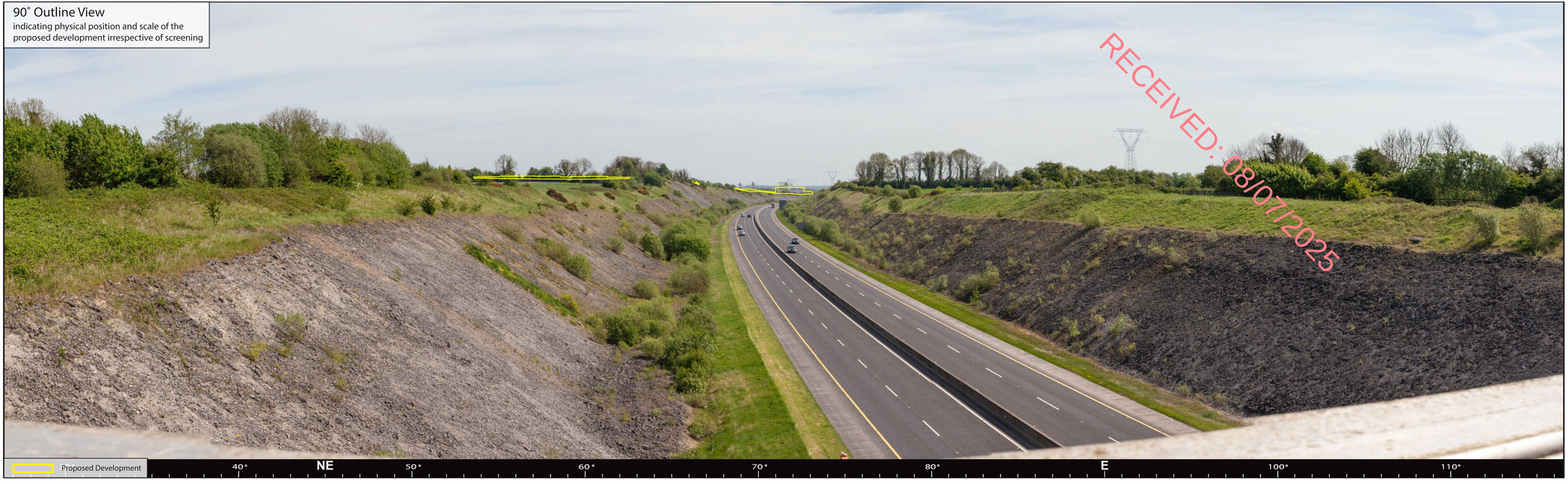
90˚ Outline View

indicating physical position and scale of the proposed development irrespective of screening



Project Admiral - Landscape and Visual Impact Assessment

Viewpoint Ref: VP17 L51254 overbridge of the M6 at Garrane

Visualisation Type 4 - This 90˚cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90˚ cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM):	643279
Northing (ITM):	738238
Direction of View:	71 ˚
Distance to Site:	917 m
Elevation:	125.7 m

Horizontal Field of View:	90˚ (cylindrical projection)
Principal Distance:	522 mm
Paper size:	841 x 297 mm
Correct printed image size:	820 x 251 mm
Enlargement Factor:	96%

Date and Time:	30/04/2025 11:12
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Lens:	Canon Fixed 50mm Full Frame Sensor
Panoramic Head:	Manfrotto Pano Head/Leveller
Camera Height:	1.7m (AGL)

Photography Software:	Adobe Lightroom
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Rendering Software:	Mental Ray/Corona
GNSS Unit:	Trimble Catalyst (GNSS)
Topographical Data:	LiDAR/OSI Terrain Data
GPS Ref:	Georeferenced/Surveyed DWGS

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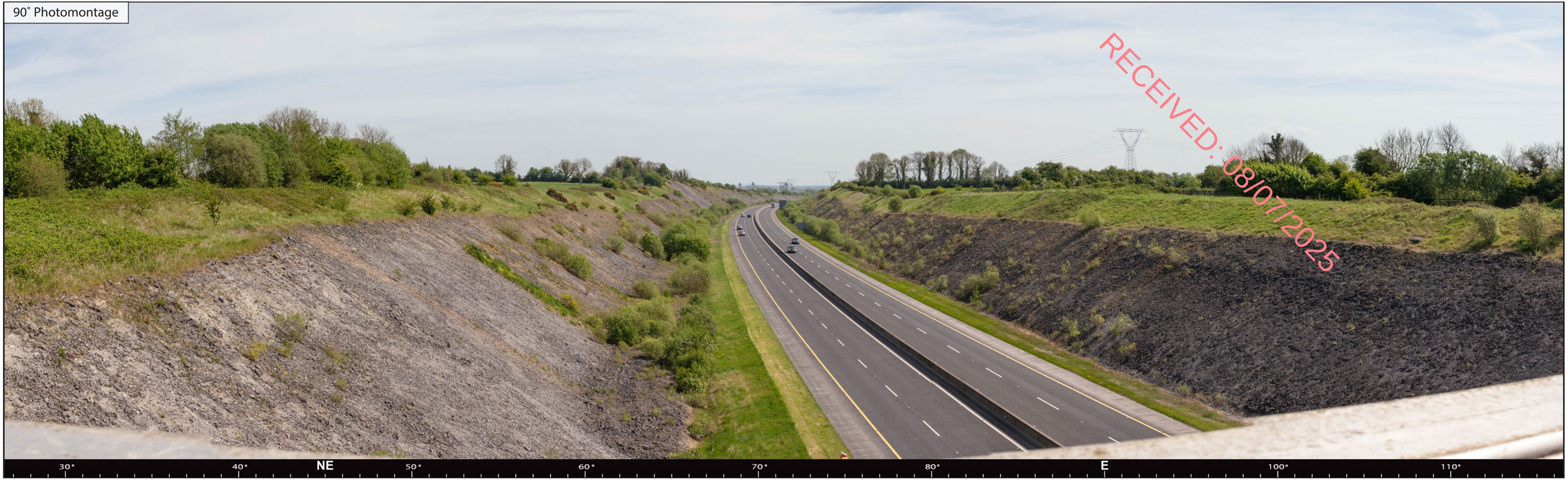
90˚ Photomontage



Project Admiral - Landscape and Visual Impact Assessment

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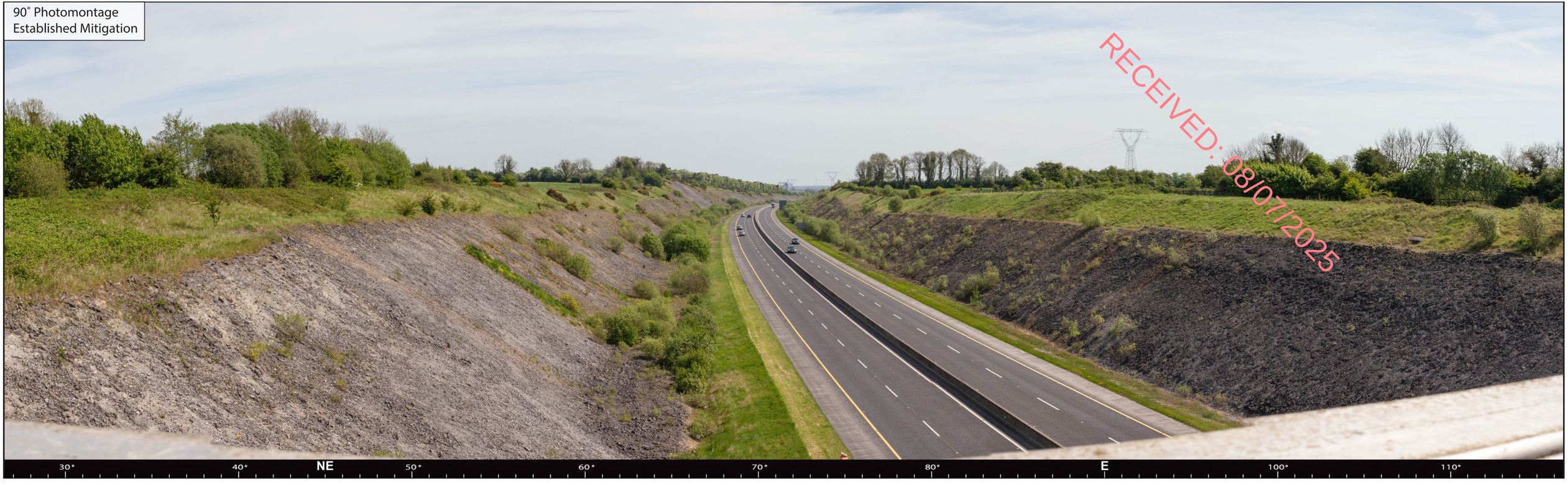
90˚ Photomontage
Established Mitigation



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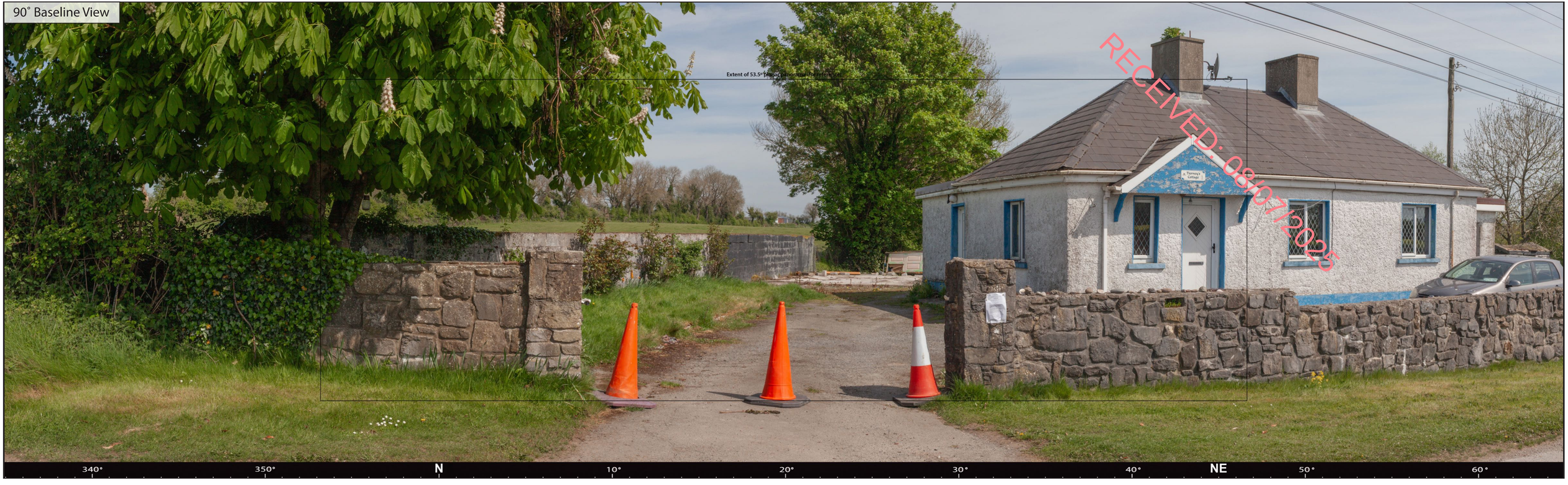

Project Admiral - Landscape and Visual Impact Assessment

Viewpoint Ref: VP18a L51254 at Rahincuill

Visualisation Type 4 - This 90˚cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90˚ cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM):	644439
Northing (ITM):	738065
Direction of View:	20 ˚
Distance to Site:	586 m
Elevation:	104.2 m

Horizontal Field of View:	90˚ (cylindrical projection)
Principal Distance:	522 mm
Paper size:	841 x 297 mm
Correct printed image size:	820 x 251 mm
Enlargement Factor:	96%

Date and Time:	30/04/2025 10:50
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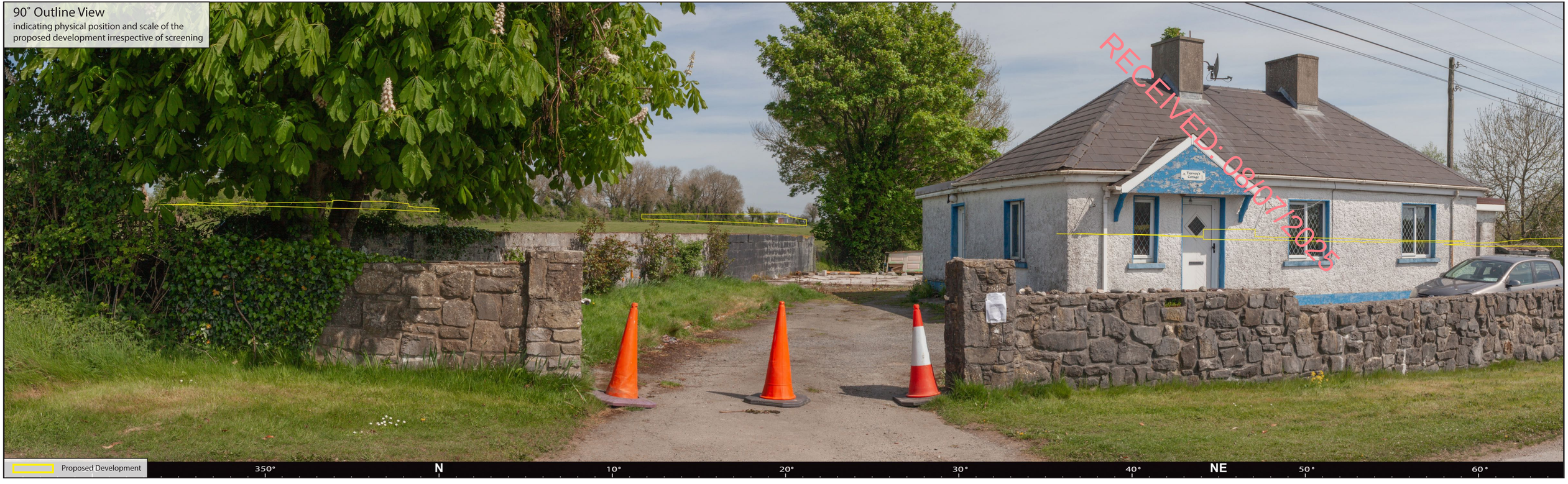
90˚ Outline View

indicating physical position and scale of the proposed development irrespective of screening



