Elmwood House
74 Boucher Road, Belfast
Co. Antrim BT12 6RZ
T +44 2890 667 914

Our ref: NI2702

Date: 28th February 2025

Mr Gerard McGee
Planning Department
Armagh City, Banbridge and Craigavon Borough Council
Bridgewater House
23A Castlewellan Road
Banbridge
BT32 4AX

Dear Gerard

LA08/2024/0259/F - Installation and operation of a 29.9MW solar farm on lands south of Magheralin and southeast of Dollingstown

RPS continue to monitor the above referenced planning application. Accordingly, we are aware of comments / clarification requests raised as part of the consultation process by:

1. Historic Environment Division (HED) Historic Monuments;
2. HED Historic Buildings;
3. Department of Agriculture Environment & Rural Affairs (DAERA) – Inland Fisheries Division; and
4. Department for Infrastructure (DfI) Roads.

This submission is made in direct response to matters raised by the above statutory bodies, as follows:

- Appendix 1 – Response to HED Historic Monuments;
- Appendix 2 – Response to HED Historic Buildings;
- Appendix 3 – Response to DAERA Inland Fisheries; and
- Appendix 4 – Response to DfI Roads.

Where required the submission is supplemented by Further Information which has been appropriately referenced within the relevant Appendix.

Whilst presented by RPS in their capacity as Planning and Environmental consultants, this response has been informed where appropriate through engagement with and direct input by:

- RES as Applicant and Project Developer – providing appropriate technical information in respect of project components;
- Paul Johnston Associates Ltd – an independent fisheries consultancy specialising in freshwater fisheries in Ireland; and
- Pager Power – as Glint and Glare consultants on the project.

Should the Council have any queries please do not hesitate to contact me using the details provided below.

Our ref: NI2702

Yours sincerely,
for RPS

Paul McKernan
Sector Director
paul.mckernan@rps.tetratech.com

cc: Rachel Buchanan – Senior Development Manager - RES

Appendix 1
Response to HED Historic Monument Clarifications

Our ref: NI2702

In their consultation response dated 05/08/24 in respect of planning application LA08/2024/0259/F, HED Historic Monuments issued the following comments and/or clarification requests, which are listed according to the sequence in which they were raised.

Responses are provided in turn under each comment / clarification.

Where required responses provided are supplemented by appropriate Further Information which is referenced as necessary and which forms part of this all-encompassing submission.

Comment/Clarification Raised

We welcome the proposed exclusion zone but consider that this should be expanded from the proposed northern extent to the existing field boundaries at west, east and south- see Figure 1 below. This area should be entirely excluded from all development works, including the fence line noted above. This is to ensure the physical protection of the scheduled monument and associated below ground archaeological remains, but also to ensure the protection of the integrity of the immediate setting of the scheduled monument.

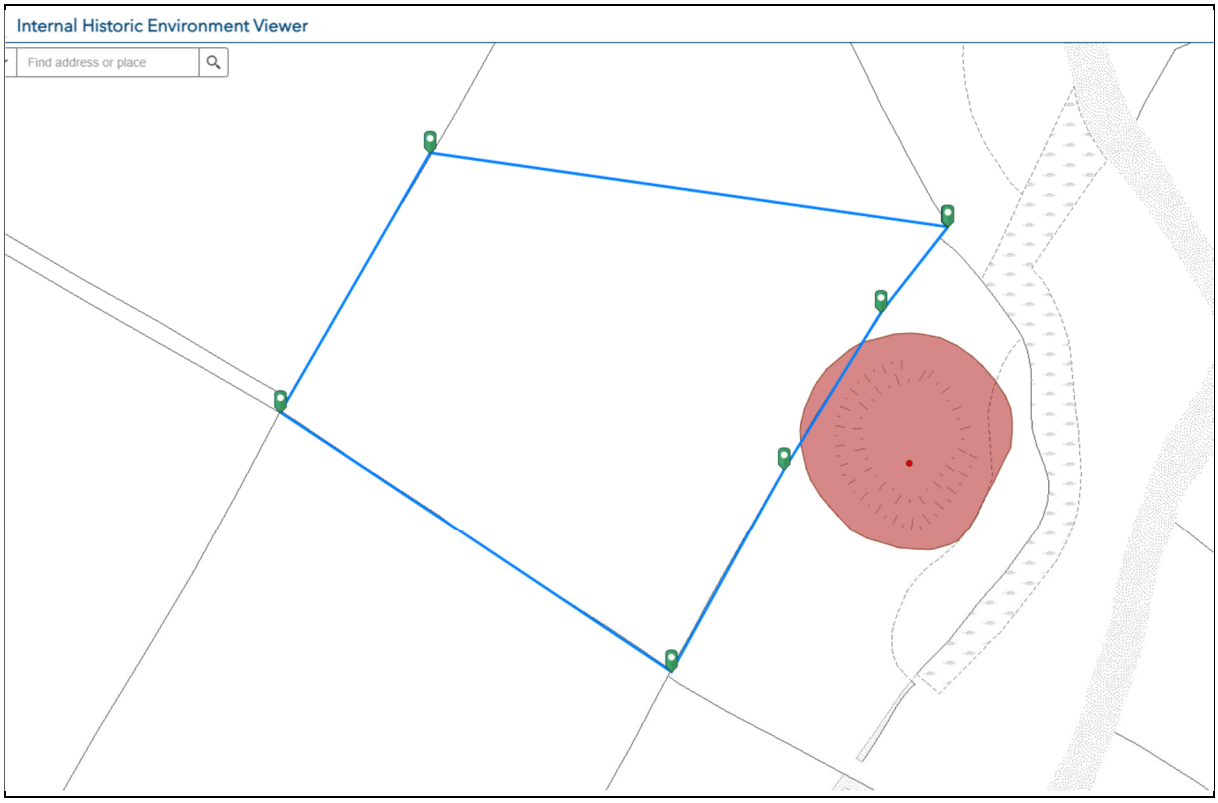


Figure 1: HED Historic Monuments Consultation Response dated 05.08.24

Direct Response

Figure 4 Site Layout 05215-RES-LAY-DR-PT-005 Rev 8.1, submitted previously for Council consideration on 30th August 2024. removes all proposed project components from the area outlined in blue on Figure 1 included above.

In the intervening period, a further layout amendment has occurred to address Council comments regarding land-parcel 4, which is at the south of the Proposed Development site. The additional amendment is reflected on Figure 4 Site Layout 05215-RES-LAY-DR-PT-005 Rev 12, which accompanies this submission, replacing the previous iteration.

For the avoidance of doubt, the area shown on Figure 1 above, continues to remain free from development proposals.

Appendix 2
Response to HED Historic Buildings Clarifications

In their consultation response dated 05/08/24 in respect of planning application LA08/2024/0259/F, HED Historic Buildings issued the following clarifications, which are listed according to the sequence in which they were raised.

Where required, responses provided are supplemented by appropriate Further Information which is referenced as necessary and which forms part of this all-encompassing submission.

Comment/Clarification Raised

HED Historic Buildings requests the following information to assess the impact of views of the proposed development on the nearby listed asset against Policy:

- **Site sections through field adjacent to Springhill house to include the listed building, PV panels and proposed and extant hedgerow planting.**
- **Photomontage illustrating view of PV farm from front of Springhill House during winter months.**

Direct Response

Please refer to:

- Drawing 2702.5.10 Rev H which accompanies this submission provides two Sections through the Parcel 1 lands of the Proposed Development as well as the garden of Springhill House located to the southeast of Parcel 1.
- The accompanying Photomontage provided as Annex 1 to Appendix 2 illustrating the view from the front of Springhill House towards Parcel 1 lands. As requested, a wintertime montage is provided. A summertime montage is provided also for completeness. The montage has been given the reference number “Viewpoint 12.”

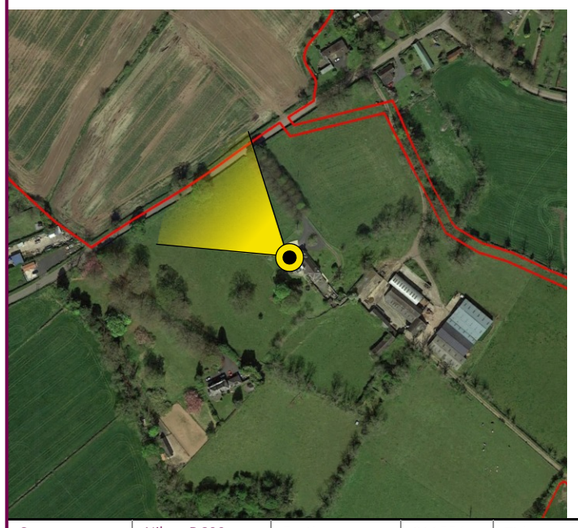
The Archaeological and Cultural Heritage Assessment submitted as part of the planning application pack sets out that from here views of the Proposed Development are screened by existing mature hedges along Springhill Road and a mature tree-lined avenue located north / north-west of the house. The Cultural Heritage Assessment concludes that, *“Given the current level of screening provided by the existing hedges and trees and the additional screening that further hedge planting would provide, the potential indirect visual impact may be considered to be imperceptible.”*

This conclusion is reinforced by the Section and Montage provided, as referred to in the bullet points above.

By way of further information, Photomontage 3 which formed part of the Landscape and Visual Impact Assessment (LVIA) submitted as part of the planning application pack, is taken along the adjacent roadside. The montage has been updated to take account of revised design proposals undertaken in response to a Department for Infrastructure (DfI) consultation response and which involved the relocation of the proposed access point along Springhill Road. The updated Photomontage 3 – now referenced VP03 Rev A - is provided as Annex 2 to Appendix 2. This reaffirms that to viewers along the roadside, potential views of the site will be screened by existing and proposed planting. The sensitive design approach to retention and augmentation of landscaping along Springhill Road is shown in Drawing 2702.5.02 Rev G which forms part of this submission.

Appendix 2 - Annex 1
Photomontage – Front of Springhill House towards Parcel 1 lands

Existing View



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311554	Title: VP12 Listed Building on Springhill Road Existing View	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.10.24 - 16.10	Northing	357711		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	305°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	90 m		Status: Issued	Date:	February 2025		

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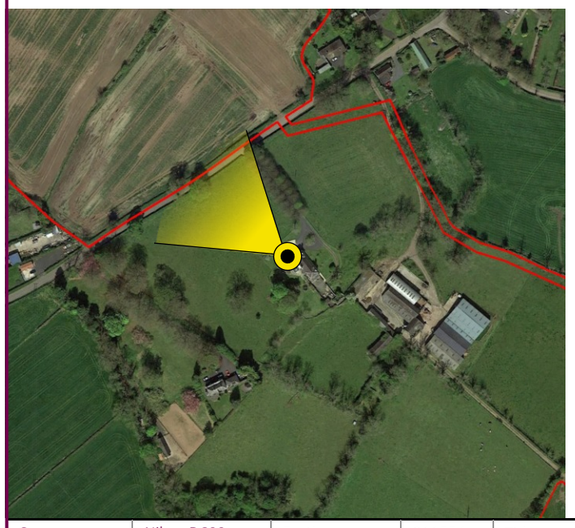
Photomontage



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311554	Title: VP12 Listed Building on Springhill Road Proposed View - Panels Only	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm
Date	01.10.24 - 16.10	Northing	357711		Projection: Irish Grid	Checked:	SA	
View height	1.65 m AGL	Direction	305°		Data Source: RPS 2025	Job Ref:	NI 2702	
Field of View	65°	Distance	90 m		Status: Issued	Date:	February 2025	

Client: res

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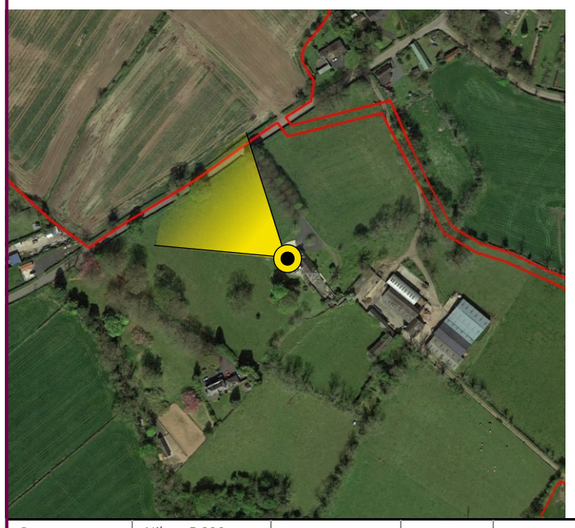
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311554	Title: VP12 Listed Building on Springhill Road Proposed View - Day 1	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.10.24 - 16.10	Northing	357711		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	305°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	90 m		Status: Issued	Date:	February 2025		

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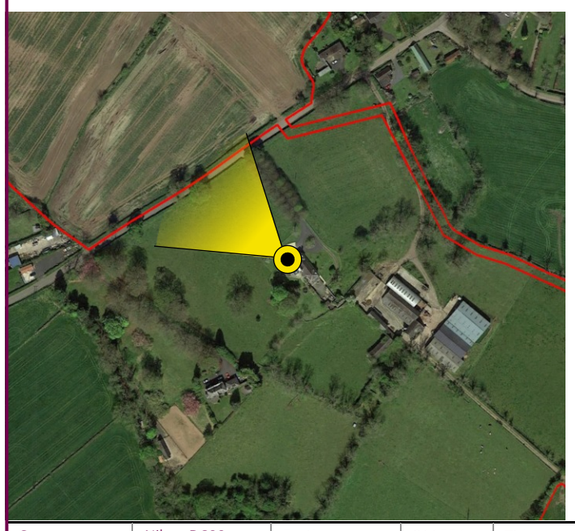
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311554	Title: VP12 Listed Building on Springhill Road Proposed View at Year 10	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.10.24 - 16.10	Northing	357711		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	305°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	90 m		Status: Issued	Date:	February 2025		

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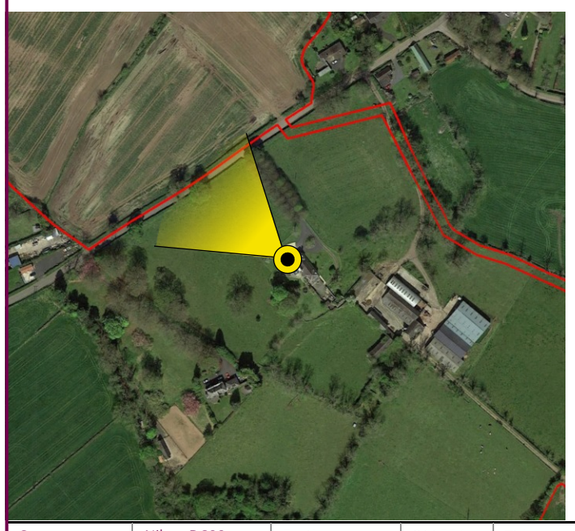
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311554	Title: VP12 Listed Building on Springhill Road Proposed View at Year 10 - Winter	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.10.24 - 16.10	Northing	357711		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	305°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	90 m		Status: Issued	Date:	February 2025		

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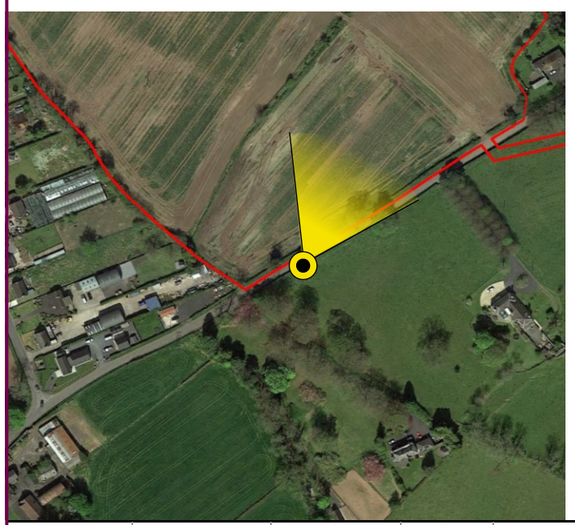
Appendix 2 - Annex 2
Updated Photomontage 3 – now referenced VP03 Rev A

Existing View



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311490	Title: VP03 Springhill Road Existing View	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.12.23 - 14.15	Northing	357765		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	15°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	15 m		Status: Revision A - Issued	Date:	February 2025		

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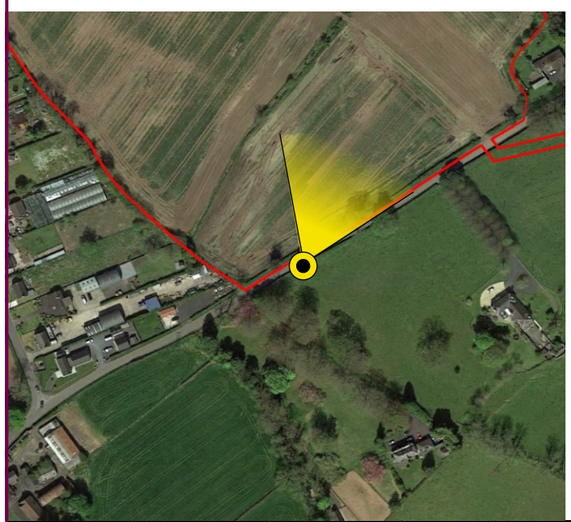
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311490	Title: VP03 Springhill Road Proposed View - Day 1	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.12.23 - 14.15	Northing	357765		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	15°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	15 m		Status: Revision A - Issued	Date:	February 2025		

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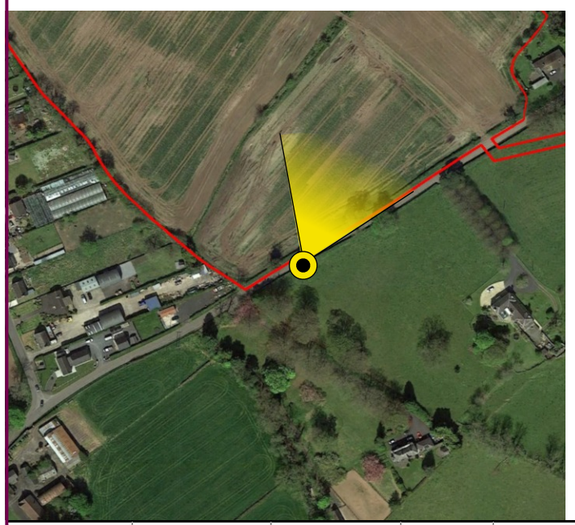
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	311490	Title: VP03 Springhill Road Proposed View at Year 10	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	01.12.23 - 14.15	Northing	357765		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	15°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	15 m		Status: Revision A - Issued	Date:	February 2025		

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Appendix 3
Response to DAERA Inland Fisheries

Our ref: NI2702

In their consultation response dated 16/07/24 in respect of planning application LA08/2024/0259/F, DAERA Inland Fisheries Division raised some clarifications regarding Electro Magnetic Fields (EMF) potentially associated with the transmission cables which traverse under the River Lagan and the potential impacts to the river during the Horizontal Directional Drilling process and as such requested clarification on matters which are listed below according to the sequence in which they were raised.

Responses are provided in turn under each clarification. Where required responses are supplemented by appropriate Further Information which is referenced as necessary.

Comment/Clarification Raised

Inland Fisheries notes the inclusion of a Construction method statement considering the construction phase of the development, NIEA must be content that the measures therein are adequate to protect the aquatic environment and the applicant must ensure they are implemented in full. The applicant should consider and adhere to the Standing Advice which is available at: https://www.daerani. gov.uk/publications/standing-advice-development-may-have-effect-water-environmentincluding-groundwater-and-fisheries.

