughout the year can be found in **Appendix 13.2b (Document Ref: 6.3 ES Vol.2, 6.3.90)**.*

13.6.47 Table 13.7 highlights a theoretical limit of glare occurrence, reporting the earliest and latest times and dates at which glare could occur. Glare would not necessarily occur continuously between these periods at a fixed receptor. Further information on the times of day when the glare is potentially able to occur can be found in the graphs in **Appendix 13.2b ForgeSolar Glint and Glare Report: Observation Points (Document Ref: 6.3 ES Vol.2, 6.3.90)**.

13.6.48 Table 13.8, below, summarises the magnitude, sensitivity and significance of effects for each OP.

Table 13.8 Significance of each Observation Point

OBSERVATION POINT	THEORETICAL ANNUAL DURATION (MINUTES)	MAGNITUDE AFTER CONSIDERING SCREENING	SENSITVITY	SIGNIFICANCE
OP1 - Westmoorland Farm	5,945	0	Medium	Minor to Negligible (**Not Significant**)
OP2 - Residential properties in Howell	3,530	0	Medium	Minor to Negligible (**Not Significant**)
OP3 - The Farm Kitchen and residential property	4,890	0	Medium	Minor to Negligible (**Not Significant**)
OP4 – Residential properties in Ewerby Thorpe	4,812	0	Medium	Minor to Negligible (**Not Significant**)
OP6 - Residential properties Ewerby (north)	2,922	0	Medium	Minor to Negligible (**Not Significant**)
OP8 - Individual residential property on Asgarby Road, to the south of Ewerby	3,095	0	Medium	Minor to Negligible (**Not Significant**)
OP9 – Boughton	1,566	0	Medium	Minor to Negligible (**Not Significant**)
OP18 - Residential property on the B1395	3.069	0	Medium	Minor to Negligible (**Not Significant**)
OP19 - Cluster of houses on Littleworth Drove	3,910	0	Medium	Minor to Negligible (**Not Significant**)
OP20 - Vine Cottage, Littleworth Drove	3,450	0	Medium	Minor to Negligible (**Not Significant**)

OP23 - Court Row Farm, Littleworth Drove	0	0		
OP24 - Farm, east of Star Fen Road	1,324	0	Medium	Minor to Negligible (**Not Significant**)
OP25 - Cluster of houses on Star Fen Road	2,856	0	Medium	Minor to Negligible (**Not Significant**)
OP29 – 91 Clay Bank	3,520	0	Medium	Minor to Negligible (**Not Significant**)
OP30 - House and farm on Clay Bank road	1,543	0	Medium	Minor to Negligible (**Not Significant**)
OP34 - Farm on Church Lane	0	0	Medium	Minor to Negligible (**Not Significant**)
OP35 – Farm on Cow Drove	3,555	0	Medium	Minor to Negligible (**Not Significant**)
OP36 – White House Farm	4,023	0	Medium	Minor to Negligible (**Not Significant**)
OP37 – Gashes Barn	5,368	0	Medium	Minor to Negligible (**Not Significant**)
OP38 – Copperhill Kennels Cattery	5,563	0	Medium	Minor to Negligible (**Not Significant**)
OP39 – Property off Halfpenny Toll Lane	3,082	0	Medium	Minor to Negligible (**Not Significant**)

** Note, the yellow or green shading of the cell indicates the maximum intensity of glare visible across the whole year. A yellow shaded cell means that the model predicts that that receptor will be capable of receiving some yellow glare. It does not indicate that the full duration shown would all be at this intensity. Further information about the breakdown of glare intensity throughout the year can be found in **Appendix 13.2b (Document Ref: 6.3 ES Vol.2, 6.3.90)**.*

Aviation

13.6.49 As noted in Section 13.3 Consultation & Scope of Assessment of this Chapter, aviation has been scoped into the assessment. Airfields within 15km of the Solar Array Area are considered in the assessment. These include the following:

- Anwick (Old Manor Farm);
- Bloxholm;
- Boston (Wyberton);
- Decoy farm;
- Griffins Farm Airstrip;
- Pointon;
- RAF Barkston Heath;
- RAF Coningsby;
- RAF Cranwell;
- RAF Waddington;
- Sempringham Fen;
- Whaley Farm; and
- Wilsford (Hanbeck Farm).

13.6.50 The closest aviation receptor, RAF Coningsby, is located approximately 9.5km to the north of the northern boundary of the Site. The aerodrome is orientated such that the runways are nominally 07 and 25, meaning that flights leaving and

landing from either runway will not directly overfly the Site without changing direction. Glare effects have been assessed in the software by means of 2-mile flight path analysis, and no glare is predicted on any of the final approach flightpaths.