Project Admiral - Landscape and Visual Impact Assessment

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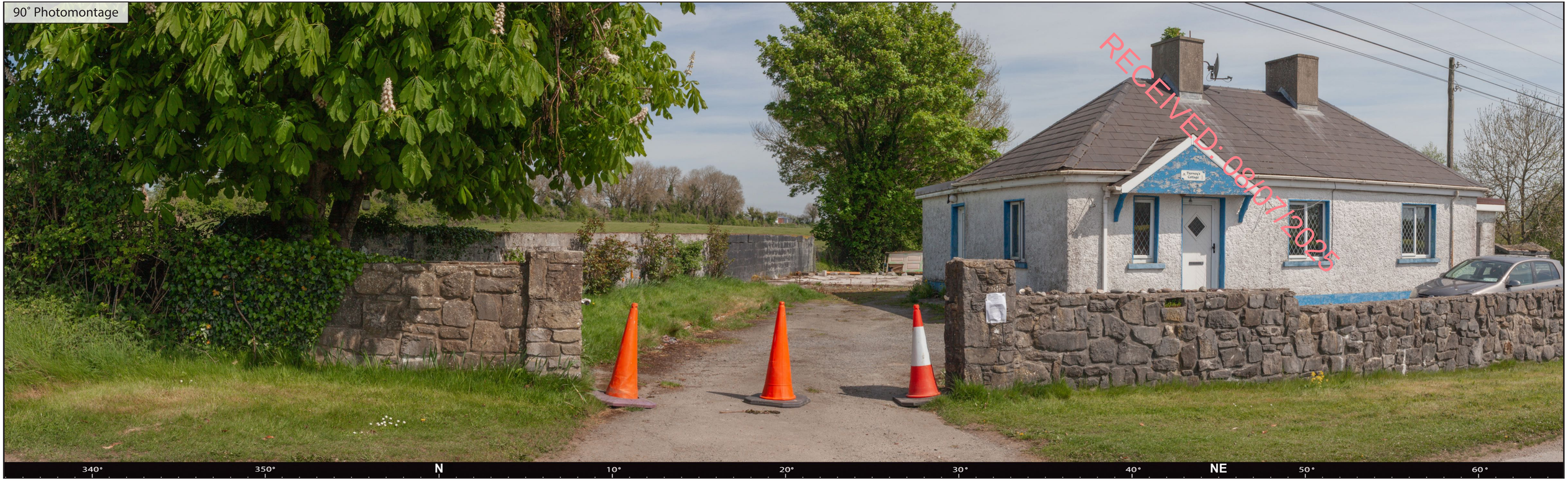

Project Admiral - Landscape and Visual Impact Assessment

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Project Admiral - Landscape and Visual Impact Assessment

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Distance to Site:	586 m
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90˚ Baseline View

Project Admiral - Landscape and Visual Impact Assessment

Viewpoint Ref: VP19 Croghan Hill

Visualisation Type 4 - This 90˚cylindrical projection panorama has been captured, prepared and presented in accordance with the guidance set out in the Landscape Institute Technical Guidance Note 06/19 for Type 4 Visualisations and the Scottish Natural Heritage 2017 guidance 'Visual Representation of Wind Farms'. This image has been presented in a 90˚ cylindrical format to aid visual comprehension of linear infrastructure occupying a wide FoV, which avoids splitting the view across numerous multiple images.

Easting (ITM):	648045
Northing (ITM):	733138
Direction of View:	335 ˚
Distance to Site:	5273 m
Elevation:	229.6 m

Horizontal Field of View:	90˚ (cylindrical projection)
Principal Distance:	522 mm
Paper size:	841 x 297 mm
Correct printed image size:	820 x 251 mm
Enlargement Factor:	96%

Date and Time:	28/09/2022 16:16
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Lens:	Canon Fixed 50mm Full Frame Sensor
Panoramic Head:	Manfrotto Pano Head/Leveller
Camera Height:	1.7m (AGL)

Photography Software:	Adobe Lightroom
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90˚ Outline View

indicating physical position and scale of the proposed development irrespective of screening

Project Admiral - Landscape and Visual Impact Assessment

Viewpoint Ref: VP19 Croghan Hill

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90˚ Photomontage

Project Admiral - Landscape and Visual Impact Assessment

Viewpoint Ref: VP19 Croghan Hill

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90˚ Photomontage
Established Mitigation

Project Admiral - Landscape and Visual Impact Assessment

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APPENDIX 12.3

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GLINT AND GLARE ASSESSMENT

Project Admiral

Co. Westmeath.

Prepared by Macro Works Ltd

May 2025

Registered Landscape Architect

EXECUTIVE SUMMARY

This Glint and Glare Assessment was carried out by Macro Works Ltd to determine the potential for solar reflectance effects upon dwelling and transport route receptors within 1km of the proposed Project Admiral Solar Farm.

The M6 and R446 regional road, both of which are situated to the south and north of the site, respectively, were identified at an early stage of the process as key receptors within the study area. Analysis of the final proposed solar farm layout identified that there was no potential for reflectance along the motorway corridor and only the potential for a very fleeting period of reflectance to occur along the regional road.

The assessment of reflectance at all residential dwellings within the 1km study area was also assessed. It concluded that there will be no significant reflectance effects generate from glint and glare towards surrounding dwellings as a result of the proposed solar farm.

The potential for hazardous effects upon aviation activities in the wider area was also considered but not relevant aviation receptors were identified and thus, aviation receptors were scoped out for further consideration.

On the basis of the analysis undertaken, it is not considered that there will be any significant reflectance or hazard effects generated from glint and glare upon any receptor identified in the study area as a result of the proposed solar farm.

1. GLINT AND GLARE ASSESSMENT

1.1 INTRODUCTION

This Glint and Glare Assessment was carried out by Macro Works Ltd to determine the potential for solar reflectance effects upon dwelling and transport route receptors in respect of the proposed Project Admiral Solar Farm development west of Rochfortbridge in Westmeath.

1.1.1 Statement of Authority

Macro Works' relevant experience includes twenty years of analysing the visual effects of a wide range of infrastructural and commercial development types. This experience includes numerous domestic and international wind and solar energy developments. The Glint and Glare analysis model used in this study for non-aviation receptors was developed by Macro Works in conjunction with the National University of Ireland, (NUI) Maynooth. It has successfully replicated results from the Federal Aviation Administration (FAA) approved Solar Glare Hazard Analysis Tool (SGHAT) software and has been utilised to assess the effects of glint and glare for many solar development sites throughout Ireland to date.

1.1.2 Guidance and Best Practice

There is currently no specific guidance or standards for the assessment of photovoltaic glint and glare effects on residential and/or route (road and rail) receptors in Ireland. Guidance has been prepared, however, by the Federal Aviation Administration to address the potential hazards that solar developments may pose to aviation activities, and this has been adopted for use by the Irish Aviation Authority. This guidance, concerned with hazard assessment, has relevance to the other receptor types mentioned, and coupled with numerous assessments already carried out across the UK, combine to establish a suitable best practice for solar development.

By virtue of their efficiency, the intensity of reflected light from modern PV solar panels is deliberately low and currently equates with that of the reflection from still water. Recent studies generally agree, however, that there still exists the potential for hazard or reflectance upon surrounding receptors. Macro Works' glint and glare analysis methods and determination of effects are based on a combination of available studies and established best practice. This methodology has been successfully implemented on numerous previous solar farm projects that met with the approval of both Planning Authorities and An Bord Pleanála.

1.1.3 Definitions

The study is concerned with the potential reflectance and hazard effects of glint and glare in relation to receptors that include the occupants of surrounding dwellings as well as road and rail users. In its "Technical Guidance for Evaluating Selected Solar Technologies on Airports"[1] the FAA have defined the terms 'Glint' and 'Glare' as meaning;

Glint – "A momentary flash of bright light"

Glare – "A continuous source of bright light"

1 Federal Aviation Administration (FAA) 2018. Technical Guidance for Evaluating Selected Solar Technologies on Airports; 3.1.2 Reflectivity. Technical Guidance for Evaluating Selected Solar Technologies on Airports. Available at: https://www.faa.gov/sites/faa.gov/files/airports/environmental/FAA-Airport-Solar-Guide-2018.pdf

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

1.1.4 General Nature of Reflectance From Photovoltaic Panels

In terms of reflectance, photovoltaic solar panels are by no means a highly reflective surface. They are designed to absorb sunlight and not to reflect it. Nonetheless, photovoltaic panels have a flat, polished surface, which emits 'specular' reflectance rather than a 'diffuse' reflectance, which would occur from a rough surface (Figure 1.1 refers). Several studies have shown that photovoltaic panels (as opposed to Concentrated Solar Power) have similar reflectance characteristics to water, which is much lower than the likes of glass, steel, snow and white concrete by comparison (Figure 1.2 refers). Similar levels of reflectance can be found in common situations in rural environments from surfaces such as shed roofs, lines of plastic ground covering used in cropping and wet roads to name but a few (Figure 1.3 - Figure 1.5 refer).

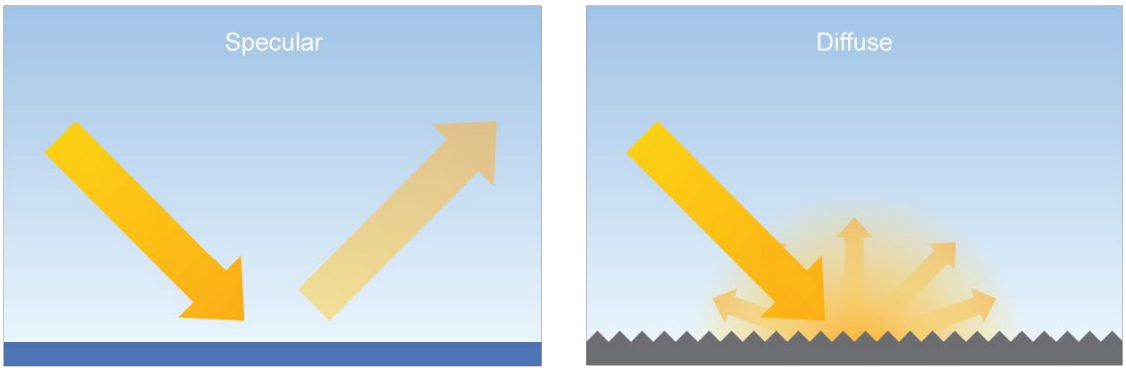

Figure 1.1: Specular vs Diffuse reflection of light from polished and rough surfaces.

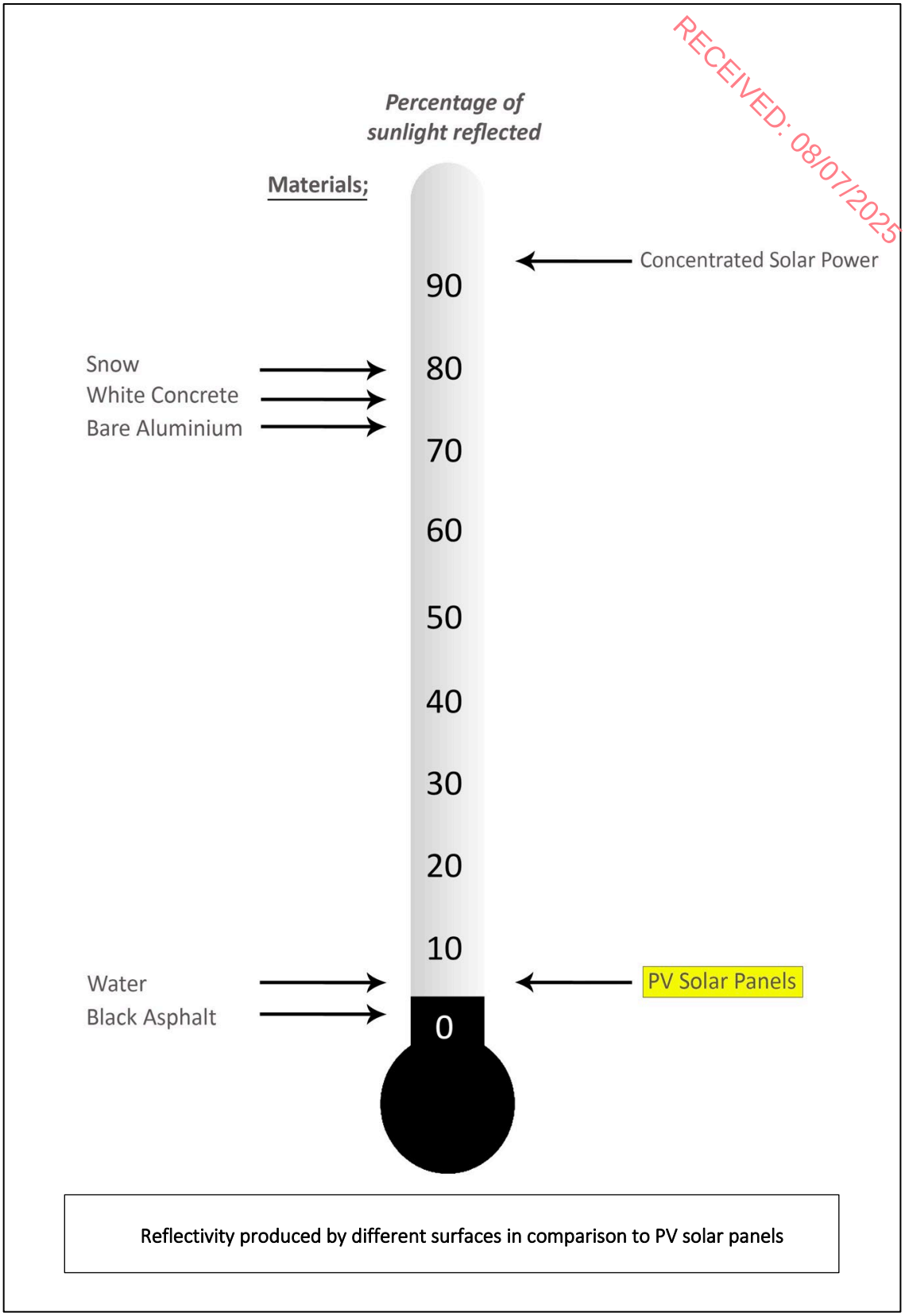

Figure 1.2: Demonstrates that the amount of sunlight (measured in watts per meter -W/m2) reflected from the surface of a solar panel is very similar to that of still water and is far less than that of many surfaces commonly found in the environment, urban or rural.

Figure 1.3: Similar level of reflectance (to photovoltaic panels) emanating from plastic ground covering in an Irish rural scenario.

Figure 1.4: Similar levels of reflectance (to photovoltaic panels) emanating from wet road surfaces.

Figure 1.5: Higher levels of reflectance (to photovoltaic panels) emanating from powder coated corrugated metal roof surfaces in an Irish rural scenario.

