

# Glint and Glare Assessment Review

Longfield Solar Farm

December 2022



## PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
- Railways
- Defence
- Buildings
- Wind
- Airports
- Radar
- Mitigation



## ADMINISTRATION PAGE

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Issue	Date	Detail of Changes
1	December 2022	Initial issue

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## EXECUTIVE SUMMARY

### Report Purpose

Pager Power has conducted an independent review of the Glint and Glare Assessment prepared by Neo Environmental for Longfield Solar Farm. No supplementary modelling or analysis has been undertaken by Pager Power. No contact with Neo Environmental has been made to confirm this author's understanding of their report, all interpretations are based on an independent reading thereof.

### Findings and Recommendations

The content of the Glint and Glare Assessment appears professional, transparent, and technically sound outside of a few discrepancies between the modelling parameters in the appendices and how they are described in the report. There is some inconsistency for one residential receptor for which a 'High' impact was predicted in the analysis but not mentioned within the mitigation section or the overall conclusions. There are two pertinent technical aspects presented within the reviewed report with which Pager Power does not agree. These are:

- The exclusion of parts of the study area on the basis that observers would not be within 5 degrees vertically of the panels. Whilst the vertical separation angle is a relevant consideration, this author does not consider it an appropriate basis for excluding receptors from detailed modelling. This is discussed in depth in Section 3.1. It is recommended that clarity is sought as to whether any road receptors were excluded solely on the basis of being outside of this vertical angular range.
- The dismissal of effects based solely on the position of the Sun behind the panels. This is a relevant consideration but inadequate as a sole determining factor. This is discussed in depth in Section 3.2.

### Recommended Clarifications

It is recommended that the developer is contacted to advise:

- Whether Network Rail have any concerns with the proposed development, particularly in the context of any railway signals in the area.
- Whether any residential, road, or rail receptors have been excluded solely on the basis of vertical angle relative to the panel area.
- Whether residential receptor 40 is predicted to experience a 'High' impact, following consideration of current visibility. If so, whether mitigation has been implemented to remove/reduce these effects.
- Whether the recommended mitigation for the residential receptors is predicted to obstruct views from all floors or the ground floor only. If the ground floor only, it is recommended that the Magnitude of Impact is increased to 'Low'.
- Whether the hedgerow screening is confirmed to be fully opaque year-round, or at least during the times that glare is predicted.

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## ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 54 countries within South Africa, Europe, 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.

## PREAMBLE

### Company Position

Pager Power was founded in 1997 and is a dedicated planning consultancy serving the building and renewable sector worldwide. Central to the company's work in the solar sector is our public guidance document, now in its fourth edition. This document was first published in April 2017, following its drafting by the company directors<sup>1</sup> and its circulation among solar developers and stakeholders alike for comment.

Pager Power has been commissioned to review an external glint and glare assessment, undertaken by Neo Environmental. The author considers Pager Power's own guidance document to contain the most appropriate assessment methodology for solar developments as it pertains to glint and glare. However, it is acknowledged that this guidance is not national policy and nor should it be considered the only acceptable approach to characterisation of the issue. Therefore, this review has sought to separate as far as possible the question of whether the assessment methodology is in keeping with Pager Power's own recommended methodology and the question of whether the assessment methodology appears reasonable on its own merits.

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<sup>1</sup> Lead author of Pager Power guidance: Danny Scrivener. Primary reviewers of Pager Power guidance: Kai Frolic and Michael Watson.

## 1 INTRODUCTION

### 1.1 Reviewed Documents

The key document that has been reviewed is the 'Glint and Glare Assessment', supported by the 'ES Chapter 10 \_ Landscape & Visual' and the 'Outline Landscape and Ecology Management Plan (LEMP)'.

No supplementary original analysis has been undertaken by Pager Power as part of this review to validate the analysis within the original assessment outside of technical commentary.