13.6.51 RAF Cranwell is located 11.2km to the west of the Solar Array Area and has two runways, with one orientated so that there could be flights landing and taking off that would travel directly over the Solar Array Area. Glare effects have been assessed in the software and only low intensity green glare is predicted on the westerly final approach.

13.6.52 Most of the other aviation receptors are small private grass airstrips. For completeness these have been assessed using the same methodology as used for much larger civilian and military airports.

13.6.53 Anwick (Old Manor Farm) is a small airstrip located to the northwest of the Site, approximately 3.1km away. It is a privately owned airstrip that is still in operation and situated by Anwick Garden Centre. Glare effects have been assessed in the software and only low intensity green glare is predicted on final approach.

13.6.54 Boston aerodrome is an airstrip located to the southeast of the Solar Array Area, approximately 14km away. It is a privately owned airstrip that was noted to be scoped in by BBC. Glare effects have been assessed in the software and only low intensity green glare is predicted on final approach.

13.6.55 A summary table of the modelled glare results has been produced in Table 13.9 Significance of each Aviation Receptor, below. Note, this shows the sum of the glare modelled on each 2-mile (3.21 km) final approach path (at a 3 degree glide angle) for all runways at each aviation receptor. Further breakdowns of the individual effects on each runway are provided in Appendix 13.2a Forge Solar Glint and Glare Report: Road, Railway & Aviation.

Table 13.9 Significance of each Aviation Receptor

AVIATION RECEPTOR	SUM OF THEORETICAL ANNUAL DURATION ON FLIGHT PATHS (MINUTES)	MAGNITUDE	SENSITVITY	SIGNIFICANCE
Anwick (Old Manor Farm)	1107	Green Glare	High	Minor to Negligible (**Not Significant**)
Bloxholm	0	0	High	Minor to Negligible (**Not Significant**)
Boston (Wyberton)	1347	Green Glare	High	Minor to Negligible (**Not Significant**)
Decoy farm	0	0	High	Minor to Negligible (**Not Significant**)
Griffins Farm Airstrip	0	0	High	Minor to Negligible (**Not Significant**)
Pointon	0	0	High	Minor to Negligible (**Not Significant**)
RAF Barkston Heath	3598	Green Glare	High	Minor to Negligible (**Not Significant**)
RAF Coningsby	0	0	High	Minor to Negligible (**Not Significant**)

AVIATION RECEPTOR	SUM OF THEORETICAL ANNUAL DURATION ON FLIGHT PATHS (MINUTES)	MAGNITUDE	SENSITVITY	SIGNIFICANCE
RAF Cranwell	664	Green Glare	High	Minor to Negligible (**Not Significant**)
RAF Waddington	0	0	High	Minor to Negligible (**Not Significant**)
Sempringham Fen	0	0	High	Minor to Negligible (**Not Significant**)
Whaley Farm	0	0	High	Minor to Negligible (**Not Significant**)
Wilsford (Hanbeck Farm)	1511	Green Glare	High	Minor to Negligible (**Not Significant**)

13.6.56 It should also be noted that, as per Appendix 13.1 **(Document Ref: 6.3 ES Vol.2, 6.4.88)**, the FAA has undertaken a policy review in relation to solar farm impacts on aviation receptors and its guidance changed as of May 2021. In the absence of any detailed UK guidance from the CAA in respect of solar PV, the FAA, guidance has been adopted as default best practice over the previous eight years.

13.6.57 In the updated guidance (FAA 14 CFR Part 77), the FAA has concluded that "*in most cases, the glint and glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features*."

13.6.58 It is also relevant to note that the National Policy Statement for Renewable Energy Infrastructure (EN-3) suggests in Paragraph 2.10.159, "*Whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farms results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms.*"

Decommissioning Phase

13.6.59 In its Scoping Opinion (**Appendix 1.2 (Document Ref: 6.3 ES Vol.2, 6.3.2)**), the Planning Inspectorate agreed with the Applicant's proposal that glare effects during decommissioning be scoped out of the assessment, provided that glint and glare is minimised through project working practices.

13.6.60 The potential for glare during decommissioning is low for similar reasons to those for the construction phase above at paragraphs 13.6.7-13.6.11, as well as that planted screening will have matured by the time of decommissioning and will be retained throughout the phase.

13.6.61 Decommissioning is envisaged to proceed inversely to construction, and therefore the time between the removal of the panels and the removal of the mounting structures, when sunlight could reflect off the steel, would likewise be minimised. For the reasons described above in the context of construction, the potential for glare is limited.

