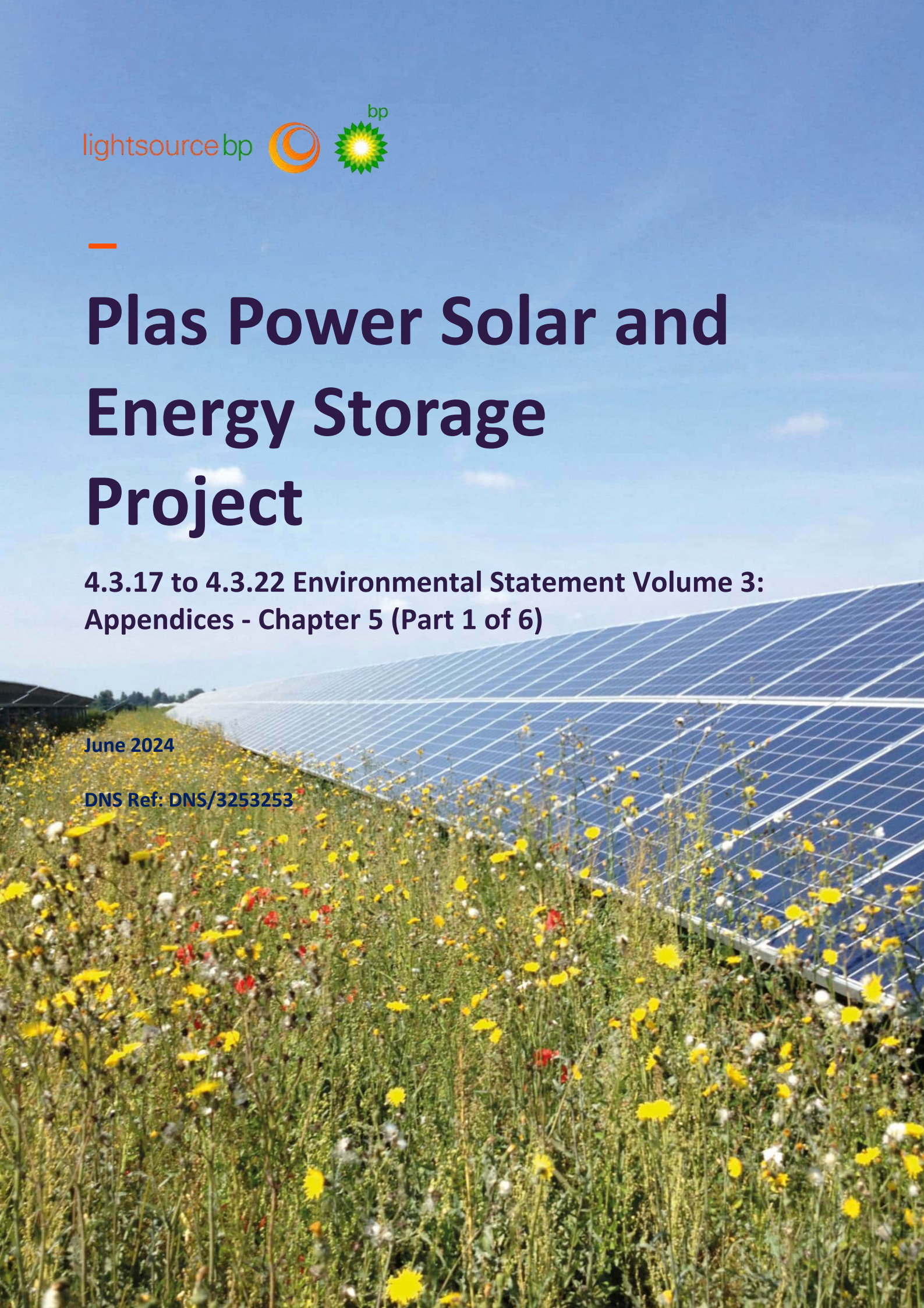


Plas Power Solar and Energy Storage Project

4.3.17 to 4.3.22 Environmental Statement Volume 3: Appendices - Chapter 5 (Part 1 of 6)

June 2024

DNS Ref: DNS/3253253

Appendix 5.1
Glint and Glare Assessment

PAGERPOWER
Urban & Renewables

Solar Photovoltaic Glint and Glare Study

RPS Group PLC

Plas Power Estate

October 2023







PLANNING SOLUTIONS FOR:

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ADMINISTRATION PAGE

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Issue	Date	Detail of Changes
1	23rd December 2022	Initial issue
2	18th October 2023	Modelling of updated layout
3	1st November 2023	Minor 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) development located at Plas Power Estate, Wrexham, Wales. The glint and glare assessment pertains to the possible impact upon surrounding road safety, residential amenity, and identified ZTV viewpoints.

Conclusions

No significant impacts are predicted on surrounding road safety, residential amenity, and observers located at the identified viewpoints in the surrounding area. Mitigation is not recommended.

Guidance and Studies

There is no existing planning guidance for the assessment of solar reflections from solar panels towards roads and nearby dwellings. Pager Power has however produced guidance for glint and glare and solar photovoltaic developments, which was published in early 2017, with the fourth edition published in 2022[1]. The guidance document sets out the methodology for assessing roads and dwellings with respect to solar reflections from solar panels.

Pager Power's approach is to undertake geometric reflection calculations and, where a solar reflection is predicted, consider the screening (existing and/or proposed) between the receptor and the reflecting solar panels. The scenario in which a solar reflection can occur for all receptors is then identified and discussed, and a comparison is made against the available solar panel reflection studies to determine the overall impact.

The available studies have measured the intensity of reflections from solar panels with respect to other naturally occurring and manmade surfaces. The results show that the reflections produced are of intensity similar to or less than those produced from still water and significantly less than reflections from glass and steel[2].

Assessment Results

Roads

The modelling has shown that solar reflections are geometrically possible towards a 1.5km section of the A483, a 3.6km section of the A525, and a 0.4km section of Heritage Way.

No significant impacts are predicted on any of the modelled road sections due to the following:

- Solar reflections are possible from panels **outside** of a road user's primary horizontal field of view (50 degrees either side of the direction of travel);

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

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

- There is significant screening such that views of reflecting panels are not expected to be possible in practice; and/or
- There is screening such that reflections will be filtered and only marginal/fleeting views of reflecting panels are expected to be possible.

Dwellings

The modelling has shown that solar reflections are geometrically possible towards 145 of the 251 assessed dwelling locations.

No significant impacts are predicted on the assessed dwellings due to the following:

- Solar reflections are possible for **less** than 60 minutes on any given day and for **less** than 3 months of the year;
- There is significant screening such that views of reflecting panels are not expected to be possible in practice;
- There is screening such that reflections will be filtered and only marginal views of reflecting panels are expected to be possible; and/or
- There is a significant clearance distance between dwelling observer and closest reflecting panel.

ZTV Viewpoints

The modelling has shown that solar reflections are geometrically possible towards 10 of the 13 assessed ZTV viewpoints.

In Pager Power's experience, significant impacts to pedestrians/observers at ZTV viewpoints are not possible due to glint and glare effects from PV developments. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance. This is because:

- The typical density of pedestrians located at these points is low in a rural environment;
- Any resultant effect is much less serious and has far lesser consequences than, for example, solar reflections experienced towards a road network whereby the resultant impacts of a solar reflection can be much more serious;
- Glint and glare effects towards an observer are transient, and time and location sensitive whereby a pedestrian could move beyond the solar reflection zone with ease with little impact upon safety or amenity;

Any observable solar reflection towards an observer would be of similar intensity to those experienced whilst navigating the natural and built environment (such as bodies of water) on a regular basis.

No significant impacts are predicted on the assessed ZTV viewpoints.

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ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 58 countries internationally.

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) development located at Plas Power Estate, Wrexham, Wales. The glint and glare assessment pertains to the possible impact upon surrounding road safety, residential amenity, and identified ZTV viewpoints. This report contains the following:

- Solar development details.
- Explanation of glint and glare.
- Overview of relevant guidance and studies.
- Overview of Sun movement.
- Assessment methodology.
- Identification of receptors.
- Glint and glare assessment for identified receptors.
- Results discussion.

Following this, a summary of findings and overall conclusions and recommendations from the desk-based analysis is presented.

1.2 Pager Power's Experience

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

1.3 Glint and Glare Definition

The definition of glint and glare is as follows[3]:

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

The term 'solar reflection' is used in this report to refer to both reflection types.

[3] These definitions are aligned with those presented within the UK Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) – published by the Department for Business, Energy & Industrial Strategy in March 2023 and the Federal Aviation Administration in the USA.

2 PROPOSED DEVELOPMENT LOCATION AND DETAILS

2.1 Site Layout (Latest)

Figure 1[4] below shows the latest site layout plan. The blue areas denote the solar panel locations.

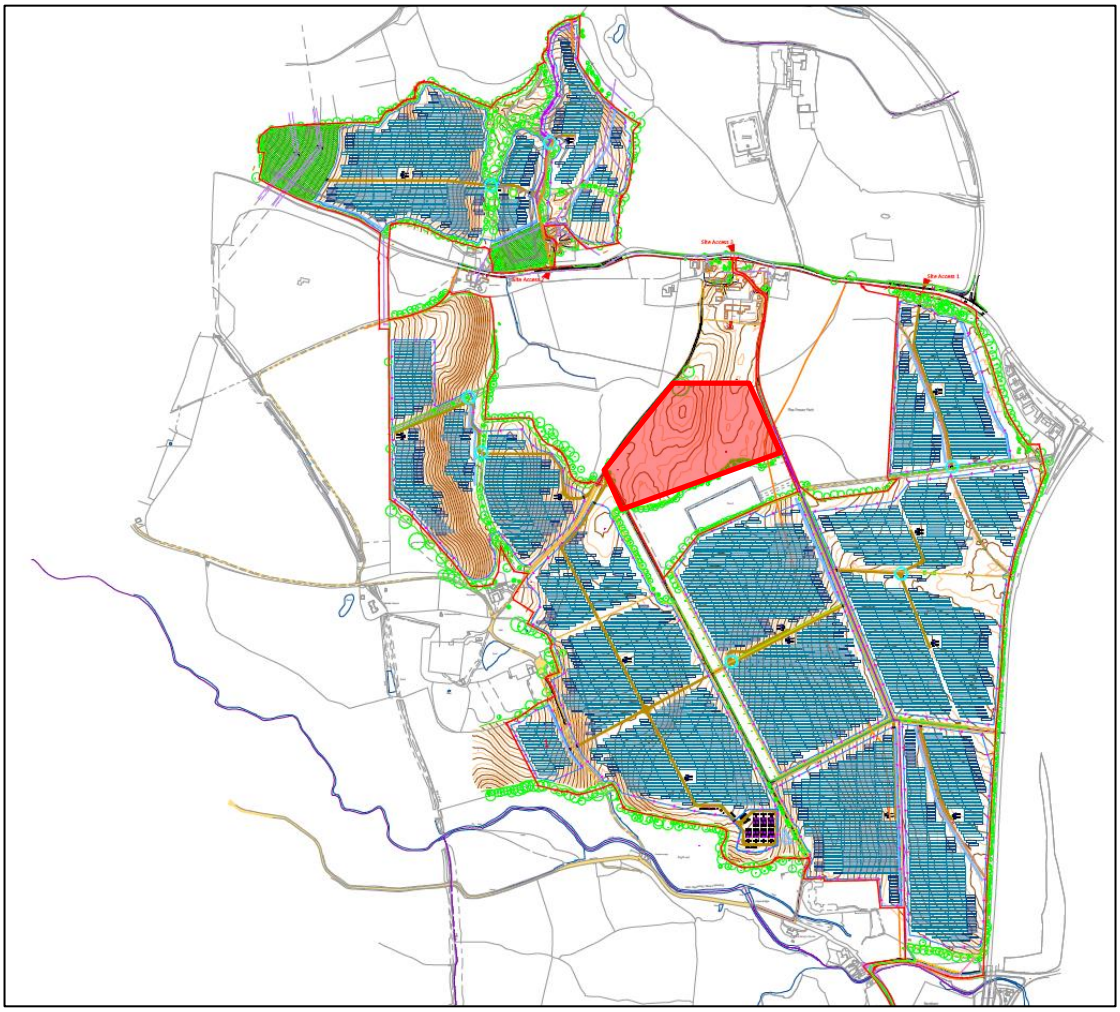


Figure 1 *Site Layout Plan*

[4]Source: GBR_Plas Power_LP2-PDL-PL_11-A3 Layout (planning).dwg (cropped). The area filled and outlined in red previously contained panels and this is shown in the layout plan in Figure 2 on the following page that was modelled within this report. The removal of the panel area does not require remodelling as the assessment undertaken in this report represents a more worst-case scenario than the currently proposed development.

2.2 Site Layout (Modelled)

Figure 2[5] below shows the site layout plan that was modelled within this report. The blue areas denote the solar panel locations.

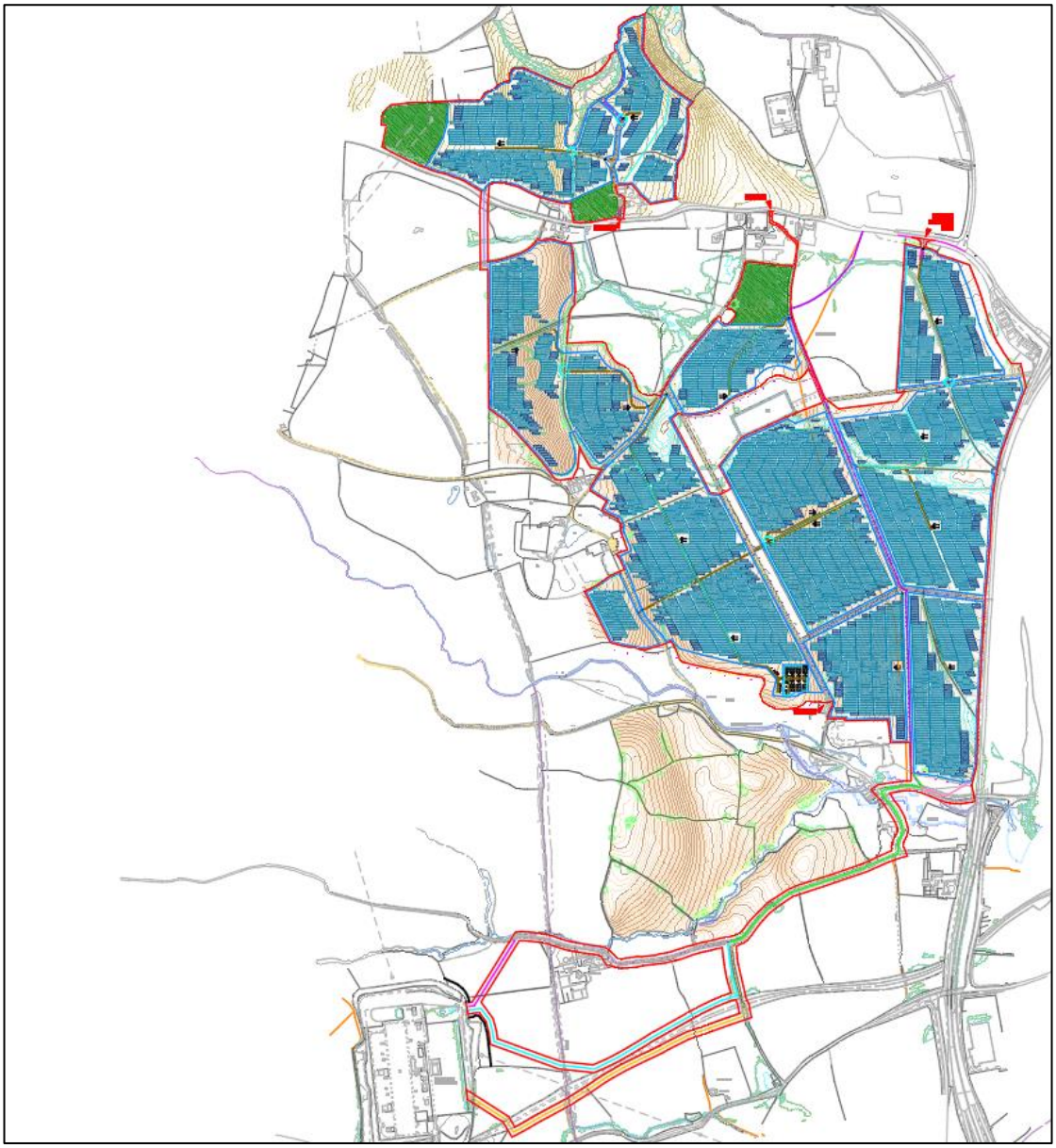


Figure 2 *Site Layout Plan*

[5] Source: GBR_Plas Power_LP2-PDL-PL_10 (draft 4).dwg (cropped)

2.3 Photovoltaic Panel Mounting Arrangements and Orientation

The solar panel dimensions as assessed within this report are as follows:

- The maximum height of the solar panels is 3.06m above ground level (agl), the minimum height is 1m agl - assessed at a panel midpoint of 2.03m agl;
- Tilt: 25 degrees above the horizontal;
- Orientation: 180 degrees (south facing).

2.4 Reflector Areas

A resolution of 20m has been chosen for this assessment. This means that a geometric calculation is undertaken for each identified receptor from a point every 20m 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 area and the assessment resolution.

The bounding co-ordinates for the proposed solar development have been extrapolated from the site plans. The data can be found in Appendix G. The assessed panel areas are shown in Figure 3 below.

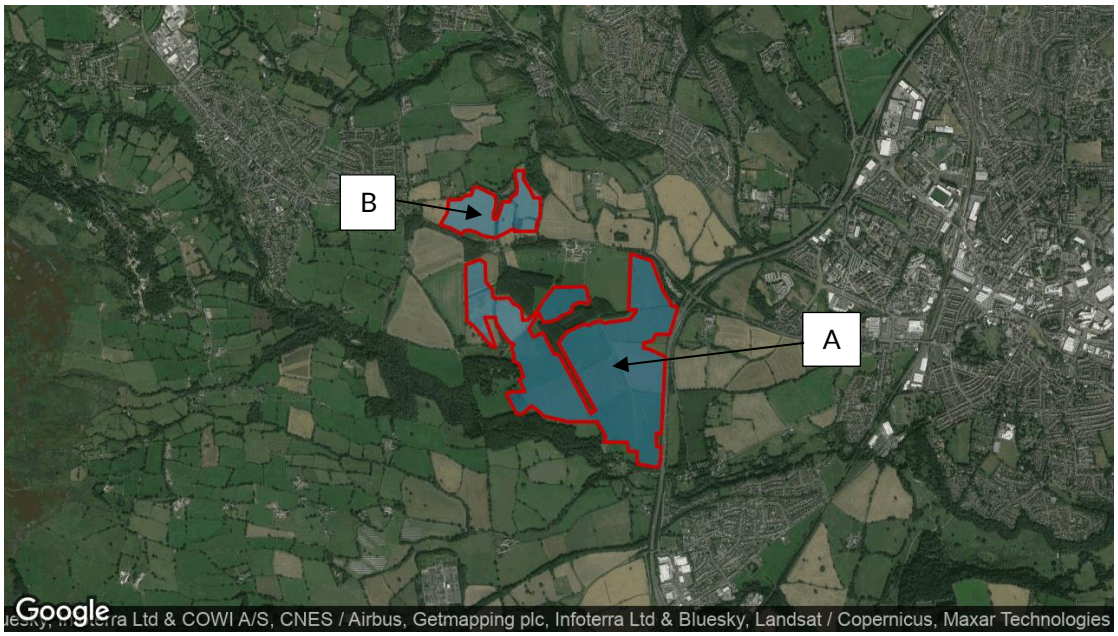


Figure 3 *Modelled solar panel areas*

3 GLINT AND GLARE ASSESSMENT METHODOLOGY

3.1 Guidance and Studies

Appendices A and B present a review of relevant guidance and independent studies with regard to glint and glare issues from solar panels. The overall conclusions from the available studies are as follows:

- Specular reflections of the Sun from solar panels are possible.
- The measured intensity of a reflection from solar panels can vary from 2% to 30% depending on the angle of incidence.
- Published guidance shows that the intensity of solar reflections from solar panels are equal to or less than those from water. It also shows that reflections from solar panels are significantly less intense than many other reflective surfaces, which are common in an outdoor environment.

3.2 Background

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

3.3 Methodology

3.3.1 Pager Power's Methodology

The glint and glare assessment methodology has been derived from the information provided to Pager Power through consultation with stakeholders and by reviewing the available guidance and studies. The methodology for a glint and glare assessments is as follows:

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

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

3.3.2 Sandia National Laboratories' Methodology

Sandia National Laboratories developed the Solar Glare Hazard Analysis Tool (SGHAT) which is no longer freely available however it is now developed by Forge Solar. Pager Power uses this model where required for aviation receptors. Whilst strictly applicable in the USA and to solar photovoltaic developments only, the methodology is widely used by aviation stakeholders internationally.

Pager Power has undertaken many glint and glare assessments with both models (SGHAT and Pager Power's) producing similar results. In this study the Pager Power model was used exclusively.

3.4 Assessment Limitations

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

4 IDENTIFICATION OF RECEPTORS

4.1 Ground-Based Receptors Overview

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

The above parameters and extensive experience over a significant number of glint and glare assessments undertaken, shows that a 1km assessment area from the proposed panel area is appropriate for glint and glare effects on ground-based receptors (road users and dwellings). Reflections towards ground-based receptors to the north of the panels are not considered possible at this latitude for fixed panels facing south and therefore the areas to the north of the northernmost panels are removed from the assessment area.

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

Terrain elevation heights have been interpolated based on OS Terrain 50 DTM data. Receptor details can be found in Appendix G.

4.2 Road Receptors

4.2.1 Overview

Road types can generally be categorised as:

- Major National – Typically a road with a minimum of two carriageways and fast-moving vehicles with busy traffic.
- National – Typically a road with a one or more carriageways and fast-moving vehicles with moderate to busy traffic density.
- Regional – Typically a single carriageway with a typical traffic density of low to moderate; and
- Local - Typically roads and lanes with the lowest traffic densities. Speed limits vary.

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

The analysis considers any major national, national, and regional roads that:

- are within the one-kilometre study area; and
- have a potential view of the panels.

A height of 1.5 metres above ground level has been taken as a typical eye level for a road user[6]. This height has therefore been added to the ground height at each receptor location. Visibility and direction of travel is considered in the assessment of all receptors.

4.2.2 Identification

In total, 86 road receptor locations have been identified distanced circa 100m apart:

- A 3.1km section of the A483 (1-32)
- A 3.8km section of the A525 (33-71)
- A 0.6km section of Heritage Way (72-78); and
- A 0.7km section of the B5097 (79-86)

These are shown in Figure 4 on the following page.

[6]This height is chosen for modelling purposes, elevated drivers are considered in the results discussion where appropriate.

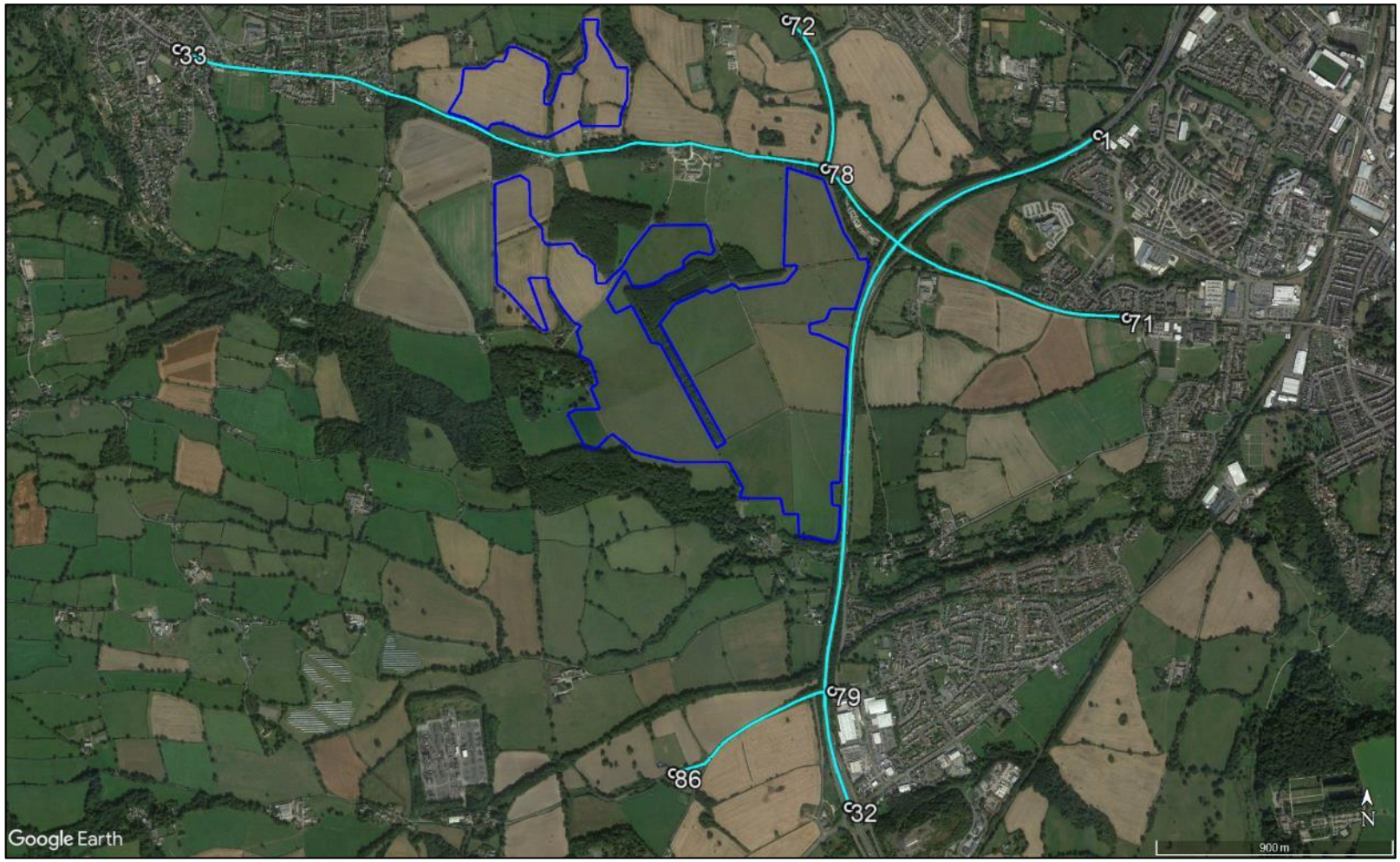


Figure 4 *Overview of road receptors*

4.3 Dwelling Receptors

4.3.1 Overview

The analysis has considered dwellings that:

- are within the one-kilometre study area; and
- have a potential view of the panels.

A height of 1.8 metres above ground level has been taken as typical eye level for an observer on the ground floor[7] of the dwelling since this is typically the most occupied floor of a dwelling throughout the day.

In residential areas with multiple layers of dwellings, only the outer dwellings have been considered for assessment. This is because they will mostly obscure views of the solar panels to the dwellings behind them, which will therefore not be impacted by the Proposed Development because the line of sight will be removed, or they will experience comparable effects to the closest assessed dwelling. In addition, due to the density of the area, every other dwelling has been modelled; impacts will not change for individual dwellings in close proximity to each other and the locations will be assessed as opposed to individual dwellings where appropriate.

The dwellings, consist of buildings that are likely divided into multiple addresses. Modelling output has not been generated for every individual address independently. The sampling resolution is sufficiently high to capture the level of effect for all potentially affected dwellings.

4.3.2 Identification

In total, 251 dwellings were identified for assessment, as shown in Figure 4 on the following page. These are shown in more detail in Figure 6 to Figure 11 on the following pages.

[7] This fixed height for the dwelling receptors is for modelling purposes. Small changes to the modelling height by a few metres is not expected to significantly change the modelling results. Views above ground floor are considered in the results discussion where necessary.

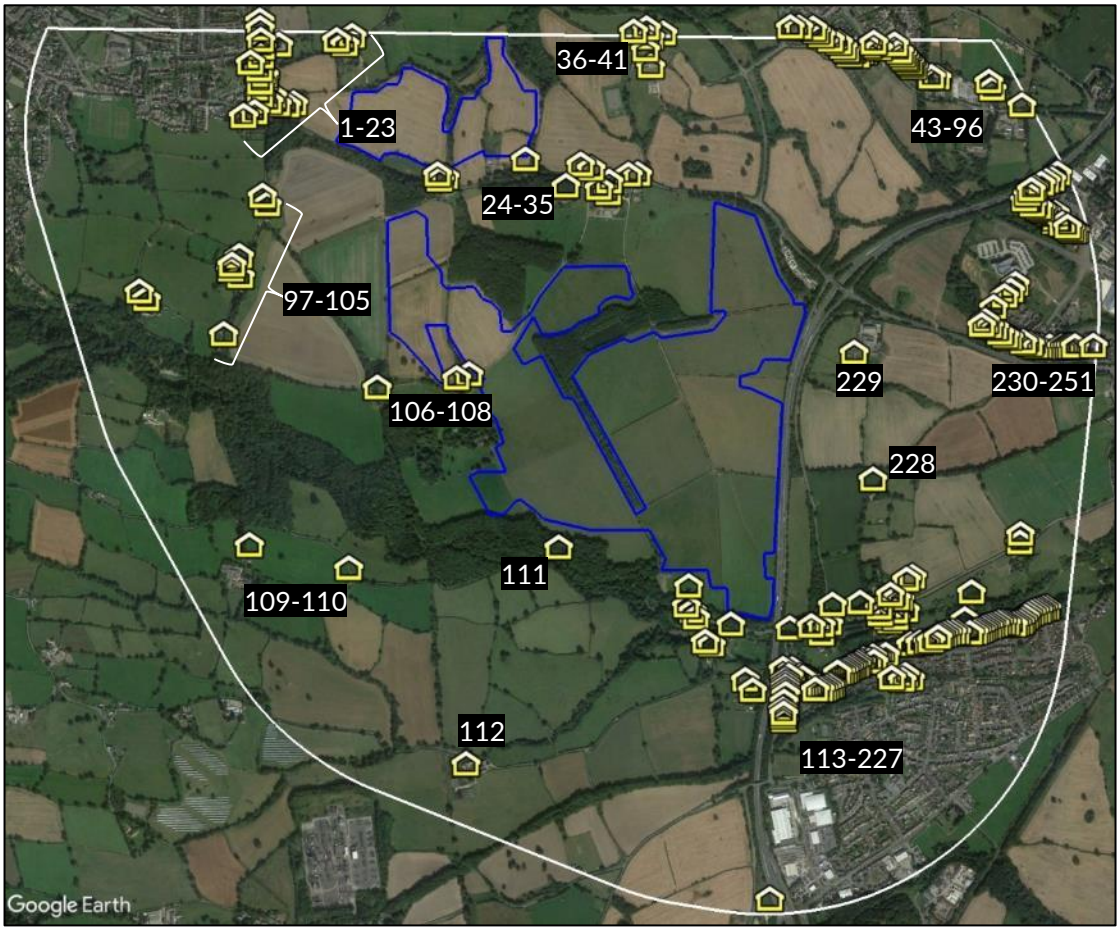


Figure 5 *Assessed dwelling locations*

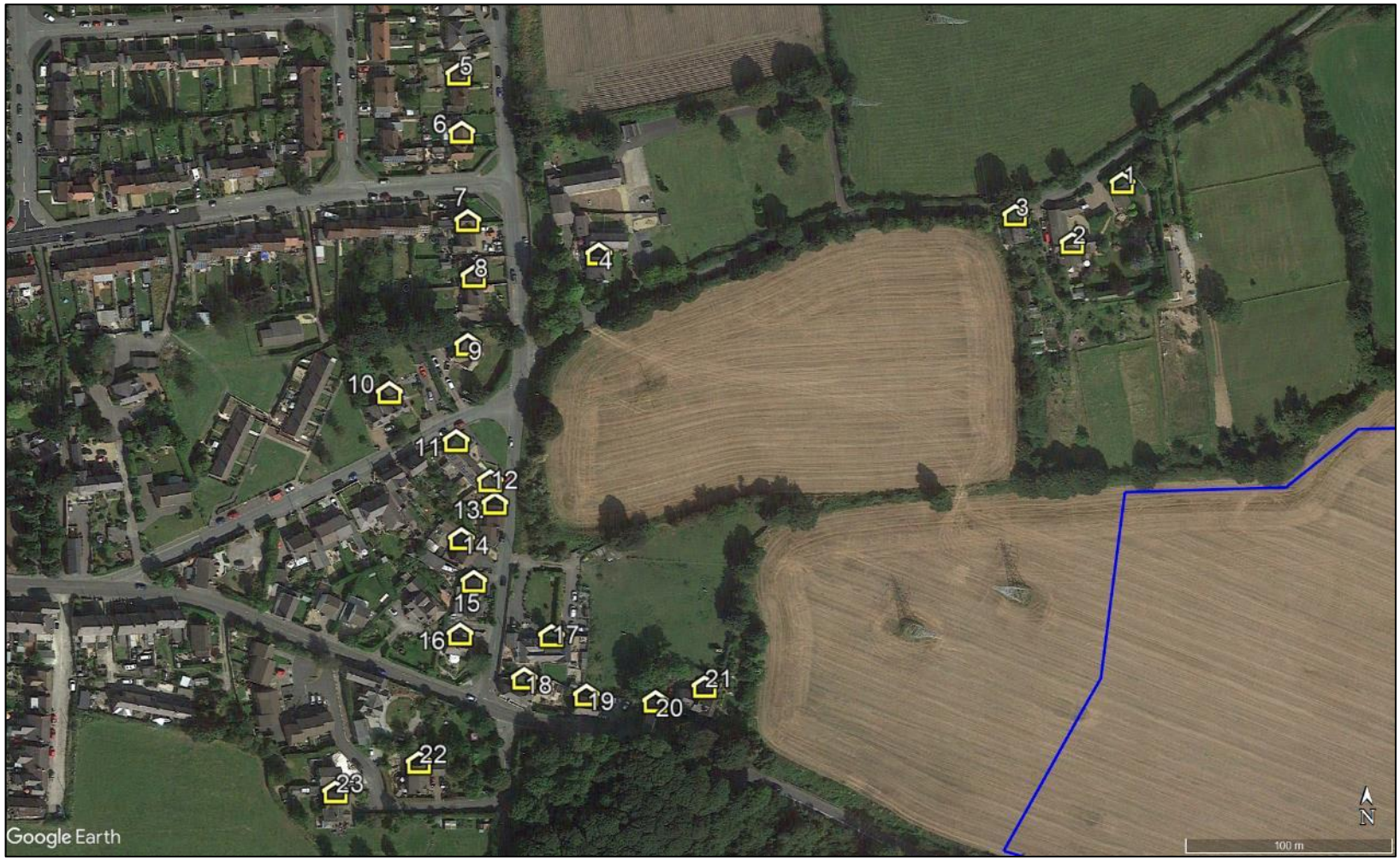


Figure 6 *Dwelling receptors 1-23*

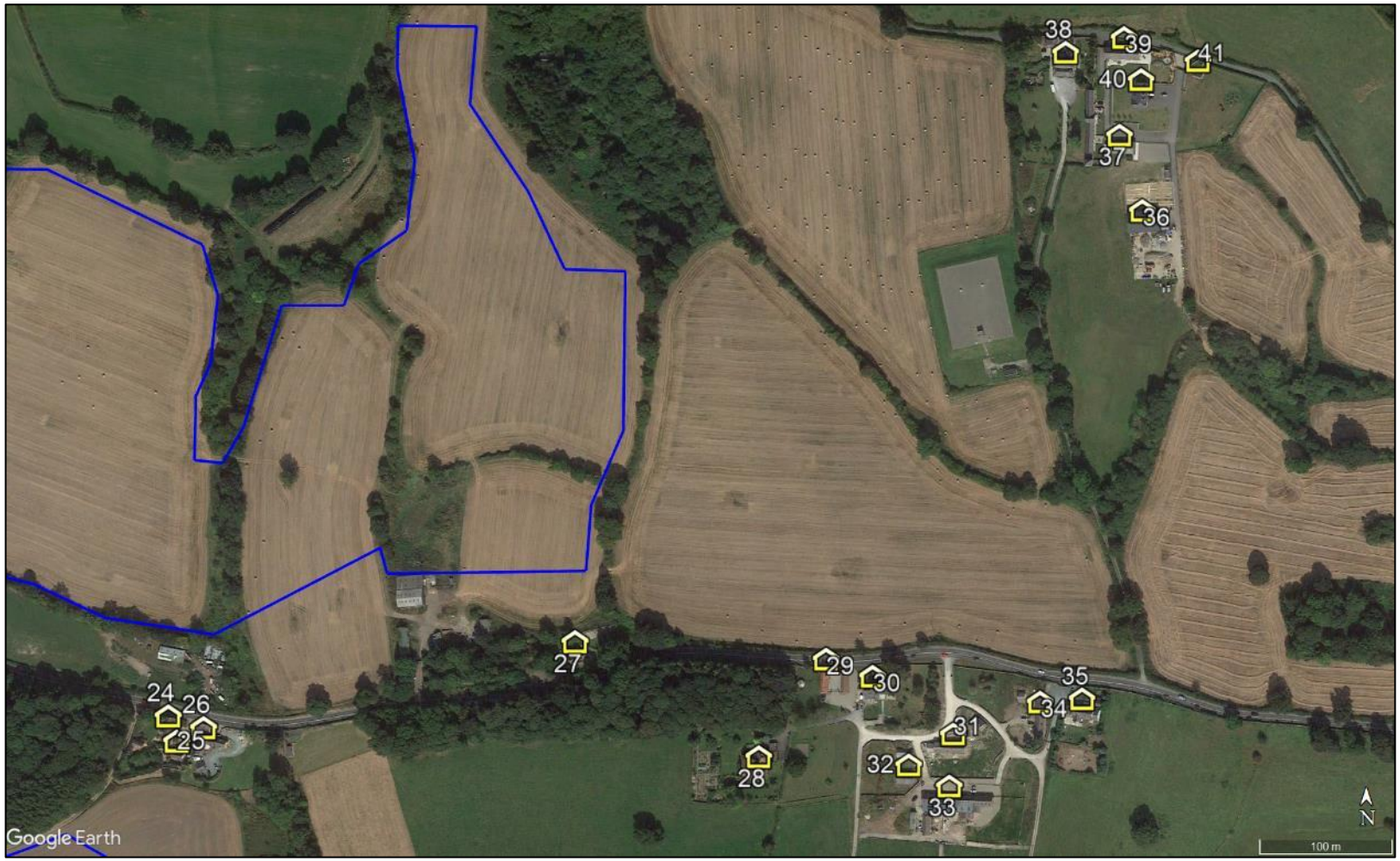


Figure 7 *Dwelling receptors 24-41*



Figure 8 *Dwelling receptors 42-72*



Figure 9 *Dwelling receptors 73-96*



Figure 10 *Dwelling receptors 97-108*



Figure 11 *Dwelling receptors 109-112*



Figure 12 *Dwelling receptors 229-251*

4.4 ZTV Viewpoints

The analysis has considered the 13 viewpoints marked in the ZTV[8]. Although not a typical requirement for assessment, these receptors have been taken forward for technical modelling at the request of the developer. The locations of these viewpoints are shown on aerial imagery in Figure 13 below. A height of 1.8 metres above ground level has been taken as typical eye level for an observer on the ground.

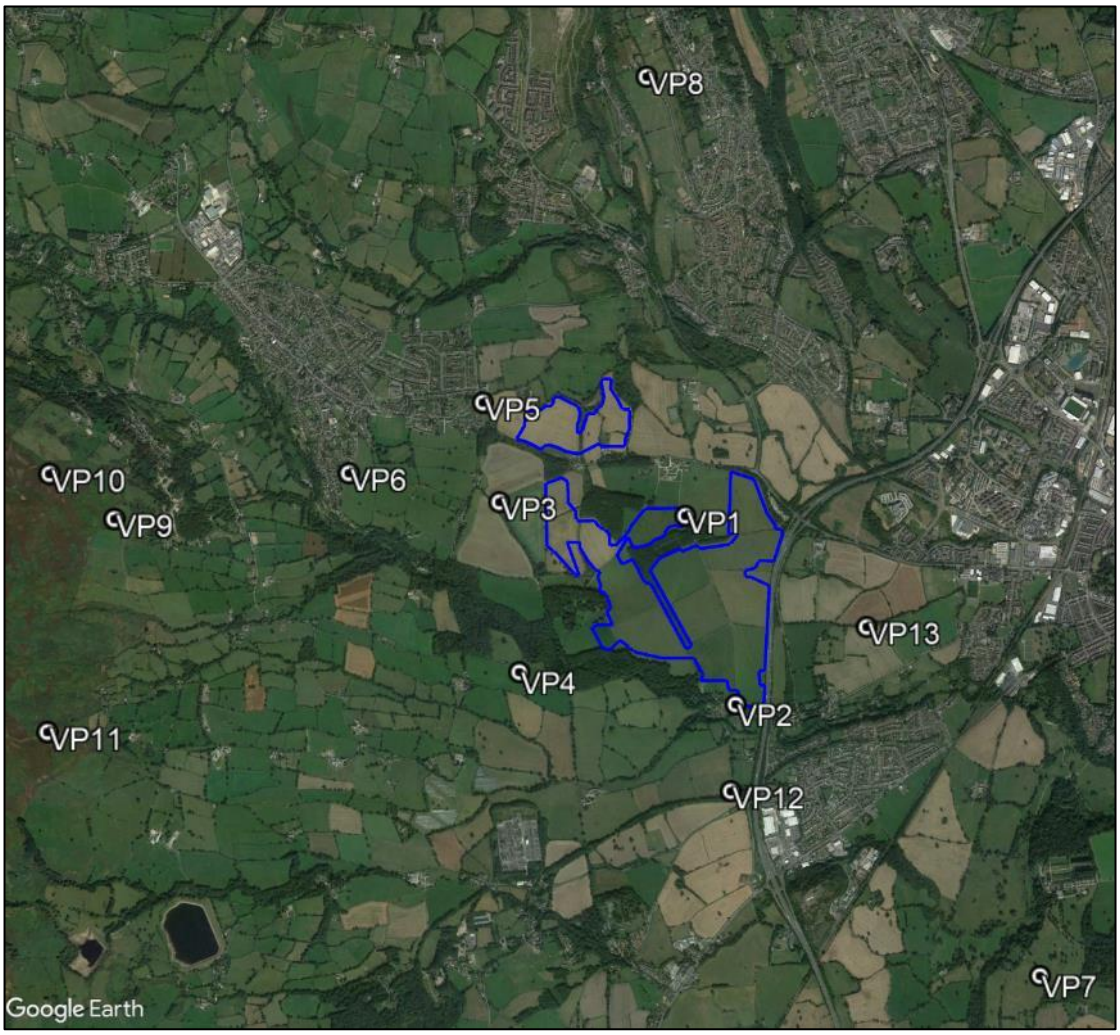


Figure 13 *Locations of ZTV viewpoints*

[8] Source: JSL3436_Fig 5.2 ZTV and Representative Viewpoints_E.pdf (cropped)

5 GEOMETRIC ASSESSMENT RESULTS AND DISCUSSION

5.1 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.

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 can be provided on request.

5.2 Roads

5.2.1 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.

5.2.2 Geometric Modelling Results

The modelling has shown that solar reflections are geometrically possible[9] towards a 1.5km section of the A483, a 3.6km section of the A525, and a 0.4km section of Heritage Way. These sections of roads are shown in orange in Figure 14 on the following page.

The modelling results for road receptors are presented in Table 1 on page 27.

[9] Only considering reflections from solar panels within 1km of the receptor. Reflections outside of 1km are not considered to be significant.