1.2 ASSESSMENT OF GROUND-BASED RECEPTORS

1.2.1 Assessment Methodology For Ground-Base Receptors

Macro Works' glint and glare assessment methodology follows a rational sequence of steps to identify receptors that might potentially be affected by glint and glare. These are then further filtered to yield those receptors to those that are likely to actually experience such effects. These steps are set out below:

1. Identify study area within which to assess the potential for glint and glare effects. The potential for substantial reflectance or hazardous impacts are greatest in close proximity to the source of reflectance and the potential for adverse impacts reduces with increased distances therefore to balance these factors a buffer extent of 1km from the site boundary is used by default on all solar farms.

2. Pre-analyse the study area for potential glare effects by populating the study area with a regular grid of receptor points (100m spacing). This analysis (1st analysis) allows us to determine those areas theoretically exposed to glint and glare effects that might warrant further investigation. We call this the "Area of Consideration for Further Analysis". This pre-analysis is based on a 3D model of the development superimposed onto a Digital Terrain Model (DTM) of the study area. Note: This DTM accurately replicates the profile of the terrain but does not account for screening by the vegetation or buildings that are present – in this sense the results are somewhat theoretical but they do offer a representation of a bare-earth, worst-case scenario.

3. Identify relevant receptors (dwellings and transport routes) that fall within the theoretically affected zones of the study area (or the "Area of Consideration for Further Analysis"). Dwelling identification utilises a combination of up to date aerial photography and the Eircode Finder tool which locates and identifies buildings classed as residential. Transport route receptors are defined by regularly spaced points along roads and rail lines (50m spacing). The height of the road Receptor Points are set to 1.7m above ground level. This is broadly equivalent to the eye level a person walking or a driver of a 4x4 / SUV type vehicle. The height of rail Receptor Points are set to 2.8m above ground level to represent the eye level of a train driver.

4. Execute the glint and glare analysis on the DTM-based 3-D model (2nd analysis), in respect of each of the theoretically affected receptors. This identifies the times of the day and months of the year that glint and glare could potentially affect receptors in the absence of screening.

   Note: When the sun is situated within 10 degrees of a reflecting PV panel as viewed from a particular receptor, the sun will be a much greater source of glare than what emanates from the surface of the PV panel therefore any potential glare during these periods is excluded when assessing potential impacts.

5. Perform the same calculations (3rd analysis) using a high-resolution digital surface model (DSM) that accounts for the existing screening inherent on and surrounding the site at the time of capture. This offers a truer reflection of the actual glare that is likely to occur and highlights where landscape mitigation may be required.

   Note: A limitation of DSM data in the context of this assessment type is that it is a snapshot of the screening situation at the time of the data capture. This situation is broadly indicative as hedgerows are a semi-permanent feature of the Irish countryside, however, seasonal variation through growth and/or cutting may result in minor changes to their screening potential. A further limitation is due to the aerial overhead nature of data capture. This can result in the under-reporting of potential visibility beneath the tree or woodland canopy and can understate the visibly porous nature of some thin hedgerows. This can result in minor underestimating of glare periods. However, where the data is deemed to be significantly unreliable for the reasons stated, analysis is supplemented, where possible, with a thorough assessment of aerial photography, Google Street View imagery and on-site verification.

6. Where instances of glint and glare remain, determine whether they are likely to cause a hazard / reflectance. For dwellings, this is achieved by comparing the periods of glare potential with our 'Magnitude of Glint and Glare Effects' table, while transport routes are examined in further detail for potential for hazardous impacts.

7. If hazard / substantial reflectance is likely to occur, mitigation measures are proposed where possible. This might relate to the re-siting of particular panels and / or the provision of additional screening.

8. If necessary, re-run the glint and glare calculations (4th analysis) to verify the effectiveness of the proposed mitigation measures and determine if there are any residual glare impacts.

1.2.2 Magnitude of Impacts for Dwelling Recepotrs

Although there is currently no regulation or guidance as to acceptable levels of glint and glare effects at receptors in Ireland, it is considered necessary to provide a gauge for determining relative levels of impact across a range of development types. Macro Works has established the following indicative textual categories of effect, which are used herein to determine the relative impact levels (Table 1.1 refers). The percentage figures provided are intended as a relative guide only. The final category of assessment is determined on the basis of professional judgement, and accounts for mitigating factors where relevant and the careful consideration of a range of circumstantial variables that may act to intensify or reduce the effect upon a particular receptor.

Note: The magnitude of glint and glare effects in Table 1.1 relates only to static receptors such as residential dwelling. As road receptors are moving objects and will only ever have the potential to experience momentary reflectance periods, the following impact magnitudes are not considered relevant for road receptors. Instead, road receptors will be assessed on whether periods of reflectance have the potential to generate significant reflectance or hazard effects.

Table 1.1 Magnitude of Glint and Glare Effects

Magnitude of Impact	Description
Very High	Hazard / reflectance effects emanating from highly reflective surfaces (>50% sunlight reflection) for most of the year (>70% / 255 days) and for significant periods of each day (>45 mins).
High	Hazard / reflectance effects emanating from moderately reflective surfaces (>30% sunlight reflection) for the majority of days in a year (>50% / 182 days) and for substantial periods of each day (>30 mins).
Medium	Reflectance effects emanating from moderately/low reflective surfaces (>10% sunlight reflection) for a substantial number of days in a year (>30% / 109 days) and for substantial periods of each day (>20 mins).
Low	Reflectance effects emanating from low reflective surfaces (>5% sunlight reflection) for a modest number of days in a year (>10% / 36 days) and for notable periods of each day (>15 mins).
Very Low	Reflectance effects emanating from low reflective surfaces (>5% sunlight reflection) for a small number of days in a year (≤10% / 36 days) and for short periods of each day (<15 mins).
Negligible	Effects either not geometrically possible or barely measurable.

Important Note

It must be emphasised at this point that all results, whether from FAA endorsed SGHAT software or our own bespoke software, are theoretical by default in that they assume that the sun is always shining and at full intensity. The results do not account for climate and inherent weather patterns that occur across the island of Ireland.

Records from Met Éireann (The Irish Meteorological Service) indicate that "over the year as a whole, most areas get an average of between 3 1/4 and 3 3/4 hours of sunshine each day". It states that "the sunniest months are May and June. During these months, sunshine duration averages between 5 and 6.5 hours per day over most of the country"[2].

While we cannot correlate the historic random periods of sunshine with our predicted periods of glare, we can state with a high level of confidence that the weather, more precisely cloud cover, will account for a substantial reduction in all figures quoted in this report i.e. frequency and duration of glare periods.

In addition, atmospheric conditions such as haze, mist, fog and precipitation will all have the effect of both reducing the visibility of the site overall and reducing the intensity of any glare emanating from the proposed solar farm.

1.2.3 Relevant Parameters of the Proposed Development

The photovoltaic panels are to be oriented in a south-facing direction to maximise solar gain and will remain in a fixed position throughout the day and year (i.e. they will not rotate to track the movement of the sun).The panels will maintain a maximum height of up to 3.84 m above the terrain and will be tilted at a pitch of 25 degrees horizontal towards the south. It is not geometrically possible for glare to occur in the terrain to the north of these south-facing PV panels; hence the 1 km study area does not extend to the north of the proposed PV panels.

A Zone of Theoretical Visibility (ZTV) analysis was undertaken as part of the Landscape and Visual Impact Assessment (LVIA), but it should be noted that areas shown on the ZTV map to have the potential for visibility of the PV array do not necessarily have the potential to be impacted by glint and glare (e.g. there is no geometric potential for glare anywhere to the north of the site but there may be the theoretical potential to see the back of PV panels).

The landform of the study area is characterised by flat to gently rolling terrain, which is typical of the Midlands of Ireland. The site ascends gently to the north from the M6 Motorway, which is either in a cutting or at grade as it passes to the south of the site. Land use is predominantly agricultural farmland, bounded by networks of hedgerow vegetation. In the southern extent of the study area, land use transitions to areas of peat bog bordered by scrubby vegetation. Blocks of conifer forest are also present throughout the study area, particularly in its southern extent. Other notable land uses include the M6 motorway corridor, the settlement of Rochfortbridge, and the newly constructed Castlelost 220kV substation.

In terms of settlement, Rochfortbridge is the principal settlement in relation to the proposed development, with its centre located just over 900 metres northeast of the proposed solar array. A string of rural dwellings extends from the settlement along the R446 regional road to the northeast of the proposed array, as well as along the site's surrounding boundaries. Other clusters of rural residential dwellings are also present along the local roads in the immediate vicinity of the site, while the settlement pattern becomes sparser in the southern extent of the study area.

2 https://www.met.ie/climate/what-we-measure/sunshine

Regarding transport routes, the nearest major route to the proposed solar array is the R446, which bisects the site. The M6, the most prominent major route within the study area, also bisects the southern extent of the site, passing through the area in an east–west direction. Additionally, the study area includes several local roads, the nearest of which pass to the east and west of the proposed array.

Due to the southerly orientation of the PV panels in the proposed solar farm, ground-based receptors (houses and transport routes) situated to the west of the solar array can only be affected by morning reflectance, when the sun is rising in the east. Conversely, receptors situated to the east of the site can only be affected by evening reflectance, when the sun is setting in the west.

Further, south facing panels in a landscape such as this result in a typical pattern of glare with potential glare impacts upon surrounding receptors occurring during the months February – October. This broadly represents the season where some or all foliage is present on vegetation. The assessment of the screening capacity of the surrounding vegetation in its winter state is therefore not necessary.

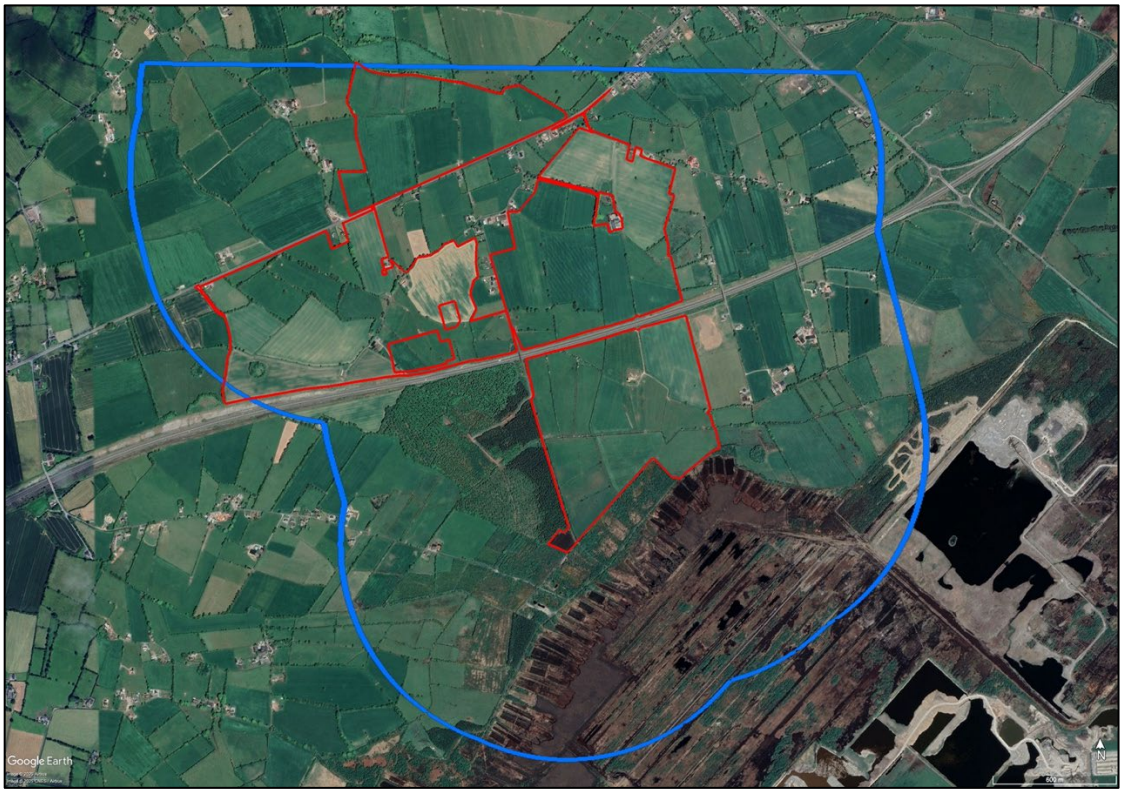

Figure 1.6: Aerial view (Google Earth Pro) of proposed solar development site (red outline), and the glint and glare study area (blue outline).

1.2.4 Mitigation by Design

It is proposed that all existing hedgerows within and around the perimeter of the site be allowed to 'grow-out' prior to construction. Additionally, advanced nursery stock in the form of 8-10cm girth trees will be used to fill any noticeable gaps. It is also proposed to plant new sections of hedgerow, along some sections of the site boundary, whilst new areas of native woodland planting are proposed along the sites boundary with the M6 motorway and along the western boundary of the southern solar parcel. The location of the proposed mitigation planting is indicated on the Landscape Masterplan - LD_PRJCT_ADMRL_3.1-3.3.

Furthermore, it is also proposed to include early-stage planting within and around the site during the first month of construction of the proposed solar farm, as noted in the mitigation section of the LVIA report (refer to Section 1.3 of the submitted LVIA) and identified on the landscape drawing package (refer to LD_PRJCT_ADMRL) . Thus, once implemented, the proposed planting measures have the potential to mitigate potential reflectance periods, even before planting has become fully established. By the time the proposed solar farm construction has concluded and the proposed panels are in place, the proposed planting will have been in place for up to two growing seasons, allowing the advanced nursery stock and whips to marginally fill out and reduce potential reflectance periods.

Once the relevant construction and associated works are complete, the hedgerows will be brought under regular agricultural management and trimmed to a height of approximately 3m-4m (generally greater than the maximum height of the proposed panels). Other existing hedgerows and vegetation will be also be maintained to maximise screening of the proposed development to provide consistent screening of the solar farm from nearby dwellings and transport routes. These proposed mitigation measures were added to the Digital Surface Model (DSM) analysis in order to produce the 'post-mitigation' results.

1.2.5 Assessment of Residential Receptors

1.2.5.1 Identification of Relevant Residential Receptors

Figure 1.7 - Figure 1.8 are output maps of the study area showing the results (areas of potential solar irradiance) of 1st phase reflectance analysis carried out on the proposed solar farm. These account for the path of the sun throughout the entire year; the panel positions and parameters; the 3D terrain parameters. This is the starting point for determining which residential receptors have the geometric potential to be affected by glint and glare – in the absence of screening.

Note: the yellow buffer line around the reflectance pattern indicating 'Area of consideration for further analysis' on the output maps represents a precautionary approach of including dwellings at the fringe of potentially affected areas. It accounts for the fact that this 'first-filter' map is based on a sampling grid point density of 100m.