13.6.62 As decommissioning progresses the number of installed panels will decrease and thus the potential for glare from the panels will decrease from that assessed above for the operational phase to nil.

13.6.63 Other equipment used in the decommissioning activities are not expected to introduce additional reflective surfaces that may contribute to glare other than vehicle windscreens, but (as above for construction) the amount of reflective surface involved will be comparable to agricultural vehicles operating in the baseline scenario.

13.7 Mitigation

13.7.1 All mitigation relevant to glint and glare is included within the design of Beacon Fen Energy Park and is discussed in section 13.6, Embedded Mitigation. Since no significant effects are predicted with the embedded mitigation, additional mitigation measures are not considered necessary.

13.8 Residual Effects

13.8.1 The significance of effect conclusions remains unchanged from those reported in Section 13.6 above. It is expected that all glare effects can be managed effectively, and all residual effects will be **Not Significant**. There are no residual effects associated with receptors where green glare is predicted, due to the low intensity of green glare, hence low potential for adverse effects.

13.8.2 Where yellow glare is predicted, suitable screening, as detailed in the **Chapter 6 Landscape and Visual (Document Ref: 6.2 ES Vol.1, 6.2.6)**, will prevent adverse effects from occurring at receptors.

Monitoring

13.8.3 No monitoring is required.

13.9 Assessment of Cumulative Effects

Inter-Cumulative Effects

13.9.1 As noted in the earlier discussion, there are a number of other sources of reflection within the local area. These include, but are not limited to, water bodies, windows and car windscreens, metal infrastructure, agricultural polythene, and other solar farms. In the right conditions, even tarmac and grass can reflect light and cause glare.

13.9.2 Owing to the sheer number of reflective surfaces present, it is not possible to assess all the potential sources of glare in the local area when considering inter-cumulative effects. However, other solar farms in the vicinity have been assessed.

13.9.3 The Planning Inspectorate's response to the Scoping Request directed the Applicant to consider the cumulative schemes identified in consultation responses received from "*Anglian Water, Boston Borough Council, Lincolnshire County Council, Natural England, North Kesteven District Council and West Lindsey District Council*". These included several neighbouring Development Consent Order (DCO) applications for various developments including NSIP-scale solar projects. The consultation response stated that these proposed

developments must be considered in terms of potential cumulative effects, as should Heckington Fen and the 800MW Springwell Solar.

13.9.4 Table 13.9 Cumulative Sites, below, describes the solar farms required to be assessed as stated in the Scoping Opinion as well as more recent additions identified in close proximity to the Site. It is relevant to note that the Scoping Opinion was based on a much larger set of draft Order Limits which included a second solar PV array cluster south of Heckington ('Beacon Fen South') which was to be located in more undulating landscape, but which is no longer part of the project. Since the inclusion of Bicker Fen South in the proposals justified a much wider area within which cumulative sites were identified for consideration, the below list is now extremely conservative and schemes with potential for cumulative effects with the Proposed Development represent only a subset of the list. It is noted in Table 13.9 where schemes were identified in the Scoping Opinion but, following the removal of Bicker Fen South from the Proposed Development, they lie too far from the Site to warrant cumulative assessment for the purpose of this Chapter. In addition, some schemes were already so far from the Proposed Development that they were excluded from the assessment. For example, the sites that West Lindsey District Council identified, namely Cottom Solar, Gate Burton, West Burton and Tillbridge Solar, are all more than 35km from the Site and will, therefore, not experience inter-cumulative glare and are scoped out from the assessment.

Table 13.9 Cumulative Sites

NO.	NAME OF SCHEME	SIZE	NSIP	LPA	DISTANCE FROM SITE	PROCEEDED TO FURTHER ASSESSMENT ?
1	Heckington Fen	400-600MW	Yes	North Kesteven	3.2km	Yes
2	Springwell Solar	800MW	Yes	North Kesteven	11km	No, outside modelling area
3	Cottam Solar	600MW	Yes	PINS to determine. Falls in administrative areas - Nottinghamshire, Lincolnshire County, Bassetlaw District and West Lindsey	41km	No, due to distance
4	Gate Burton	500MW	Yes	PINS to determine. Falls in administrative areas - Nottinghamshire, Lincolnshire County, Bassetlaw District and West Lindsey	45km	No, due to distance
5	West Burton	480MW	Yes	PINS to determine. Falls in administrative areas - Nottinghamshire, Lincolnshire County, Bassetlaw District and West Lindsey	37km	No, due to distance
6	Tillbridge	500MW	Yes		46km	No, due to distance
7	Temple Oaks Renewable Energy Facility	240MW	Yes	PINS to determine. Falls in administrative area of Folkingham	15.9km	No, outside of modelling area

