One Earth Solar Farm

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Glint and Glare Assessment

February 2025

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GLINT AND GLARE ASSESSMENT

One Earth Solar Farm
EN010159/APP/7.16

Our Ref: 6758

26 February 2025

Contents

Report Details

Client: One Earth Solar Farm Ltd

Prepared by: VL

1 Executive Summary

1.1.1 Eb7 have been instructed to assess potential episodes of reflected solar glint and glare from the proposed Solar PV Modules for One Earth Solar Farm (Proposed Development), located across the districts of West Lindsey District Council, Bassetlaw District Council and Newark and Sherwood District Council.

1.1.2 The assessment has followed the Solar Glare Hazard methodology and Page Power glare significance criteria, commonly used for impacts on aviation and other receptors nearby due to sunlight reflected on PV panels.

1.1.3 The study considered fixed PV panels and several types of receptors: Airports, airdromes and airstrips (and their correspondent approaching flying paths), railways, roads, buildings, PRoW, bridleways and waterways. The design includes embedded mitigation consisting of screening in the form of vegetation and (until the vegetation is at 4m above ground level (AGL) temporary screening as wooden hoarding or similar, at locations OB01 to OB08 in Appendix 1.

1.1.4 The results show that the proposed solar farm will only have low impacts on sensitive receptors around the Order Limits with the proposed embedded mitigation. These impacts will have no significant effects, and they will require no additional mitigation.

1.1.5 The glint and glare assessment has been based on the Illustrative Masterplan [EN010159/APP/2.7] and has taken an overly precautionary approach by assuming no existing planting is in place. At detailed design, the glint and glare assessment will be re-run based on the detailed design for the Proposed Development, and appropriate mitigation confirmed in the Landscape Environmental Management Plan to ensure the effects are not worse than those reported in this assessment. That assessment will take into account existing vegetation and, as above, may require some interim hoardings in some locations (as shown at locations OB01 to OB08 in Appendix 1) until hedgerows proposed as part of the Proposed Development are an appropriate height to adequately mitigation any effects.

2 Legislative Framework, Planning Policy and Guidance

2.1 National Planning Policy for Renewable Energy Infrastructure (NPS) EN-3 (2024)

2.1.1 EN-3 sets out the primary policy for decisions by the Secretary of State for nationally significant renewable energy infrastructure.

2.1.2 Sections 2.10.102 to 2.10.106 set out general considerations for the assessment of impacts of glint and glare in relation to solar panels." Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel". Where receptors are likely to have potential glint and glare issues, the applicants are expected to estimate the potential impact based on the angle and duration of incidence and the intensity of the reflections. The effect of frames and supports may also be considered.

2.1.3 Sections 2.10.134 to 2.10.136 give advice on possible mitigation measures to address the impacts of glint and glare, such as anti-reflective coating with a specified angle of maximum reflection attenuation, the implementation of screening to block reflections, or adjusting the azimuth alignment or the elevation tilt angle.

2.1.4 Sections 2.10.158 and 1.10.159 state the need to consider the potential impact on receptors such as nearby homes, motorists, public rights of way, and aviation infrastructure (including aircraft departure and arrival flight paths). "Whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farms results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms".

2.2 Local Planning Policy

2.2.1 Newark & Sherwood Local Development Framework, Draft Solar Energy, Supplementary Planning Document (July 2024, sections 6.35 to 6.38) refers to EN-3. A glint and glare assessment should identify potential receptors (including aviation) and how they could be affected, estimating the duration and intensity of the reflections. Tracking systems and other supporting structures and frames should be considered.

2.2.2 Bassetlaw Local Plan 2020-2038 Policy ST-49: Renewable Energy Generation states that glare from new solar developments should be considered.

2.3 Guidance

2.3.1 There is no provision on glint and glare from the European Aviation Safety Authority. The UK CAA (Civil Aviation Authority) guide (Renewable energy developments: Solar photovoltaic developments CAST Aerodrome Safeguarding 2023) only provides high-level guidance regarding safety considerations (Air Traffic Service personnel and pilots) and study areas, but it does not prescribe a specific methodology for assessing glint and glare effects.

2.3.2 CAST Guidance Note GA1 Safeguarding Guidance to General Aviation Aerodrome Managers & Operators recommends considering glint and glare over a wide area, covering Visual Reference Points (VRPs) and other important points like the circuit. It also estates that solar reflections with potential to cause after-image ("yellow glare") are of considerable concern, especially for a pilot on approach. It recommends fixed solar panels instead of tracking systems due to the certainty over the range of times when glare is possible.

2.3.3 CAST Aerodrome Safeguarding Advice Note 5 (February 2024) recommends early consultation with the aerodrome authority. A glint and glare assessment should be conducted for solar energy developments within 5 km from an aerodrome, but it could be considered out 10 km and beyond in exceptional circumstances. Safety should be considered for the ATS personnel at the control tower, especially within the visual control room (VCR), pilots (on approach, in a visual circuit or on the ground, departing and taxiing aircraft), and CNS equipment. Panels close to the ends of a runway should accommodate an EFATO area, which extends 45 degrees either side from the extended runway centreline.

2.3.4 Many aviation stakeholders refer to the US Federal Aviation Administration (FAA) guide (Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports 2013). This document recommends undertaking technical assessments using the Solar Glare Hazard Analysis Tool (SGHAT), developed by Sandia National Laboratories.

2.3.5 In addition to the FAA guide, this assessment has also been carried out in accordance with industry best practice and the 4th edition of the Solar Photovoltaic and Building Development Glint and Glare Guidance, published by Pager Power in 2022, which includes guidance for aviation and railway operations, road users, and dwellings.

2.3.6 While a Scoping Opinion was adopted for the Proposed Development before the PINS Guidance – Nationally Significant Infrastructure Projects: Technical Advice Page for Scoping Solar Development (September 2024) was released, to the extent that guidance provides comments on how to address solar impacts within the EIA following scoping, these have also been considered.

2.3.7 At the time of this report there was no published guidance on the effects of glint and glare on bridleways, public rights of way (PRoW) or boat users.

3 Methodology

3.1 Glint and Glare Definition

3.1.1 Glint is a momentary flash of bright light typically received by moving receptors or from moving reflectors.

3.1.2 Glare is a continuous source of bright light typically received by static receptors or from large reflective surfaces. The term 'solar reflection' is used in this report to refer to both reflection types, glint and glare.

3.2 Methodology

3.2.1 The methodology for a glint and glare assessment is as follows:

- Identify receptors in the area surrounding the Proposed Development.
- Consider the visibility of the panels from the receptor's location. If the panels are not visible from the receptor then no impact is possible upon the receptor.
- Based on the results of the geometric calculation, determine whether solar reflections would be visible throughout the year, and if so, at what times they will occur and their frequency.

- Estimate the glare intensity (retinal glare hazard) where reflections are visible.
- Determine the expected glare impact based with respect to the published studies and guidance, especially depending on the type of receptor, and considering the glare intensity and any relevant mitigating factors.
- Establish whether these impacts will cause significant effects which may require additional mitigation.

3.3 Retinal Glare Hazard Metric

3.3.1 Glint and glare is evaluated using the Retinal Glare Hazard (RGH), which is the standard metric for measuring the ocular impact of any proposed solar energy system. The visual impact is a function of the retinal irradiance (brightness) and the subtended angle (size) of a glare source, and it quantifies the potential to cause an after-image in the retina, which would reduce the visual performance. RGH is classified as (img. 1):

- Green glare: Low potential to cause after-image.
- Yellow glare: Potential to cause an after-image.
- Red glare: Potential for permanent eye damage.

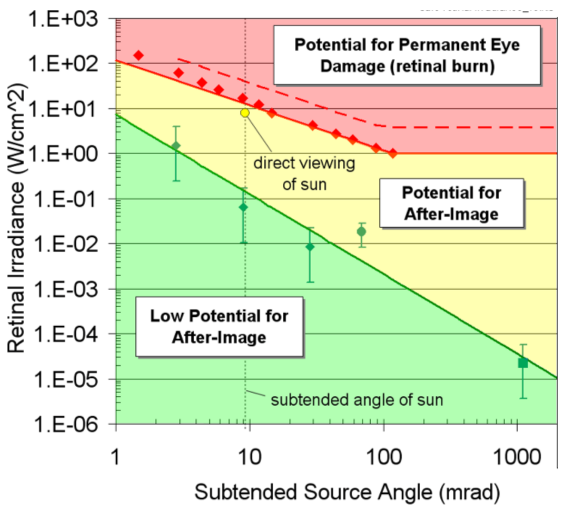

Image 1 - Retinal Glare Hazard Ocular Plot

3.4 Technical Assumptions and Limitations

3.4.1 The technical assessments have been undertaken with the following assumptions:

- Clear and sunny skies for the entire year, as a highly conservative worst-case scenario.
- Fixed intensity within the cone of reflection, with is defined by the slope error of the PV surface material.
- The topographic profile of each solar PV area is simplified to a single plane.
- Solar panels are evenly distributed across the solar PV areas.
- There is no consideration for PV overshadowing between rows of panels, gaps between

them or supporting structures.

- The combined effects of several panels can be calculated cumulatively, but there is no consideration for simultaneity.
- Direct normal irradiance (DNI) is calculated from the theoretical value at the zenith, considering the sinus of the solar altitude as a factor.
- Times are denoted in standard time with no daylight savings.
- The simulated test environment is defined using information from Google Maps, including the location, extents and elevation for the receptors, terrain levels and obstructions.
- Only the front part of the PV panels will reflect the solar rays. The reverse of the panels and other parts of the solar system (i.e. frames or supports) will have a matt finish and not cause solar reflections.
- No obstructions are considered between the reflection and the receptor.
- Any existing screening (bushes, trees, buildings etc.) that may obstruct the Sun from view of the solar panels is not included in the modelling unless stated otherwise.

4 Evaluation Criteria

4.1 Impact Levels for Approaching Aircrafts

- Green glare or yellow glare with significant mitigation factors: Low impact.
- Yellow glare without significant mitigation: Moderate impact.
- Red glare: High impact.

4.1.1 The location of the solar reflection is more important than the duration (fast-moving receptor). The time may also be relevant in relation to operational schedules.

4.1.2 FAA 2013 allows only for green glare along the final approach.

4.2 Impact Levels for Air Traffic Control Towers (ATCT)

- Green glare with significant mitigation factors: Low impact;
- Green glare without significant mitigation or yellow glare: Moderate impact; and
- Red glare: High impact.

4.2.1 Note: FAA 2013 requires no glare to the ATCT.

4.3 Impact Levels for Road Receptors

4.3.1 The glare angle (between the reflection and the line of sight) is more significant than the duration of glare for roads, as the receptor is moving.

- Local roads: Low impact.
- Major national, national and regional roads.
  - Green glare, or yellow glare with mitigating factors: Low impact.
  - Yellow glare without mitigating factors: Moderate impact.
  - Red glare without mitigation: High impact.

4.4 Impact Levels for Railway Receptors

- Green glare, or yellow glare with mitigating factors: Low impact.
- Yellow glare without mitigating factors: Moderate impact.
- Red glare without mitigation: High impact.

4.5 Impact Levels for Building Receptors

- Reflections significantly screened or mitigated: Low impact.
- Reflections not screened/mitigated:
  - Frequency <180 days/year and <60 min/day: Low impact.
  - Frequency <180 days/year or <60 min/day: Moderate impact.
  - Frequency >180 days/year and >60 min/day: High impact.