Direct Response

The planning submission before Council for consideration includes an Outline Construction Environmental Management Plan (OCEMP) setting out best practice principles and a framework of mechanisms under which the construction process will be managed. The OCEMP remains a "live" document which is updated and developed as the project progresses. Prior to construction the Appointed Contractor will develop and implement a Final CEMP (CEMP) to ensure that construction activities are planned and managed in accordance with RES' own best practice principles, environmental recommendations contained within the suite of planning documents and binding environmental requirements.

RES welcome the advice provided which will help inform the emerging CEMP. As per previous experience, it is anticipated that the requirement to agree this document with the Council – as the Planning Authority – will be a pre-commencement requirement of any emerging planning consent for the Proposed Development.

Section 9 of the OCEMP confirm those environmental mitigation measures proposed within the suite of planning documents, to protect among other things, the water environment. Table 9.1 sets out Water Environment Mitigation Measures which includes a commitment to adhere with Guidance for Pollution Prevention (GPP) including:

- GPP1 – Understanding your environmental responsibilities; and
- GPP5 – Works in or near water.

As per Section 2.3 of the OCEMP document, and to reinforce the above statements regarding the CEMP process, the Final CEMP will be agreed with the Council through consultation, to take account of any mitigation methods and control measures proposed by key stakeholders including DAERA prior to the commencement of construction.

Comment/Clarification Raised

As the transmission cables traverse (under) the river to connect the generating sites has there been any assessment of the electro-magnetic fields (EMF) that these may induce to the river and how they might affect fish behaviour, especially that of migratory salmonids and eels?

Direct Response

The earth produces a natural geomagnetic field while natural electrical fields can be generated by fish from their own physiological processes or through the interaction of the organism with earth processes such as wave action, currents and the earth's magnetic field (Gill and Bartlet, 2010)[1].

[1] Gill, A.B. an Bartlett, M. (2010). Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. *Scottish Natural Heritage Commissioned Report No.401*

Geomagnetic fields in particular are important in the natural migration of fish species such as eels and salmon (Fey et al., 2019)[2]. For example, marine juvenile stages of eels rely both on oceanic currents and on the earths geomagnetic field to move from the oceanic to coastal environment before entering freshwater to grow and mature; adult eels rely on it during the movement from coastal to oceanic waters in preparation for spawning.

All forms of renewable technologies, including marine and land-based wind farms, and solar farms, have the aim of harnessing energy and generating electricity which is transmitted or distributed to sub-stations via electrical cables that are buried within the ground, seabed, or beneath rivers and lakes. As electricity passes through a cable, this generates an electric field, which through its own movement, generates a magnetic field. Magnetic fields in turn can generate electrical fields.

Collectively, these are referred to as electro-magnetic fields (EMFs) and these can be emitted into the environment beyond the cable. The strength of the EMF emitted will be affected by inter-alia the size of the cable, the presence and type of shielding used and the distance between the cable and the receptor.

Cable Associated EMF Strengths and Effects on Fish Behaviour

A 33kV underground AC trefoil formation cable is proposed for the interconnection cable at Magheralin Solar Farm. The trefoil formation is the cable protective insulation and sheath. Due to the sheath design, there is no external electric fields and only magnetic fields can pass through the sheath (EMFs.info, 2024).

To date, the assessment of the effect of EMFs on fish has largely focused on cables installed in the marine environment with few studies focusing on the freshwater environment. A comprehensive review by Gill and Bartlet (2010) focused on EMF impacts generated by subsea cables on Atlantic salmon, sea trout and European eel behaviour, while a review by Emma (2016)[3] was more general, covering both vertebrate and invertebrate marine organisms.

Gill and Bartlet (2010) reported that impacts on fish would depend on the strength of the emitted EMF, which is dependent on the conductor size, current load of the cable, and burial depth. Gill and Bartlet (2010) cited modelling studies showing that the strength of EMF emitted is positively related to the size of cable current.

Models using a 33kV cable buried 1.5m beneath the seabed showed that the strength of the magnetic field was 1.5 uT[4] in the sea bed, declining to 0.03 uT at the sea and sea bed interface (Gill and Bartlet, 2010). For context, these modelled values are >1 to 3 orders of magnitude lower than the earth's magnetic field, which has a reported strength range of 25 to 70 uT (Emma, 2016; Fey et al., 2019). Importantly, the strength of the EMF field declines markedly as an inverse square of the distance from the cable (Gill and Bartlet 2010; Fey et al. 2019). Snyder et al, (2019)[5] reported that increasing the burial depth of undersea cables from 1 to 2 m reduces the magnetic field at the seafloor about four-fold. Armstrong et al. (2016) suggested that burial or armouring would reduce the field intensities that may be experienced by fish by an order of magnitude and more.

In the review by Emma (2016), there was insufficient empirical evidence to show a negative impact and the conclusion was that EMFs from buried marine cables posed a low risk to benthic organisms, species likely to have the greatest potential for interaction with buried cables. A similar conclusion was reached in an extensive review of EMF impacts on marine fishes by Snyder et al., (2019) who reported that although bottom dwelling (benthic) fish would be the most likely to encounter an EMF from buried cables, the distance-decay rate from cable burial minimises the exposure and lack of significant effect.

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[2] Fey, D.P., Jakubowska, M., Greszkiewicz, M., Andrulewicz, E., Otremba, Z., and Urban-Malinga, B. (2019). Are magnetic and electromagnetic fields of anthropogenic origin potential threats to early life-stages of fish? Aquatic Toxicology, 209, 150-158.

[3] Emma, B. (2016). A Review of the Evidence of Electromagnetic Field (Emf) Effects on Marine Organisms. Journal of Ecology and Environmental Sciences, 4, 2, p. 22-26.

[4] uT refers to a unit of magnetic field strength known as microtesla.

[5] Snyder, D.B, Bailey, W.H., Katherine Palmquist, K., Cotts, B.R.T, and Olsen, K.R. Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. U.S. Department of the Interior Bureau of Ocean Energy Management Office of Renewable Energy Programs. Pp. 44.

Interestingly, Armstrong et al. (2016), investigated the response of Atlantic salmon adults and post-smolts to magnetic field strengths from 1.3 to 95 uT in a controlled experimental arena but found no significant impact on swimming behaviour at any field strength. Armstrong et al. (2016) concluded that their results should reassure that salmon are unlikely to be adversely affected by magnetic fields under most situations. Again, the upper experimental strength used by Armstrong et al. (2016) is over three orders of magnitude higher than what would be expected at the riverbed surface above a 1.5m buried 33kV cable (i.e. 0.03uT vs. experimental values of 95 uT); the proposed burial depth of 3m for the River Lagan crossing would be expected to produce an even smaller field.

Olsson et al. (2010)[6] reported a study on the effect of a buried power cable on European eels, which showed that the swimming speed was significantly slower when crossing a 130 kV AC power cable with a field strength of 200 μT at 1 m burial depth. However, these responses were observed with a high current and MF cable with strengths over 3 orders of magnitude higher than the proposed crossing cable for the River Lagan, and at shallower depths.

The estimated magnetic frequency of a larger 132kV underground cable of 2.38μT at 0m and 0.32μT at 5m from the centre line (EMFs.info,2024) is one / two order of magnitude lower than the earth's magnetic field strength of 25 to 70 uT (Emma, 2016; Fey et al., 2019).

Overall, based on the review of impacts on fish more generally, and on specific studies on free-swimming eels and salmon, the magnitude of impact of EMFs from the 3m buried 33kV cable below the River Lagan is *Negligible*

Comment/Clarification Raised

Inland Fisheries notes that the depth of the cabling is proposed to be approx. 3m below the river bed level, is this sufficient to ensure that any EMF has no impact on the river itself?

Direct Response

Please refer to the information provided in the response to the previous clarification which confirms:

- A 33kV underground AC trefoil formation cable is proposed for the interconnection cable at Magheralin Solar Farm.
- There is no external electric fields and only magnetic fields can pass through the sheath (EMFs.info, 2024).
- The earth produces a natural geomagnetic field while natural electrical fields can be generated by fish from their own physiological processes.
- The strength of the EMF emitted will be affected by inter-alia the size of the cable, the presence and type of shielding used and the distance between the cable and the receptor.
- Models using a 33kV cable buried 1.5m beneath the seabed showed that the strength of the magnetic field was 1.5 uT in the seabed, declining to 0.03 uT at the sea and seabed interface (Gill and Bartlet, 2010). For context, these modelled values are >1 to 3 orders of magnitude lower than the earth's magnetic field, which has a reported strength range of 25 to 70 uT (Emma, 2016; Fey et al., 2019).
- Snyder et al, (2019) reported that increasing the burial depth of undersea cables from 1 to 2 m reduces the magnetic field at the seafloor about four-fold. The proposed burial depth of 3m for the River Lagan crossing would be expected to produce an even smaller field.

Accordingly, the impact of any potential EMF on the riverbed is predicted to be negligible.

Comment/Clarification Raised

Is there likely to be any noise or vibration introduced into the watercourse through this process and if so to what levels as it may impact fish behaviour?

Direct Response

[6] Olsson, T., Bergsten, P., Nissen, J. & Larsson, A. (2010). Impact of electric and magnetic fields from submarine cables on marine organisms - the current state of knowledge. Vattenfall Ocean Energy Programme, Project Number 3080100 Final Report. 67pp.

During construction there will be the potential for noise associated with the Horizontal Directional Drill under the River Lagan or the pumping of bentonite fluid through to the drill head. The rotation of the drill will cause a low level of noise and vibration although it is worth noting – as set out in Appendix H of the OCEMP that formed part of the planning submission - that drilling activities including set up and dismantling are anticipated to last only for a period of 5 days in totality.

An in-depth study and review by Parvin et al. (2007)[7] measured the level of underwater noise and vibration generated during HDD operations under the River Wye; based on the noise generated during drilling, and on the sound perception of test fish species, the predicted magnitude of impact was from Neutral to Negligible, and was associated with behavioural avoidance in a few individuals of a population of a sensitive species with specialist hearing abilities, such as Shad (Alosa spp.; not present within the River Lagan) to a low likelihood of disturbance for a hearing generalist such as Atlantic salmon (Parvin et al., 2007; present within the River Lagan). It is noteworthy that lamprey have a similar noise perception threshold as for salmon (see Nedwell et al., 2008)[8], and so the same low likelihood of disturbance is expected.

However, vibration can damage incubating eggs in salmonids but this is only likely with percussive activities such as piling. For example, mechanical shock is a well-known causative factor for mortality during the egg incubation stage following fertilisation, when sensitivity is extremely high. There is no available information in the scientific literature on the effects of drilling on fish egg survival, however, activities such as egg transport and handling in culture facilities, and pile driving and controlled explosions during mining and quarrying, are factors that have caused mortality (Crisp, 1993[9]; Jensen, 2003)[10]. The magnitude of impact of rotational HDD is considered to pose a lesser risk than that of pile driving and would be similar to the risks of noise to free-swimming fish considered above; as per DMRB guidance, this would equate to a *Neutral* to *Negligible* magnitude of impact where habitat is considered suitable for salmon and trout spawning.

As per Section 9.4 of the OCEMP document, submitted as part of the suite of documents to support the planning application, a number of best practice noise mitigation measures will be implemented to reduce noise levels during the construction phase. This includes measures to control noise at source as well as general noise mitigations in accordance with British Standard BS5228:2009+A1:2014 – Noise and Vibration Control on Construction and Open Sites.

Examples of best practice measures include:

- Use of mufflers and silencers on pneumatic percussive tools;
- Shutting down of machinery when not in use in periods between work; and
- Placing of ancillary plant such as generators, compressors and pumps behind physical barriers and ensuring the direction of noise emissions including exhausts and engines is away from sensitive receptors.

Comment/Clarification Raised

Is there the potential for deleterious materials e.g oils or coolant to enter the watercourse?

Direct Response

The potential for deleterious materials to enter the watercourse is during the construction period. The Proposed Development does not contain any moving parts, is unmanned and will be accessed only for maintenance, set out within the Transport Statement that accompanies the planning submission, as being no more than one vehicle trip per week. The potential therefore for environmental effects on the

[7] Parvin, S.J., Nedwell, J.R., Edwards, B., Workman, R., and Brooker, A. (2007). Measurement and assessment of underwater noise and vibration during Horizontal Directional Drilling operations under the River Wye. Subacoustech Report No. 763R0422.

[8] Nedwell, J.R., Parvin, S.J., Edwards, B., Gentry, S., Workman, R. and Brooker, A.G. (2008). Measurements of underwater noise and vibration during augerbore, rockbore, mircotunnelling and associated pipeline construction operations. Subacoustical report No.732R1225

[9] Crisp, T.D. (1993). The environmental requirements of salmon and trout in fresh water. Freshwater Forum, 3,3. P176-202.

[10] Jensen (2003). New mechanical shock sensitivity units in support of criteria for protection of salmonid eggs from blasting or seismic disturbance. Canadian Technical Report of Fisheries and Aquatic Sciences 2452, 1-15.

watercourse during operation as a result of deleterious materials caused by the Proposed Development, is therefore negligible.

The planning submission before Council includes an Outline Construction Environmental Management Plan (OCEMP) setting out best practice principles and a framework of mechanisms under which the construction process will be managed. To reinforce the statements included previously within this submission, the OCEMP remains a "live" document which is updated and developed as the project progresses. Prior to construction the Appointed Contractor will develop and implement a Final CEMP (CEMP) to ensure that construction activities are planned and managed in accordance with RES' own best practice principles as well as environmental recommendations contained within the suite of planning documents and binding environmental requirements.

Section 9 of the OCEMP confirm those environmental mitigation measures proposed within the suite of planning documents, to protect among other things, the water environment. Appendix H of the OCEMP provides an Outline Horizontal Drilling Methodology whilst Appendix I of the OCEMP provides a HDD Crossing Point layout and section drawing.

Among the proposed environmental protection measures set out are:

- Application in the design process of a minimum 5m separation zone between all proposed works and existing watercourses or drains at the site;
- In the event of the requirement to refuel plant on-site, this will take place within dedicated areas located away from watercourses or drains utilising further mitigation measures including drip trays;
- Containment of any on-site fuels within bunds providing for at least 110% of storage capacity;
- Implementing the measures of a Pollution Prevention Plan including procedures for addressing spills or environmental incidents – an example of which is included in Appendix F of the OCEMP;
- Appropriate storage of other materials with potential for run off away from existing watercourses and outside of proposed exclusion zones – which will be a minimum of 10m wide;
- Identification of any stockpile areas to ensure best location to reduce material movements and minimise possibility of erosion or run-off;
- Ensuring that HDD work areas and entry/exit points will be set back from the River Lagan crossing – a minimum of 18m on the southern side and anticipated 45m on the northern side;
- Application of silt fences between any excavated materials and surface water features to prevent the potential for sediment washing into the water environment;
- Adherence to GPP documents as part of all site management processes including GPP1 – Understanding your environmental responsibilities – Good Practice Guidelines, and GPP5 – Works and maintenance in or near water;

It is proposed that the suite of in-built design measures including separation distances to drains and watercourses from infrastructure, as well as the further suite of environmental protection measures proposed within the OCEMP, and which will be updated and agreed prior to construction with the Council, will appropriately offset the potential for deleterious materials to enter watercourses around the site, thus avoiding the potential for any unacceptable or significant associated affects.

Comment/Clarification Raised

Inland Fisheries also notes that NIEA have requested that if permission is granted that a CEMP is conditioned as part of the approval.

Direct Response

As set out in the response to the preceding clarification, the planning submission before Council for consideration includes an Outline Construction Environmental Management Plan (OCEMP) setting out best practice principles and a framework of mechanisms under which the construction process will be managed. The OCEMP remains a "live" document which is updated and developed as the project progresses. Prior to construction the Appointed Contractor will develop and implement a Final CEMP (CEMP) to ensure that construction activities are planned and managed in accordance with RES' own best practice principles as well as environmental recommendations contained within the suite of planning documents and binding environmental requirements.

Accordingly, RES welcome this suggestion by NIEA, which aligns with their own experience of similar sites and processes typically requiring the submission of a CEMP for Council approval, as a pre-commencement requirement of any emerging planning consent.

Appendix 4
Response to DfI Roads

In their consultation response dated 04/10/24 in respect of planning application LA08/2024/0259/F, DfI Roads raised clarifications in respect of traffic and glint and glare matters as set out below.

Responses are provided in turn under each clarification. Where required responses are supplemented by appropriate Further Information which is referenced as necessary.

Comment/Clarification Raised

Submitted plans are still lacking in detail regarding dimensions of access width and radii. Visibility splay standards proposed are satisfactory and their availability in vertical plane has been confirmed. However, Council Planning may wish to see more detail regarding the extent of hedge etc to be removed and what new boundary treatment is proposed behind the visibility splays. A suitably detailed single plan at 1/500 scale should be provided for each access. Multiple plans showing short sections of each visibility splay is confusing particularly when the plan numbering does not clearly group each area with others relevant to it.

Direct Response

Please refer to the following Figures which accompany this submission and provide suitably detailed single plans at 1:500 scale confirming access width and radii, in accordance with DfI Roads recommendations:

- Figure 19: Site Access 1 Proposed works 05215-RES-ACC-DR-PT004 Rev 1
- Figure 20: Site Access 2 Proposed works 05215-RES-ACC-DR-PT005 Rev 1
- Figure 21: Site Access 3 Proposed works 05215-RES-ACC-DR-PT006 Rev 2

Submitted plans can be read alongside and reflect those Figures submitted previously in respect of Access 1, 2 and 3 which DfI have confirmed illustrate acceptable visibility splays and confirm availability in the vertical plane.

RPS would refer the Council to the following Figures which confirm the landscaping proposals at the site including boundary treatment along sight splays:

- 2702.5.01 – Rev G to 2702.5.06 – Rev G (inclusive).

Comment/Clarification Raised

DFI Roads repeat that staff are not qualified to adjudicate upon the report and update, provided.

It still appears to DFI Roads that if the faces of the panels are visible to drivers, that there is potential for harm to be caused with drivers being dazzled and the report appears to recognise this. We would still recommend that it may be necessary to consider appropriate conditions to mitigate impacts that are only found after construction and operation has begun. Council may need to consider whether such conditions are possible and practical.

Direct Response

RPS refer to original Glint and Glare submission which formed part of the planning application suite of documents. This Glint and Glare Report sets out that whilst solar reflections are possible towards a 2.1km section and separate 1.7km section of the B2 and a further 0.4km section of the B9, no significant effects are predicted along any of these roadsides.

Notwithstanding the preceding conclusions, through engagement with the Council it is acknowledged that the potential for Glint and Glare effects particularly associated with development proposals at the southern-most land parcel (Parcel 4) is a matter upon which further clarification is sought.

Accordingly, the Applicant has instructed Pager Power (Glint and Glare consultants) to undertake a further assessment of the Parcel 4 lands to confirm updated assessment outcomes at this parcel of land. In all other respects, the existing Glint and Glare assessment remains a material consideration.

The updated Parcel 4 Glint and Glare Assessment is provided as Appendix 4 Annex 1 of this document. To confirm some of the points contained therein:

- The original Glint and Glare report did not predict any significant effects in terms of glint and glare on any of the relevant roads, residential or aviation receptors as a result of the panel layout within Parcel 4 of the development;
- Layout reductions referred to previously in the Addendum only lessen the potential for impacts. Alongside layout reductions, through discussions with the LPA, landscaping proposals which are inherent parts of the overall project, have been enhanced to further limit the potential for visibility

of the project, especially that located within Land Parcel 4. As a consequence of the layout reductions so too the associated potential for Glint and Glare effects is also further reduced.

