PAGERPOWER
Urban & Renewables

Solar Photovoltaic Glint and Glare Study

TORANDCO Limited on behalf of Premier Foods Plc

Land Adjacent to Carlton Bakery

August 2023



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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been retained to assess the possible effects of glint and glare from a fixed ground-mounted solar photovoltaic development located in Barnsley, United Kingdom. This assessment pertains to the possible impacts upon road safety, residential amenity, and aviation activity associated with Yorkshire Air Ambulance Nostell Helicopter Port.

Overall Conclusions

No significant impacts are predicted upon road safety, residential amenity, and aviation activity associated with YAA Nostell Helicopter Port. Mitigation is not recommended.

Guidance and Studies

Guidelines exist in the UK (produced by the Civil Aviation Authority) and in the USA (produced by the Federal Aviation Administration) with respect to solar developments and aviation activity. The UK CAA guidance is relatively high-level and does not prescribe a formal methodology. There is no formal planning guidance for the assessment of solar reflections from solar panels towards roads and nearby dwellings. Pager Power has however produced guidance for glint and glare and solar photovoltaic developments, which was published in early 2017, with the fourth edition[1] published in 2022. This methodology defines a comprehensive process for determining the impact upon road safety, residential amenity, and aviation activity.

Pager Power's approach is to undertake geometric reflection calculations and, where a solar reflection is predicted, consider the screening (existing and/or proposed) between the receptor and the reflecting solar panels. For aviation activity, where a solar reflection is predicted, solar intensity calculations are undertaken where appropriate in line with the Sandia National Laboratories' FAA methodology[2]. The scenario in which a solar reflection can occur for all receptors is then identified and discussed, and a comparison is made against the available solar panel reflection studies to determine the overall impact.

The available studies have measured the intensity of reflections from solar panels with respect to other naturally occurring and manmade surfaces. The results show that the reflections produced are of intensity similar to or less than those produced from still water and significantly less than reflections from glass and steel[3].

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[1] Pager Power Glint and Glare Guidance, Fourth Edition, September 2022.
[2] Formerly mandatory for on-airfield solar developments in the USA under the FAA's interim policy, superseded in 2021 with a policy that effectively requires individual airports to sign off on their on-airfield development as they see fit.
[3] SunPower, 2009, SunPower Solar Module Glare and Reflectance (appendix to Solargen Energy, 2010).

Assessment Conclusions – Road Safety

Solar reflections are geometrically possible towards a 400m section of Shaw Lane. Screening in the form of existing vegetation is predicted to significantly obstruct views of reflecting panels, such that solar reflections will not be experienced by road users. No impacts are predicted upon this section of Shaw Lane and mitigation is not required.

Assessment Conclusions – Residential Amenity

Solar reflections are geometrically possible towards 39 of the assessed 61 dwellings. Screening in the form of existing vegetation and/or buildings is predicted to significantly obstruct views of reflecting panels, such that solar reflections will not be experienced by residents at 26 dwellings. No impact is predicted upon these 26 dwellings, and mitigation is not required.

For the remaining 13 dwellings, solar reflections are geometrically possible for more than three months per year, but less than 60 minutes on any given day. Existing vegetation is predicted to significantly obstruct views of reflecting panels for residents on the ground floor of dwellings, with views being deemed possible from above ground floor levels. Therefore, a low impact upon residential amenity is predicted at these 13 dwellings, and mitigation is not recommended.

High-Level Assessment Conclusions – Aviation Activity

Solar reflections originating from the proposed development towards the 2-mile approach paths for YAA Nostell Helicopter Port are predicted to be of acceptable glare intensities in accordance with the associated guidance (Appendix D) and industry best practice or occur outside a pilot's primary field-of-view (50 degrees either side relative to the runway threshold bearing). No significant impacts upon aviation activity associated with YAA Nostell Helicopter Port are predicted, and mitigation is not required. Detailed modelling is not recommended.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, United Kingdom. The company has undertaken projects in 58 countries within Europe, Africa, America, Asia and Australasia.

The company comprises a team of experts to provide technical expertise and guidance on a range of planning issues for large and small developments.

Pager Power was established in 1997. Initially the company focus was on modelling the impact of wind turbines on radar systems. Over the years, the company has expanded into numerous fields including:

- Renewable energy projects;
- Building developments;
- Aviation and telecommunication systems.

Pager Power prides itself on providing comprehensive, understandable and accurate assessments of complex issues in line with national and international standards. This is underpinned by its custom software, longstanding relationships with stakeholders and active role in conferences and research efforts around the world.

Pager Power's assessments withstand legal scrutiny and the company can provide support for a project at any stage.

1 INTRODUCTION

1.1 Overview

Pager Power has been retained to assess the possible effects of glint and glare from a fixed ground-mounted solar photovoltaic development located in Barnsley, United Kingdom. This assessment pertains to the possible impacts upon road safety, residential amenity, and aviation activity associated with Yorkshire Air Ambulance Nostell Helicopter Port.