4.5.1 Current methods of assessment do not allow for the calculation of combined daily and annual frequencies from different PV areas. In those cases the significance for dwellings can be adapted as follows:

- Frequency <10,800min/year: Low impact.
- Frequency >10,800min/year: Moderate to high impact.

4.6 Impact Levels for Other Receptors

4.6.1 There is little guidance on glint and glare public rights of way (PRoW) or bridleways. Glare should be avoided where possible, but it is generally considered that significant impacts upon pedestrians on a PRoW or riders on bridleways are not possible. The typical density of pedestrians and riders is low in a rural environment. There is little safety hazard associated with reflections towards an observer on a footpath or bridgeway, and any resultant effect is much less serious than, for example, on the road network. Also, pedestrians or horses have more freedom to move beyond the solar reflection with little impact upon safety or amenity.

4.7 Mitigating factors

4.7.1 Mitigating factors include but are not limited to the following:

- Direct sunlight is concurrent with the reflection. In these cases the user is likely to be prepared and adapted for glare.

- Significant screening (i.e. trees or hedgerows deciduous or with gaps). This implies reflections less intense and smaller.
- Times of the day/year when reflections are visible. If the reflections do not overlap with the operational times of the receptor (i.e. use of a room or rush hour on a road) there is usually no impact.
- Type of road (major national, national, regional or local). The more dense the traffic the higher the risk of an accident.
- Length of the path (i.e. road/railway) affected by glare. The longer the path the more higher the risk of an accident.
- Duration of exposure. Continuous exposure may be more severe than one spread over time.
- Glare angle between the reflection and the line of sight. Glare is more intense close to the line of sight.
- For buildings, oblique reflections impacting a window are less likely to be seen from inside.

4.8 Impact Significance and Mitigation

4.8.1 The significance and the need for mitigation depend on the level of impact:

- No impact: Reflection not visible. No mitigation needed.
- Low impact: Reflection visible but of limited relevance (i.e. significantly screened). No mitigation needed.
- Moderate impact: Reflection visible but not under worst-case conditions. Potentially acceptable, but consultation, mitigation and further analysis should be considered.
- Major impact: Reflections visible under worst-case conditions, which implies a significant impact. Mitigation and consultation recommended.

5 Site and Proposed Design

5.1.1 The present study for the Proposed Development was undertaken considering the Work Plan [EN010159/APP/2.3], Illustrative Masterplan [EN010159/APP/2.7], the Outline Design Parameters [EN010159/APP/5.9] and the details of the Proposed Development as described in Chapter 5: Description of the Proposed Development [EN010159/APP/6.5]. The terrain in the area is mainly flat.

5.1.2 Image 2 shows the proposed layouts which demonstrate the worst-case scenario for the purposes of this assessment. The blue areas denote the proposed solar panel locations, which have been grouped in ten areas (A to J).

5.1.3 All PV modules feature the following characteristics:

- Fixed panels (no solar tracking system);
- 15 degrees tilt (elevation) angle;
- Due South orientation (180 degrees azimuth from North);
- Panel material: Smooth glass with Anti-reflective coating, with a slope error of 8.43 mrad; and
- The design includes solar panels at different heights due to potential flooding.

5.1.4 The proposed design includes embedded mitigation (img. 2 and tbl. 1 in Appendix 1) consisting of screening in the form of vegetation (4m AGL) to provide a barrier against glare, in order to ensure potential impacts are within recommendation for receptors on the ground. Vegetation may provide varying levels of cover, immediately after planting, during winter, and after maintenance (i.e. pruning).

5.1.5 Temporary screening (4m high wooden hoarding or similar) will be implemented on OB01 to OB08 (img. 2 and tbl. 1 in Appendix 1) and removed once the vegetation achieves 4m AGL.

6 Assessment Receptors

6.1 Aviation Receptors

6.1.1 Thirteen airports, aerodromes and airstrips were identified within 15 km from the solar PV modules. The assessment has considered 23 flying paths that could be potentially affected (img. 3 and tbl. 2 in Appendix 2). The flying paths generally represent planes approaching a runway for landing. Departing aircrafts are not included because after taking off pilots will be looking up towards the sky and not down at elements on the ground.

6.1.2 Following a consultation with Darlton Gliding Club, four additional flying paths were considered for that gliders approaching that airfield (img.4 in Appendix 2).

6.2 Road and Railway Receptors

6.2.1 The majority of roads are of local importance. As any impact on local roads will be of limited low impact, these roads have not been included in the analysis.

6.2.2 Two roads of national/regional relevance within 1km from the proposed solar PV modules were included in the study (img. 5 and tbl. 3 Appendix 2): A57 (Durham Road) and A1133. Both roads were split in two sections.

6.2.3 There is a former railway line that connected Tuxford and Lincoln. Most of this line was dismantled and it is now Skellingthorpe Walk. However, a western section of the line, up to the former High Marnham Power Station, is still used as a test track by Network Rail. This has been included in the analysis (img. 5 and tbl. 3 Appendix 2).

6.3 Building Receptors

6.3.1 140 buildings (mostly dwellings) were selected within 1km from the solar PV modules (imgs.

6 to 9 in Appendix 2). Details of these properties can also be found in table 5 (Appendix 3). The analysis has focused on ground floor spaces, as it is typically considered the main living space and has a greater significance with respect to residential amenity and views from the first floor.

6.4 Other Receptors

6.4.1 Several public rights of way and bridleways were identified within 1km from the solar PV modules (img. 10 in Appendix 2). At the time of this report there is no published guidance in relation to this type of receptors. Therefore, only a high-level assessment has been considered in this case.

6.4.2 Boats and other waterway users along river Trent were considered as receptors. Due to the river being at a lower position in relation to the surrounding landscape, waterway users are unlikely to receive solar reflections. Therefore, the river has been discarded from further technical analysis.

7 Assessment Assumptions

7.1.1 Calculation of the ocular hazard:

- Zenith Direct Normal Irradiance (DNI) 1kW/m2;
- Ocular transmission coefficient 0.5;
- Pupil diameter 0.002 m; and
- Eye focal length 0.017 m.

7.1.2 As a worst-case scenario, all panels have been considered at a lowest common height above ground (0.70m).

7.1.3 Flying Paths:

- Threshold height: 15m.
- Glide slope: 3 degrees.
- Field of view: 30 degrees vertically and 50 degrees horizontally.
- Flying approach consistently in line with the runaway.

7.1.4 The analysis includes maximum view angles for path receptors. Therefore, the results only show reflections within the field of view.

7.1.5 For Darlton Gliding Club a 180 degrees field of view and U-shape paths were considered (figs. 5 and 6).

7.1.6 The heights above ground for route and point receptors considered in the assessment are:

- Roads:1.50m
- Railways: 2.75m

- Buildings: 2.0m

8 Assessment Results

8.1.1 It should be noted that most reflexions will occur very close to direct sunlight from a viewer's point of view due to the timings (dawn and sunset) and the low tilt (15 degrees). This means that the reflexion would not catch the viewer unprepared and any potential impacts would be less intense.

8.1.2 The results of the technical assessment can be for in Appendix 3. The graphs show the visible reflections throughout the year and their level of glare as perceived from the receptor. They also show when these reflections are visible (days/months and times). Times are standard clock time with no summer savings.

8.2 Results for Flying Paths

8.2.1 The analysis found relevant glare impacts on South Hykenham (FP-18) and Darlton Gliding Club (DGC1 to DGC4).

8.2.2 The results for FP-18 (imgs. 11 to 15) show that an approaching aircraft will only receive green glare between 6pm and 7pm during the summer months. This will result in low impacts with no significant effects, which would require no additional mitigation.

8.2.3 Regarding Darlton Gliding Club, all four approaches receive a mixture of green and yellow glare (figs. 16 to 51). All reflexions are only visible very early in the morning, before 7:45, and gliders at Darlton Gliding Club never fly before 10am. The only potential reflexions during operational hours could be seen on the right-hand circuit to runway 05 (DGC3) from Solar PV Module B (fig. 37). However, these reflexions are only visible at the beginning of the circuit, they quickly fade off, and they are not in the direction of travel. Overall, the impact on the gliding paths will be low and with no significant effects, which would require no additional mitigation.

8.3 Results for Roads

8.3.1 The results for the southern section of A1133 (RD-2) show green glare just before sunset from Solar PV Modules A, B and C (figs. 52 to 54). It also shows a bit of yellow glare right after sunrise from Solar PV Module I (fig. 55), which will come from the same direction as direct sunlight, so drivers should not be caught unprepared. Overall, based on the results there will only be low impacts along the A113 with no significant effects, which require no additional mitigation.

8.3.2 On the western section of A57 (RD-4) drivers will only experience marginal green glare (figs. 56 and 57), resulting in negligible impacts and therefore no significant effects, which require no additional mitigation.

8.3.3 The assessment results for roads shown for roads were undertaken the proposed embedded mitigation (screening in the form of vegetation 4m AGL) in place. Temporary screening with the same cover (as 4m AGL wooden hoarding or similar) will be provided until the vegetation achieves sufficient height.

8.4 Results for Railways

8.4.1 The results for High Marnham Test Track (RW) show mostly green glare in the mornings before 7am (figs. 58 to 63), with just a few minutes per year of yellow glare from Solar PV Module E. This will result in low impacts with no significant effects, and requiring no additional mitigation.

8.4.2 As per roads, temporary screening will be provided until the permanent screening in the form of vegetation achieves sufficient height.

8.5 Results for Buildings

8.5.1 With regards to buildings, the duration of glare is the key parameter. The analysis shows that with the proposed mitigation (screening in the form of vegetation) in place, none of the 140 buildings assessed will exceed 10,800 hours of visible reflections per year (table 5). Therefore, we expect only low impacts with no significant effects, which should require no additional mitigation.

8.5.2 At the beginning of the solar farm operational period some buildings may temporarily experience additional glare whilst the proposed vegetation is growing. The results show that 19 buildings may exceed 10,800 hours of visible reflections per year (table 5). This effects will quickly fade in time as the vegetation reaches the prescribed height. It is also noted that the assessment takes a worst-case approach and the modelling does not consider the mitigation from any existing screening (bushes, trees, buildings etc) at the properties which may obstruct the sun from view of the solar panels. As there is no recommendation in the guidance regarding temporary effects, and glare in buildings is a nuisance with no element of safety (unlike for roads or the railway), additional temporary mitigation is not required in this case.

8.6 Other Receptors

8.6.1 Bridleways and PRoWs located north of the solar PV modules (i.e. PW01 in img. 10) will not receive solar reflections, as they will only see the back of the panels. If they are located to the south (i.e. PW14) they are also unlikely to see any reflections due to the low tilt on the solar PV modules (15 degrees), unless they are very close to them.

8.6.2 With solar PV modules facing due south most visible reflections will be visible from PRoW or bridleways located east or west of the reflective surfaces (i.e. PW10). The potential for glare will be higher if the riser or pedestrian also travels in the same direction (i.e. PW4), as the reflections are likely to be closer to the line of sight. However, as these reflections will be visible early in the morning or late in the evening, they will concur with direct sunlight. In these cases the user is likely to be prepared and adapted for glare, resulting in a lower impact.

8.6.3 A few PRoW and bridleways may experience higher levels of glare as they go between PV panels. This effect may be more pronounced for riders due to their higher point of view.

8.6.4 Overall, it is expected a mixture of levels of glare on bridleways and PRoW, with some of these impacts will be mitigated by the proposed screening. As explained in the Evaluation Criteria, impacts on these type of receptors area generally considered as not significant. Therefore, no additional mitigation is necessary, especially since an open view of the landscape is generally more appreciated.