- The Glint and Glare assessment represents a worst-case scenario approach which assumes the sun is visible during all daylight hours throughout the year.
- Simply because a view of solar panels is theoretically possible this should not be confused with the potential for Glint and Glare effects. Solar panels are opaque and designed to absorb rather sunlight. The intensity of reflections from solar panels, where they do exist, are understood to be equal to or less than those from still water and significantly less than many other outdoor reflective surfaces.
- The assessment considers the face of the panel rather than the frame or the reverse of the panels. The potential for Glint and Glare effects from frames is significantly less than panels and therefore an assessment of panels is a robust approach. Further whilst panels are bi-facial they are directed downwards and away from the sun. Where there is potential for glint and glare effects from reflected light from lower surfaces, this will in turn be directed downwards to the ground and will not impact on sensitive receptors.
- Pager Power has undertaken over 1,500 Glint and Glare assessments in the UK and internationally in accordance with a methodology that has been assessed and withstood scrutiny. The studies have included assessment of civil and military aerodromes, railway infrastructure and other ground-based receptors including roads and dwellings.

Planting Proposals

As part of the engagement process with the Council during the post-application process, there has been discussion regarding landscape proposals, notably those at the southern-most land parcel (Parcel 4).

It is worth reinforcing that landscape proposals at Parcel 4 have been designed to have an immediate positive impact and comprise:

a. Planting of Semi-mature trees (of native species) of a minimum height of 6m along the south-western boundary (Drumlin Road) as detailed within the Key on Dwg. 2702.5.01 - Landscape Mitigation Plan (Overall);
b. Planting of mixed species mitigation planting along the south-western boundary in combination with the above tree planting – which will be interspersed throughout. Mitigation planting is comprised of a mix of native species – as detailed in Table 2 on Dwg. 2702.5.01 Rev G - Landscape Mitigation Plan (Overall). This will sit below the canopies of the above-referenced semi-mature trees, and collectively will form a visual screen;
c. For the avoidance of doubt, mitigation planting identified in Table 2 on 2702.5.01 Rev G - Landscape Mitigation Plan (Overall) contains evergreen species to allow for year round screening effects, comprising -
   i. Mitigation planting has been specified to include 25% evergreen species (*Pinus sylvestris* & *Ilex aquifolium)* and a further 20% Semi-evergreen species (*Ligustrum vulgare);*
d. Remaining boundaries to Parcel 4 lands are defined by new hedgerow planting (refer Table 1 Drawing 2702.5.01 Rev G - Landscape Mitigation Plan (Overall)). This hedgerow planting contains trees of 4.5m minimum height at the time of planting, along with native species hedgerow mix which again contains evergreen species (30%) comprising *Pinus sylvestris* & *Ilex aquifolium;*
e. Remaining mitigation planting across Parcels 1-3 inclusive is comprised of new hedgerow planting (refer Table 1) interspersed with trees of 4.5m minimum height at the time of planting.

For completeness, Photomontage 10 which formed part of the Landscape and Visual Impact Assessment (LVIA) submitted as part of the planning application pack, is taken along Drumlin Road, and has been updated to reflect revised layout and landscaping proposals – now referenced as VP10 – Rev A. A further long-distance view is taken from further south along Drumlin Road and is referencd as VP10A. Both montages are provided as Annex 2 to Appendix 4. This reaffirms that to viewers along the roadside, potential views of the site will be screened.

To further inform Council consideration of the Parcel 4 lands, Drawings 2702.5.07 Rev H, 2702.5.08 Rev H and 2702.5.09 Revision H provide sections across Parcel 4 lands which demonstrate the potential for visibility of the proposed development from surrounding vantage points, taking account of landscaping proposals.

Appendix 4 - Annex 1
Parcel 4 – Glint and Glare Assessment (Amended Reduced Development)

PAGERPOWER
Urban & Renewables

Solar Photovoltaic Glint and Glare Addendum

Magheralin SF

RPS Group PLC

February 2025





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ADMINISTRATION PAGE

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Issue	Date	Detail of Changes
1	10th February 2025	Initial issue
2	28th February 2025	Administrative amendments

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been retained to assess the possible effects of glint and glare from a proposed solar photovoltaic (PV) farm comprising four land parcels located south-west of Magheralin, County Down, Northern Ireland. A glint and glare assessment[1] was produced concerning the potential impact on surrounding road safety, residential amenity, and aviation activity, which in this instance comprise the potential sensitive receptors surrounding the site of the proposed development. This assessment formed part of the planning application pack presented for consideration to Armagh, Banbridge and Craigavon Borough Council, the local planning authority (the LPA) for the project.

Discussions with the LPA have led to reductions to the solar panel layout, notably to Parcel 4 of the project, which comprises the southern-most land parcel located south of the B2 Dromore Road and east of the B9 Drumlin Road. This report (the Addendum) considers the layout changes at Parcel 4 only to identify any changes to the glint and glare results and conclusions, at the southern-most land parcel.

The minor reductions to proposed solar panel areas across Land Parcels 1-3 would not significantly affect the glint and glare assessment and conclusions previously presented, which confirm there are no predicted significant effects on surrounding road safety, residential amenity, and aviation activity.

Scope of Work

The panels are fixed south facing and solar reflections at ground level towards the north at this latitude are highly unlikely. Therefore, re-modelling has only been undertaken for selected receptors which have the potential to experience glint and glare effects from the infrastructure proposed on Parcel 4:

- Road receptors 35 to 49, and 73 to 88;
- Dwelling receptors 130 to 162, and 218 to 245.

An additional dwelling receptor 246 has been added to represent a consented development.

Updating landscaping proposals form an inherent part of the overall project. Where landscaping is proposed at Land Parcel 4, this has been considered within this Addendum.

All remaining receptors are to the north of parcel 4 and have been excluded from the remodelling as they will not be significantly affected by the change in the panel layout.

The potential effects on the high-level aviation assessment have also been considered.

[1] Latest version is issue 4 (12090A - Magheralin SF - Solar Photovoltaic Glint and Glare Study - 09Jan24)

Overall Conclusions

No impacts requiring further mitigation are predicted on surrounding road safety, residential amenity, and aviation activity.

The are no additional impacts introduced by the change in solar panel layout.

An overview of the assessment results is presented in the subsections below.

Assessment Results – Roads

A low impact is predicted on the road section from receptor 75 to 76 along the B9 (Drumlin Road) under baseline conditions. With the consideration of proposed landscape planting[2], no impact is predicted on this road section.

No impacts are predicted on any of the remaining re-modelled road sections under baseline conditions.

Assessment Results - Dwellings

A moderate impact is predicted on dwellings 218 to 220 under baseline conditions. With the consideration of proposed landscape planting, no impact is predicted on dwellings 218 to 220.

No impacts are predicted on the remaining re-modelled dwelling receptors under baseline conditions.

High-Level Aviation Assessment Conclusions

The changes in the solar panel layout are not significant such that the two airfields within 10km of the proposed development (Tarsan Lane Microlights Airfield and Tandagree Airstrip) need be reconsidered. The previously stated conclusions still apply.

No significant impacts are predicted, and further assessment is not recommended for either of the above aerodromes.

[2] Landscape proposals at Parcel 4 comprise planting of semi-mature trees with a minimum height of 6m, augmented with mitigation planting which will sit under the canopies of the semi-mature trees. Collectively this will form an immediately effective visual screen all year round, given the presence of evergreen species within the planting mix.

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 60 countries.

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

Pager Power was established in 1997. Initially the company focus was on modelling the impact of wind turbines on radar systems.

Over the years, the company has expanded into numerous fields including:

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

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

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

1 INTRODUCTION

1.1 Overview

Pager Power has been retained to assess the possible effects of glint and glare from a proposed solar photovoltaic (PV) farm comprising four land parcels located south-west of Magheralin, County Down, Northern Ireland. A glint and glare assessment[3] was produced concerning the potential impact on surrounding road safety, residential amenity, and aviation activity, which in this instance comprise the potential sensitive receptors surrounding the site of the proposed development. This assessment formed part of the planning application pack presented for consideration to Armagh, Banbridge and Craigavon Borough Council, the local planning authority (the LPA) for the project.

Discussions with the LPA have led to reductions to the solar panel layout, notably to Parcel 4 of the project, which comprises the southern-most land parcel located south of the B2 Dromore Road and east of the B9 Drumlin Road. This report (the Addendum) considers the layout changes at Parcel 4 only to identify any changes to the glint and glare results and conclusions, at the southern-most land parcel.

The minor reductions to proposed solar panel areas across Land Parcels 1-3 would not significantly affect the glint and glare assessment and conclusions previously presented, which confirm there are no predicted significant effects on surrounding road safety, residential amenity, and aviation activity.

1.2 Pager Power's Experience

Pager Power has undertaken over 1,500 Glint and Glare assessments in the UK and internationally. The studies have included assessment of civil and military aerodromes, railway infrastructure and other ground-based receptors including roads and dwellings.

1.3 Glint and Glare Definition

The definition of glint and glare is as follows:

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

[3] Latest version is issue 4 (12090A - Magheralin SF - Solar Photovoltaic Glint and Glare Study - 09Jan24)

These definitions are aligned with those presented within the National Policy Statement for Renewable Energy Infrastructure (EN-3)[5] and the Federal Aviation Administration in the USA. The term 'solar reflection' is used in this report to refer to both reflection types.

1.4 Background and Studies

As confirmed above, this Addendum should be read alongside the previous Glint and Glare report that formed part of the planning submission to the LPA for the project. It is worth noting:

- The original report[3] did not predict any significant effects in terms of glint and glare on any of the relevant roads, residential or aviation receptors as a result of the panel layout within Parcel 4 of the development;
- Layout reductions referred to previously in this Addendum only lessen the potential for impacts. Alongside layout reductions, through discussions with the LPA, landscaping proposals which are inherent parts of the overall project, have been enhanced to further limit the potential for visibility of the project, especially the solar panels located within Land Parcel 4.
- The assessment represents a worst-case scenario approach which assumes the sun is visible during all daylight hours throughout the year.
- Simply because a view of solar panels is theoretically possible, this should not be confused with the potential for glint and glare effects. Solar panels are opaque and designed to absorb rather than reflect sunlight. The intensity of reflections from solar panels, where they do exist, are understood to be equal to or less than those from still water and significantly less than many other outdoor reflective surfaces;
- The assessment considers the face of the panel rather than the frame or the reverse of the panels. The potential for Glint and Glare effects from frames is significantly less than from the panel surface and therefore the assessment of panels only is a robust approach. Furthermore whilst panels are bi-facial, the reverse face would be directed downwards and away from the sun, therefore there is no potential for glint and glare effects from the reverse panel surface on sensitive receptors.
- Pager Power has undertaken over 1,500 Glint and Glare assessments in the UK and internationally in accordance with a methodology that has been assessed and withstood scrutiny. The studies have included assessment of civil and military aerodromes, railway infrastructure and other ground-based receptors including roads and dwellings.

[5] Published by the Department for Energy Security and Net Zero in November 2023 and came into force on 17 January 2024

2 PROPOSED SOLAR DEVELOPMENT LOCATION AND DETAILS

2.1 Proposed Development Site Layout

The latest proposed development layout[6] is shown in Figure 1 below.

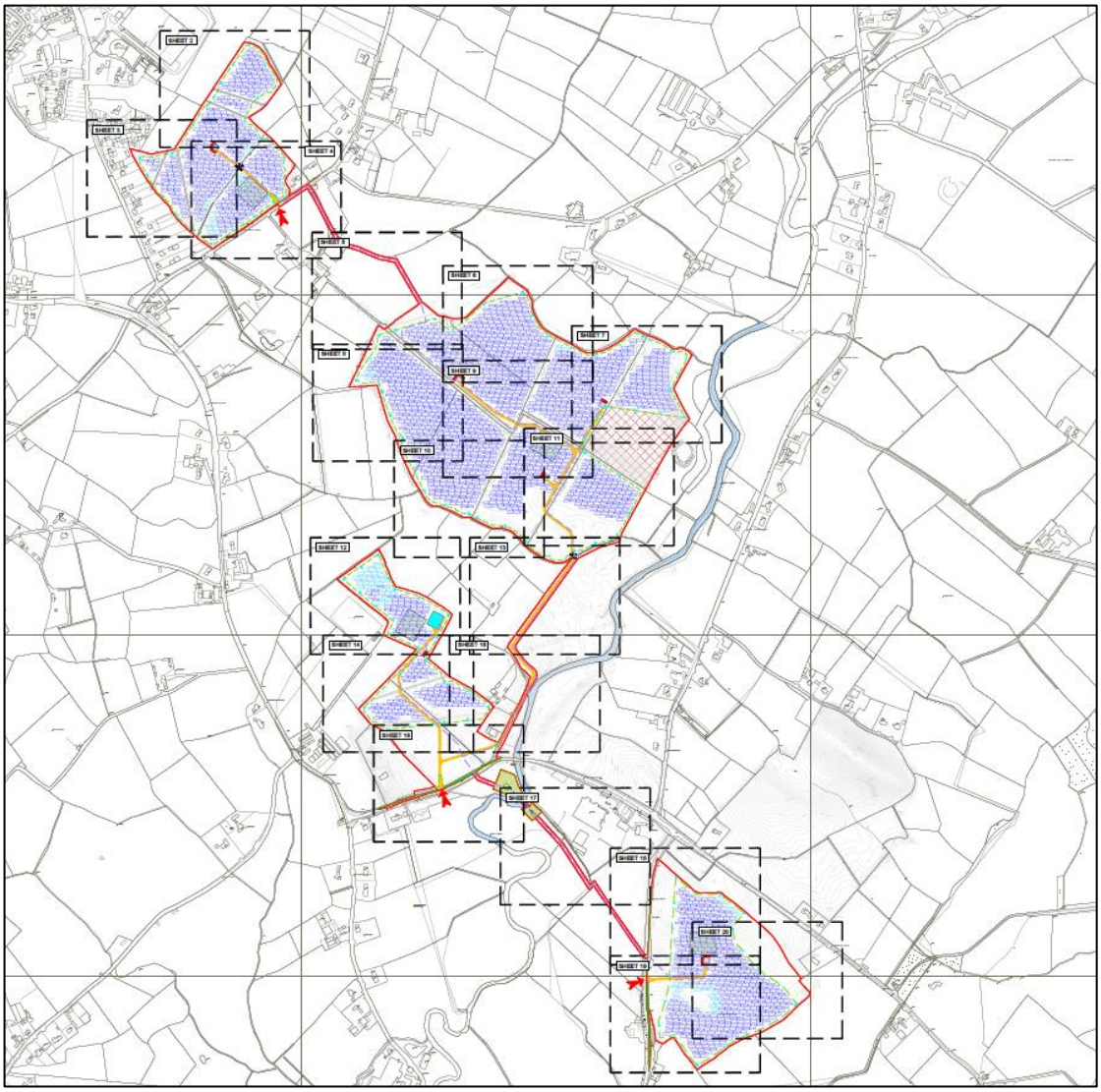


Figure 1 *Proposed development layout*

[6] Source: Figure 4 - 05215-RES-LAY-DR-PT-005 1 Rev 12.pdf

2.2 Reflector Areas

A resolution of 10m has been chosen for this assessment. This means that a geometric calculation is undertaken for each identified receptor from a point every 10m from within the defined areas. This resolution is sufficiently high to maximise the accuracy of the results; increasing the resolution further would not significantly change the modelling output. The number of modelled reflector points are determined by the size of the reflector areas and the assessment resolution. The bounding coordinates for the proposed solar development have been extrapolated from the site plans.

Figure 2 below shows the assessed reflector areas that have been used for modelling purposes. Parcels 1-3 remain the same as those assessed within the previously submitted glint and glare assessment. This Addendum relates solely to the updated solar panel layout within Parcel 4.

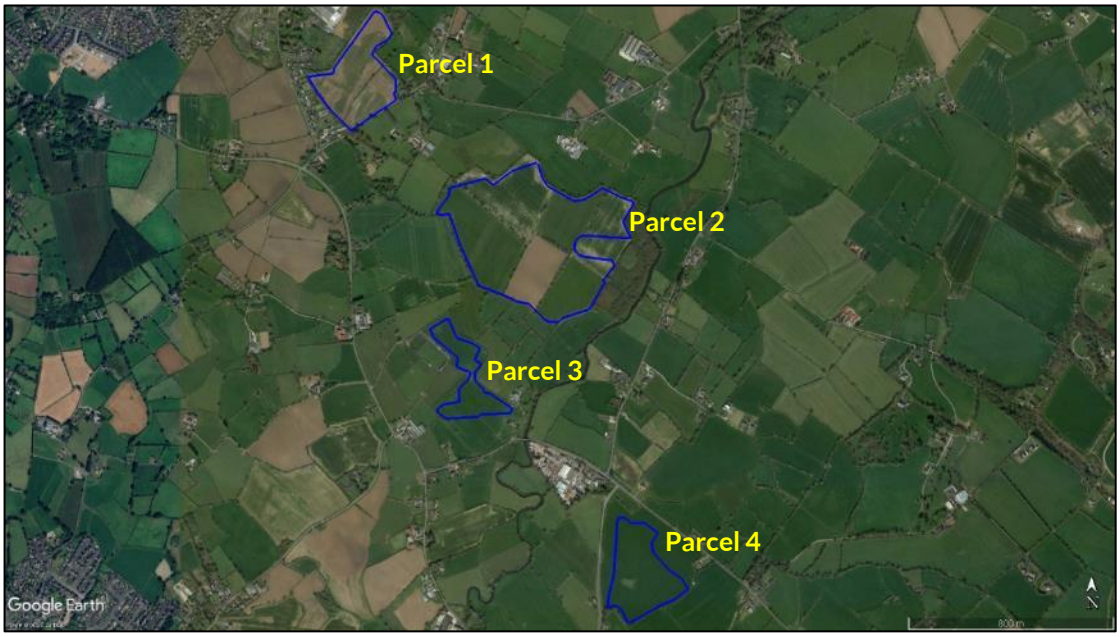


Figure 2 *Assessed reflector areas – aerial image*

2.3 Solar Panel Information

The technical information used for the modelling is presented in Table 1 below. The centre of the solar panel has been used as the assessed height in metres above ground level (agl). As well as the panel reductions at Land Parcel 4, the revised proposals also involve a reduction in overall proposed panel height at this land parcel to a maximum of 3m at their top edge. This is a reduction from the maximum height of 3.5m that was previously assessed.

Solar Panel Technical Information (Parcel 4)	
Azimuth angle[7]	180°
Elevation (tilt) angle[8]	18°
Centre height above ground level (agl)	2.025m agl[10]

Table 1 *Solar panel information*

2.4 Landscape Plan

Figure 3 below shows a excerpt of the latest landscape planting plan[11], relevant to parcel 4.