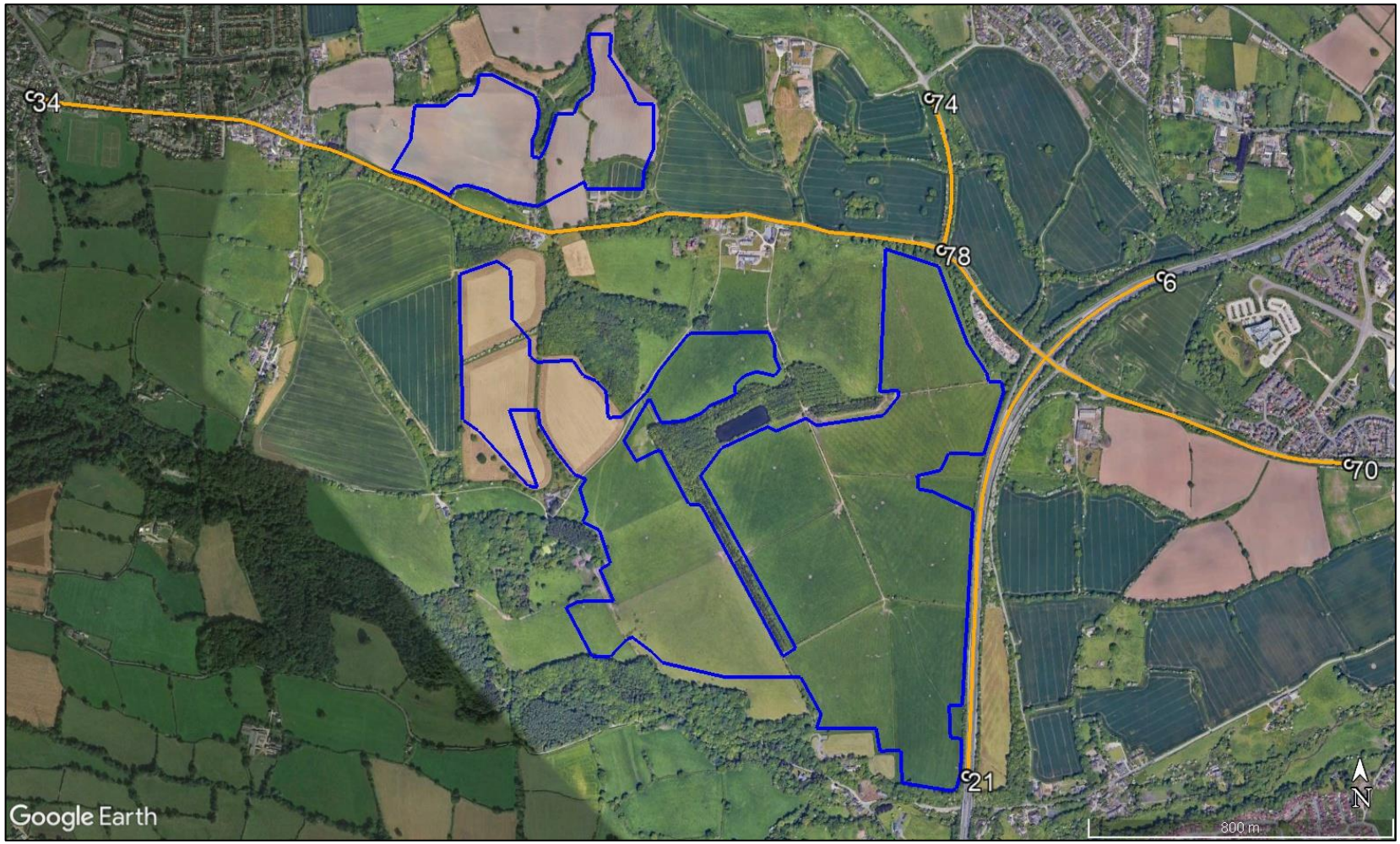


Figure 14 *Sections of roads towards which solar reflections are geometrically possible (orange) – aerial image*

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
1 - 5	Solar reflections are not geometrically possible	N/A	N/A	None	No
6 - 9	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening terrain and vegetation	N/A	None	No
10 - 17	Solar reflections predicted to originate from **outside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening vegetation	N/A	None	No
18 - 21	Solar reflections predicted to originate from **outside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be mostly screened by intervening vegetation	N/A	Low	No
22 - 33	Solar reflections are not geometrically possible	N/A	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
34 - 41	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening terrain, buildings, and vegetation	N/A	None	No
42 - 48	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening terrain, and deciduous roadside vegetation during summer months During spring and autumn months, views of reflecting panels will be filtered such that significant reflections are not predicted	N/A	Low	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
49 - 70	Solar reflections predicted to originate from **inside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening terrain and vegetation	N/A	None	No
71 - 73	Solar reflections are not geometrically possible	N/A	N/A	None	No
74 - 78	Solar reflections predicted to originate from **outside** of a road user's primary horizontal field of view	Reflecting panels are predicted to be screened by intervening terrain and vegetation	N/A	None	No
79 - 86	Solar reflections are not geometrically possible	N/A	N/A	None	No

Table 1 *Geometric modelling results, assessment of impact significance, and mitigation recommendation/requirement – road receptors*

5.2.3 Desk-Based Screening Review



Figure 15 *View towards reflecting panel area from road receptor 7 (level of screening is representative of receptors 6-9) – streetview image*



Figure 16 *View towards reflecting panel area from road receptor 10 (level of screening is representative of receptors 10-14) – streetview image*



Figure 17 *Roadside screening for road receptor 17 (level of screening is representative of receptors 14-17) – streetview image*



Figure 18 *View towards reflecting panel area from road receptor 20 (level of screening is representative of receptors 18-21) – streetview image*



Figure 19 *View towards reflecting panel area from road receptor 41 (level of screening is representative of receptors 34-41) – streetview image*



Figure 20 *Roadside screening (outlined in green) for road receptor 42 (level of screening is representative of receptors 42-43) – streetview image*

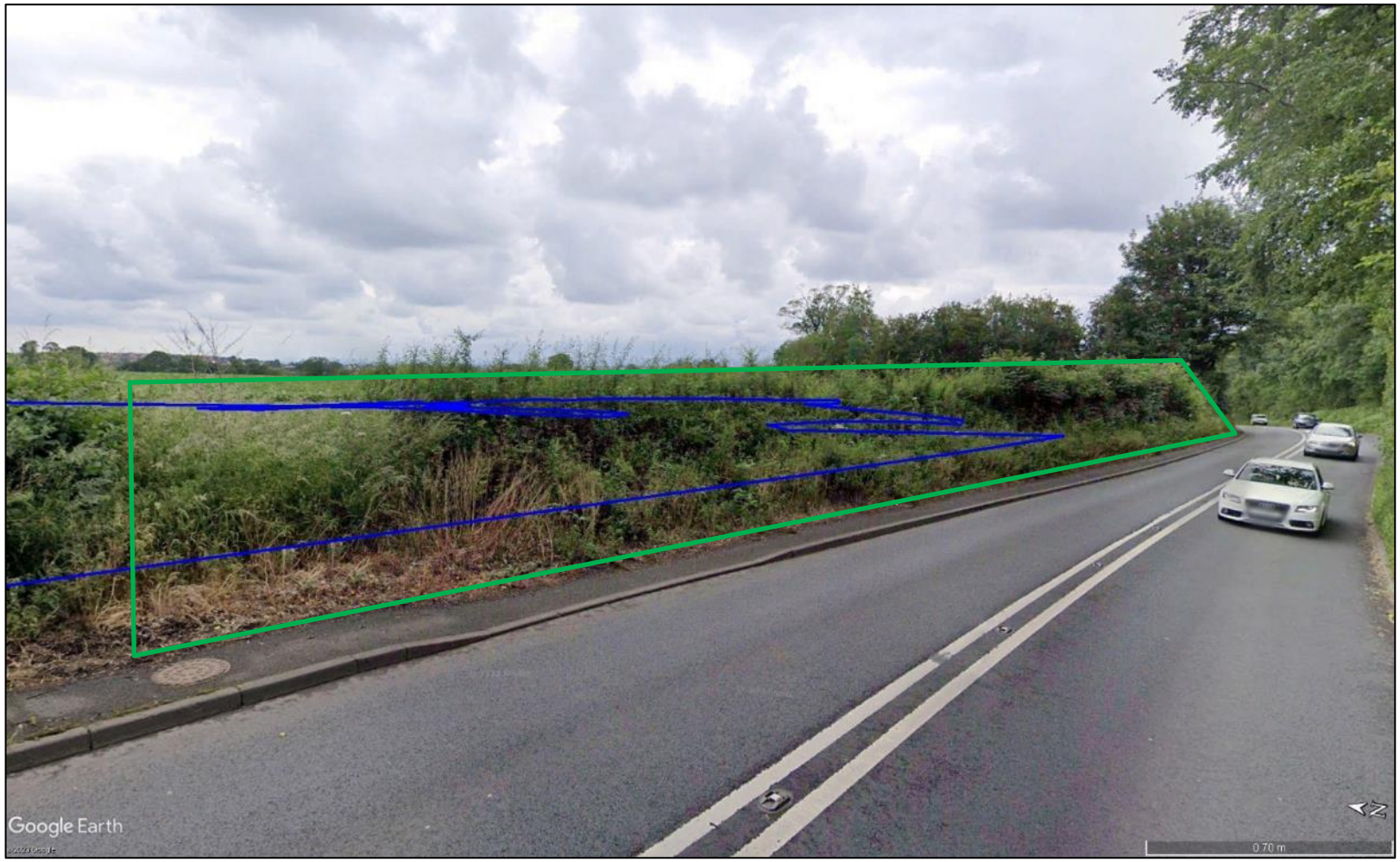


Figure 21 *Roadside screening (outlined in green) for road receptor 44 (level of screening is representative of receptors 44-45) – streetview image*

5.2.4 Conclusions

No significant impacts are predicted on any of the modelled road sections due to the following:

- Solar reflections are possible from panels **outside** of a road user's primary horizontal field of view (50 degrees either side of the direction of travel);
- There is significant screening such that views of reflecting panels are not expected to be possible in practice; and/or
- There is screening such that reflections will be filtered and only marginal/fleeting views of reflecting panels are expected to be possible.

5.3 Dwellings

5.3.1 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 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.

5.3.2 Geometric Modelling Results

The modelling has shown that solar reflections are geometrically possible[10] towards 145 of the 251 assessed dwelling receptors, as shown in Figure 22 on the following page. The modelling results for dwelling receptors are analysed in Table 2 on page 37.

[10] Only considering reflections from solar panels within 1km of the receptor. Reflections outside of 1km are not considered to be significant.

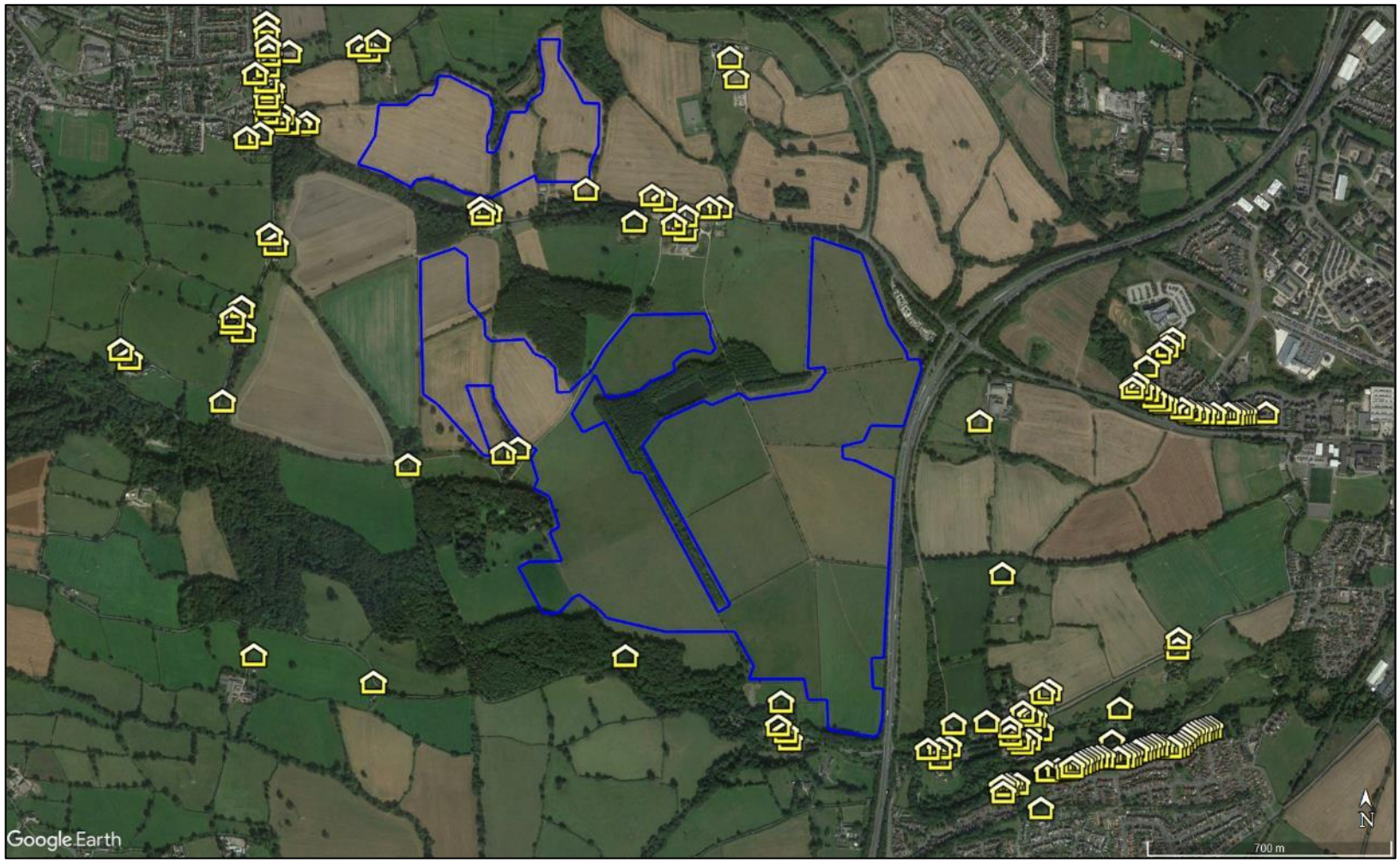


Figure 22 *Dwellings towards which solar reflections are geometrically possible – aerial image*

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
1-10	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation and/or terrain	N/A	None	No
11-23	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
24-26	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
27 - 31	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
32-33	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	Majority of reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain Views of reflecting panels to the east may be possible	Reflecting panels are at least 300m away	Low	No
34-35	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
36-37	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation and/or terrain	N/A	None	No
38-96	Solar reflections are not geometrically possible	N/A	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
97-102	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
103-104	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	Majority of reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain Views of reflecting panels to the east may be possible	Reflecting panels are at least 400m away	Low	No
105-106	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
107-108	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by proposed hedgerow planting maintained at 3m agl	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
109-111	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
112	Solar reflections are not geometrically possible	N/A	N/A	None	No
113-116	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
117-158	Solar reflections are not geometrically possible	N/A	N/A	None	No
159-164	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
165-166	Solar reflections are not geometrically possible	N/A	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
167	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
168	Solar reflections are not geometrically possible	N/A	N/A	None	No
169-203	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
204	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
205-224	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
225-226	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
227	Solar reflections are not geometrically possible	N/A	N/A	None	No
228-229	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
230-231	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No
232-244	Solar reflections predicted for **less** than 60 minutes on any given day and for **more** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No

Receptor	Geometric modelling results (without consideration of screening)	Identified screening and predicted visibility (desk-based review)	Relevant Factors	Predicted Impact Classification	Further Mitigation Recommended/Required?
245-251	Solar reflections predicted for **less** than 60 minutes on any given day and for **less** than 3 months of the year	All reflecting panels are expected to be significantly screened by intervening vegetation, buildings, and/or terrain	N/A	None	No

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

5.3.3 Desk-Based Screening Review

Figure 23 below depicts the cumulative reflector area (yellow area) relative to locations 107 and 108 and the proposed hedgerow planting at 3m above ground level (green lines). Figure 24 shows the relevant extract from the landscape mitigation plan.

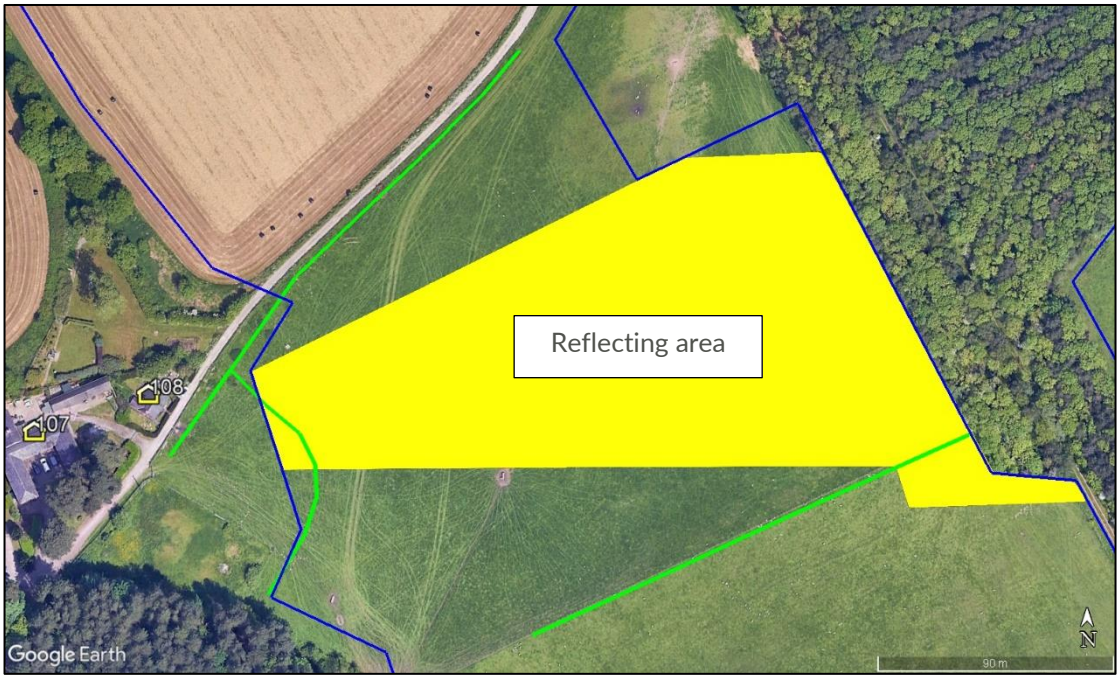


Figure 23 *Proposed hedgerow planting relative to the cumulative reflector area for dwellings 107 and 108*

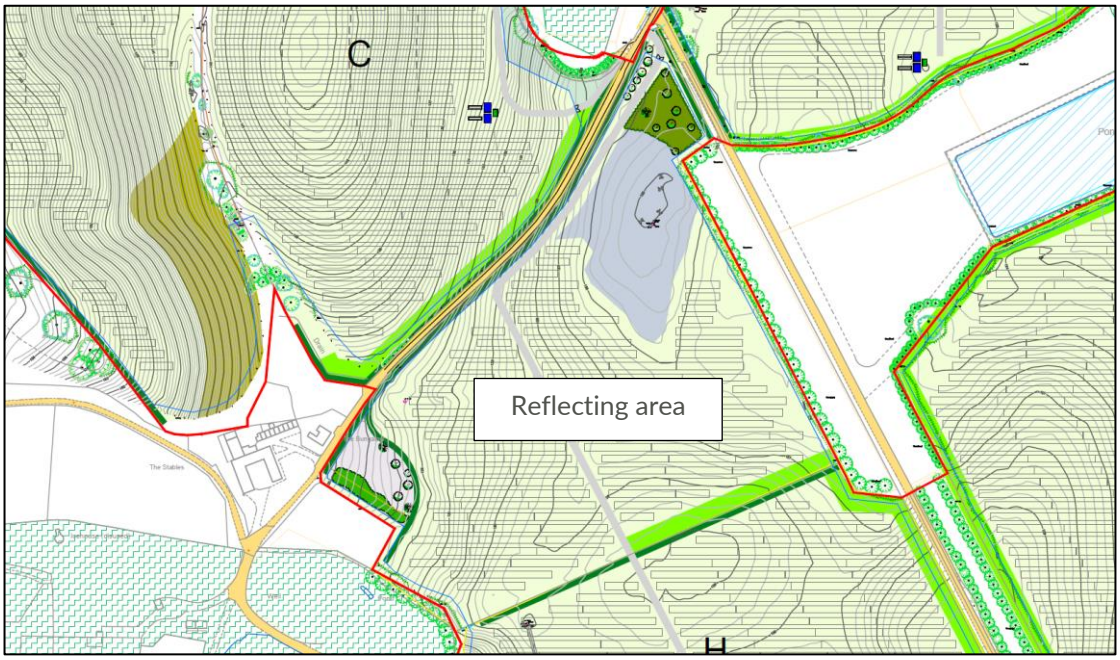


Figure 24 *Relevant extract from landscape mitigation plan for dwellings 107 and 108*

Figure 25 below depicts the cumulative reflector area (yellow area) relative to locations 123-206.



Figure 25 *Aerial image depicting locations 57-160, relative to the reflector area*

Figure 26 below depicts the cumulative reflector area (yellow area) relative to locations 228-251. This is the total area accounting for potential reflections throughout March-September.



Figure 26 *Vegetation screening on the eastern boundary of the site for dwellings 228-251, relative to the cumulative reflector area*

5.3.4 Conclusions

No significant impacts are predicted on the assessed dwellings due to the following:

- Solar reflections are possible for **less** than 60 minutes on any given day and for **less** than 3 months of the year;
- There is significant screening such that views of reflecting panels are not expected to be possible in practice;
- There is screening such that reflections will be filtered and only marginal views of reflecting panels are expected to be possible; and/or
- There is a significant clearance distance between dwelling observer and closest reflecting panel.

5.4 ZTV Viewpoints

5.4.1 Impact Significance Methodology

There is no formal methodology for the assessment of the identified viewpoints.

In Pager Power's experience, significant impacts to pedestrians/observers at ZTV viewpoints are not possible due to glint and glare effects from PV developments. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance. This is because:

- The typical density of pedestrians located at these points is low in a rural environment;
- Any resultant effect is much less serious and has far lesser consequences than, for example, solar reflections experienced towards a road network whereby the resultant impacts of a solar reflection can be much more serious;
- Glint and glare effects towards an observer are transient, and time and location sensitive whereby a pedestrian could move beyond the solar reflection zone with ease with little impact upon safety or amenity;
- Any observable solar reflection towards an observer would be of similar intensity to those experienced whilst navigating the natural and built environment on a regular basis.

5.4.2 Geometric Modelling Results

The modelling has shown that solar reflections are geometrically possible towards 10 of the 13 assessed ZTV viewpoints (VP1-VP6, VP9-VP11, and VP13). These are shown in Figure 27 below. The modelling output showing the precise predicted times and the reflecting panel areas are presented in Appendix H.

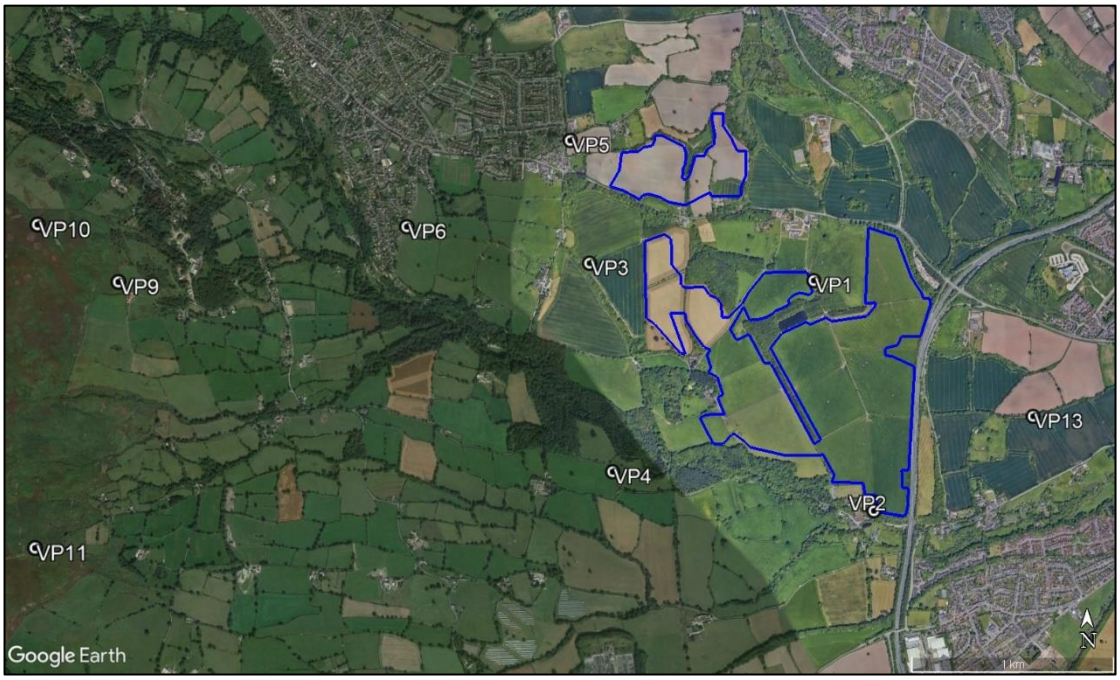


Figure 27 *ZTV viewpoints towards which solar reflections are geometrically possible – aerial image*

VP1 is predicted to have visibility of reflecting panels shown in Figure 28 below.



Figure 28 *Visible reflecting panel areas from VP1 – aerial image*

VP2 is predicted to be screened by proposed native hedgerow planting maintained at 3m above ground level.

VP3 is predicted to have visibility of reflecting panels in Figure 29 below with a minimum clearance distance of 250m.



Figure 29 *Visible reflecting panel area from VP3 – aerial image*

VP4, VP5, and VP13 are predicted to be screened by intervening vegetation.

VP6 is predicted to be screened by intervening buildings and vegetation.

VP9, VP10, and VP11 may have views of the Proposed Development.

For VP9, reflections are predicted for less than 60 minutes on any given day and for more than 3 months of the year, and the reflecting panels are at least 2.3km away (see Figure 30 below).



Figure 30 *Visible reflecting panel area from VP9 – aerial image*

For VP10, reflections are predicted for less than 60 minutes on any given day and for less than 3 months of the year, and the reflecting panels are at least 2.5km away (see Figure 31 below).



Figure 31 *Visible reflecting panel area from VP10 – aerial image*

For VP11, reflections are predicted for less than 60 minutes on any given day and for more than 3 months of the year, and the reflecting panels are at least 3km away (see Figure 32 below).

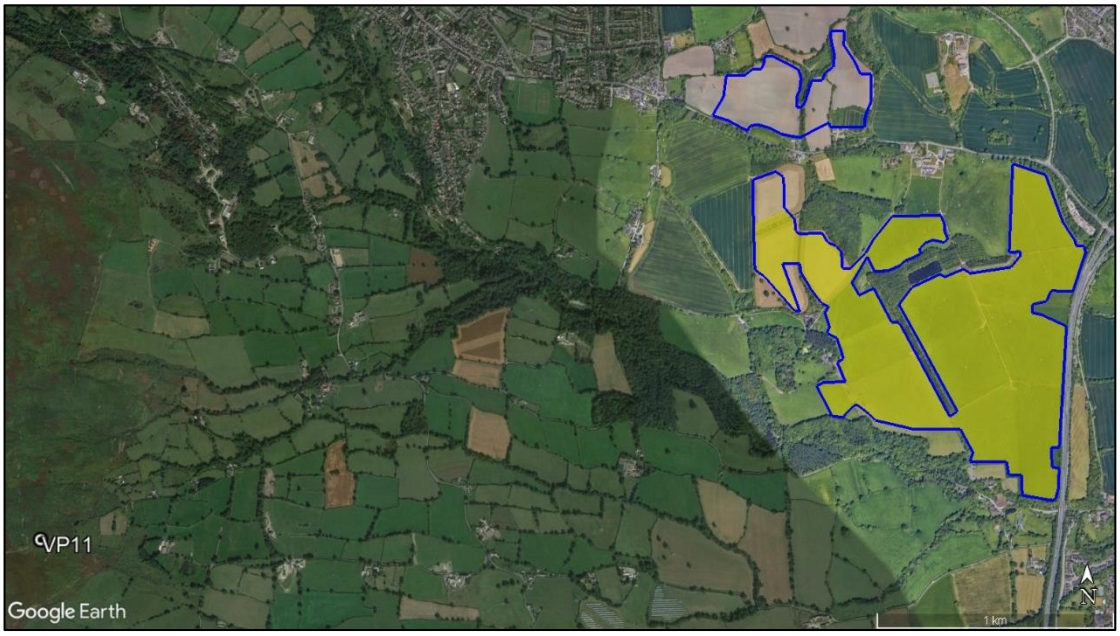


Figure 32 *Visible reflecting panel area from VP11 – aerial image*

Based on the impact significance methodology for a dwelling, which is a more significant receptor with respect to amenity, a low impact would be predicted on these three receptors, and mitigation would not be recommended.

5.4.3 Conclusions

No significant impacts are predicted on the assessed ZTV viewpoints.

6 CONCLUSIONS

6.1 Roads

The modelling has shown that solar reflections are geometrically possible towards a 1.5km section of the A483, a 3.6km section of the A525, and a 0.4km section of Heritage Way.

No significant impacts are predicted on any of the modelled road sections due to the following:

- Solar reflections are possible from panels **outside** of a road user's primary horizontal field of view (50 degrees either side of the direction of travel);
- There is significant screening such that views of reflecting panels are not expected to be possible in practice; and/or
- There is screening such that reflections will be filtered and only marginal/fleeting views of reflecting panels are expected to be possible.

6.2 Dwellings

The modelling has shown that solar reflections are geometrically possible towards 145 of the 251 assessed dwelling locations.

No significant impacts are predicted on the assessed dwellings due to the following:

- Solar reflections are possible for **less** than 60 minutes on any given day and for **less** than 3 months of the year;
- There is significant screening such that views of reflecting panels are not expected to be possible in practice;
- There is screening such that reflections will be filtered and only marginal views of reflecting panels are expected to be possible; and/or
- There is a significant clearance distance between dwelling observer and closest reflecting panel.

6.3 ZTV Viewpoints

The modelling has shown that solar reflections are geometrically possible towards 10 of the 13 assessed ZTV viewpoints.

In Pager Power's experience, significant impacts to pedestrians/observers at ZTV viewpoints are not possible due to glint and glare effects from PV developments. The reasoning is due to the sensitivity of the receptors (in terms of amenity and safety) being concluded to be of low significance. This is because:

- The typical density of pedestrians located at these points is low in a rural environment;
- Any resultant effect is much less serious and has far lesser consequences than, for example, solar reflections experienced towards a road network whereby the resultant impacts of a solar reflection can be much more serious;

- Glint and glare effects towards an observer are transient, and time and location sensitive whereby a pedestrian could move beyond the solar reflection zone with ease with little impact upon safety or amenity;
- Any observable solar reflection towards an observer would be of similar intensity to those experienced whilst navigating the natural and built environment on a regular basis.

No significant impacts are predicted on the assessed ZTV viewpoints.

6.4 Overall

No significant impacts are predicted on surrounding road safety, residential amenity, and observers located at the identified viewpoints in the surrounding area. Mitigation is not recommended.

APPENDIX A – OVERVIEW OF GLINT AND GLARE GUIDANCE

Overview

This section presents details regarding the relevant guidance and studies with respect to the considerations and effects of solar reflections from solar panels, known as 'Glint and Glare'.

This is not a comprehensive review of the data sources, rather it is intended to give an overview of the important parameters and considerations that have informed this assessment.

UK Planning Policy

Renewable and Low Carbon Energy

The National Planning Policy Framework under the planning practice guidance for Renewable and Low Carbon Energy[11] (specifically regarding the consideration of solar farms, paragraph 013) states:

'What are the particular planning considerations that relate to large scale ground-mounted solar photovoltaic Farms?

The deployment of large-scale solar farms can have a negative impact on the rural environment, particularly in undulating landscapes. However, the visual impact of a well-planned and well-screened solar farm can be properly addressed within the landscape if planned sensitively.

Particular factors a local planning authority will need to consider include:

…

- *the proposal's visual impact, the effect on landscape of glint and glare (see guidance on landscape assessment) and on **neighbouring uses and aircraft safety**;*
- *the extent to which there may be additional impacts if solar arrays follow the daily movement of the sun;*

…

The approach to assessing cumulative landscape and visual impact of large scale solar farms is likely to be the same as assessing the impact of wind turbines. However, in the case of ground-mounted solar panels it should be noted that with effective screening and appropriate land topography the area of a zone of visual influence could be zero.'

[11] Renewable and low carbon energy, UK Ministry of Housing, Communities & Local Government, date: 18 June 2015, last updated 14 August 2023, accessed on: 29/08/2023

Draft National Policy Statement for Renewable Energy Infrastructure

The Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)[12] sets out the primary policy for decisions by the Secretary of State for nationally significant renewable energy infrastructure. Sections 3.10.93-97 state:

'3.10.93 Solar panels are specifically designed to absorb, not reflect, irradiation.[13] However, solar panels may reflect the sun's rays at certain angles, causing glint and glare. Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor.

3.10.94 Applicants should map receptors to qualitatively identify potential glint and glare issues and determine if a glint and glare assessment is necessary as part of the application.

3.10.95 When a quantitative glint and glare assessment is necessary, applicants are expected to consider the geometric possibility of glint and glare affecting nearby receptors and provide an assessment of potential impact and impairment based on the angle and duration of incidence and the intensity of the reflection.

3.10.96 The extent of reflectivity analysis required to assess potential impacts will depend on the specific project site and design. This may need to account for 'tracking' panels if they are proposed as these may cause differential diurnal and/or seasonal impacts.

3.10.97 When a glint and glare assessment is undertaken, the potential for solar PV panels, frames and supports to have a combined reflective quality may need to be assessed, although the glint and glare of the frames and supports is likely to be significantly less than the panels.'

The EN-3 does not state which receptors should be considered as part of a quantitative glint and glare assessment. Based on Pager Power's extensive project experience, typical receptors include residential dwellings, road users, aviation infrastructure, and railway infrastructure.

Sections 3.10.125-127 state:

3.10.125 Applicants should consider using, and in some cases the Secretary of State may require, solar panels to comprise of (or be covered with) anti-glare/anti-reflective coating with a specified angle of maximum reflection attenuation for the lifetime of the permission.

3.10.126 Applicants may consider using screening between potentially affected receptors and the reflecting panels to mitigate the effects.

3.10.127 Applicants may consider adjusting the azimuth alignment of or changing the elevation tilt angle of a solar panel, within the economically viable range, to alter the angle of incidence.

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[12] Draft National Policy Statement for Renewable Energy Infrastructure (EN-3), Department for Energy Security & Net Zero, date: March 2023, accessed on: 05/04/2023.

[13] Most commercially available solar panels are designed with anti-reflective glass or are produced with anti-reflective coating and have a reflective capacity that is generally equal to or less hazardous than other objects typically found in the outdoor environment, such as bodies of water or glass buildings.

In practice this is unlikely to remove the potential impact altogether but in marginal cases may contribute to a mitigation strategy.

The mitigation strategies listed within the EN-3 are relevant strategies that are frequently utilised to eliminate or reduce glint and glare effects towards surrounding observers. The most common form of mitigation is the implementation of screening along the site boundary.

Sections 3.10.149-150 state:

3.10.149 Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes, motorists, public rights of way, and aviation infrastructure (including aircraft departure and arrival flight paths).

3.10.150 Whilst there is some evidence that glint and glare from solar farms can be experienced by pilots and air traffic controllers in certain conditions, there is no evidence that glint and glare from solar farms results in significant impairment on aircraft safety. Therefore, unless a significant impairment can be demonstrated, the Secretary of State is unlikely to give any more than limited weight to claims of aviation interference because of glint and glare from solar farms.

The latest version of the draft EN-3 goes some way in referencing that the issue is more complex than presented in the previous issue; though, this is still unlikely to be welcomed by aviation stakeholders, who will still request a glint and glare assessment on the basis that glare may lead to impact upon aviation safety. It is possible that the final issue of the policy will change in light of further consultation responses from aviation stakeholders.

Finally, the EN-3 relates solely to nationally significant renewable energy infrastructure and therefore does not apply to all planning applications for solar farms.

Assessment Process – Ground-Based Receptors

No process for determining and contextualising the effects of glint and glare has been determined when assessing the impact of solar reflections upon surrounding roads and dwellings. Therefore, the Pager Power approach is to determine whether a reflection from the proposed solar development is geometrically possible and then to compare the results against the relevant guidance/studies to determine whether the reflection is significant.

The Pager Power approach has been informed by the policy presented above, current studies (presented in Appendix B) and stakeholder consultation. Further information can be found in Pager Power's Glint and Glare Guidance document[14] which was produced due to the absence of existing guidance and a specific standardised assessment methodology.

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

APPENDIX B – OVERVIEW OF GLINT AND GLARE STUDIES

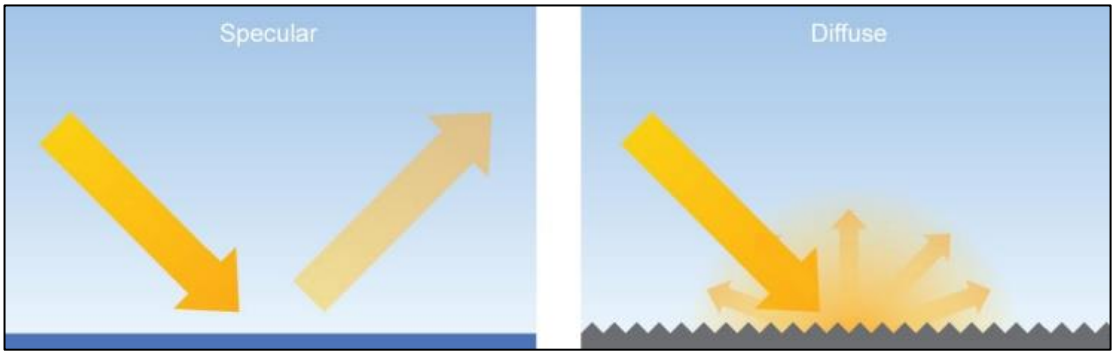
Overview

Studies have been undertaken assessing the type and intensity of solar reflections from various surfaces including solar panels and glass. An overview of these studies is presented below.

The guidelines presented are related to aviation safety. The results are applicable for the purpose of this analysis.

Reflection Type from Solar Panels

Based on the surface conditions reflections from light can be specular and diffuse. A specular reflection has a reflection characteristic similar to that of a mirror; a diffuse will reflect the incoming light and scatter it in many directions. The figure below, taken from the FAA guidance[15], illustrates the difference between the two types of reflections. Because solar panels are flat and have a smooth surface most of the light reflected is specular, which means that incident light from a specific direction is reradiated in a specific direction.



Specular and diffuse reflections

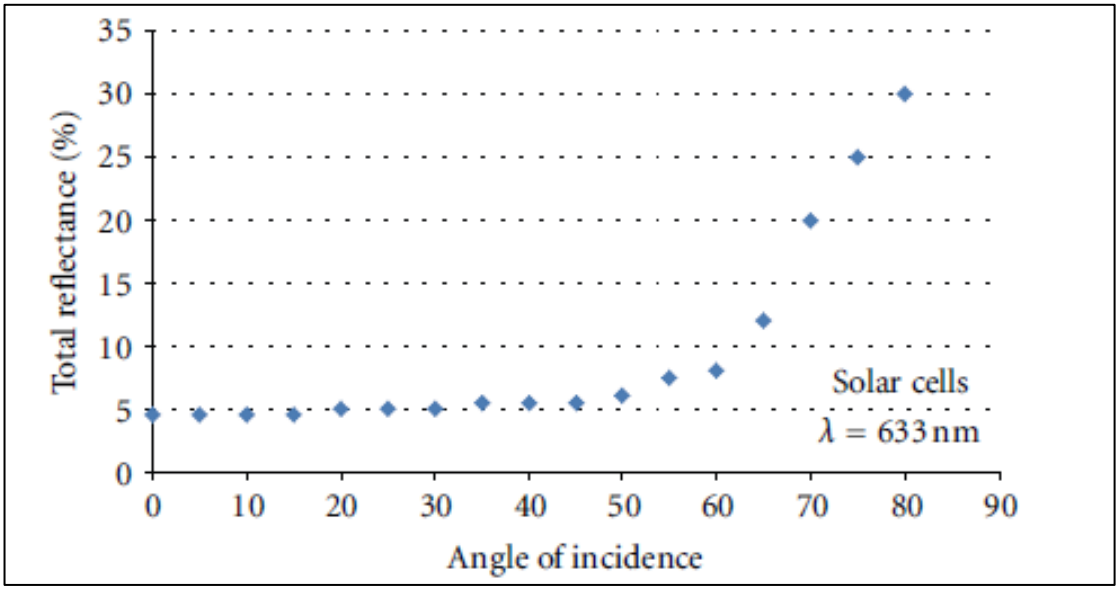
[15] Technical Guidance for Evaluating Selected Solar Technologies on Airports, Federal Aviation Administration (FAA), date: 04/2018, accessed on: 08/12/2021.

Solar Reflection Studies

An overview of content from identified solar panel reflectivity studies is presented in the subsections below.

Evan Riley and Scott Olson, "A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems"

Evan Riley and Scott Olson published in 2011 their study titled: *A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems*[16]". They researched the potential glare that a pilot could experience from a 25-degree fixed tilt PV system located outside of Las Vegas, Nevada. The theoretical glare was estimated using published ocular safety metrics which quantify the potential for a postflash glare after-image. This was then compared to the postflash glare after-image caused by smooth water. The study demonstrated that the reflectance of the solar cell varied with angle of incidence, with maximum values occurring at angles close to 90 degrees. The reflectance values varied from approximately 5% to 30%. This is shown on the figure below.



Total reflectance % when compared to angle of incidence

The conclusions of the research study were:

- The potential for hazardous glare from flat-plate PV systems is similar to that of smooth water;
- Portland white cement concrete (which is a common concrete for runways), snow, and structural glass all have a reflectivity greater than water and flat plate PV modules.

[16] Evan Riley and Scott Olson, "A Study of the Hazardous Glare Potential to Aviators from Utility-Scale Flat-Plate Photovoltaic Systems," ISRN Renewable Energy, vol. 2011, Article ID 651857, 6 pages, 2011. doi:10.5402/2011/651857

FAA Guidance – "Technical Guidance for Evaluating Selected Solar Technologies on Airports"[17]

The 2018 FAA Guidance included a diagram which illustrates the relative reflectance of solar panels compared to other surfaces. The figure shows the relative reflectance of solar panels compared to other surfaces. Surfaces in this figure produce reflections which are specular and diffuse. A specular reflection (those made by most solar panels) has a reflection characteristic similar to that of a mirror. A diffuse reflection will reflect the incoming light and scatter it in many directions. A table of reflectivity values, sourced from the figure within the FAA guidance, is presented below.

Surface	Approximate Percentage of Light Reflected[18]
Snow	80
White Concrete	77
Bare Aluminium	74
Vegetation	50
Bare Soil	30
Wood Shingle	17
Water	5
Solar Panels	5
Black Asphalt	2

Relative reflectivity of various surfaces

Note that the data above does not appear to consider the reflection type (specular or diffuse).

An important comparison in this table is the reflectivity compared to water which will produce a reflection of very similar intensity when compared to that from a solar panel. The study by Riley and Olsen study (2011) also concludes that still water has a very similar reflectivity to solar panels.

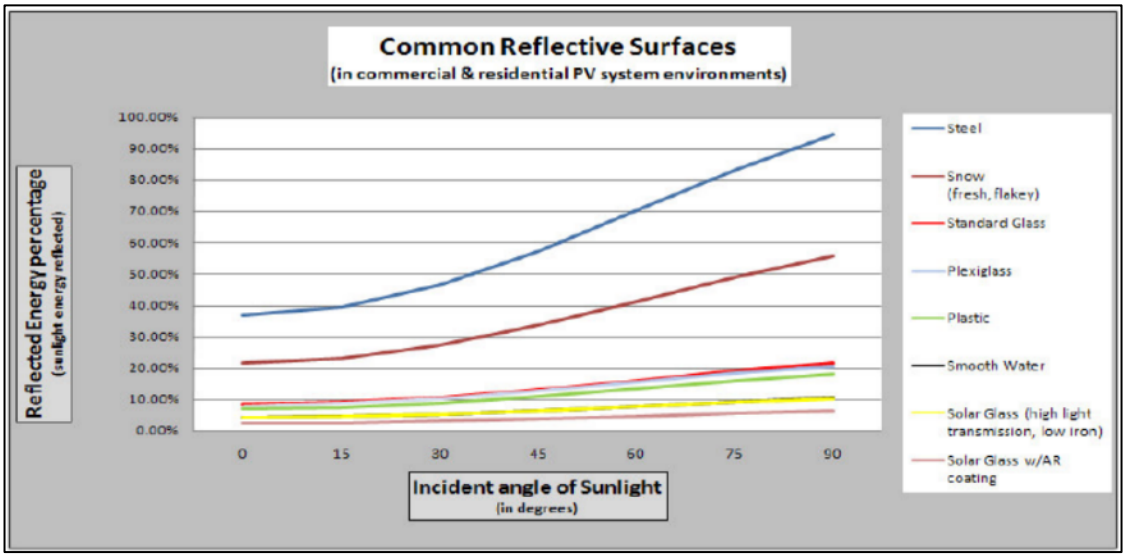
[17] Technical Guidance for Evaluating Selected Solar Technologies on Airports, Federal Aviation Administration (FAA), date: 04/2018, accessed on: 08/12/2021.

[18] Extrapolated data, baseline of 1,000 W/m^2 for incoming sunlight.

SunPower Technical Notification (2009)

SunPower published a technical notification[19] to '*increase awareness concerning the possible glare and reflectance impact of PV Systems on their surrounding environment*'.

The figure presented below shows the relative reflectivity of solar panels compared to other natural and manmade materials including smooth water, standard glass and steel.



Common reflective surfaces

The results, similarly to those from Riley and Olsen study (2011) and the FAA (2010), show that solar panels produce a reflection that is less intense than those of '*standard glass and other common reflective surfaces*'.

With respect to aviation and solar reflections observed from the air, SunPower has developed several large installations near airports or on Air Force bases. It is stated that these developments have all passed FAA or Air Force standards with all developments considered "No Hazard to Air Navigation". The note suggests that developers discuss any possible concerns with stakeholders near proposed solar farms.

[19] Source: Technical Support, 2009. SunPower Technical Notification – Solar Module Glare and Reflectance.

APPENDIX C – OVERVIEW OF SUN MOVEMENTS AND RELATIVE REFLECTIONS

The Sun's position in the sky can be accurately described by its azimuth and elevation. Azimuth is a direction relative to true north (horizontal angle i.e. from left to right) and elevation describes the Sun's angle relative to the horizon (vertical angle i.e. up and down).

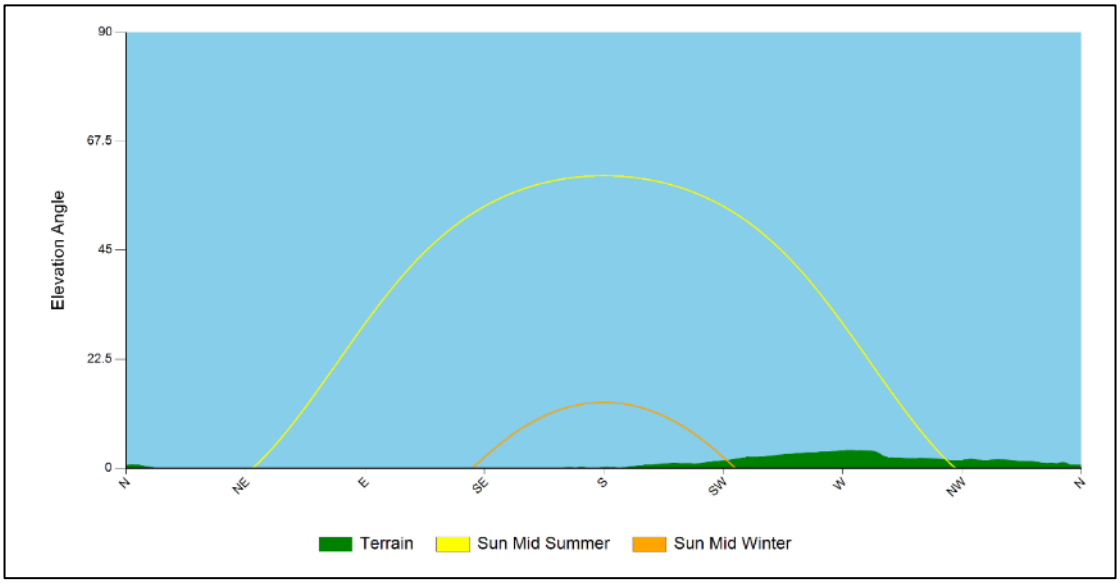
The Sun's position can be accurately calculated for a specific location. The following data being used for the calculation:

- Time.
- Date.
- Latitude.
- Longitude.

The following is true at the location of the solar development:

- The Sun is at its highest around midday and is to the south at this time.
- The Sun rises highest on 21 June (longest day).
- On 21 December, the maximum elevation reached by the Sun is at its lowest (shortest day).

The combination of the Sun's azimuth angle and vertical elevation will affect the direction and angle of the reflection from a reflector. The figure below shows terrain at the horizon as well as the sunrise and sunset curves throughout the year from lon:-3.042463 lat:53.045415.



Terrain elevation at the horizon

APPENDIX D – GLINT AND GLARE IMPACT SIGNIFICANCE

Overview

The significance of glint and glare will vary for different receptors. The following section presents a general overview of the significance criteria with respect to experiencing a solar reflection.