8.6.5 There will be no impacts on waterways as the panels will not be visible.

9 Conclusions

9.1.1 Due to the river being at a lower position in relation to the surrounding landscape, waterway users are unlikely to receive solar reflections, and these receptors have been discounted as no likely significant effects are predicted.

9.1.2 Modelling has been undertaken for sensitive receptors around the Site consisting of flying paths, roads, railway, buildings and PRoW and bridleways. Embedded mitigation, consisting of vegetation screening 4m AGL, and at locations OB01 to OB28 in Appendix 1, and temporary screening (as wooden hoarding or similar 4m AGL, until the vegetation achieves the recommended height) located at locations OB01 to OB08, have been included within the assessment. The results from the modelling show that the Proposed Development will only have low impacts on these sensitive receptors and no likely significant effects are predicted.

Appendix 1.   Proposed Development

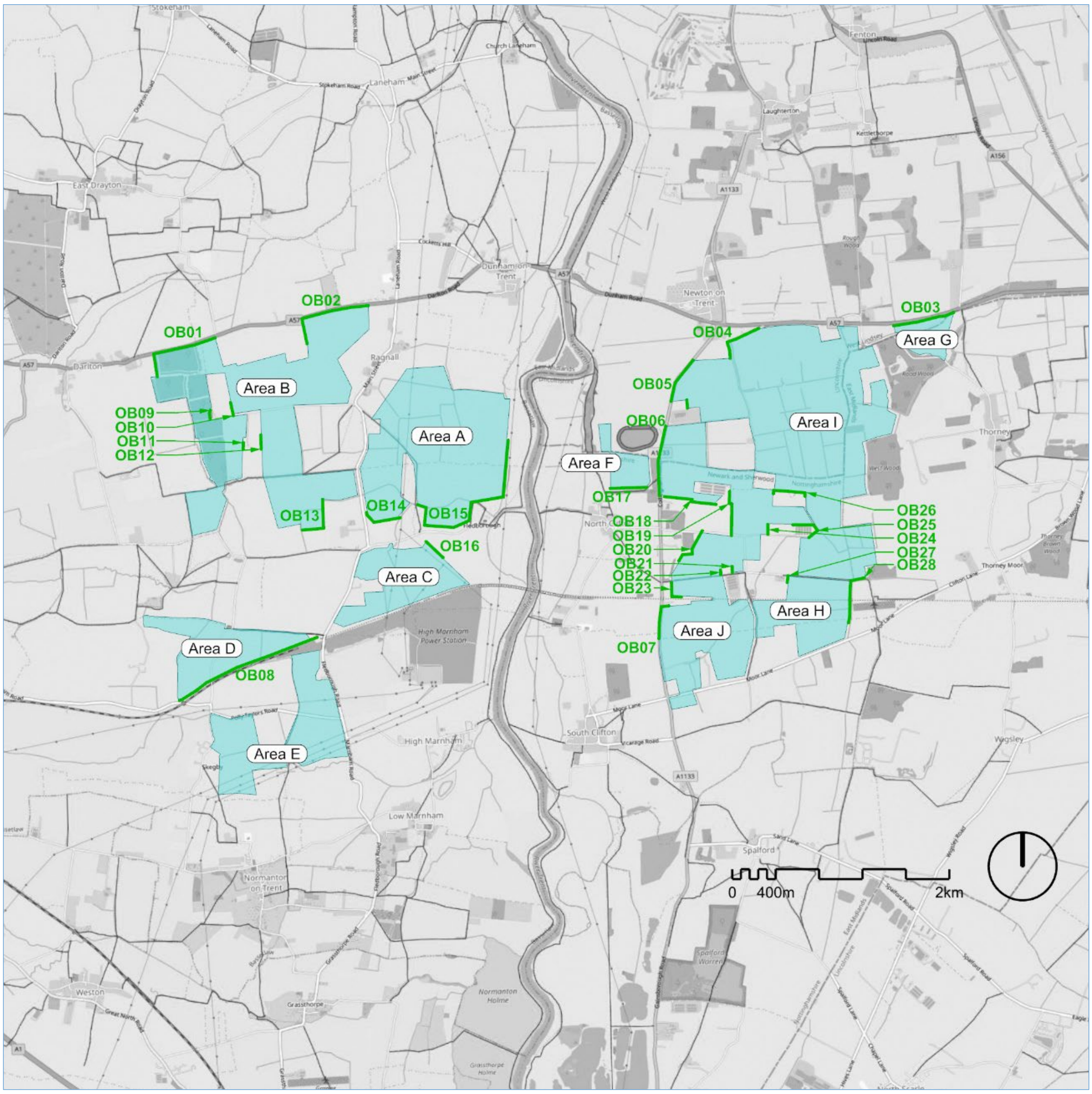

Image 2 - PV areas and screening location map

Code	Length (m)	Height (m)
OB01	789	4.0
OB02	850	4.0
OB03	568	4.0
OB04	464	4.0
OB05	514	4.0
OB06	637	4.0
OB07	360	4.0
OB08	1403	4.0
OB09	81.2	4.0
OB10	40	4.0
OB11	83	4.0

OB12	83	4.0
OB13	115	4.0
OB14	59	4.0
OB15	106	4.0
OB16	76	4.0
OB17	168	4.0
OB18	121	4.0
OB19	99	4.0
OB20	298	4.0
OB21	1474	4.0
OB22	95	4.0
OB23	103	4.0
OB24	62	4.0
OB25	182	4.0
OB26	38	4.0
OB27	32	4.0
OB28	33	4.0
OB29	23	4.0
OB30	59	4.0
OB31	403	4.0
OB32	195	4.0

Table 1. Screening list

Appendix 2. Assessment Receptors

Flying Paths

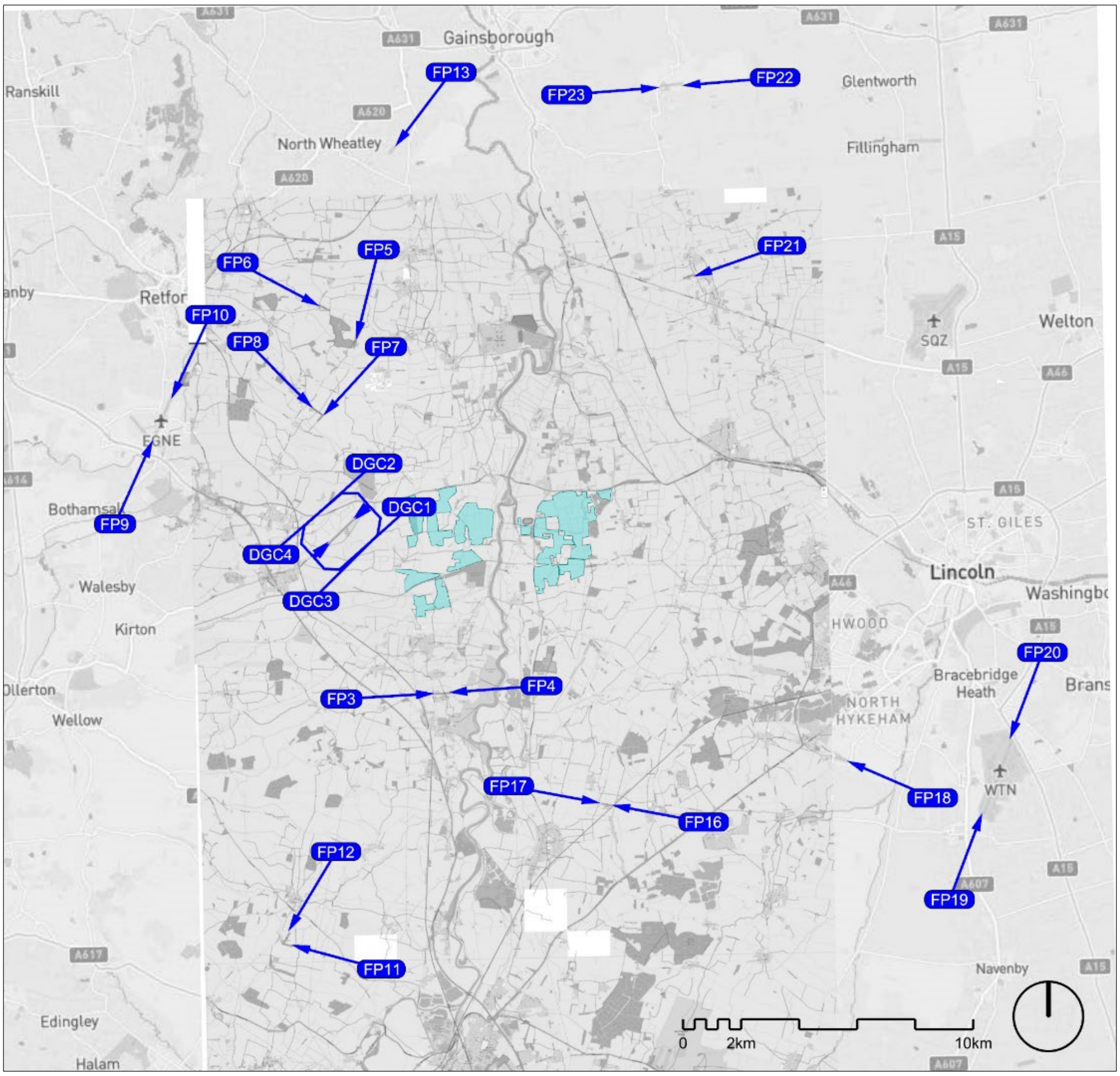

Image 3 - Flying path location map

Image 4 - Darlton Gliding Club – Runway 27 (left) and runway 05 (right)

Code	Name
FP3	Grasthorpe Grange Farm Private Airstrip - W
FP4	Grasthorpe Grange Farm Private Airstrip - E
FP5	Forwood Farm Aristrip GB-0443 - N
FP6	Grove Farm - NW
FP7	Headon Airfield GB-0439 - NE
FP8	Headon Airfield GB-0439 - NE
FP9	Retford Gamston Airport - SW
FP10	Retford Gamston Airport - NE
FP11	Caunton Airfield - SE
FP12	Caunton Airfield - NE
FP13	West Burton Airstrip - NE
FP16	Beeches Farm Airstrip GB-0325 - E
FP17	Beeches Farm Airstrip GB-0325 - W
FP18	South Hykeham - E
FP19	RAF Waddington - S
FP20	RAF Waddington - N
FP21	Stow - E
FP22	Sturgate Arifield - W
FP23	Sturgate Arifield - E
DCG1	Darlton Gliding Club - runway23 (left-hand)
DCG2	Darlton Gliding Club - runway23 (right-hand)
DCG3	Darlton Gliding Club - runway05 (right-hand)
DCG4	Darlton Gliding Club - runway05 (left-hand)