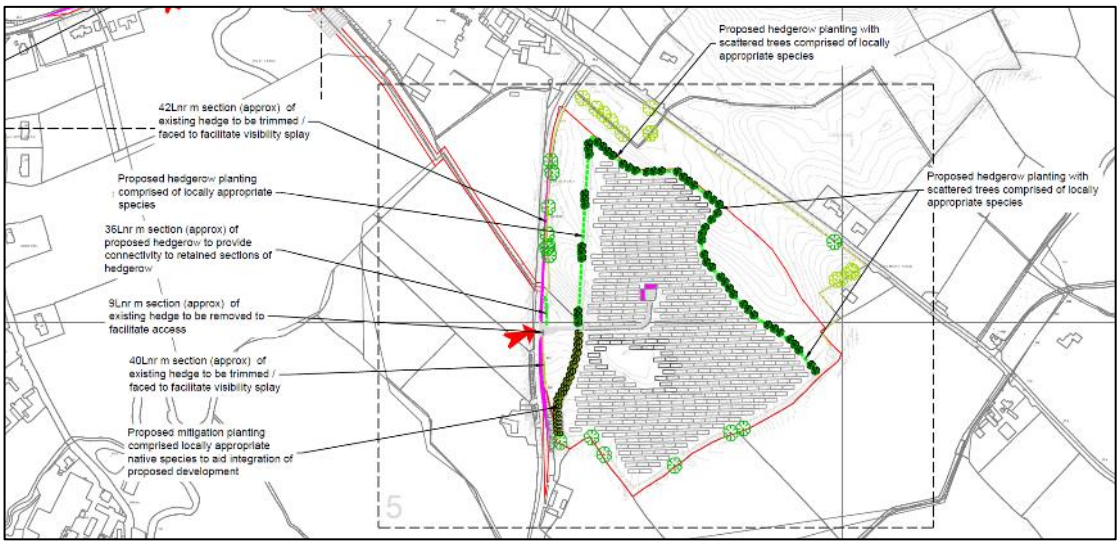


Figure 3 *Snapshot of Landscape Plan*

[7] Clockwise orientation the panels are facing relative to True North (0°)
[8] Relative to the horizontal.
[10] Minimum height = 1.05m agl, maximum height = 3m agl.
[11] 2702.5.01 to 2502.5.06_Mitigation Plans_Rev G.pdf

3 IDENTIFICATION OF RECEPTORS

3.1 Ground-Based Receptors Overview

The panels are fixed south facing and solar reflections at ground level towards the north at this latitude are highly unlikely. Therefore, re-modelling has only been undertaken for selected receptors which have the potential to experience glint and glare effects from the infrastructure proposed on Parcel 4:

- Road receptors 35 to 49, and 73 to 88;
- Dwelling receptors 130 to 162, and 218 to 245.

An additional dwelling receptor 246 has been added to represent a consented development.

All remaining receptors are to the north of parcel 4 and have been excluded from the remodelling as they will not be significantly affected by the change in the panel layout.

The re-modelled receptors are shown in Figure 4 on the following page and Figure 5 on page 15.

Figure 4 *Overview of re-modelled road receptors*

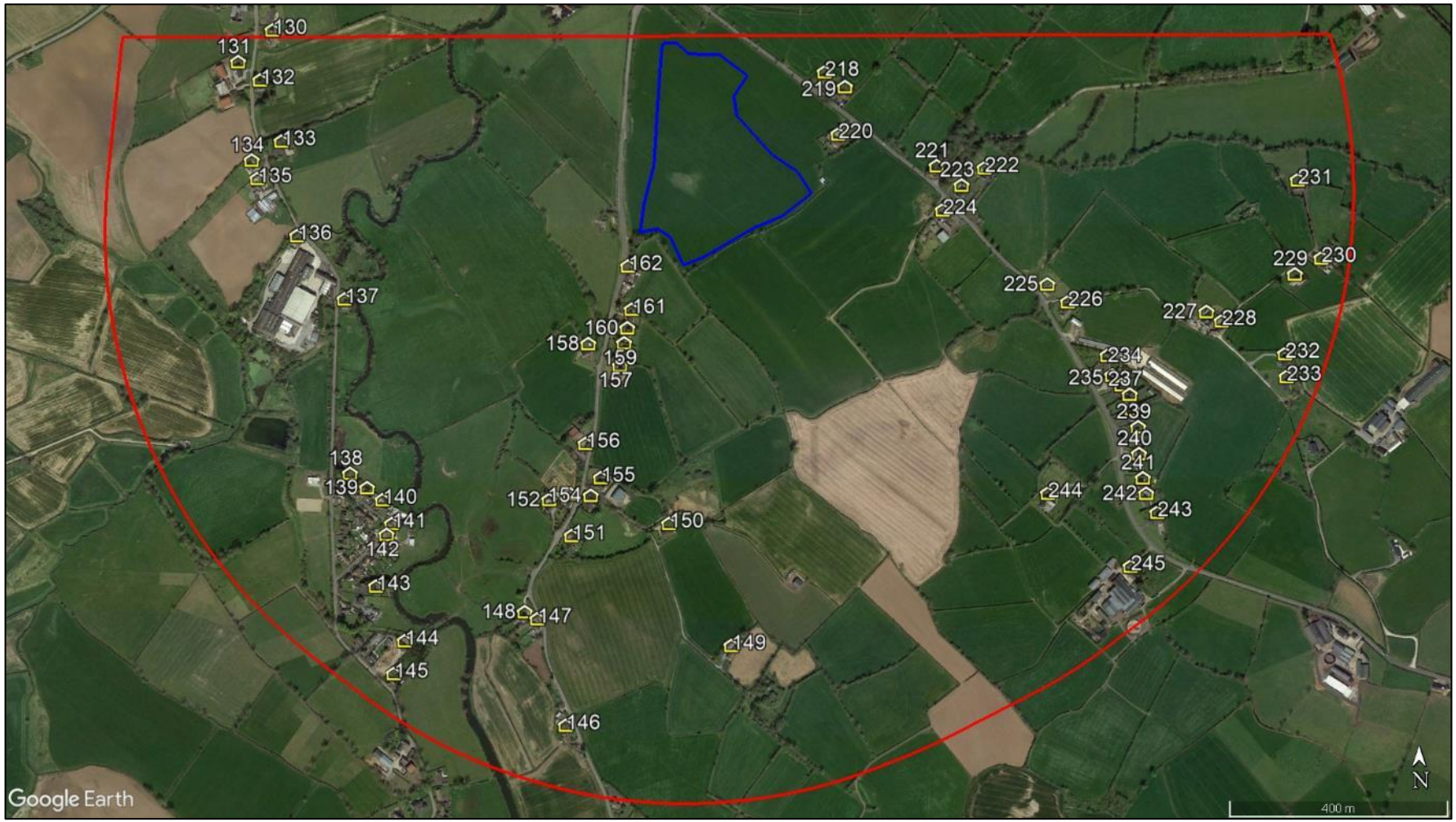


Figure 5 *Overview of re-modelled dwelling receptors 130 to 162 and 218 to 245*

Figure 6 *Additional dwelling receptor 246*

4 GEOMETRIC ASSESSMENT RESULTS AND DISCUSSION

4.1 Overview

The following sub-sections present the modelling results as well as the significance of any predicted impact in the context of existing screening, as well as the relevant criteria set out in the next subsection. The criteria are determined by the assessment process for each receptor, which are set out in Appendix D of the full glint and glare assessment report.

When determining the visibility of the reflecting panels for an observer, a conservative review of the available imagery is undertaken, whereby it is assumed views of the panels are possible if it cannot be reliably determined that existing screening will remove effects.

The modelling output showing the precise predicted times and the reflecting panel areas are presented in Appendix A.

4.2 Roads

4.2.1 Impact Significance Methodology

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

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

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

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

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

- Whether the solar reflection originates from directly in front of a road user – a solar reflection that is directly in front of a road user is more hazardous than a solar reflection to one side;
- Whether visibility is likely for elevated drivers (applicable to dual carriageways and motorways only) – there is typically a higher density of elevated drivers along dual carriageways and motorways compared to other types of road;
- The separation distance to the panel area – larger separation distances reduce the proportion of an observer's field of view that is affected by glare;
- The position of the Sun – effects that coincide with direct sunlight appear less prominent than those that do not.

If following consideration of the relevant factors, the solar reflections do not remain significant, the impact significance is low, and mitigation is not recommended.

If following consideration of the relevant factors, the solar reflections remain significant, then the impact significance is moderate, and mitigation is recommended.

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

4.2.2 Geometric Modelling Results

The re-modelling results for road receptors 35 to 49, and 73 to 88 are analysed are presented in Table 2 on the following pages.

Road Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Whether reflections occur inside a road user's primary FOV (with consideration of screening)[12]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended or Required?
35 – 45	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	No	N/A	Baseline: No impact	No
46 – 49	Solar reflections are not geometrically possible	N/A	N/A	N/A	No impact	No

[12] Assessment scenario may include an initial conservative qualitative consideration of screening. The reflecting area of the solar development may be partially screened such that it does not meet the key criteria i.e. whether the solar reflection occurs within a road users' main field of view.

Road Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Whether reflections occur inside a road user's primary FOV (with consideration of screening)[12]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended or Required?
73 – 74	Solar reflections predicted to originate from **outside** of a road user's primary horizontal field of view (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	No	N/A	Baseline: No impact	No
75 – 76	Solar reflections predicted to originate from **outside** of a road user's primary horizontal field of view (from parcel 4)	Lack of existing screening All reflecting panels are predicted to be screened by proposed landscape planting as shown in Figure 3 on page 12	No	N/A	Baseline: Low impact With proposed mitigation planting: No impact	No

Road Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Whether reflections occur inside a road user's primary FOV (with consideration of screening)[12]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended or Required?
77	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view (from parcel 4)	Reflecting panels are predicted to be screened by intervening terrain, buildings and existing vegetation	No	N/A	Baseline: No impact	No
78 – 88	Solar reflections are not geometrically possible	N/A	N/A	N/A	No impact	No

Table 2 *Geometric modelling results, assessment of impact significance, and mitigation recommendation/requirement – road receptors*

4.2.3 Conclusions

A low impact is predicted on the road section from receptor 75 to 76 along the B9 (Drumlin Road) under baseline conditions. With the consideration of proposed landscape planting[13], no impact is predicted on this road section.

No impacts are predicted on any of the remaining re-modelled road sections under baseline conditions

4.3 Dwellings

4.3.1 Impact Significance Methodology

The key considerations for residential dwellings are:

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

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

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

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

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

If following consideration of the relevant factors, the solar reflections do not remain significant, the impact significance is low, and mitigation is not recommended. If following consideration of

[13] Landscape proposals at Parcel 4 comprise planting of semi-mature trees with a minimum height of 6m, augmented with mitigation planting which will sit under the canopies of the semi-mature trees. Collectively this will form an immediately effective visual screen all year round, given the presence of evergreen species within the planting mix.

the relevant factors, the solar reflections remain significant, then the impact significance is moderate, and mitigation is recommended.

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

4.3.2 Geometric Modelling Results

The re-modelling results for dwelling receptors 130 to 162, and 218 to 246 are analysed in Table 3 on the following pages.

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
130	Solar reflections are not geometrically possible	N/A	N/A	N/A	Baseline: No impact	No
131 – 133	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	None	N/A	Baseline: No impact	No

[14] With respect to the ground floor only

[15] Assessment scenario may include an initial conservative qualitative consideration of screening in determining the duration of predicated effects in practice. The reflecting area of the solar development may be partially screened such that it does not meet the two key criteria i.e. 1) The solar reflection occurs for more than 3 months per year. 2) and/or for more than 60 minutes on any given day.

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
134 – 137	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	None	N/A	Baseline: No impact	No
138 – 161	Solar reflections are not geometrically possible	N/A	N/A	N/A	Baseline: No impact	No

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
162	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	None	N/A	Baseline: No impact	No

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
218 – 220	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	Intervening terrain and vegetation Visibility of reflecting panels cannot be ruled out under baseline conditions All reflecting panels are predicted to be screened by proposed landscape planting as shown in Figure 3 on page 12	Baseline: **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4) With proposed mitigation planting: **none**	N/A	Baseline: Moderate impact With proposed mitigation planting: No impact	No

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
221 – 228	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, and/or existing vegetation and proposed landscape planting as shown in Figure 3 on page 12	None	N/A	Baseline: No impact	No
229 – 233	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation	None	N/A	Baseline: No impact	No

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
234 – 237	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation	None	N/A	Baseline: No impact	No
238 – 240	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by intervening terrain, buildings, and/or existing vegetation	None	N/A	Baseline: No impact	No
241 – 245	Solar reflections are not geometrically possible	N/A	N/A	N/A	Baseline: No impact	No

Dwelling Receptor	Geometric modelling results from panel areas within 1km (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Duration of effects[14] (with consideration of screening)[15]	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended?
246	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year (from parcel 4)	All reflecting panels are predicted to be screened by existing vegetation proposed landscape planting as shown in Figure 3 on page 12	None	N/A	Baseline: No impact	No

Table 3 *Geometric modelling results, assessment of impact significance, and mitigation recommendation/requirement – dwelling receptors*

4.3.3 Conclusions

A moderate impact is predicted on dwellings 218 to 220 under baseline conditions. With the consideration of proposed landscape planting[16], no impact is predicted on dwellings 218 to 220.

No impacts are predicted on the remaining re-modelled dwelling receptors under baseline conditions.

[16] Landscape proposals at Parcel 4 comprise planting of semi-mature trees with a minimum height of 6m, augmented with mitigation planting which will sit under the canopies of the semi-mature trees. Collectively this will form an immediately effective visual screen all year round, given the presence of evergreen species within the planting mix.

APPENDIX A – DETAILED MODELLING RESULTS

Overview

The results charts for the receptors are shown on the following pages.

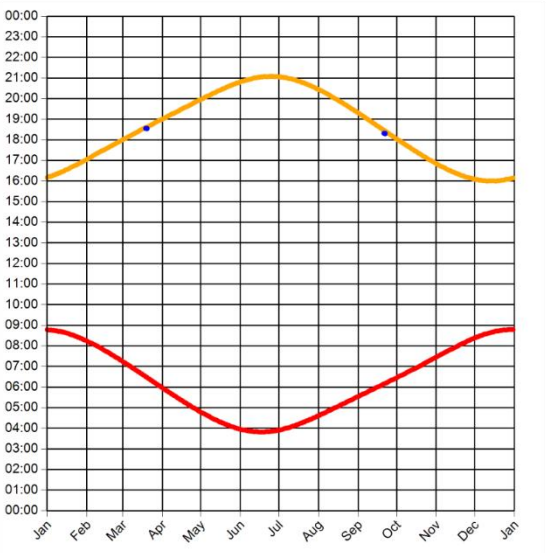
Each Pager Power chart shows:

- The receptor (observer) location – top right image. This also shows the azimuth range of the Sun itself at times when reflections are possible. If sunlight is experienced from the same direction as the reflecting panels, the overall impact of the reflection is reduced as discussed within the body of the report;
- The reflecting panels – bottom right image. The reflecting area is shown in yellow. If the yellow panels are not visible from the observer location, no issues will occur in practice. Additional obstructions which may obscure the panels from view are considered separately within the analysis;
- The reflection date/time graph – left hand side of the page. The blue line indicates the dates and times at which geometric reflections are possible. This relates to reflections from the yellow areas;
- The sunrise and sunset curves throughout the year (red and yellow lines).

Road Receptors

Observer 35 Results

Reflection Date/Time (GMT) Graph



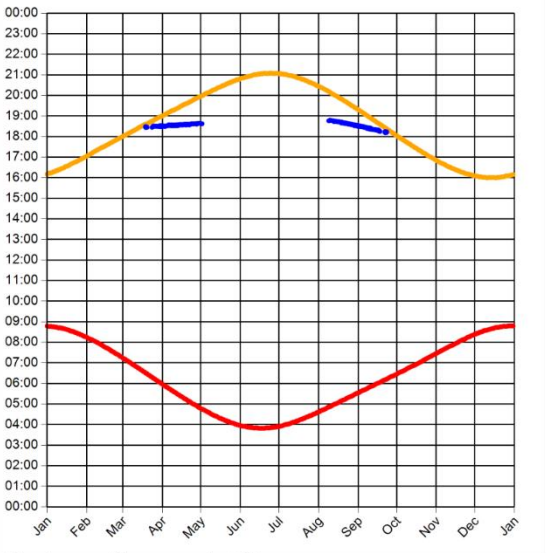
Min observer difference angle: 0.4°
Max observer difference angle: 0.7°

Observer Location — Sun azimuth range is 270° - 270.5° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

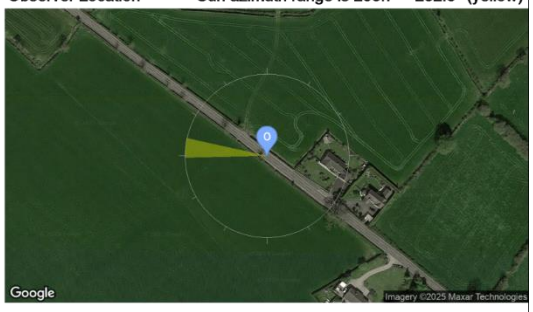
Observer 36 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 12.2°

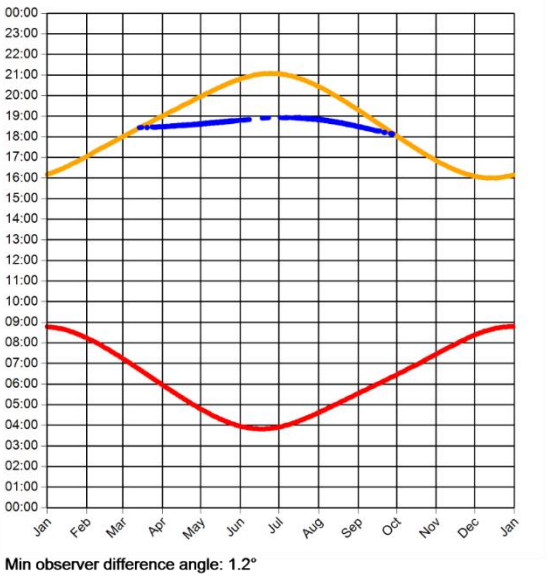
Observer Location — Sun azimuth range is 268.7° - 282.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

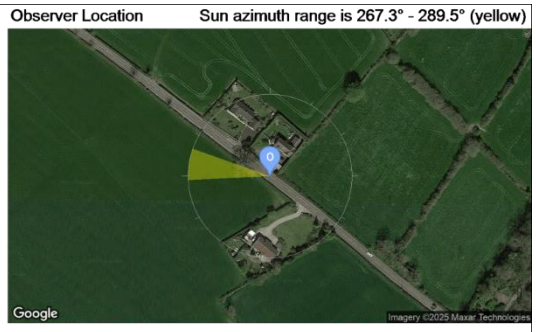
Observer 37 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 17°

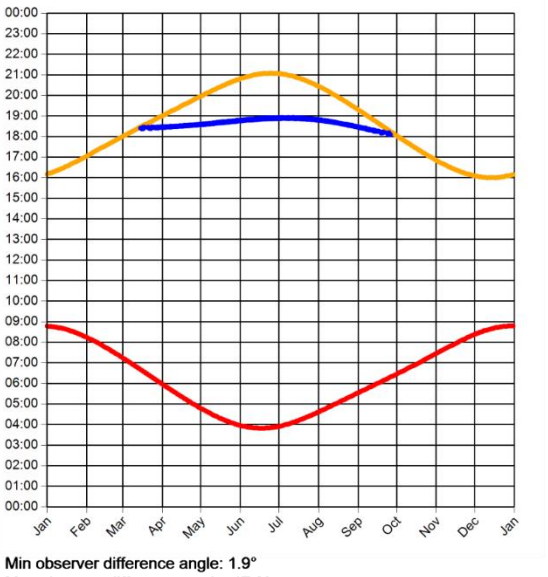
Observer Location — Sun azimuth range is 267.3° - 289.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

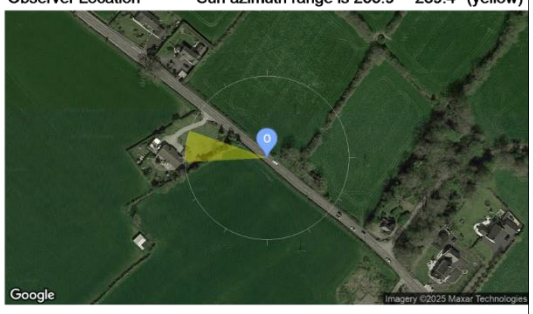
Observer 38 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 17.9°