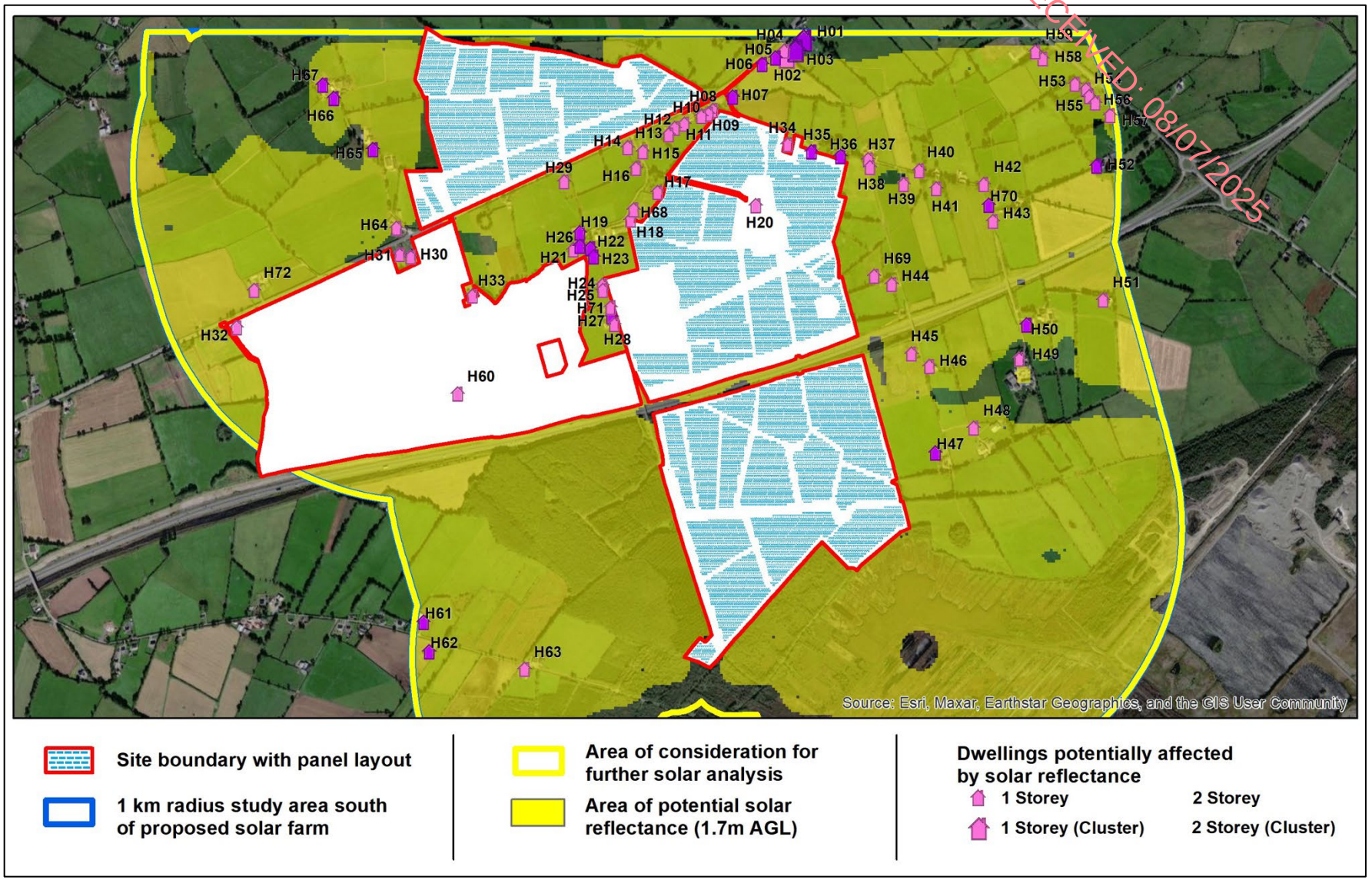

Figure 1.7 Parts of the study area where houses are potentially affected by glint and glare. The results are based on 3D terrain data that does not account for screening by vegetation or man-made structures and are based on a viewers' eye-level when standing on the ground floor = 1.7m above ground level.

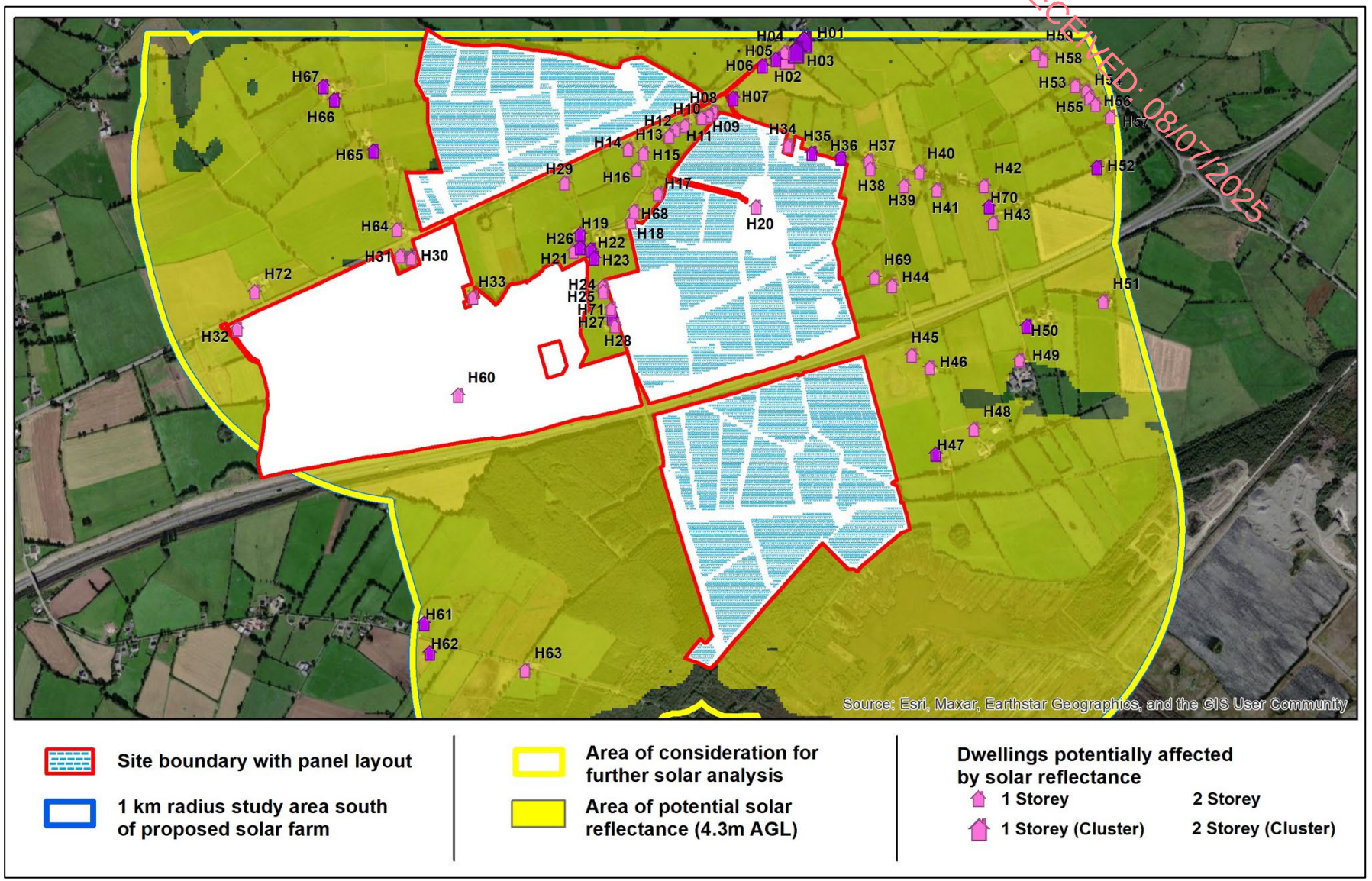

Figure 1.8 Parts of the study area where houses are potentially affected by glint and glare. The results are based on 3D terrain data that does not account for screening by vegetation or man-made structures and are based on a viewers' eye-level when standing on the first floor = 4.3m above ground level.

1.2.6 Results of Analysis of Residential Receptors

The results of the analysis for the dwellings which occur within the 'Area of Consideration for Further Analysis' are contained in Appendix A and C. These set out the times of day and days of the year that glint and glare effects could theoretically be experienced at residential receptors within the study area. Appendix C includes the entire potential glare periods, however in accordance with the stated methodology, Appendix A excludes periods where the sun is within 10 degrees of the angle of reflectance and it is these figures that form the basis of this assessment.

A summary of the results in Appendix A is included in Table 1.2 below. An assessment of the results will be undertaken in Section 1.2.6.1. This assessment also outlines the potential magnitude of impact that may occur at residential receptors.

Note: The results in the left hand columns of Appendix A are theoretical in that they are derived from a "bare-ground" data model that does not account for screening that might exist in the intervening landscape in the form of buildings and/or vegetation. This helps to establish a worst-case scenario baseline, from which we identify a subset of receptors for more thorough investigation. It is important to note that these figures do not necessarily represent an accurate portrayal of real impacts.

Table 1.2 Summary of Results in Appendix A - Dwellings

Receptor ID	Reflectance theoretically possible based on DTM topographic mapping (for control purposes)	Potential for impact after existing screening is taken into account (DSM)	Potential for impact after the proposed mitigation screening is taken into account (DSM)
H01	None	None	None
H02	None	None	None
H03	None	None	None
H04	None	None	None
H05	None	None	None
H06	None	None	None
H07	Yes Potentially	None	None
H08	Yes Potentially	None	None
H09	Yes Potentially	None	None
H10	Yes Potentially	None	None
H11	Yes Potentially	Yes Potentially	None
H12	Yes Potentially	Yes Potentially	None
H13	Yes Potentially	None	None
H14	Yes Potentially	Yes Potentially	None
H15	Yes Potentially	None	None
H16	Yes Potentially	None	None
H17	Yes Potentially	None	None

H18	Yes Potentially	None	None
H19	Yes Potentially	None	None
H20	Yes Potentially	None	None
H21	Yes Potentially	None	None
H22	Yes Potentially	Yes Potentially	None
H23	Yes Potentially	Yes Potentially	None
H24	Yes Potentially	Yes Potentially	None
H25	Yes Potentially	None	None
H26	Yes Potentially	None	None
H27	Yes Potentially	Yes Potentially	Yes Potentially
H28	Yes Potentially	Yes Potentially	None
H29	Yes Potentially	None	None
H30	None	None	None
H30	None	None	None
H31	None	None	None
H32	Yes Potentially	None	None
H33	Yes Potentially	None	None
H34	Yes Potentially	None	None
H35	Yes Potentially	None	None
H36	Yes Potentially	None	None
H37	Yes Potentially	None	None
H38	Yes Potentially	None	None
H39	Yes Potentially	None	None
H40	Yes Potentially	None	None
H41	Yes Potentially	None	None
H42	Yes Potentially	None	None
H43	Yes Potentially	None	None
H44	Yes Potentially	None	None
H45	Yes Potentially	None	None
H46	Yes Potentially	None	None
H47	Yes Potentially	None	None
H48	Yes Potentially	None	None
H49	None	None	None
H50	Yes Potentially	None	None
H51	Yes Potentially	None	None
H52	Yes Potentially	None	None
H53	Yes Potentially	None	None

H54	**Yes Potentially**	None	None
H55	**Yes Potentially**	None	None
H56	None	None	None
H57	None	None	None
H58	None	None	None
H59	None	None	None
H60	**Yes Potentially**	None	None
H61	**Yes Potentially**	None	None
H62	**Yes Potentially**	None	None
H63	**Yes Potentially**	None	None
H64	**Yes Potentially**	None	None
H65	**Yes Potentially**	None	None
H66	**Yes Potentially**	None	None
H67	**Yes Potentially**	None	None
H68	**Yes Potentially**	**Yes Potentially**	None
H69	**Yes Potentially**	None	None
H70	**Yes Potentially**	None	None
H71	**Yes Potentially**	**Yes Potentially**	None
H72	**Yes Potentially**	None	None

1.2.6.1 *Effects on Residential Receptors*

A total of 72 dwellings were examined. Computer analysis using terrain-only data (DTM) identified that glint and glare is geometrically possible at 59 of these. Further analysis, taking account of the existing screening inherent across the study area (using a digital surface model - DSM) and on-site verification of the analysis results, indicates that 10 no. dwellings are actually likely to have the potential to be materially affected by glint and glare prior to mitigation. This is on the basis of the considerable screening afforded by buildings and hedgerows that occur between the vast majority of receptors and potentially reflecting panels. Post mitigation establishment only 1 no. of these dwellings have the potential to incur glint and glare effects. Details of the assessment for these dwellings are outlined below.

H27

House H27 is a two-storey dwelling located along the L-51251 local road located to the immediate west of the central solar parcel. The analysis indicates the theoretical potential for reflectance emanating from the proposed PV panels at the ground floor for a maximum of 6 minutes per day over 22 days of the year and for a maximum of 4 minutes per day over 23 days of the year at the 1st floor of this dwelling. Prior to the proposed mitigation, the magnitude of impact is deemed **Very Low**

Once the proposed mitigation planting is fully established, reflectance emanating from the proposed PV panels will be entirely eliminated at the ground floor but will remain unchanged at the 1st floor. Thus, post-mitigation establishment, the magnitude of effect remains **Very low**.

Note: It is important to note that the reflectance periods identified above are theoretical and represent the worst-case scenario in terms of potential reflectance and assume that the sun is always shining and at full intensity. The results do not account for climate and inherent weather patterns that occur across the island of Ireland (refer to Met Eireann data[3]) . In addition, atmospheric conditions such as haze, mist, fog and precipitation will all have the effect of both reducing the visibility of the site overall and reducing the intensity of any glare emanating from the proposed solar farm. Overall, it is not considered that the reflectance periods outlined above will material impact on the enjoyment of any properties considered in this assessment. As landscape professionals with a combined 20+ years of LVIA experience, Macro Works do not consider that the reflectance periods outlined above will materially impact on the enjoyment of this property.

1.2.6.2 Ameliorating Factors

A key consideration for reflectance effects is the incidence (incoming) angle of the sun's rays when they strike the reflecting surface (solar panels in this instance). The most intense reflective rays occur when the receptor is at 90 degrees to the incidence rays. At decreasing angles the reflectance becomes increasingly diffused across a wider portion of the reflecting surface, thereby diminishing the intensity of the reflected rays. The nature of the reflecting surface also plays a major part in the degree of diffusion / absorption of the incidence rays and modern PV solar panels have become very efficient at absorbing rather than reflecting light. With regard to the proposed development, the potential for reflectance only has the potential to occur when during the early morning hours and later during the evening during the Spring, Summer and Autumn months when the sun is low in the sky – typically at < 30 degree sun incidence angle.