Table 2. Flying path list

Roads and railway

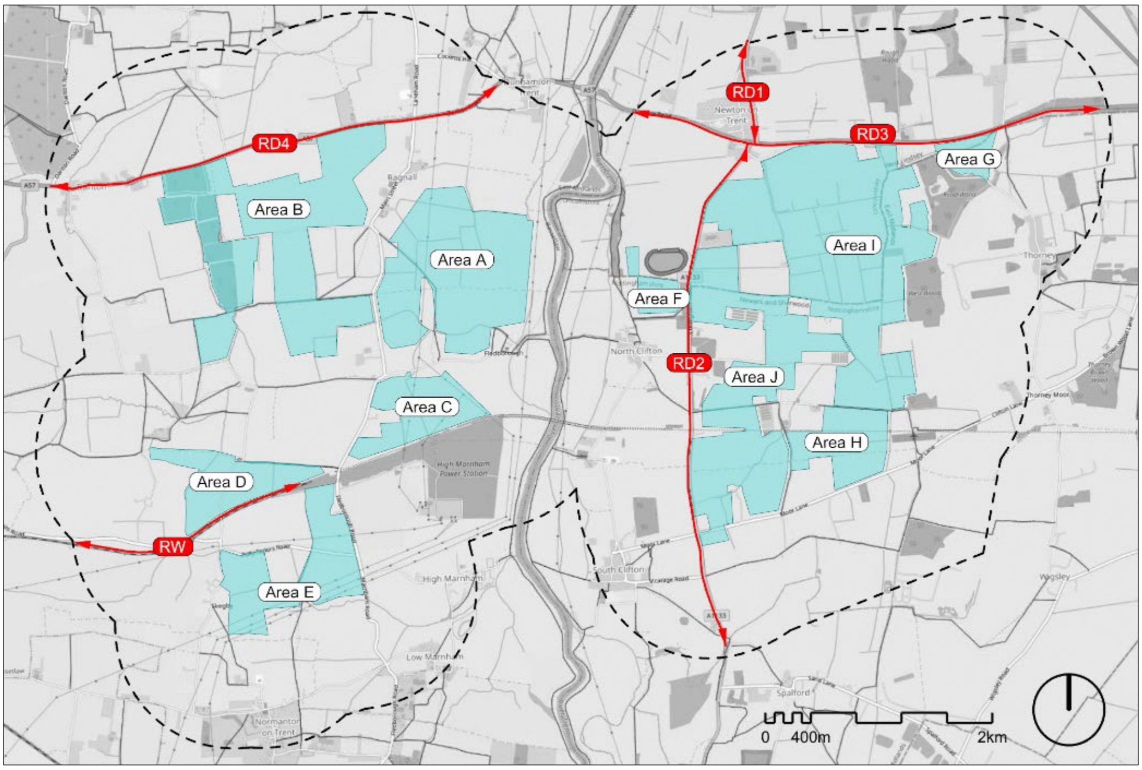

Image 5 - Road and railway location map

Code	Name
RD1	A1133 - North section
RD2	A1133 - South section
RD3	A57 (Dunham Road) - East section
RD4	A57 (Dunham Road) - West section
RW	Network Rail's High Marnham Test Track

Table 3. Road and railway list

Buildings

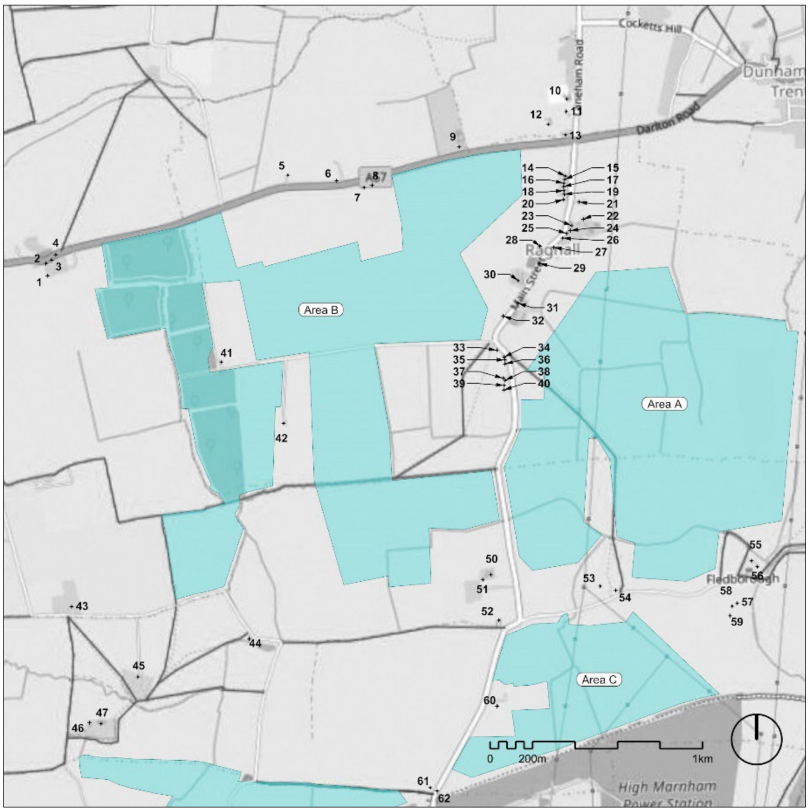

Image 6 - Building receptors and screening (Part 1)

Image 7 - Building receptors and screening (Part 2)

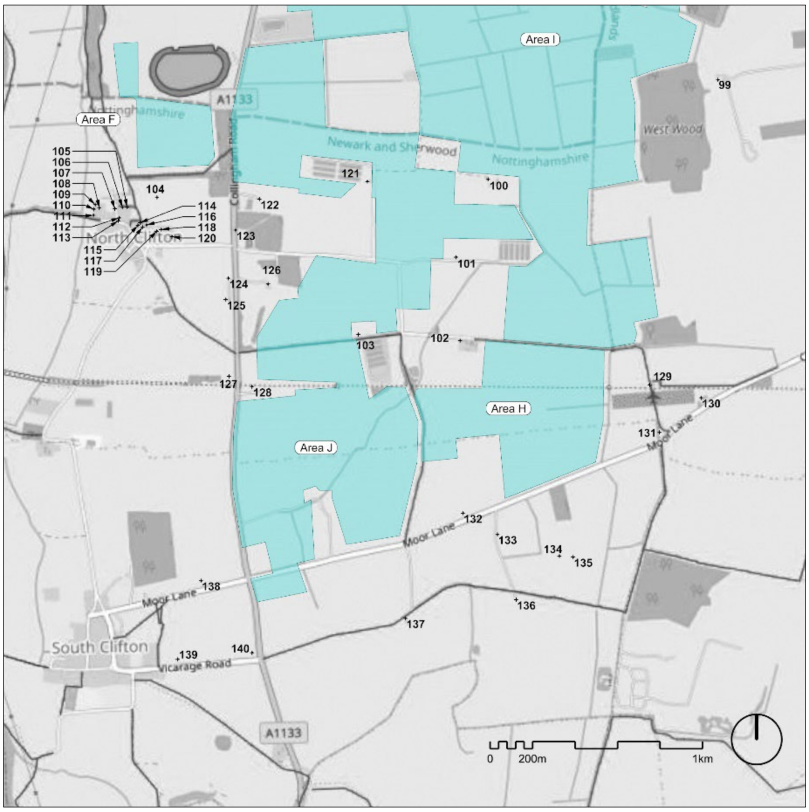

Image 8 - Building receptors and screening (Part 3)

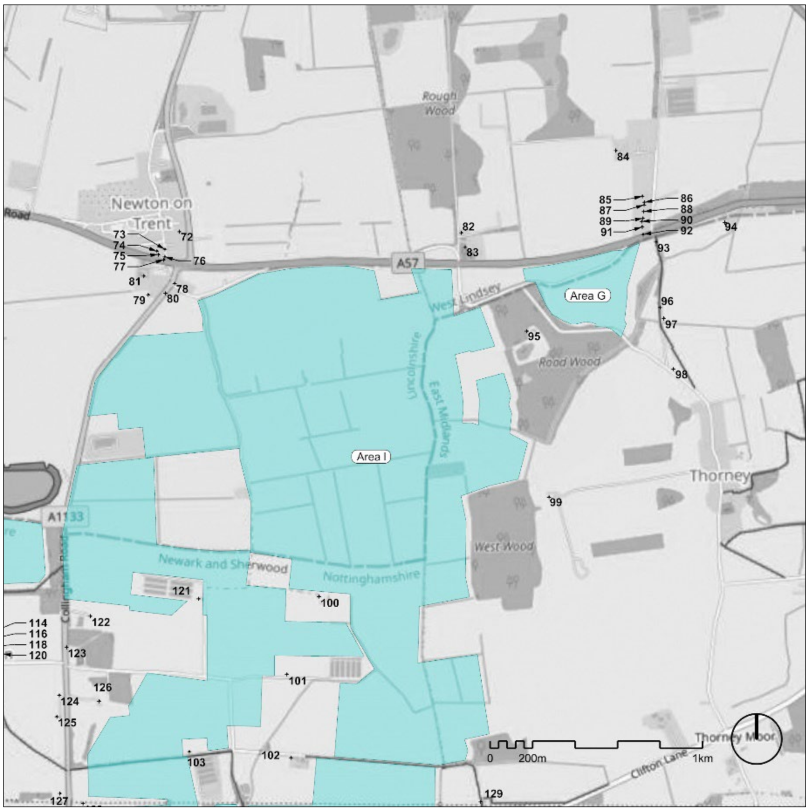

Image 9 - Building receptors and screening (Part 4)

Other receptors

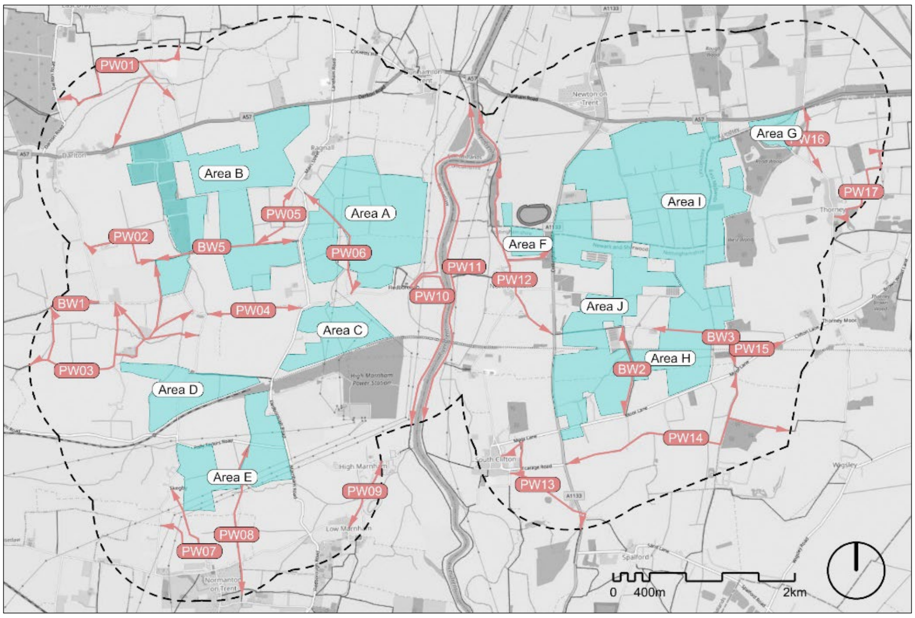

Image 10 - Public rights of way and bridleway receptors

Appendix 3. Assessment Results

South Hykenham (FP18)