### 1.2 Report Structure

The review comments are presented for each page of the glint and glare report in Table 1 starting on the following page. This has been the focus of the review exercise.

A cursory examination of the supporting documentation has been completed, including cross-checks of the technical input that has informed the modelling.

Sub-sections pertaining to points of contention are presented following the review notes. A list of recommended clarifications is also presented.

## 2 REVIEW OF GLINT AND GLARE ASSESSMENT

### 2.1 Review Notes

Table 1 below presents the author's notes on the external report. The comments use terms like 'Pager Power considers' rather than 'the author considers' to avoid any confusion as to which author is being referenced.

Page	Description	Pager Power Comments
1 of 72	Cover page	-
2 of 72	Administrative details	Disclaimer and copyright notice. Pager Power is working on the basis that due notification has been addressed prior to our receipt of the report.
3 of 72	Administrative details	-
4 of 72	Table of contents	-
5 of 72	Table of contents (continued)	-



Page	Description	Pager Power Comments
6 of 72	Executive summary	<p>The study areas for road users, residential dwellings, and aviation infrastructure applied here are consistent with Pager Power's recommendations. The study area for railway operations and infrastructure is not mentioned.</p> <p>The 'no reflection zone' term used is not defined; however, Pager Power believes this in reference to Section 5.2 and 5.3.</p> <p>17 aerodromes were not taken forward for detailed modelling 'due to their size and/or orientation in relation to the Scheme.' Pager Power does not consider the size of the aerodrome a relevant factor and instead considers the separation distance. Pager Power does agree with the approach of not undertaking detailed modelling for these 17 aerodromes.</p> <p>The report states that a 'High' impact is predicted upon 10 residential receptors following review of the actual visibility. The analysis in Section 6.57 indicates that 11 residential receptors will have a 'High' impact – it appears that residential receptor 40 has been unaccounted for.</p> <p>Following the implementation of mitigation, the overall impact is low for seven residential receptors and none for the remaining residential receptors.</p> <p>Following the implementation of mitigation, the overall impact is none for all road receptors. Pager Power assumes that this conclusion is applied to the lengths of road between adjacent receptors, this is not stated explicitly.</p>

Page	Description	Pager Power Comments
7 of 72	Executive summary (continued)	<p>Following the implementation of mitigation, the overall impact is none for all railway receptors. Pager Power assumes that this conclusion is applied to the lengths of railway line between adjacent receptors, this is not stated explicitly.</p> <p>Following the implementation of mitigation, the overall impact is none for Earls Colne Airfield and Andrewsfield Airfield.</p> <p>The report states the receptors for which mitigation is required. Residential receptor 40 is again not mentioned here.</p> <p>Temporary solid hoarding will be implemented prior to the hedgerows providing sufficient obstruction. Pager Power agrees with this approach, particularly where safety is the concern (road users and railway infrastructure).</p>
8 of 72	Introduction	<p>This sets out the background and information on the site.</p> <p>The introduction conveys that reflections from the frames are not significant and reflections from the panels are the main focus. Pager Power considers this reasonable.</p> <p>The report mentions that glint is a momentary flash towards an observer and can cause visual impact and viewer distraction on ground-based receptors and on aviation.</p> <p>The definition of glare as opposed to glint is not the definition adopted by Pager Power; however, these definitions can vary, and this has no significant bearing on the analysis itself.</p> <p>Pager Power does not agree that a direct reflection of sunlight can only be experienced as a momentary flash. A direct reflection of sunlight can also be experienced as sustained reflection.</p>
9 of 72	Introduction (continued)	<p>The Figures and Appendices are listed here.</p> <p>The Appendices show that two different tilt angles were modelled, this has not been mentioned within the executive summary. It is assumed that the worst-case results were presented within the executive summary (this is confirmed later within the report).</p>