Impact Significance Definition

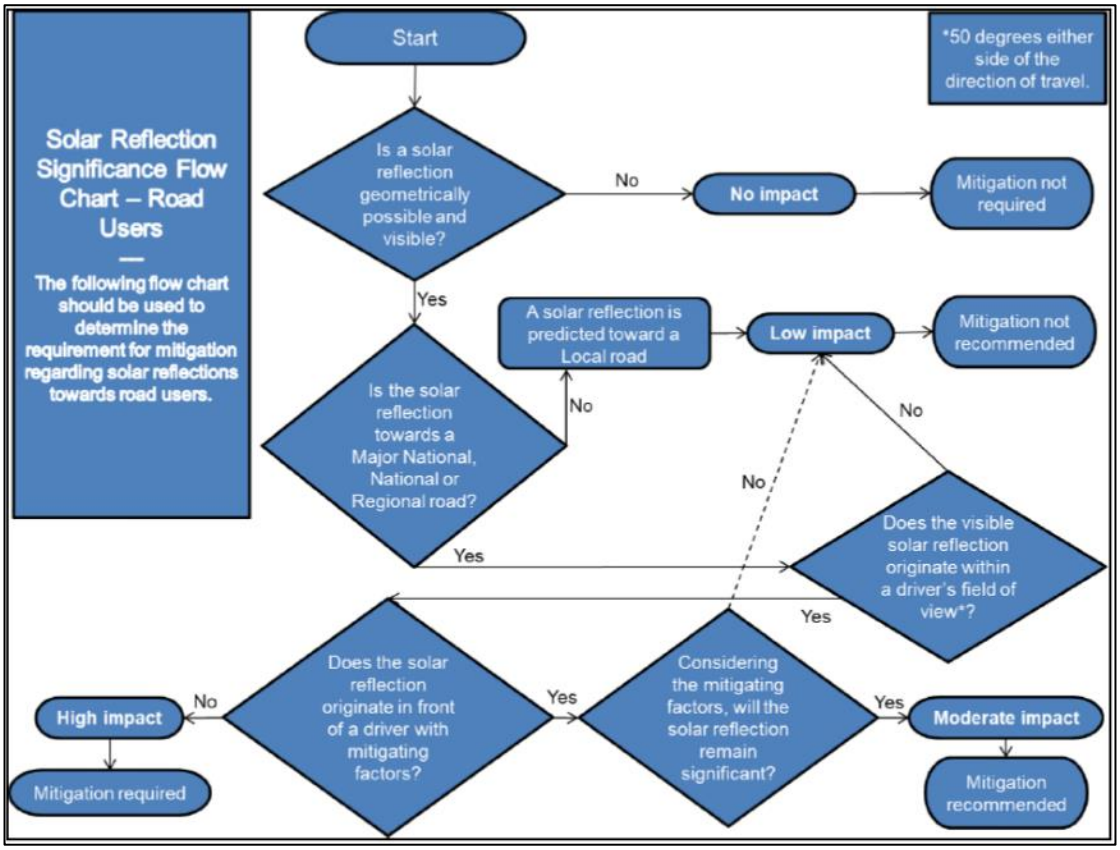
The table below presents the recommended definition of 'impact significance' in glint and glare terms and the requirement for mitigation under each.

Impact Significance	Definition	Mitigation Requirement
No Impact	A solar reflection is not geometrically possible or will not be visible from the assessed receptor.	No mitigation required.
Low	A solar reflection is geometrically possible however any impact is considered to be small such that mitigation is not required e.g. intervening screening will limit the view of the reflecting solar panels.	No mitigation required.
Moderate	A solar reflection is geometrically possible and visible however it occurs under conditions that do not represent a worst-case.	Whilst the impact may be acceptable, consultation and/or further analysis should be undertaken to determine the requirement for mitigation.
Major	A solar reflection is geometrically possible and visible under conditions that will produce a significant impact. Mitigation and consultation is recommended.	Mitigation will be required if the proposed solar development is to proceed.

Impact significance definition

Assessment Process for Road Receptors

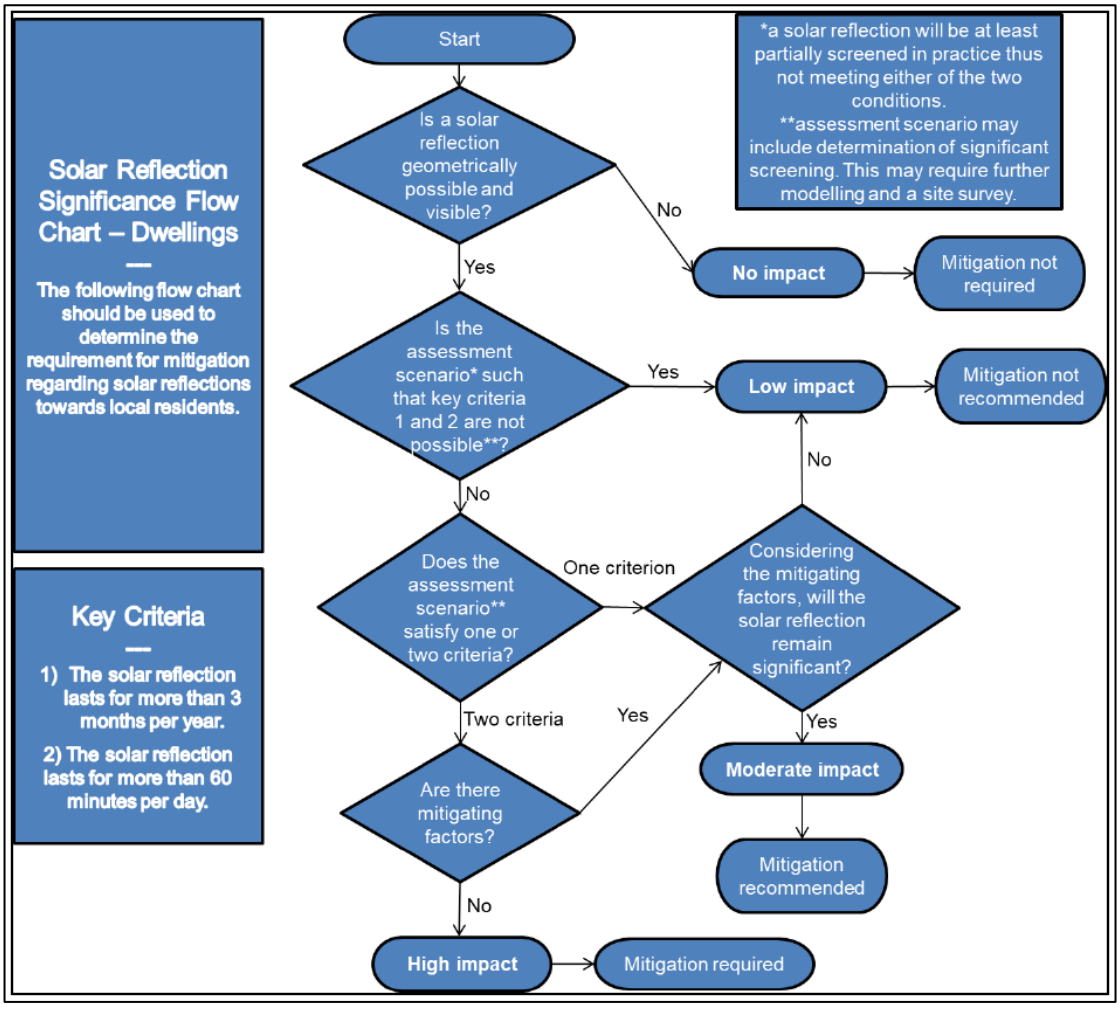
The flow chart presented below has been followed when determining the mitigation requirement for road receptors.



Road receptor mitigation requirement flow chart

Assessment Process for Dwelling Receptors

The flow chart presented below has been followed when determining the mitigation requirement for dwelling receptors.



Dwelling receptor mitigation requirement flow chart

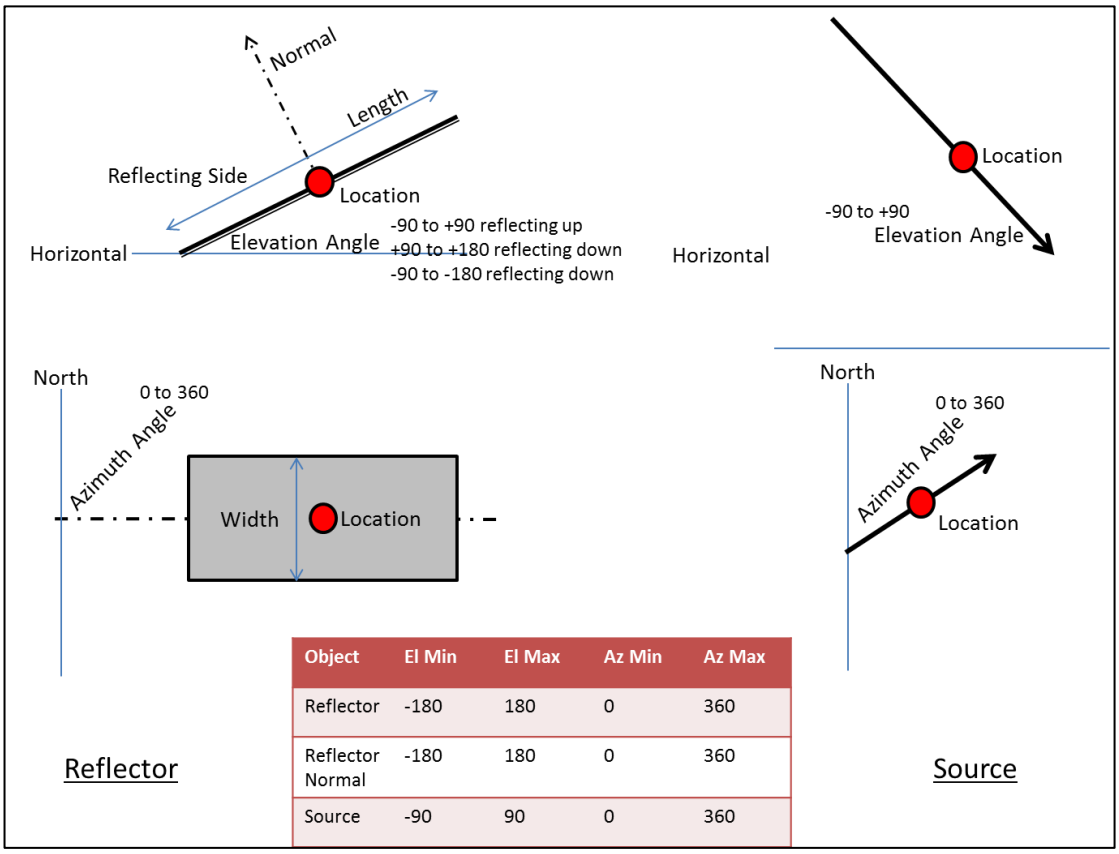
APPENDIX E – REFLECTION CALCULATIONS METHODOLOGY

Pager Power's Reflection Calculations Methodology

The calculations are three dimensional and complex, accounting for:

- The Earth's orbit around the Sun;
- The Earth's rotation;
- The Earth's orientation;
- The reflector's location;
- The reflector's 3D Orientation.

Reflections from a flat reflector are calculated by considering the normal which is an imaginary line that is perpendicular to the reflective surface and originates from it. The diagram below may be used to aid understanding of the reflection calculation process.



Object	El Min	El Max	Az Min	Az Max
Reflector	-180	180	0	360
Reflector Normal	-180	180	0	360
Source	-90	90	0	360

The following process is used to determine the 3D Azimuth and Elevation of a reflection:

- Use the Latitude and Longitude of reflector as the reference for calculation purposes;
- Calculate the Azimuth and Elevation of the normal to the reflector;
- Calculate the 3D angle between the source and the normal;

- If this angle is less than 90 degrees a reflection will occur. If it is greater than 90 degrees no reflection will occur because the source is behind the reflector;
- Calculate the Azimuth and Elevation of the reflection in accordance with the following:
    - The angle between source and normal is equal to angle between normal and reflection;
    - Source, Normal and Reflection are in the same plane.

APPENDIX F – ASSESSMENT LIMITATIONS AND ASSUMPTIONS

Pager Power's Model

The model considers 100% sunlight during daylight hours which is highly conservative.

The model does not account for terrain between the reflecting solar panels and the assessed receptor where a solar reflection is geometrically possible.

The model considers terrain between the reflecting solar panels and the visible horizon (where the sun may be obstructed from view of the panels)[20].

It is assumed that the panel elevation angle assessed represents the elevation angle for all of the panels within each solar panel area defined.

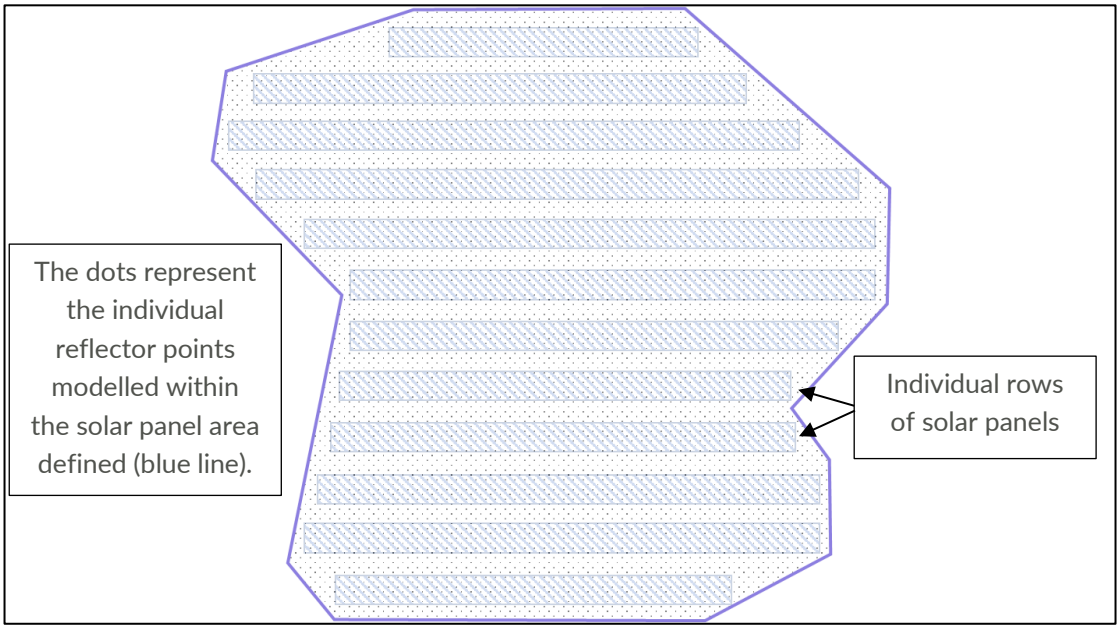
It is assumed that the panel azimuth angle assessed represents the azimuth angle for all of the panels within each solar panel area defined.

Only a reflection from the face of the panel has been considered. The frame or the reverse of the frame of the solar panel has not been considered.

The model assumes that a receptor can view the face of every panel (point, defined in the following paragraph) within the development area whilst in reality this, in the majority of cases, will not occur. Therefore any predicted solar reflection from the face of a solar panel that is not visible to a receptor will not occur in practice.

A finite number of points within each solar panel area defined is chosen based on an assessment resolution so that a comprehensive understanding of the entire development can be formed. This determines whether a solar reflection could ever occur at a chosen receptor. The model does not consider the specific panel rows or the entire face of the solar panel within the development outline, rather a single point is defined every 'x' metres (based on the assessment resolution) with the geometric characteristics of the panel. A panel area is however defined to encapsulate all possible panel locations. See the figure on the following page which illustrates this process.

[20] UK only.



Solar panel area modelling overview

A single reflection point is chosen for the geometric calculations. This suitably determines whether a solar reflection can be experienced at a receptor location and the time of year and duration of the solar reflection. Increased accuracy could be achieved by increasing the number of heights assessed however this would only marginally change the results and is not considered significant.

The available street view imagery, satellite mapping, terrain and any site imagery provided by the developer has been used to assess line of sight from the assessed receptors to the modelled solar panel area, unless stated otherwise. In some cases, this imagery may not be up to date and may not give the full perspective of the installation from the location of the assessed receptor.

Any screening in the form of trees, buildings etc. that may obstruct the Sun from view of the solar panels is not within the modelling unless stated otherwise. The terrain profile at the horizon is considered if stated.

APPENDIX G – RECEPTOR AND REFLECTOR AREA DETAILS

Terrain Height

Terrain Height was calculated from Pager Power's database (established on OS Panorama 50m DTM) based on the coordinates of the point of interest.

Road Receptor Data

The table below presents the coordinates and altitudes for the assessed road receptors.

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
1	53.049736	-3.016813	98.74
2	53.049248	-3.018069	101.50
3	53.04884	-3.019403	100.75
4	53.048513	-3.020797	100.10
5	53.048245	-3.022226	101.95
6	53.04796	-3.023645	104.19
7	53.047579	-3.024999	106.07
8	53.0471	-3.026263	108.50
9	53.046528	-3.027417	110.05
10	53.045871	-3.028436	111.46
11	53.045133	-3.02929	111.50
12	53.044327	-3.029948	110.36
13	53.04347	-3.030398	110.50
14	53.04259	-3.030691	110.50
15	53.041695	-3.030848	110.10
16	53.040795	-3.030893	109.27
17	53.039896	-3.030951	108.29
18	53.038997	-3.031015	108.22

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
19	53.038098	-3.031075	107.50
20	53.037198	-3.031136	107.87
21	53.0363	-3.031215	110.21
22	53.035402	-3.031316	101.08
23	53.034506	-3.031453	100.88
24	53.033619	-3.031707	103.84
25	53.032734	-3.031978	105.77
26	53.031845	-3.032197	107.95
27	53.030948	-3.032297	108.08
28	53.03005	-3.032226	108.03
29	53.029159	-3.032026	106.50
30	53.028287	-3.031656	105.33
31	53.027438	-3.03116	103.49
32	53.02697	-3.030879	102.40
33	53.052249	-3.067853	237.58
34	53.051869	-3.066498	230.38
35	53.051678	-3.065042	222.35
36	53.051589	-3.063552	217.86
37	53.05152	-3.062059	214.58
38	53.051454	-3.060566	211.39
39	53.051385	-3.059073	203.78
40	53.051136	-3.057643	193.59
41	53.050831	-3.056237	186.94
42	53.050569	-3.054808	180.10

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
43	53.050194	-3.053447	170.33
44	53.049902	-3.052034	166.58
45	53.049489	-3.050705	162.50
46	53.049195	-3.049291	152.35
47	53.048982	-3.047837	147.61
48	53.048982	-3.04636	145.91
49	53.049082	-3.044872	143.50
50	53.049273	-3.043422	139.74
51	53.049332	-3.041949	133.31
52	53.04932	-3.040455	129.38
53	53.049253	-3.038983	123.50
54	53.049113	-3.037507	122.64
55	53.048924	-3.03605	122.39
56	53.048821	-3.034563	121.08
57	53.048685	-3.033084	116.60
58	53.048296	-3.031763	113.50
59	53.047587	-3.030852	112.72
60	53.0469	-3.029892	113.50
61	53.046305	-3.02877	112.02
62	53.045762	-3.02758	110.03
63	53.045338	-3.02626	107.50
64	53.045008	-3.024872	104.50
65	53.044733	-3.023447	103.25
66	53.044418	-3.022045	101.95

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
67	53.044079	-3.020659	101.07
68	53.043798	-3.01924	100.33
69	53.043625	-3.017773	96.50
70	53.043578	-3.016278	94.50
71	53.043544	-3.015173	93.50
72	53.053562	-3.034395	121.36
73	53.052891	-3.03341	120.36
74	53.052106	-3.032687	117.34
75	53.051258	-3.032194	113.50
76	53.050378	-3.031891	113.47
77	53.049481	-3.031892	114.41
78	53.048564	-3.032214	114.50
79	53.030905	-3.03183	107.50
80	53.03069	-3.033276	109.50
81	53.030309	-3.03463	110.76
82	53.029921	-3.03598	112.10
83	53.029458	-3.037262	114.02
84	53.028883	-3.038398	115.50
85	53.028345	-3.039536	117.89
86	53.028156	-3.040787	119.50

Road Receptor Data

Dwelling Receptor Data

The table below presents the coordinates for the assessed dwelling receptors.

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
1	53.05299	-3.05248	175.70
2	53.05274	-3.05283	177.12
3	53.05285	-3.05323	179.74
4	53.05267	-3.05604	193.80
5	53.05338	-3.05696	195.72
6	53.05315	-3.05694	196.13
7	53.0528	-3.0569	196.67
8	53.05258	-3.05686	196.11
9	53.05231	-3.0569	195.48
10	53.05212	-3.05741	196.86
11	53.05193	-3.05698	193.78
12	53.05177	-3.05676	192.89
13	53.05168	-3.05673	192.49
14	53.05154	-3.05695	191.83
15	53.05137	-3.05687	191.53
16	53.05116	-3.05696	190.87
17	53.05115	-3.05636	188.09
18	53.05098	-3.05654	188.87
19	53.05091	-3.05613	187.47
20	53.05088	-3.05567	183.71
21	53.05094	-3.05534	184.06
22	53.05065	-3.05723	191.38
23	53.05054	-3.05777	193.70

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
24	53.04889	-3.0483	148.75
25	53.04873	-3.0482	147.37
26	53.04881	-3.04793	147.66
27	53.04936	-3.04392	141.50
28	53.04858	-3.04191	130.89
29	53.04923	-3.04117	131.40
30	53.04911	-3.04065	129.06
31	53.04872	-3.03975	125.80
32	53.04852	-3.04025	127.65
33	53.04837	-3.03979	125.54
34	53.04893	-3.03878	123.80
35	53.04895	-3.03831	123.66
36	53.05221	-3.03765	125.88
37	53.05271	-3.03791	129.10
38	53.05326	-3.03851	130.41
39	53.05336	-3.03786	127.16
40	53.05308	-3.03767	127.76
41	53.05321	-3.03703	125.06
42	53.05343	-3.03061	115.23
43	53.05342	-3.03018	114.50
44	53.05339	-3.02947	114.42
45	53.0533	-3.02931	114.16
46	53.05318	-3.02906	114.50
47	53.05304	-3.02858	114.71

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
48	53.05296	-3.02817	114.30
49	53.05283	-3.02796	114.06
50	53.05274	-3.02778	113.89
51	53.0527	-3.02773	113.90
52	53.05259	-3.02763	113.56
53	53.05256	-3.02725	113.80
54	53.05267	-3.02706	113.80
55	53.05267	-3.02686	114.17
56	53.05276	-3.02674	114.54
57	53.05286	-3.02664	115.11
58	53.05296	-3.0264	115.33
59	53.05279	-3.02614	114.83
60	53.05291	-3.02535	113.36
61	53.05269	-3.0251	112.80
62	53.0526	-3.02496	112.80
63	53.05251	-3.02484	112.80
64	53.05245	-3.02475	112.80
65	53.05237	-3.0246	112.41
66	53.05231	-3.02452	112.29
67	53.05223	-3.02439	111.80
68	53.05193	-3.02348	110.80
69	53.05191	-3.02319	110.80
70	53.0518	-3.02056	106.64
71	53.05158	-3.02039	106.10

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
72	53.05109	-3.01888	103.80
73	53.04902	-3.01707	98.99
74	53.04884	-3.01735	99.00
75	53.04879	-3.01764	99.81
76	53.04871	-3.01789	100.66
77	53.04858	-3.01827	100.52
78	53.04853	-3.01839	100.54
79	53.04839	-3.01856	100.57
80	53.04822	-3.01873	100.69
81	53.04806	-3.01834	99.80
82	53.048	-3.01803	99.80
83	53.04795	-3.0179	99.80
84	53.0479	-3.01777	99.10
85	53.04786	-3.01764	98.65
86	53.0478	-3.01749	97.80
87	53.04779	-3.01732	97.80
88	53.04782	-3.01717	97.80
89	53.04766	-3.01715	97.80
90	53.04754	-3.01719	97.80
91	53.04748	-3.01682	97.55
92	53.04742	-3.01667	97.74
93	53.0474	-3.01655	97.79
94	53.04733	-3.01641	97.58
95	53.04728	-3.01626	97.19

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
96	53.04727	-3.01615	97.07
97	53.04532	-3.063	189.74
98	53.0451	-3.06266	187.95
99	53.04598	-3.05844	184.80
100	53.04578	-3.05799	183.95
101	53.04612	-3.05839	184.80
102	53.04638	-3.05803	184.26
103	53.04818	-3.05689	183.39
104	53.04793	-3.05666	182.91
105	53.04405	-3.05883	182.16
106	53.04247	-3.05127	163.46
107	53.04276	-3.04736	142.12
108	53.04288	-3.04676	137.65
109	53.03774	-3.05764	165.59
110	53.03704	-3.05273	155.80
111	53.03765	-3.04229	121.08
112	53.03111	-3.04693	133.28
113	53.03647	-3.03575	114.96
114	53.03587	-3.03587	110.14
115	53.0357	-3.03556	108.89
116	53.03551	-3.03539	107.70
117	53.03478	-3.03492	110.34
118	53.03469	-3.03461	108.24
119	53.0353	-3.03362	101.18

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
120	53.03362	-3.03289	105.14
121	53.0333	-3.03252	105.88
122	53.02694	-3.03165	103.68
123	53.03239	-3.03093	106.80
124	53.03251	-3.03097	106.61
125	53.0326	-3.03095	106.42
126	53.03272	-3.03099	106.13
127	53.03296	-3.03093	105.60
128	53.03319	-3.03084	104.73
129	53.03328	-3.03086	104.67
130	53.0334	-3.03087	103.99
131	53.0335	-3.03086	103.72
132	53.0336	-3.03089	103.37
133	53.03395	-3.03098	102.44
134	53.03394	-3.03052	102.50
135	53.03373	-3.03068	102.81
136	53.03371	-3.03014	102.68
137	53.03367	-3.02998	102.54
138	53.03365	-3.02981	102.14
139	53.03364	-3.02967	102.15
140	53.03332	-3.02935	103.06
141	53.03332	-3.0291	102.95
142	53.03334	-3.02894	102.80
143	53.03338	-3.02879	102.72

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
144	53.03343	-3.02863	102.54
145	53.03344	-3.02851	102.52
146	53.03384	-3.02822	101.83
147	53.03385	-3.02806	101.88
148	53.03388	-3.0279	101.80
149	53.03392	-3.02778	101.80
150	53.03397	-3.02767	101.80
151	53.03401	-3.02755	101.80
152	53.03403	-3.02744	101.80
153	53.03407	-3.02728	101.80
154	53.03413	-3.02718	101.80
155	53.03415	-3.02703	101.98
156	53.03423	-3.02693	101.69
157	53.03423	-3.02675	101.75
158	53.03419	-3.02663	101.95
159	53.03416	-3.02638	102.28
160	53.03432	-3.02643	100.97
161	53.03435	-3.02623	100.65
162	53.03436	-3.02608	101.17
163	53.03437	-3.02593	101.32
164	53.03437	-3.02578	100.87
165	53.03367	-3.02548	103.80
166	53.03361	-3.02495	103.80
167	53.03376	-3.02479	103.80

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
168	53.03366	-3.02452	103.80
169	53.03469	-3.02452	93.94
170	53.03474	-3.02405	95.13
171	53.03476	-3.02364	96.60
172	53.0348	-3.02347	94.68
173	53.03487	-3.0233	94.27
174	53.03491	-3.02312	94.62
175	53.03495	-3.023	94.20
176	53.03499	-3.02284	93.47
177	53.03503	-3.02265	92.84
178	53.03505	-3.02241	92.19
179	53.03505	-3.02218	92.12
180	53.03503	-3.02152	92.58
181	53.03505	-3.02129	92.55
182	53.03509	-3.02115	92.52
183	53.03511	-3.021	92.31
184	53.03516	-3.02087	91.97
185	53.0352	-3.02074	91.83
186	53.03523	-3.02057	92.03
187	53.03526	-3.02042	92.18
188	53.03529	-3.02023	91.80
189	53.03534	-3.02006	91.80
190	53.03534	-3.01986	91.80
191	53.03532	-3.01964	91.80

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
192	53.03532	-3.01946	91.80
193	53.03528	-3.01929	91.80
194	53.03531	-3.01914	91.80
195	53.03535	-3.01896	91.80
196	53.03542	-3.01884	91.80
197	53.03552	-3.01869	91.80
198	53.03559	-3.01856	91.80
199	53.03564	-3.01839	91.80
200	53.03568	-3.01823	91.80
201	53.0357	-3.01805	91.80
202	53.03573	-3.01793	91.80
203	53.03577	-3.01778	91.80
204	53.03579	-3.0176	91.80
205	53.03804	-3.01892	92.58
206	53.03778	-3.01895	92.10
207	53.03627	-3.02141	91.09
208	53.03545	-3.02176	91.30
209	53.03674	-3.02443	102.27
210	53.03666	-3.02472	102.09
211	53.03609	-3.02523	101.81
212	53.03606	-3.02505	100.78
213	53.03572	-3.02477	91.41
214	53.03568	-3.02529	92.64
215	53.03548	-3.02526	90.69

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
216	53.03538	-3.02555	92.04
217	53.0355	-3.02573	98.09
218	53.0356	-3.02605	100.59
219	53.0358	-3.0261	101.16
220	53.0362	-3.02554	102.02
221	53.03596	-3.02708	102.09
222	53.0359	-3.02848	101.80
223	53.03533	-3.02866	100.57
224	53.03527	-3.02904	100.02
225	53.03501	-3.02903	100.13
226	53.03525	-3.02955	101.06
227	53.03518	-3.03064	100.10
228	53.03971	-3.02643	105.92
229	53.04356	-3.02738	109.22
230	53.04566	-3.01919	99.21
231	53.04546	-3.01943	99.59
232	53.04529	-3.01974	99.17
233	53.04495	-3.0203	99.80
234	53.04453	-3.02073	101.14
235	53.0444	-3.02091	101.44
236	53.04437	-3.02053	100.85
237	53.04433	-3.02026	100.62
238	53.04417	-3.01998	100.80
239	53.04408	-3.01971	100.10

Location	Latitude (°)	Longitude (°)	Assessed Altitude (m) (amsl)
240	53.04403	-3.01951	100.19
241	53.04389	-3.01879	98.65
242	53.04383	-3.01844	97.92
243	53.04377	-3.01812	96.80
244	53.04376	-3.01787	96.80
245	53.04376	-3.01744	95.80
246	53.04376	-3.01683	95.29
247	53.04374	-3.01663	94.80
248	53.04376	-3.01648	94.80
249	53.04376	-3.01634	94.80
250	53.04377	-3.01616	94.67
251	53.04378	-3.01523	93.80

Dwelling Receptor Data

ZTV Viewpoints

The table below presents the coordinates for the assessed ZTV viewpoints.

No.	Latitude (°)	Longitude (°)	Assessed Height (m) (amsl)
VP1	53.046289	-3.038354	121.92
VP2	53.036203	-3.033908	111.99
VP3	53.047012	-3.054691	174.10
VP4	53.037969	-3.053009	147.12
VP5	53.052283	-3.056083	192.50
VP6	53.048532	-3.067722	231.81
VP7	53.02164	-3.006803	94.19
VP8	53.069546	-3.041657	191.73
VP9	53.046107	-3.087512	335.08

No.	Latitude (°)	Longitude (°)	Assessed Height (m) (amsl)
VP10	53.048446	-3.092738	382.33
VP11	53.035036	-3.093124	355.78
VP12	53.031565	-3.034333	111.22
VP13	53.04034	-3.022246	102.60

ZTV Viewpoint Data

Modelled Panel Areas

The boundary coordinates of the modelled panel areas are presented in the tables below.

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
1	53.045247	-3.034630	55	53.044814	-3.048896
2	53.045287	-3.033922	56	53.044817	-3.047819
3	53.045148	-3.033896	57	53.044508	-3.047752
4	53.044697	-3.034503	58	53.043871	-3.047118
5	53.044467	-3.037093	59	53.043338	-3.046430
6	53.044627	-3.037512	60	53.043223	-3.045989
7	53.044335	-3.038669	61	53.042995	-3.046222
8	53.044433	-3.038995	62	53.042463	-3.045944
9	53.043944	-3.040761	63	53.042239	-3.046104
10	53.043298	-3.041577	64	53.042047	-3.045473
11	53.039293	-3.037897	65	53.041275	-3.045049
12	53.039108	-3.038398	66	53.041136	-3.045444
13	53.042617	-3.041558	67	53.040411	-3.044934
14	53.042643	-3.042040	68	53.040396	-3.046290
15	53.043907	-3.043148	69	53.040259	-3.046741
16	53.043644	-3.044063	70	53.039110	-3.045741
17	53.044114	-3.044527	71	53.039102	-3.045065

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
18	53.045091	-3.043550	72	53.039515	-3.044420
19	53.044525	-3.043090	73	53.039554	-3.044203
20	53.044576	-3.042231	74	53.039180	-3.043383
21	53.044744	-3.041562	75	53.038969	-3.043061
22	53.044937	-3.041190	76	53.038625	-3.040599
23	53.045070	-3.040642	77	53.038628	-3.037716
24	53.045197	-3.040228	78	53.037751	-3.036917
25	53.045406	-3.040271	79	53.037419	-3.037104
26	53.045615	-3.039891	80	53.037407	-3.034780
27	53.045713	-3.039443	81	53.036877	-3.034623
28	53.045678	-3.039155	82	53.036875	-3.033815
29	53.045616	-3.038715	83	53.036126	-3.033761
30	53.045774	-3.038520	84	53.035983	-3.032396
31	53.046049	-3.038715	85	53.035929	-3.031845
32	53.046335	-3.038732	86	53.035981	-3.031639
33	53.046635	-3.038943	87	53.036384	-3.031481
34	53.046595	-3.042028	88	53.037149	-3.031446
35	53.045732	-3.043185	89	53.037168	-3.031877
36	53.045216	-3.043663	90	53.037931	-3.031929
37	53.044656	-3.044631	91	53.037931	-3.031422
38	53.044648	-3.045130	92	53.042485	-3.031018
39	53.045253	-3.045211	93	53.042924	-3.032598
40	53.045498	-3.045586	94	53.042987	-3.033155
41	53.045612	-3.046070	95	53.043292	-3.033170

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
42	53.045969	-3.046471	96	53.043420	-3.032270
43	53.045926	-3.047848	97	53.043817	-3.031962
44	53.046050	-3.048109	98	53.043797	-3.030597
45	53.046443	-3.048128	99	53.045246	-3.029846
46	53.046910	-3.048788	100	53.045492	-3.029940
47	53.048041	-3.048849	101	53.045486	-3.030418
48	53.048238	-3.049355	102	53.045677	-3.030486
49	53.047934	-3.050753	103	53.046383	-3.031248
50	53.046868	-3.050752	104	53.048168	-3.032382
51	53.044594	-3.050646	105	53.048569	-3.034429
52	53.044342	-3.050053	106	53.048569	-3.034429
53	53.043072	-3.048165	107	53.045247	-3.034630
54	53.043044	-3.047825			

Modelled Panel Area A

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
1	53.053508	-3.045013	22	53.051774	-3.052447
2	53.053499	-3.045859	23	53.051000	-3.052604
3	53.053213	-3.045864	24	53.050298	-3.053292
4	53.052607	-3.045667	25	53.050115	-3.052301
5	53.052147	-3.045745	26	53.049745	-3.051140
6	53.051927	-3.046265	27	53.049931	-3.050935
7	53.051656	-3.046419	28	53.049978	-3.050479
8	53.051652	-3.047089	29	53.049850	-3.049686
9	53.050863	-3.047496	30	53.049627	-3.048959

No.	Latitude (°)	Longitude (°)	No.	Latitude (°)	Longitude (°)
10	53.050629	-3.047720	31	53.049513	-3.047820
11	53.050647	-3.048025	32	53.050076	-3.046026
12	53.051063	-3.048004	33	53.049909	-3.045949
13	53.051275	-3.047845	34	53.049920	-3.043801
14	53.051715	-3.047763	35	53.050351	-3.043745
15	53.052046	-3.047926	36	53.050839	-3.043395
16	53.052518	-3.049539	37	53.051888	-3.043375
17	53.052518	-3.050030	38	53.051898	-3.044034
18	53.052279	-3.050078	39	53.052410	-3.044436
19	53.052042	-3.050246	40	53.052987	-3.045075
20	53.052035	-3.050784	41	53.053508	-3.045013
21	53.051792	-3.051301			

Modelled Panel Area B

APPENDIX H – MODELLING RESULTS

Overview

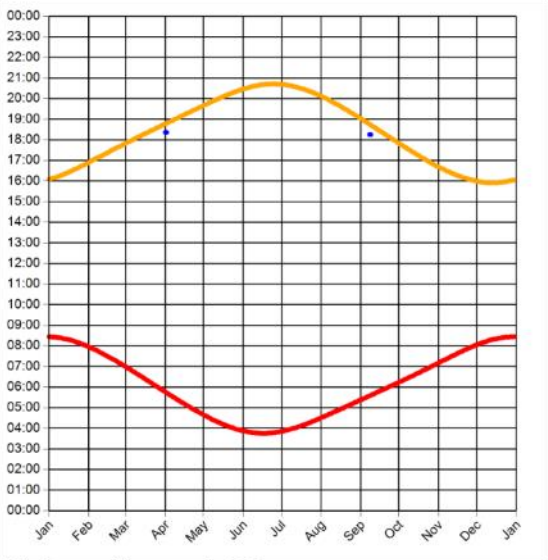
The charts for the receptors where a solar reflection is geometrically possible are shown in the following sections. Each chart shows:

- 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).

Roads

Observer 6 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 2.4°

Observer Location — Sun azimuth range is 274.2° - 274.5° (yellow)

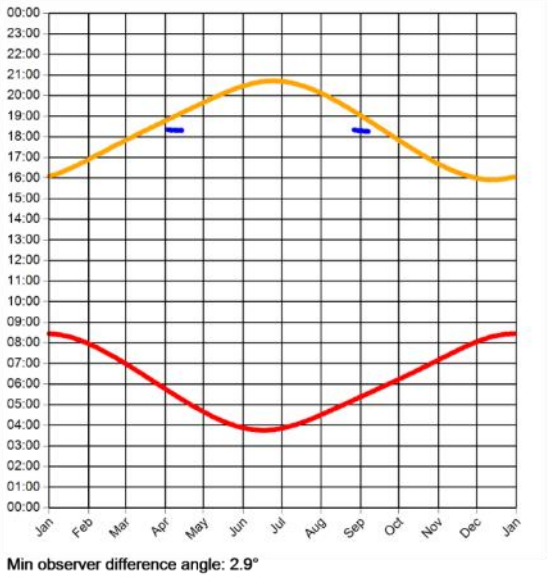


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 7 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 6.1°

Observer Location — Sun azimuth range is 274.6° - 277.3° (yellow)

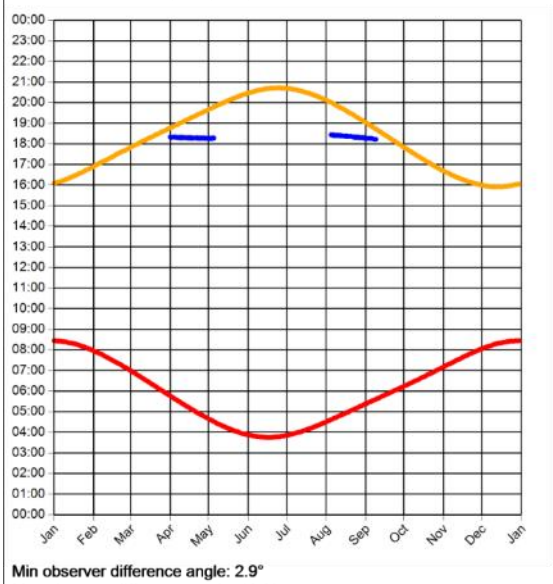


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



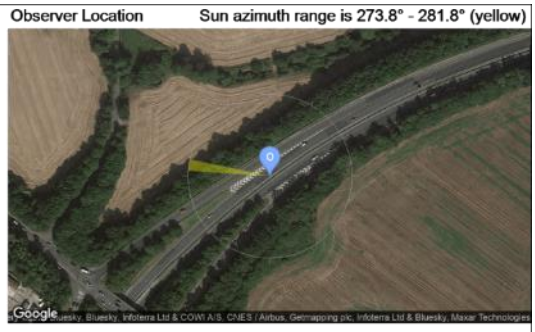
Observer 8 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 12.2°

Observer Location — Sun azimuth range is 273.8° - 281.8° (yellow)

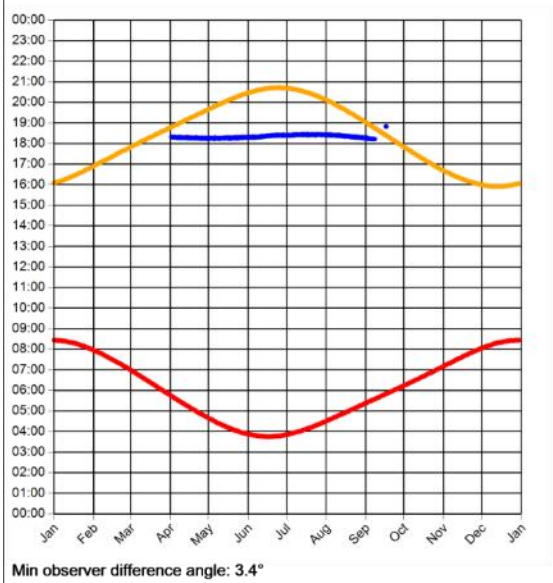


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 9 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 274° - 286.5° (yellow)

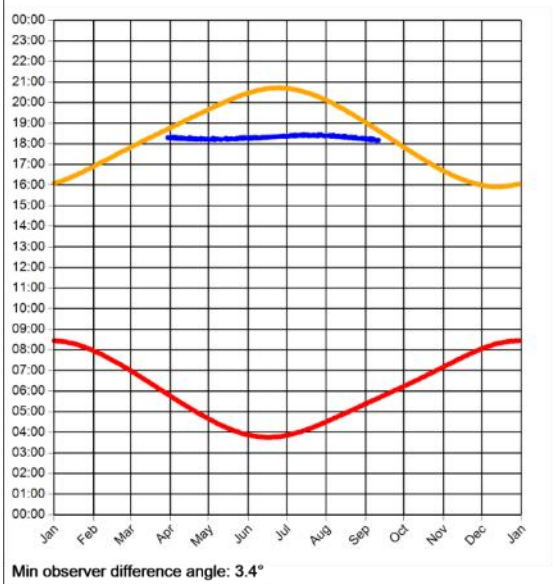


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 10 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 18.7°

Observer Location — Sun azimuth range is 272.9° - 285.9° (yellow)

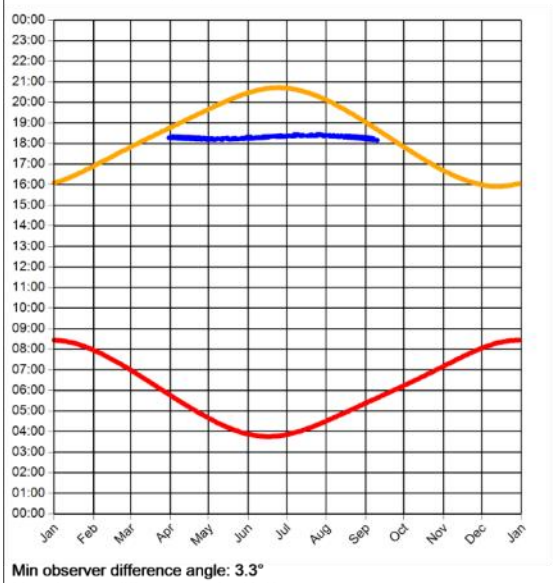


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 11 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 19.1°

Observer Location — Sun azimuth range is 272.9° - 286.1° (yellow)

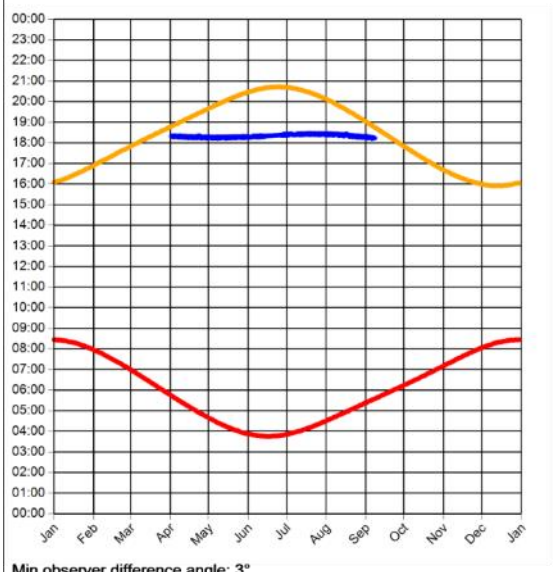


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 12 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 18.7°

Observer Location

Sun azimuth range is 274° - 286.3° (yellow)

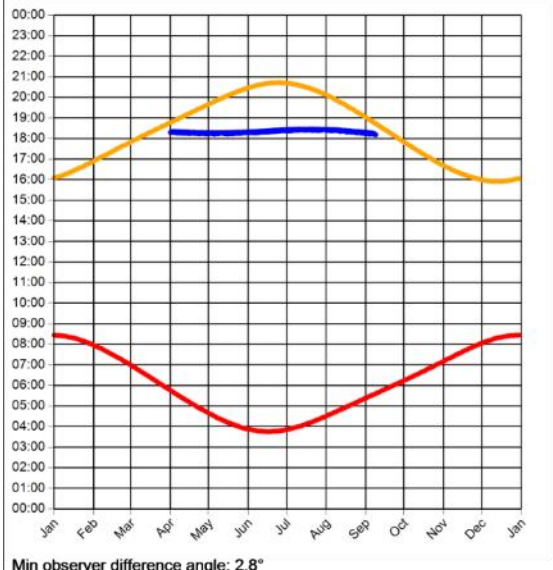


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 13 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18.8°

Observer Location

Sun azimuth range is 273.4° - 286.5° (yellow)

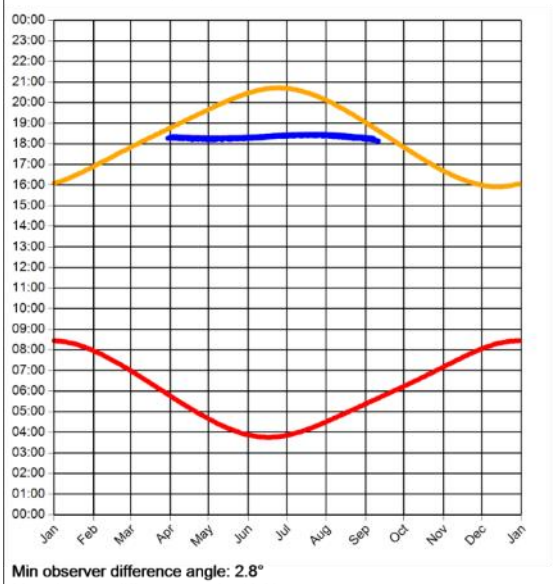


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 14 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18.8°

Observer Location — Sun azimuth range is 272.5° - 286.5° (yellow)

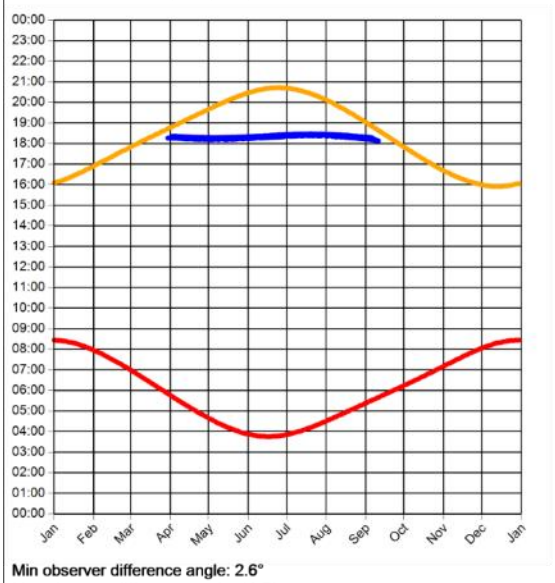


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 15 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 19.7°

Observer Location — Sun azimuth range is 272.5° - 286.6° (yellow)