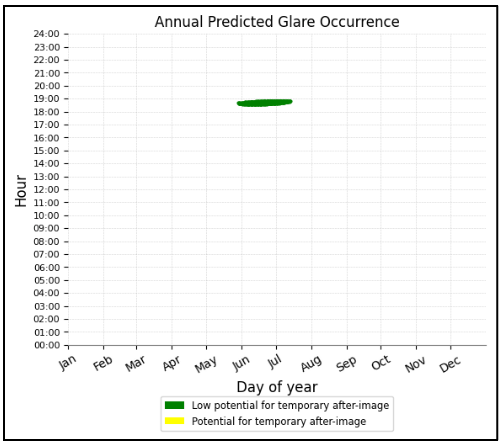

Image 11 - FP18 – PV area B

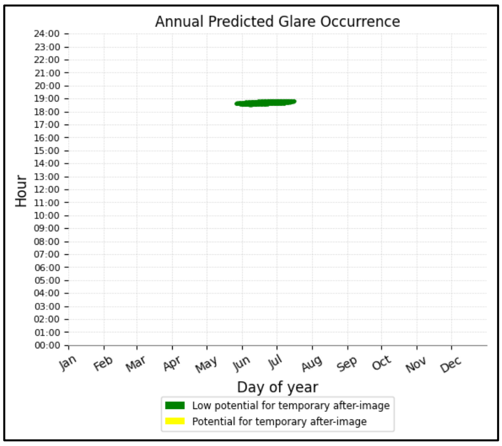

Image 12 - FP18 – PV area C

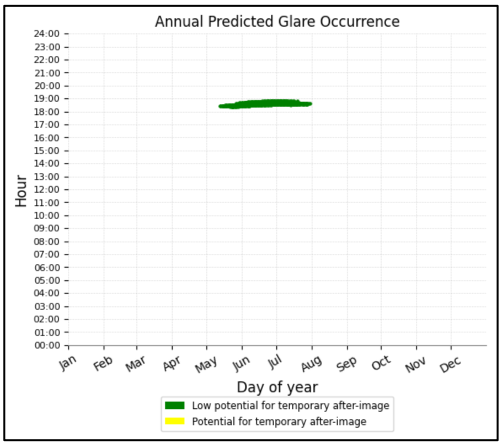

Image 13 - FP18 – PV area D

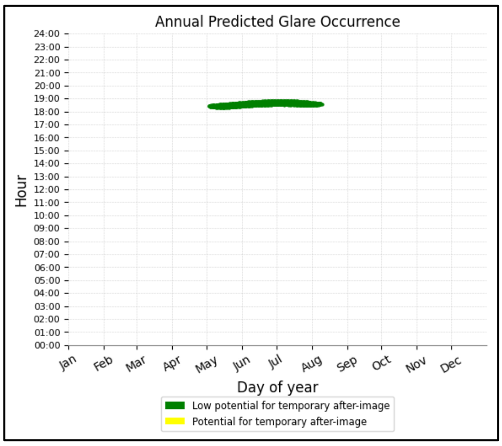

Image 14 - FP18 – PV area E

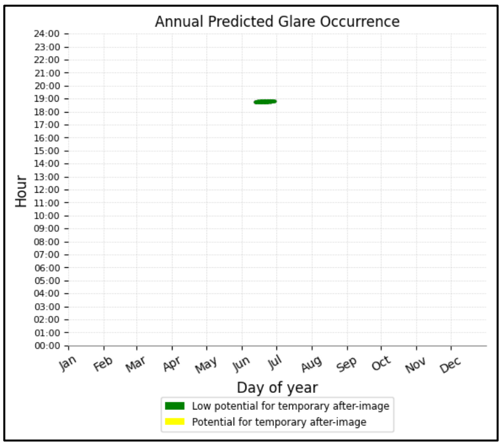

Image 15 - FP18 – PV area J

Darlton Gliding Club – Runway 27 Left –hand Circuit (DG1)

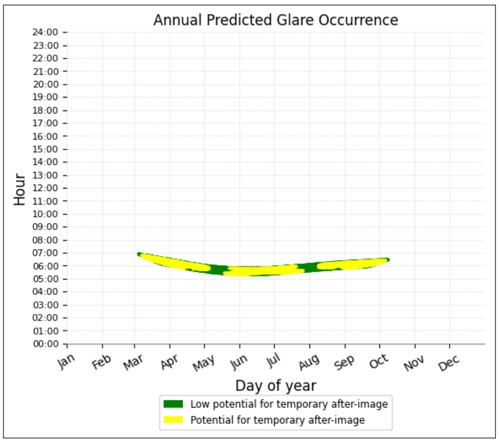

Image 16 - DGC1 – PV area A

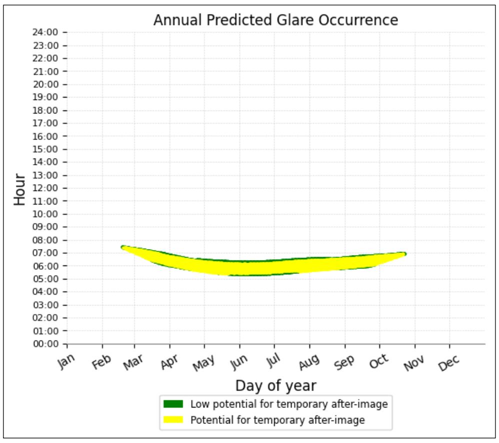

Image 17 - DGC1– PV area B

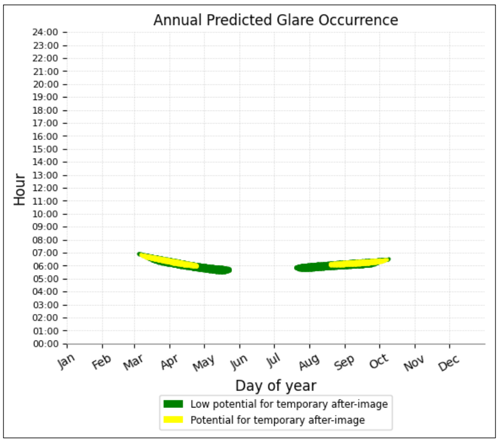

Image 18 - DGC1– PV area C

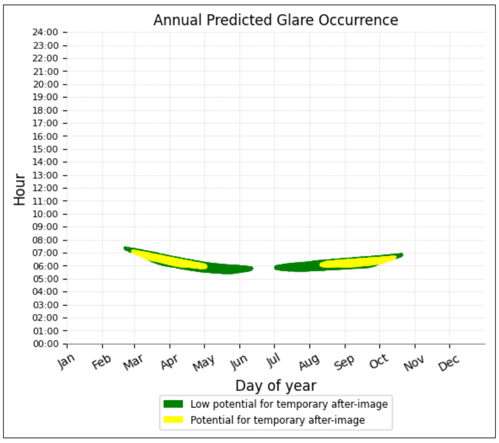

Image 19 - DGC1– PV area D

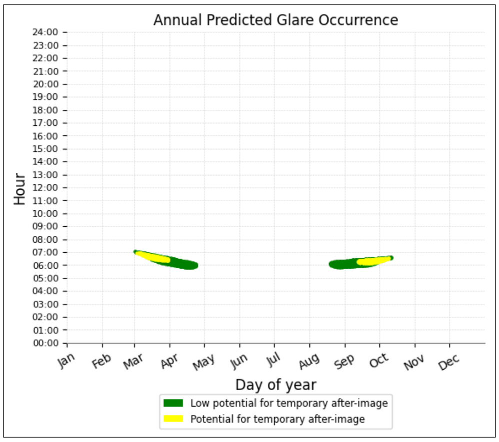

Image 20 - DGC1– PV area E

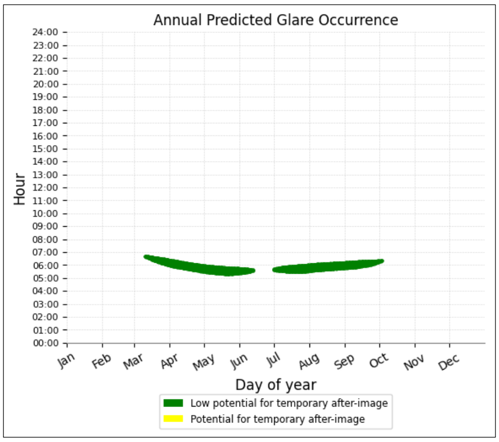

Image 21 - DGC1– PV area F

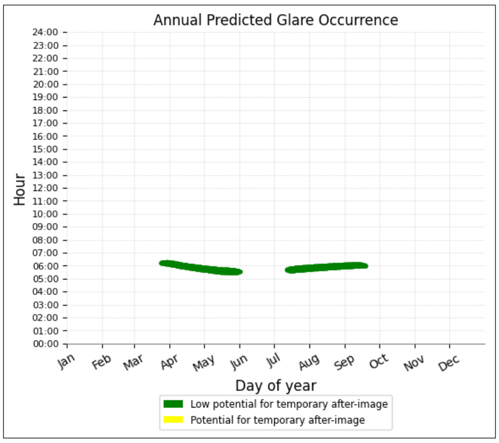

Image 22 - DGC1– PV area G

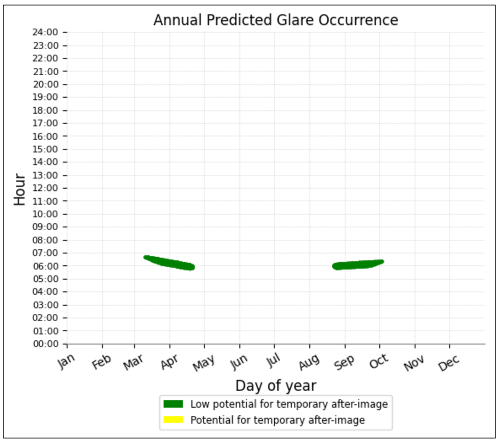

Image 23 - DGC1– PV area H

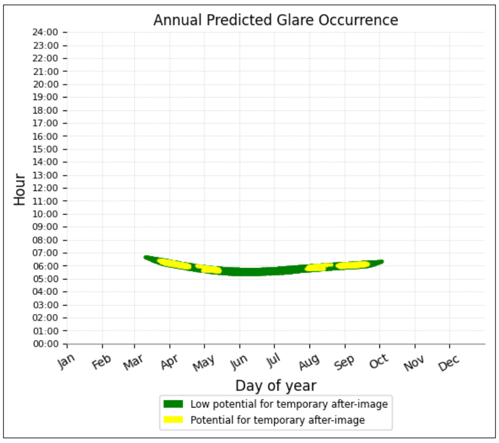

Image 24 - DGC1– PV area I

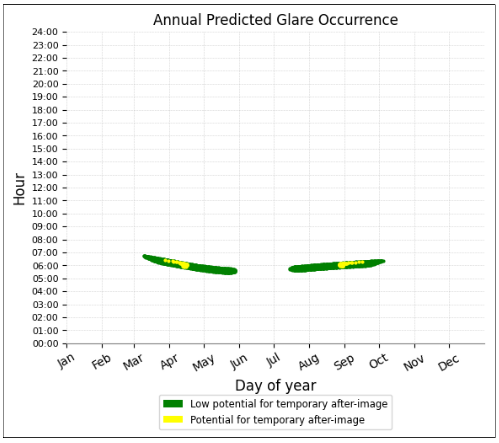

Image 25 - DGC1– PV area J

Darlton Gliding Club - Runway 27 Right-hand Circuit (DGC2)