Page	Description	Pager Power Comments
10 of 72	Introduction (continued), Definitions and General comments	<p>The report layout and authors' credentials are presented here.</p> <p>The qualifications of the Neo Environmental authors are consistent with those of the industry in general, there are no industry-standard qualifications for provision of glint and glare assessments.</p> <p>A different definition of glint and glare is presented on this page. This one is aligned with the definition adopted by Pager Power. The explanation of glint and glare is reasonable.</p> <p>The commentary on solar panels advises that they "omit" specular reflection. This is likely just a typo<sup>2</sup>, reflections from solar panels are certainly specular and the overall message within this part of the report is consistent with this fact.</p>
11 of 72	Introduction (continued), General comments and time zones	<p>The report quotes a conclusion from an STA report that Pager Power would dispute; however, the report has considered impacts upon aviation and Pager Power believes this has been included for reference.</p>
12-15 of 72	Legislation and guidance	<p>Appropriate sources are referenced, there is little in the way of formal guidance that sets clear modelling requirements and impact significance criteria for the issue of glint and glare<sup>3</sup>.</p> <p>The report incorrectly states the FAA policy from 2013 is the current policy. The FAA released a final policy in 2021 that superseded the 2013 interim guidance. Pager Power acknowledges that the quantitative thresholds within the 2013 guidance are still typically used by licensed aerodromes in the UK.</p>
16 of 72	Methodology	<p>The approach and considerations set out on this page are reasonable.</p>

<sup>2</sup> It is possible the intention was to write 'emit', which would not strictly be true since it's a reflection; however, this is unimportant and has no bearing on the report's quality.

<sup>3</sup> Pager Power considers its own guidance document to represent a good industry standard, and elements of the methodology and approach within the reviewed report are consistent with Pager Power's guidance document. It is acknowledged that commercial providers of glint and glare assessments may have strategic reasons not to reference this and that they may not have considered it at all, there is no requirement for them to do so.

Page	Description	Pager Power Comments
17 of 72	Methodology (continued).	<p>The reviewed report states in Section 4.9 that most panels have a slight surface texture which has not been modelled to conform with the worst-case scenario. This does not appear to be accurate, the data in Appendix B shows that the panel surface type is 'light textured glass with AR coating'.</p> <p>It is an appropriate choice if such panels are proposed, however it does not, in fact, represent the worst-case scenario in terms of intensity. The model allows five types of surfaces. There are three that are more conservative (higher intensity) than the selected option and just one that is less conservative.</p> <p>The surface type is relevant if glare intensity is to be used as a basis for allowing effects, particularly for aviation receptors. On this occasion, no solar reflections within a pilot's main field of view have been predicted, and therefore the mischaracterisation of the panel type has no bearing on the overall conclusions.</p> <p>The modelling has been undertaken using Forge Solar, an industry-standard provider of third-party software that was originally produced in the USA for aviation authorities there.</p> <p>The determination of ocular impact set out on this page is reasonable, with the exception of the interpretation of intensity. Pager Power does not agree that green glare can be ignored for ground-based receptors; however, as all impacts towards road and rail receptors will be mitigated, this point has no bearing on this assessment.</p> <p>The explanation of source angle and irradiance is generally appropriate, the statement that a large source angle can result in high intensity even if irradiance is low is not correct from a strictly technical standpoint<sup>4</sup>; however, it does convey the appropriate consideration.</p>

<sup>4</sup> Intensity inherently has a 'per area' component in its definition. It is therefore not the intensity that increases with source angle, rather it is the level of hazard that increases because the angular size of the effect is increasing.