This report contains the following:

- Solar development details;
- Explanation of glint and glare;
- Overview of relevant guidance and studies;
- Overview of Sun movement;
- Assessment methodology;
- Identification of receptors;
- Glint and glare assessment for identified receptors;
- Results discussion;
- High-level assessment of aviation activity;
- Overall conclusions and recommendations.

1.2 Pager Power's Experience

Pager Power has undertaken over 1,100 Glint and Glare assessments in the UK and internationally. The studies have included assessment of civil and military aerodromes, railway infrastructure and other ground-based receptors including roads and dwellings.

1.3 Glint and Glare Definition

The definition[4] of glint and glare is as follows:

- Glint – a momentary flash of bright light typically received by moving receptors or from moving reflectors;
- Glare – a continuous source of bright light typically received by static receptors or from large reflective surfaces.

The term 'solar reflection' is used in this report to refer to both reflection types i.e. glint and glare.

[4] These definitions are aligned with those presented within the Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) – published by the Department for Energy Security and Net Zero in March 2023 and the Federal Aviation Administration in the USA.

2 SOLAR DEVELOPMENT LOCATION AND DETAILS

2.1 Overview

The following sections present key details pertaining to the proposed development and this assessment.

2.2 Proposed Development Site Layout

Figure 1 below shows the site layout and landscape screening[5] for the proposed development.

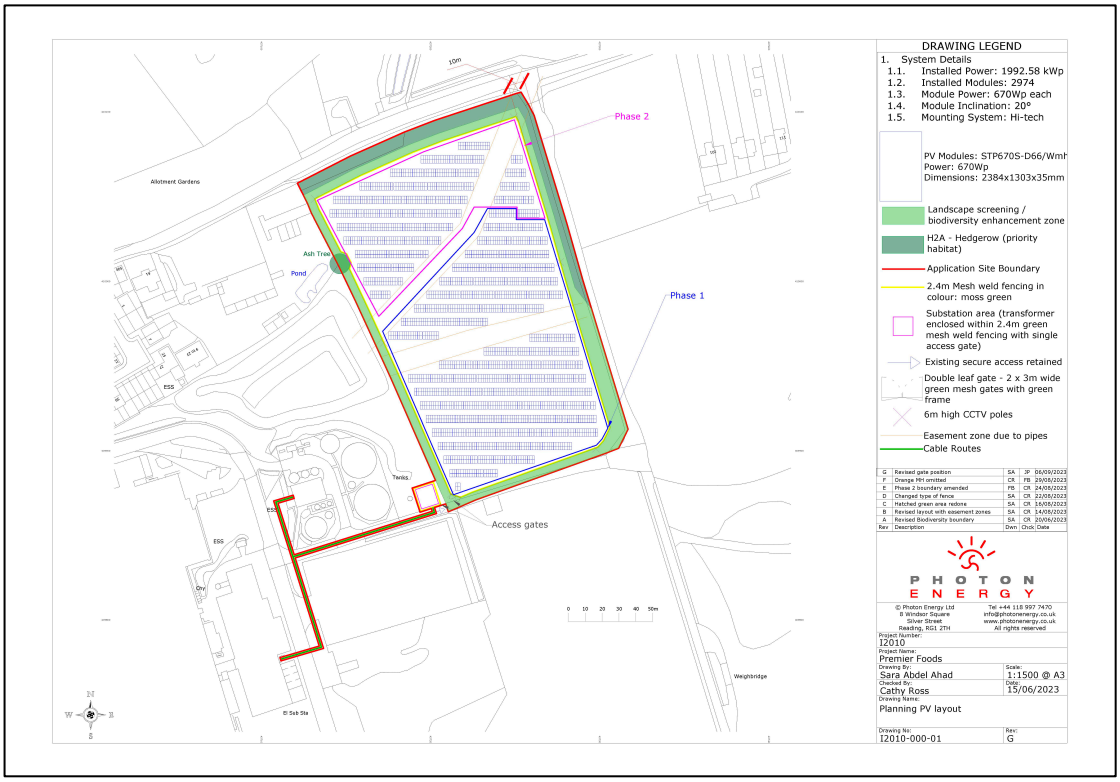


Figure 1 *Site layout and landscape screening*

[5] Source: TORANDCO, August 2023, 'I2010-000-01F Planning Drawing - PV Layout'

2.3 Reflector Areas

The bounding coordinates for the proposed development have been extrapolated from the site plans. The data can be found in Appendix G. Figure 2 below shows the assessed reflector areas that have been used for modelling purposes.



Figure 2 *Assessed reflector areas*

The Pager Power model has used a resolution of 5m has been chosen for this assessment. This means that a geometric calculation is undertaken for each identified receptor every 5m from within the defined area. This resolution is sufficiently high to maximise the accuracy of the results – increasing the resolution further would not significantly change the modelling output. If a reflection is experienced from an assessed panel location, then it is likely that a reflection will be viewable from similarly located panels within the proposed solar development.