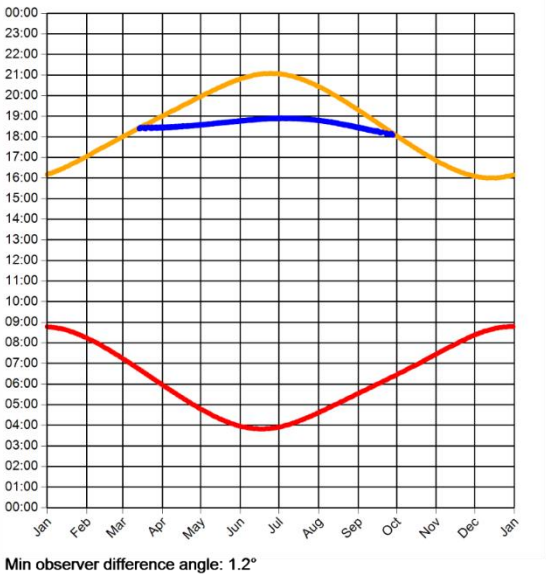
Observer Location — Sun azimuth range is 266.9° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

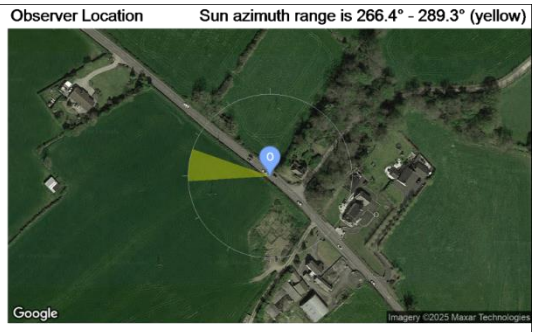
Observer 39 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 17.9°

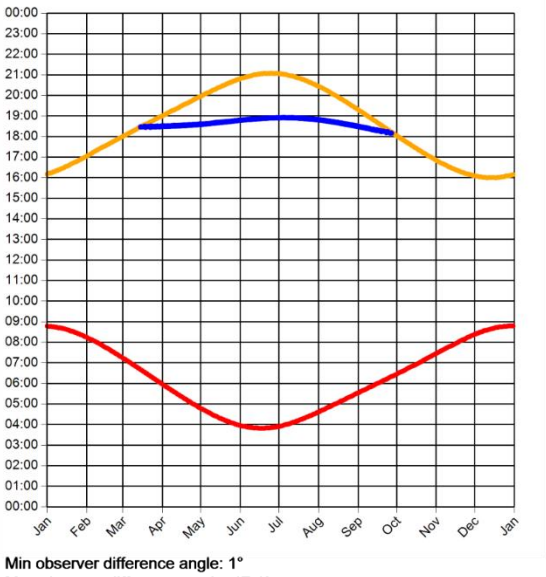
Observer Location Sun azimuth range is 266.4° - 289.3° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

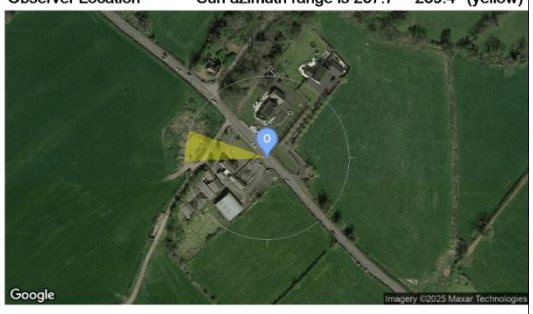
Observer 40 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1°
Max observer difference angle: 17.4°

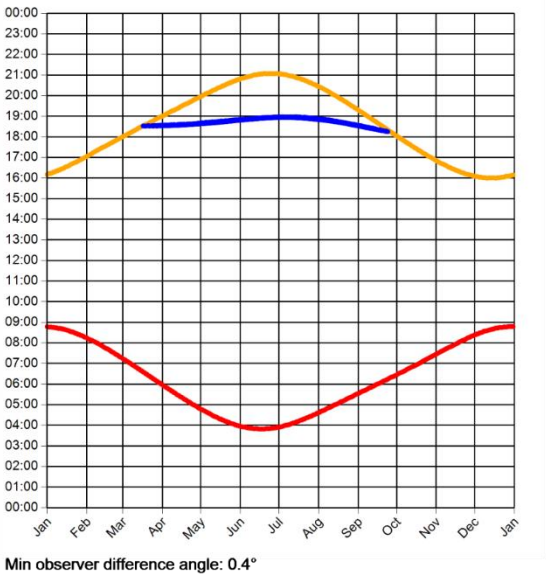
Observer Location Sun azimuth range is 267.7° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

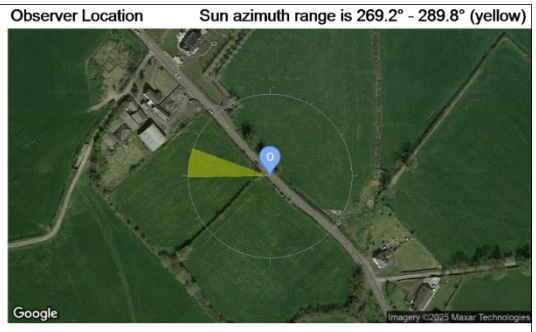
Observer 41 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.4°
Max observer difference angle: 16.7°

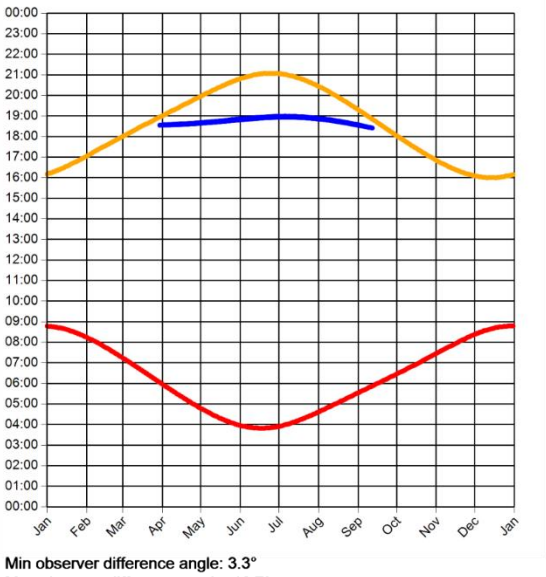
Observer Location — Sun azimuth range is 269.2° - 289.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 42 Results

Reflection Date/Time (GMT) Graph



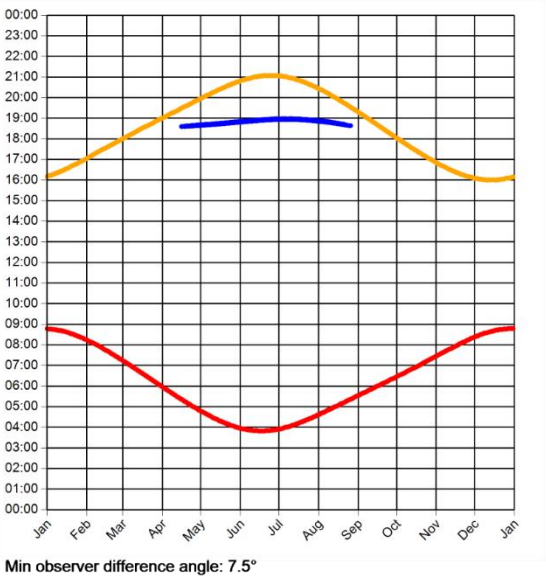
Min observer difference angle: 3.3°
Max observer difference angle: 16.7°

Observer Location — Sun azimuth range is 273.1° - 290° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

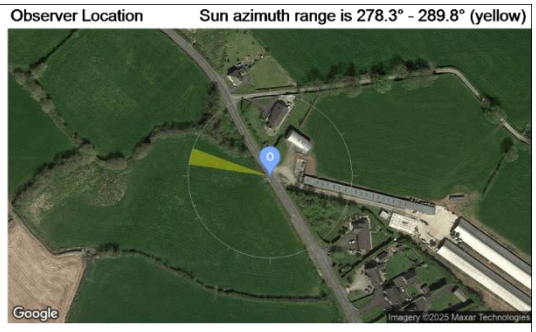
Observer 43 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7.5°
Max observer difference angle: 16.7°

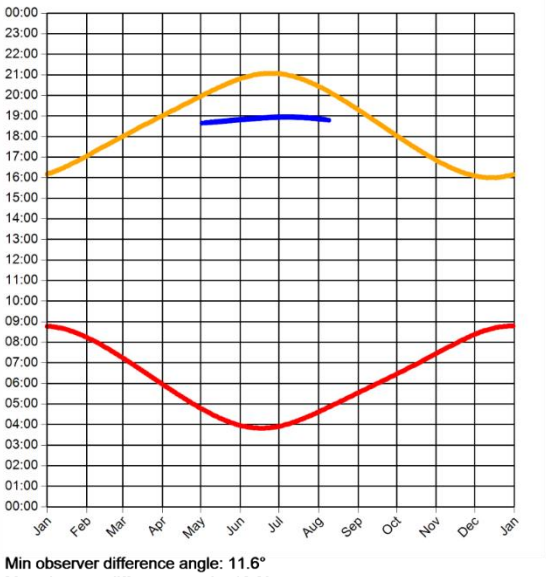
Observer Location Sun azimuth range is 278.3° - 289.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 44 Results

Reflection Date/Time (GMT) Graph



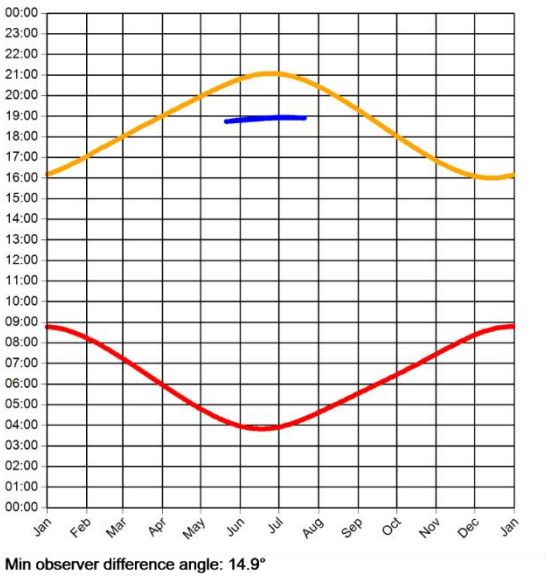
Min observer difference angle: 11.6°
Max observer difference angle: 16.9°

Observer Location Sun azimuth range is 282.7° - 289.7° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

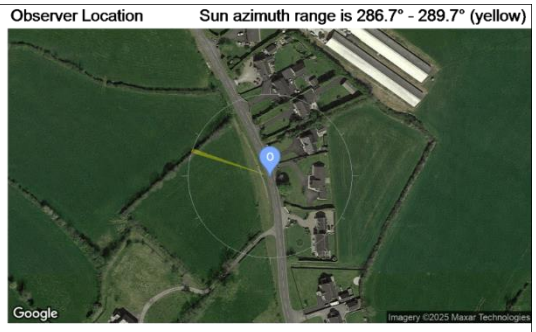
Observer 45 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 14.9°
Max observer difference angle: 17.1°

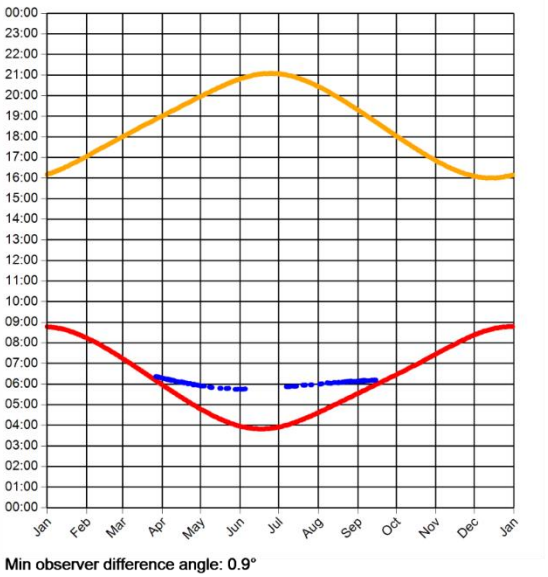
Observer Location — Sun azimuth range is 286.7° - 289.7° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

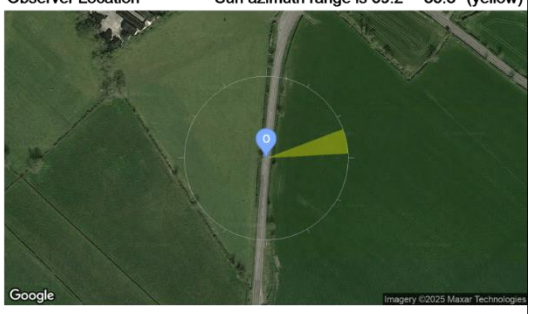
Observer 73 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 12.4°

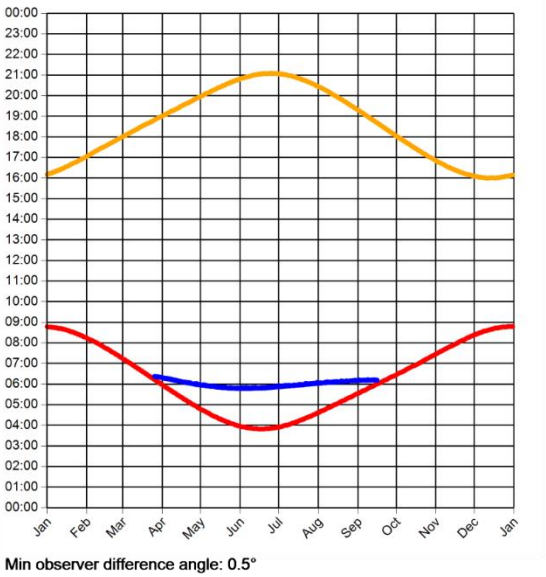
Observer Location — Sun azimuth range is 69.2° - 86.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 74 Results

Reflection Date/Time (GMT) Graph



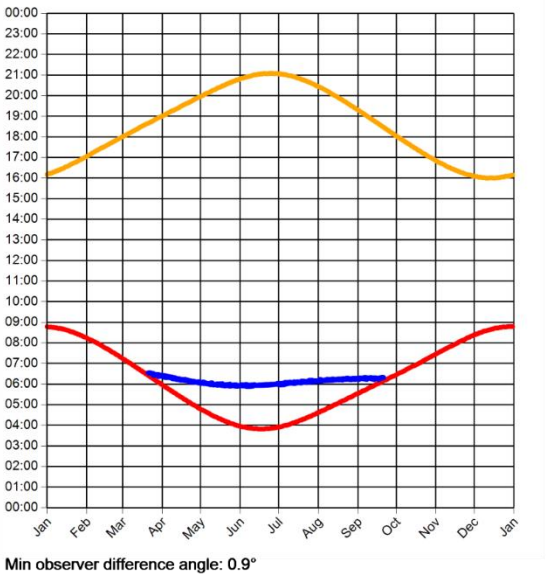
Min observer difference angle: 0.5°
Max observer difference angle: 14.3°

Observer Location — Sun azimuth range is 68.6° - 87° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

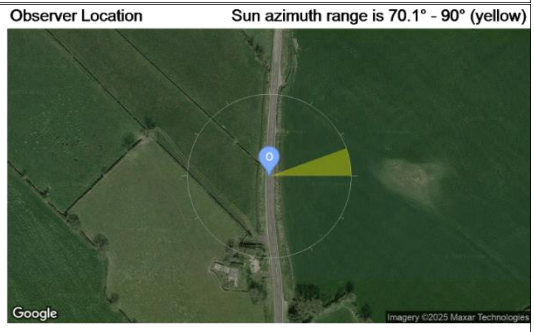
Observer 75 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 17.3°

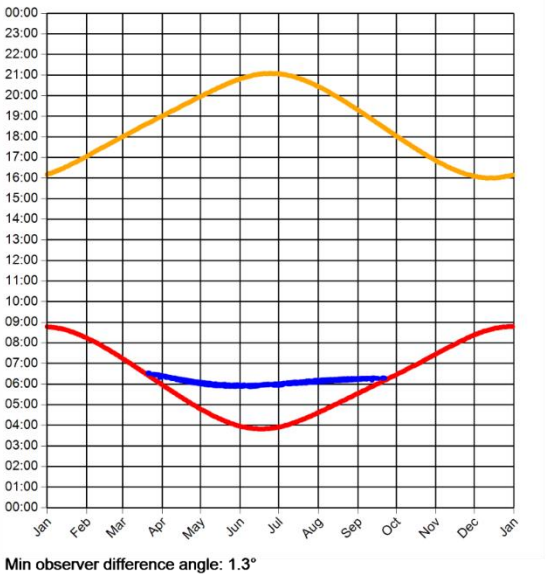
Observer Location — Sun azimuth range is 70.1° - 90° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 76 Results

Reflection Date/Time (GMT) Graph



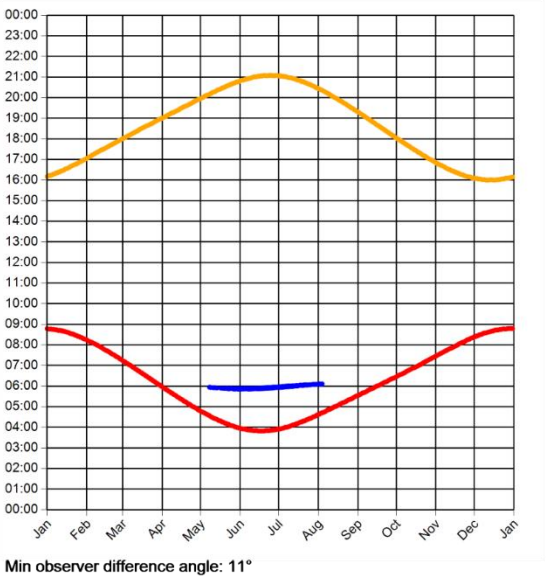
Min observer difference angle: 1.3°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 69.9° - 89.9° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

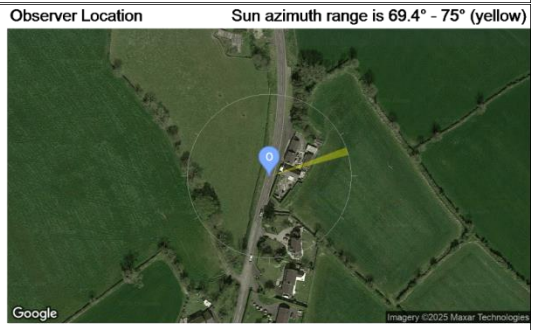
Observer 77 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 11°
Max observer difference angle: 15.8°

Observer Location — Sun azimuth range is 69.4° - 75° (yellow)

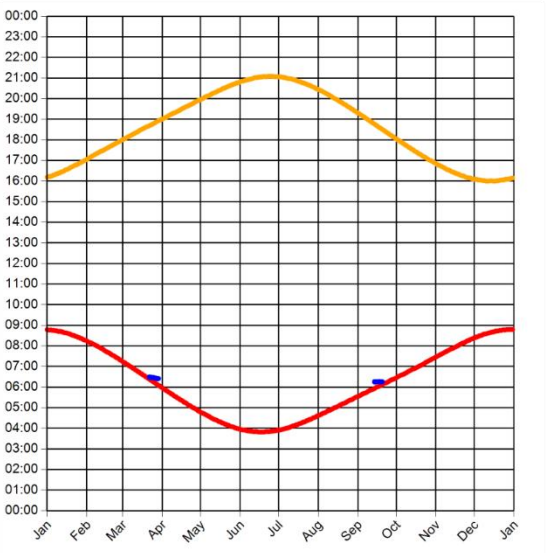


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Dwelling Receptors

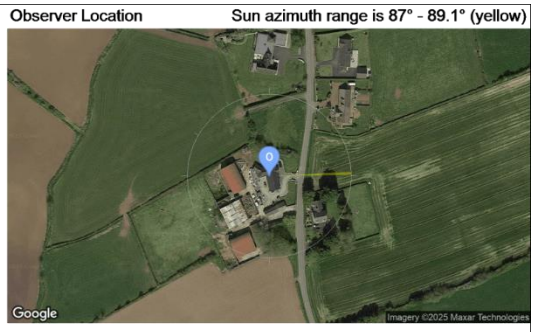
Observer 131 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 2.7°