Page	Description	Pager Power Comments
18 of 72	Methodology (continued), parameters and receptors.	<p>The report states that the worst case will be at either 10- or 30-degrees tilt for each receptor. Pager Power agrees it is a reasonable approach to assess 10- and 30-degrees tilt for each receptor.</p> <p>The assessment has used the top of the panel as the point to determine glint and glare occurrence. Pager Power recommends using the panel centre; however, this difference is unlikely to have a significant bearing on the results and there is an objective case for taking either approach (the centre is the aggregate panel position, the top is the most likely to be visible in practice. The main risk of using such a high point on the panel is that the model may incorrectly assume an observer with an eye height lower than the entire panel and therefore unaffected. This limitation exists if the centre is used, but it is minimised because the height difference is smaller.</p> <p>The criteria for receptor selection is as per Pager Power's guidance except for a 20cm difference in observer height for a dwelling, this approach is appropriate.</p> <p>The report states that an assessment was undertaken to determine zones where solar reflections will never be directed near ground level. The report does not appear to show or reference this assessment.</p> <p>The remaining points around receptor selection and approximations for groups of receptors are reasonable.</p>

Page	Description	Pager Power Comments
19 of 72	Methodology (continued), receptors and impact magnitude.	<p>The report states that glint is only considered an issue with regards to aviation safety when the solar farm is within close proximity to a runway. This is not necessarily true as solar reflections could be experienced by pilots or ATC personnel from solar developments that are not in close proximity to a runway.</p> <p>The buffer zones used for large international/licensed aerodromes and military aerodromes are reasonable. It is however possible that small aerodromes request a glint and glare assessment for solar developments further than 5km.</p> <p>The criteria used for static receptors are not the criteria adopted by Pager Power, however, they appear reasonable for residential receptors.</p> <p>Railway signals do not appear to have been considered or assessed. It is recommended that signal information is requested from Network Rail for assessment – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p>

Page	Description	Pager Power Comments
20 of 72	Methodology (continued), impact magnitude	<p>This page explains that effects that occur more than 25 degrees outside a driver's field of view have no impact. The technical basis for this figure appears to be an extract from a 2015 publication by the Federal Aviation Administration. Pager Power published a White Paper in November 2021, which has been in the public domain since December 2021, examining the evidence for exclusion of effects based on the field of view, which included consideration of the FAA guidance. This concluded that there was no strong basis for adopting an angle of less than 50 degrees for road users (50 degrees is also the value that was adopted by the FAA themselves, due to there being a window between 25 and 50 degrees in which effects are unknown). Pager Power assumes this criterion is independent of the intensity criterion on Page 17, the latter is not repeated in this 'magnitude' section.</p> <p>Pager Power understands that Network Rail uses 30 degrees to be considered 'within the field of view', based on signal sighting documentation published by Network Rail.</p> <p>Section 4.31 states that the Horizontal Field of View (HFOV) has been assessed at 90 degrees left and right from the cockpit. This does not appear to be accurate, the data in Appendix B shows that the HFOV used is 50 degrees left and right from the cockpit.</p> <p>Section 4.32 states that the FAA guidance states that there should be no potential for glare or 'low potential for after-image' at any existing or future planned runway landing thresholds. Whilst this FAA guidance has been superseded, these quantitative thresholds are still typically used by licensed aerodromes in the UK.</p>

Page	Description	Pager Power Comments
21 of 72	Methodology (continued), impact magnitude and assessment limitations	<p>The report identifies an ATC Tower as a moving receptor. This is not correct; however, it is believed this is placed under the wrong sub-heading.</p> <p>Pager Power agrees that, whilst the FAA guidance states that no solar reflections should be experienced within an ATC Tower, further assessment of the glare scenario should be undertaken to determine the impact.</p> <p>Section 4.35 appears to contradict Section 4.34 and seems to recommend any solar reflections experienced within an ATC Tower should be mitigated. Due to no solar reflections from the proposed development being predicted towards an ATC Tower, this discrepancy has no bearing on the analysis itself.</p> <p>The assessment limitations set out on this page are reasonable.</p>
22 of 72	Baseline conditions and residential receptors	<p>The report states that reflections within 5 degrees of the horizontal have the potential to be seen by ground-based receptors. This appears to be a basis for eliminating portions of the study area. <b><u>Pager Power does not consider this a necessary or appropriate step, see Section 3.1.</u></b></p> <p>The parameters that have informed the analysis within Section 5.2 have not been provided and therefore cannot be checked. The azimuth angles identified seem reasonable from Pager Power's experience.</p> <p>The residential dwelling receptor selection methodology, previously stated, is reasonable.</p>
23-26 of 72	Results for residential receptors	-
27 of 72	Results for residential receptors (continued) and road / rail receptors	<p>The report advises that some minor roads have been dismissed due to the likelihood of users travelling at low speed. Pager Power agrees that in general roads with low traffic densities and speeds are not at significant risk of glint and glare effects from solar panels.</p> <p>The road receptors have been selected 200 metres apart.</p>