2.4 Solar Panel Technical Information

The technical information of the modelled solar panels used in this assessment is summarised below:

- Azimuth angle[6]: 180°;
- Elevation angle[7]: 20°;
- Assessed centre height[8]: 1.66m above ground level.

[6] Direction the panels are facing relative to True North (0°)
[7] Pitch above horizontal
[8] Relative to the lowest (0.826m) and highest (2.497m) points above ground level

3 GLINT AND GLARE ASSESSMENT METHODOLOGY

3.1 Overview

The following sub-sections provide a general overview with respect to the guidance studies and methodology which informs this report. Pager Power has also produced its own Glint and Glare Guidance which draws on assessment experience, consultation and industry expertise.

3.2 Guidance and Studies

Guidelines exist in the UK (produced by the Civil Aviation Authority) and in the USA (produced by the Federal Aviation Administration) with respect to solar developments and aviation activity. The UK CAA guidance is relatively high-level and does not prescribe a formal methodology. There is no formal planning guidance for the assessment of solar reflections from solar panels towards roads and nearby dwellings. Pager Power has however produced guidance for glint and glare and solar photovoltaic developments, which was published in early 2017, with the fourth edition[9] published in 2022. This methodology defines a comprehensive process for determining the impact upon road safety, residential amenity and aviation activity.

The Pager Power approach is to identify receptors, undertake geometric reflection calculations and review the scenario under which a solar reflection can occur, whilst comparing the results against available solar reflection studies.
Appendix A and B present a review of relevant guidance and independent studies with regard to glint and glare issues from solar panels and glass. The overall conclusions from the available studies are as follows:

- Specular reflections of the Sun from solar panels and glass are possible;
- The measured intensity of a reflection from solar panels can vary from 2% to 30% depending on the angle of incidence;

Published guidance shows that the intensity of solar reflections from solar panels are equal to or less than those from still water and similar to those from glass. It also shows that reflections from solar panels are significantly less intense than many other reflective surfaces, which are common in an outdoor environment, including steel[10].

3.3 Background

Details of the Sun's movements and solar reflections are presented in Appendix C.

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

[10] SunPower, 2009, SunPower Solar Module Glare and Reflectance (appendix to Solargen Energy,2010).

3.4 Methodology

The glint and glare assessment methodology has been derived from the information provided to Pager Power through consultation with stakeholders and by reviewing the available guidance, studies and Pager Power's practical experience. The methodology for this glint and glare assessment is as follows:

- Identify receptors in the area surrounding the proposed development;
- Consider direct solar reflections from the proposed development towards the identified receptors by undertaking geometric calculations;
- Consider the visibility of the reflectors from the receptor's location. If the reflectors are not visible from the receptor then no reflection can occur;
- Based on the results of the geometric calculations, determine whether a reflection can occur, and if so, at what time it will occur;
- Consider the solar reflection intensity, if appropriate;
- Consider both the solar reflection from the proposed development and the location of the direct sunlight with respect to the receptor's position;
- Consider the solar reflection with respect to the published studies and guidance;
- Determine whether a significant detrimental impact is expected in line with Appendix D.

Within the Pager Power model, the reflector area is defined, as well as the relevant receptor locations. The result is a chart that states whether a reflection can occur, the duration and the panels that can produce the solar reflection towards the receptor.

3.5 Assessment Methodology and Limitations

Further technical details regarding the methodology of the geometric calculations and limitations are presented in Appendix E and Appendix F.

4 IDENTIFICATION OF RECEPTORS

4.1 Overview

The following sections present the relevant receptors assessed within this report. Terrain data has been interpolated based on Ordnance Survey (OS) 50 Digital Terrain Model (DTM) data. The receptor details for all receptors are presented in Appendix G.

4.2 Ground Based Receptors Overview

There is no formal guidance with regard to the maximum distance at which glint and glare should be assessed. From a technical perspective, there is no maximum distance for potential reflections. The significance of a reflection however decreases with distance because the proportion of an observer's field of vision that is taken up by the reflecting area diminishes as the separation distance increases. Terrain and shielding by vegetation are also more likely to obstruct an observer's view at longer distances.

The above parameters and industry experience over a significant number of glint and glare assessments undertaken, shows that a 1km assessment area from the proposed development is considered appropriate for glint and glare effects on road users and dwellings. Reflections towards ground-based receptors located further north than any proposed panel are highly unlikely[11]. Therefore, receptors north of the most northern panel areas have not been modelled. The assessment area (white outlined area in the following figures) has been designed accordingly as 1km from the proposed development, disregarding the area to the north of the north-most solar panels.

Potential receptors within the associated assessment area are identified based on mapping and aerial photography of the region. The initial judgement is made based on high-level consideration of aerial photography and mapping i.e. receptors are excluded if it is clear from the outset that no visibility would be possible. A more detailed assessment is made if the modelling reveals a reflection would be geometrically possible.