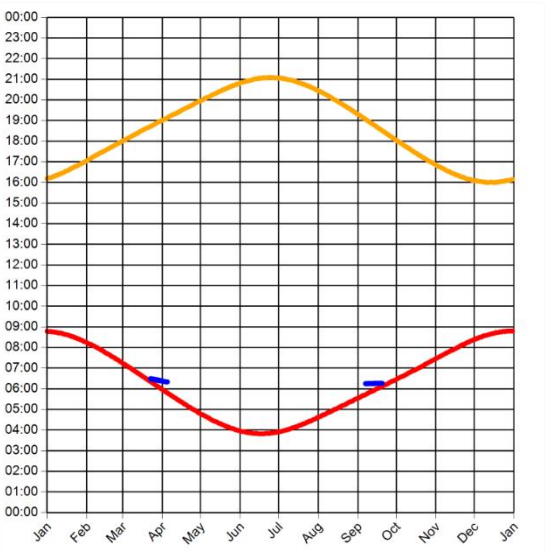
Observer Location — Sun azimuth range is 87° - 89.1° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

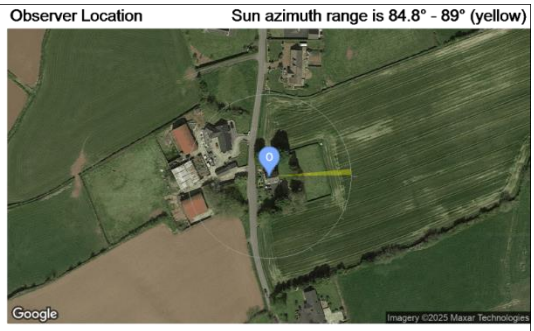
Observer 132 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 4.6°

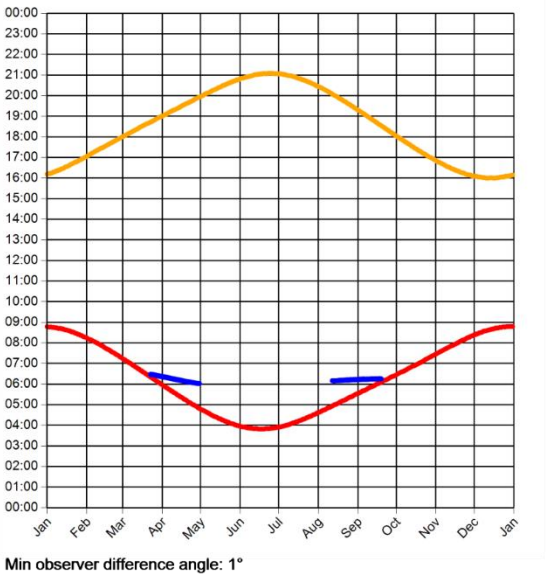
Observer Location — Sun azimuth range is 84.8° - 89° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

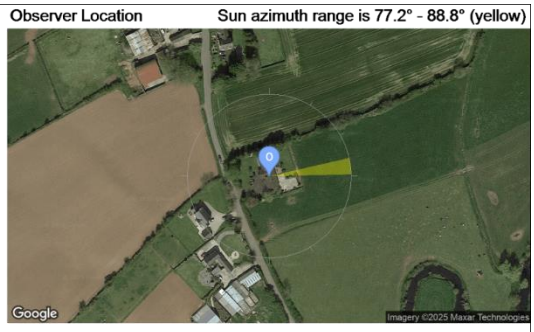
Observer 133 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1°
Max observer difference angle: 9.8°

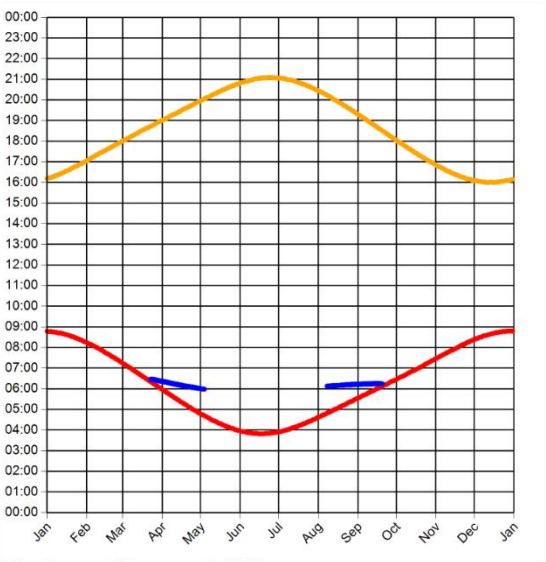
Observer Location — Sun azimuth range is 77.2° - 88.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 134 Results

Reflection Date/Time (GMT) Graph



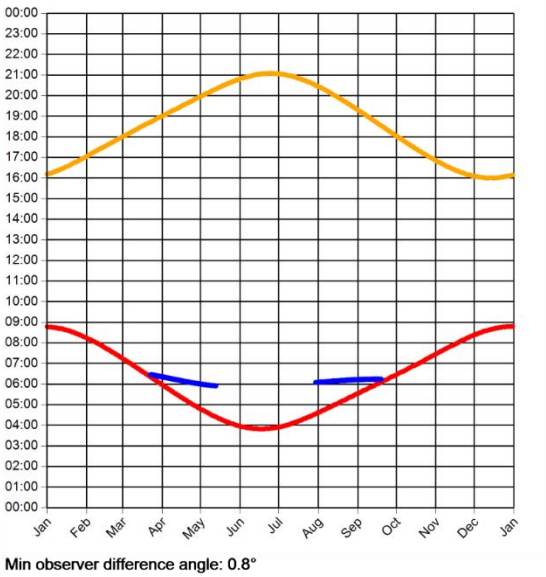
Min observer difference angle: 0.8°
Max observer difference angle: 10.3°

Observer Location — Sun azimuth range is 76° - 88.7° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

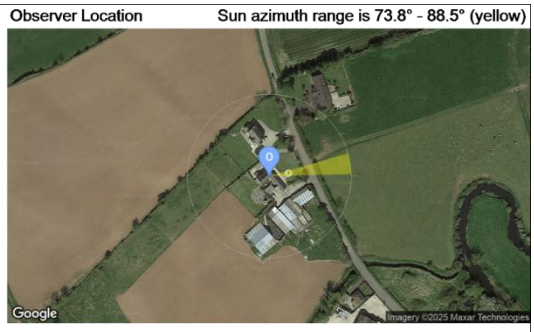
Observer 135 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.8°
Max observer difference angle: 11.7°

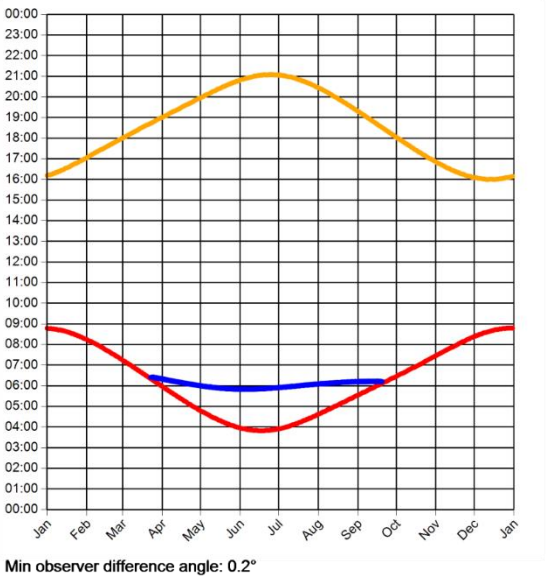
Observer Location — Sun azimuth range is 73.8° - 88.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

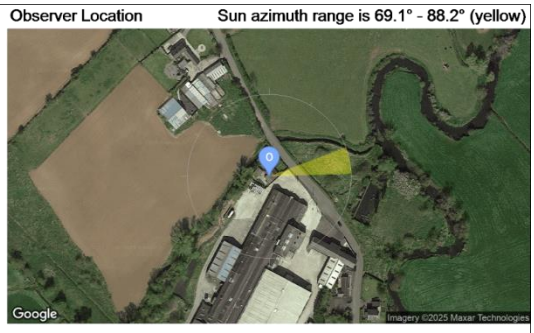
Observer 136 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.2°
Max observer difference angle: 14.7°

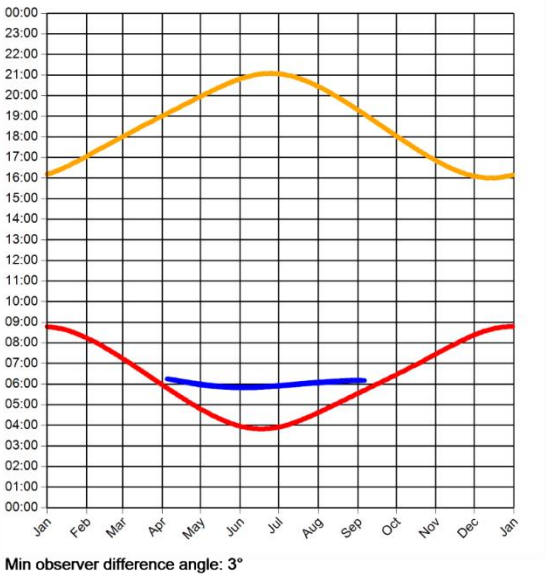
Observer Location — Sun azimuth range is 69.1° - 88.2° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

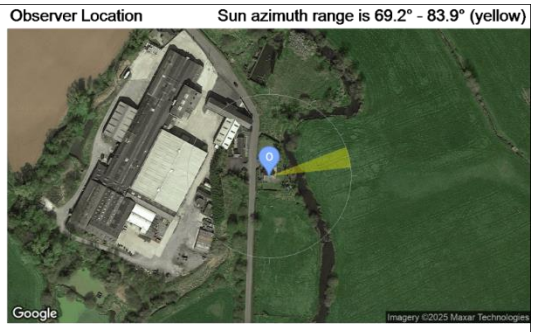
Observer 137 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 14.9°

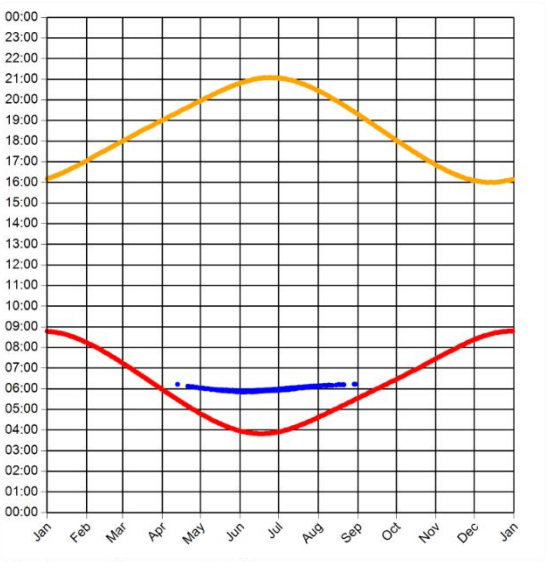
Observer Location — Sun azimuth range is 69.2° - 83.9° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

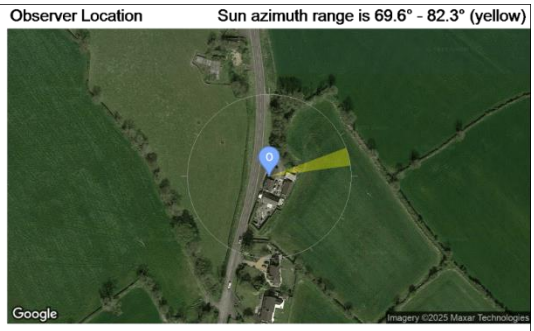
Observer 162 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 6.2°
Max observer difference angle: 16.3°

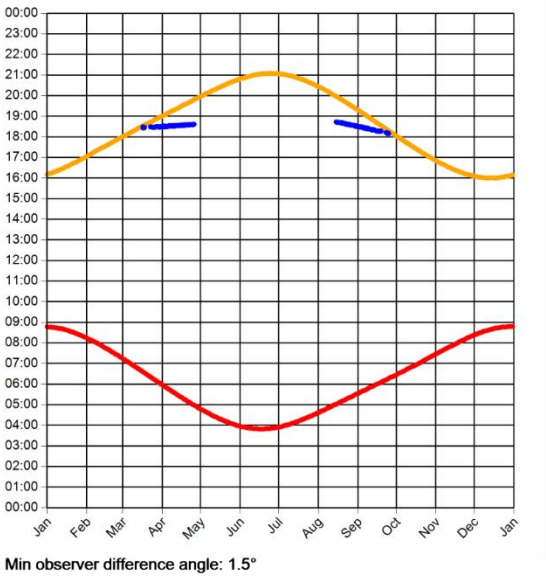
Observer Location — Sun azimuth range is 69.6° - 82.3° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

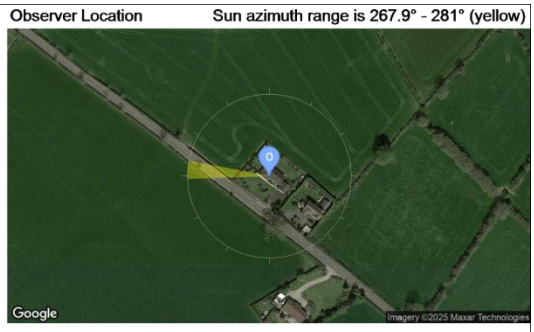
Observer 218 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 11.1°

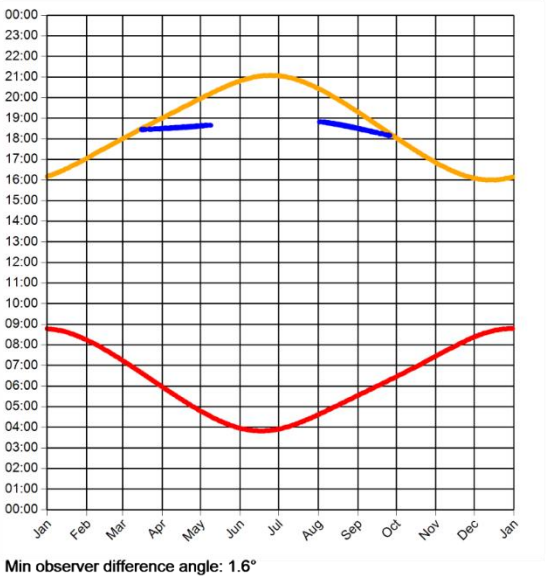
Observer Location — Sun azimuth range is 267.9° - 281° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

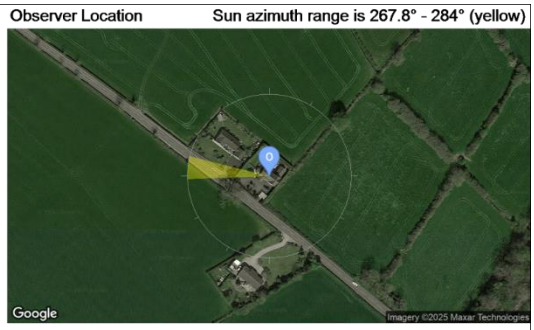
Observer 219 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 13.5°

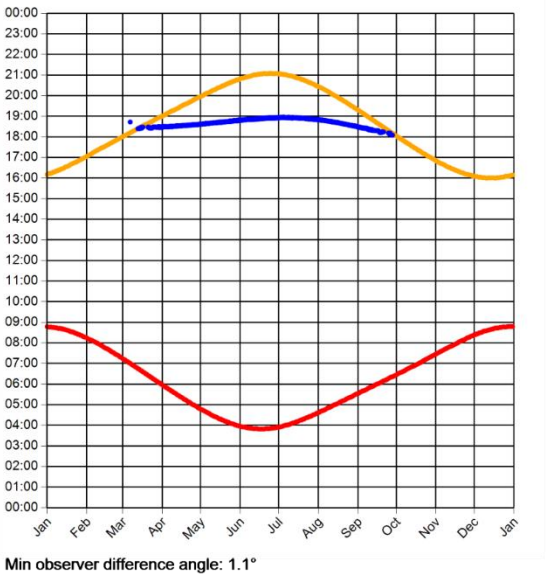
Observer Location — Sun azimuth range is 267.8° - 284° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

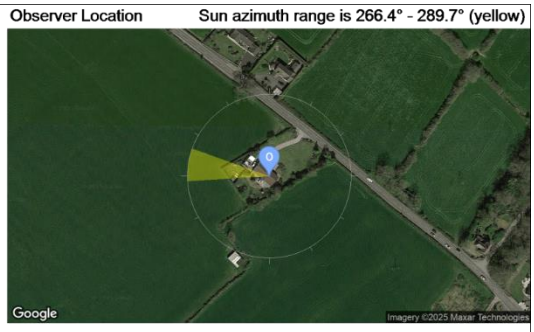
Observer 220 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.1°
Max observer difference angle: 17.2°

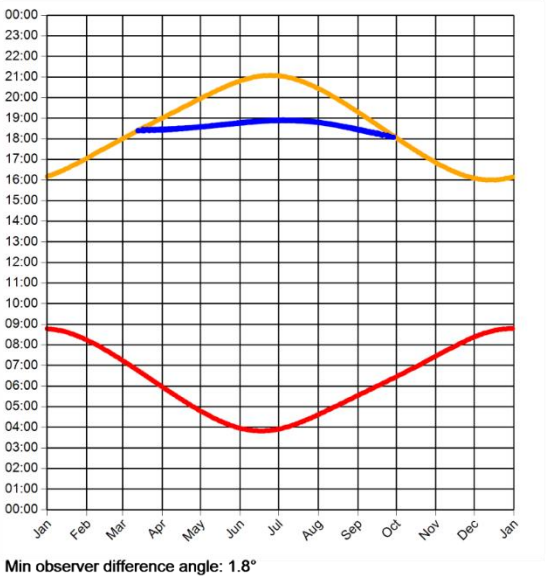
Observer Location Sun azimuth range is 266.4° - 289.7° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

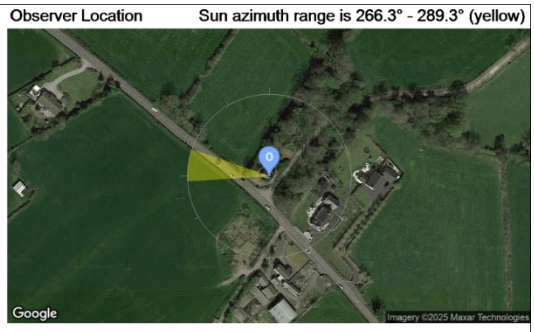
Observer 221 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.8°
Max observer difference angle: 18.1°