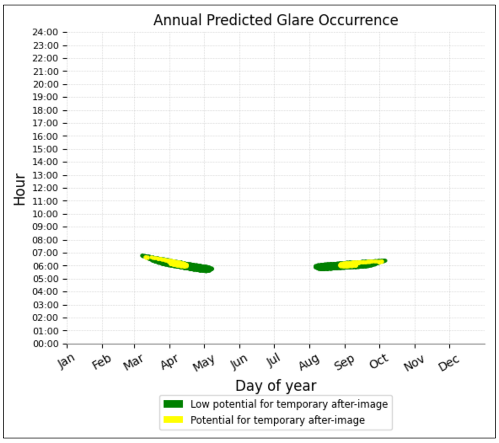

Image 26 - DGC2– PV area A

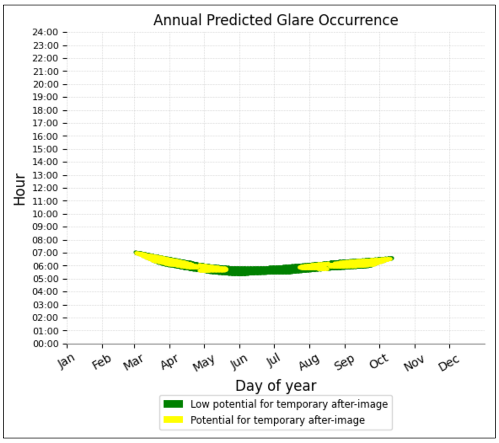

Image 27 - DGC2– PV area B

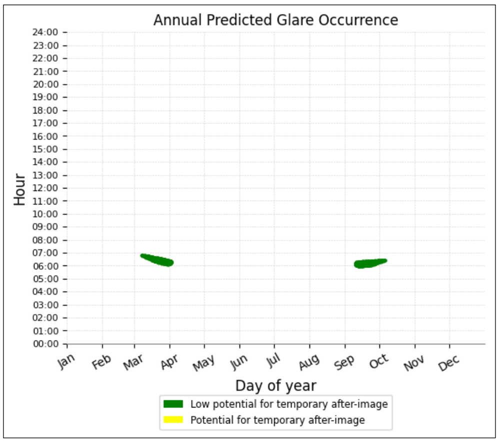

Image 28 - DGC2– PV area C

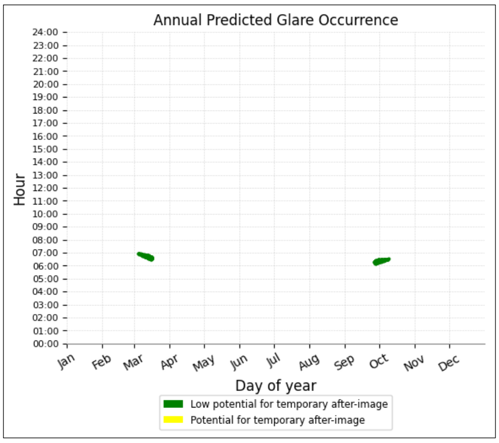

Image 29 - DGC2– PV area D

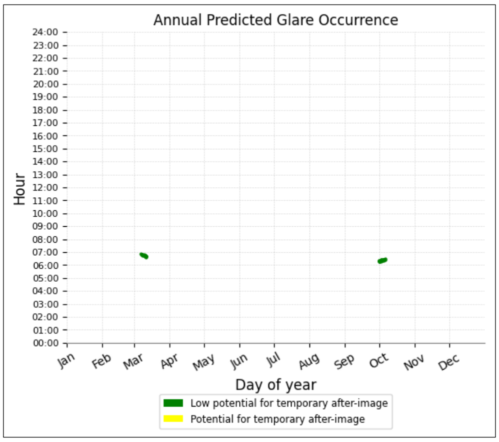

Image 30 - DGC2– PV area E

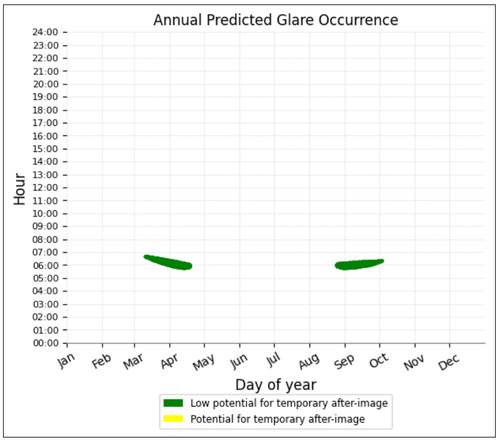

Image 31 - DGC2– PV area F

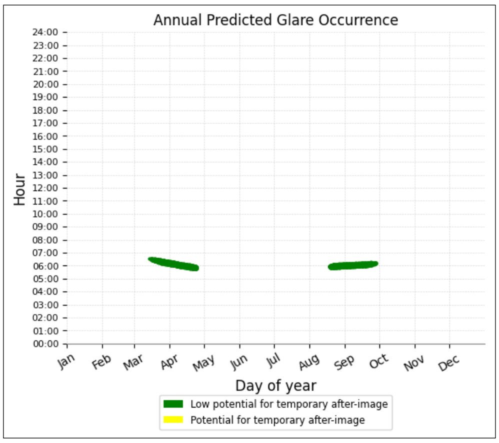

Image 32 - DGC2– PV area G

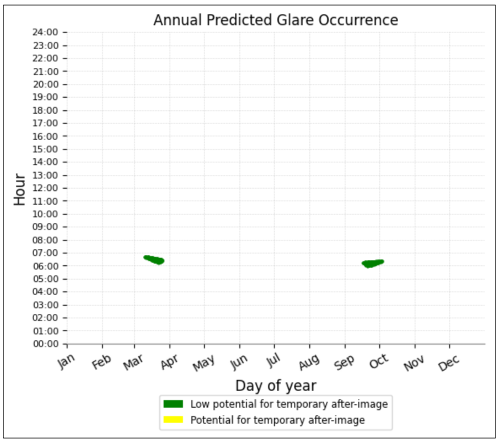

Image 33 - DGC2– PV area H

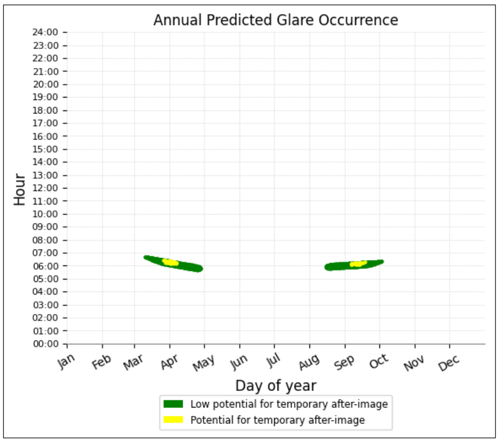

Image 34 - DGC2– PV area I

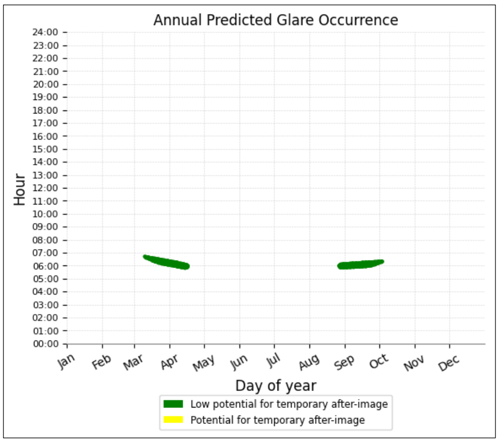

Image 35 - DGC2– PV area J

Darlton Gliding Club - Runway 05 Right-hand Circuit (DGC3)