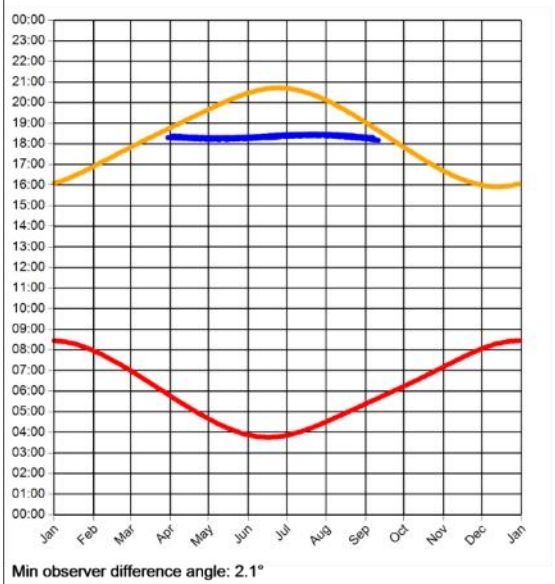


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



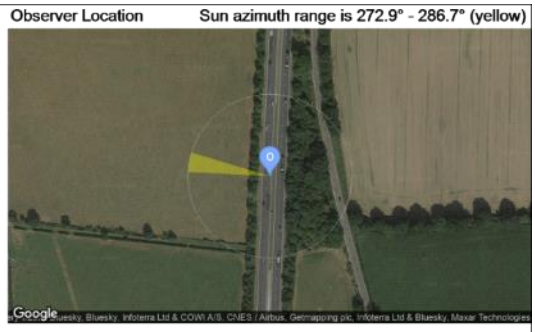
Observer 16 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 19.6°

Observer Location — Sun azimuth range is 272.9° - 286.7° (yellow)

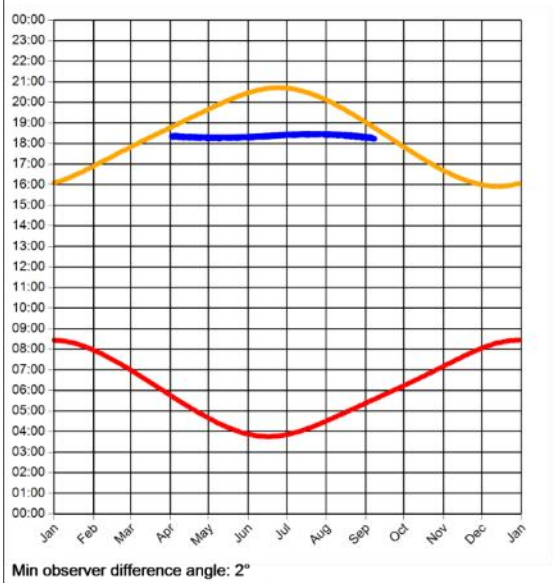


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 17 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 18.7°

Observer Location — Sun azimuth range is 273.8° - 286.7° (yellow)

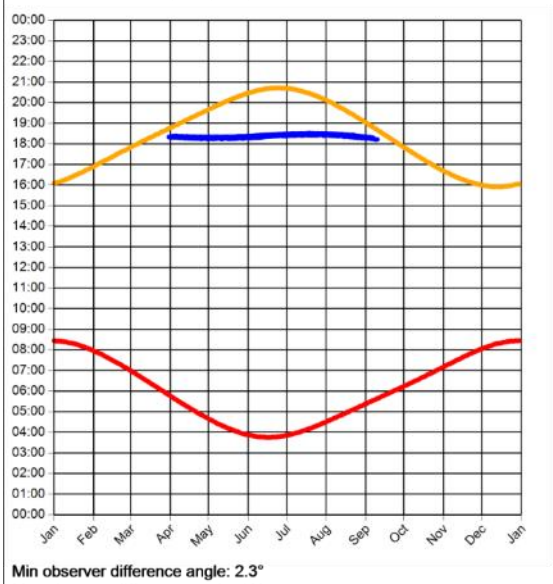


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 18 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.6° - 287° (yellow)

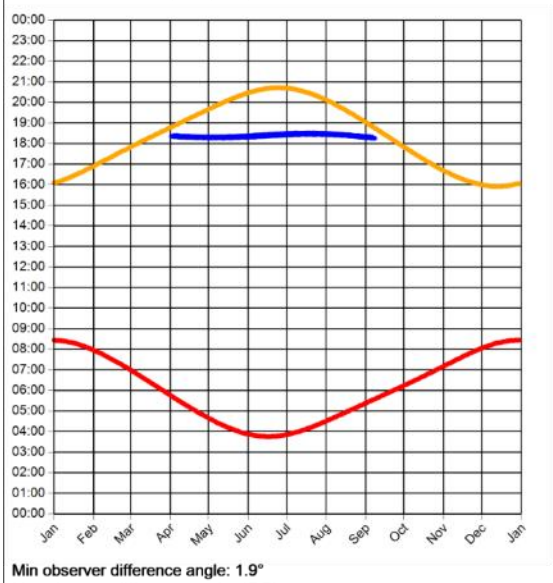


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 19 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 274.4° - 287.1° (yellow)

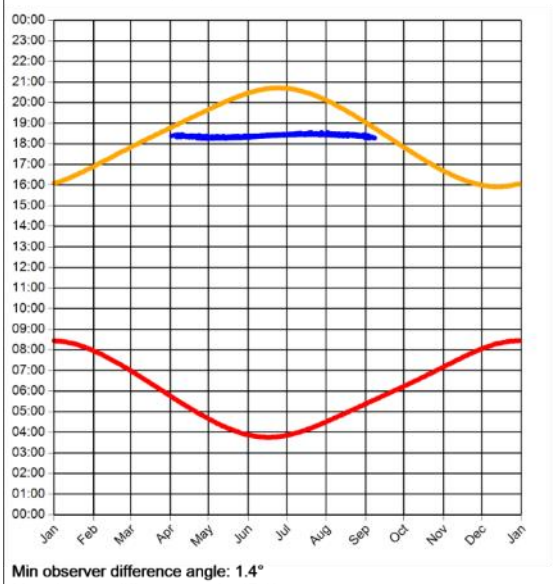


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 20 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.4°
Max observer difference angle: 17.4°

Observer Location — Sun azimuth range is 274.7° - 286.9° (yellow)

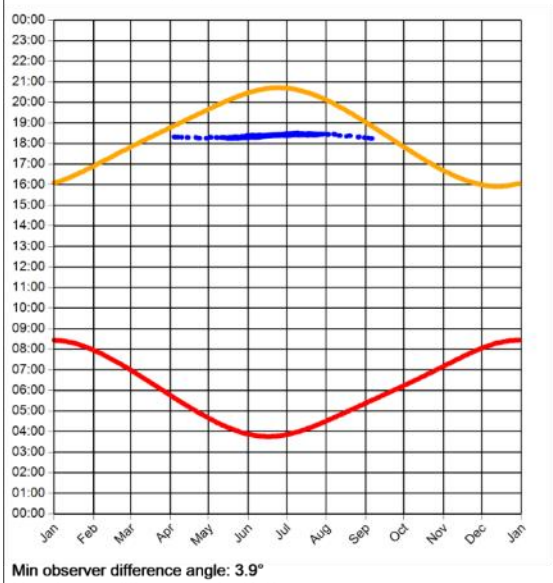


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 21 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.9°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 274.6° - 286.9° (yellow)

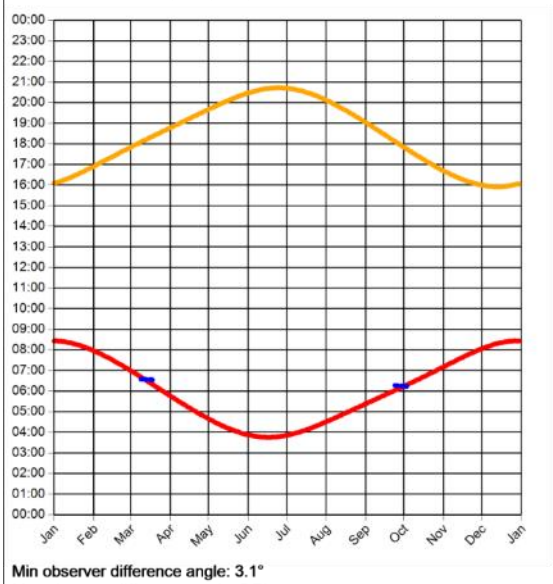


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 34 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.1°
Max observer difference angle: 5.7°

Observer Location — Sun azimuth range is 92.9° - 95.2° (yellow)

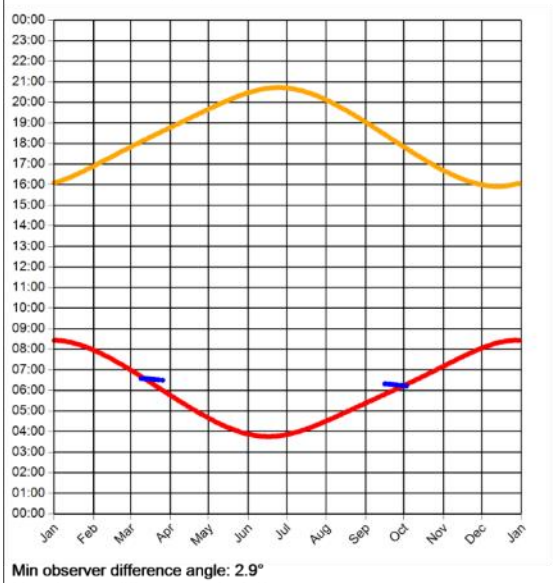


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 35 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 8.1°

Observer Location — Sun azimuth range is 90.9° - 95° (yellow)

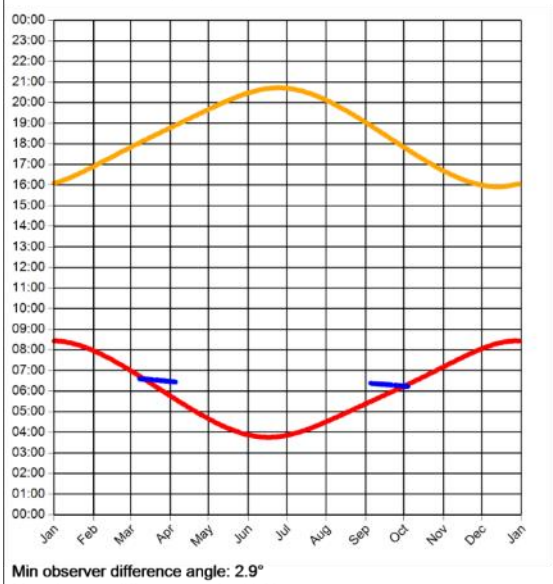


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 36 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 11.8°

Observer Location — Sun azimuth range is 88.5° - 95.5° (yellow)

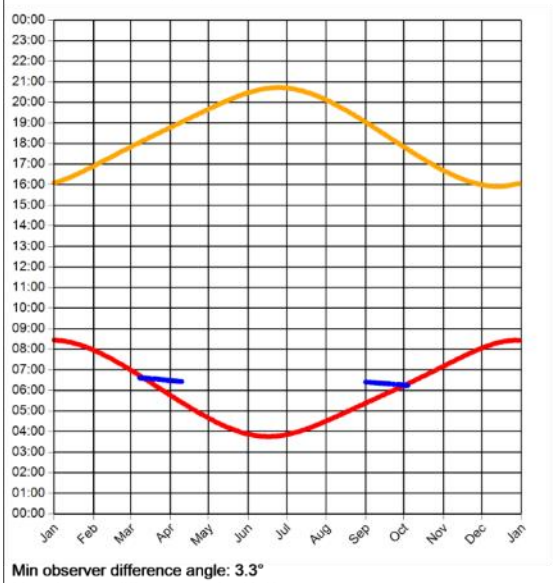


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 37 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 13.4°

Observer Location — Sun azimuth range is 87.6° - 95.7° (yellow)

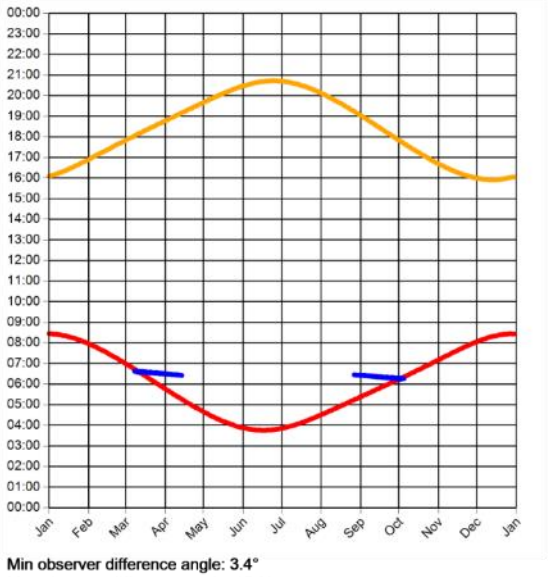


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 38 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 15.3°

Observer Location — Sun azimuth range is 86.7° - 96.1° (yellow)

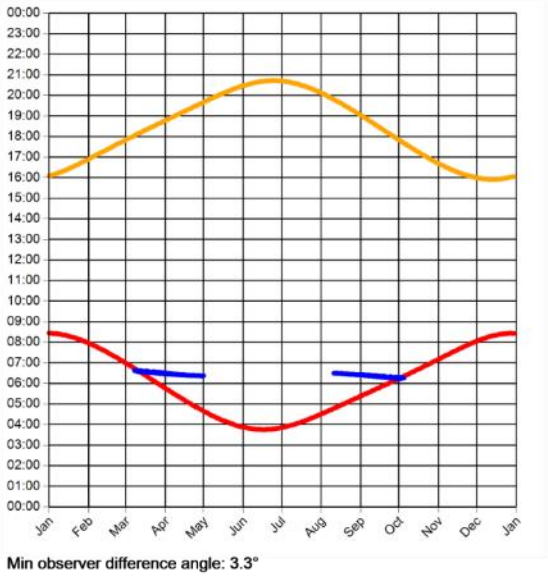


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 39 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 20°

Observer Location — Sun azimuth range is 83.2° - 96° (yellow)

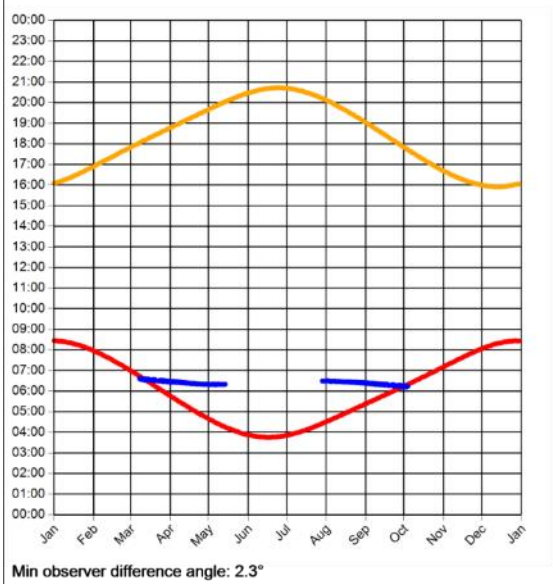


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 40 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 22.4°

Observer Location — Sun azimuth range is 80.6° - 95.6° (yellow)

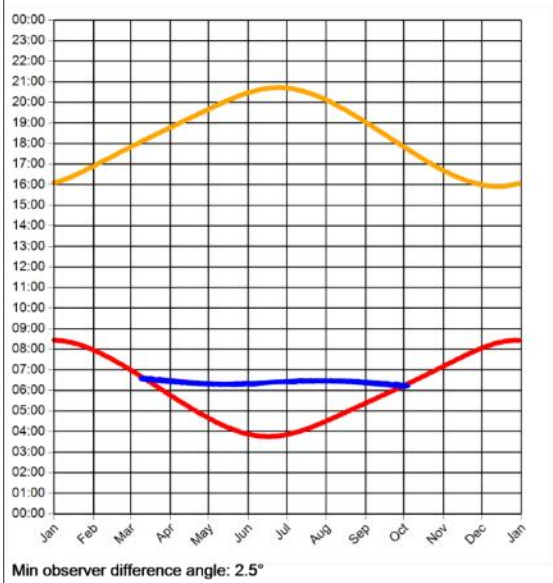


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 41 Results

Reflection Date/Time (GMT) Graph

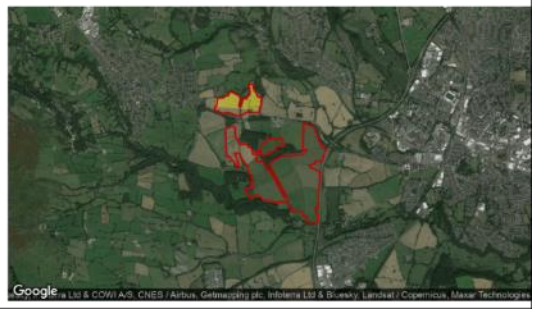


Min observer difference angle: 2.5°
Max observer difference angle: 25.9°

Observer Location — Sun azimuth range is 77.3° - 95.3° (yellow)

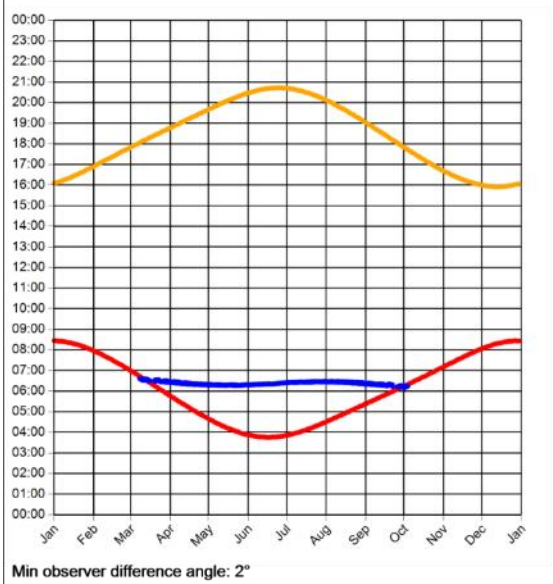


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



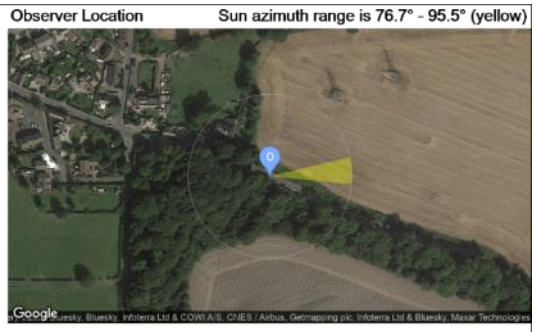
Observer 42 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 25.2°

Observer Location — Sun azimuth range is 76.7° - 95.5° (yellow)

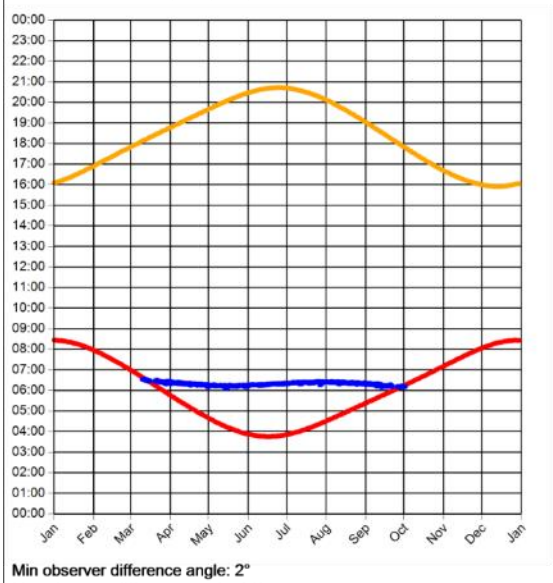


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 43 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 24°

Observer Location — Sun azimuth range is 76° - 94.3° (yellow)

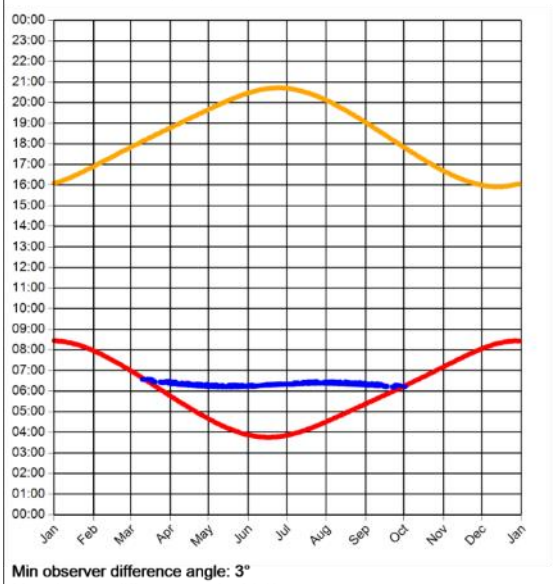


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 44 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 24.4°

Observer Location — Sun azimuth range is 76.1° - 94.7° (yellow)

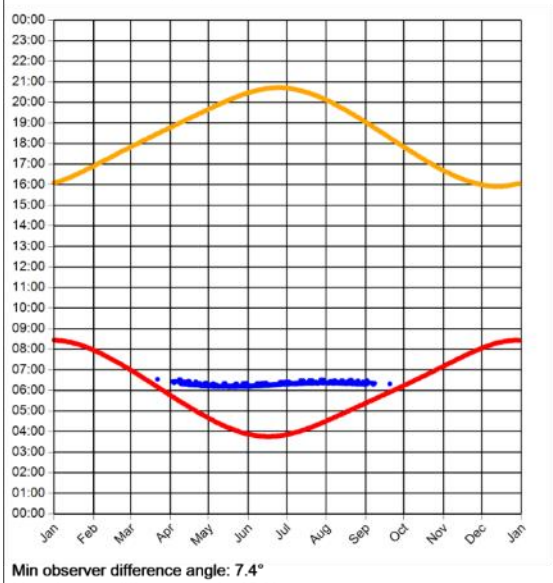


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 45 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7.4°
Max observer difference angle: 25.2°

Observer Location — Sun azimuth range is 75.7° - 92.2° (yellow)

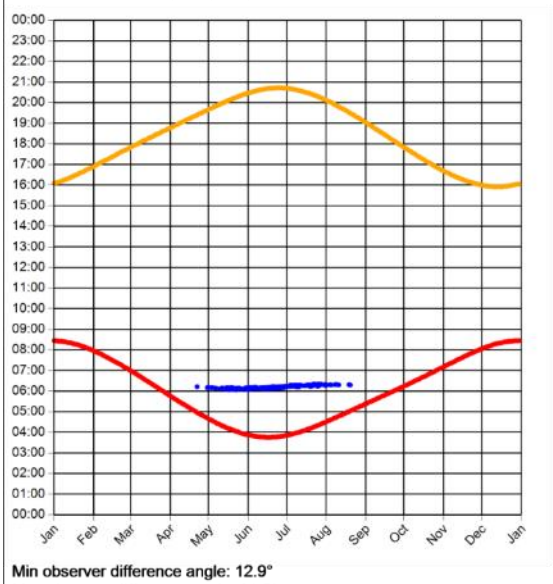


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 46 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 12.9°
Max observer difference angle: 21.5°

Observer Location — Sun azimuth range is 74.2° - 83° (yellow)

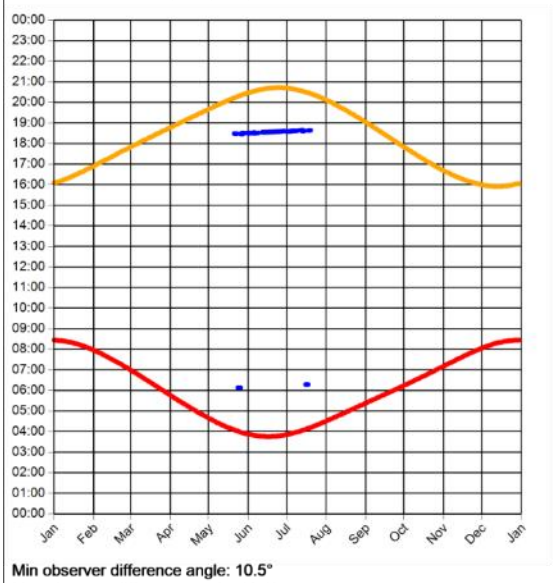


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 47 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 10.5°
Max observer difference angle: 19.4°

Observer Location — Sun azimuth ranges (yellow)

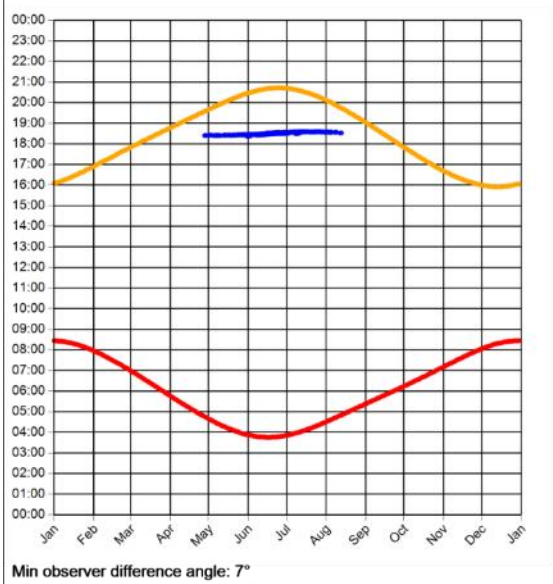


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



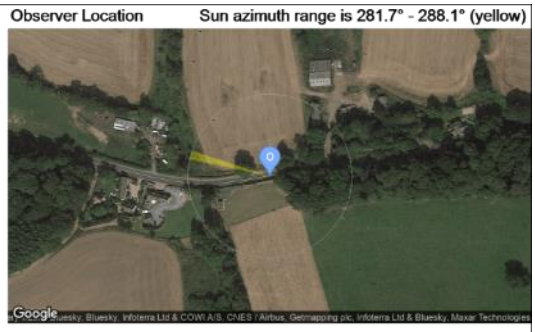
Observer 48 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7°
Max observer difference angle: 15.3°

Observer Location — Sun azimuth range is 281.7° - 288.1° (yellow)

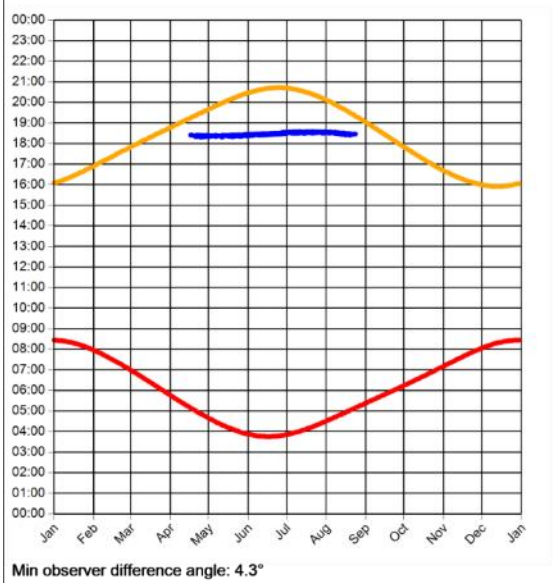


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 49 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.3°
Max observer difference angle: 16°

Observer Location — Sun azimuth range is 279.2° - 287.7° (yellow)

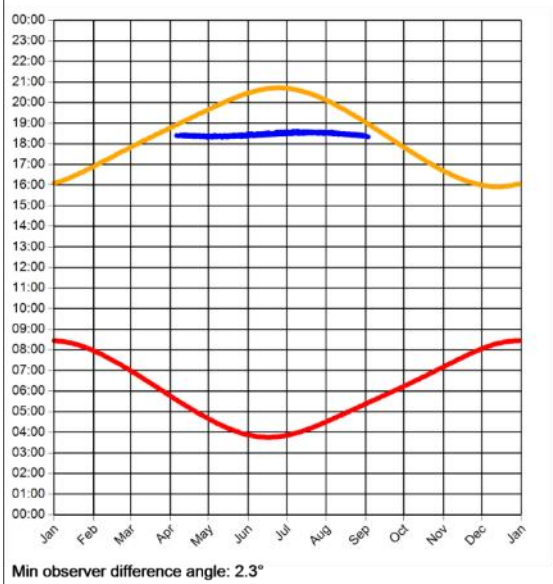


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



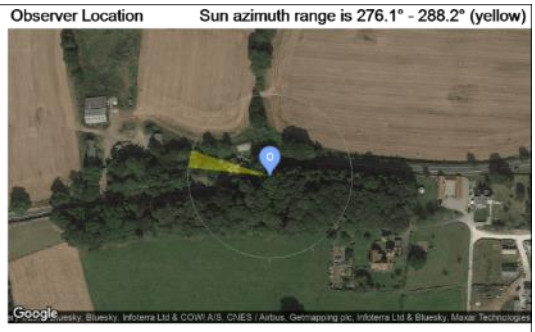
Observer 50 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 15.8°

Observer Location — Sun azimuth range is 276.1° - 288.2° (yellow)

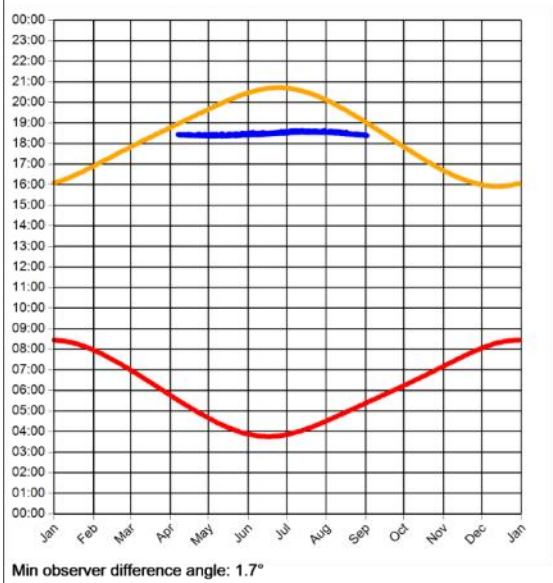


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 51 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 15.4°

Observer Location — Sun azimuth range is 276.8° - 288.2° (yellow)

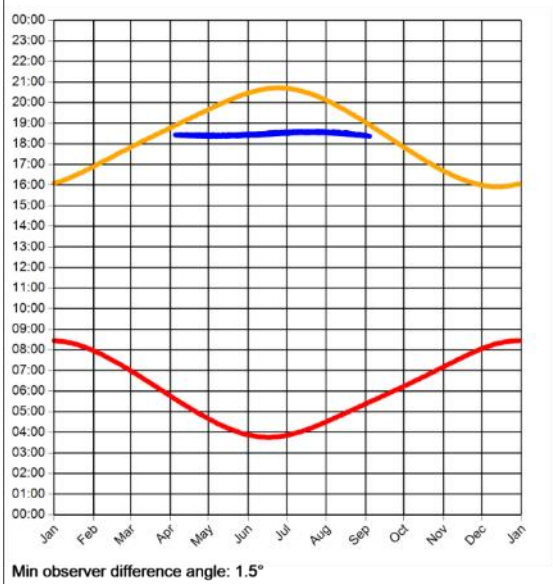


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



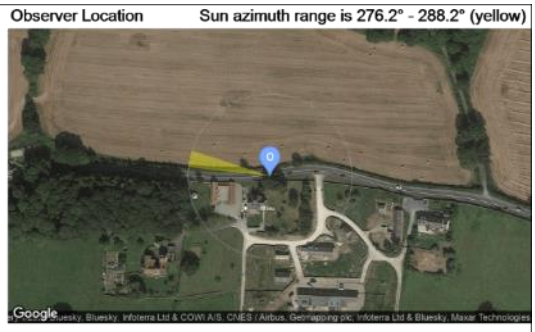
Observer 52 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 15.6°

Observer Location — Sun azimuth range is 276.2° - 288.2° (yellow)

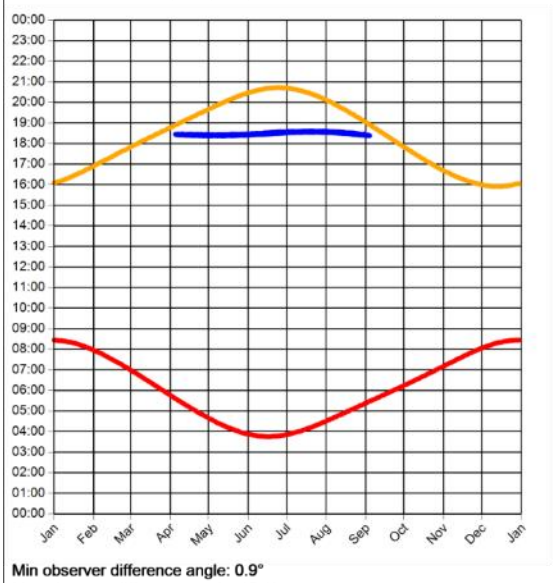


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 53 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 15.4°

Observer Location — Sun azimuth range is 276.4° - 288.2° (yellow)

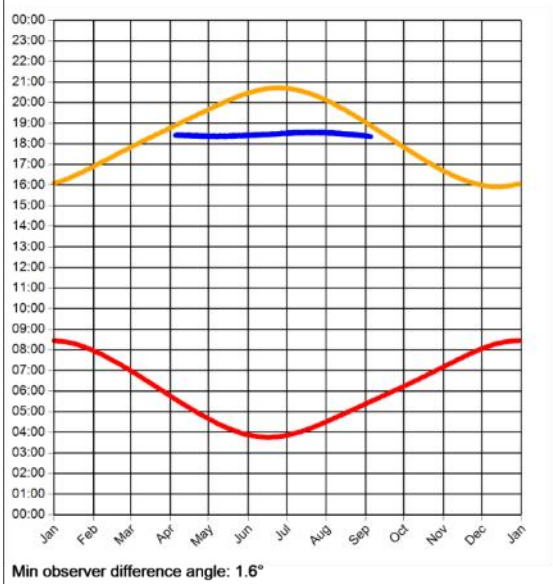


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



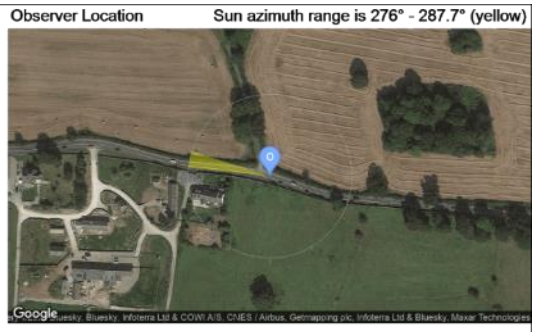
Observer 54 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 15.8°

Observer Location — Sun azimuth range is 276° - 287.7° (yellow)

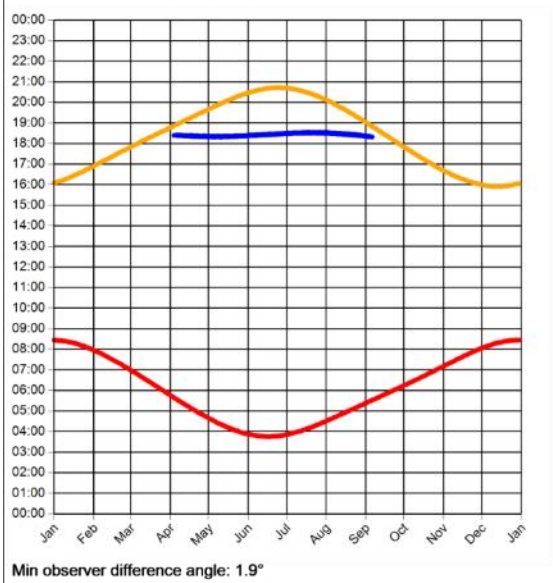


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 55 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 16.2°

Observer Location — Sun azimuth range is 275.5° - 287.4° (yellow)

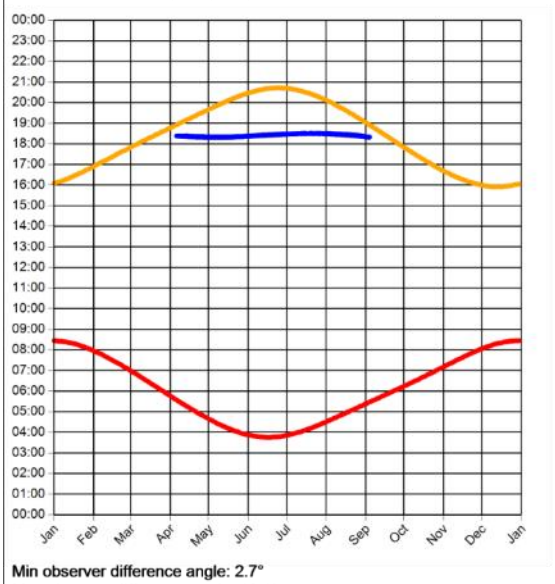


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



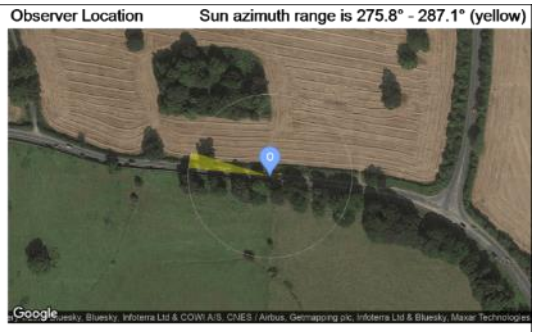
Observer 56 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 16.4°

Observer Location — Sun azimuth range is 275.8° - 287.1° (yellow)

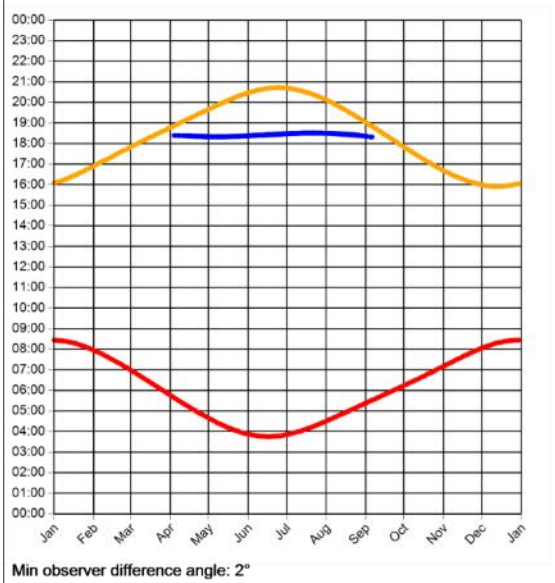


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 57 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 16.5°

Observer Location — Sun azimuth range is 275.5° - 287.2° (yellow)

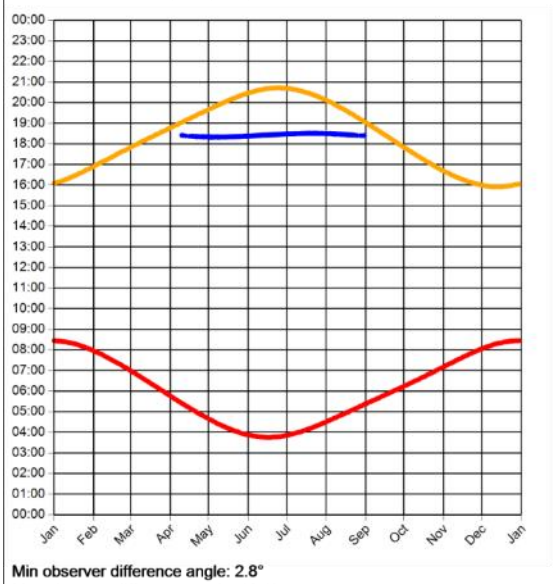


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



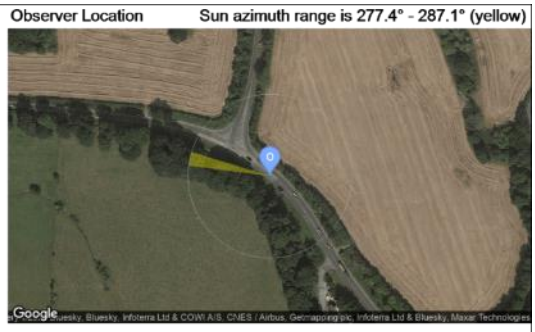
Observer 58 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 16.4°

Observer Location — Sun azimuth range is 277.4° - 287.1° (yellow)

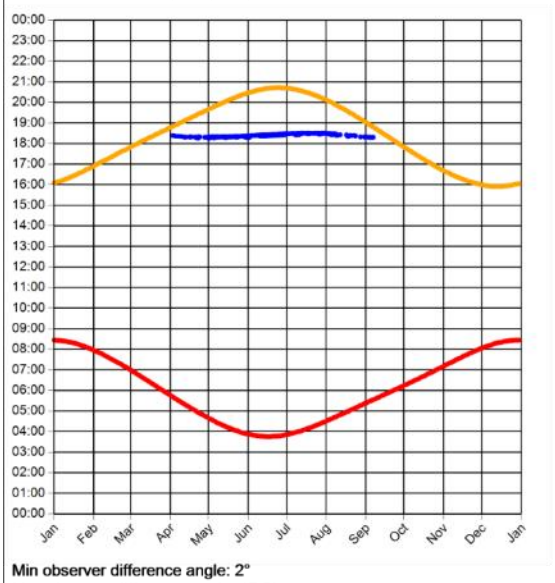


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 59 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 275.1° - 287° (yellow)

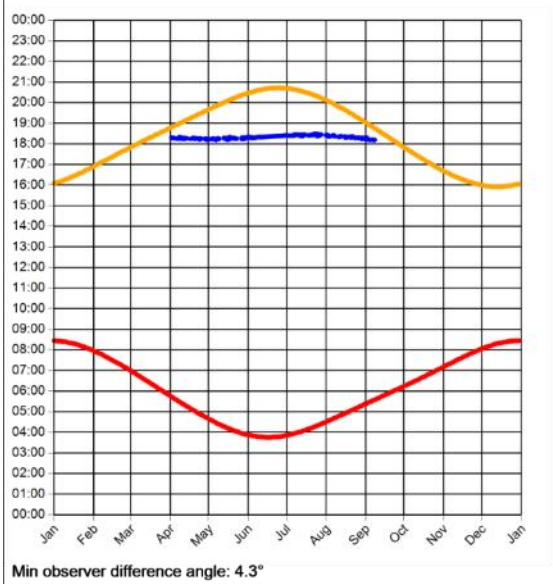


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 60 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.3°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.6° - 286.2° (yellow)

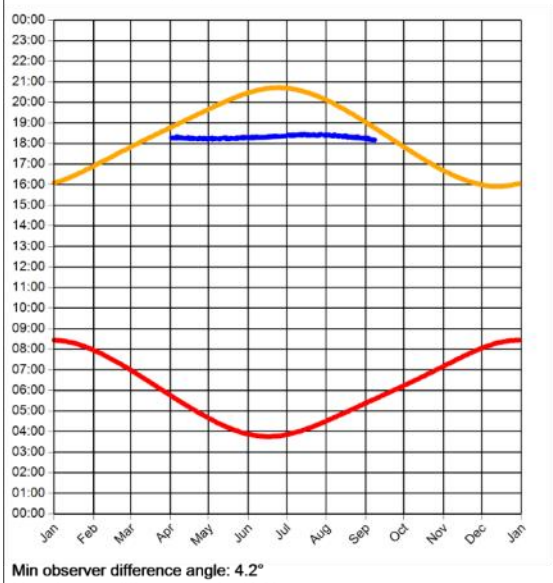


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 61 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.2°
Max observer difference angle: 18.8°

Observer Location — Sun azimuth range is 273.4° - 286.1° (yellow)

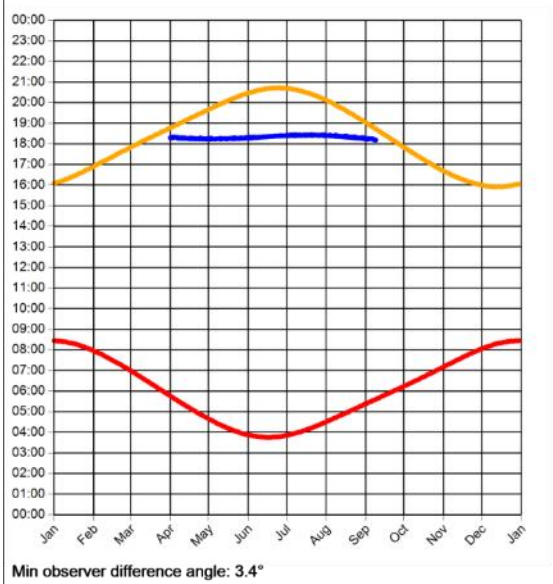


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



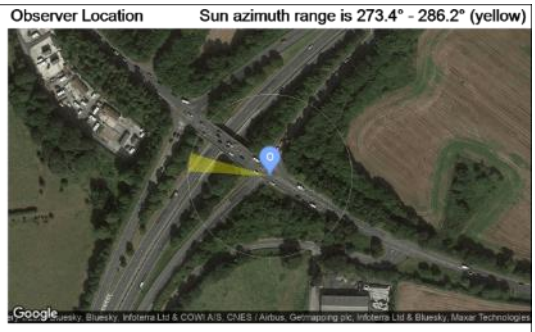
Observer 62 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.4° - 286.2° (yellow)

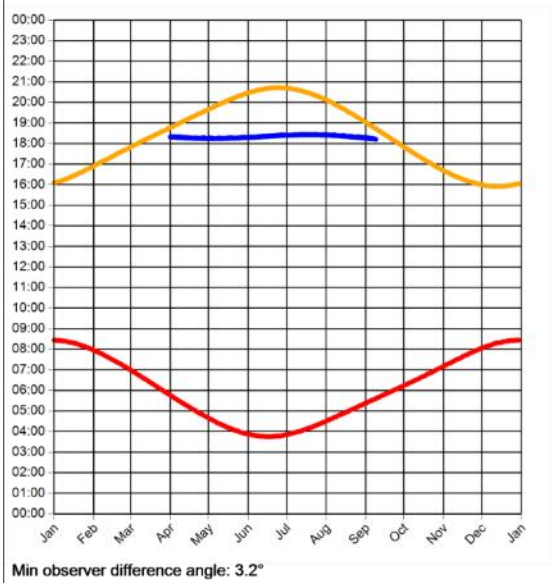


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 63 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 18.3°

Observer Location — Sun azimuth range is 273.6° - 286.4° (yellow)

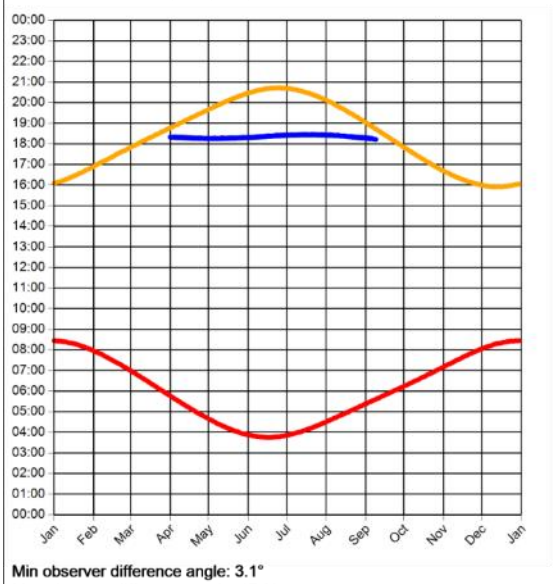


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 64 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.1°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 273.7° - 286.6° (yellow)