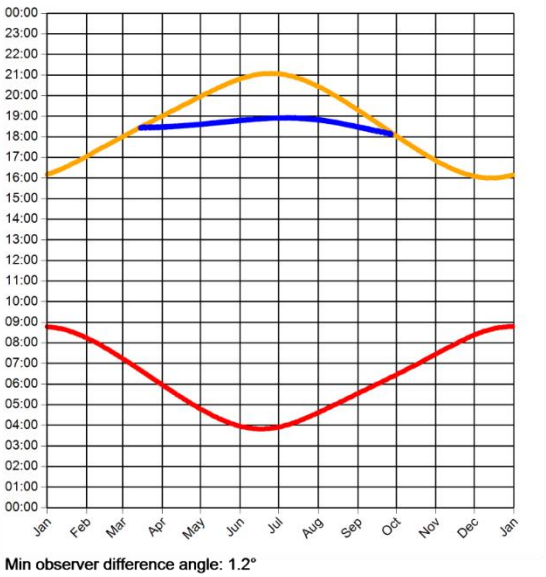
Observer Location Sun azimuth range is 266.3° - 289.3° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

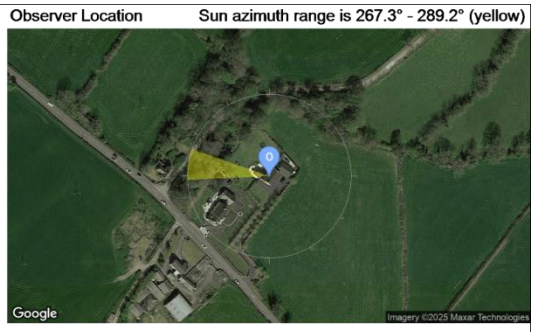
Observer 222 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 17.4°

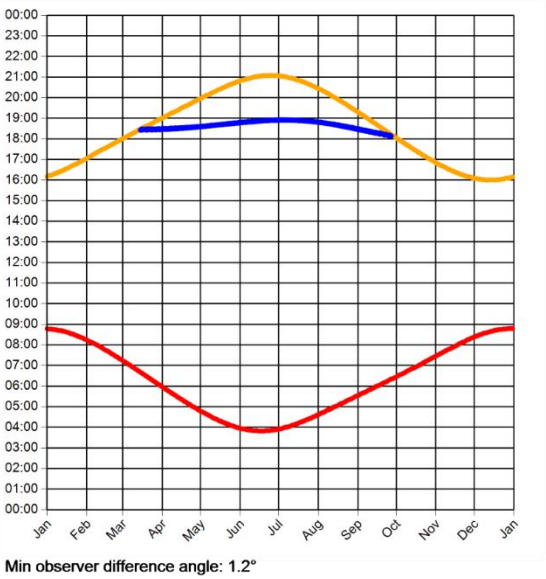
Observer Location — Sun azimuth range is 267.3° - 289.2° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

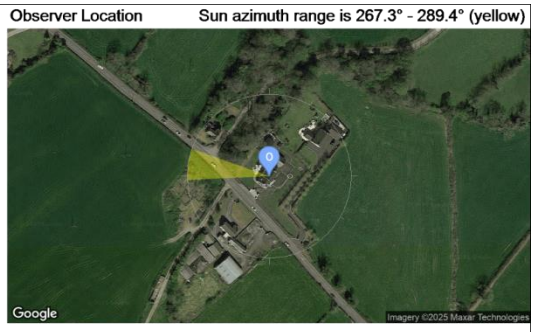
Observer 223 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 17.6°

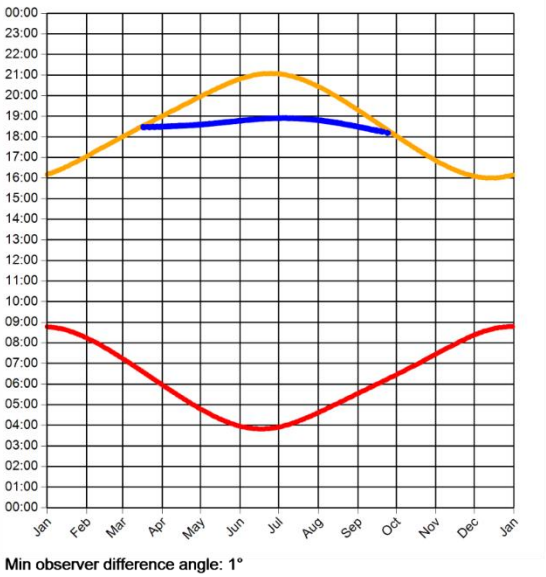
Observer Location — Sun azimuth range is 267.3° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

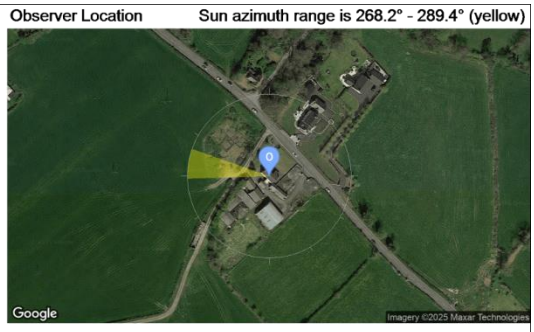
Observer 224 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1°
Max observer difference angle: 17.7°

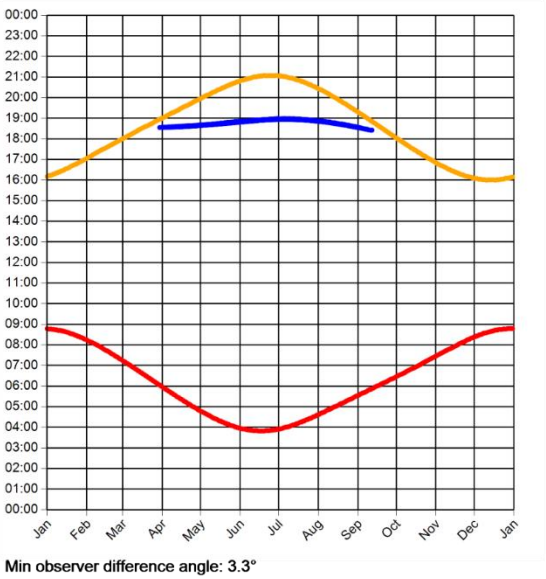
Observer Location — Sun azimuth range is 268.2° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

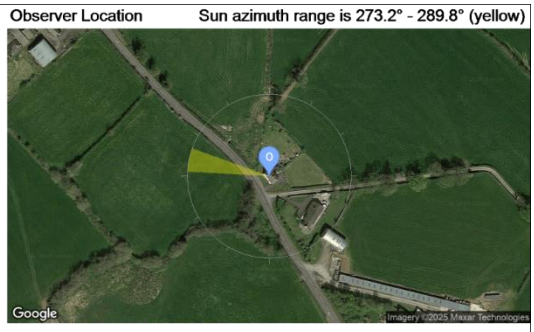
Observer 225 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 16.7°

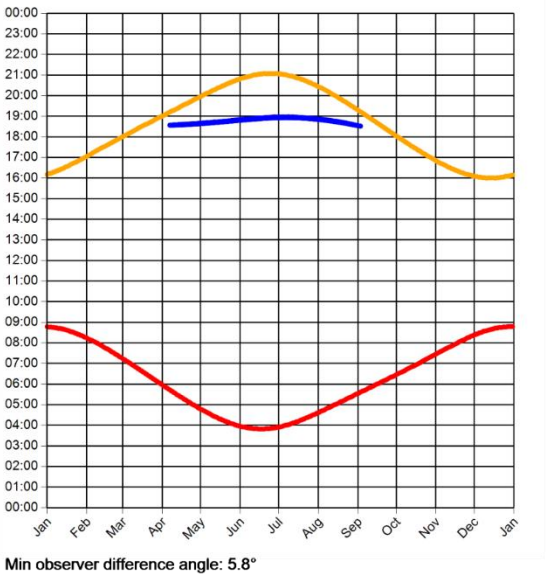
Observer Location — Sun azimuth range is 273.2° - 289.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

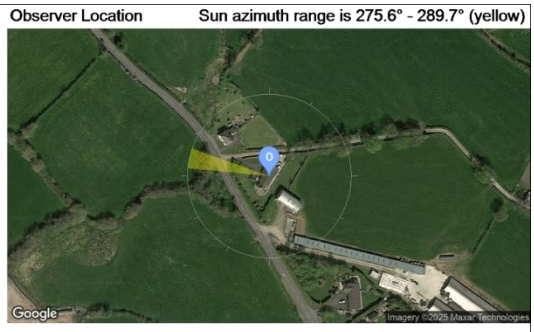
Observer 226 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 5.8°
Max observer difference angle: 17°

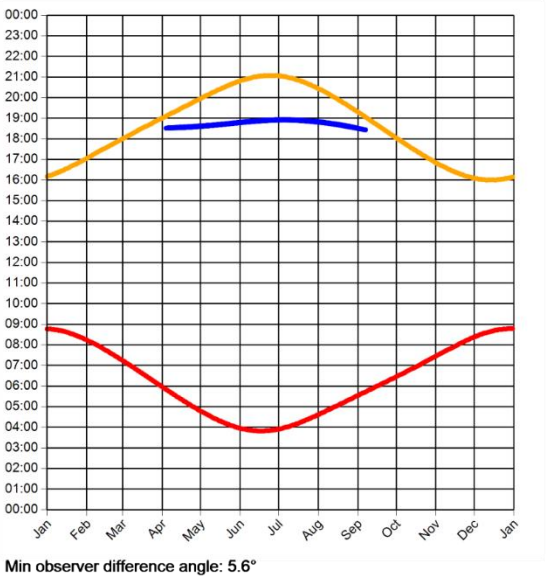
Observer Location — Sun azimuth range is 275.6° - 289.7° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

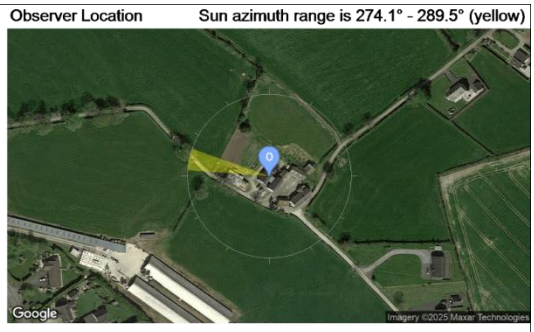
Observer 227 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 5.6°
Max observer difference angle: 17.3°

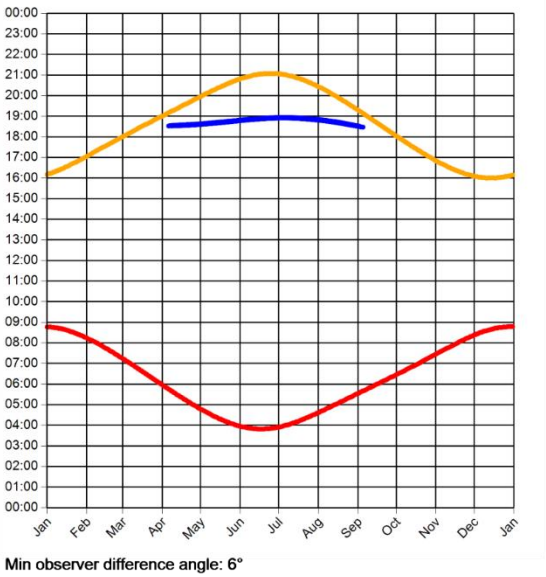
Observer Location — Sun azimuth range is 274.1° - 289.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

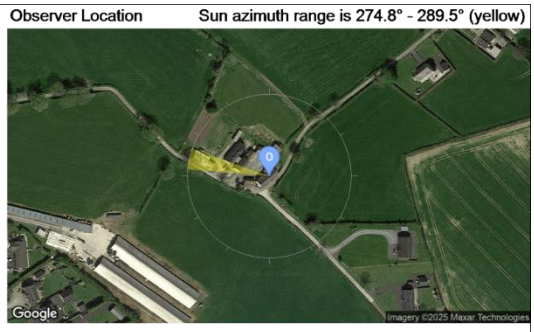
Observer 228 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 6°
Max observer difference angle: 17.2°

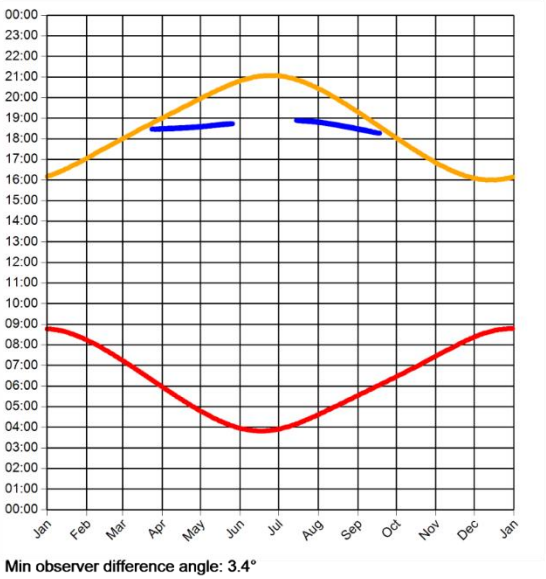
Observer Location — Sun azimuth range is 274.8° - 289.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

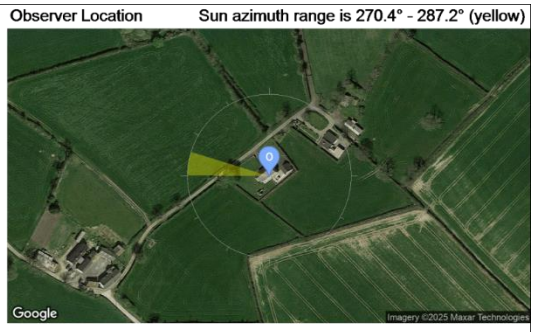
Observer 229 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 16.3°

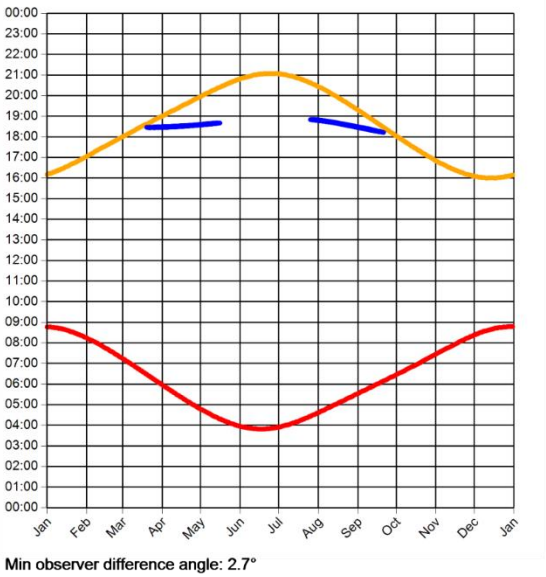
Observer Location — Sun azimuth range is 270.4° - 287.2° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

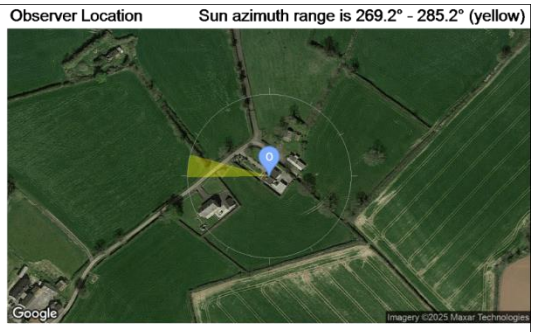
Observer 230 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 15.2°

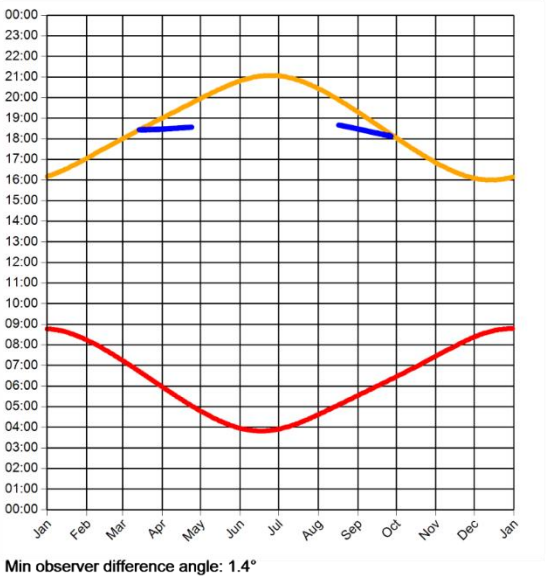
Observer Location — Sun azimuth range is 269.2° - 285.2° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

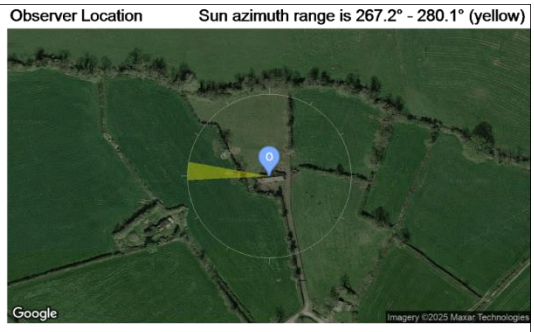
Observer 231 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.4°
Max observer difference angle: 11.2°

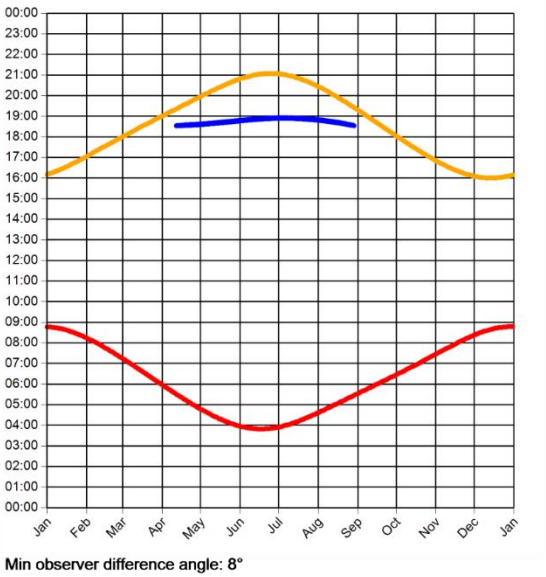
Observer Location — Sun azimuth range is 267.2° - 280.1° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

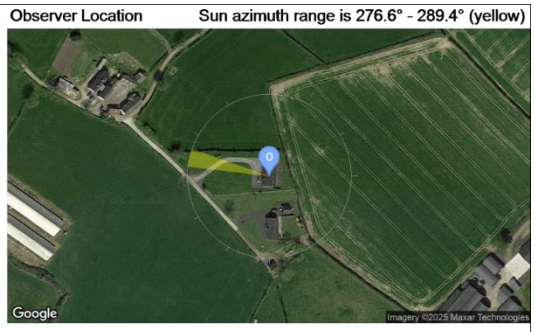
Observer 232 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 8°
Max observer difference angle: 17.5°

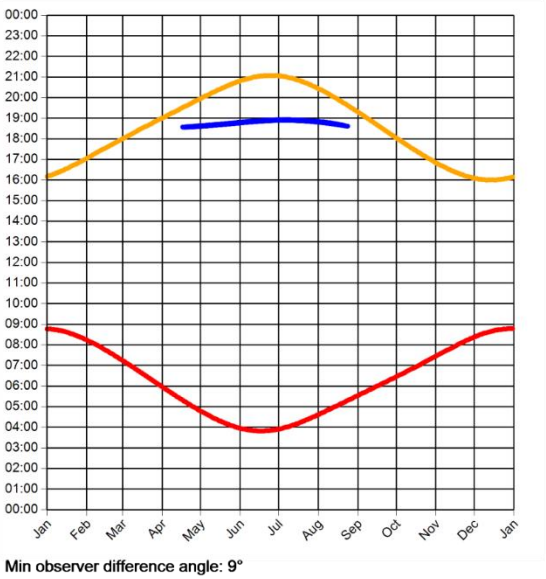
Observer Location — Sun azimuth range is 276.6° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