4.3 Road Receptors

4.3.1 Road Receptors Overview

Road types can generally be categorised as:

- Major National – Typically a road with a minimum of two carriageways with a maximum speed limit of up to 70mph. These roads typically have fast moving vehicles with busy traffic;
- National – Typically a road with a one or more carriageways with a maximum speed limit 60mph or 70mph. These roads typically have fast moving vehicles with moderate to busy traffic density;

[11] For fixed, south-facing panels at this latitude.

- Regional – Typically a single carriageway with a maximum speed limit of up to 60mph. The speed of vehicles will vary with a typical traffic density of low to moderate;
- Local – Typically roads and lanes with the lowest traffic densities. Speed limits vary.

Technical modelling is not recommended for local roads, where traffic densities are likely to be relatively low. Any solar reflections from the proposed development that are experienced by a road user along a local road would be considered low impact in the worst-case in accordance with the guidance presented in Appendix D.

The analysis has also considered major national, national, and regional roads that:

- Are within the one-kilometre assessment area;
- Have a potential view of the panels.

4.3.2 Identified Road Receptors

A 460m section of Shaw Lane has been identified within the assessment area with potential views of the panel area. Receptors 1 to 6 are placed approximately 100m apart along the identified road section, as shown in Figure 3 below. An additional height of 1.5m is added to the assessed height to account for the eye-level of a typical road user.



Figure 3 *Road receptors*

Sections of Church Street (dark blue), Fish Dam Lane (orange), Industry Road (purple), W Green Way (light blue) and the B6132 (red) are also within the assessment area; however, have not been geometrically modelled for in this assessment as views of the proposed development are not possible. Figures 4 to 5 on the following page show the identified sections of these roads and screening in the form of existing vegetation, intervening terrain and buildings.

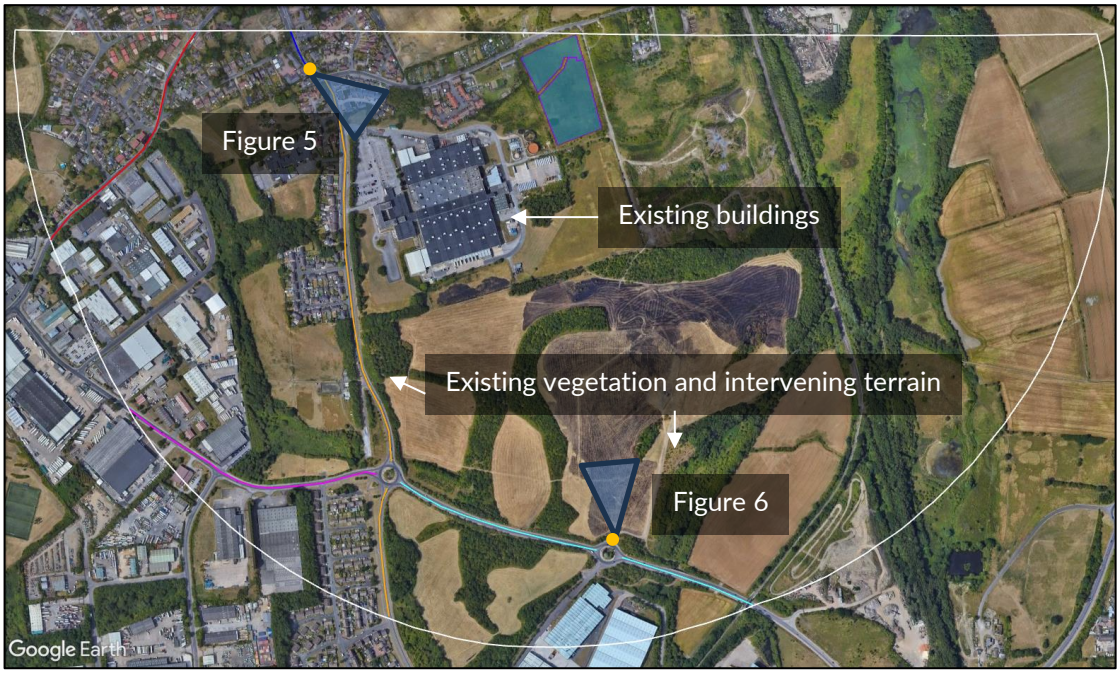


Figure 4 *Identified sections of road*



Figure 5 *Point-of-view from Church Road*



Figure 6 *Point-of-view from W Green Way*

Zones of Theoretical Visibility (ZTV)[12] indicates the visible terrain from a point in shaded regions of green.



Figure 7 *Zones of Theoretical Visibility along W Green Way*

[12] Generated by Google Earth at 2 metres above ground level

4.4 Dwelling Receptors

4.4.1 Dwelling Receptors Overview

The analysis has considered dwellings that:

- Are within the one-kilometre assessment area; and
- Have a potential view of the panels.

In residential areas with multiple layers of dwellings, only the outer dwellings have been considered for assessment. This is because they will mostly obscure views of the solar panels to the dwellings behind them, which will therefore not be impacted by the proposed development because line of sight will be removed, or they will experience comparable effects to the closest assessed dwelling.