NO.	NAME OF SCHEME	SIZE	NSIP	LPA	DISTANCE FROM SITE	PROCEEDED TO FURTHER ASSESSMENT ?
8	Fosse Green Energy	+50MW	Yes	PINS to determine. Falls in administrative areas – Lincolnshire and North Kesteven	27.2km	No, due to distance
9	Mallard Pass Solar	350MW	Yes	Lincolnshire	29.9km	No, due to distance
10	One Earth Solar	+50MW	Yes	PINS to determine. Falls in administrative area of Lincolnshire	38.3km	No, due to distance
11	Meridian Solar	750MW	Yes	PINS to determine. Falls in administrative area of Lincolnshire	14.2km	No, outside of modelling area
12	Leoda Solar	500MW		PINS to determine. Falls in administrative area of North Kesteven	17.5km	No, outside of modelling area
14	Vicarage Drove (B/21/0443)	49.9MW	No	Boston Borough	8km southeast of the Site	No, outside modelling area
15	Land at Little Hale Fen (21/1337/EIASCR) – Screening	49.9MW	No	North Kesteven	7.5km southeast of the Site	No, to the south of all OPs and the Site
16	Land at Ewerby Thorpe (14/1034/EIASCR) – Screening	28MW	No	North Kesteven	-	No, in screening process 2015, no layout plans available
17	Land to the North of White Cross Lane (19/0863/FUL) – Approved	32MW	No	North Kesteven	6.4km southwest of Site	No, following removal of Beacon Fen South this Development lies to the south of all OPs and the Site and cumulative effects are not expected.
18	Grange Farm (12/1242/FUL) – Operational	15MW	No	North Kesteven	6.17km southwest of Site	No, following removal of Beacon Fen South this Development lies to the south of all OPs and the Site and cumulative effects are not expected.
19	Land South of Gorse Lane, Silk Willoughby (19/0060/FUL) – Approved	20MW	No	North Kesteven	c. 8.9km southwest of Site	No, outside modelling area
20	Land East Of London Road/Stump Cross Hill And West Of Southfields Handley Chase	410 residential dwellings	No	North Kesteven	7.5km	No, following removal of Beacon Fen South the Solar Array Area appears to be >7km from this

NO.	NAME OF SCHEME	SIZE	NSIP	LPA	DISTANCE FROM SITE	PROCEEDED TO FURTHER ASSESSMENT ?
	Sleaford NG34 7WE (22/0856/RESM) – pending determination					residential development so it is outside the modelling area
21	Land South Of London Road Sleaford Lincs (20/0363/RESM) - Approved	25 residential dwellings	No	North Kesteven	7.5km	No, following removal of Beacon Fen South the Solar Array Area is >7km from this development and there is no line of sight through Sleaford
22	Land East Of London Road/Stumpcross Hill And West Of Southfields, Sleaford ('Handley Chase') (21/0669/RESM) – Approved	270 residential dwellings	No	North Kesteven	7.1km	No, following removal of Beacon Fen South the Solar Array Area is >7km from this development and there is no line of sight through Sleaford
23	Land South Of London Road Sleaford NG34 7TD (21/1068/RESM) – Approved	235 residential dwellings	No	North Kesteven	7.1km	No, outside modelling area

13.9.5 After inspection of each of the above, the sites identified that were greater than 5km away from the Solar Array Area of the proposed Beacon Fen Energy Park were scoped out as, at this distance and given the intervening vegetation present, there are no inter-cumulative glare effects expected.

13.9.6 Some of the cumulative sites include the development of residential properties and they are sites to consider as building regulations could dictate that they have roof-mounted PV. At this stage, the potential risk is acknowledged, but there is not sufficient data available to undertake a proportionate assessment and any risk is unlikely to result in significant effects due to (for example) distance, separation between buildings, slight divergences in panel orientation (since grid pattern development is not commonplace in rural England), and screening.

13.9.7 Heckington Fen Energy Park was assessed for inter-cumulative effects as it lies within the 5km modellable boundary. Glare from Heckington Fen Energy Park was predicted at some of the receptors in the computer model, which does not account for vegetation, but the design of that site includes the introduction of screening around the perimeter. As such, no residual glare effects are predicted. As there will be no residual glare from Heckington Fen Energy Park, there are no inter-cumulative effects with proposed Solar Array Area of the Beacon Fen Energy Park.