Page	Description	Pager Power Comments
28-29 of 72	Results for road receptors	A table with the road receptor coordinates and whether solar reflections are possible is presented.
30 of 72	Results for road receptors (continued) and rail receptors	The rail receptors have been selected 200 metres apart.
31 to 57	Results for rail receptors and aviation receptors	A table with the identified aviation infrastructure within 30km is presented.  Some additional unlicensed aerodromes have been identified by Pager Power within the 30km area; however, Pager Power does not recommend any additional aerodromes are considered.
32 of 72	Aviation receptors (continued)	The report states that Earls Colne and Andrewsfield Airfield have been assessed in detail due to their distance from the site. Pager Power agrees that the other aerodromes do not require detailed assessment.  Earls Colne Airfield details are presented and are accurate.
33 of 72	Aviation receptors (continued)	Additional Earls Colne Airfield details are presented. The source of the ATC Tower height is not referenced; however, the height of an ATC Tower for an airfield of this size is reasonable and small variations in height are not predicted to change the results of the modelling.  Andrewsfield Airfield details are presented and are accurate.  Section 5.21 states that both runways will be assessed as one runway due to their proximity. Pager Power agrees this is a reasonable approach.
34 of 72	Aviation receptors (continued)	The ATC Tower height has been found using Google Earth 3D modelling. This approach is reasonable as small variations in height are not predicted to change the results of the modelling, as previously stated.

Page	Description	Pager Power Comments
35-38 of 72	Residential receptor impact assessment	<p>Section 6.2 states that the tables identify the receptors where solar reflections will be experienced. Pager Power does not believe this is strictly true because additional obstructions have not been considered at this stage. This has no bearing on the report quality.</p> <p>It is stated here that 34 receptors were excluded due to being within the no-reflection zones. Pager Power recommends enquiring which receptors were excluded solely on the basis of vertical angle – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>Tabulated data showing minutes / hours of glare for each residential receptor number and a Magnitude of Impact. The worst-case tilt angle is also provided.</p> <p>The Forge modelling software does not provide output that combines multiple panel areas into one output. Based on two cross-checks of the modelling output charts (receptors 64 and 80), it appears as though this has been taken into account by the author.</p>

Page	Description	Pager Power Comments
39-57 of 72	Residential receptor impact assessment (continued)	<p>The tables results are summarised and are accurate.</p> <p>The report provides an overview of the imagery within the Appendices. The report does not mention whether views from above the ground floor have been considered; however, cross-checks of the Appendices appear to show they have been.</p> <p>Assessment of the residential impacts is presented on the following pages.</p> <p>The visibility assessment appears to be conservative and states that impacts remain where visibility cannot be reliably ruled out.</p> <p>Effects towards six residential receptors are dismissed due to the sun being low in the sky behind the solar array. It states that the “sun’s direct glare” will be greater than those from the solar array. It is not clear what is meant by this, particularly considering the definition of glare used by the author; however, it is likely that this is intended to refer to direct sunlight being of greater intensity than reflections.</p> <p>Pager Power considers the sun’s position at the time of reflections to be a relevant mitigating factor but not necessarily one that solely reduces the impact for residential receptors to acceptable levels. <b><u>See Section 3.2.</u></b></p> <p>Section 6.127 states that the worst-case impact towards residential receptors 78 and 79 is ‘None’. This contradicts the impact presented in Section 6.95, which states a ‘Low’ impact. These residential areas do not appear to be mentioned anywhere else in the report and therefore there appears to be no consequence of this discrepancy.</p>
58-59 of 72	Residential receptor impact assessment (continued), road receptor impact assessment	<p>It is stated here that 24 receptors were excluded due to being within the no-reflection zones. Pager Power recommends enquiring which receptors were excluded solely on the basis of vertical angle – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>Tabulated data showing the minutes of each solar reflection type for each road receptor number. The Magnitude of Impact and worst-case tilt angle is also provided.</p>