Additionally, in some cases, a single receptor point may be used to represent a small number of separate addresses. In such cases, the results for the receptor will be representative of the adjacent observer locations, such that the overall level of effect in each area is captured reliably.

4.4.2 Identified Dwelling Receptors

The assessed dwelling receptors are shown in Figures 8 to 13 on the following pages. In total, 61 dwellings have been assessed. An additional 1.8m height above ground is used in the modelling to simulate the typical viewing height of an observer on the ground floor[13].



Figure 8 *Overview of all dwelling receptors*

[13] Small changes to this height are not significant, and views above the ground floor considered are considered where appropriate.



Figure 9 *Dwellings 1 to 23*

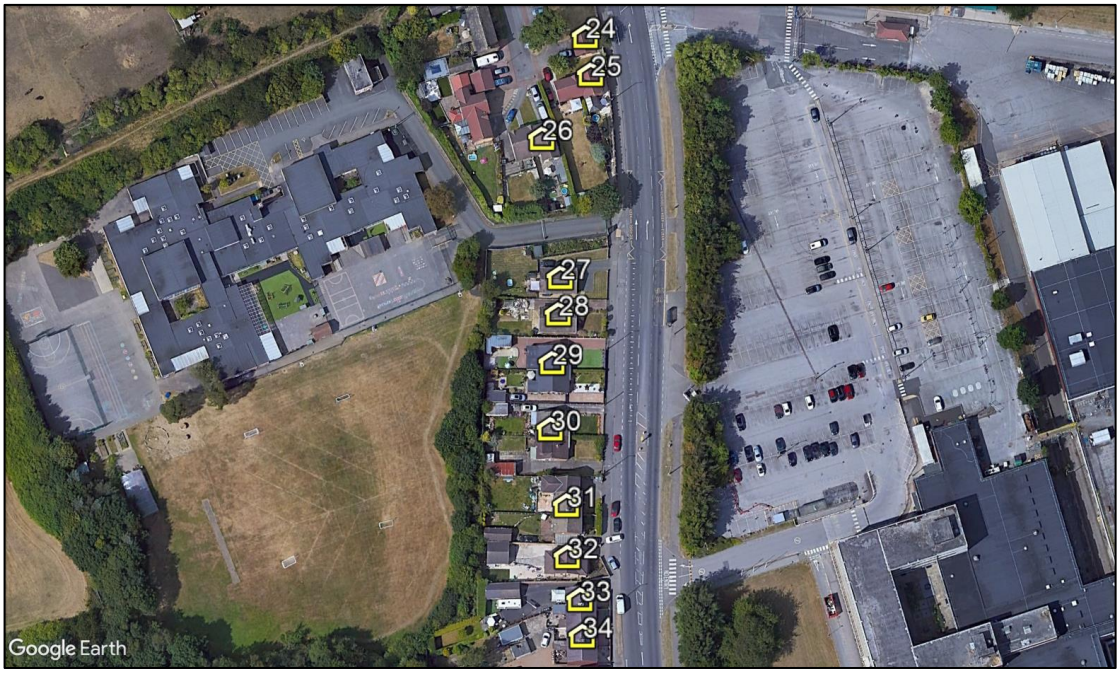


Figure 10 *Dwellings 24 to 34*



Figure 11 *Dwellings 35 to 44*

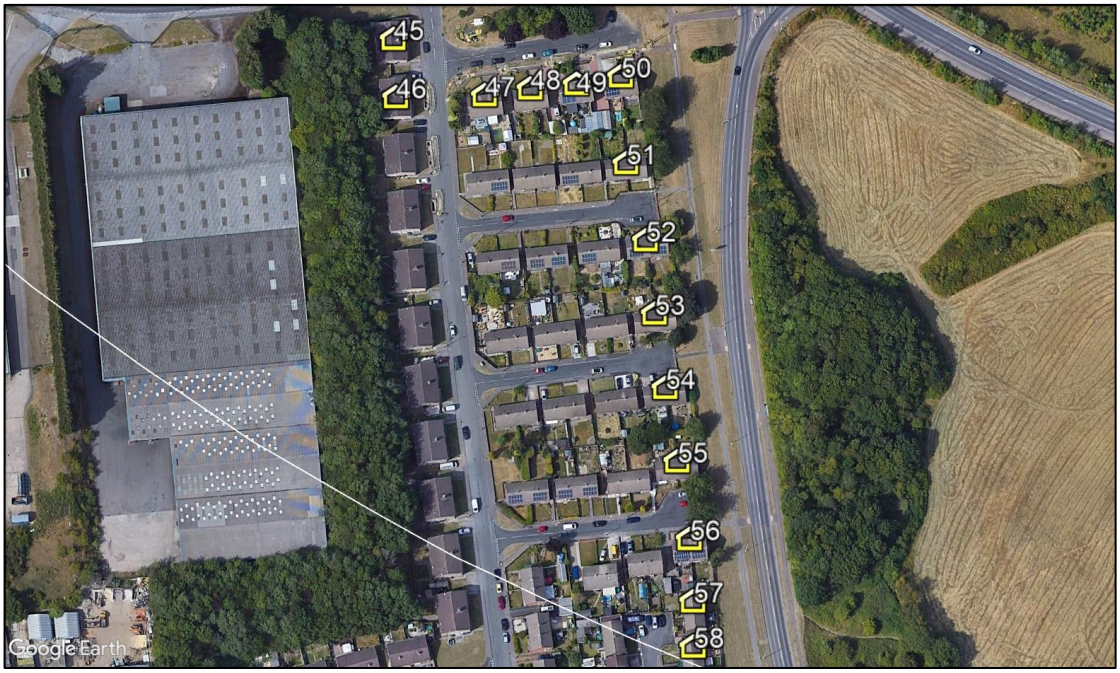


Figure 12 *Dwellings 45 to 58*



Figure 13 *Dwellings 59 to 61*

5 GEOMETRIC ASSESSMENT RESULTS AND DISCUSSION

5.1 Overview

The following sub-sections summarise the results of the assessment:

- The key considerations for each receptor type. The criteria are determined by the assessment process for each receptor, which are set out in Appendix D;
- Geometric modelling results of the assessment based solely on bare-earth terrain i.e., without consideration of screening in the form of buildings, dwellings, (existing or proposed) vegetation, and/or terrain. The modelling output for receptors, shown in Appendix H, presents the precise predicted times and the reflecting panel areas;
- Whether a reflection will be experienced in practice. When determining the visibility of the reflecting panels for an observer, a conservative review of the available imagery, landscape strategy plan, google earth viewshed (high-level terrain analysis), and/or site photography (if available) is undertaken, whereby it is assumed views of the panels are possible if it cannot be reliably determined that existing and/or proposed screening will remove effects. Detailed screening analysis may be undertaken to determine visibility, where appropriate;
- The impact significance and any mitigation recommendations/requirements;
- The desk-based review of the available imagery, where appropriate.

Appendix H presents the results charts showing specific times and dates.

5.2 Assessment Results – Road Receptors

5.2.1 Key Considerations

The key considerations for road users along major national, national, and regional roads are:

- Whether a reflection is predicted to be experienced in practice; and
- The location of the reflecting panel relative to a road user's direction of travel.

Where solar reflections are not geometrically possible, or the reflecting panels are predicted to be significantly obstructed from view, no impact is predicted, and mitigation is not required.

Where solar reflections originate from outside of a road user's primary horizontal field of view (50 degrees either side relative to the direction of travel), or the closest reflecting panel is over 1km from the road user, the impact significance is low, and mitigation is not recommended.