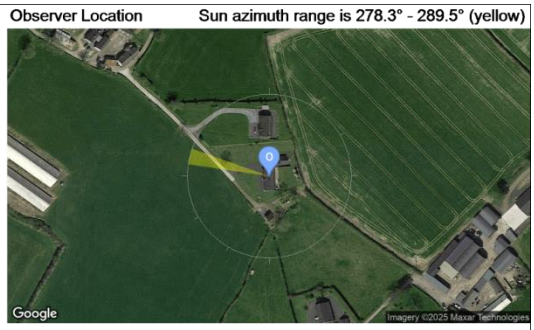
Observer 233 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 9°
Max observer difference angle: 17.5°

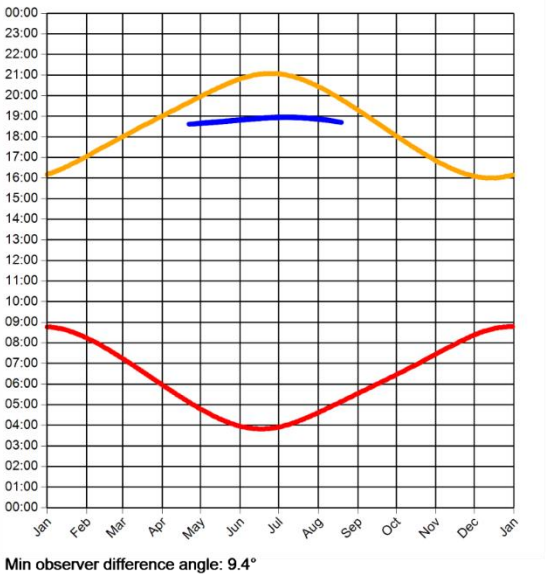
Observer Location — Sun azimuth range is 278.3° - 289.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

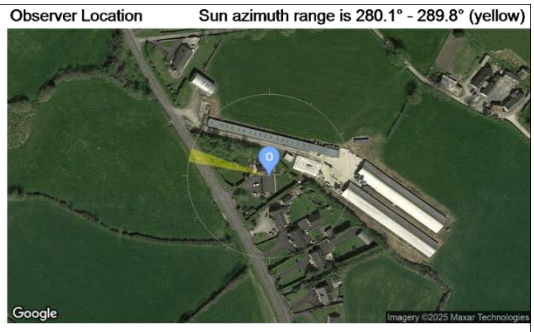
Observer 234 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 9.4°
Max observer difference angle: 16.8°

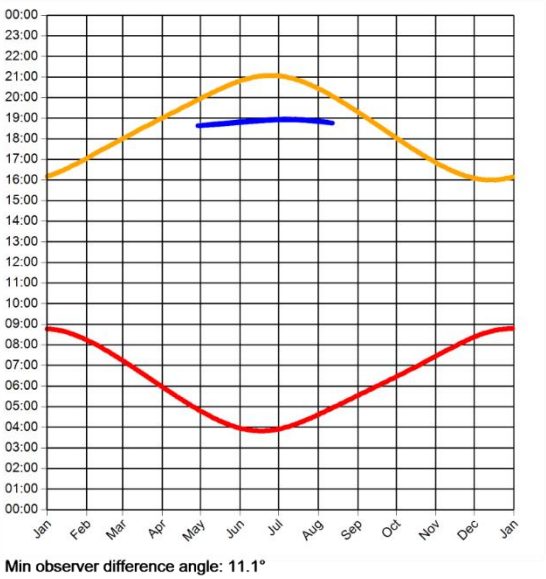
Observer Location — Sun azimuth range is 280.1° - 289.8° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

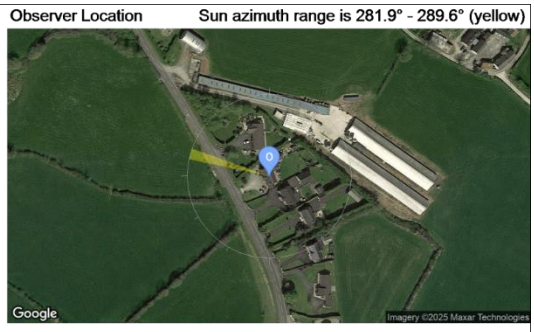
Observer 235 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 11.1°
Max observer difference angle: 17.1°

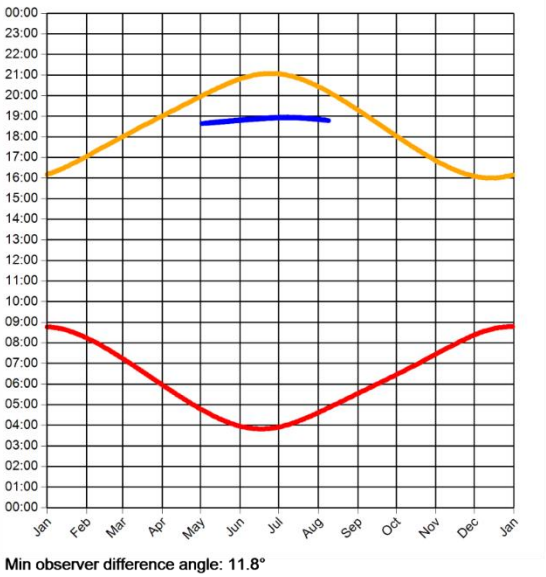
Observer Location — Sun azimuth range is 281.9° - 289.6° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

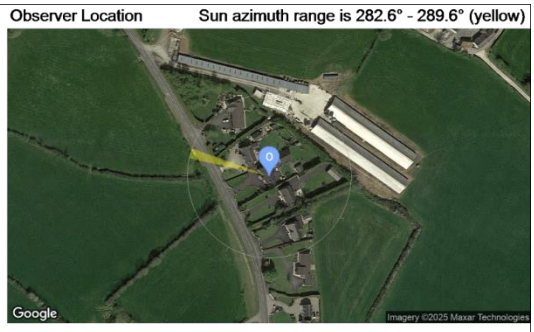
Observer 236 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 11.8°
Max observer difference angle: 17.2°

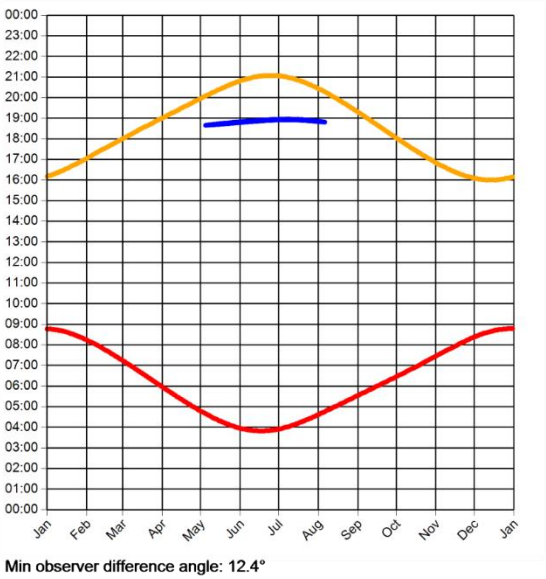
Observer Location Sun azimuth range is 282.6° - 289.6° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

Observer 237 Results

Reflection Date/Time (GMT) Graph



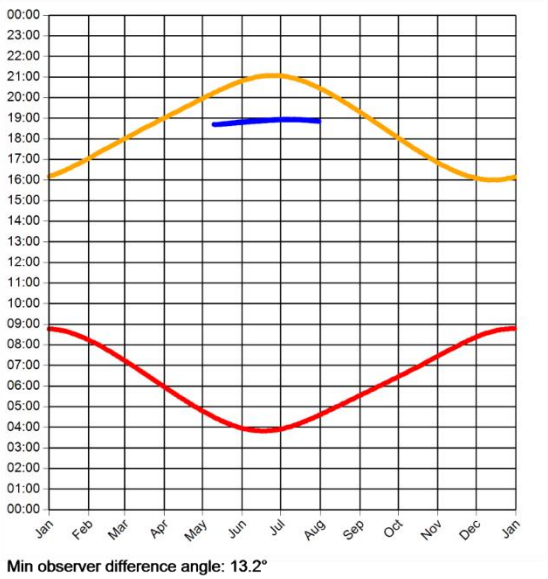
Min observer difference angle: 12.4°
Max observer difference angle: 17.2°

Observer Location Sun azimuth range is 283.3° - 289.6° (yellow)

Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

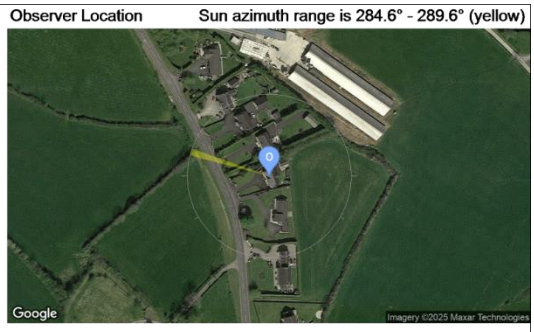
Observer 238 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 13.2°
Max observer difference angle: 17.1°

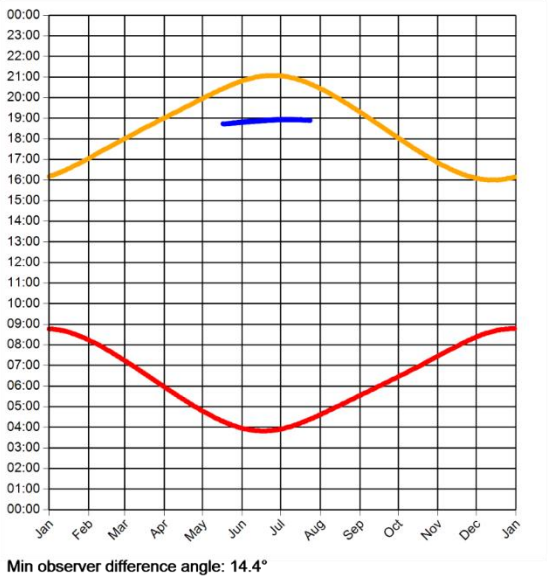
Observer Location — Sun azimuth range is 284.6° - 289.6° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

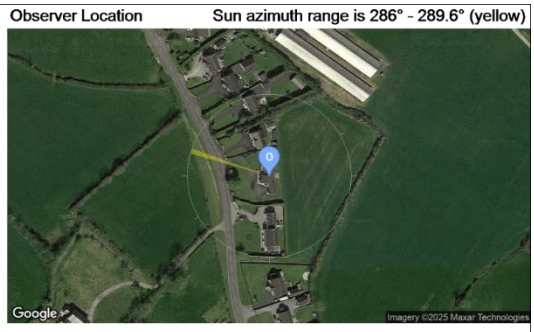
Observer 239 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 14.4°
Max observer difference angle: 17.1°

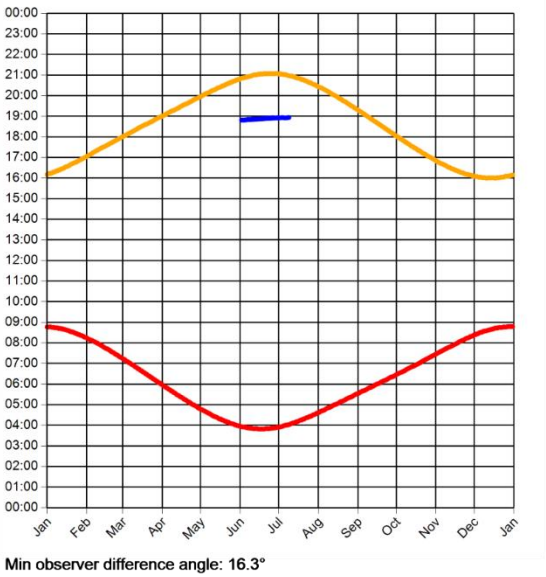
Observer Location — Sun azimuth range is 286° - 289.6° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

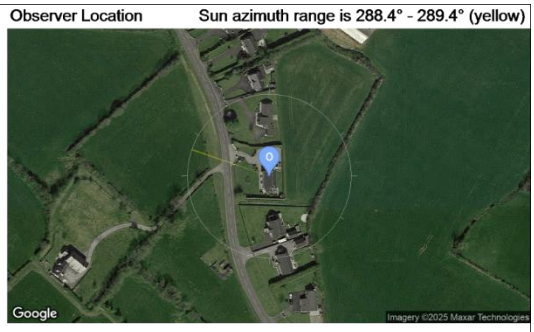
Observer 240 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 16.3°
Max observer difference angle: 17.2°

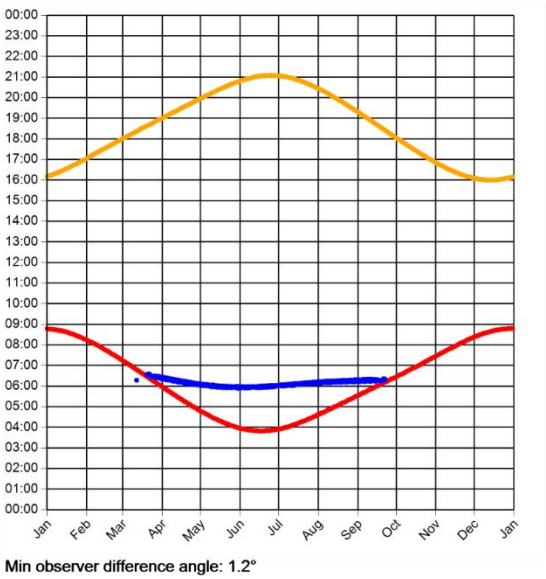
Observer Location — Sun azimuth range is 288.4° - 289.4° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

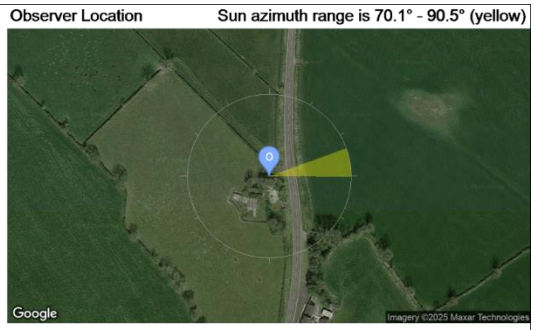
Observer Dwelling 246 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 70.1° - 90.5° (yellow)



Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)

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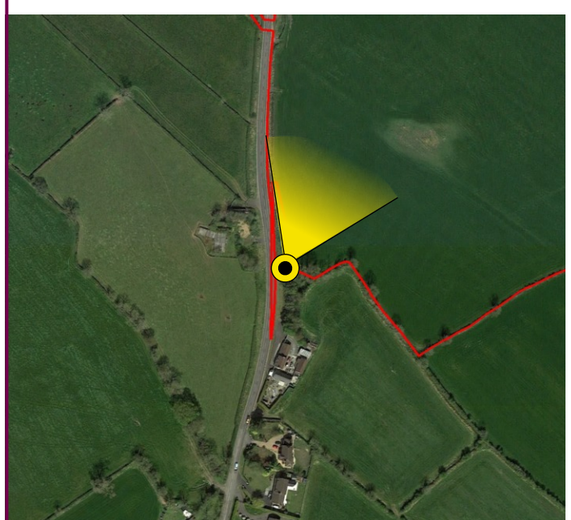
Appendix 4 - Annex 2
Updated Photomontage 10 – now referenced VP10 Rev A
Additional Photomontage 10A – Drumlin Road – Long View

Existing View



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312425
Date	11.06.23 - 13.40	Northing	355843
View height	1.65 m AGL	Direction	26°
Field of View	65°	Distance	20 m

Title:
VP10 Drumlin Road
Existing View

Data Details	Drawn by:	PM
Projection: Irish Grid	Checked:	SA
Data Source: RPS 2025	Job Ref:	NI 2702
Status: Revision A - Issued	Date:	February 2025

Project:
Magheralin Solar Farm

Client:
res

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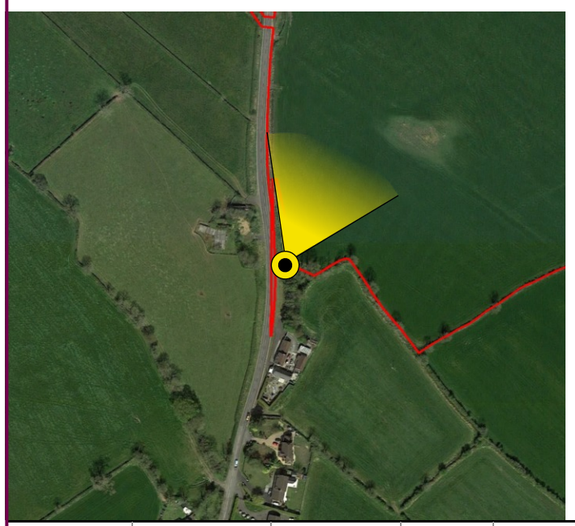
Photomontage



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312425	Title: VP10 Drumlin Road Proposed View - Panels Only	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	11.06.23 - 13.40	Northing	355843		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	26°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	20 m		Status: Revision A - Issued	Date:	February 2025		

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Photomontage with planting

Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312425	Title: VP10 Drumlin Road Proposed View - Day 1	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	11.06.23 - 13.40	Northing	355843		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	26°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	20 m		Status: Revision A - Issued	Date:	February 2025		

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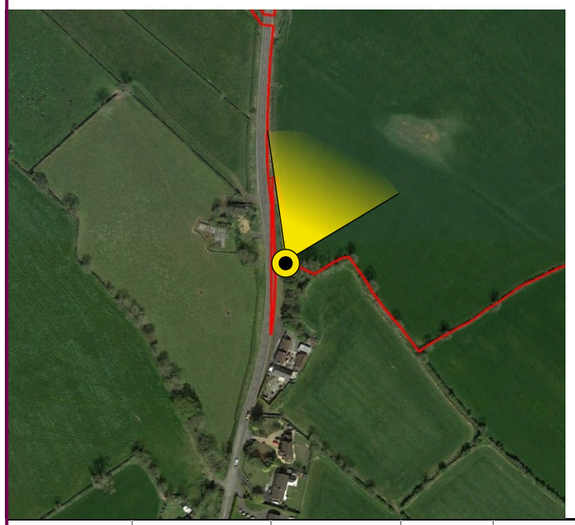
Photomontage with planting



Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312416	Title: VP10 Drumlin Road Proposed View at Year 10	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	11.06.23 - 13.40	Northing	355803		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	10°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	65 m		Status: Revision A - Issued	Date:	February 2025		

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Existing View

Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312416	Title: VP10A Drumlin Road - Long View Existing View	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	24.10.24 - 11.20	Northing	355803		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	10°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	65 m		Status: Issued	Date:	February 2025		

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Photomontage

Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312416	Title: VP10A Drumlin Road - Long View Proposed View - Panels Only	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: RES
Date	24.10.24 - 11.20	Northing	355803		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	10°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	65 m		Status: Issued	Date:	February 2025		

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Photomontage with planting

Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312416	Title: VP10A Drumlin Road - Long View Proposed View - Day 1	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: res
Date	24.10.24 - 11.20	Northing	355803		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	10°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	65 m		Status: Issued	Date:	February 2025		

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Photomontage with planting

Aerial Location Map

Tripod location image

Camera	Nikon D600	Easting	312416	Title: VP10A Drumlin Road - Long View Proposed View at Year 10	Data Details	Drawn by:	PM	Project: Magheralin Solar Farm	Client: RES
Date	24.10.24 - 11.20	Northing	355803		Projection: Irish Grid	Checked:	SA		
View height	1.65 m AGL	Direction	10°		Data Source: RPS 2025	Job Ref:	NI 2702		
Field of View	65°	Distance	65 m		Status: Issued	Date:	February 2025		

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