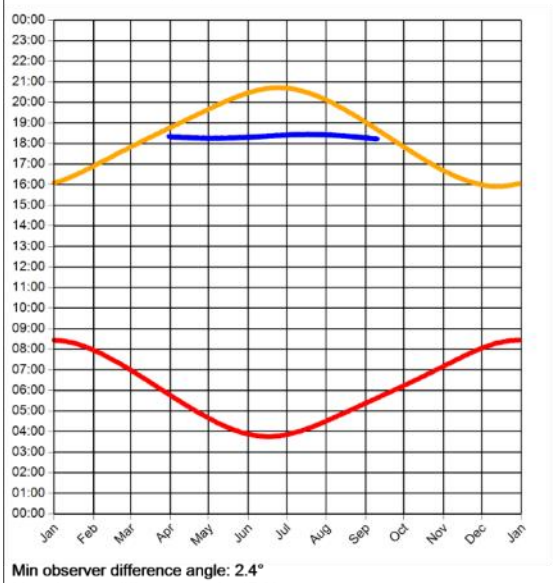


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 65 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 273.7° - 286.4° (yellow)

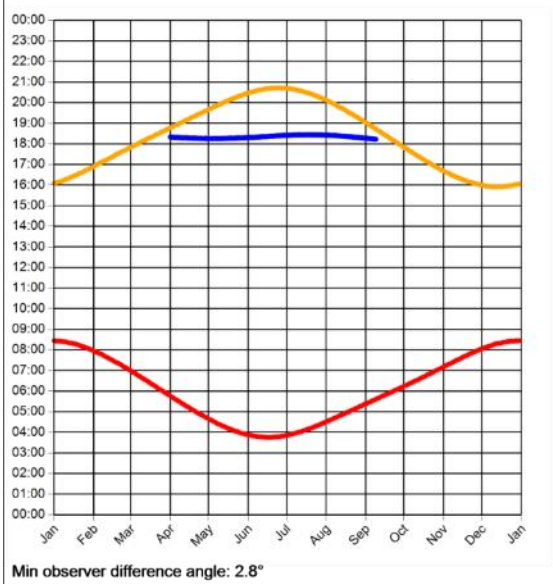


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



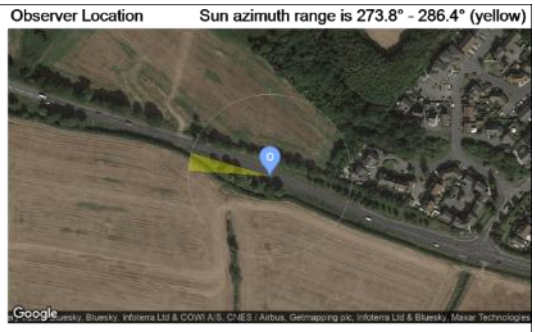
Observer 66 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.8° - 286.4° (yellow)

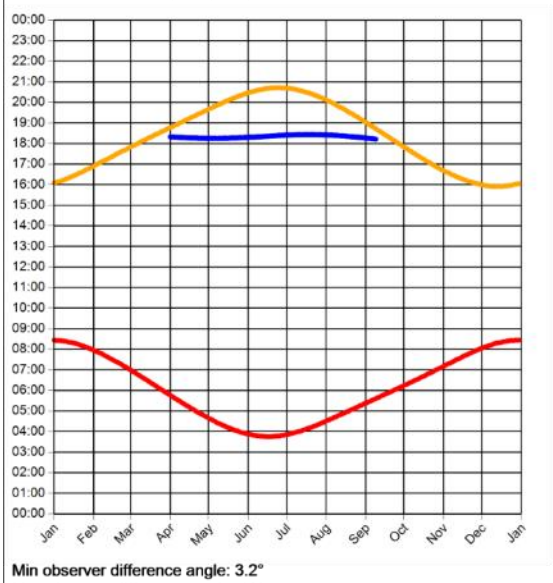


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 67 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.7° - 286.4° (yellow)

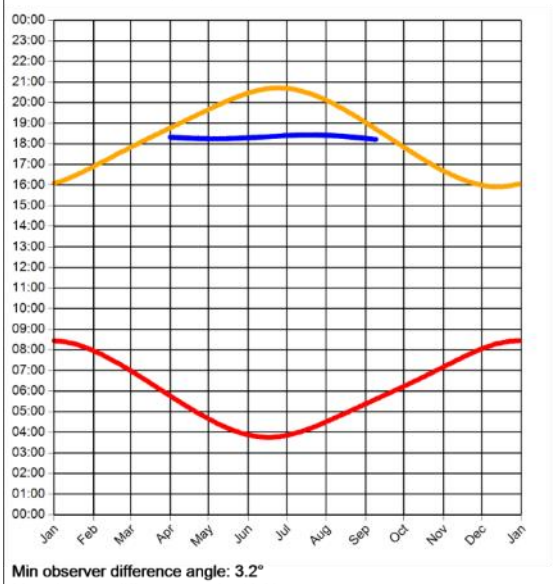


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 68 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 18.2°

Observer Location — Sun azimuth range is 273.7° - 286.1° (yellow)

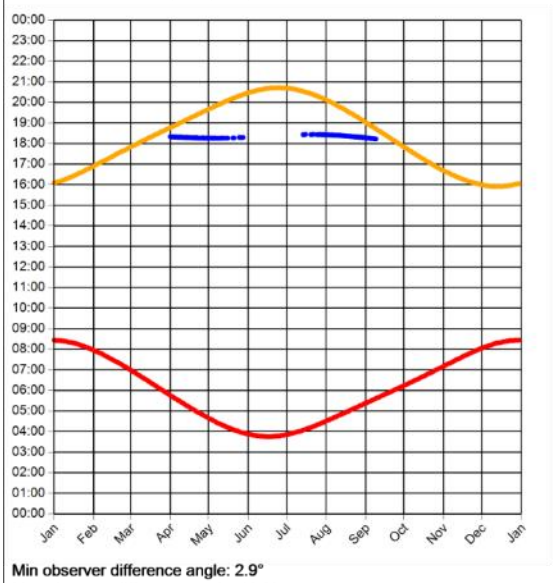


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 69 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 16.3°

Observer Location — Sun azimuth range is 273.8° - 285° (yellow)

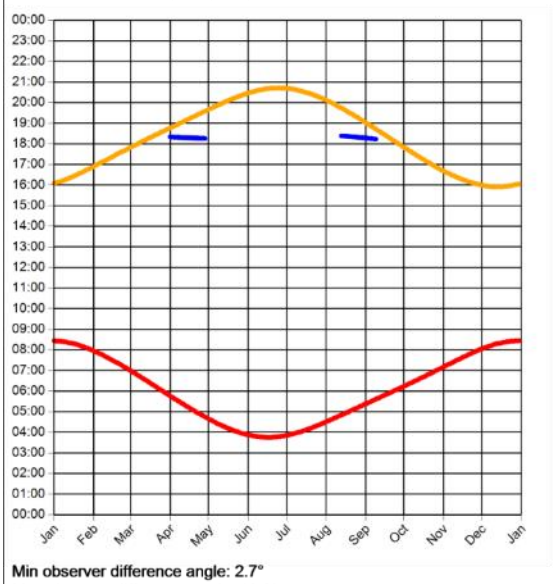


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 70 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 10.6°

Observer Location — Sun azimuth range is 273.9° - 280.1° (yellow)

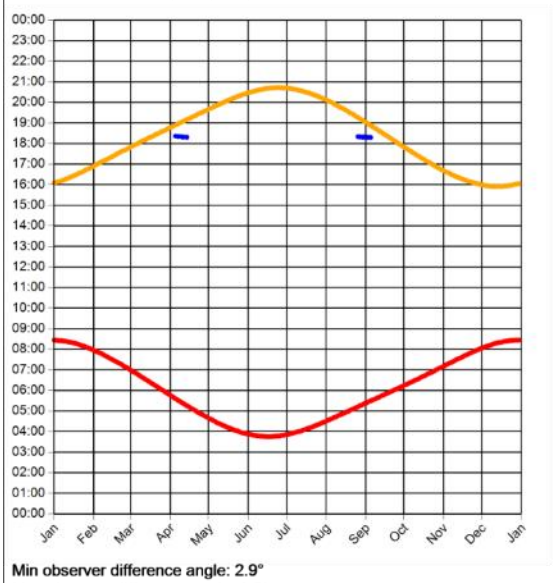


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 74 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 6.5°

Observer Location — Sun azimuth range is 275.3° - 277.4° (yellow)

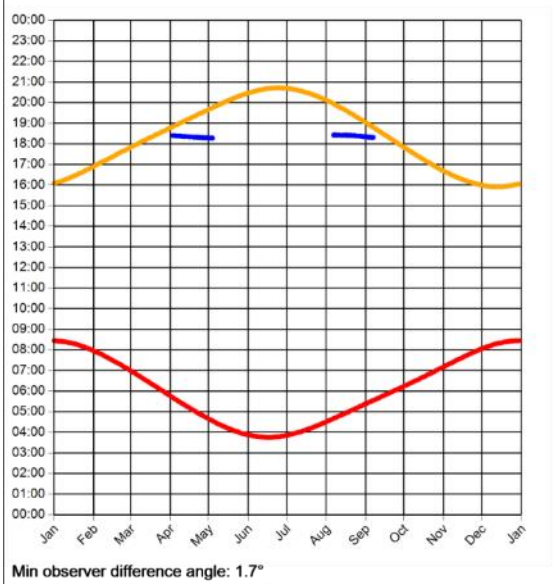


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 75 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 11.5°

Observer Location — Sun azimuth range is 275.2° - 281.5° (yellow)

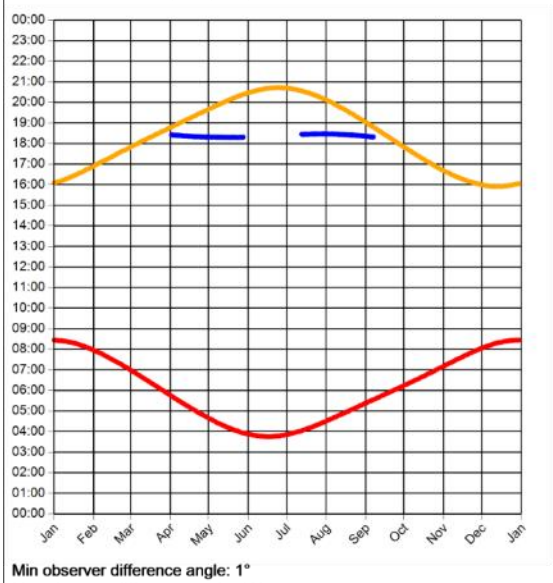


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 76 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1°
Max observer difference angle: 16°

Observer Location — Sun azimuth range is 275.3° - 285.2° (yellow)

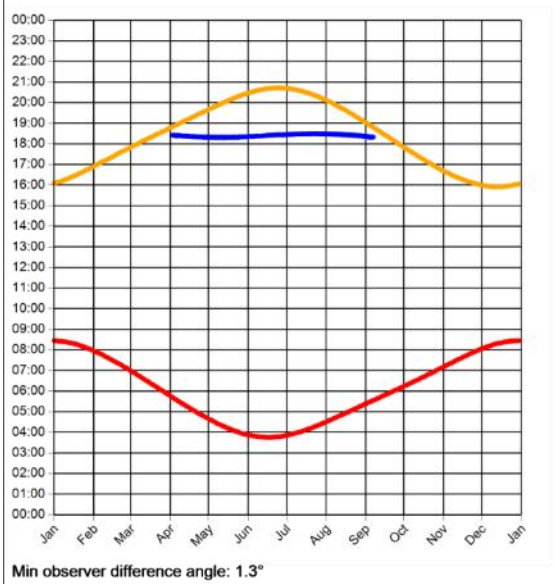


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



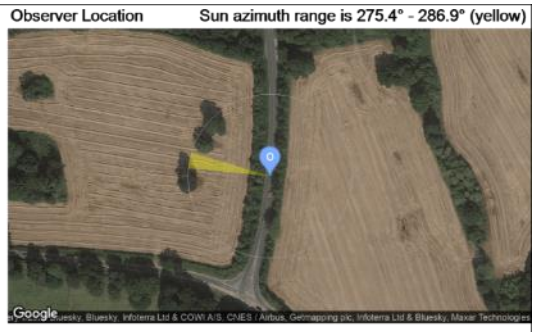
Observer 77 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.3°
Max observer difference angle: 16.8°

Observer Location — Sun azimuth range is 275.4° - 286.9° (yellow)

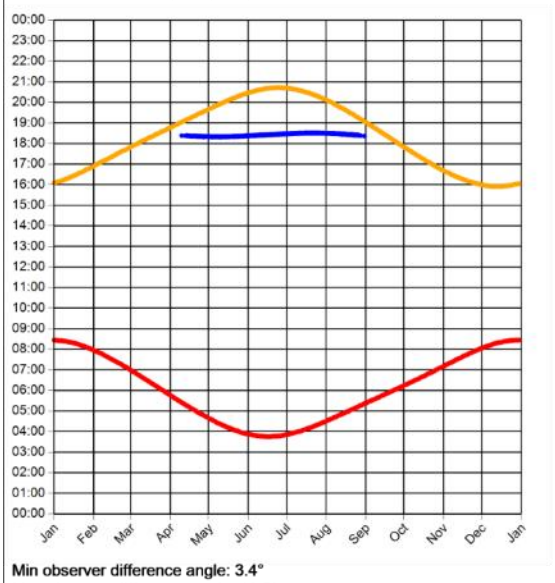


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 78 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 16.5°

Observer Location — Sun azimuth range is 277° - 287.1° (yellow)



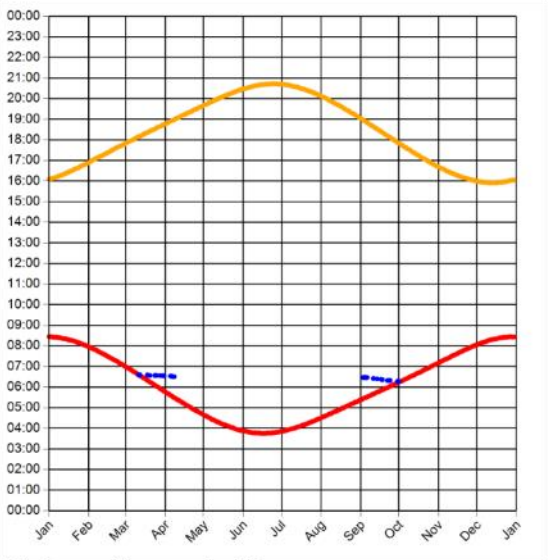
Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Dwellings

Observer 1 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.1°
Max observer difference angle: 14.6°

Observer Location — Sun azimuth range is 88.8° - 95° (yellow)

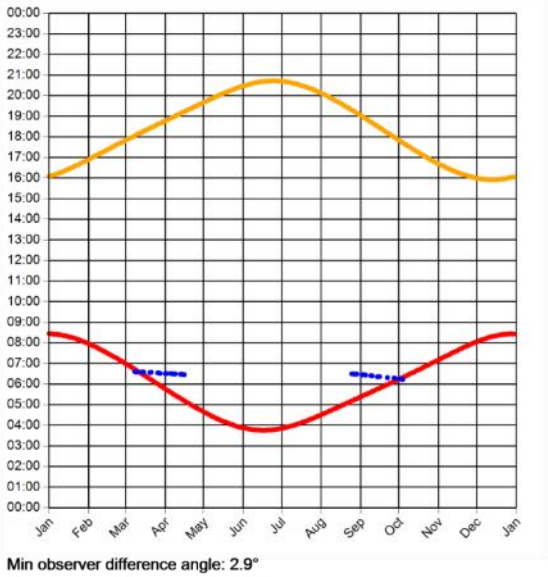


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 2 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 17.1°

Observer Location — Sun azimuth range is 86.7° - 95.5° (yellow)

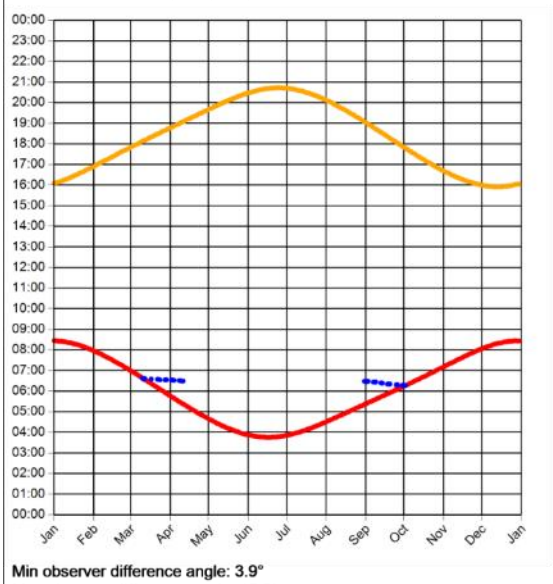


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 3 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.9°
Max observer difference angle: 15.5°

Observer Location — Sun azimuth range is 88.1° - 95.3° (yellow)

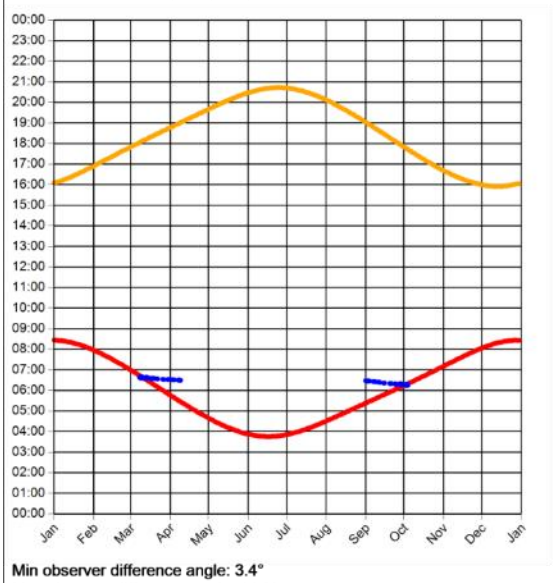


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 4 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 14.9°

Observer Location — Sun azimuth range is 88.4° - 96.2° (yellow)

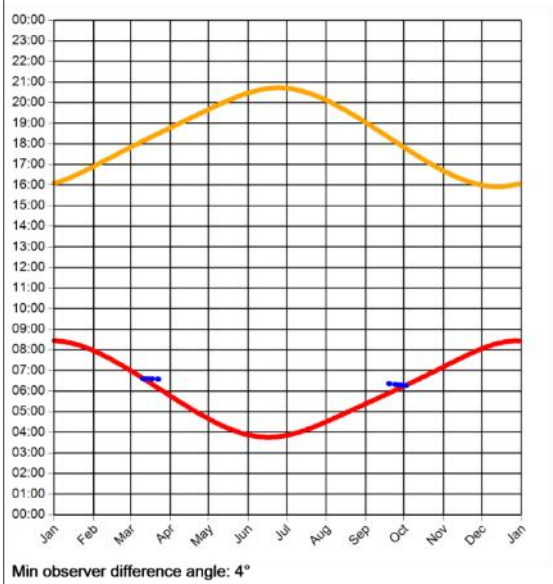


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 5 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4°
Max observer difference angle: 8.9°

Observer Location — Sun azimuth range is 92.5° - 95.5° (yellow)

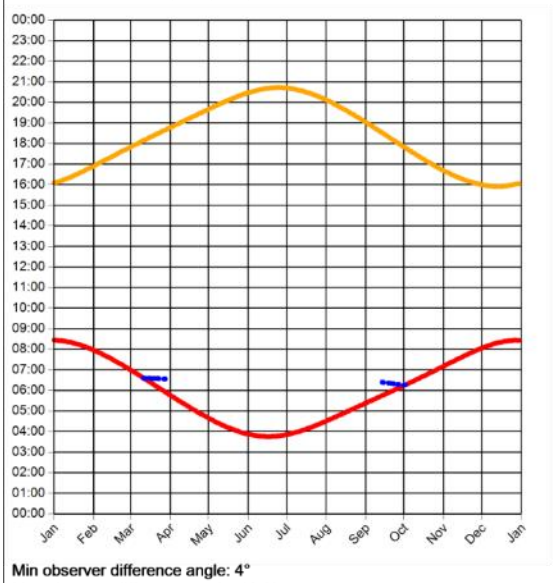


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 6 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4°
Max observer difference angle: 10.6°

Observer Location — Sun azimuth range is 91.2° - 95.2° (yellow)

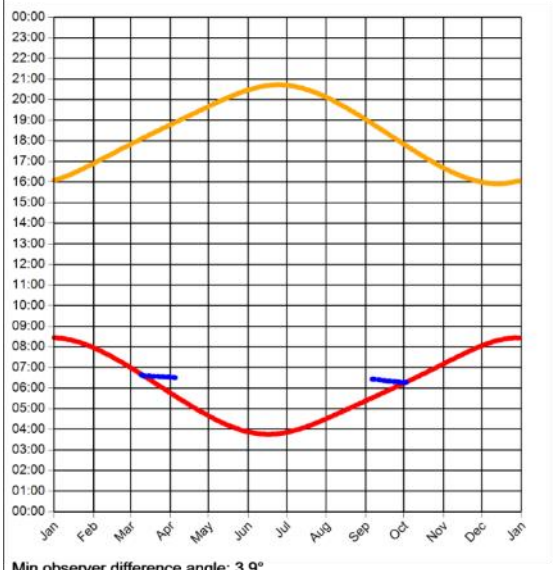


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 7 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.9°
Max observer difference angle: 13.1°

Observer Location — Sun azimuth range is 89.3° - 95.7° (yellow)

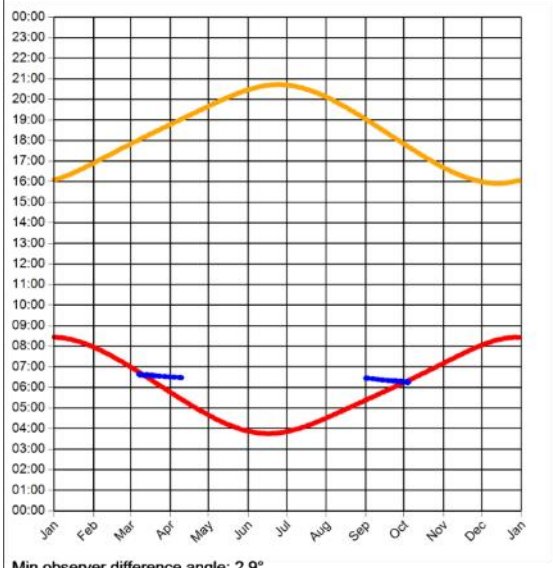


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 8 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 14.6°

Observer Location — Sun azimuth range is 88.1° - 96.3° (yellow)

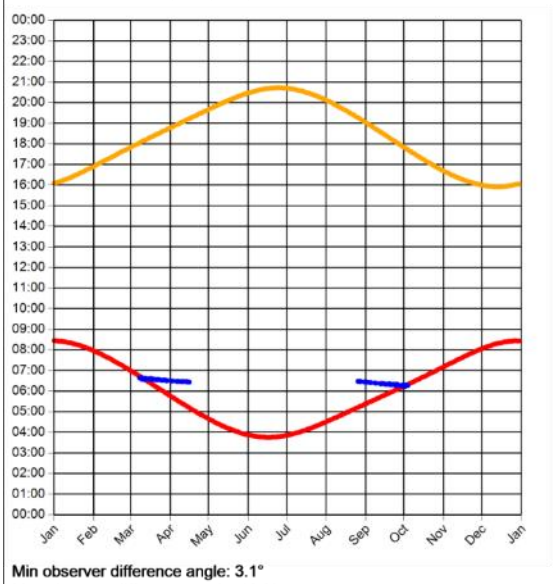


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 9 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.1°
Max observer difference angle: 16.3°

Observer Location — Sun azimuth range is 86.6° - 96° (yellow)

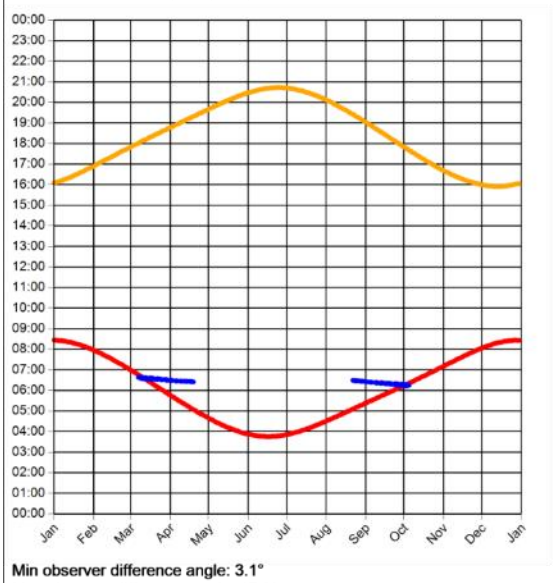


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 10 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.1°
Max observer difference angle: 17.3°

Observer Location — Sun azimuth range is 85.8° - 96.1° (yellow)

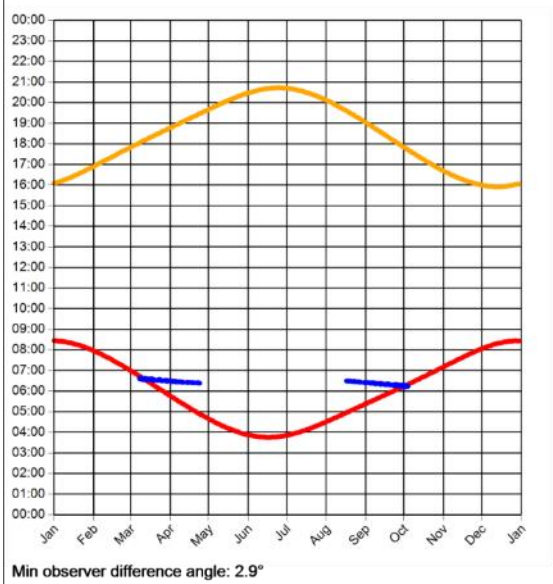


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 11 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 18.3°

Observer Location — Sun azimuth range is 84.6° - 95.8° (yellow)

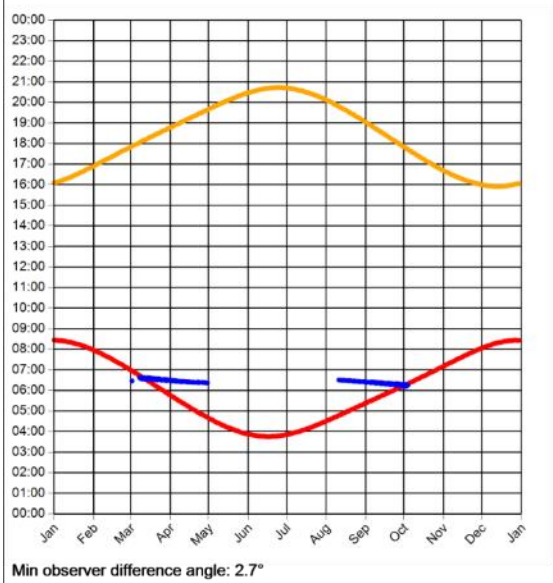


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 12 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 19.9°

Observer Location — Sun azimuth range is 83.4° - 95.8° (yellow)

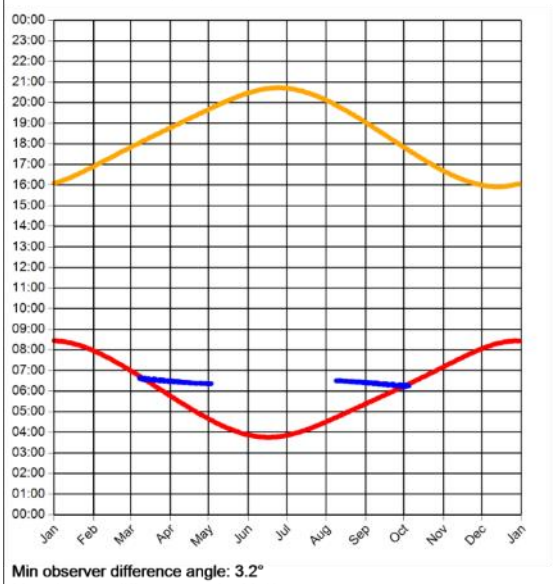


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 13 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 20.4°

Observer Location — Sun azimuth range is 82.8° - 96° (yellow)

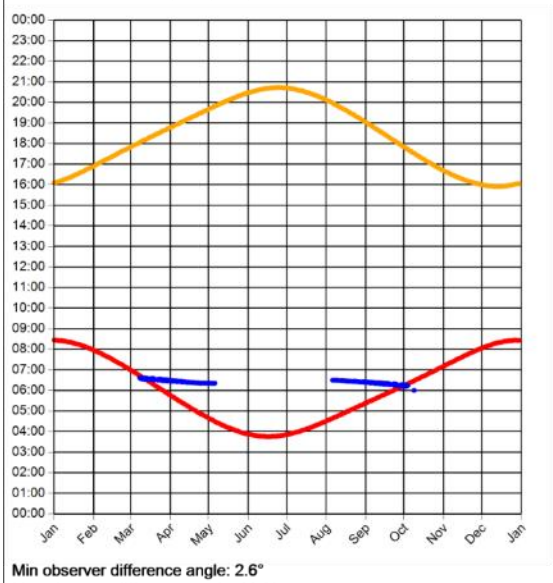


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 14 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 20.9°

Observer Location — Sun azimuth range is 82.2° - 95.6° (yellow)

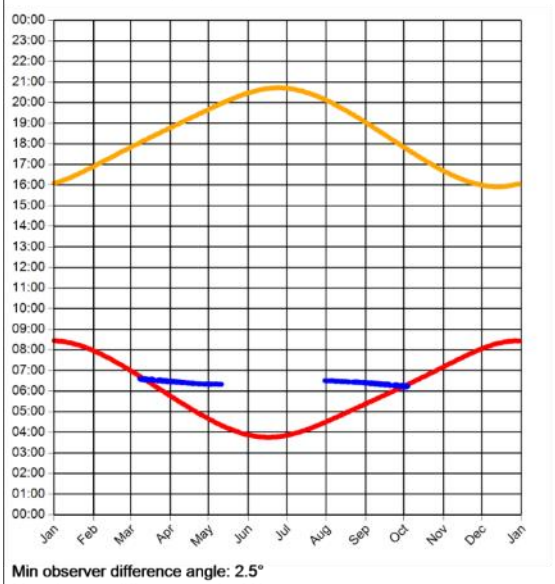


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 15 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.5°
Max observer difference angle: 22°

Observer Location — Sun azimuth range is 81.2° - 95.7° (yellow)

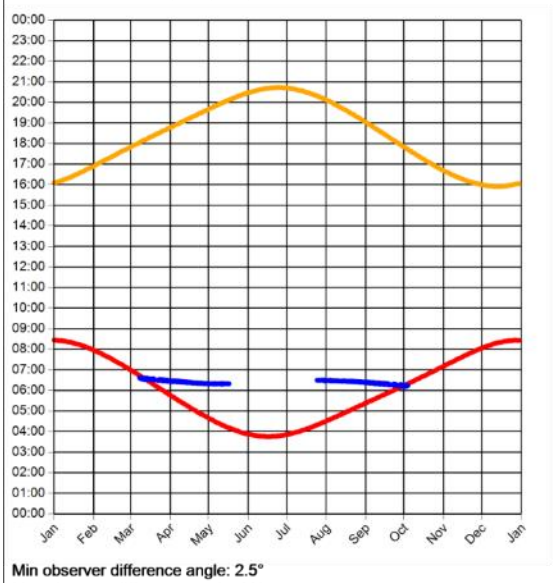


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 16 Results

Reflection Date/Time (GMT) Graph

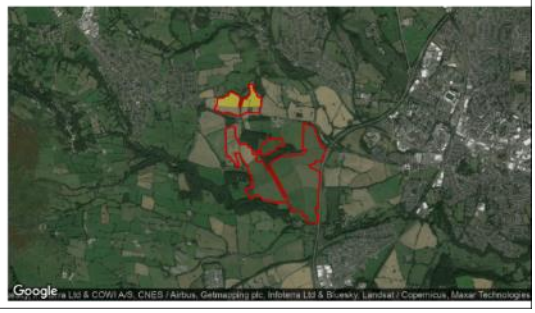


Min observer difference angle: 2.5°
Max observer difference angle: 23°

Observer Location — Sun azimuth range is 80.1° - 95.6° (yellow)

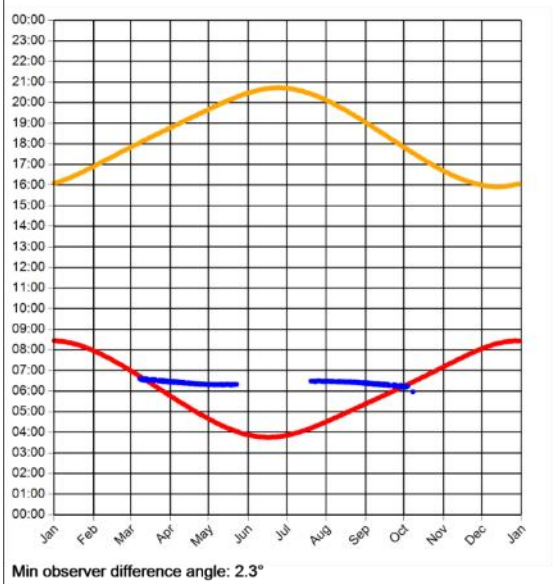


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 17 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 23.9°

Observer Location — Sun azimuth range is 79.3° - 95.5° (yellow)

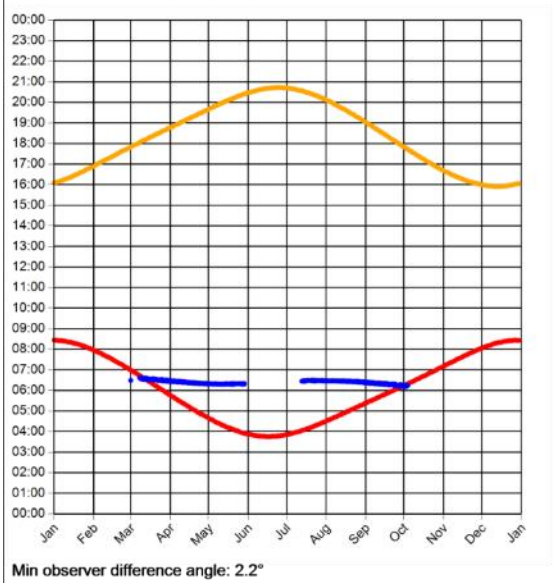


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 18 Results

Reflection Date/Time (GMT) Graph

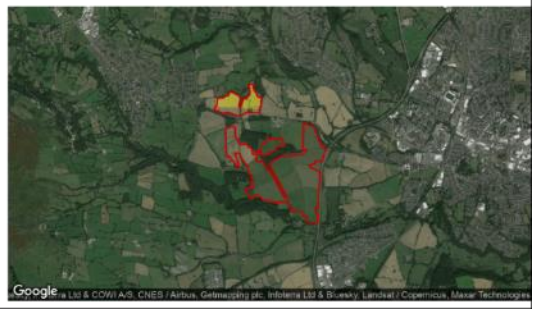


Min observer difference angle: 2.2°
Max observer difference angle: 24.6°

Observer Location — Sun azimuth range is 78.2° - 95.6° (yellow)

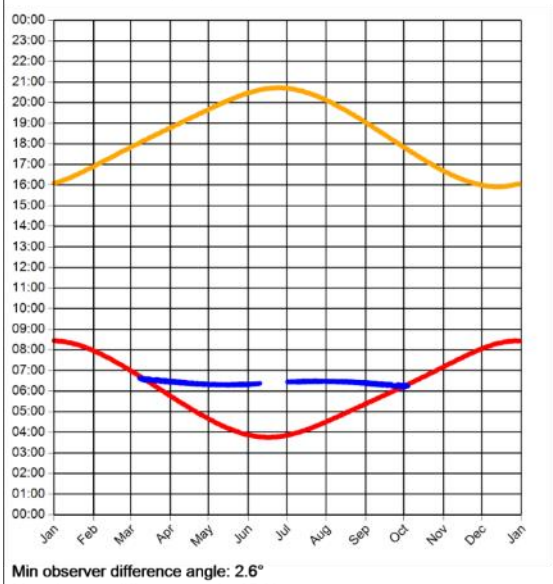


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 19 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 25.8°

Observer Location — Sun azimuth range is 77.7° - 95.7° (yellow)

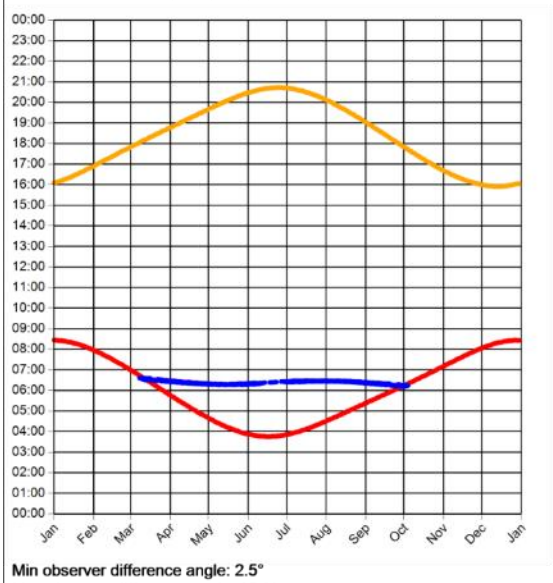


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 20 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.5°
Max observer difference angle: 25.9°

Observer Location — Sun azimuth range is 77.2° - 95.5° (yellow)

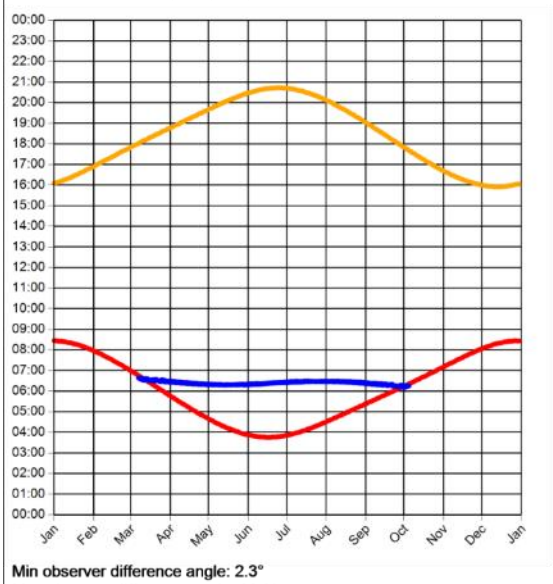


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



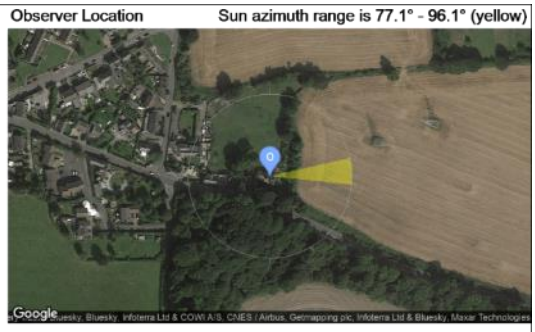
Observer 21 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 26.2°

Observer Location — Sun azimuth range is 77.1° - 96.1° (yellow)

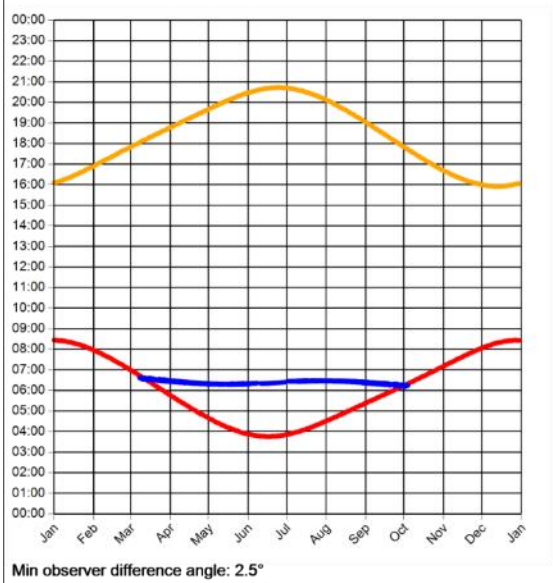


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 22 Results

Reflection Date/Time (GMT) Graph

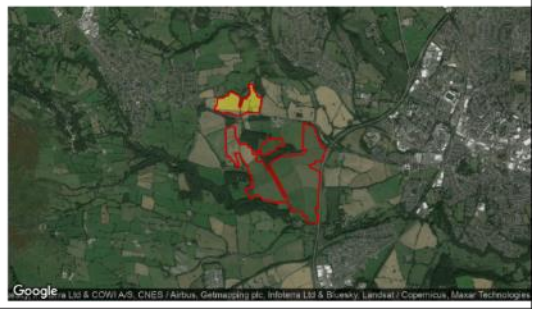


Min observer difference angle: 2.5°
Max observer difference angle: 25.5°

Observer Location — Sun azimuth range is 76.8° - 95.6° (yellow)

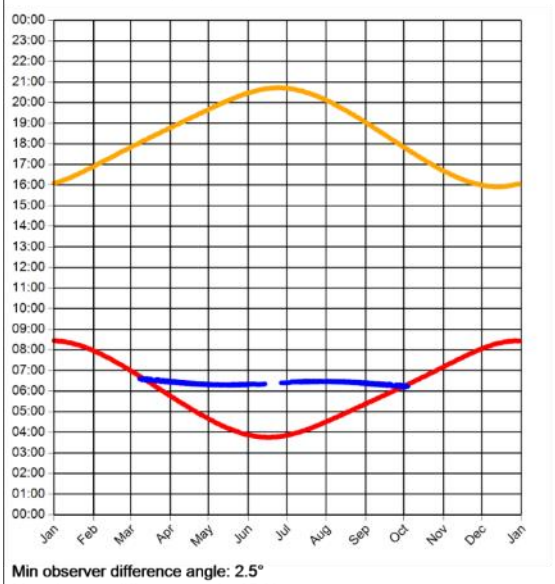


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 23 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.5°
Max observer difference angle: 25.3°

Observer Location — Sun azimuth range is 77.1° - 95.5° (yellow)

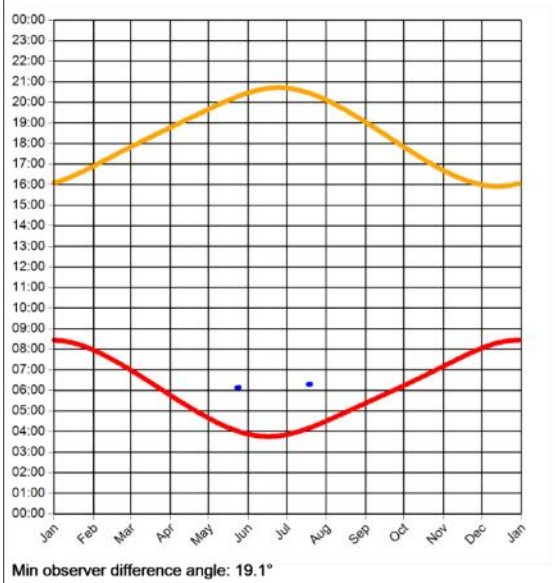


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 24 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 19.1°
Max observer difference angle: 19.4°

Observer Location — Sun azimuth range is 76.9° - 77.2° (yellow)

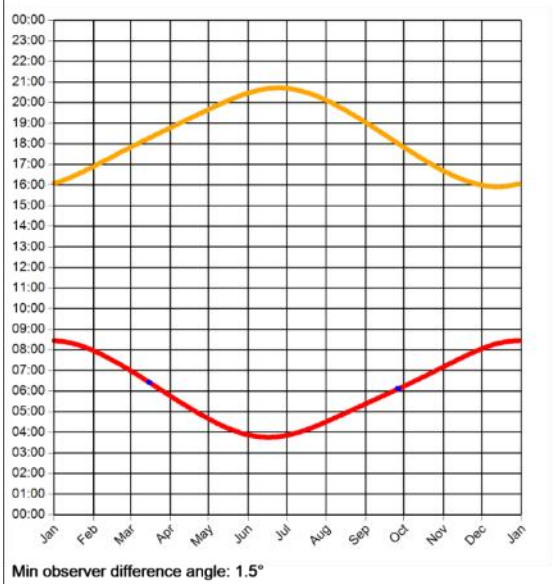


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



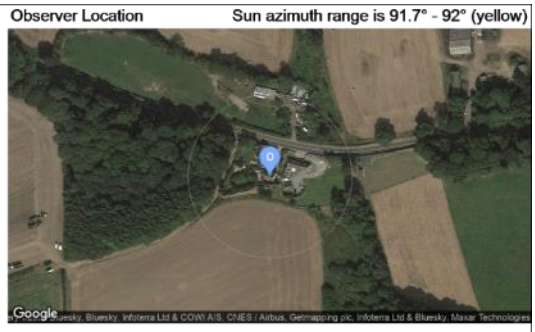
Observer 25 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 1.9°

Observer Location — Sun azimuth range is 91.7° - 92° (yellow)

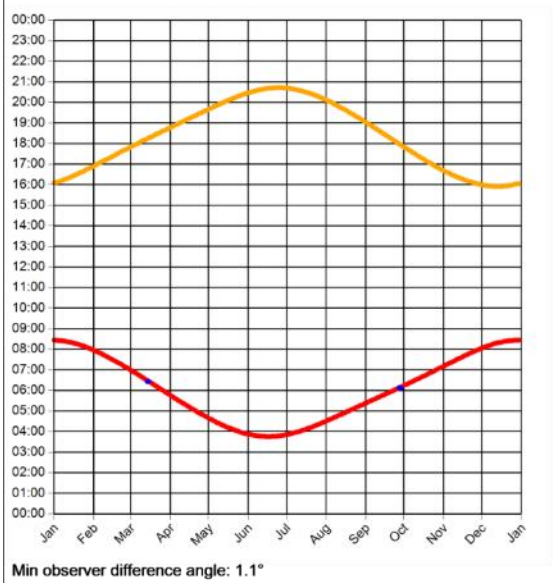


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 26 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.1°
Max observer difference angle: 1.7°

Observer Location — Sun azimuth range is 92.1° - 92.5° (yellow)

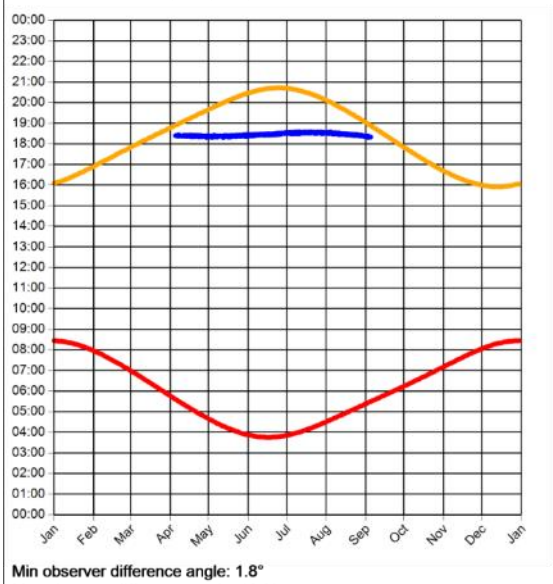


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



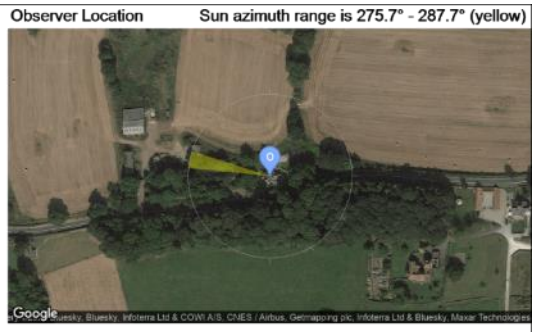
Observer 27 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.8°
Max observer difference angle: 16.3°