Page	Description	Pager Power Comments
60 of 72	Road receptor impact assessment (continued)	<p>The tables results are summarised and are accurate.</p> <p>The report provides an overview of the imagery within the Appendices. The report does not mention whether views for elevated drivers (e.g., HGVs) have been considered; however, cross-checks of the Appendices appear to show they have been.</p> <p>The report states that impacts on eight road receptors remain 'High'.</p>
61 of 72	Rail receptor impact assessment	<p>It is stated here that five receptors were excluded due to being within the no-reflection zones. Pager Power recommends enquiring which receptors were excluded solely on the basis of vertical angle – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>Tabulated data showing the minutes of each solar reflection type for each rail receptor number. The Magnitude of Impact and worst-case tilt angle is also provided.</p> <p>The tables results are summarised and are accurate.</p> <p>The report provides an overview of the imagery within the Appendices.</p> <p>The report states that impacts on all rail receptors are reduced to None. Assessment of the rail impacts is presented on the following pages.</p>

Page	Description	Pager Power Comments
62 of 72	Rail receptor impact assessment (continued), aviation impact assessment	<p>Tabulated data showing the minutes of each solar reflection type for each aviation receptor.</p> <p>The Forge model only states solar reflections are geometrically possible towards approaching aircraft when within the defined Vertical Field of View (VFOV) and HFOV.</p> <p>The report incorrectly stated that a 90-degree HFOV was used whilst the Appendices shows a 50- degree HFOV.</p> <p>The 50-degree angle is the standard HFOV applied by Forge and there is technical merit for doing so. However, as the report states the HFOV is wider than has been considered, this could lead to impacts towards approaching aircraft not being identified (though they would not be considered significant).</p> <p>Based on Pager Power's experience, it is not likely that changing the HFOV would change the results as solar reflections are not likely to be geometrically possible this far north of the proposed development.</p>

Page	Description	Pager Power Comments
63-66 of 72	Mitigation and residential residual impacts	<p>Residential receptor 40 is not mentioned here, for which a 'High' impact was identified in Section 6.57. It is recommended that clarification is sought as to whether mitigation has been proposed for this residential receptor – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>The report states that hedgerows are to be planted/infilled and maintained to a height 3 metres and that this will reduce all residential and road impacts to None. Whilst Pager Power believes this to be true for the road impacts, hedgerows of this height are not likely to obstruct views from above the ground floor of a dwelling.</p> <p>Pager Power recommends implementing screening for ground floor effects only; however, it is recommended that any residential receptor where impacts will not be removed from above the ground floor are upgraded to 'Low' – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>The report does not specify the exact height required to screen views; however, the report states that temporary screening will be implemented until the hedgerows are grown sufficiently.</p> <p>It is not confirmed that the screening will be entirely opaque year-round, or at least during the times at which glare is predicted. It is recommended that clarification is sought on this detail – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p> <p>Tabulated residential residual impacts, summarising the findings at each stage of assessment, are presented.</p> <p>Residential receptor 40 shows that the impact following visibility analysis is None. It is recommended clarification is sought on the impact upon this residential receptor – <b><u>recommendations are summarised in Section 4.1 of this review document.</u></b></p>
64-68	Residential residual impacts (continued), road residual impacts	<p>Tabulated road impacts, summarising the findings at each stage of assessment, are presented.</p>