Where solar reflections are predicted to be experienced from inside of a road user's primary field-of-view, expert assessment of the following factors is required to determine the impact significance and mitigation requirement:

- Whether the solar reflection originates from directly in front of a road user – a solar reflection that is directly in front of a road user is more hazardous than a solar reflection to one side;

- Whether visibility is likely for elevated drivers (relevant to dual carriageways and motorways[14]);
- The separation distance to the panel area. Larger separation distances reduce the proportion of an observer's field of view that is affected by glare;
- Whether a solar reflection is fleeting in nature. Small gap/s in screening, e.g. an access point to the site, may not result in a sustained reflection for a road user;
- The position of the Sun. Effects that coincide with direct sunlight appear less prominent than those that do not. The Sun is a far more significant source of light.

Following consideration of these relevant factors, where the solar reflection is not deemed significant, a low impact is predicted, and mitigation is not recommended. Where the solar reflection is deemed significant, the impact significance is moderate, and mitigation is recommended.

Where solar reflections originate from directly in front of a road user and there are no mitigating factors, the impact significance is high, and mitigation is required.

5.2.2 Geometric Modelling Results and Discussion

Table 1 on the following page present the following:

- Geometric modelling results (bare earth terrain i.e. without consideration of screening);
- Desk-based review of identified screening;
- Consideration of relevant factors where appropriate;
- Predicted impact significance.

[14] There is typically a higher density of elevated drivers (such as HGVs) along dual carriageways and motorways compared to other types of road.

Road Receptor	Geometric Modelling Results (screening not considered)	Identified Screening and Predicted Visibility (desk-based review)	Mitigating Factors	Predicted Impact Classification
1 – 5	Solar reflections are geometrically possible **inside** a road user's primary field-of-view	Existing vegetation predicted to significantly obstruct views of reflecting panels	N/A	No impact
6	Solar reflections are not geometrically possible	N/A	N/A	No impact

Table 1 *Geometric modelling results and predicted impact - road receptors*

5.2.3 Desk-Based Review of Available Imagery

A desk-based review of the available imagery is presented in the following Figures 14 to 15 on the following pages. The cumulative reflecting panel areas are indicated by regions of yellow. The identified screening in the form of existing vegetation and existing buildings is outlined in green and pink respectively. Streetview images are used to show the point-of-view of a road user at specific locations, with blue triangles to illustrate the field-of-view direction.