Observer Location — Sun azimuth range is 275.7° - 287.7° (yellow)

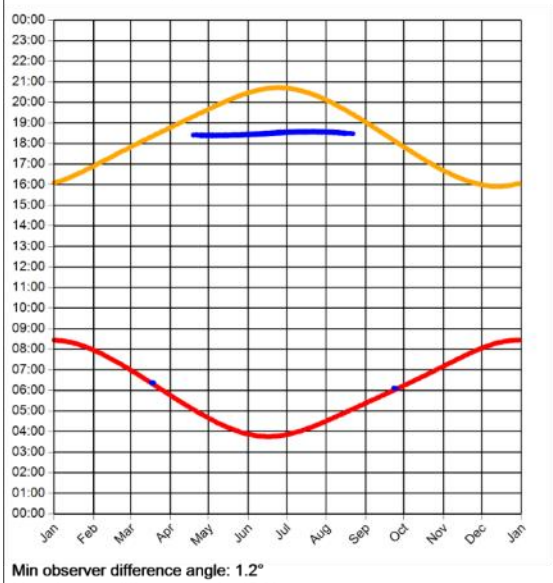


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 28 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 15.2°

Observer Location — Sun azimuth ranges (yellow)

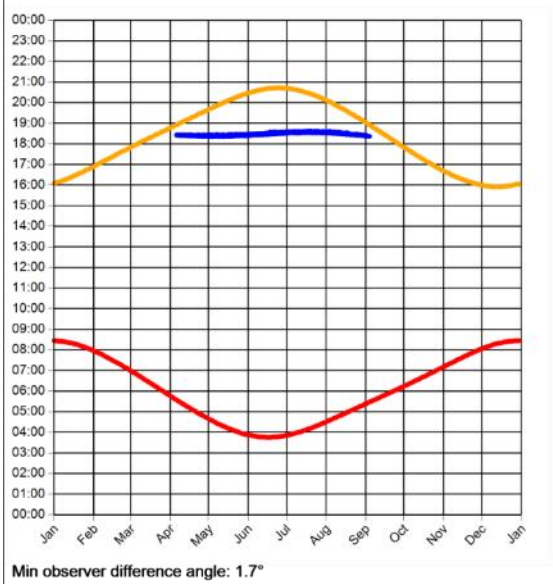


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



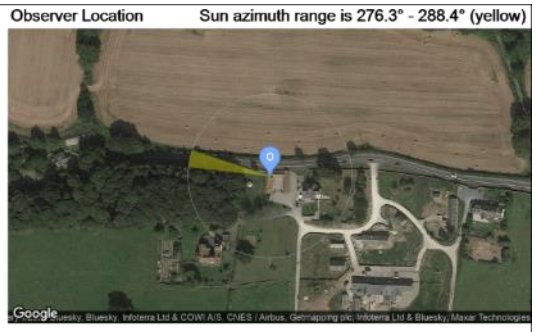
Observer 29 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 15.3°

Observer Location — Sun azimuth range is 276.3° - 288.4° (yellow)

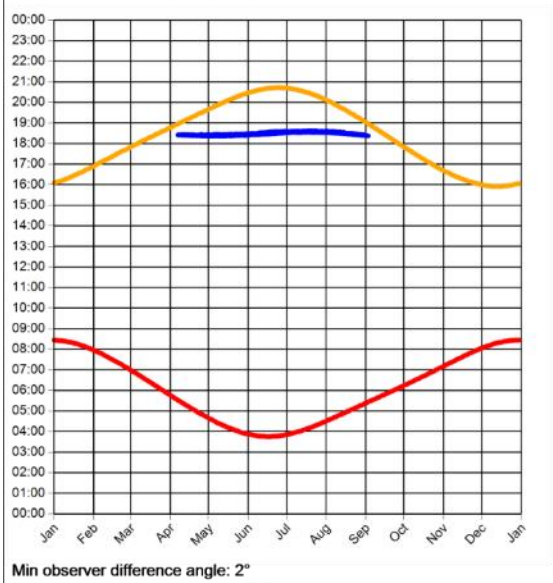


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 30 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 15.5°

Observer Location — Sun azimuth range is 276.6° - 288.5° (yellow)

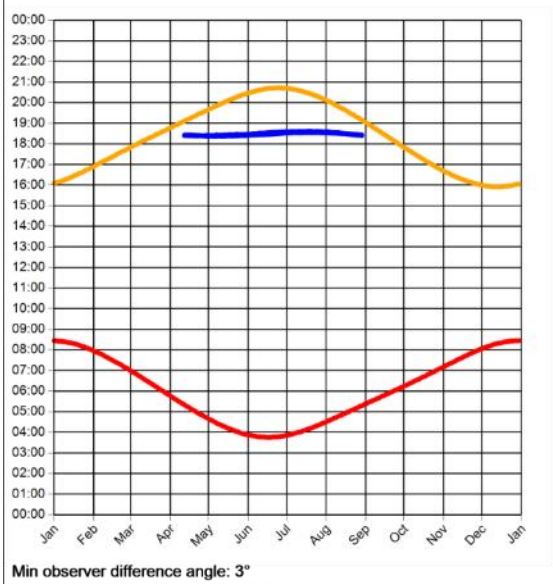


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 31 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 15.5°

Observer Location — Sun azimuth range is 277.7° - 288.3° (yellow)

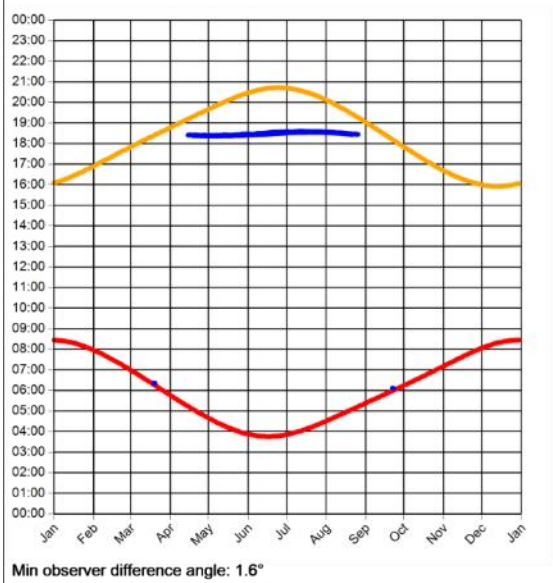


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 32 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 15.5°

Observer Location — Sun azimuth ranges (yellow)

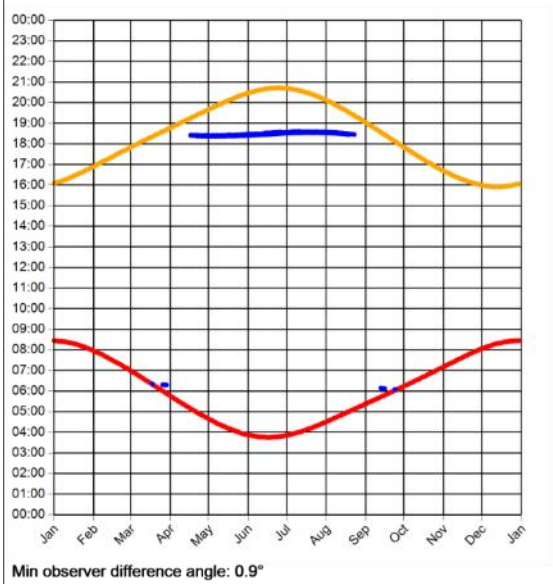


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 33 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 15.4°

Observer Location — Sun azimuth ranges (yellow)

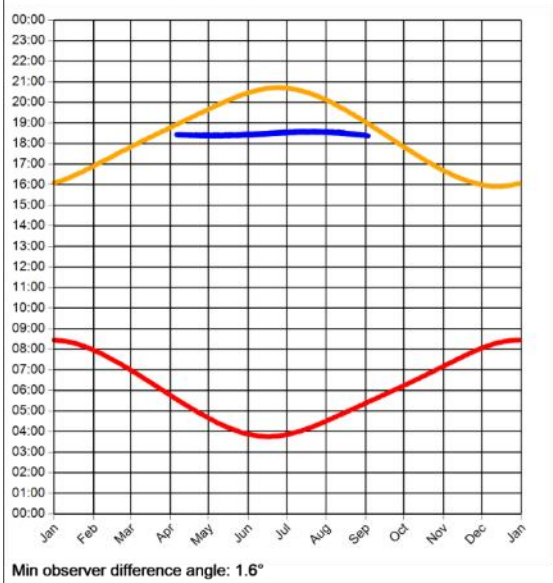


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 34 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 15.3°

Observer Location — Sun azimuth range is 276.5° - 287.9° (yellow)

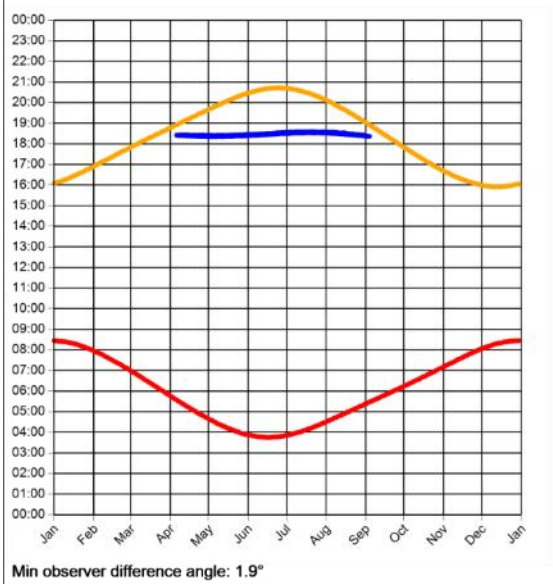


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 35 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 15.7°

Observer Location — Sun azimuth range is 276.3° - 287.9° (yellow)

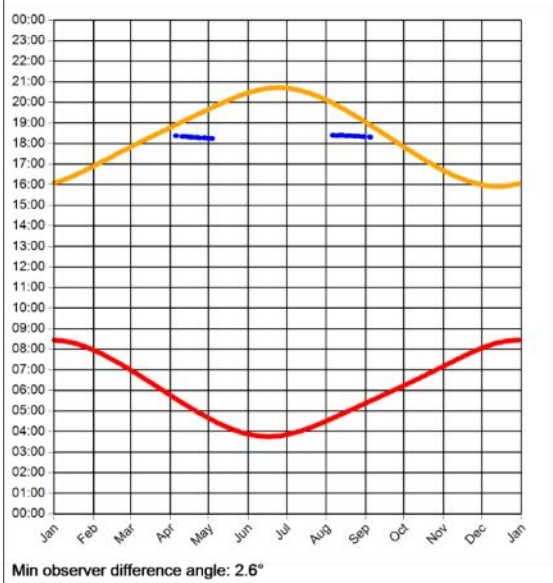


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 36 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 12.4°

Observer Location — Sun azimuth range is 275.5° - 281.3° (yellow)

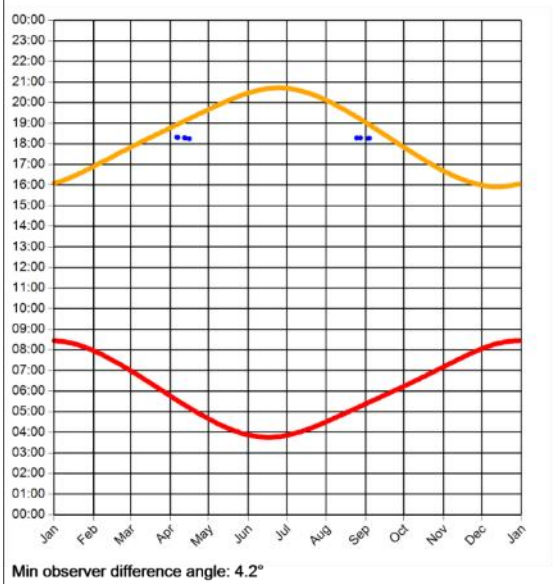


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 37 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.2°
Max observer difference angle: 8.3°

Observer Location — Sun azimuth range is 275.2° - 277° (yellow)

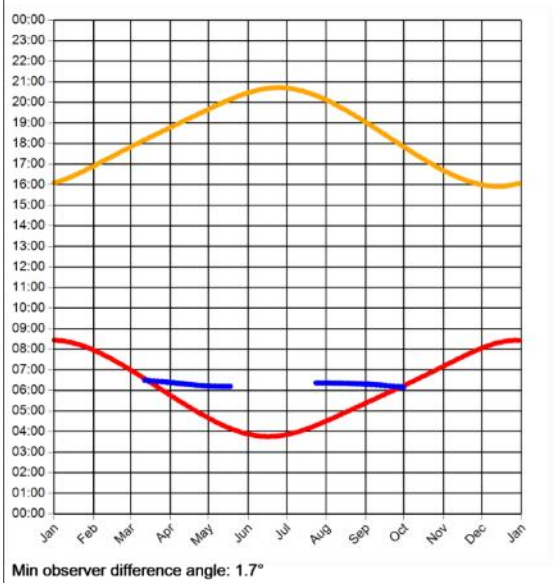


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 97 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 20.1°

Observer Location — Sun azimuth range is 78.4° - 93.5° (yellow)

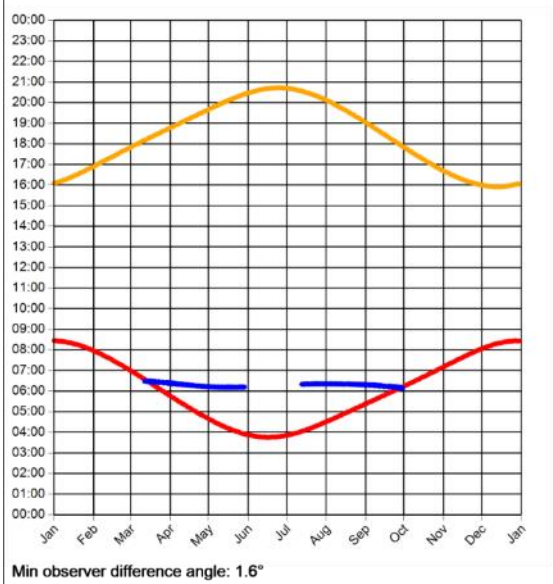


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 98 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 21.4°

Observer Location — Sun azimuth range is 76.9° - 93.4° (yellow)

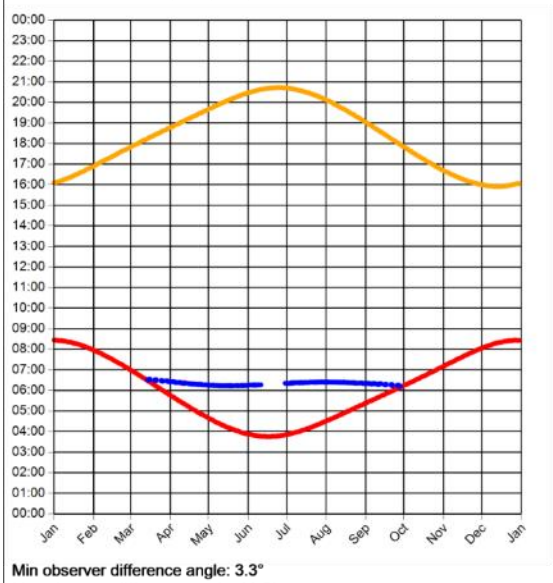


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 99 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 23.5°

Observer Location — Sun azimuth range is 76.5° - 93.6° (yellow)

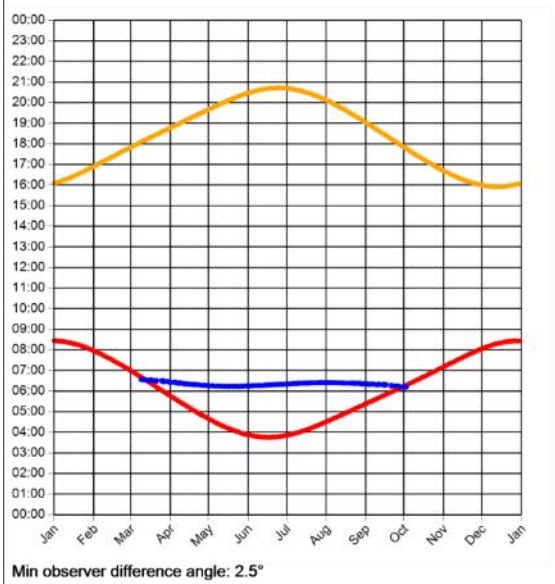


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 100 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.5°
Max observer difference angle: 24.1°

Observer Location — Sun azimuth range is 76.2° - 94.8° (yellow)

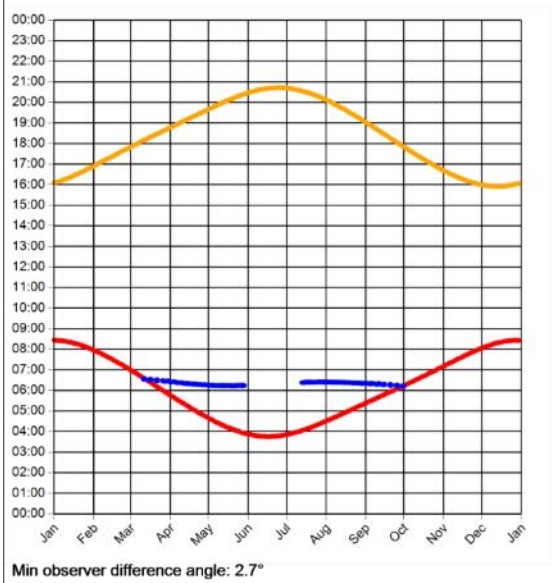


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 101 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 22.6°

Observer Location — Sun azimuth range is 77.4° - 94.4° (yellow)

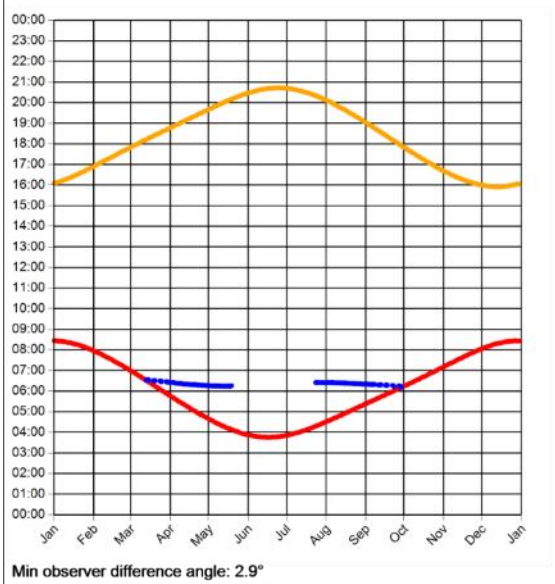


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 102 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 21.5°

Observer Location — Sun azimuth range is 78.9° - 93.9° (yellow)

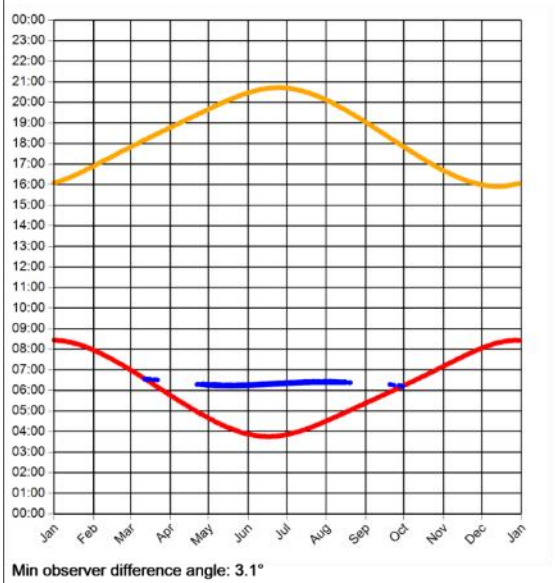


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 103 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.1°
Max observer difference angle: 24.6°

Observer Location — Sun azimuth ranges (yellow)

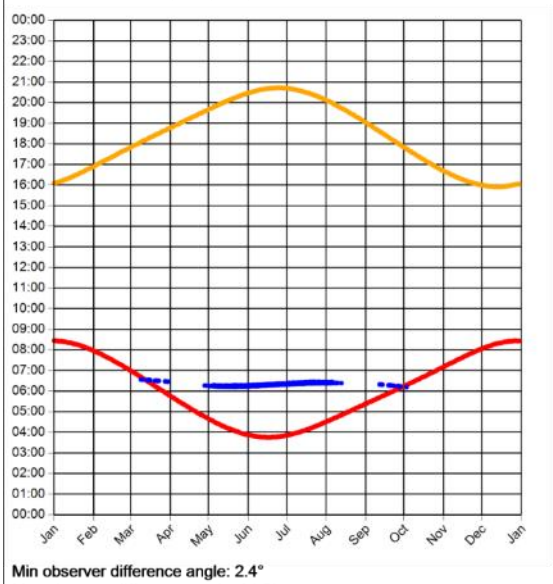


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



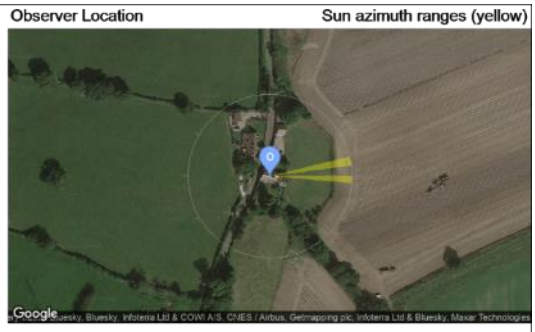
Observer 104 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 24.5°

Observer Location — Sun azimuth ranges (yellow)

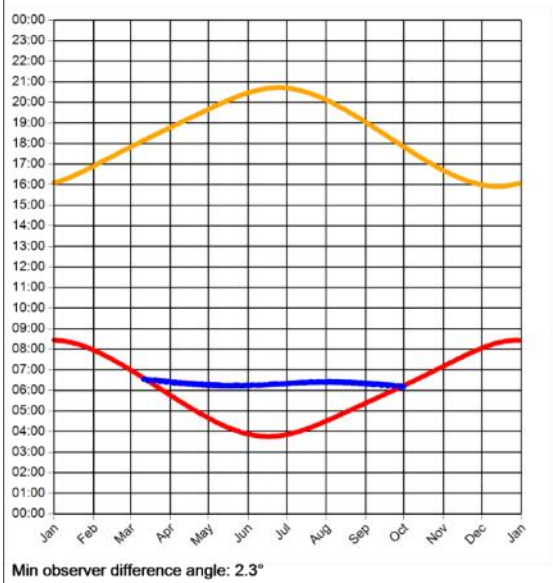


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 105 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 24.1°

Observer Location — Sun azimuth range is 76° - 94.2° (yellow)

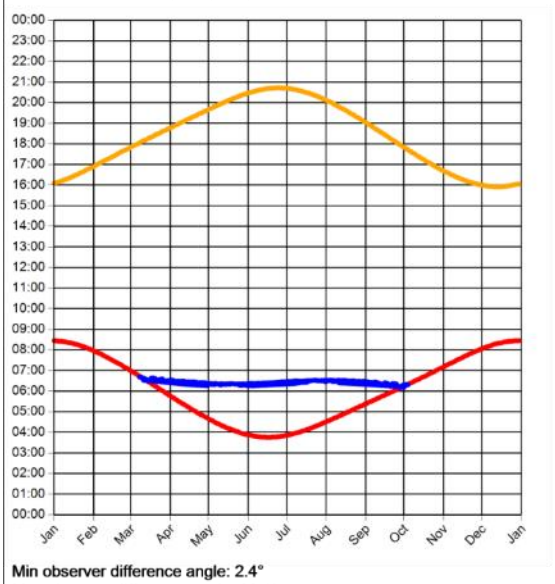


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 106 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 26.4°

Observer Location — Sun azimuth range is 76.2° - 96.4° (yellow)

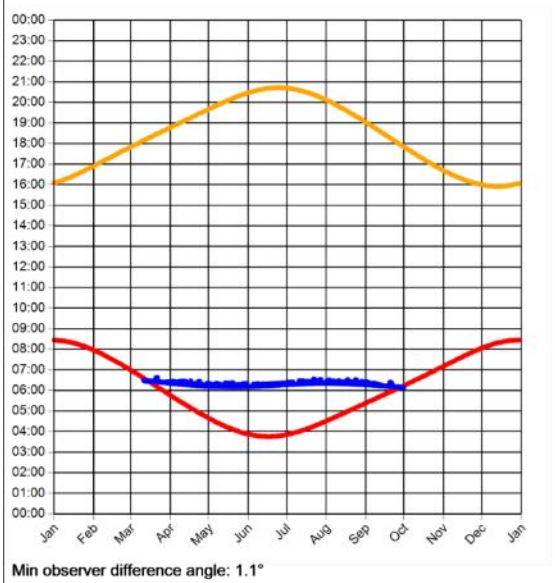


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 107 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.1°
Max observer difference angle: 25.1°

Observer Location — Sun azimuth range is 75.4° - 93.5° (yellow)

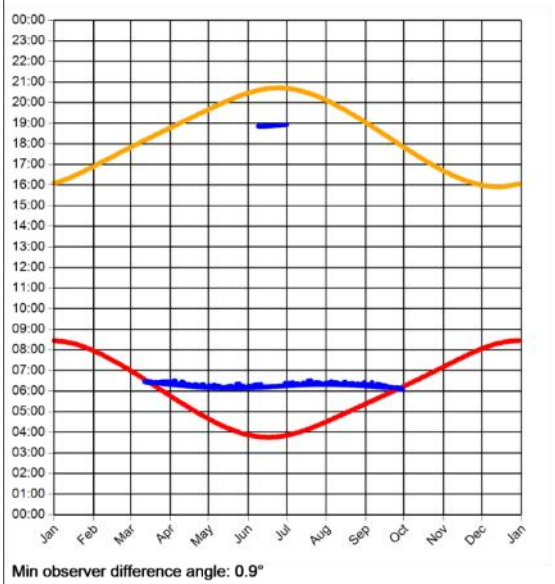


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 108 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 24.6°

Observer Location — Sun azimuth ranges (yellow)

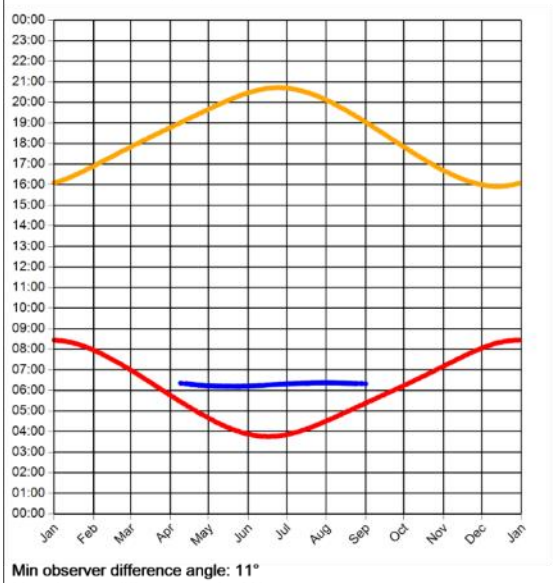


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 109 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 11°
Max observer difference angle: 23°

Observer Location — Sun azimuth range is 75.9° - 86.8° (yellow)

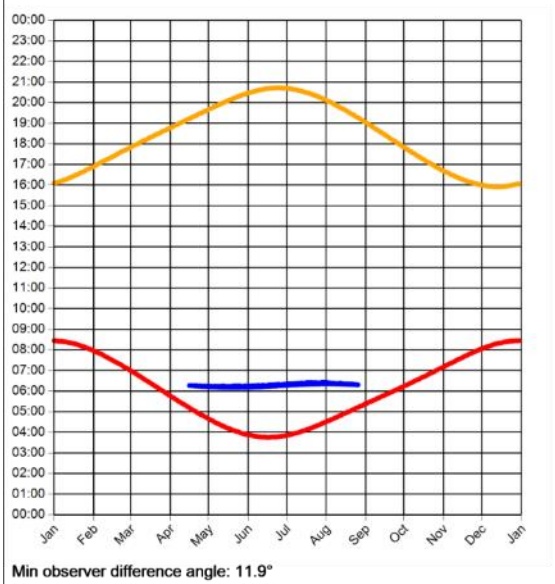


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 110 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 11.9°
Max observer difference angle: 23.9°

Observer Location — Sun azimuth range is 75.5° - 84.7° (yellow)

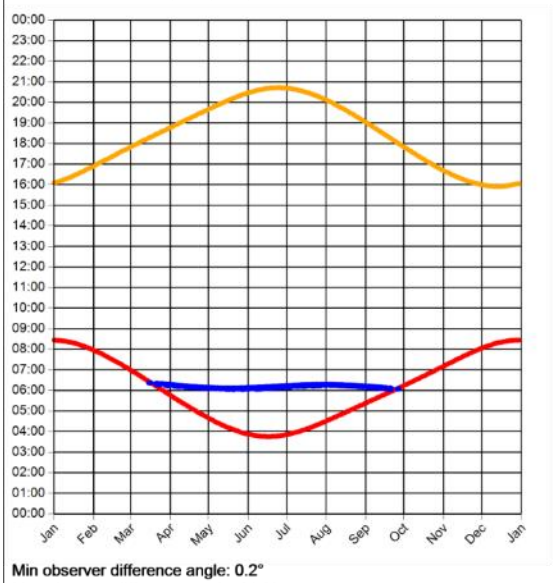


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 111 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.2°
Max observer difference angle: 21.2°

Observer Location — Sun azimuth range is 74° - 91.6° (yellow)

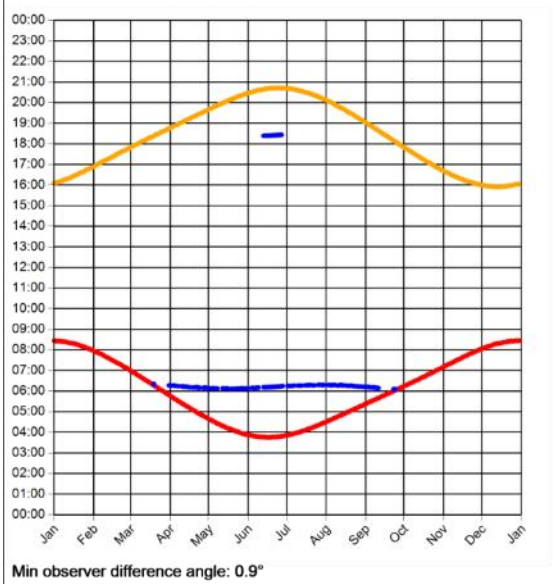


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 113 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.9°
Max observer difference angle: 21.4°

Observer Location — Sun azimuth ranges (yellow)

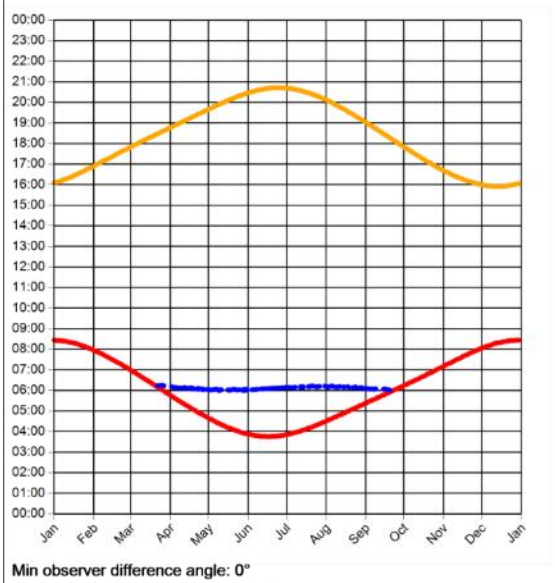


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 114 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0°
Max observer difference angle: 18.8°

Observer Location — Sun azimuth range is 74° - 88.6° (yellow)

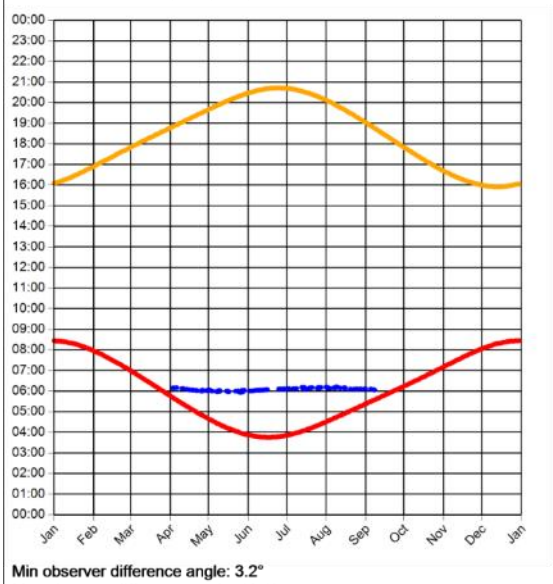


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 115 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 73.8° - 85.5° (yellow)

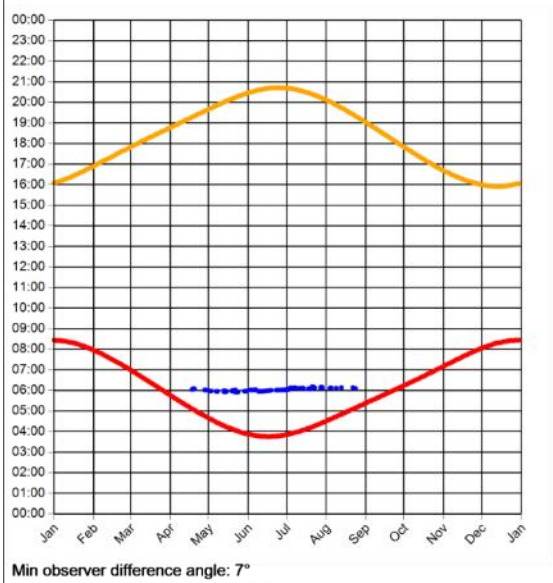


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 116 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 72.9° - 82° (yellow)

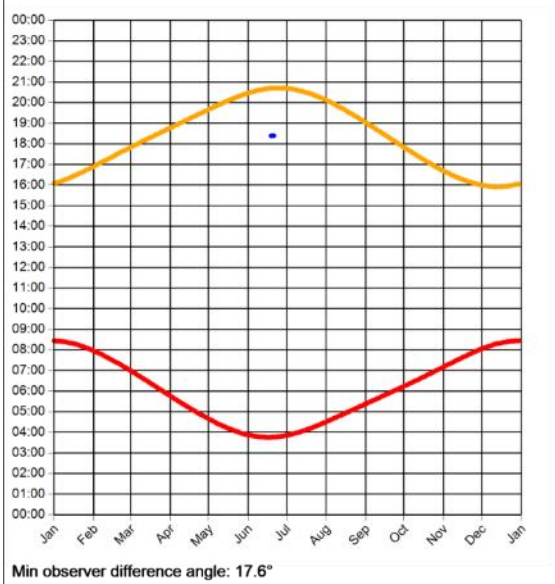


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 159 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 17.6°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 286.5° - 286.5° (yellow)

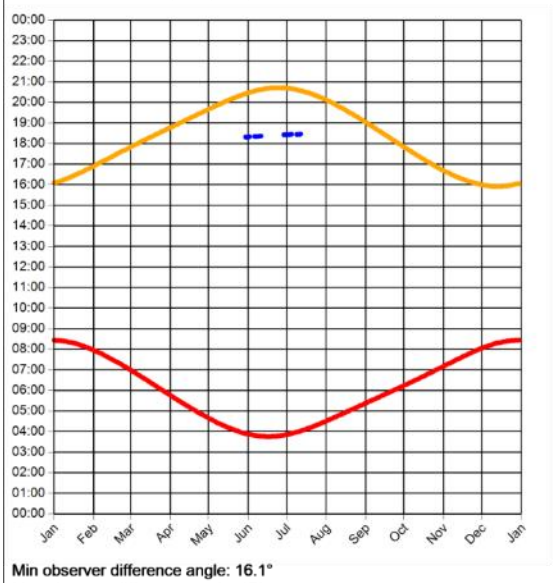


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 160 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 16.1°
Max observer difference angle: 17°

Observer Location — Sun azimuth range is 285.4° - 286.3° (yellow)

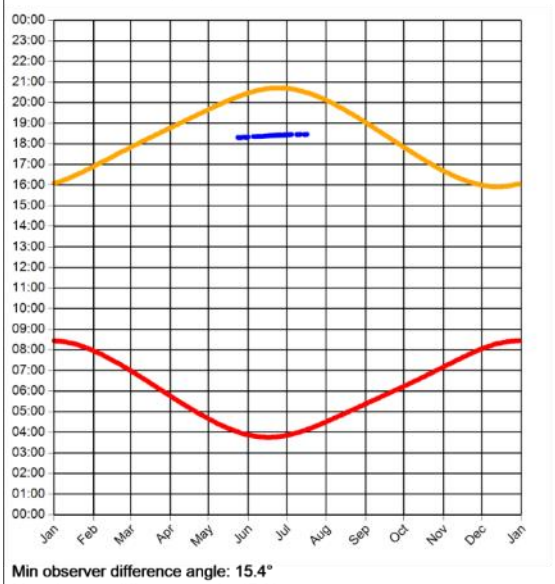


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 161 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 15.4°
Max observer difference angle: 17.3°

Observer Location Sun azimuth range is 284.8° - 286.6° (yellow)

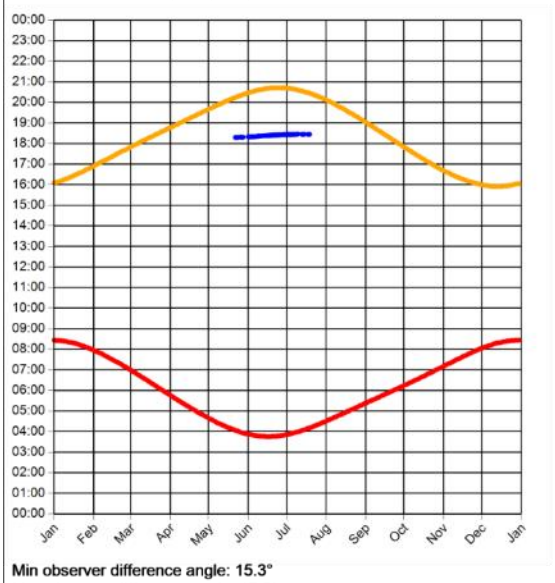


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 162 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 15.3°
Max observer difference angle: 17.5°

Observer Location Sun azimuth range is 284.4° - 286.7° (yellow)

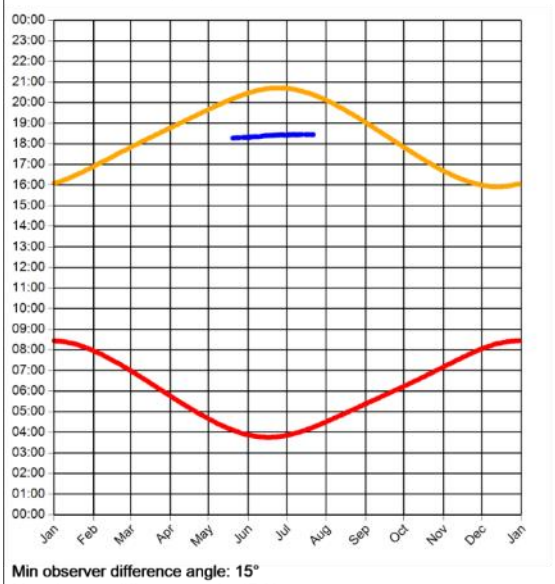


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 163 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 15°
Max observer difference angle: 17.2°

Observer Location — Sun azimuth range is 284° - 286.7° (yellow)

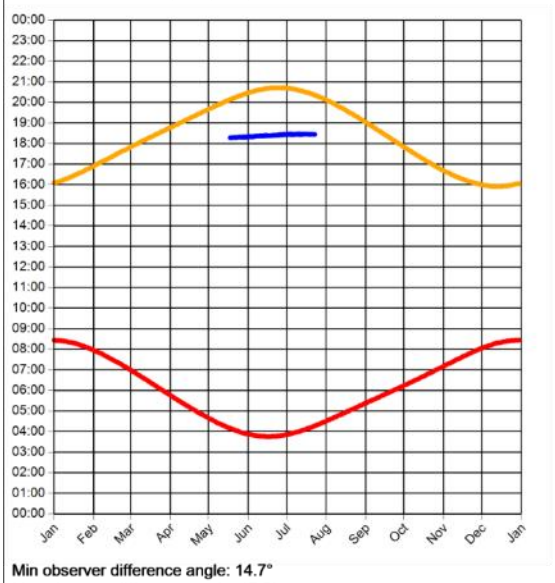


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 164 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 14.7°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 283.8° - 286.7° (yellow)

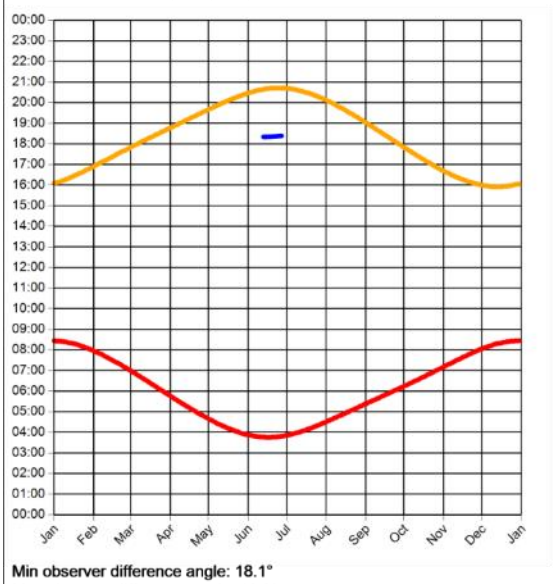


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 167 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 18.1°
Max observer difference angle: 18.3°

Observer Location — Sun azimuth range is 286° - 286.1° (yellow)

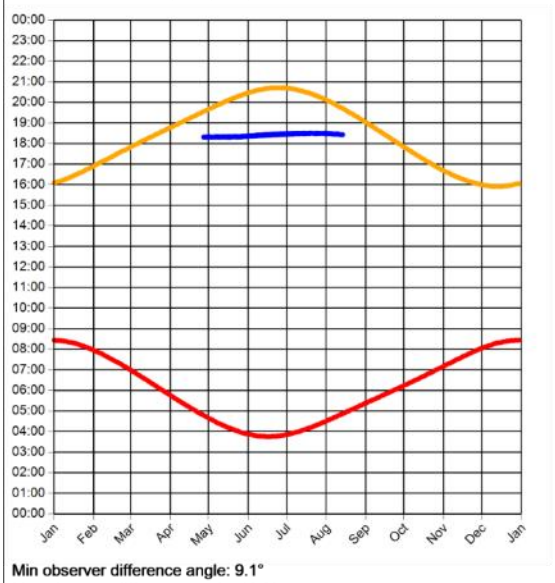


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 169 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 9.1°
Max observer difference angle: 16.8°

Observer Location — Sun azimuth range is 280.4° - 287.2° (yellow)

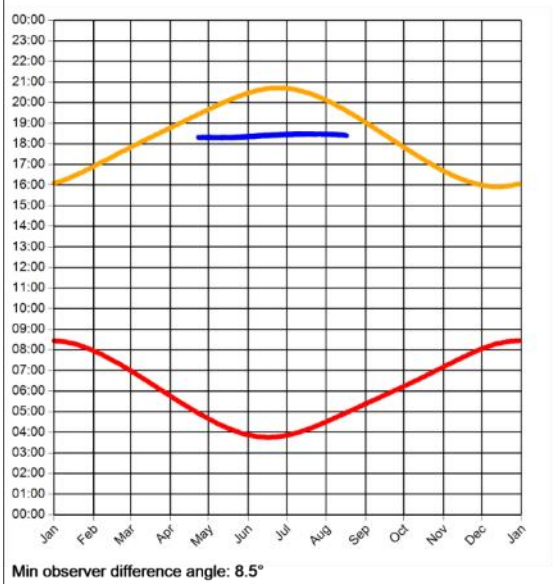


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



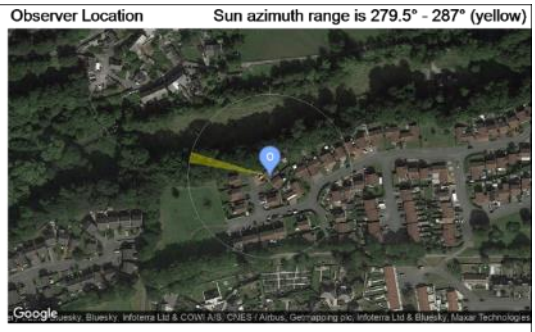
Observer 170 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 8.5°
Max observer difference angle: 17.2°

Observer Location — Sun azimuth range is 279.5° - 287° (yellow)

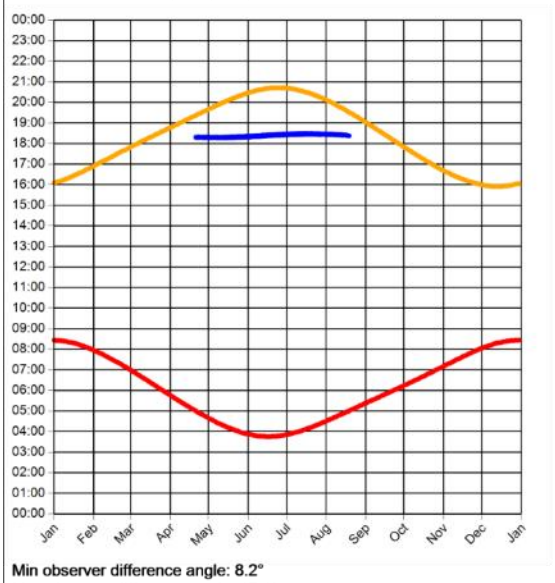


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 171 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 8.2°
Max observer difference angle: 17.4°

Observer Location — Sun azimuth range is 278.9° - 286.9° (yellow)

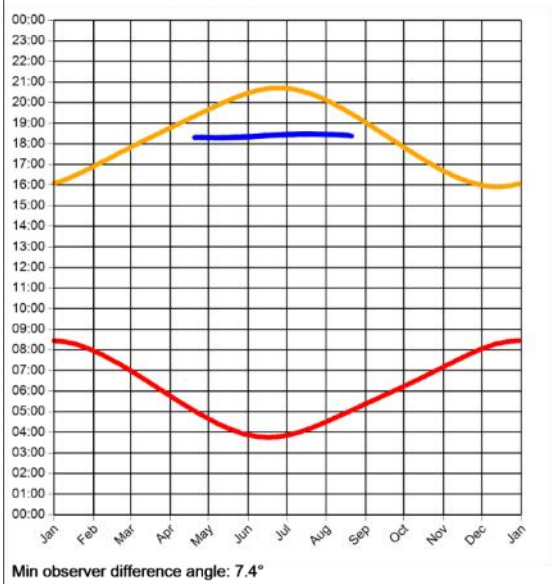


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



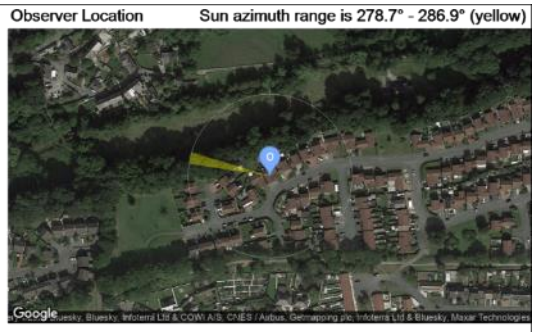
Observer 172 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7.4°
Max observer difference angle: 17.1°