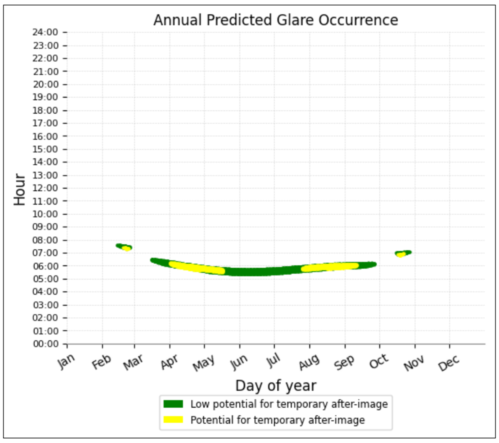

Image 36 - DGC3– PV area A

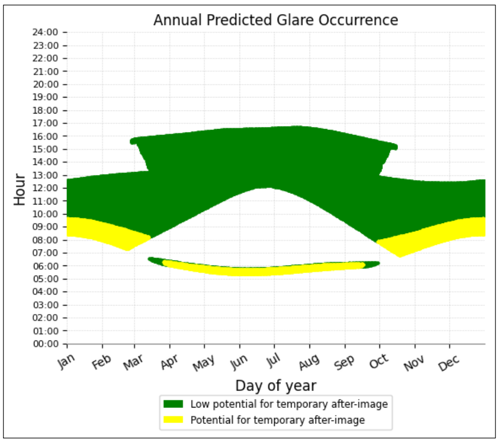

Image 37 - DGC3– PV area B

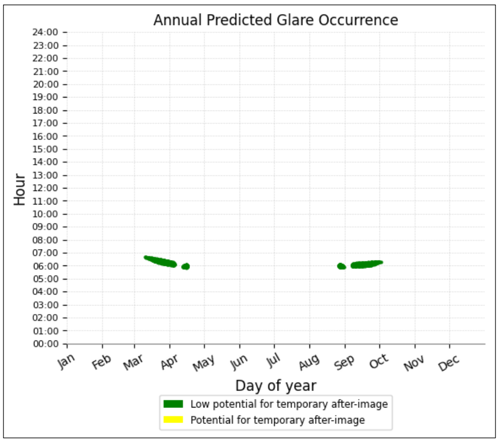

Image 38 - DGC3– PV area C

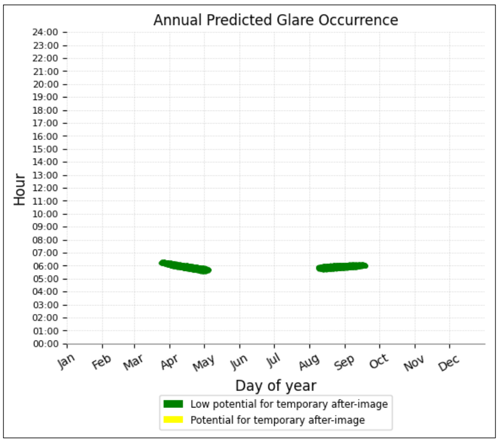

Image 39 - DGC3– PV area F

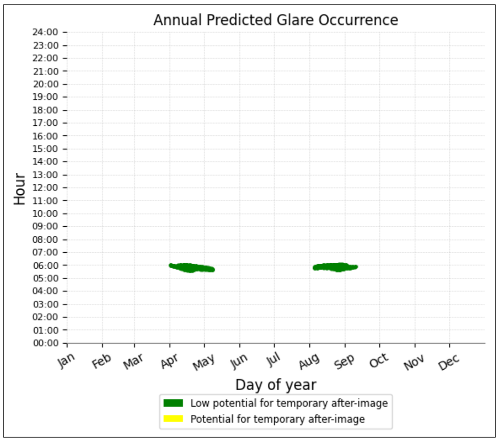

Image 40 - DGC3– PV area G

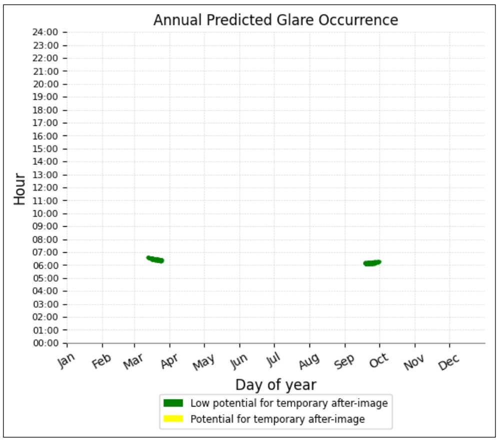

Image 41 - DGC3– PV area H

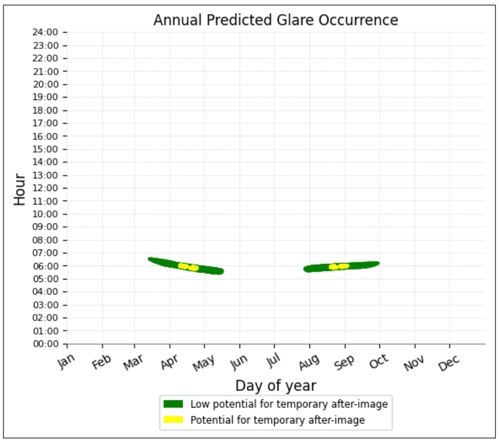

Image 42 - DGC3– PV area I

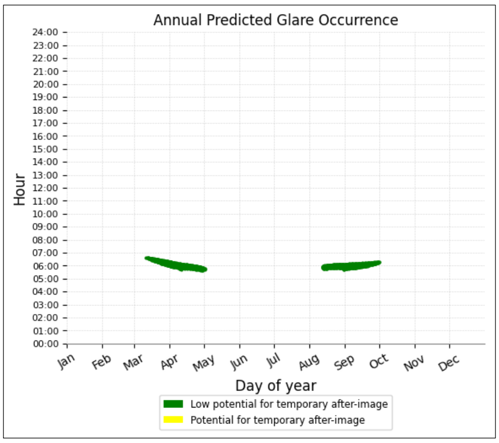

Image 43 - DGC3– PV area J

Darlton Gliding Club - Runway 05 Left-hand Circuit (DGC4)