A technical note on solar module glare and reflectance prepared by SunPower Corporation[4] outlines the degree of material reflectivity for a range of sun incident angles. As per the table below (Table 1.3 below) the degree of reflectivity of solar panels below 30 degrees is < 5.03% and is likely to have no material consequence on surrounding receptors. It is also important to reiterate that in terms of reflectance, photovoltaic solar panels are by no means a highly reflective surface. They are designed to absorb sunlight and not to reflect it. Furthermore, as technology has improved, the addition of an antireflective coating on panels has become an option. A June 2023 study by Loughborough University states "currently around 90% of commercial PV modules are supplied with an AR coating applied to the cover glass"[5].

Several studies have shown that even standard photovoltaic panels, without anti-reflective coatings have similar reflectance characteristics to water, which is much lower than the likes of glass, steel and snow by comparison (see Table 1.3). Similar levels of reflectance can be found in common situations in rural environments from surfaces such as shed roofs, lines of plastic ground covering used in cropping and wet roads to name but a few. In the case of modern PV solar panels which include an anti-reflective coating, reflectance levels are even less than that emitted from standard window glass and still water. Indeed, the degree of reflectivity of solar panels below 30 degrees reduces to < 3.12% and is likely to have a negligible effect on surrounding receptors

Table 1.3 Material Reflectivity at various sun incident angles (derived from Sunpower Corporation (September 2009), T09014 Solar Module Glare and Reflectance Technical Memo)

3 https://www.met.ie/climate/what-we-measure/sunshine

4 Sunpower Corporation (September 2009), T09014 Solar Module Glare and Reflectance Technical Memo

5 "The performance and durability of Anti-reflection coatings for solar module cover glass – a review" Available at: https://www.sciencedirect.com/science/article/pii/S0038092X23004061

Common Reflective Surfaces (In surrounding environments for PV systems)		Sun Incident angle in degrees						
		0	15	30	45	60	75	90
Material Reflectivity (percent of incident light reflected)	Steel	36.73%	39.22%	46.34%	57.11%	70.02%	83.15%	94.40%
	Snow	21.63%	23.09%	27.29%	33.63%	41.23%	48.96%	55.59%
	Standard Glass	8.44%	9.01%	10.65%	13.12%	16.09%	19.10%	21.69%
	Plexiglass	8.00%	8.54%	10.09%	12.44%	15.25%	18.11%	20.56%
	Plastic	6.99%	7.46%	8.82%	10.87%	13.33%	15.83%	17.97%
	Smooth Water	4.07%	4.35%	5.14%	6.33%	7.76%	9.22%	10.47%
	Solar Glass (high light transmission)	3.99%	4.26%	5.03%	6.20%	7.61%	9.03%	10.26%
	Solar Glass w/AR coating	2.47%	2.64%	3.12%	3.84%	4.71%	5.59%	6.35%

Note: Index of refraction values may vary slightly depending on suppliers and reference documentation.

1.2.7 Conclusion - Residential Receptors

Each dwelling within 1km of the proposed development has been fully assessed based on location, height and orientation in relation to the proposed solar farm. For the reasons outlined above, it has been determined that glint and glare impacts are at the lower end of the spectrum (i.e. ranging between Very Low and Negligible) as the proposed panels are not considered to be highly reflective surfaces, and the frequency/durations involved are not considered excessive to the degree that they will have a material impact on the enjoyment of any property.

It must also be re-emphasised that the reflectance periods provided are theoretical by default and represent a worst-case scenario in that they assume that the sun is always shining and at full intensity. In the Irish context, the reflectance frequency/duration figures provided are likely to be at least double the reality, according to Met Eireann data.

Thus, it is considered that there will be no significant reflectance effects generated from glint and glare towards surrounding dwellings as a result of the proposed solar farm.

1.2.8 Assessment of Transport Route Receptors

1.2.8.1 Identification of Relevant Transport Route Receptors

Figure 1.9 is an output map of the study area showing the results (areas of potential solar irradiance) of 1st phase reflectance analysis carried out on the proposed solar farm. These account for the path of the sun throughout the entire year; the panel positions and parameters; the 3D terrain parameters. This is the starting point for determining which transport route receptors have the geometric potential to be affected by glint and glare – in the absence of screening.

Note: the yellow buffer line around the reflectance pattern indicating 'Area of consideration for further analysis' on the output map represents a precautionary approach of including transport route sections at the fringe of potentially affected areas. It accounts for the fact that this 'first-filter' map is based on a sampling grid point density of 100m.

Receptor Points have been positioned along all the potentially affected roads (R) and railways (T) within the 'Area of Consideration for Further Analysis'. Transport route Receptor Points are placed automatically in an un-biased fashion at 50m intervals along route lines using Geographic Information Systems (GIS) software. There will be instances where points may be screened by single trees in otherwise open sections of route, or, conversely they may be exposed through a gateway in an otherwise long section of screening hedgerow. Their frequency is designed, however, to reflect the overall screening characteristics of the route sections.

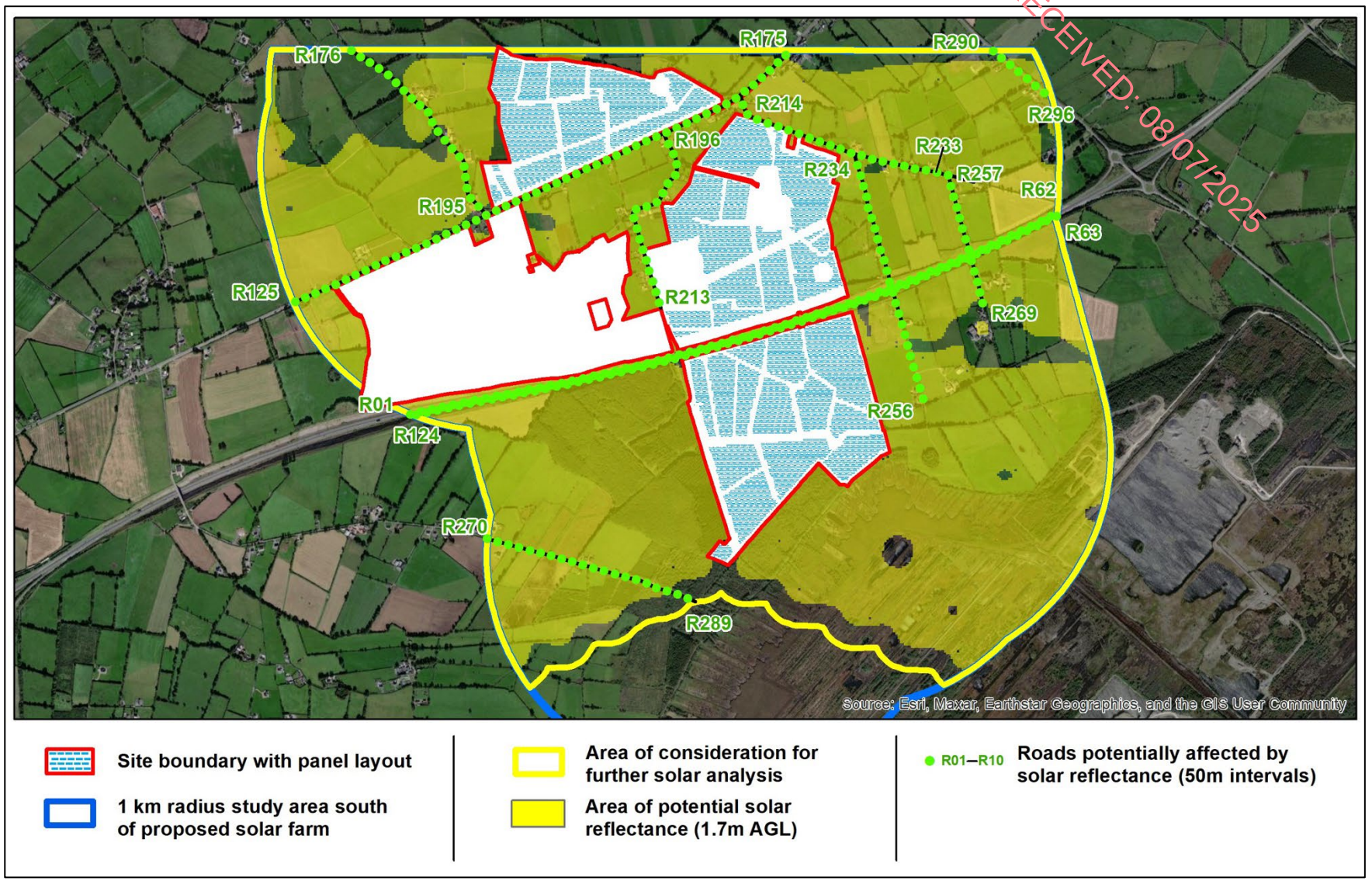

Figure 1.9 Parts of the study area where roads are potentially affected by glint and glare. The results are based on 3D terrain data that does not account for screening by vegetation or man-made structures and are based on viewer's eye level at 1.7m above ground level for roads

1.2.9 Results of Analysis of Transport Route Receptors

The results of the analysis for the transport routes which occur within the 'Area of Consideration for Further Analysis' is contained in Appendix B and D. These set out the times of day and days of the year that glint and glare effects could theoretically be experienced at transport route receptors within the study area. Appendix D includes the entire potential glare periods, however in accordance with the stated methodology, Appendix B excludes periods where the sun is within 10 degrees of the angle of reflectance, and it is these figures that form the basis of this assessment.

A summary of the results in Appendix B is included in Table 1.4 below. An assessment of the results will be undertaken in Section 1.2.9.1

Note: The results in the left hand columns of Appendix B are theoretical in that they are derived from a "bare-ground" data model that does not account for screening that might exist in the intervening landscape in the form of buildings and/or vegetation. This helps to establish a worst-case scenario baseline, from which we identify a subset of receptors for more thorough investigation. It is important to note that these figures do not necessarily represent an accurate portrayal of real impacts.

It is important to note that the figures for the maximum minutes per day in Appendix B relate to the time window that a section of route can potentially experience reflectance and are therefore of less consequence than they would be for a static dwelling receptor. Such effects can only be experienced for the period of time it takes to travel along the affected road section, and therefore will be fleeting and in any event significantly less than the maximum periods outlined.

Table 1.4 Summary of Results contained in Appendix B - Transport Receptors: Roads

Receptor ID	Reflectance theoretically possible based on DTM topographic mapping (for control purposes)	Potential for impact after existing screening is taken into account (DSM)	Potential for impact after the proposed mitigation screening is taken into account (DSM)
R01	Yes Potentially	None	None
R02	Yes Potentially	None	None
R03	Yes Potentially	None	None
R04	Yes Potentially	None	None
R05	Yes Potentially	None	None
R06	Yes Potentially	None	None
R07	Yes Potentially	None	None
R08	Yes Potentially	None	None
R09	Yes Potentially	None	None
R10	Yes Potentially	None	None
R11	Yes Potentially	None	None
R12	Yes Potentially	None	None
R13	Yes Potentially	None	None
R14	Yes Potentially	None	None
R15	Yes Potentially	None	None

R16	Yes Potentially	None	None
R17	Yes Potentially	None	None
R18	Yes Potentially	None	None
R19	Yes Potentially	None	None
R20	Yes Potentially	None	None
R21	Yes Potentially	None	None
R22	Yes Potentially	None	None
R23	Yes Potentially	None	None
R24	Yes Potentially	None	None
R25	Yes Potentially	None	None
R26	Yes Potentially	None	None
R27	Yes Potentially	Yes Potentially	None
R28	Yes Potentially	Yes Potentially	None
R29	Yes Potentially	Yes Potentially	None
R30	Yes Potentially	Yes Potentially	None
R31	Yes Potentially	Yes Potentially	None
R32	Yes Potentially	Yes Potentially	None
R33	Yes Potentially	Yes Potentially	None
R34	Yes Potentially	Yes Potentially	None
R35	Yes Potentially	Yes Potentially	None
R36	Yes Potentially	None	None
R37	Yes Potentially	None	None
R38	Yes Potentially	None	None
R39	Yes Potentially	None	None
R40	Yes Potentially	None	None
R41	Yes Potentially	None	None
R42	None	None	None
R43	None	None	None
R44	None	None	None
R45	None	None	None
R46	None	None	None
R47	None	None	None
R48	None	None	None
R49	None	None	None
R50	None	None	None
R51	None	None	None
R52	None	None	None

R53	None	None	None
R54	None	None	None
R55	None	None	None
R56	Yes Potentially	None	None
R57	Yes Potentially	None	None
R58	Yes Potentially	None	None
R59	None	None	None
R60	Yes Potentially	None	None
R61	Yes Potentially	None	None
R62	Yes Potentially	None	None
R63	Yes Potentially	None	None
R64	Yes Potentially	None	None
R65	Yes Potentially	None	None
R66	Yes Potentially	None	None
R67	Yes Potentially	None	None
R68	Yes Potentially	None	None
R69	Yes Potentially	None	None
R70	None	None	None
R71	Yes Potentially	None	None
R72	None	None	None
R73	None	None	None
R74	None	None	None
R75	None	None	None
R76	None	None	None
R77	None	None	None
R78	None	None	None
R79	None	None	None
R80	None	None	None
R81	None	None	None
R82	None	None	None
R83	Yes Potentially	None	None
R84	Yes Potentially	None	None
R85	Yes Potentially	None	None
R86	Yes Potentially	None	None
R87	Yes Potentially	None	None
R88	Yes Potentially	None	None
R89	Yes Potentially	None	None

R90	Yes Potentially	Yes Potentially	None
R91	Yes Potentially	None	None
R92	Yes Potentially	Yes Potentially	None
R93	Yes Potentially	None	None
R94	Yes Potentially	None	None
R95	Yes Potentially	None	None
R96	Yes Potentially	None	None
R97	Yes Potentially	None	None
R98	Yes Potentially	None	None
R99	Yes Potentially	None	None
R100	Yes Potentially	None	None
R101	Yes Potentially	None	None
R102	Yes Potentially	None	None
R103	Yes Potentially	None	None
R104	Yes Potentially	None	None
R105	Yes Potentially	None	None
R106	Yes Potentially	None	None
R107	Yes Potentially	None	None
R108	Yes Potentially	None	None
R109	Yes Potentially	None	None
R110	Yes Potentially	None	None
R111	Yes Potentially	None	None
R112	Yes Potentially	None	None
R113	Yes Potentially	None	None
R114	Yes Potentially	None	None
R115	Yes Potentially	None	None
R116	Yes Potentially	None	None
R117	Yes Potentially	None	None
R118	Yes Potentially	None	None
R119	Yes Potentially	None	None
R120	Yes Potentially	None	None
R121	None	None	None
R122	Yes Potentially	None	None
R123	Yes Potentially	None	None
R124	Yes Potentially	None	None
R125	Yes Potentially	None	None
R126	Yes Potentially	None	None