Figure 14 *Screening for road receptors 1 to 5*



Figure 15 *Point-of-view from road receptor 4*

5.3 Assessment Results – Dwelling Receptors

5.3.1 Key Considerations

The key considerations for residential dwellings are:

- Whether a reflection is predicted to be experienced in practice;
- The duration of the predicted effects, relative to thresholds of:
    - Three months per year;
    - 60 minutes on any given day.

Where solar reflections are not geometrically possible, or the reflecting panels are predicted to be significantly obstructed from view, no impact is predicted, and mitigation is not required.

Where effects occur for **less** than three months per year and **less** than 60 minutes on any given day, or the closest reflecting panel is over 1km from the dwelling, the impact significance is low, and mitigation is not recommended.

Where reflections are predicted to be experienced for **more** than three months per year and/or for **more** than 60 minutes on any given day, expert assessment of the following factors is required to determine the impact significance and mitigation requirement:

- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare;
- The position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not;
- Whether visibility is likely from all storeys – the ground floor is typically considered the main living space and has a greater significance with respect to residential amenity;
- Whether the dwelling appears to have windows facing the reflecting area – factors that restrict potential views of a reflecting area reduce the level of impact.

Following consideration of these mitigating factors, where the solar reflection is not deemed significant, a low impact is predicted, and mitigation is not recommended. Where the solar reflection is deemed significant, the impact significance is moderate, and mitigation is recommended.

If effects last for **more** than 3 months per year and for **more** than 60 minutes on any given day, and there are no mitigating factors, the impact significance is high, and mitigation is required.

5.3.2 Geometric Modelling Results and Discussion

Table 2 on the following page presents the following:

- Geometric modelling results (bare earth terrain i.e. without consideration of screening);
- Desk-based review of identified screening;
- Consideration of any relevant factors present, where appropriate;
- Predicted impact significance.

Dwelling Receptor	Geometric Modelling Results (screening not considered)	Identified Screening and Predicted Visibility (desk-based review)	Mitigating Factors	Predicted Impact Classification
1 – 13	Solar reflections geometrically possible for **more** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation is predicted to significantly obstruct views of reflecting panels from observers on ground floor levels	Views would be limited to above ground floor levels Effects will coincide with direct sunlight	Low
14 – 17	Solar reflections geometrically possible for **more** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation and buildings predicted to significantly obstruct views of reflecting panels	N/A	No impact
18 – 23	Solar reflections geometrically possible for **less** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation and buildings predicted to significantly obstruct views of reflecting panels	N/A	No impact
24 – 32	Solar reflections geometrically possible for **more** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation and buildings predicted to significantly obstruct views of reflecting panels	N/A	No impact
33 – 36	Solar reflections geometrically possible for **less** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation and buildings predicted to significantly obstruct views of reflecting panels	N/A	No impact
37 – 58	Solar reflections are not geometrically possible	N/A	N/A	No impact

Dwelling Receptor	Geometric Modelling Results (screening not considered)	Identified Screening and Predicted Visibility (desk-based review)	Mitigating Factors	Predicted Impact Classification
59 – 61	Solar reflections geometrically possible for **less** than 3 months per year but **less** than 60 minutes on any given day	Existing vegetation predicted to significantly obstruct views of reflecting panels	N/A	No impact

Table 2 *Geometric modelling results and predicted impact - dwelling receptors*

5.3.3 Desk-Based Review of Available Imagery

A desk-based review of the available imagery is presented in Figures 16 to 20. The cumulative reflecting panel areas are indicated by regions of yellow.



Figure 16 *Screening for dwellings 1 to 13*



Figure 17 *Screening for dwellings 14 to 17*



Figure 18 *Screening for dwellings 18 to 23*



Figure 19 *Screening for dwellings 24 to 36*



Figure 20 *Screening for dwellings 59 to 61*

6 HIGH-LEVEL AVIATION ASSESSMENT

6.1 Overview

Glint and glare assessment for aviation receptors are typically undertaken for licensed aerodromes within 10km of a proposed solar development. Geometric modelling for general aviation unlicensed aerodromes is typically required within 5km of a proposed development. At ranges of 10-20km, the requirement for assessment is much less common for licensed aerodromes, with typically assessment only being undertaken for licensed aerodromes at these ranges. Assessment of any aviation effects for developments over 20km is not a usual requirement.

The following section presents a high-level assessment and conclusion of aviation concerns for Yorkshire Air Ambulance (YAA) Nostell Helicopter Port.

6.2 High-Level Assessment of YAA Nostell Helicopter Port

YAA Nostell Helicopter Port is approximately 9.2km southeast of the proposed development and understood to have an Air Traffic Control (ATC) Tower. The location of the helicopter port and 2-mile approach paths within a 360-degree range at 45 intervals relative to the proposed development is shown in Figure 21 below.