Page	Description	Pager Power Comments
69 of 72	Road residual impacts (continued), rail residual impacts and aviation residual impacts	Tabulated rail and aviation impacts, summarising the findings at each stage of assessment, are presented.  Table 7-4 mentions Norwich Airport; however, this is expected to be a typo and the contents of the table is consistent with the assessment results.
70-71 of 72	Aviation residual impacts (continued), summary	The number of residential receptors with a 'High' impact, following the review of actual visibility, is listed as 10, not 11.  Residential receptor 40 is not mentioned here, for which a 'High' impact was identified in Section 6.57.
71-72 of 72	List of appendices	-
N/A	Report Appendices	The report appendices have not been reviewed in detail. Cross-checks suggest the modelling inputs are reasonable and consistent with the methodology as described with the exception of the discrepancy on page 17 of the reviewed report, as described previously.  No independent analysis of visibility or otherwise has been conducted by Pager Power. Overall, the approach of examining available imagery to draw a conclusion is reasonable if applied conservatively. There is no reason to think the approach to doing this is unreasonable; however, independent analysis is outside the scope of this review.  Pager Power cannot comment on the veracity of the conclusions around real-world visibility.

Table 1 Review notes

## 3 POINTS OF CONTENTION

### 3.1 Excluding Parts of Study Area

It is understood based on Sections 5.1-5.3 that parts of the study area were excluded for ground-based receptors if they did not fall within 5 degrees of the horizontal from the panel area, or they did not fall within the azimuth range within which effects are judged to be possible.

The reason for excluding parts of the study area this way is unclear, in particular the exclusion on the basis of vertical angle. The reviewed report states:

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

Whilst most reflections towards ground-based receptors would likely fall within this range, there are instances where this may not be the case. Observers that are immediately adjacent to the panel area could potentially experience reflections at a vertical angle outside this range; furthermore, there is no clear benefit to excluding areas of the site on this basis prior to running the model, except for reducing the amount of processing required.

Pager Power recommends running technical modelling for all receptors that have the potential to experience reflections and have the potential to view the proposed development within the 1 km study area.

It is recommended that clarification is sought regarding which receptor locations were excluded from detailed modelling solely based on vertical angle, if any. Ideally these should be presented on a map with the development to allow them to be interpreted readily.

### 3.2 Sun Position

The reviewed report judges the impacts on residential receptors 20, 78, 79, 93, 97, and 98 to be 'Low' seemingly due to the fact that the sun would be low behind the development at the time of reflection.

Pager Power considers this a relevant factor, but not the sole grounds for determining an effect to be acceptable in the absence of other supporting reasons. In particular, if these effects are predicted to be experienced for a significant duration throughout the year, by residents on the ground floor of the dwelling, and from close proximity to the reflecting panels, mitigation in the form of screening or layout optimisation may still be recommended by Pager Power.

The reviewed report does not present the glare duration throughout the year, whether effects will be experienced from the ground floor of the dwellings, or quantified distances. It is recommended that further clarification around the impact classification for residential receptors 20, 78, 79, 93, 97, and 98 is sought.



## 4 FURTHER INFORMATION

### 4.1 Recommended Clarifications

It is recommended that the developer is contacted to advise:

- Whether Network Rail have any concerns with the proposed development, particularly in the context of any railway signals in the area.
- Whether any residential, road, or rail receptors have been excluded solely on the basis of vertical angle relative to the panel area.
- Whether residential receptor 40 is predicted to experience a 'High' impact, following consideration of current visibility. If so, whether mitigation has been implemented to remove/reduce these effects.
- Whether the recommended mitigation for the residential receptors is predicted to obstruct views from all floors or the ground floor only. If the ground floor only, it is recommended that the Magnitude of Impact is increased to 'Low'.
- Whether the hedgerow screening is confirmed to be fully opaque year-round, or at least during the times that glare is predicted.

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