R127	Yes Potentially	None	None
R128	Yes Potentially	None	None
R129	Yes Potentially	None	None
R130	Yes Potentially	None	None
R131	Yes Potentially	None	None
R132	Yes Potentially	None	None
R133	Yes Potentially	None	None
R134	Yes Potentially	None	None
R135	None	None	None
R136	None	None	None
R137	None	None	None
R138	None	None	None
R139	None	None	None
R140	None	None	None
R141	None	None	None
R142	None	None	None
R143	None	None	None
R144	None	None	None
R145	None	None	None
R146	Yes Potentially	Yes Potentially	None
R147	Yes Potentially	Yes Potentially	None
R148	Yes Potentially	Yes Potentially	None
R149	Yes Potentially	Yes Potentially	None
R150	Yes Potentially	Yes Potentially	None
R151	Yes Potentially	Yes Potentially	None
R152	Yes Potentially	Yes Potentially	None
R153	Yes Potentially	None	None
R154	Yes Potentially	Yes Potentially	None
R155	Yes Potentially	Yes Potentially	None
R156	Yes Potentially	Yes Potentially	None
R157	Yes Potentially	Yes Potentially	None
R158	Yes Potentially	Yes Potentially	None
R159	Yes Potentially	Yes Potentially	None
R160	Yes Potentially	Yes Potentially	None
R161	Yes Potentially	Yes Potentially	None
R162	Yes Potentially	Yes Potentially	None
R163	Yes Potentially	None	None

R164	Yes Potentially	None	None
R165	Yes Potentially	Yes Potentially	None
R166	Yes Potentially	Yes Potentially	None
R167	Yes Potentially	None	None
R168	Yes Potentially	Yes Potentially	None
R169	Yes Potentially	None	None
R170	Yes Potentially	None	None
R171	Yes Potentially	None	None
R172	None	None	None
R173	None	None	None
R174	None	None	None
R175	None	None	None
R176	None	None	None
R177	None	None	None
R178	None	None	None
R179	None	None	None
R180	None	None	None
R181	None	None	None
R182	None	None	None
R183	Yes Potentially	None	None
R184	Yes Potentially	None	None
R185	Yes Potentially	None	None
R186	None	None	None
R187	None	None	None
R188	None	None	None
R189	None	None	None
R190	None	None	None
R191	Yes Potentially	None	None
R192	Yes Potentially	None	None
R193	Yes Potentially	None	None
R194	Yes Potentially	None	None
R195	Yes Potentially	Yes Potentially	None
R196	Yes Potentially	None	None
R197	Yes Potentially	Yes Potentially	None
R198	Yes Potentially	None	None
R199	Yes Potentially	None	None
R200	Yes Potentially	None	None

R201	Yes Potentially	Yes Potentially	None
R202	Yes Potentially	None	None
R203	Yes Potentially	None	None
R204	Yes Potentially	Yes Potentially	None
R205	Yes Potentially	None	None
R206	Yes Potentially	Yes Potentially	None
R207	Yes Potentially	Yes Potentially	None
R208	Yes Potentially	Yes Potentially	None
R209	Yes Potentially	Yes Potentially	None
R210	Yes Potentially	Yes Potentially	None
R211	Yes Potentially	Yes Potentially	None
R212	Yes Potentially	Yes Potentially	None
R213	Yes Potentially	Yes Potentially	None
R214	Yes Potentially	Yes Potentially	None
R215	Yes Potentially	None	None
R216	Yes Potentially	None	None
R217	Yes Potentially	None	None
R218	Yes Potentially	None	None
R219	Yes Potentially	Yes Potentially	None
R220	Yes Potentially	Yes Potentially	None
R221	Yes Potentially	None	None
R222	Yes Potentially	None	None
R223	Yes Potentially	None	None
R224	Yes Potentially	None	None
R225	Yes Potentially	None	None
R226	Yes Potentially	None	None
R227	None	None	None
R228	Yes Potentially	None	None
R229	Yes Potentially	None	None
R230	None	None	None
R231	Yes Potentially	None	None
R232	Yes Potentially	None	None
R233	Yes Potentially	None	None
R234	None	None	None
R235	Yes Potentially	None	None
R236	Yes Potentially	None	None
R237	Yes Potentially	None	None

R238	Yes Potentially	None	None
R239	Yes Potentially	None	None
R240	Yes Potentially	None	None
R241	Yes Potentially	None	None
R242	Yes Potentially	None	None
R243	Yes Potentially	None	None
R244	Yes Potentially	None	None
R245	Yes Potentially	None	None
R246	Yes Potentially	None	None
R247	Yes Potentially	None	None
R248	Yes Potentially	None	None
R249	Yes Potentially	Yes Potentially	Yes Potentially
R250	None	None	None
R251	Yes Potentially	None	None
R252	Yes Potentially	None	None
R253	Yes Potentially	None	None
R254	Yes Potentially	Yes Potentially	None
R255	Yes Potentially	Yes Potentially	None
R256	Yes Potentially	None	None
R257	Yes Potentially	None	None
R258	Yes Potentially	None	None
R259	Yes Potentially	None	None
R260	Yes Potentially	None	None
R261	Yes Potentially	None	None
R262	Yes Potentially	None	None
R263	Yes Potentially	None	None
R264	None	None	None
R265	Yes Potentially	None	None
R266	Yes Potentially	None	None
R267	Yes Potentially	None	None
R268	None	None	None
R269	None	None	None
R270	Yes Potentially	None	None
R271	Yes Potentially	None	None
R272	Yes Potentially	None	None
R273	Yes Potentially	None	None
R274	Yes Potentially	None	None

R275	**Yes Potentially**	None	None
R276	**Yes Potentially**	None	None
R277	**Yes Potentially**	None	None
R278	**Yes Potentially**	None	None
R279	**Yes Potentially**	None	None
R280	**Yes Potentially**	None	None
R281	**Yes Potentially**	None	None
R282	**Yes Potentially**	None	None
R283	**Yes Potentially**	None	None
R284	**Yes Potentially**	None	None
R285	**Yes Potentially**	None	None
R286	**Yes Potentially**	None	None
R287	None	None	None
R288	None	None	None
R289	None	None	None
R290	None	None	None
R291	None	None	None
R292	None	None	None
R293	None	None	None
R294	None	None	None
R295	**Yes Potentially**	None	None
R296	**Yes Potentially**	None	None

1.2.9.1 *Effects on Road Receptors*

Appendix B examined a total of 296 road Receptor Points. Analysis of terrain-level screening (using a digital terrain model - DTM) identified that glint and glare is theoretically possible at 226 of these road Receptor Points. Further analysis, taking account of the existing screening inherent across the study area (using a digital surface model - DSM) and on-site verification of the analysis results, determined that 48 of the road receptor points will actually have the potential to be materially affected by glint and glare prior to mitigation. These road receptor points are situated on local and regional roads in the vicinity of the proposed development. The results indicate that the existing screening afforded by buildings and vegetation that occurs between receptors and potentially reflecting panels has a significant bearing on reducing the overall glint and glare likely to be experienced within the study area. The final analysis (DSM with mitigation added) indicates only 1 Road Receptor Point has the potential to experience residual glare.

The 1 road Receptor Point with the potential to incur glint and glare residual effects in the DSM analysis will be assessed in further detail (pre and post-mitigation) in the sections below.

R249

This receptor point is located along the L11273 local road located to the east of the southern solar parcel south of the M6 motorway. The DSM analysis results show that reflectance has the potential to occur for a maximum window of up to 16 minutes per day over 105 days of the year. Post mitigation establishment, the potential glare periods will marginally reduce from a maximum of 846 minutes per year to a maximum of 822 minutes per year.

It is important to note that there must be clear sunshine for any glare to occur. It is also important to note that reflectance only has the potential to occur for a very brief section of this local road carriageway (< 5m section). Furthermore, glare will not be experienced when travelling south along this section of road as the potential glare will be outside of the field of view, i.e. offset greater than 100 degrees to the direction of travel (Figure 1.10 refers) For these reasons, it is not considered that there will be any significant reflectance or hazard effects generated from glint and glare.

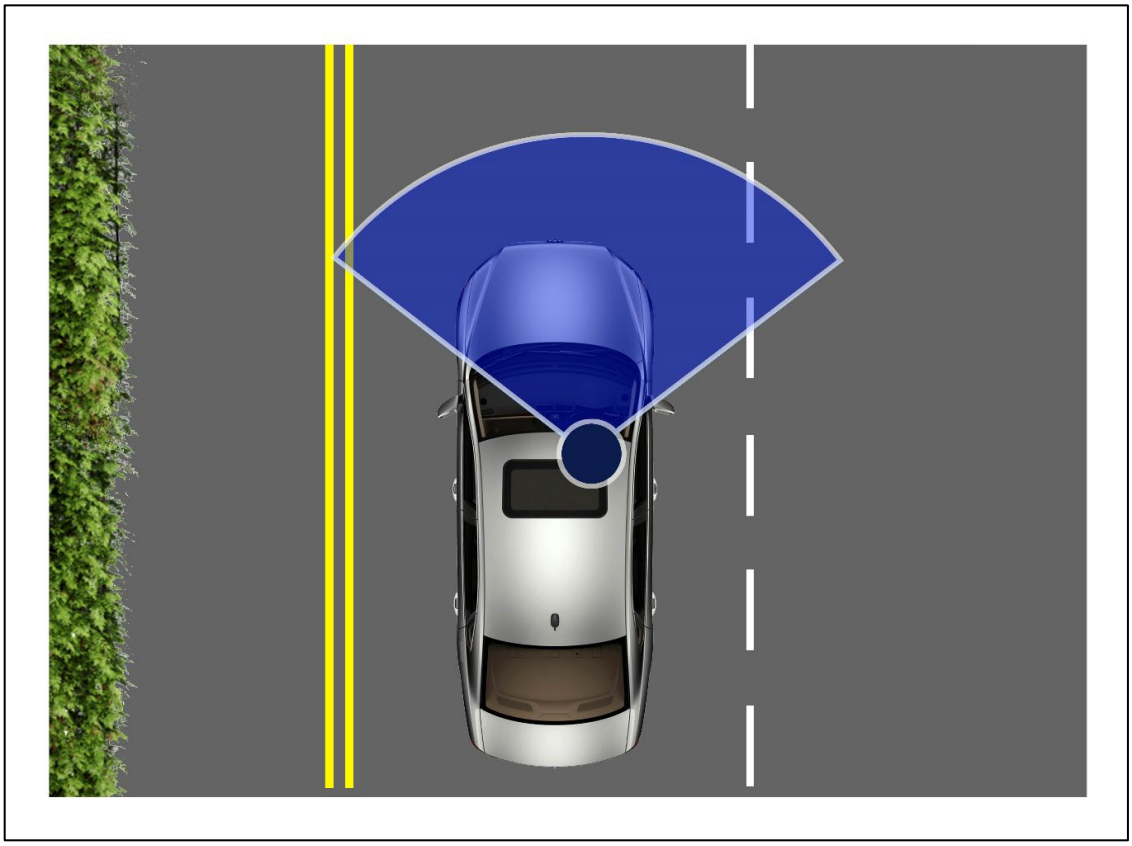

Figure 1.10 Illustration of a 100 degree field of view for driver (blue hatched area) extending 50 degrees to the left and 50 degrees to the right from the direction of travel.

1.2.10 Conclusion - Road Receptors

For the reasons outlined above, it is not considered that the glint and glare emanating from the proposed solar PV panels will generate significant reflectance or hazard effects for road users within the study area.

1.3 ASSESSMENT OF AVIATION RECEPTORS

1.3.1 Identification of Relevant Aviation Receptors

In accordance with current IAA and DAA protocol 10 km and 15 km radius study areas were established for the identification of IAA registered aerodromes and main airports respectively, that might require testing for glint and glare impacts. However, there are no IAA registered aerodromes within the 10 km aviation study area and neither of DAA's Dublin or Cork airports occur within 15 km of the proposed solar farm. For these reasons, no further aviation analysis was undertaken.

Furthermore, the Planning and Development (Solar Safeguarding Zone) Regulations 2022 set out 43 Solar Safeguarding Zones (SSZs). A SSZ is an area around an airport, aerodrome or helipad in which there is a potential for glint or glare from solar panels to impact aviation safety. The proposed development is not located within any of the defined SSZs, and therefore, an aviation-based glint and glare analysis was scoped out for further assessment.

1.4 OVERALL CONCLUSION

From the analysis and discussions contained herein, it is considered that there will not be any significant reflectance effects from glint and glare at dwellings within the study area. It is also considered that there will not be any hazardous glint and glare effects upon road receptors resulting from the proposed Project Admiral Solar Farm.

APPENDIX A: RESULTS OF GLINT AND GLARE ASSESSMENT - DWELLING RECEPTORS

The results tables set out the days of the year and the times of the day that glint and glare effects could theoretically be experienced for each residential receptor within the study area. It is important to note that the analysis assumes that the sun will be shining at all times without cloud cover, thus the output periods in the context of the Irish climate could be considered to be significantly exaggerated.

APPENDIX B: RESULTS OF GLINT AND GLARE ASSESSMENT - TRANSPORT RECEPTORS

The results tables set out the days of the year and the times of the day that glint and glare effects could theoretically be experienced for each residential receptor within the study area. It is important to note that the analysis assumes that the sun will be shining at all times without cloud cover, thus the output periods in the context of the Irish climate could be considered to be significantly exaggerated.

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APPENDIX C: GEOMETRIC ASSESSMENT RESULTS – DWELLING RECEPTORS

Note 1: Only those dwellings have been included where an episode of glint and glare has been predicted when taking account of the existing non-landform screening (vegetation and buildings). If a dwelling receptor is not present, it has been determined that glint and glare is unlikely given current levels of screening inherent in the surrounding landscape. See Appendix A for the full list of results for all dwellings in tabular format.

Note 2: Yellow panels are those that have potential to generate reflectance, but not all at once.

Note 3: Unlike for Appendix A, in Appendix C glare periods where the glaring panels are within 10 degrees of the shining sun have been included.