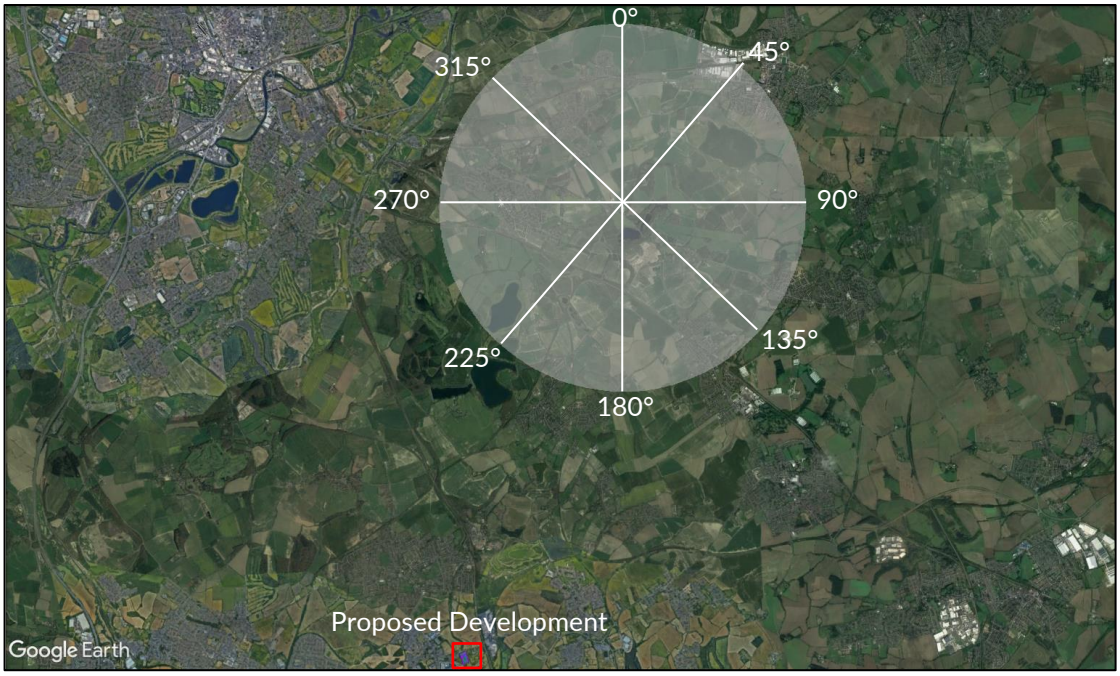


Figure 21 *YAA Nostell relative to proposed development*

6.2.1 Assessment

The proposed development size, distance from the aerodrome and industry experience are considered to determine the potential impact.

The following can be concluded for YAA Nostell Helicopter Port with regards to the proposed development:

- Existing vegetation, buildings and intervening terrain is predicted to significantly obstruct views of the proposed development from the ATC Tower, such that the proposed development will not be visible for ATC personnel;
- Solar reflections originating from the proposed development towards the 2-mile approach paths will have glare intensities no greater than 'low potential for temporary after-image' or occur outside a pilot's field-of-view (50 degrees either side relative to the runway threshold bearing). Considering the associated guidance (Appendix D) and industry best practice, the glare intensity is considered acceptable.

6.2.2 Conclusions

No significant impacts upon aviation activity associated with YAA Nostell Helicopter Port are predicted, and mitigation is not required. Detailed modelling is not recommended.

7 OVERALL CONCLUSIONS

7.1 Assessment Conclusions – Road Safety

Solar reflections are geometrically possible towards a 400m section of Shaw Lane. Screening in the form of existing vegetation is predicted to significantly obstruct views of reflecting panels, such that solar reflections will not be experienced by road users. No impacts are predicted upon this section of Shaw Lane and mitigation is not required.

7.2 Assessment Conclusions – Residential Amenity

Solar reflections are geometrically possible towards 39 of the assessed 61 dwellings. Screening in the form of existing vegetation and/or buildings is predicted to significantly obstruct views of reflecting panels, such that solar reflections will not be experienced by residents at 26 dwellings. No impact is predicted upon these 26 dwellings, and mitigation is not required.

For the remaining 13 dwellings, solar reflections are geometrically possible for more than three months per year, but less than 60 minutes on any given day. Existing vegetation is predicted to significantly obstruct views of reflecting panels for residents on the ground floor of dwellings, with views being deemed possible from above ground floor levels. Therefore, a low impact upon residential amenity is predicted at these 13 dwellings, and mitigation is not recommended.

7.3 High-Level Assessment Conclusions – Aviation Activity

Solar reflections originating from the proposed development towards the 2-mile approach paths for YAA Nostell Helicopter Port are predicted to be of acceptable glare intensities in accordance with the associated guidance (Appendix D) and industry best practice or occur outside a pilot's primary field-of-view (50 degrees either side relative to the runway threshold bearing). No significant impacts upon aviation activity associated with YAA Nostell Helicopter Port are predicted, and mitigation is not required. Detailed modelling is not recommended.

7.4 Overall Conclusions

No significant impacts are predicted upon road safety, residential amenity, and aviation activity associated with YAA Nostell Helicopter Port. Mitigation is not recommended.