Observer Location — Sun azimuth range is 278.7° - 286.9° (yellow)

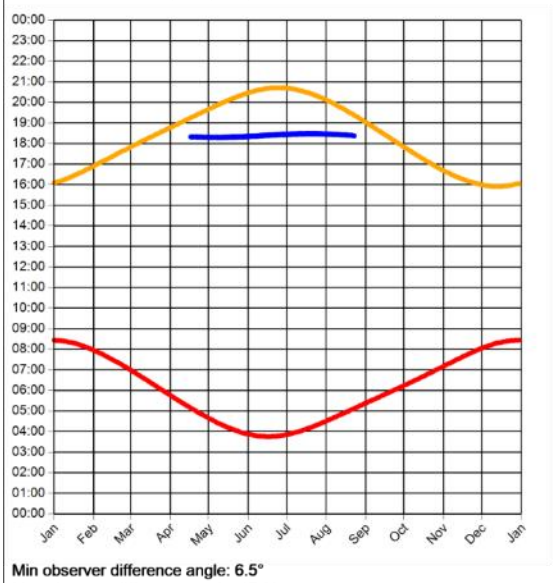


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 173 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 6.5°
Max observer difference angle: 17.3°

Observer Location — Sun azimuth range is 278.1° - 286.9° (yellow)

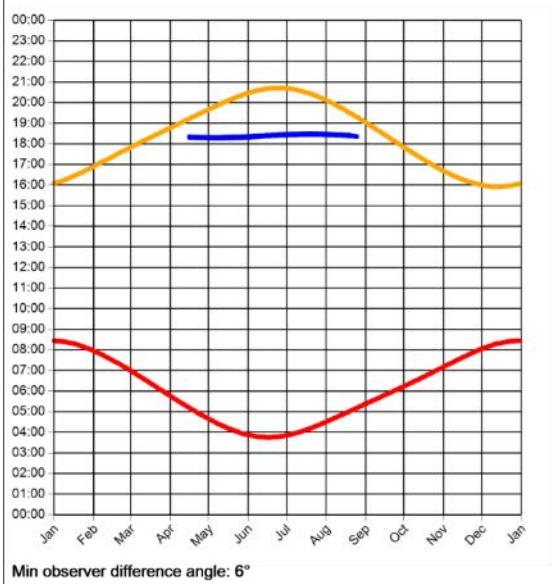


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 174 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 6°
Max observer difference angle: 17.4°

Observer Location — Sun azimuth range is 277.7° - 286.8° (yellow)

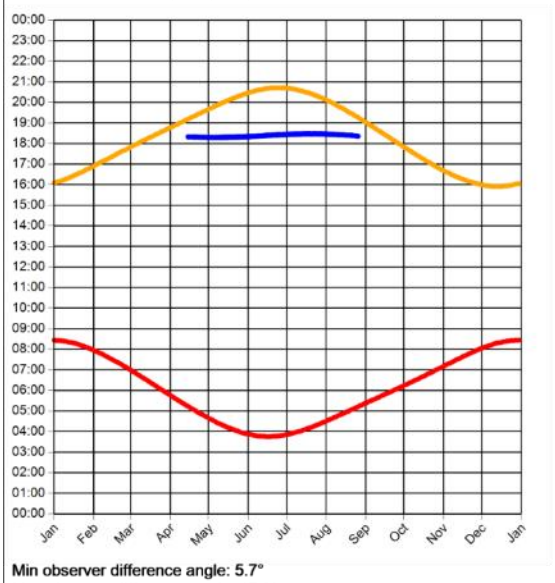


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 175 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 5.7°
Max observer difference angle: 17.3°

Observer Location — Sun azimuth range is 277.5° - 286.9° (yellow)

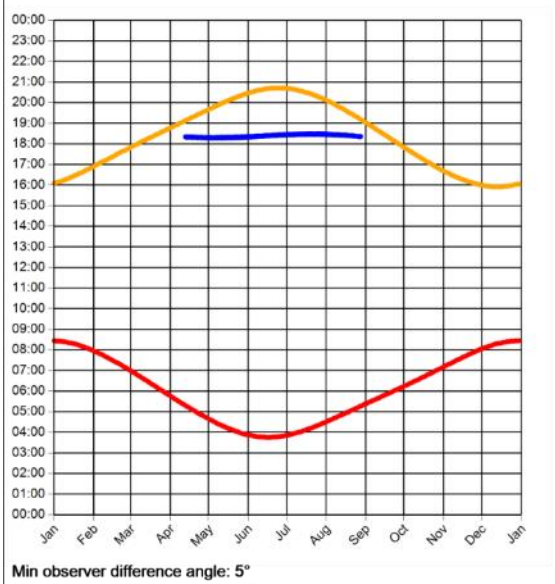


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 176 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 5°
Max observer difference angle: 17.2°

Observer Location Sun azimuth range is 277.2° - 286.8° (yellow)

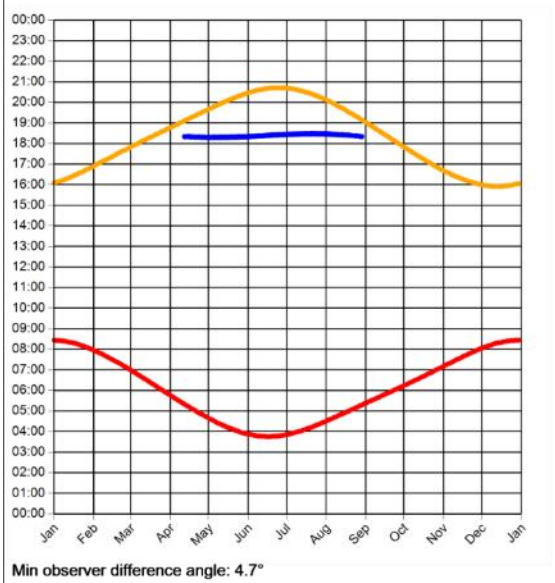


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 177 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.7°
Max observer difference angle: 17.3°

Observer Location Sun azimuth range is 276.9° - 286.9° (yellow)

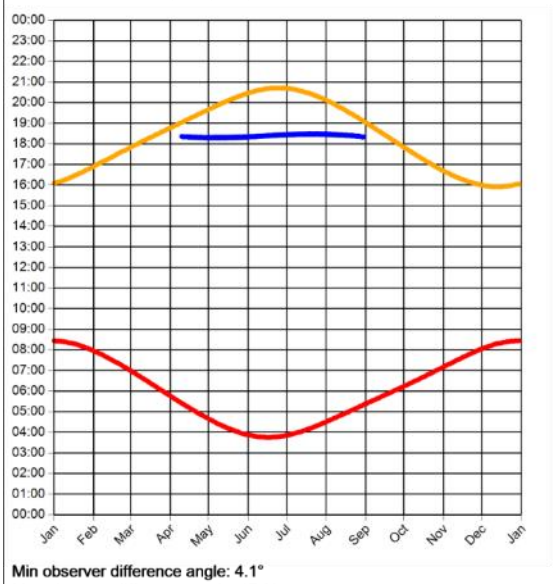


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



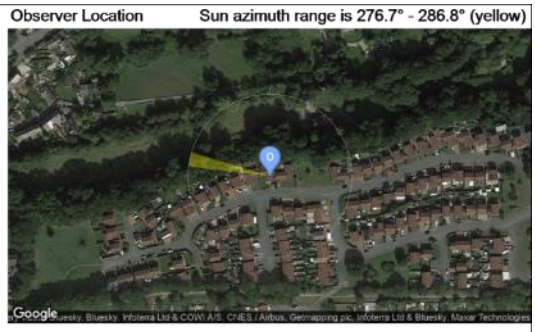
Observer 178 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.1°
Max observer difference angle: 17.2°

Observer Location — Sun azimuth range is 276.7° - 286.8° (yellow)

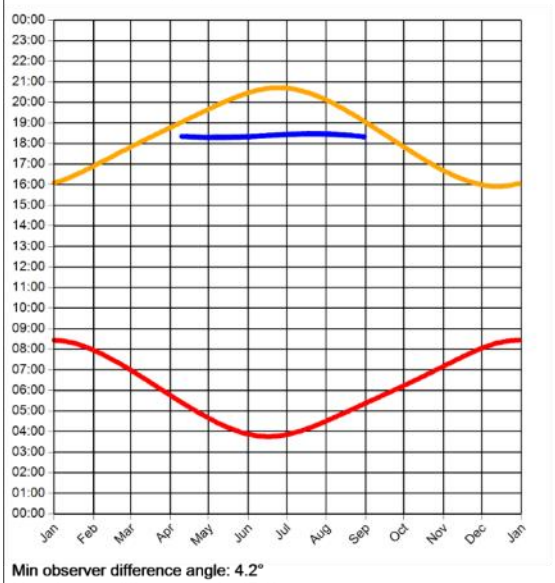


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 179 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.2°
Max observer difference angle: 17.4°

Observer Location — Sun azimuth range is 276.5° - 286.7° (yellow)

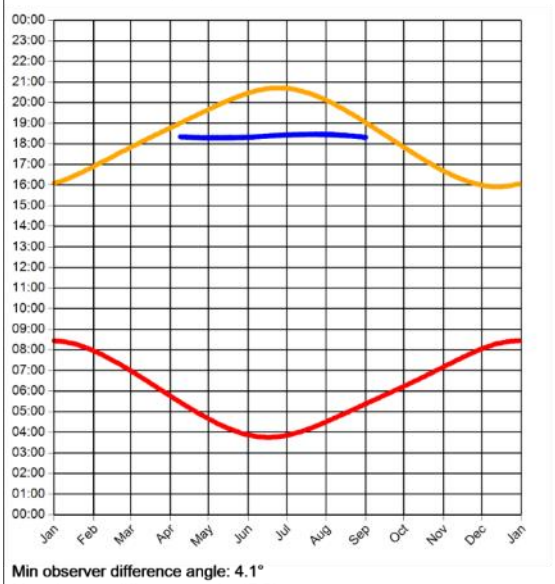


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 180 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 4.1°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 276.2° - 286.6° (yellow)

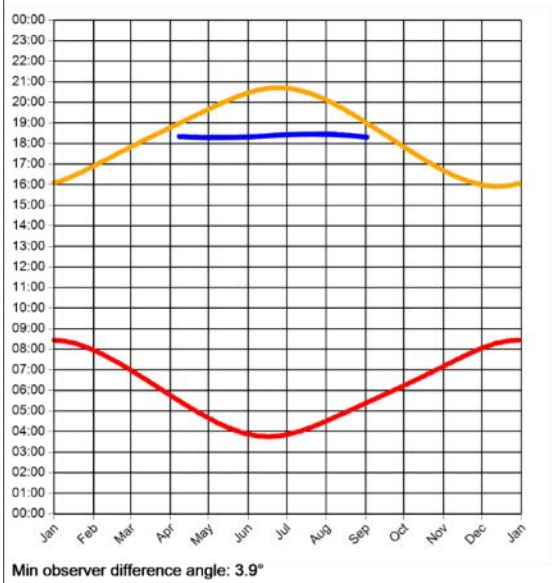


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 181 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.9°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 275.9° - 286.6° (yellow)

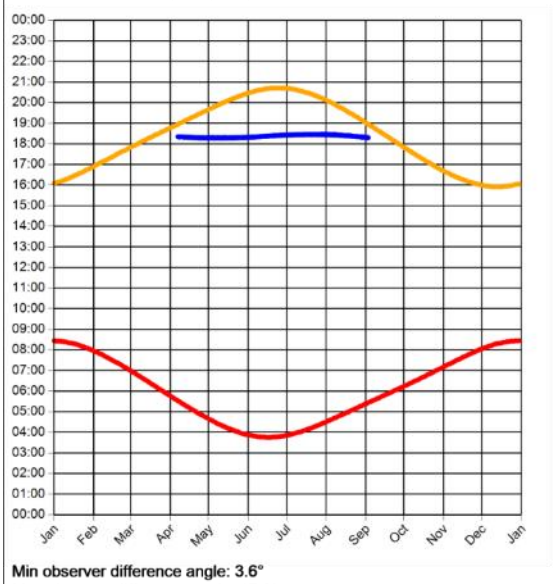


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 182 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.6°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 275.7° - 286.6° (yellow)

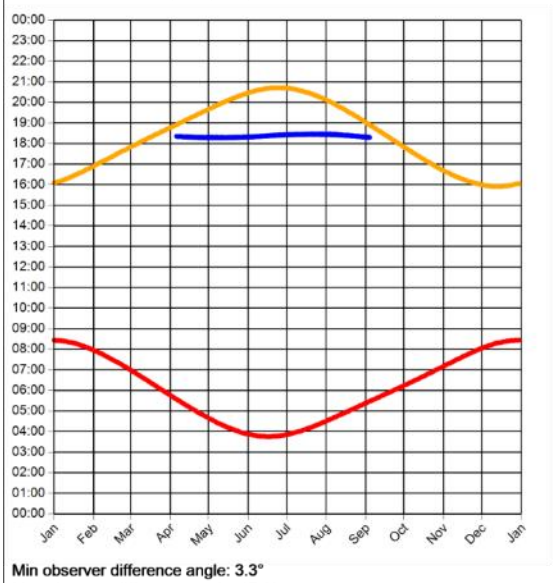


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 183 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 275.5° - 286.6° (yellow)

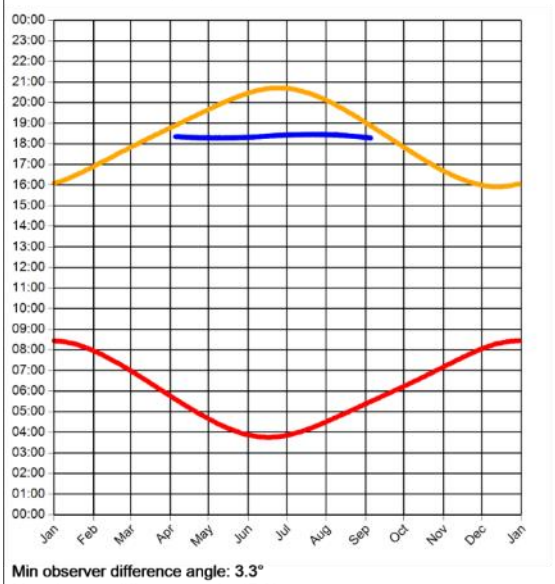


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 184 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.3°
Max observer difference angle: 17.6°

Observer Location — Sun azimuth range is 275.2° - 286.6° (yellow)

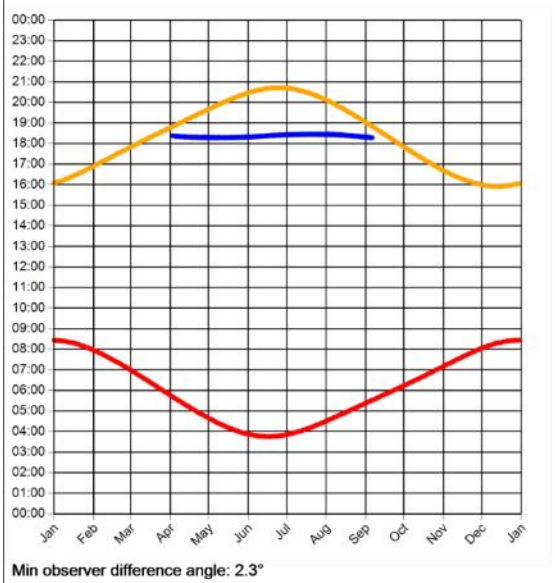


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 185 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 17.6°

Observer Location — Sun azimuth range is 275° - 286.6° (yellow)

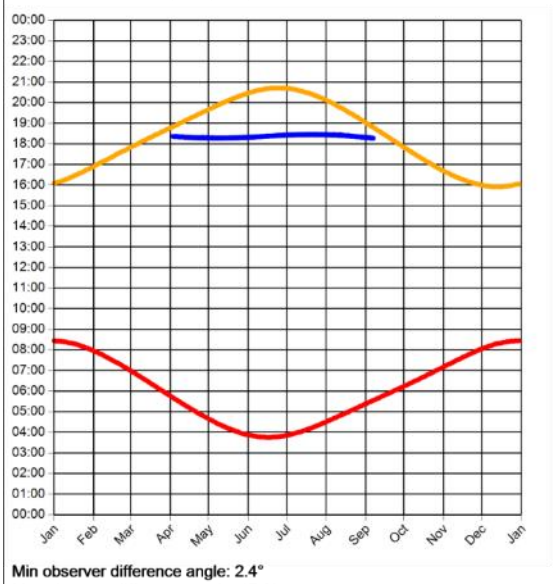


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



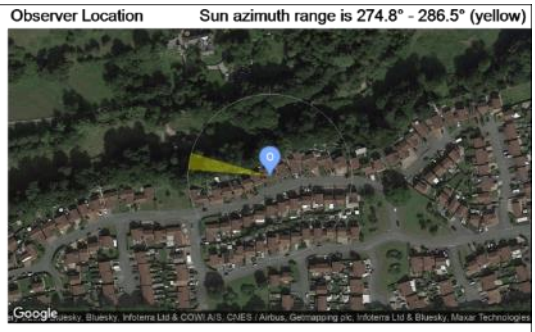
Observer 186 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 274.8° - 286.5° (yellow)

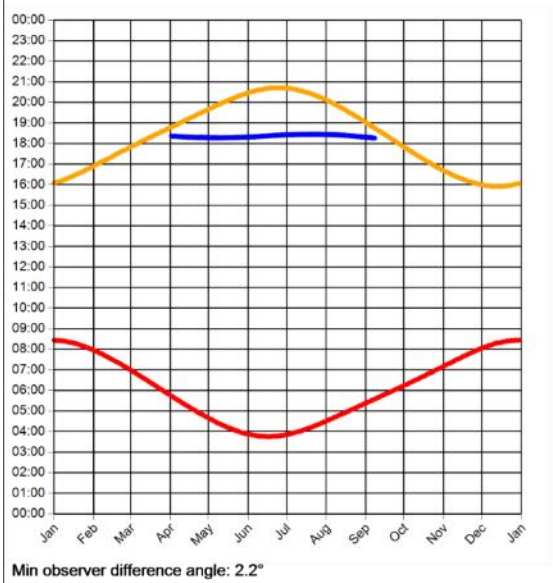


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 187 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 274.5° - 286.5° (yellow)

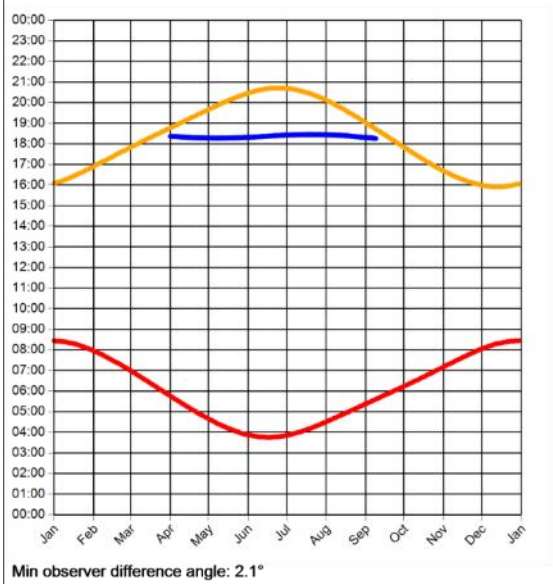


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 188 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 274.3° - 286.5° (yellow)

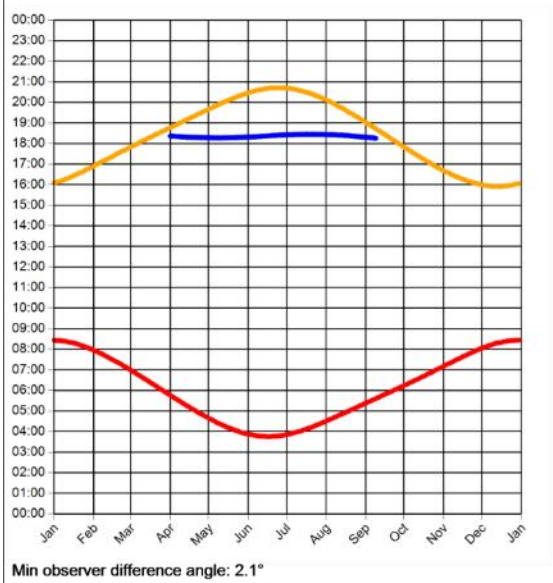


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 189 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 17.7°

Observer Location Sun azimuth range is 274.2° - 286.5° (yellow)

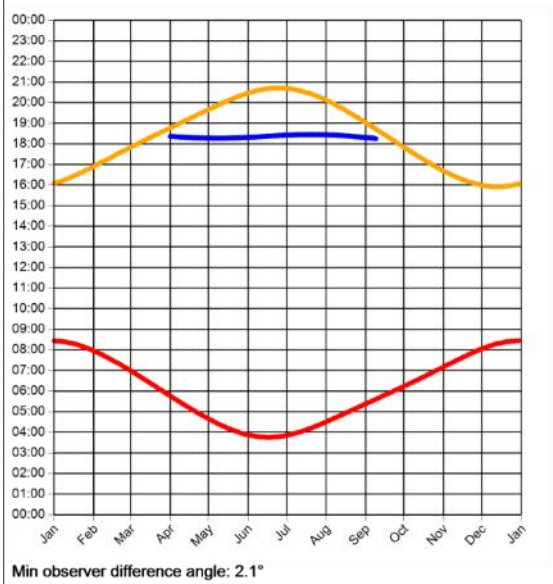


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



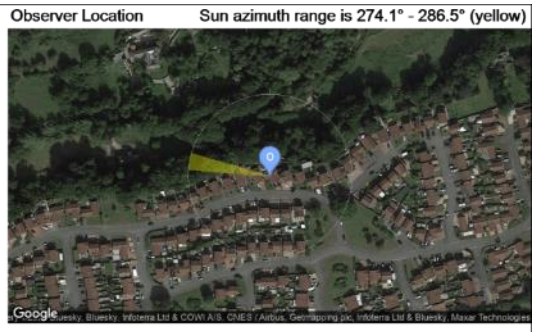
Observer 190 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 17.6°

Observer Location — Sun azimuth range is 274.1° - 286.5° (yellow)

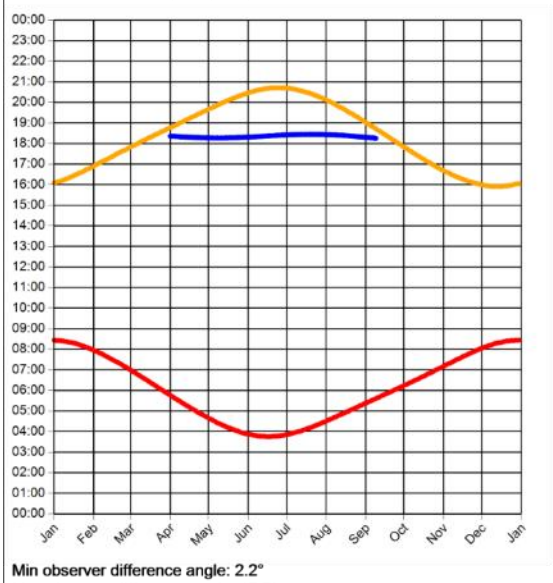


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 191 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 274.1° - 286.5° (yellow)

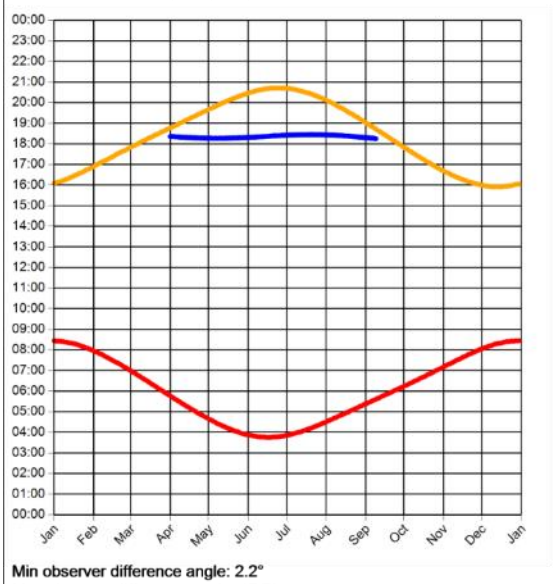


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 192 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 274.1° - 286.5° (yellow)

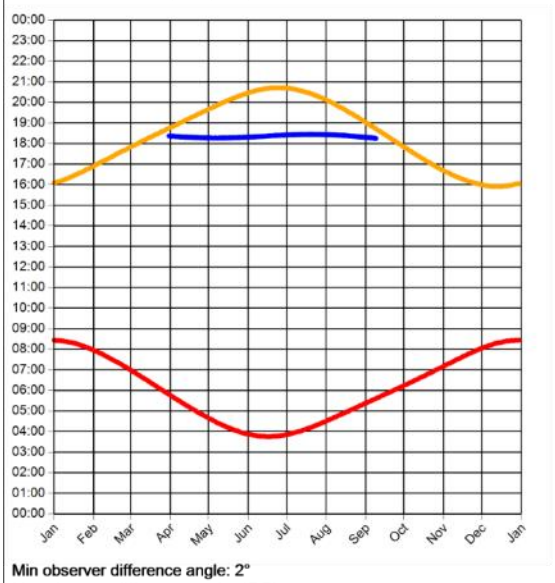


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 193 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 274° - 286.4° (yellow)

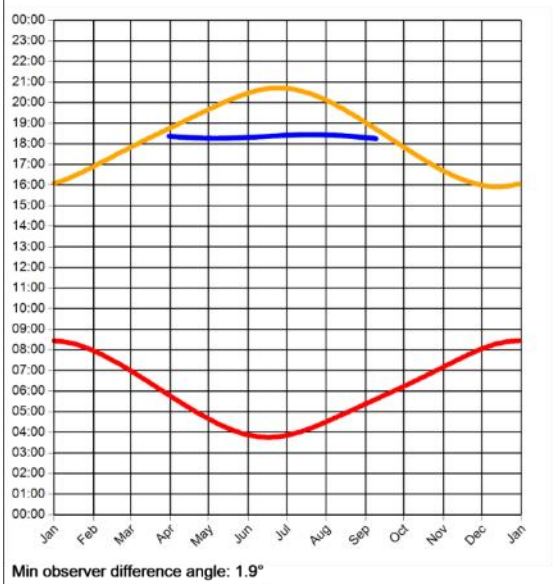


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 194 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 274° - 286.4° (yellow)

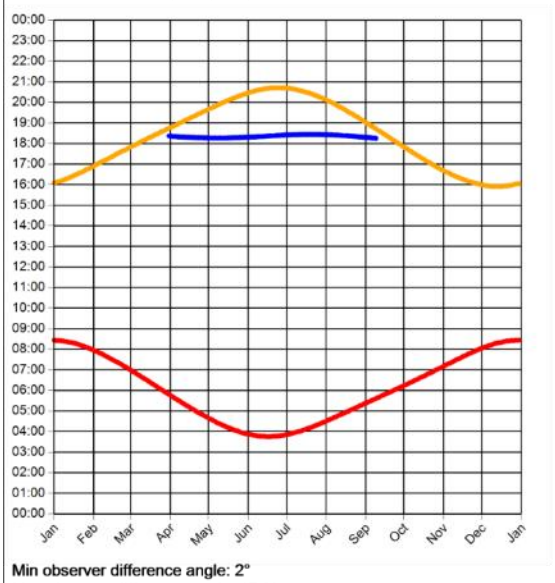


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 195 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274° - 286.4° (yellow)

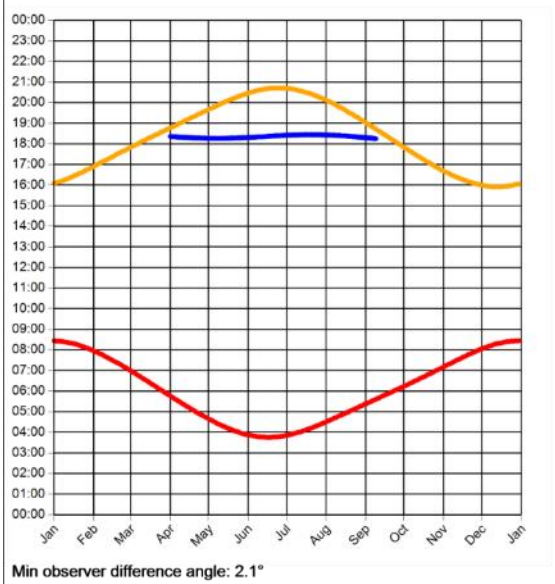


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 196 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274.2° - 286.4° (yellow)

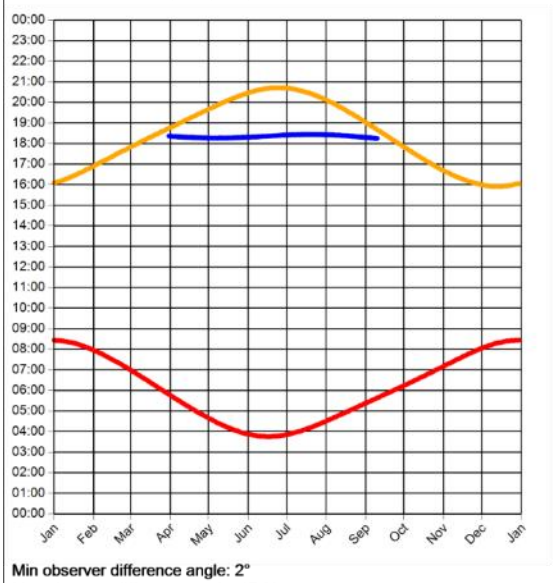


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 197 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274° - 286.3° (yellow)

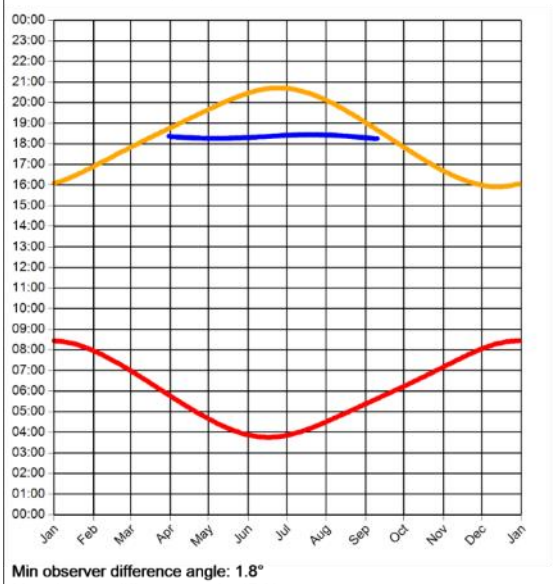


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 198 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.8°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 274° - 286.3° (yellow)

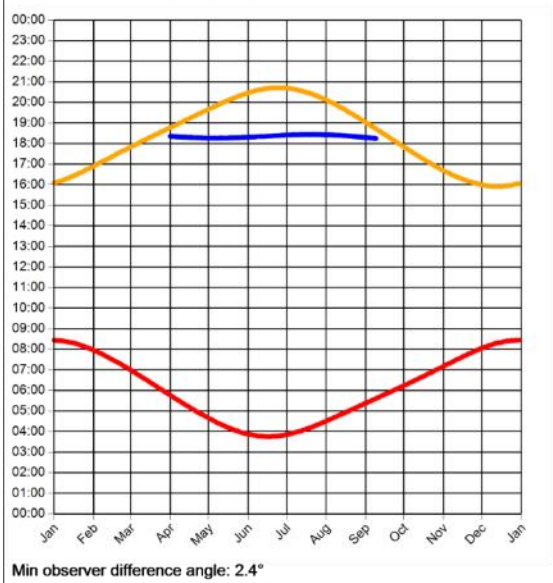


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 199 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274.1° - 286.3° (yellow)

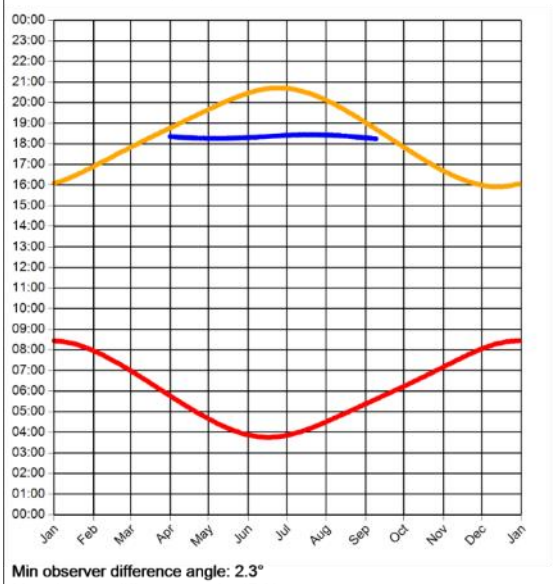


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 200 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274° - 286.3° (yellow)

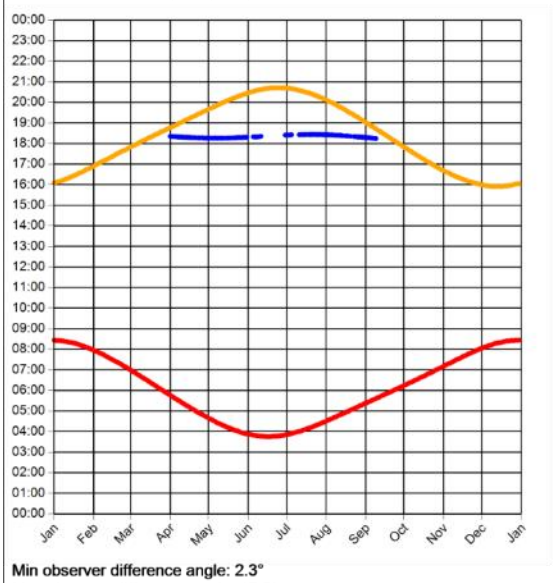


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 201 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 274.1° - 286.2° (yellow)

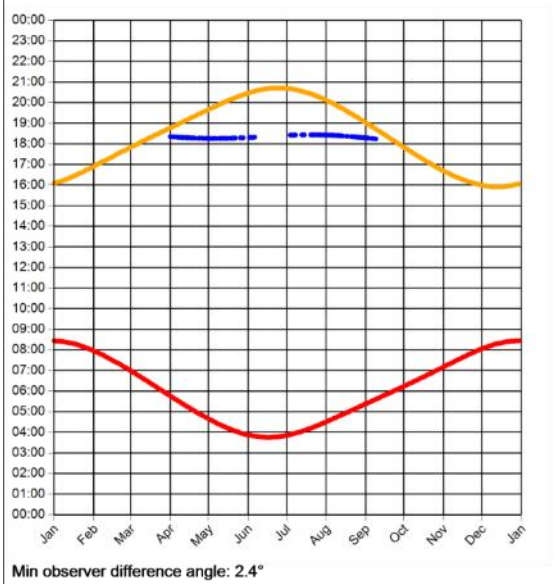


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 202 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 17.2°

Observer Location — Sun azimuth range is 274° - 285.9° (yellow)

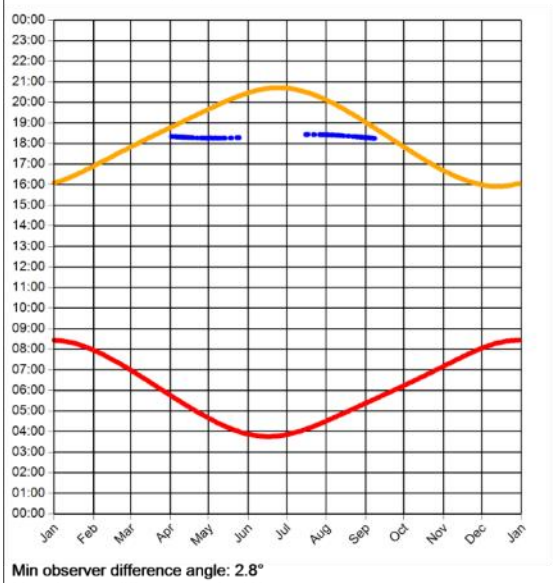


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 203 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 16°

Observer Location — Sun azimuth range is 274.3° - 284.7° (yellow)

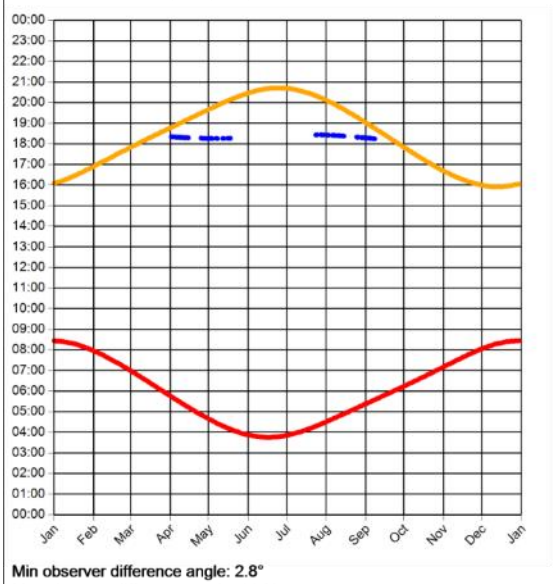


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 204 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 14.8°

Observer Location — Sun azimuth range is 274.2° - 283.7° (yellow)

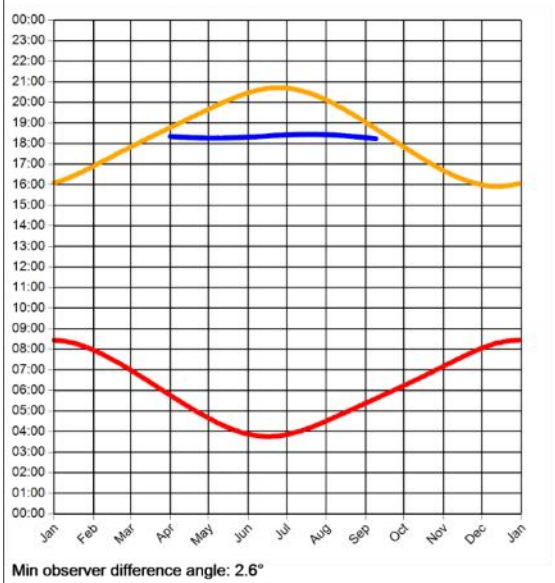


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 205 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 17.7°

Observer Location — Sun azimuth range is 273.9° - 286.5° (yellow)

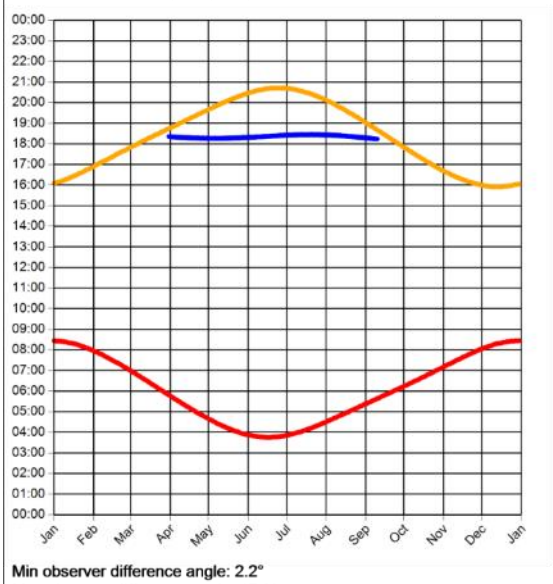


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 206 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 273.8° - 286.4° (yellow)

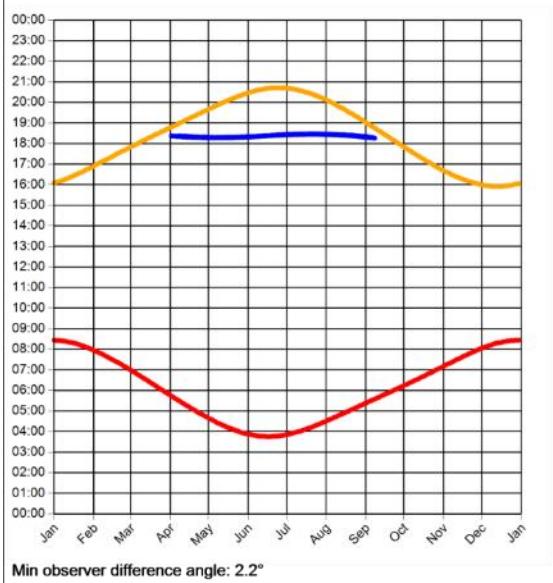


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 207 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 17.5°

Observer Location — Sun azimuth range is 274.5° - 286.6° (yellow)

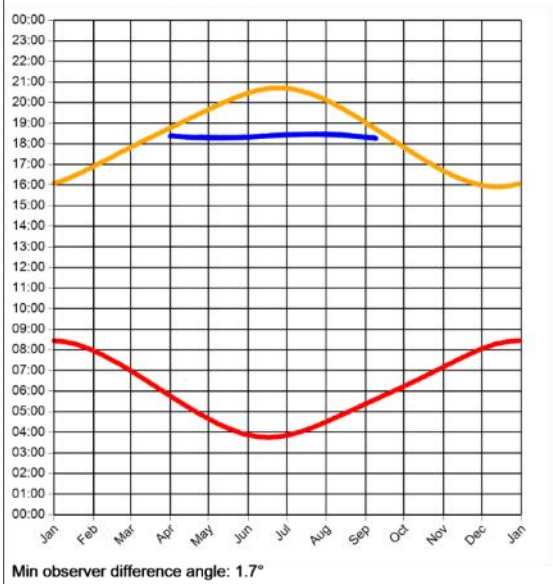


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 208 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 17.4°

Observer Location — Sun azimuth range is 274.3° - 286.7° (yellow)

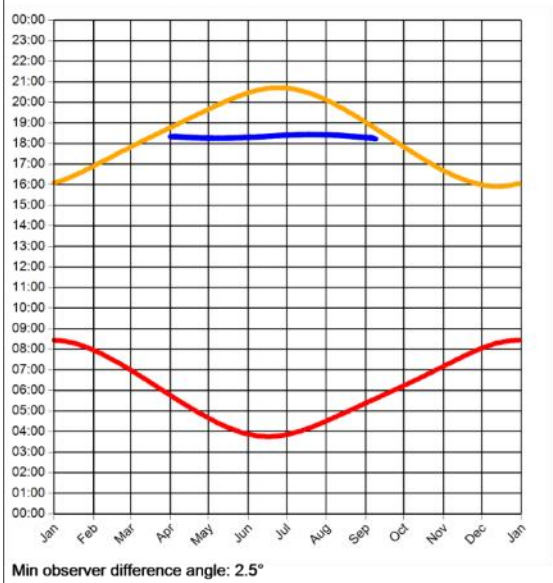


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 209 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.5°
Max observer difference angle: 18.4°

Observer Location — Sun azimuth range is 273.8° - 286.4° (yellow)

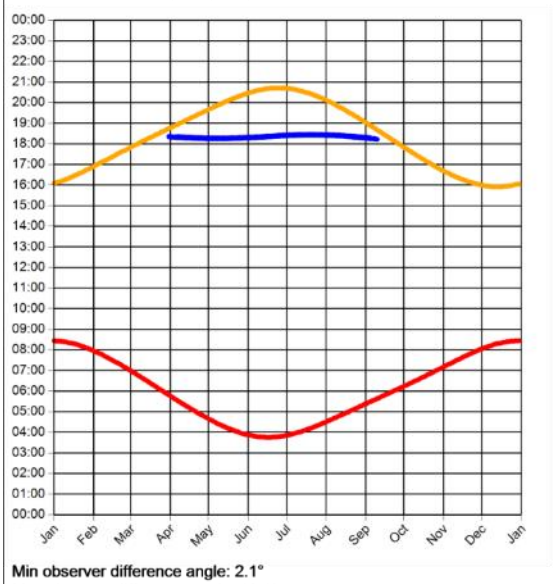


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



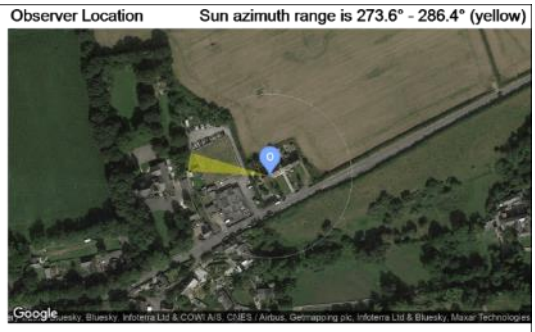
Observer 210 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 18.4°

Observer Location — Sun azimuth range is 273.6° - 286.4° (yellow)

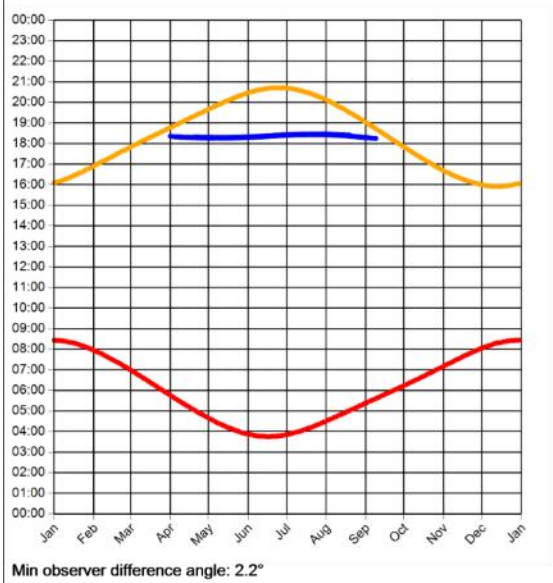


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 211 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 274.1° - 286.5° (yellow)

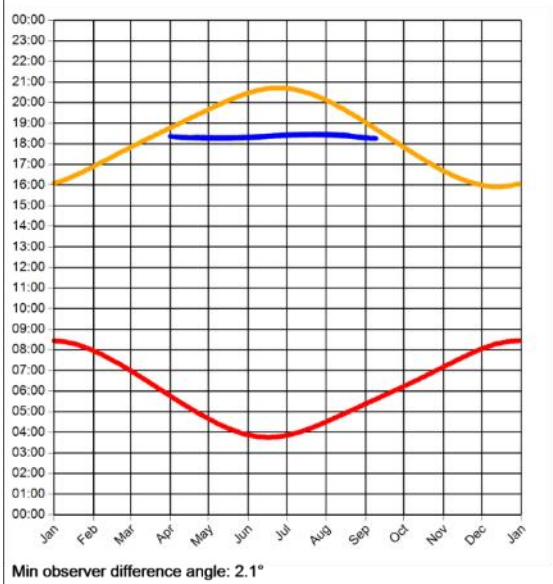


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 212 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.1°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 274.3° - 286.5° (yellow)