APPENDIX D: GEOMETRIC ASSESSMENT RESULTS – TRANSPORT RECEPTORS

Note 1: Only those transport route receptors have been included where an episode of glint and glare has been recorded when taking account of the existing non-landform screening (vegetation and buildings). If a route receptor is not present, it has been determined that glint and glare is unlikely given current levels of screening inherent in the surrounding landscape. See Appendix B for the full list of results for all transport route receptors in tabular format.

Note 2: Yellow panels are those that have potential to generate reflectance, but not all at once.

Note 3: Unlike for Appendix B, in Appendix D glare periods where the glaring panels are within 10 degrees of the shining sun have been included.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H01a	1 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H01b	2 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H02										Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H03a	1 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H03b	2 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H04										Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H05a	1 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H05b	2 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H06a	1 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H06b	2 of 2									Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H07a	1 of 2	April	11	36	3.3			7:00 p.m. - 7:30 p.m.	36	Tot days: 69 18.9% days Tot mins: 284 Max mins: 14 Avg mins: 4.12	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0
		May	23	94	4.1			6:30 p.m. - 8:00 p.m.	94			
		July	14	56	4			7:00 p.m. - 8:00 p.m.	56			
		August	21	98	4.7			7:00 p.m. - 8:00 p.m.	98			

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H07b	2 of 2	April	17	120	7.1			7:00 p.m. - 8:00 p.m.	120	Tot days: 92 25.2% days Tot mins: 560 Max mins: 16 Avg mins: 6.09	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0
		May	28	158	5.6			6:30 p.m. - 8:00 p.m.	158			
		July	19	88	4.6			7:00 p.m. - 8:00 p.m.	88			
		August	28	194	6.9			7:00 p.m. - 8:00 p.m.	194			

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H08		April	4	10	2.5			7:00 p.m. - 7:30 p.m.	10	Tot days: 71	Tot days: 0	Tot days: 0
		May	22	62	2.8			7:00 p.m. - 7:30 p.m.	62	19.5% days		
		June	14	34	2.4			7:00 p.m. - 7:30 p.m.	34	Tot mins: 200	Tot mins: 0	Tot mins: 0
		July	22	66	3			7:00 p.m. - 8:00 p.m.	66	Max mins: 6		
		August	9	28	3.1			7:00 p.m. - 8:00 p.m.	28	Avg mins: 2.82		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H09		April	4	8	2			7:00 p.m. - 8:00 p.m.	8	Tot days: 68	Tot days: 0	Tot days: 0
		May	14	36	2.6			7:00 p.m. - 8:00 p.m.	36	18.6% days		
		June	25	50	2			7:00 p.m. - 8:00 p.m.	50	Tot mins: 152	Tot mins: 0	Tot mins: 0
		July	16	36	2.3			7:30 p.m. - 8:00 p.m.	36	Max mins: 4		
		August	9	22	2.4			7:30 p.m. - 8:00 p.m.	22	Avg mins: 2.24		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H10		April	4	10	2.5			7:00 p.m. - 8:00 p.m.	10	Tot days: 56	Tot days: 0	Tot days: 0
		May	16	38	2.4			7:00 p.m. - 8:00 p.m.	38	15.3% days		
		June	10	22	2.2			7:00 p.m. - 8:00 p.m.	22	Tot mins: 130	Tot mins: 0	Tot mins: 0
		July	15	36	2.4			7:30 p.m. - 8:00 p.m.	36	Max mins: 4		
		August	11	24	2.2			7:30 p.m. - 8:00 p.m.	24	Avg mins: 2.32		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H11		April	1	2	2			7:30 p.m. - 8:00 p.m.	2	Tot days: 58	Tot days: 44	Tot days: 0
		May	18	38	2.1			7:30 p.m. - 8:00 p.m.	38	15.9% days	12.1% days	
		June	17	38	2.2			7:30 p.m. - 8:00 p.m.	38	Tot mins: 126	Tot mins: 96	Tot mins: 0
		July	17	38	2.2			7:30 p.m. - 8:00 p.m.	38	Max mins: 4	Max mins: 4	
		August	5	10	2			7:30 p.m. - 8:00 p.m.	10	Avg mins: 2.17	Avg mins: 2.18	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H12		April	3	10	3.3	7:00 a.m. - 7:30 a.m.	2	7:30 p.m. - 8:00 p.m.	8	Tot days: 53	Tot days: 4	Tot days: 0
		May	16	44	2.8			7:00 p.m. - 8:00 p.m.	44	14.5% days	1.1% days	
		June	11	22	2			7:30 p.m. - 8:00 p.m.	22	Tot mins: 140	Tot mins: 8	Tot mins: 0
		July	14	40	2.9			7:30 p.m. - 8:00 p.m.	40	Max mins: 8	Max mins: 2	
		August	9	24	2.7	7:00 a.m. - 7:30 a.m.	4	7:30 p.m. - 8:00 p.m.	20	Avg mins: 2.64	Avg mins: 2	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H13		April	7	28	4	7:00 a.m. - 7:30 a.m.	18	7:00 p.m. - 8:00 p.m.	10	Tot days: 82	Tot days: 0	Tot days: 0
		May	16	60	3.8	7:00 a.m. - 7:30 a.m.	24	7:00 p.m. - 8:00 p.m.	36	22.5% days		
		June	28	96	3.4			7:30 p.m. - 8:00 p.m.	96	Tot mins: 292	Tot mins: 0	Tot mins: 0
		July	16	38	2.4	7:00 a.m. - 7:30 a.m.	2	7:30 p.m. - 8:00 p.m.	36	Max mins: 14		
		August	15	70	4.7	7:00 a.m. - 7:30 a.m.	40	7:00 p.m. - 8:00 p.m.	30	Avg mins: 3.56		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H14		April	6	32	5.3	7:00 a.m. - 7:30 a.m.	26	7:30 p.m. - 8:00 p.m.	6	Tot days: 99	Tot days: 30	Tot days: 0
		May	30	148	4.9	7:00 a.m. - 7:30 a.m.	80	7:00 p.m. - 8:00 p.m.	68	27.1% days	8.2% days	
		June	16	46	2.9	7:00 a.m. - 7:30 a.m.	12	7:00 p.m. - 8:00 p.m.	34	Tot mins: 460	Tot mins: 68	Tot mins: 0
		July	28	138	4.9	7:00 a.m. - 8:00 a.m.	72	7:30 p.m. - 8:00 p.m.	66	Max mins: 10	Max mins: 4	
		August	19	96	5.1	7:00 a.m. - 8:00 a.m.	76	7:30 p.m. - 8:00 p.m.	20	Avg mins: 4.65	Avg mins: 2.27	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H15		April	13	38	2.9	7:00 a.m. - 8:00 a.m.	38			Tot days: 68	Tot days: 0	Tot days: 0
		May	20	62	3.1	7:00 a.m. - 7:30 a.m.	26	7:00 p.m. - 8:00 p.m.	36	18.6% days		
		June	2	4	2			7:30 p.m. - 8:00 p.m.	4	Tot mins: 212	Tot mins: 0	Tot mins: 0
		July	15	36	2.4			7:30 p.m. - 8:30 p.m.	36	Max mins: 10		
		August	18	72	4	7:00 a.m. - 8:00 a.m.	58	7:30 p.m. - 8:00 p.m.	14	Avg mins: 3.12		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H16		April	16	60	3.8	7:00 a.m. - 8:30 a.m.	50	7:00 p.m. - 8:00 p.m.	10	Tot days: 132	Tot days: 0	Tot days: 0
		May	31	154	5	7:00 a.m. - 8:00 a.m.	94	7:00 p.m. - 8:00 p.m.	60	36.2% days		
		June	29	168	5.8	7:00 a.m. - 8:00 a.m.	58	7:00 p.m. - 8:00 p.m.	110	Tot mins: 666	Tot mins: 0	Tot mins: 0
		July	30	168	5.6	7:30 a.m. - 8:00 a.m.	96	7:00 p.m. - 8:00 p.m.	72	Max mins: 12		
		August	23	110	4.8	7:00 a.m. - 8:00 a.m.	76	7:30 p.m. - 8:00 p.m.	34	Avg mins: 5.05		
		September	3	6	2	8:00 a.m. - 8:30 a.m.	6					

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H17	1 of 2	April	15	58	3.9	7:00 a.m. - 8:00 a.m.	10	7:00 p.m. - 8:00 p.m.	48	Tot days: 132	Tot days: 0	Tot days: 0
		May	31	118	3.8	7:00 a.m. - 7:30 a.m.	16	7:00 p.m. - 8:00 p.m.	102	36.2% days		
		June	29	138	4.8	7:00 a.m. - 8:00 a.m.	36	7:00 p.m. - 8:00 p.m.	102	Tot mins: 524	Tot mins: 0	Tot mins: 0
		July	31	110	3.5	7:00 a.m. - 8:00 a.m.	20	7:30 p.m. - 8:00 p.m.	90	Max mins: 8		
		August	26	100	3.8	7:00 a.m. - 8:00 a.m.	20	7:00 p.m. - 8:00 p.m.	80	Avg mins: 3.97		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H18		April	10	82	8.2	7:00 a.m. - 7:30 a.m.	10	7:00 p.m. - 8:00 p.m.	72	Tot days: 121	Tot days: 0	Tot days: 0
		May	31	164	5.3	7:00 a.m. - 7:30 a.m.	28	7:00 p.m. - 8:00 p.m.	136	33.2% days		
		June	29	84	2.9	7:00 a.m. - 7:30 a.m.	44	7:00 p.m. - 8:00 p.m.	40	Tot mins: 646	Tot mins: 0	Tot mins: 0
		July	31	154	5	7:00 a.m. - 8:00 a.m.	34	7:30 p.m. - 8:00 p.m.	120	Max mins: 18		
		August	20	162	8.1	7:00 a.m. - 8:00 a.m.	20	7:00 p.m. - 8:00 p.m.	142	Avg mins: 5.34		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H19a	1 of 2	April	15	92	6.1	7:00 a.m. - 7:30 a.m.	34	7:00 p.m. - 8:00 p.m.	58	Tot days: 114	Tot days: 0	Tot days: 0
		May	30	208	6.9	6:30 a.m. - 7:30 a.m.	106	7:00 p.m. - 8:00 p.m.	102	31.2% days		
		June	13	56	4.3	7:00 a.m. - 7:30 a.m.	32	7:30 p.m. - 8:00 p.m.	24	Tot mins: 692	Tot mins: 0	Tot mins: 0
		July	31	156	5	7:00 a.m. - 8:00 a.m.	92	7:30 p.m. - 8:00 p.m.	64	Max mins: 14		
		August	25	180	7.2	7:00 a.m. - 8:00 a.m.	70	7:00 p.m. - 8:30 p.m.	110	Avg mins: 6.07		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H19b	2 of 2	April	18	234	13	7:00 a.m. - 8:00 a.m.	150	7:00 p.m. - 8:00 p.m.	84	Tot days: 132	Tot days: 0	Tot days: 0
		May	30	270	9	7:00 a.m. - 8:30 a.m.	168	7:00 p.m. - 8:00 p.m.	102	36.2% days		
		June	27	84	3.1	7:00 a.m. - 7:30 a.m.	28	7:00 p.m. - 8:00 p.m.	56	Tot mins: 1156	Tot mins: 0	Tot mins: 0
		July	29	174	6	7:00 a.m. - 8:30 a.m.	106	7:30 p.m. - 8:00 p.m.	68	Max mins: 22		
		August	28	394	14.1	7:00 a.m. - 8:30 a.m.	270	7:00 p.m. - 8:30 p.m.	124	Avg mins: 8.76		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H20		April	14	44	3.1	7:00 a.m. - 8:00 a.m.	30	7:00 p.m. - 8:00 p.m.	14	Tot days: 131	Tot days: 0	Tot days: 0
		May	30	396	13.2	7:00 a.m. - 8:00 a.m.	166	7:00 p.m. - 8:00 p.m.	230	35.9% days		
		June	30	500	16.7	7:00 a.m. - 8:00 a.m.	214	7:00 p.m. - 8:00 p.m.	286	Tot mins: 1586	Tot mins: 0	Tot mins: 0
		July	31	532	17.2	7:00 a.m. - 8:00 a.m.	216	7:00 p.m. - 8:00 p.m.	316	Max mins: 28		
		August	26	114	4.4	7:00 a.m. - 8:00 a.m.	96	7:00 p.m. - 8:00 p.m.	18	Avg mins: 12.11		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H21		April	16	80	5	7:00 a.m. - 8:00 a.m.	36	7:00 p.m. - 8:00 p.m.	44	Tot days: 129	Tot days: 0	Tot days: 0
		May	29	220	7.6	7:00 a.m. - 7:30 a.m.	66	7:00 p.m. - 8:00 p.m.	154	35.3% days		
		June	30	160	5.3	7:00 a.m. - 7:30 a.m.	72	7:30 p.m. - 8:00 p.m.	88	Tot mins: 800	Tot mins: 0	Tot mins: 0
		July	28	170	6.1	7:00 a.m. - 8:00 a.m.	68	7:30 p.m. - 8:00 p.m.	102	Max mins: 16		
		August	25	168	6.7	7:00 a.m. - 8:00 a.m.	60	7:00 p.m. - 8:00 p.m.	108	Avg mins: 6.2		
		September	1	2	2	7:30 a.m. - 8:00 a.m.	2					

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H22a	1 of 2	April	16	110	6.9	7:00 a.m. - 8:00 a.m.	28	7:00 p.m. - 8:00 p.m.	82	Tot days: 131	Tot days: 0	Tot days: 0
		May	30	216	7.2	6:30 a.m. - 8:00 a.m.	70	7:00 p.m. - 8:00 p.m.	146	35.9% days		
		June	29	108	3.7	7:00 a.m. - 7:30 a.m.	10	7:30 p.m. - 8:00 p.m.	98	Tot mins: 822	Tot mins: 0	Tot mins: 0
		July	28	206	7.4	7:00 a.m. - 8:00 a.m.	64	7:30 p.m. - 8:30 p.m.	142	Max mins: 18		
		August	27	180	6.7	7:00 a.m. - 8:00 a.m.	46	7:00 p.m. - 8:00 p.m.	134	Avg mins: 6.27		
		September	1	2	2	7:30 a.m. - 8:00 a.m.	2					