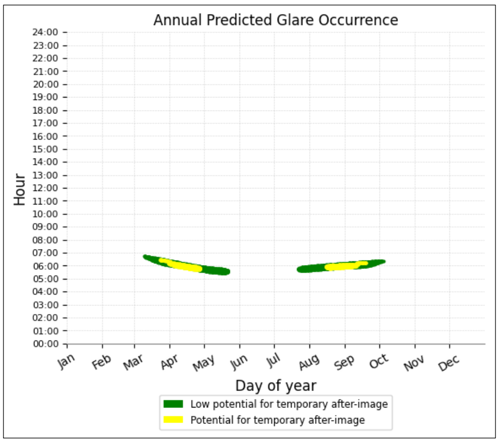

Image 44 - DGC4– PV area A

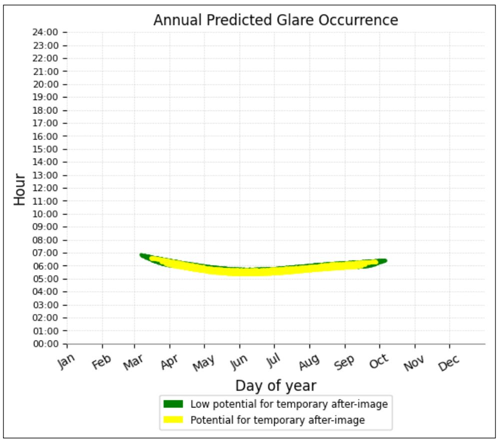

Image 45 - DGC4– PV area B

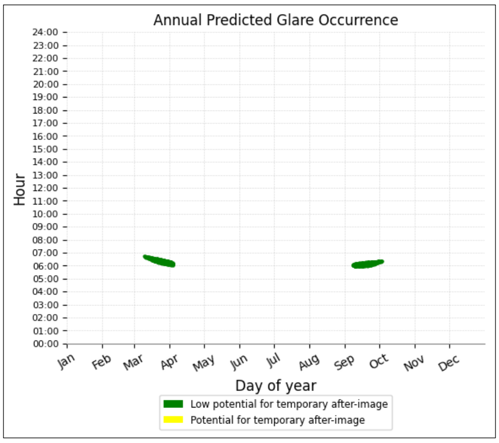

Image 46 - DGC4– PV area C

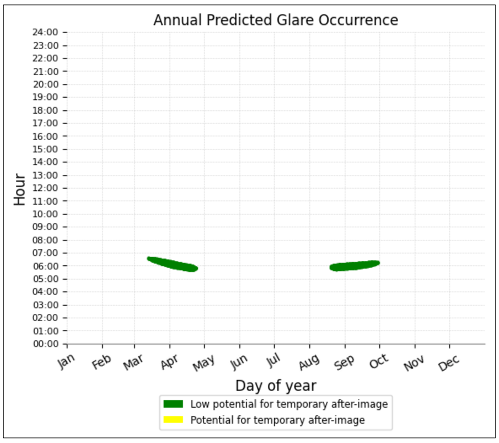

Image 47 - DGC4– PV area F

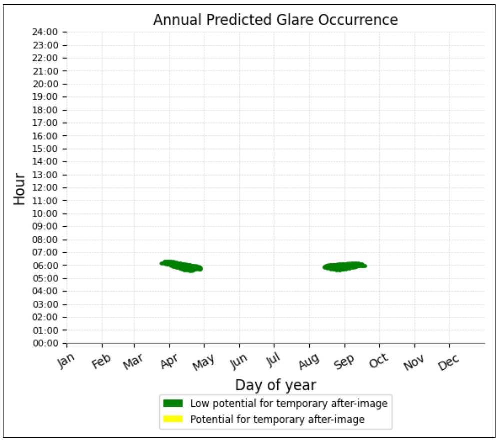

Image 48 - DGC4– PV area G

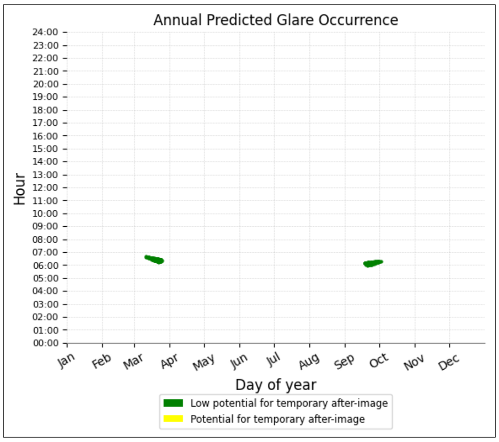

Image 49 - DGC4– PV area H

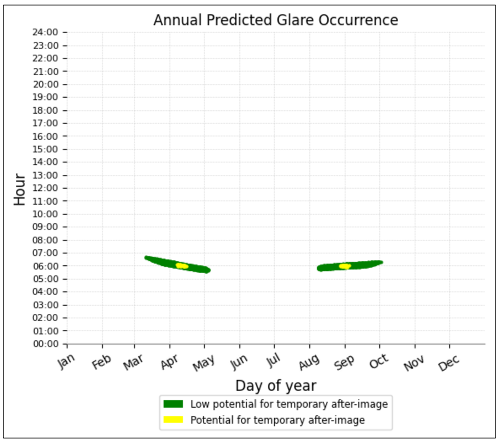

Image 50 - DGC4– PV area I

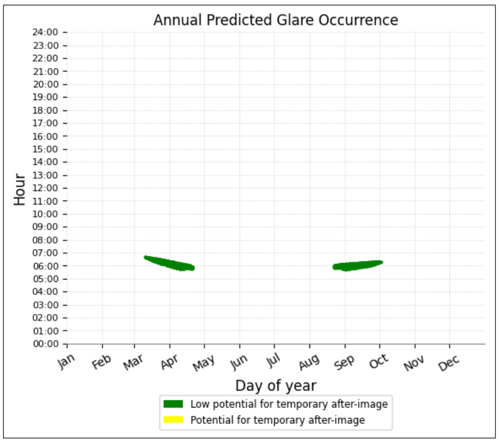

Image 51 - DGC4– PV area J

Roads

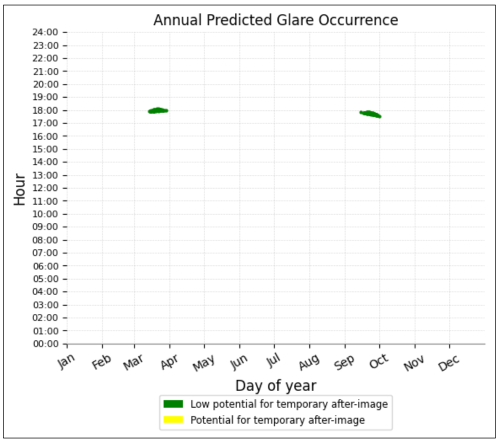

Image 52 - RD2– PV area A

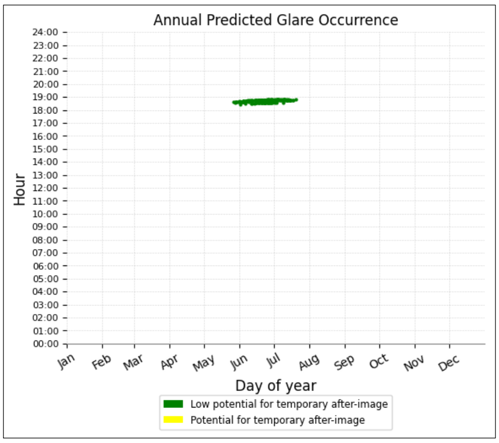

Image 53 - RD2– PV area B

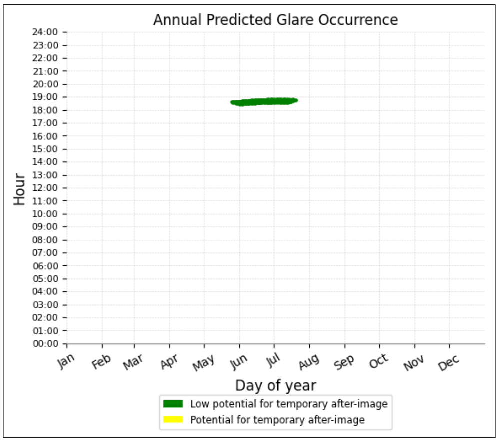

Image 54 - RD2– PV area C

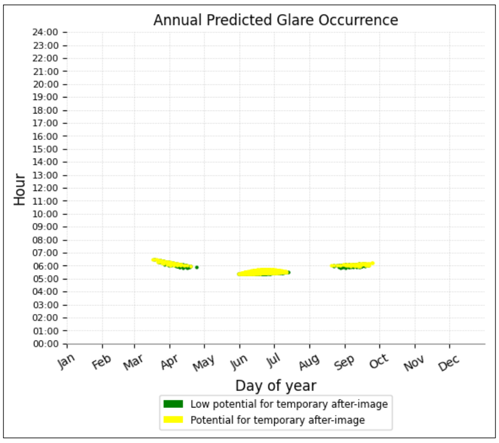

Image 55 - RD2– PV area I

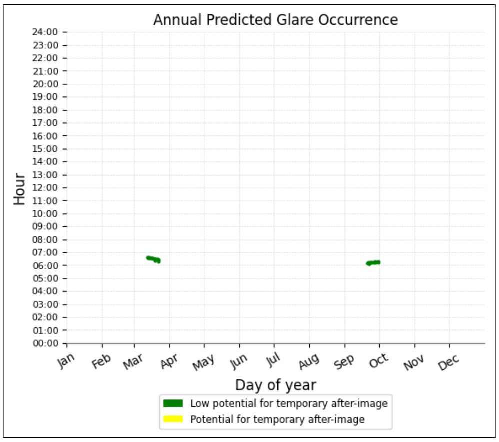

Image 56 - RD4– PV area A

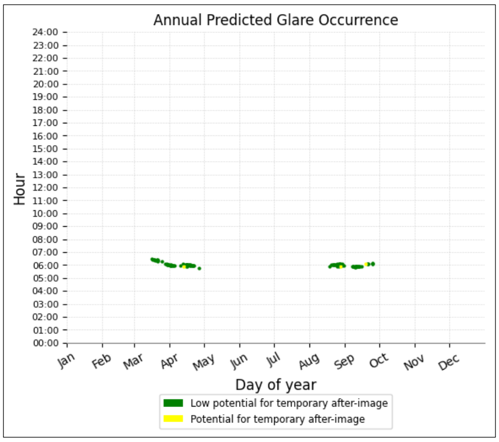

Image 57 - RD4– PV area B

Railway

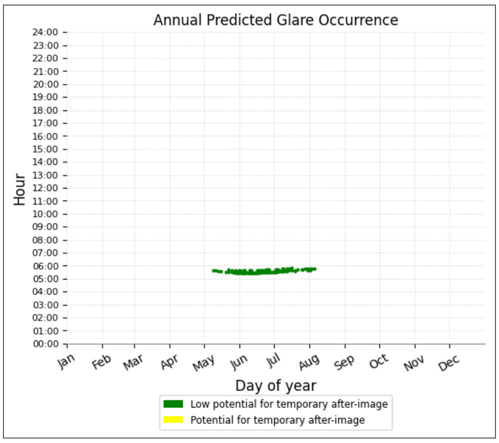

Image 58 - RW– PV area A

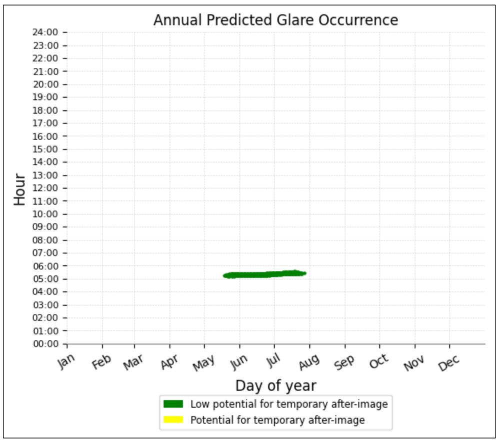

Image 59 - RW – PV area C

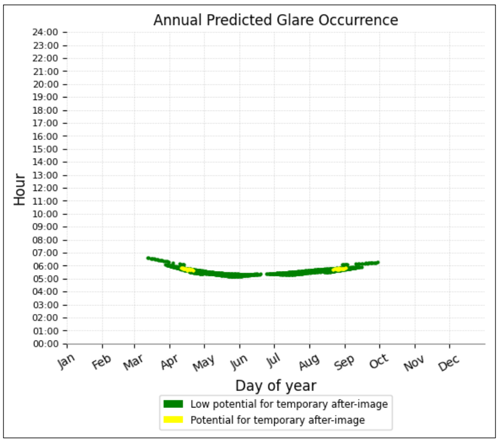

Image 60 - RW – PV area E

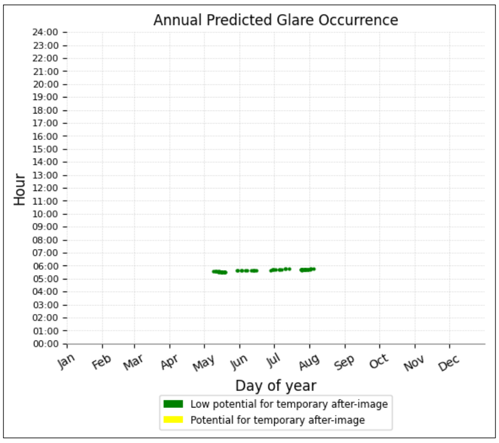

Image 61 - RW – PV area F

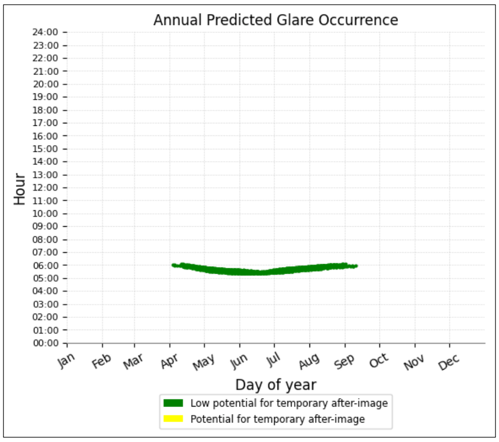

Image 62 - RW – PV area i

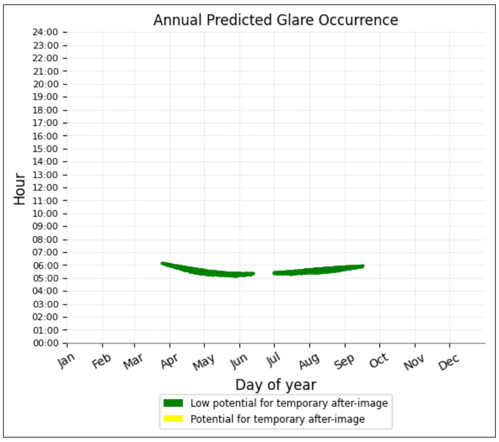

Image 63 - RW – PV area j

Buildings

Code	Building Name	Annual Glare (min) Without mitigation	With mitigation
OP1	Darlton Hall 01	4596	4596
OP2	Darlton Hall 02	3234	3234
OP3	Darlton Hall 03	3095	3095
OP4	Darlton Hall 04	2500	2500
OP5	Goosemorr Cottage	35	35
OP6	Wimpton House	34	34
OP7	Grey Oak	2160	2160
OP8	The Grove	2706	2706
OP9	Field House Farm	0	0
OP10	Dunham-on-Trent Primary School	0	0
OP11	Woodlands	0	0
OP12	Vicarage	0	0
OP13	Roy Martin Gunsmith	0	0
OP14	Roberts Close 01	3561	3561
OP15	Roberts Close 02	3492	3492
OP16	Roberts Close 03	3530	3530
OP17	Roberts Close 04	3515	3515
OP18	Roberts Close 05	3409	3409
OP19	Roberts Close 06	3323	3323
OP20	Briar Lea	3191	3191
OP21	Top Cottage	2096	2096
OP22	Roberts Farm	2168	2168
OP23	unknown	1913	1913
OP24	unknown	1954	1954
OP25	unknown	2110	2110
OP26	unknown	2182	2182
OP27	Ragnar House	1926	1926
OP28	Chestnut Barn	1504	1504
OP29	unknown	1834	1834
OP30	Ragnar Hall	2903	2903
OP31	Chestnut Farm	5325	5325
OP32	Hall Farm Cottage	6360	6360
OP33	Corner Cottage	6488	6488
OP34	unknown	6494	6494
OP35	unknown	6684	6684
OP36	Oak Tree Cottage	6734	6734
OP37	Stoneheaven 01	6546	6546
OP38	Stoneheaven 02	6499	6499
OP39	Rose Cottage	5879	5879
OP40	Chestnut Cottage	5694	5694
OP41	Far Hill Farm	199	1170

OP42	Vicarage Farm	0	0
OP43	Majors Farm	0	9215
OP44	Gibraltar Farm	0	5098
OP45	Wells Farm	0	5068
OP46	Woodcoates 01	0	4835
OP47	Woodcoates 02	0	4485
OP48	Babbington Springs Cottages	0	7191
OP49	Babbington Springs Farm	0	7104
OP50	North Farm	0	741
OP51	Top Farm	0	497
OP52	Long Row Cottage	0	3501
OP53	The Gables	262	8722
OP54	The Gables Bungalow	0	7308
OP55	unknown	4574	1454
OP56	unknown	2514	5969
OP57	unknown	2641	5815
OP58	unknown	2187	5975
OP59	unknown	3068	5871
OP60	Fledborough House	3205	7663
OP61	Station Cottages 01	0	9219
OP62	Station Cottages 02	4727	8460
OP63	Skegby House Cottage	40	8587
OP64	Skegby House	1905	6735
OP65	Fords Barn 01	3666	7062
OP66	Fords Barn 02	3953	6493
OP67	Skegby Manor	4277	6949
OP68	Thurber	4887	4422
OP69	Stonehill Farm	5317	3126
OP70	Matthews C of Primary School	5219	3529
OP71	Hill Farm	5634	4556
OP72	unknown	3001	0
OP73	unknown	3061	0
OP74	unknown	2888	0
OP75	unknown	3164	0
OP76	unknown	3332	0
OP77	unknown	3825	0
OP78	unknown	3729	48
OP79	unknown	4698	744
OP80	Clicksden View	3860	581
OP81	Hall Farm	161	199
OP82	Deborah Farm	0	0
OP83	Silver Trees Farm	0	0
OP84	Thurles House	0	0
OP85	Park Farm Cottages 01	0	0

OP86	Park Farm Cottages 02	0	0
OP87	Park Farm Cottages 03	0	0
OP88	Park Farm Cottages 04	0	0
OP89	Park Farm Cottages 05	0	0
OP90	Park Farm Cottages 06	0	0
OP91	Park Farm Cottages 07	0	0
OP92	Park Farm Cottages 08	0	0
OP93	Birchland Farm	307	262
OP94	Woodside Farm	0	0
OP95	Thorney Gate	4547	4574
OP96	Damnbreezy	2383	2514
OP97	Lodge Farm	2530	2641
OP98	Braemar	1893	2187
OP99	Westwood Farm Cottages	3657	3068
OP100	California Farm	10580	3205
OP101	unknown	7620	0
OP102	Moor Farm	7555	4727
OP103	unknown	10440	40
OP104	The Manor	13362	1905
OP105	Trentholme Farm 01	12146	3666
OP106	Trentholme Farm 02	11794	3953
OP107	Trentholme Farm 03	11053	4277
OP108	unknown	10158	4887
OP109	unknown	10393	5317
OP110	unknown	10014	5219
OP111	unknown	10364	5634
OP112	unknown	10047	3001
OP113	unknown	10398	3061
OP114	unknown	11128	2888
OP115	unknown	11378	3164
OP116	unknown	10998	3332
OP117	unknown	10902	3825
OP118	unknown	10939	3729
OP119	unknown	11299	4698
OP120	unknown	10446	3860
OP121	unknown	12970	3557
OP122	Watson Farms	12681	3756
OP123	Mill Hill House	11851	5104
OP124	The Lodge	11271	5454
OP125	Mudors	12124	6505
OP126	North Clifton Hall	12795	3596
OP127	Station Cottage	11977	5507
OP128	unknown	8122	4210
OP129	The Gate House	11873	53

OP130	Carr Farm	11404	2967
OP131	Cosy Cot	9836	162
OP132	Moor Farm	7954	7770
OP133	Moorfields Farm	6219	6031
OP134	Amblerod Farm 01	6279	6272
OP135	Amblerod Farm 02	6214	5943
OP136	The Grange	6162	6111
OP137	Birkland Barn	5544	5630
OP138	The Paddocks	6714	6440
OP139	unknown	2440	2312
OP140	The Old Police House	2251	2307

Table 4.Annual Glare duration for buildings