Intra-Cumulative Effects

13.9.1 In combination effects, where effects from glare and other environmental effects collectively affect the same receptor would theoretically be possible in an unmitigated design, but with the embedded mitigation screening of the Solar

Array Area and given the flat landscape within which it is situated, it should be possible to eradicate almost all glare effects (except possibly from upper storeys windows with views down into the Solar Array Area).

13.9.2 Intra-cumulative effects are where glare effects and other environmental effects collectively affect the same receptor. For glare to occur, the receptor must have visibility of the panels. There is, therefore, a degree of overlap between the glare assessment and the visual impact assessment. There can be no glare without some degree of visual impact, but it is not the case that all receptors that experience visual impacts will be exposed to glare.

13.9.3 Other intra-cumulative effects would theoretically be possible in an unmitigated design but, assuming the proposed Solar Array Area of the Beacon Fen Energy Park is appropriately screened, and the other environmental effects are also adequately mitigated, there would be little risk of intra-cumulative effects occurring.

13.10 Summary

13.10.1 There are a range of other common materials and surfaces likely to cause glare that are already present within the study area. These include, *inter alia*, the following:

- glass in windows;
- conservatories or greenhouses;
- flashes caused by light reflecting off passing vehicles; and
- calm water.

13.10.2 Since it is not possible to assess all reflective materials in the 5km study area due to the sheer number of potential reflective surfaces present, the baseline will assume there is no other glare present.

13.10.3 The assessment considered ground and air receptors including residential dwellings, commercial buildings, roads, railway and aviation receptors.

13.10.4 Both the construction and decommissioning phases were scoped out of the assessment, as agreed with the Planning Inspectorate, provided that glare is minimised through project working practices (see **Appendix 2.4 - Outline Construction Environmental Management Plan (OCEMP) (Document Ref 6.3 ES Vol.2, 6.3.7)**). During the operational phase, effects will vary throughout the year as the sun reaches different heights in the sky and different weather conditions are observed. The ground receptors are selected based on the ZTV. For ground receptors, a mixture of green and yellow glare was predicted at some of the OPs and routes, but with the current levels of screening and proposed embedded mitigation, these effects will range from **Minor Adverse to Negligible/None,** and **Not Significant**. For the route receptors, a mixture of green and yellow glare was predicted, but with the current levels of screening and proposed embedded mitigation, these effects will range from **Minor Adverse to Negligible/None,** and **Not Significant**. For the Railway, green glare was predicted, however the section of the railway assessed is well screened and so the railway will not experience any glare. Therefore, these effects will be **Negligible** and **Not Significant.** For aviation receptors, at most low intensity green glare with no potential for temporary afterimage is predicted on final

approach to all the runways assessed. This is a **Minor Adverse** effect and **Not Significant.**

13.10.5 Design work has been ongoing for the Proposed Development and opportunities to reduce glare effects through the intelligent selection of design options have been undertaken as part of the iterative design process. This has included choosing different panel heights for some of the arrays and determining the locations of screening hedgerows and other planting mitigation. With the proposed mitigation, it is expected that all glare effects can be managed effectively and there will be **no residual effects**. No monitoring is required.

13.10.6 Of those solar farms that were initially considered for inter-cumulative effects, only Heckington Fen Energy Park falls within the range able to be modelled in ForgeSolar. As this site has mitigation plans to introduce screening around the perimeter, there will be no visibility to glare causing panels. Therefore, inter-cumulative glare will not occur.

13.10.7 Following the implementation of the embedded mitigation, including screening around the perimeter of the Solar Array Area there should not be any glare received at ground-based receptors outside of the Solar Array Area. Therefore, there should not be any potential for intra-cumulative glare effects to arise.

13.10.8 It is expected that all potential glare effects can be managed effectively, and all residual effects will be Not Significant.

13.10.1 A summary of the likely significant residual effects of the Proposed Development on the receptors considered within this Chapter are summarised in Table 13.10, below.

Table 13.10 Discipline - Summary Assessment Matrix

Issue	Description of Impact	Geographical Significance							Impact	Nature	Significance	Mitigation Measures
		I	N	R	C	D	P	L				
During Operation												
Glare on Roads	Potential for dazzle							X	Minor Adverse		Not Significant	No additional mitigation required
Glare on Rail	Potential for dazzle							X	Negligible		Not Significant	No additional mitigation required
Glare on Dwellings	Potential for dazzle							X	Minor Adverse		Not Significant	No additional mitigation required
Glare on Aviation	Potential for dazzle							X	Minor Adverse - Negligible		Not Significant	No additional mitigation required

Key:
Geographical Significance: I = International N = National R = Regional C = County D = District P = Parish L = Low to Local
Nature: St = Short Term Mt = Medium Term Lt = Long Term R = Reversible Ir = Irreversible