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H22b	1 of 2	April	20	294	14.7	7:00 a.m. - 8:00 a.m.	210	7:00 p.m. - 8:00 p.m.	84	Tot days: 142	Tot days: 63	Tot days: 0
		May	31	530	17.1	7:00 a.m. - 8:00 a.m.	364	7:00 p.m. - 8:00 p.m.	166	38.9% days	17.3% days	
		June	30	310	10.3	7:00 a.m. - 8:30 a.m.	208	7:30 p.m. - 8:00 p.m.	102	Tot mins: 2130	Tot mins: 184	Tot mins: 0
		July	31	426	13.7	7:00 a.m. - 8:30 a.m.	276	7:30 p.m. - 8:30 p.m.	150	Max mins: 30	Max mins: 6	
		August	30	570	19	7:00 a.m. - 8:00 a.m.	398	7:00 p.m. - 8:00 p.m.	172	Avg mins: 15	Avg mins: 2.92	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H23a	1 of 2	April	10	42	4.2	7:00 a.m. - 8:00 a.m.	16	7:00 p.m. - 8:00 p.m.	26	Tot days: 117	Tot days: 66	Tot days: 0
		May	30	238	7.9	7:00 a.m. - 8:00 a.m.	64	7:00 p.m. - 8:00 p.m.	174	32.1% days	18.1% days	
		June	27	84	3.1	7:00 a.m. - 7:30 a.m.	28	7:30 p.m. - 8:00 p.m.	56	Tot mins: 684	Tot mins: 188	Tot mins: 0
		July	29	168	5.8	7:00 a.m. - 7:30 a.m.	48	7:30 p.m. - 8:00 p.m.	120	Max mins: 16	Max mins: 6	
		August	21	152	7.2	7:00 a.m. - 8:00 a.m.	46	7:00 p.m. - 8:00 p.m.	106	Avg mins: 5.85	Avg mins: 2.85	

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H23b	2 of 2	April	19	180	9.5	7:00 a.m. - 8:00 a.m.	158	7:00 p.m. - 7:30 p.m.	22	Tot days: 142	Tot days: 127	Tot days: 0
		May	31	630	20.3	7:00 a.m. - 8:00 a.m.	438	7:00 p.m. - 8:00 p.m.	192	38.9% days	34.8% days	
		June	30	364	12.1	7:00 a.m. - 8:00 a.m.	300	7:30 p.m. - 8:00 p.m.	64	Tot mins: 2168	Tot mins: 634	Tot mins: 0
		July	31	546	17.6	7:00 a.m. - 8:30 a.m.	428	7:30 p.m. - 8:00 p.m.	118	Max mins: 34	Max mins: 18	
		August	31	448	14.5	7:00 a.m. - 8:00 a.m.	330	7:00 p.m. - 8:00 p.m.	118	Avg mins: 15.27	Avg mins: 4.99	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H24		April	8	34	4.3	7:00 a.m. - 7:30 a.m.	34			Tot days: 98	Tot days: 49	Tot days: 0
		May	21	66	3.1	7:00 a.m. - 7:30 a.m.	36	7:00 p.m. - 8:00 p.m.	30	26.8% days	13.4% days	
		June	30	228	7.6	7:00 a.m. - 8:00 a.m.	56	7:00 p.m. - 8:00 p.m.	172	Tot mins: 492	Tot mins: 122	Tot mins: 0
		July	25	108	4.3	7:00 a.m. - 8:00 a.m.	38	7:30 p.m. - 8:00 p.m.	70	Max mins: 12	Max mins: 4	
		August	14	56	4	7:00 a.m. - 8:00 a.m.	56			Avg mins: 5.02	Avg mins: 2.49	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H25		April	8	26	3.3	7:00 a.m. - 7:30 a.m.	26			Tot days: 84	Tot days: 0	Tot days: 0
		May	18	64	3.6	7:00 a.m. - 7:30 a.m.	58	7:30 p.m. - 8:00 p.m.	6	23% days		
		June	27	134	5	7:00 a.m. - 7:30 a.m.	14	7:30 p.m. - 8:00 p.m.	120	Tot mins: 348	Tot mins: 0	Tot mins: 0
		July	15	64	4.3	7:00 a.m. - 8:00 a.m.	38	7:30 p.m. - 8:00 p.m.	26	Max mins: 8		
		August	16	60	3.8	7:00 a.m. - 8:00 a.m.	60			Avg mins: 4.14		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H26a	1 of 2	April	15	110	7.3	7:00 a.m. - 8:00 a.m.	38	7:00 p.m. - 8:00 p.m.	72	Tot days: 128	Tot days: 0	Tot days: 0
		May	29	184	6.3	7:00 a.m. - 7:30 a.m.	70	7:00 p.m. - 8:00 p.m.	114	35.1% days		
		June	30	290	9.7	7:00 a.m. - 8:00 a.m.	74	7:00 p.m. - 8:00 p.m.	216	Tot mins: 984	Tot mins: 0	Tot mins: 0
		July	29	216	7.4	7:00 a.m. - 8:00 a.m.	72	7:30 p.m. - 8:30 p.m.	144	Max mins: 20		
		August	25	184	7.4	7:00 a.m. - 8:00 a.m.	58	7:00 p.m. - 8:00 p.m.	126	Avg mins: 7.69		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H26b	2 of 2	April	21	324	15.4	7:00 a.m. - 8:00 a.m.	236	7:00 p.m. - 8:00 p.m.	88	Tot days: 145	Tot days: 0	Tot days: 0
		May	31	448	14.5	7:00 a.m. - 8:30 a.m.	302	7:00 p.m. - 8:00 p.m.	146	39.7% days		
		June	30	428	14.3	7:00 a.m. - 8:30 a.m.	212	7:00 p.m. - 8:00 p.m.	216	Tot mins: 2150	Tot mins: 0	Tot mins: 0
		July	31	406	13.1	7:00 a.m. - 8:30 a.m.	260	7:00 p.m. - 8:30 p.m.	146	Max mins: 30		
		August	31	542	17.5	7:00 a.m. - 8:00 a.m.	378	7:00 p.m. - 8:00 p.m.	164	Avg mins: 14.83		
		September	1	2	2	7:30 a.m. - 8:00 a.m.	2					

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H27a	1 of 2	April	10	48	4.8	7:00 a.m. - 8:00 a.m.	48			Tot days: 113	Tot days: 22	Tot days: 0
		May	25	94	3.8	7:00 a.m. - 8:00 a.m.	94			31% days	6% days	
		June	30	110	3.7	7:00 a.m. - 7:30 a.m.	110			Tot mins: 418	Tot mins: 82	Tot mins: 0
		July	25	84	3.4	7:00 a.m. - 8:00 a.m.	84			Max mins: 10	Max mins: 6	
		August	23	82	3.6	7:00 a.m. - 8:00 a.m.	82			Avg mins: 3.7	Avg mins: 3.73	

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H27b	2 of 2	April	15	70	4.7	7:00 a.m. - 8:00 a.m.	70			Tot days: 131	Tot days: 23	Tot days: 23
		May	31	246	7.9	7:00 a.m. - 8:00 a.m.	246			35.9% days	6.3% days	6.3% days
		June	30	332	11.1	7:00 a.m. - 8:00 a.m.	332			Tot mins: 1106	Tot mins: 78	Tot mins: 78
		July	30	328	10.9	7:00 a.m. - 8:00 a.m.	328			Max mins: 18	Max mins: 4	Max mins: 4
		August	25	130	5.2	7:00 a.m. - 8:00 a.m.	130			Avg mins: 8.44	Avg mins: 3.39	Avg mins: 3.39

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H28		April	8	24	3	7:00 a.m. - 8:00 a.m.	24			Tot days: 108	Tot days: 21	Tot days: 0
		May	29	96	3.3	7:00 a.m. - 8:00 a.m.	96			29.6% days	5.8% days	
		June	27	88	3.3	7:00 a.m. - 8:00 a.m.	88			Tot mins: 364	Tot mins: 56	Tot mins: 0
		July	28	102	3.6	7:00 a.m. - 8:00 a.m.	102			Max mins: 8	Max mins: 6	
		August	16	54	3.4	7:00 a.m. - 8:00 a.m.	54			Avg mins: 3.37	Avg mins: 2.67	

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H29		April	21	168	8	7:00 a.m. - 8:30 a.m.	156	7:00 p.m. - 8:00 p.m.	12	Tot days: 129	Tot days: 0	Tot days: 0
		May	28	212	7.6	7:00 a.m. - 8:00 a.m.	168	7:00 p.m. - 8:00 p.m.	44	35.3% days		
		June	24	48	2			7:30 p.m. - 8:00 p.m.	48	Tot mins: 820	Tot mins: 0	Tot mins: 0
		July	23	116	5	7:00 a.m. - 8:00 a.m.	80	7:30 p.m. - 8:00 p.m.	36	Max mins: 20		
		August	29	266	9.2	7:00 a.m. - 8:30 a.m.	234	7:30 p.m. - 8:00 p.m.	32	Avg mins: 6.36		
		September	4	10	2.5	7:30 a.m. - 8:30 a.m.	10					

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.			PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
	Level	Month	Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H30										Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.			PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
	Level	Month	Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H31										Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0	Tot days: 0 Tot mins: 0

House Nos.			PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
	Level	Month	Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H32		April	9	68	7.6	7:00 a.m. - 8:00 a.m.	68			Tot days: 30 8.2% days	Tot days: 0	Tot days: 0
		May	6	32	5.3	7:00 a.m. - 7:30 a.m.	32			Tot mins: 202 Max mins: 14 Avg mins: 6.73	Tot mins: 0	Tot mins: 0
		August	15	102	6.8	7:00 a.m. - 8:00 a.m.	102					

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H33		April	14	64	4.6	7:00 a.m. - 8:00 a.m.	64			Tot days: 78	Tot days: 0	Tot days: 0
		May	26	142	5.5	6:30 a.m. - 7:30 a.m.	142			21.4% days		
		July	14	80	5.7	7:00 a.m. - 7:30 a.m.	80			Tot mins: 406	Tot mins: 0	Tot mins: 0
		August	24	120	5	7:00 a.m. - 8:00 a.m.	120			Max mins: 12		
										Avg mins: 5.21		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H34		April	1	2	2			7:30 p.m. - 8:00 p.m.	2	Tot days: 32	Tot days: 0	Tot days: 0
		May	9	18	2			7:00 p.m. - 8:00 p.m.	18	8.8% days		
		June	12	24	2			7:30 p.m. - 8:00 p.m.	24	Tot mins: 66	Tot mins: 0	Tot mins: 0
		July	6	12	2			7:30 p.m. - 8:00 p.m.	12	Max mins: 4		
		August	4	10	2.5			7:30 p.m. - 8:00 p.m.	10	Avg mins: 2.06		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H35a	1 of 2	April	6	18	3			7:00 p.m. - 8:00 p.m.	18	Tot days: 52	Tot days: 0	Tot days: 0
		May	17	48	2.8			7:00 p.m. - 8:00 p.m.	48	14.2% days		
		June	4	12	3			7:00 p.m. - 8:00 p.m.	12	Tot mins: 152	Tot mins: 0	Tot mins: 0
		July	15	48	3.2			7:00 p.m. - 8:00 p.m.	48	Max mins: 6		
		August	10	26	2.6			7:30 p.m. - 8:00 p.m.	26	Avg mins: 2.92		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H35b	2 of 2	April	16	160	10			7:00 p.m. - 8:00 p.m.	160	Tot days: 134	Tot days: 0	Tot days: 0
		May	31	284	9.2			7:00 p.m. - 8:00 p.m.	284	36.7% days		
		June	30	246	8.2			7:00 p.m. - 8:00 p.m.	246	Tot mins: 1224	Tot mins: 0	Tot mins: 0
		July	31	276	8.9			7:00 p.m. - 8:00 p.m.	276	Max mins: 16		
		August	26	258	9.9			7:00 p.m. - 8:00 p.m.	258	Avg mins: 9.13		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H36a	1 of 2	April	18	198	11			7:00 p.m. - 8:00 p.m.	198	Tot days: 137	Tot days: 0	Tot days: 0
		May	31	352	11.4			7:00 p.m. - 8:00 p.m.	352	37.5% days		
		June	30	530	17.7			7:00 p.m. - 8:00 p.m.	530	Tot mins: 1802	Tot mins: 0	Tot mins: 0
		July	31	392	12.6			7:00 p.m. - 8:00 p.m.	392	Max mins: 22		
		August	27	330	12.2			7:00 p.m. - 8:00 p.m.	330	Avg mins: 13.15		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H36b	2 of 2	April	19	232	12.2			7:00 p.m. - 8:00 p.m.	232	Tot days: 139	Tot days: 0	Tot days: 0
		May	31	468	15.1			7:00 p.m. - 8:00 p.m.	468	38.1% days		
		June	30	546	18.2			7:00 p.m. - 8:00 p.m.	546	Tot mins: 2104	Tot mins: 0	Tot mins: 0
		July	31	450	14.5			7:00 p.m. - 8:00 p.m.	450	Max mins: 24		
		August	28	408	14.6			7:00 p.m. - 8:00 p.m.	408	Avg mins: 15.14		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.

Appendix A - Dwelling and Urban Area Sample Point Results

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H37		April	16	160	10			7:00 p.m. - 8:00 p.m.	160	Tot days: 134	Tot days: 0	Tot days: 0
		May	31	376	12.1			7:00 p.m. - 8:00 p.m.	376	36.7% days		
		June	30	486	16.2			7:00 p.m. - 8:00 p.m.	486	Tot mins: 1678	Tot mins: 0	Tot mins: 0
		July	31	398	12.8			7:00 p.m. - 8:00 p.m.	398	Max mins: 22		
		August	26	258	9.9			7:00 p.m. - 8:00 p.m.	258	Avg mins: 12.52		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H38		April	9	70	7.8			7:00 p.m. - 8:00 p.m.	70	Tot days: 118	Tot days: 0	Tot days: 0
		May	31	216	7			7:00 p.m. - 8:00 p.m.	216	32.3% days		
		June	30	516	17.2			7:00 p.m. - 8:00 p.m.	516	Tot mins: 1262	Tot mins: 0	Tot mins: 0
		July	31	322	10.4			7:00 p.m. - 8:00 p.m.	322	Max mins: 22		
		August	17	138	8.1			7:00 p.m. - 8:00 p.m.	138	Avg mins: 10.69		

House Nos.	Level	Month	PER MONTH			MORNING		EVENING		WITHOUT SCREENING	WITH EXISTING SCREENING	WITH ADDED SCREENING
			Tot Days	Tot Mins	Avg Mins	Period	Tot Mins	Period	Tot Mins			
H39		April	1	2	2			7:00 p.m. - 7:30 p.m.	2	Tot days: 3	Tot days: 0	Tot days: 0
		August	2	4	2			7:30 p.m. - 8:00 p.m.	4	0.8% days		
										Tot mins: 6	Tot mins: 0	Tot mins: 0
										Max mins: 2		
										Avg mins: 2		

Note: dwellings identified with an 'a' and 'b' are two-storey dwellings. 'a' relates to the ground floor, and 'b' relates to the 1st floor.