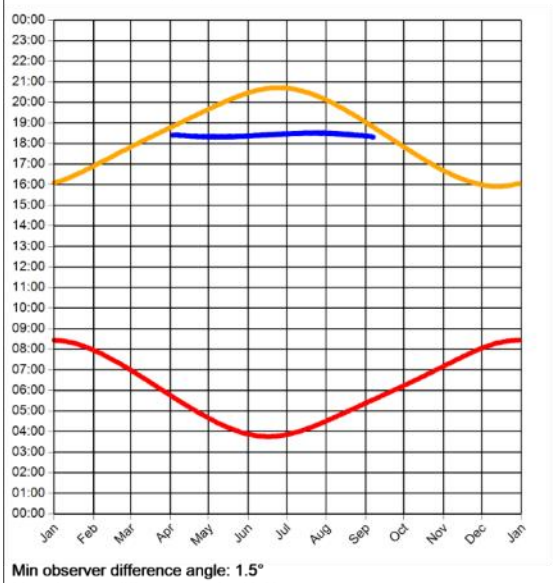


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 213 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 16.6°

Observer Location — Sun azimuth range is 275.2° - 287.1° (yellow)

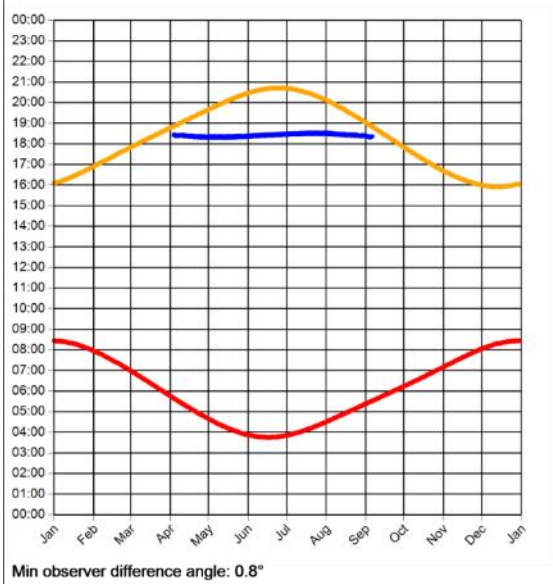


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 214 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.8°
Max observer difference angle: 16.6°

Observer Location Sun azimuth range is 275.7° - 287.1° (yellow)

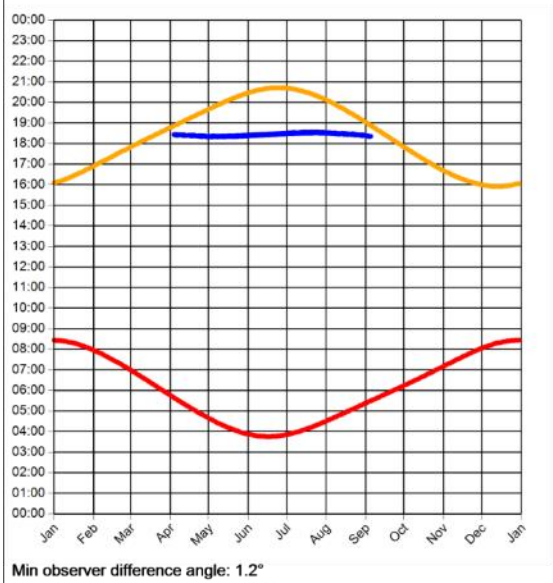


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 215 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.2°
Max observer difference angle: 16.3°

Observer Location Sun azimuth range is 275.9° - 287.3° (yellow)

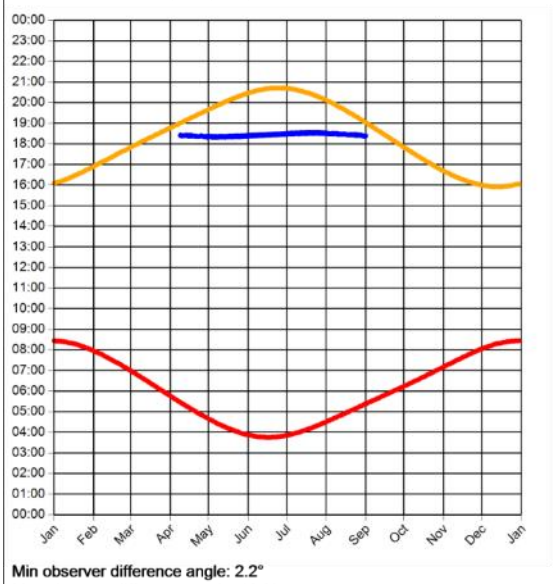


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 216 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.2°
Max observer difference angle: 16.3°

Observer Location — Sun azimuth range is 276.9° - 287.4° (yellow)

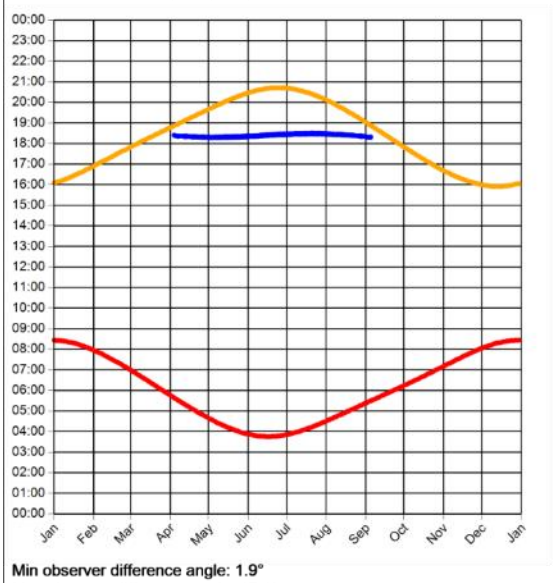


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 217 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.9°
Max observer difference angle: 17.1°

Observer Location — Sun azimuth range is 275.4° - 287.1° (yellow)

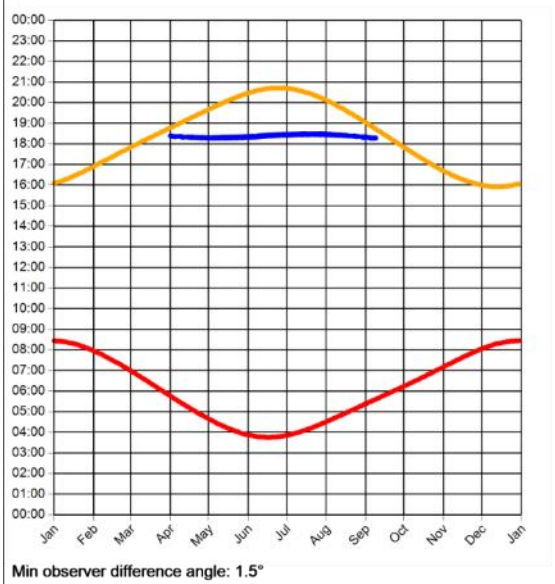


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 218 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 17.6°

Observer Location — Sun azimuth range is 274.5° - 286.9° (yellow)

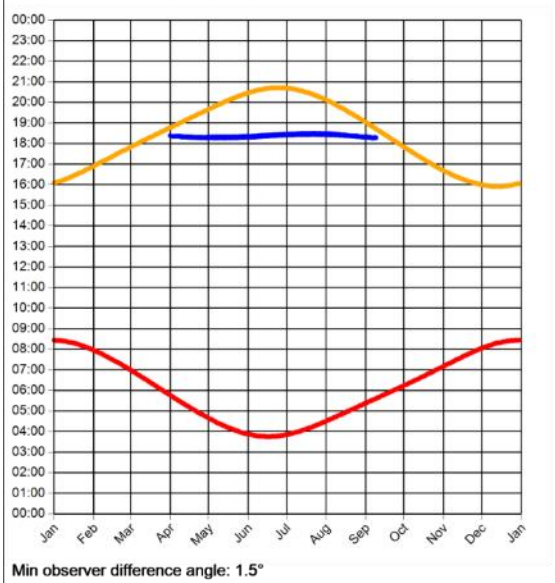


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 219 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.5°
Max observer difference angle: 17.8°

Observer Location — Sun azimuth range is 274.5° - 286.7° (yellow)

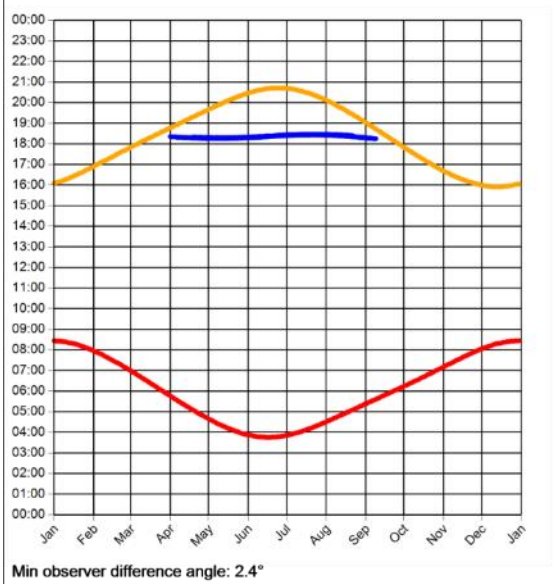


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 220 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 18.1°

Observer Location Sun azimuth range is 274.1° - 286.6° (yellow)

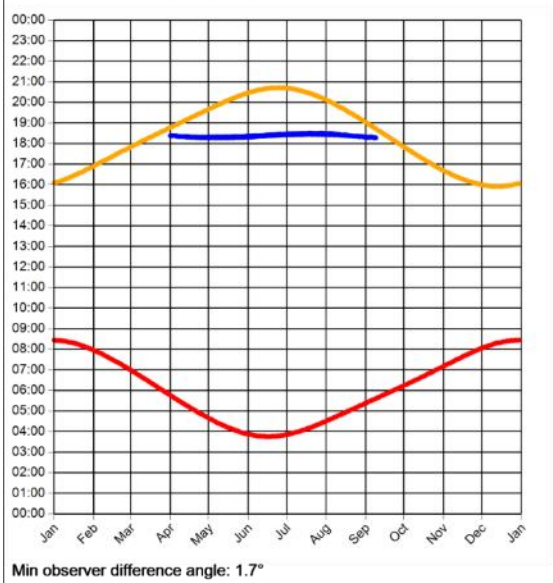


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 221 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.7°
Max observer difference angle: 17.6°

Observer Location Sun azimuth range is 274.5° - 286.9° (yellow)

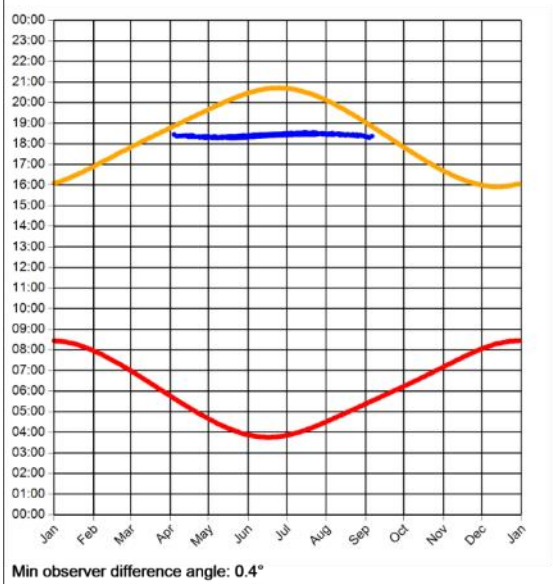


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 222 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 0.4°
Max observer difference angle: 17°

Observer Location — Sun azimuth range is 275.7° - 287.4° (yellow)

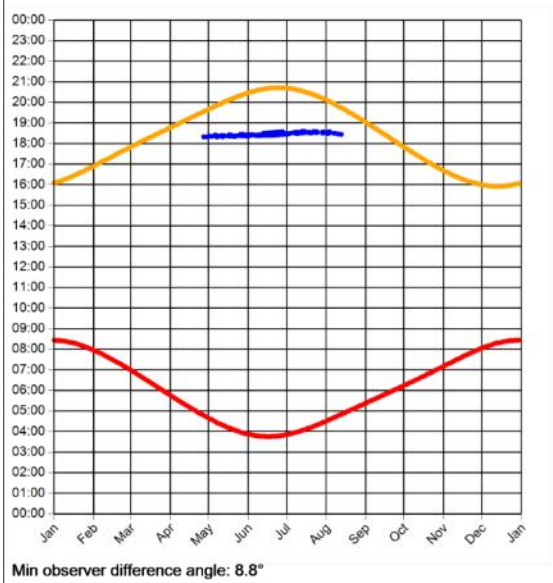


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 223 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 8.8°
Max observer difference angle: 17.3°

Observer Location — Sun azimuth range is 280.6° - 288° (yellow)

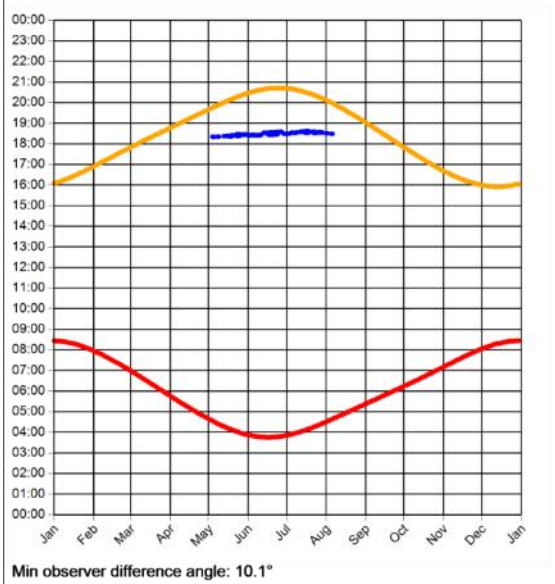


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



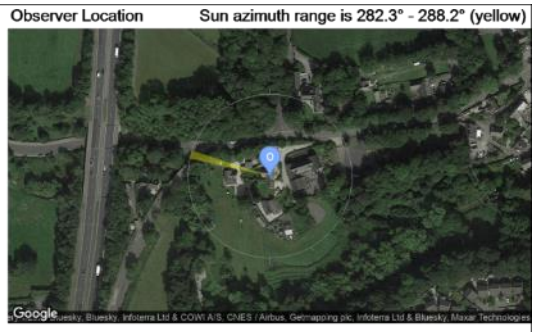
Observer 224 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 10.1°
Max observer difference angle: 16.2°

Observer Location — Sun azimuth range is 282.3° - 288.2° (yellow)

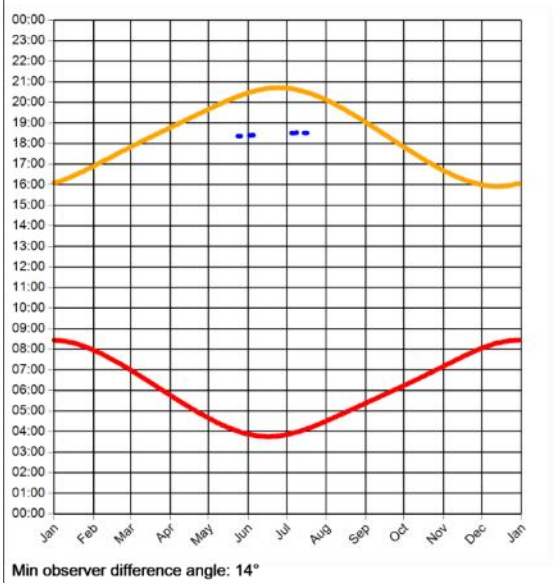


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 225 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 14°
Max observer difference angle: 15°

Observer Location — Sun azimuth range is 285.4° - 286.7° (yellow)

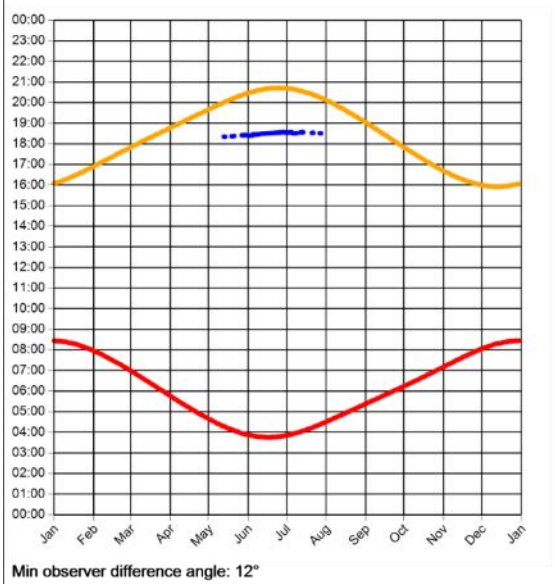


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



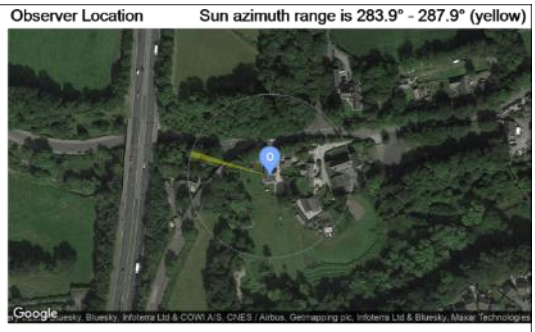
Observer 226 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 12°
Max observer difference angle: 14.9°

Observer Location — Sun azimuth range is 283.9° - 287.9° (yellow)

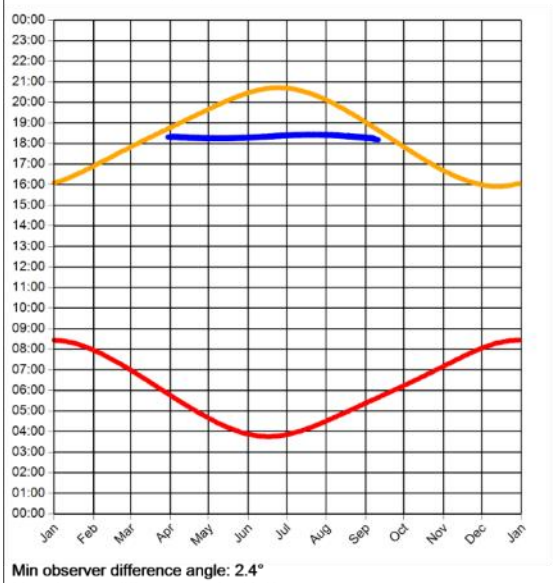


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 228 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 19.1°

Observer Location — Sun azimuth range is 273° - 286.5° (yellow)

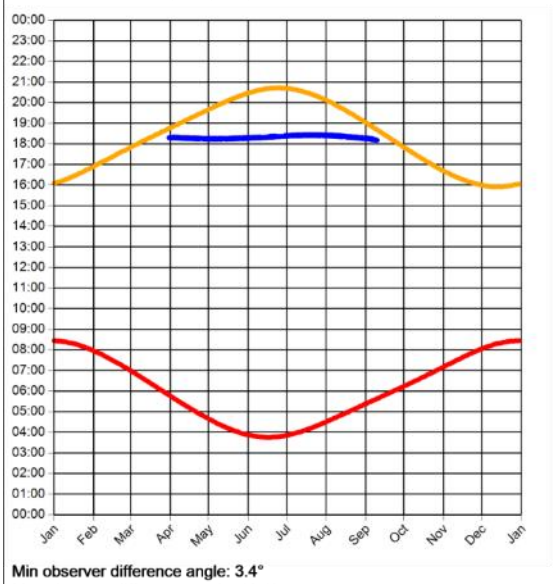


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 229 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.4°
Max observer difference angle: 19.1°

Observer Location — Sun azimuth range is 273.1° - 286.3° (yellow)

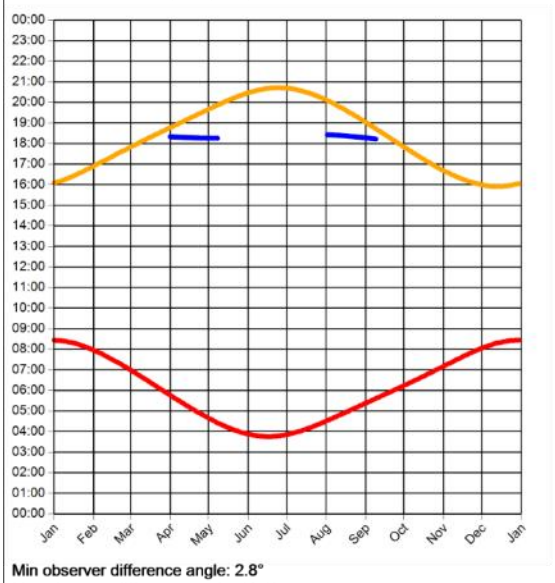


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 230 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 13.1°

Observer Location — Sun azimuth range is 273.8° - 282.2° (yellow)

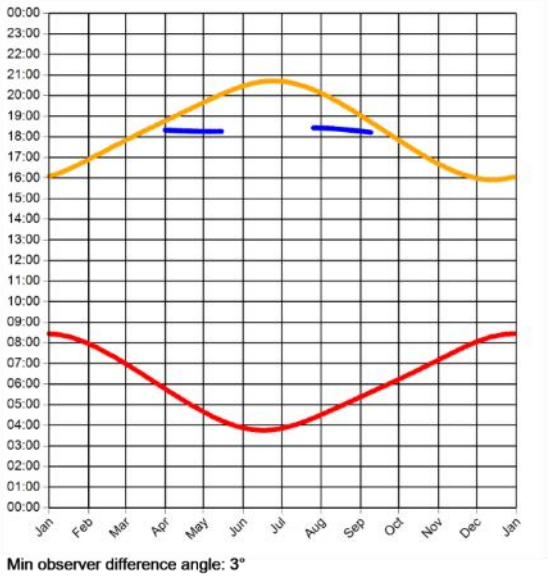


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 231 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 14.4°

Observer Location

Sun azimuth range is 273.7° - 283.3° (yellow)

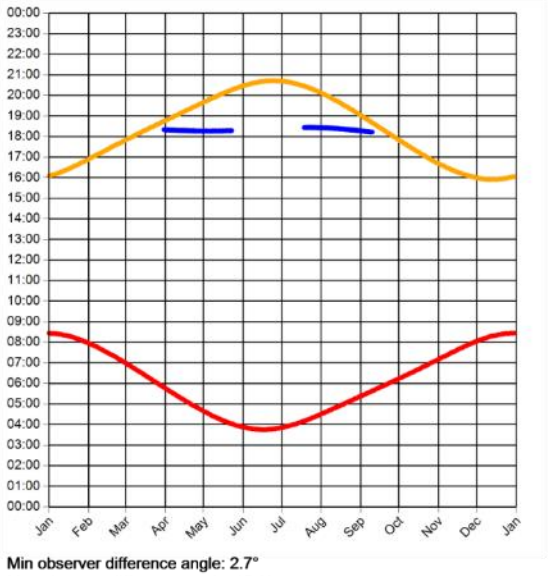


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 232 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 15.6°

Observer Location

Sun azimuth range is 273.6° - 284.4° (yellow)

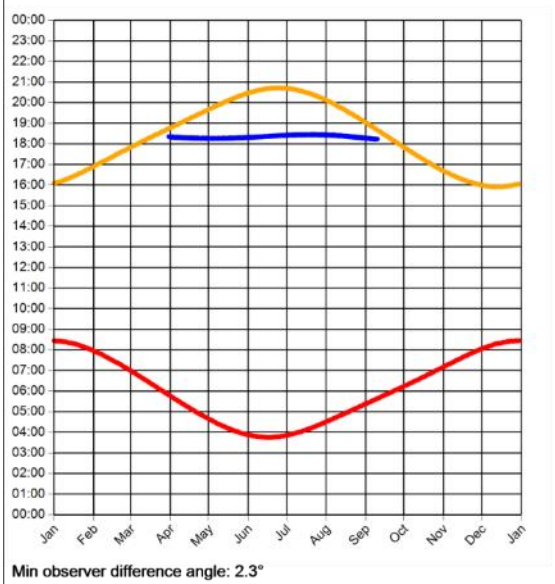


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 233 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.3°
Max observer difference angle: 17.9°

Observer Location — Sun azimuth range is 273.8° - 286.4° (yellow)

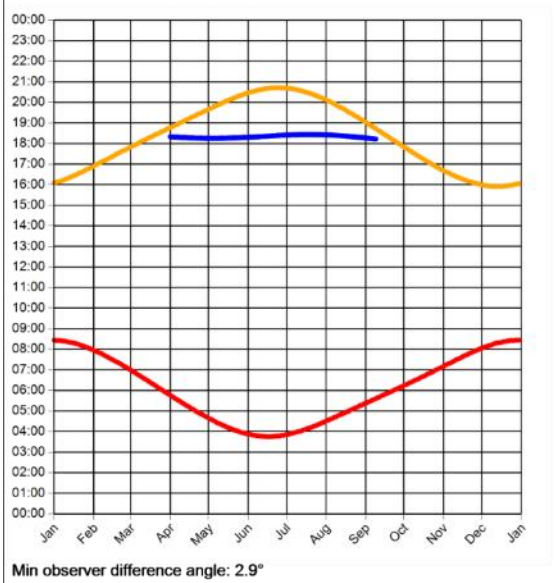


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 234 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 273.8° - 286.3° (yellow)

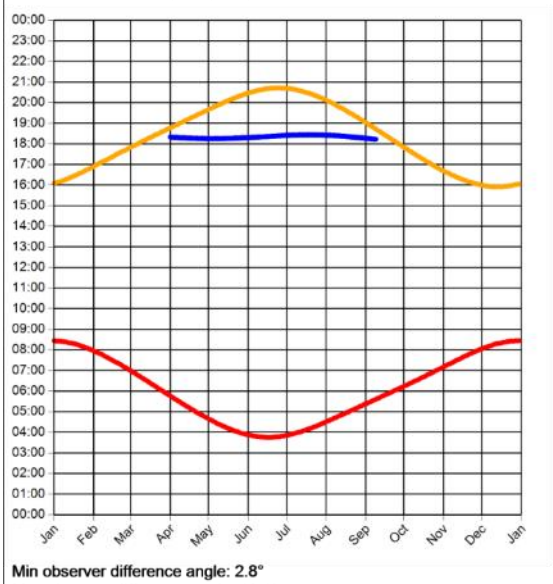


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 235 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 273.8° - 286.3° (yellow)

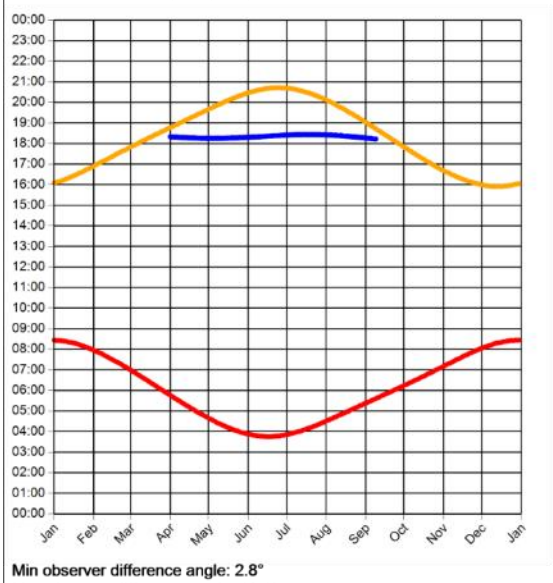


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 236 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 273.7° - 286.4° (yellow)

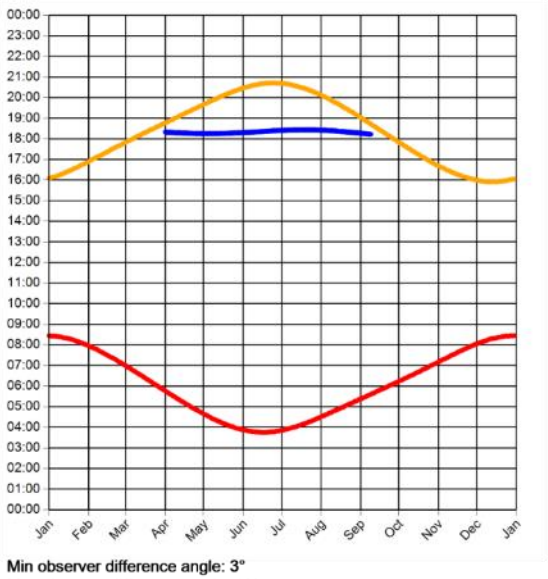


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 237 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.8° - 286.4° (yellow)

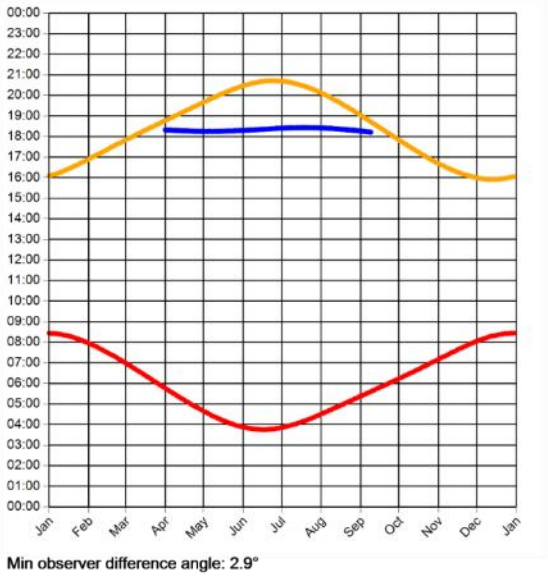


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 238 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 18.1°

Observer Location — Sun azimuth range is 273.7° - 286.2° (yellow)

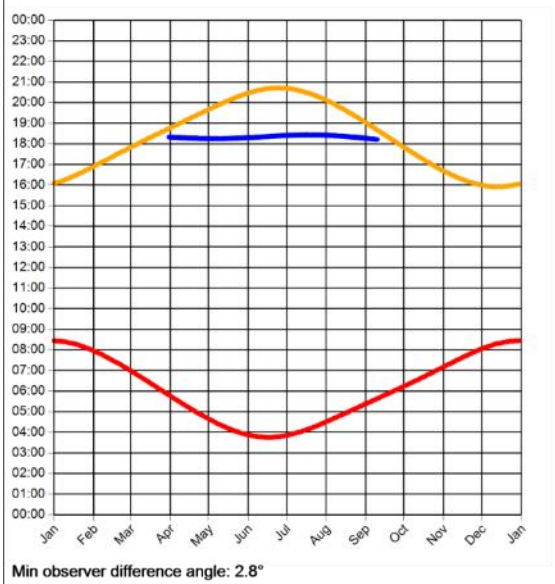


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 239 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18.1°

Observer Location Sun azimuth range is 273.5° - 286.4° (yellow)

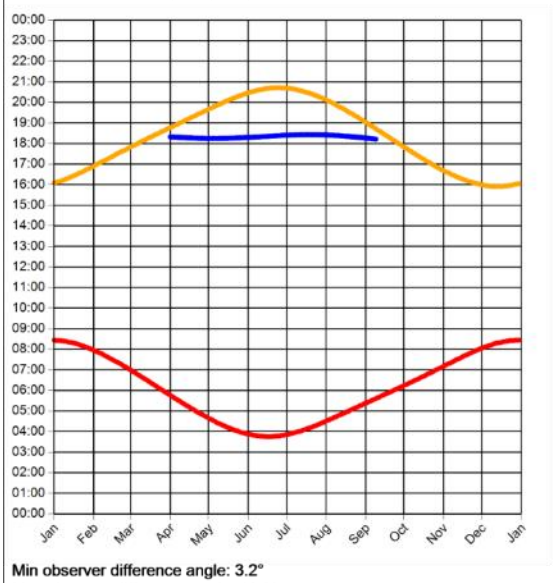


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 240 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 18.2°

Observer Location Sun azimuth range is 273.7° - 286.3° (yellow)

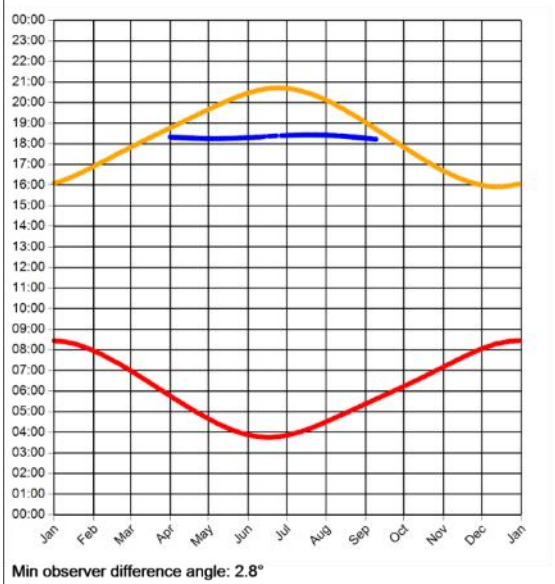


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 241 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 18°

Observer Location — Sun azimuth range is 273.8° - 286.3° (yellow)

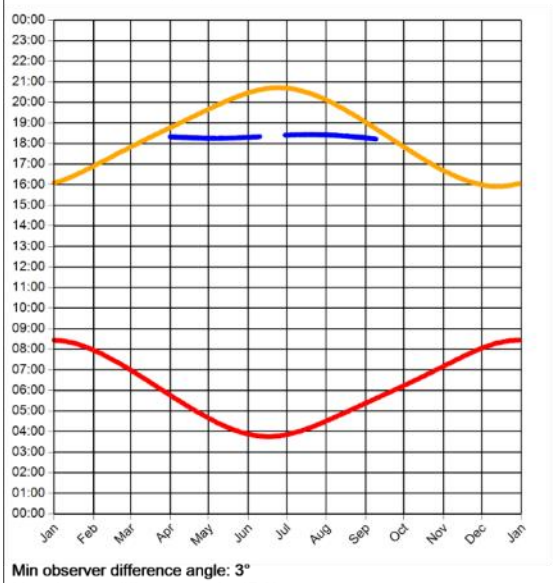


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 242 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 17.6°

Observer Location — Sun azimuth range is 273.8° - 286° (yellow)

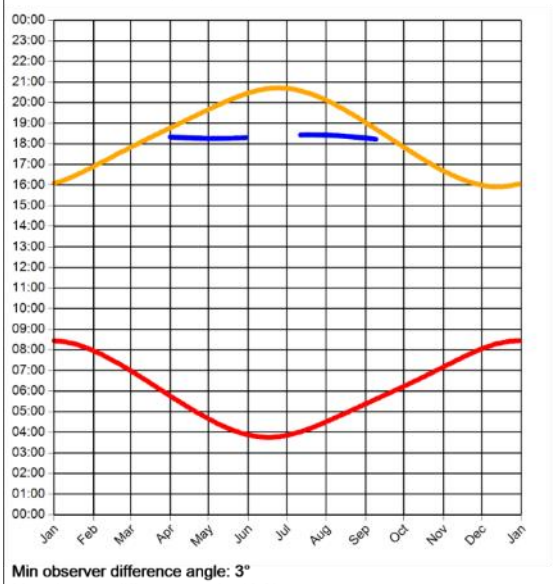


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 243 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 16.6°

Observer Location Sun azimuth range is 273.8° - 285.3° (yellow)

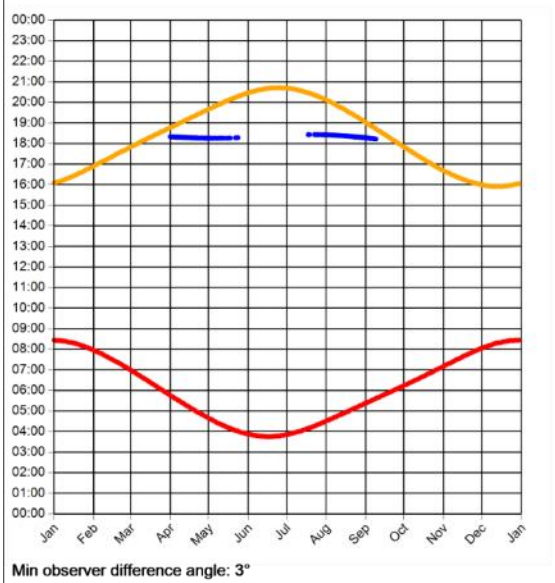


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 244 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3°
Max observer difference angle: 15.8°

Observer Location Sun azimuth range is 273.8° - 284.6° (yellow)

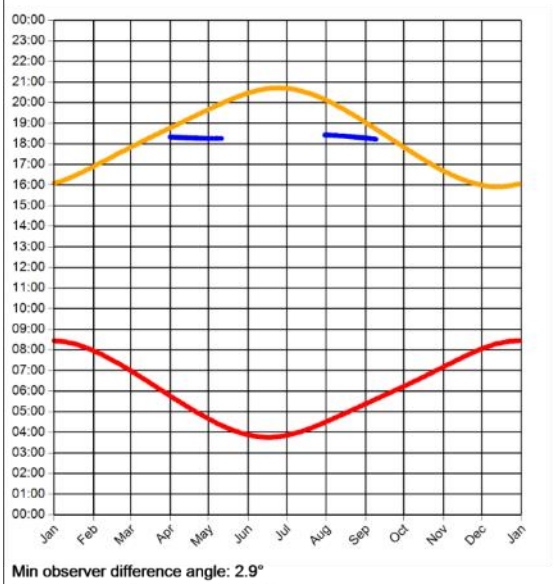


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 245 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 13.6°

Observer Location — Sun azimuth range is 273.8° - 282.6° (yellow)

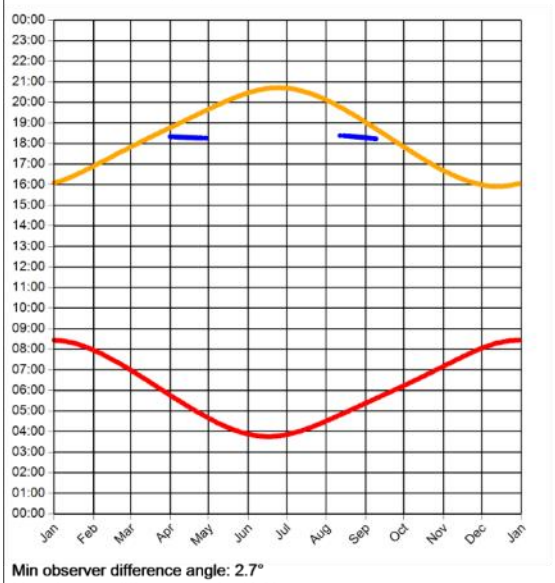


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 246 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 10.8°

Observer Location — Sun azimuth range is 273.8° - 280.3° (yellow)

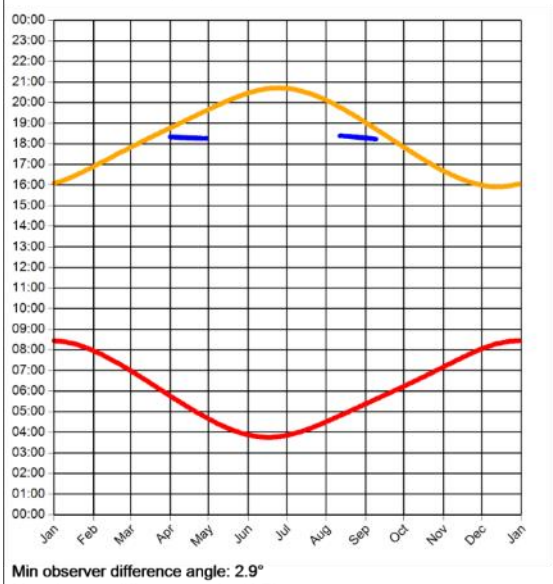


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 247 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.9°
Max observer difference angle: 10.7°

Observer Location Sun azimuth range is 273.9° - 280.4° (yellow)

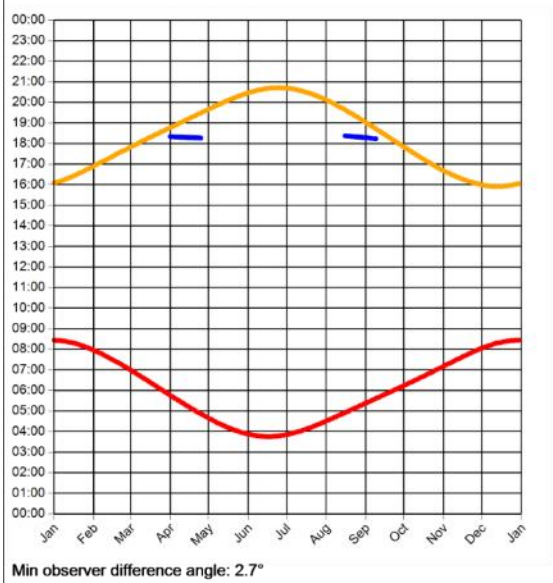


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 248 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 9.8°

Observer Location Sun azimuth range is 273.9° - 279.5° (yellow)

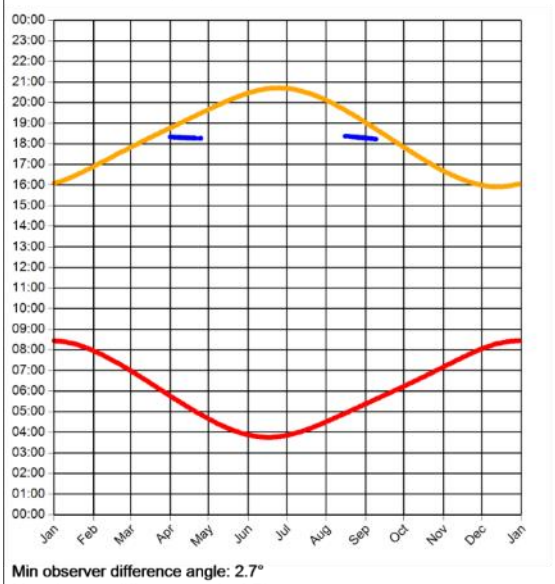


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 249 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.7°
Max observer difference angle: 9.7°

Observer Location — Sun azimuth range is 273.9° - 279.5° (yellow)

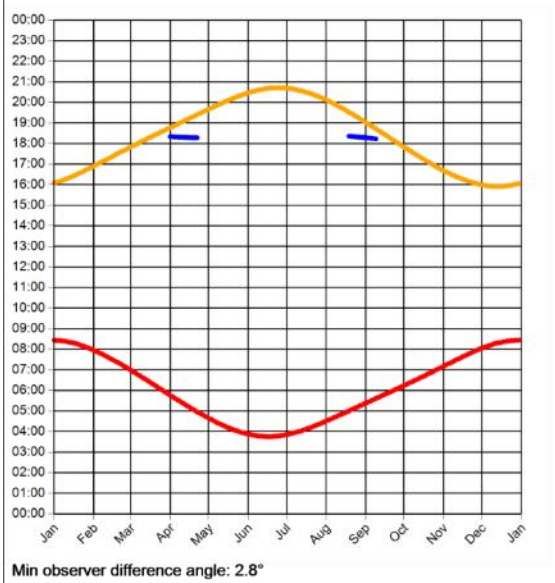


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 250 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.8°
Max observer difference angle: 8.9°

Observer Location — Sun azimuth range is 273.9° - 278.9° (yellow)

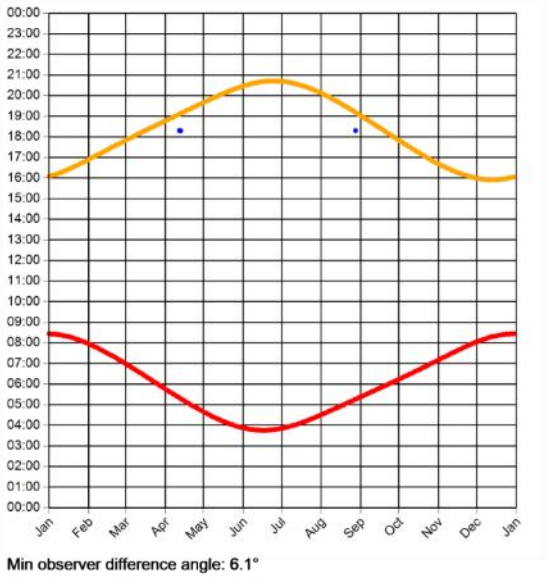


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer 251 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 6.1°

Max observer difference angle: 6.3°

Observer Location

Sun azimuth range is 276.7° - 276.8° (yellow)



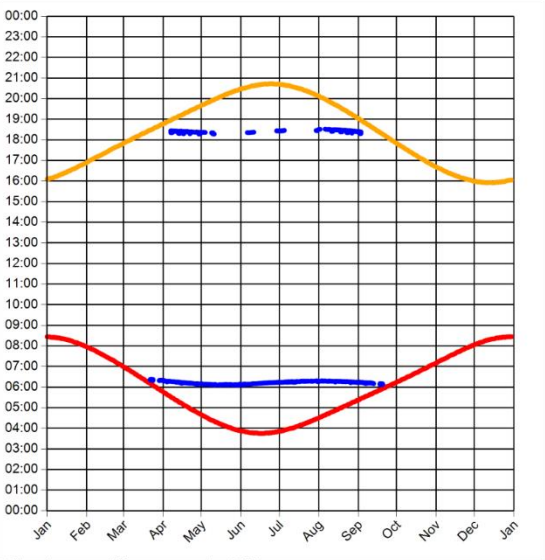
Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



ZTV Viewpoints

Observer VP1 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 21.1°

Observer Location — Sun azimuth ranges (yellow)

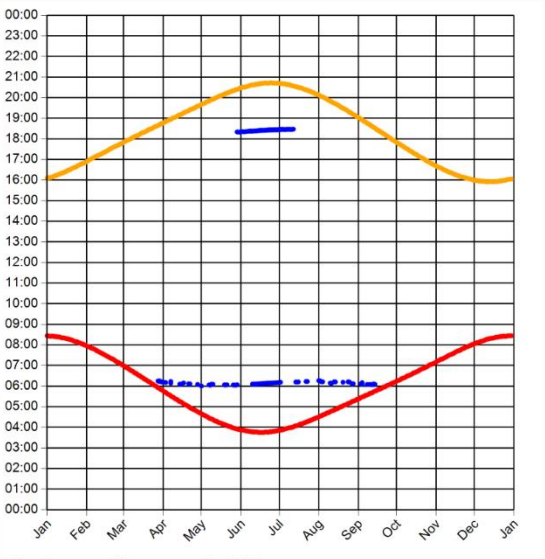


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer VP2 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.6°
Max observer difference angle: 19.5°

Observer Location — Sun azimuth ranges (yellow)

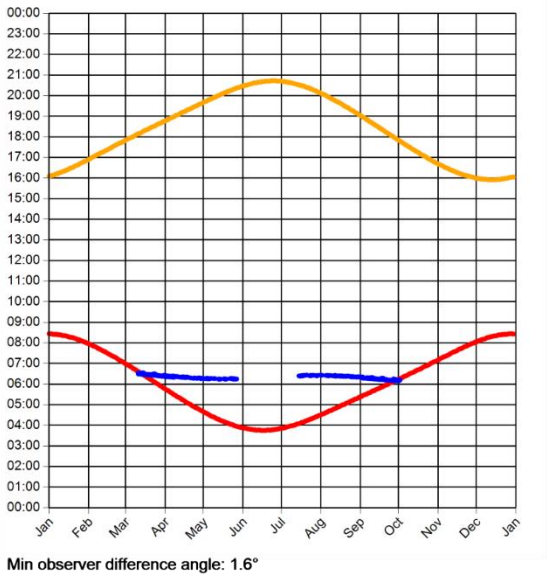


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



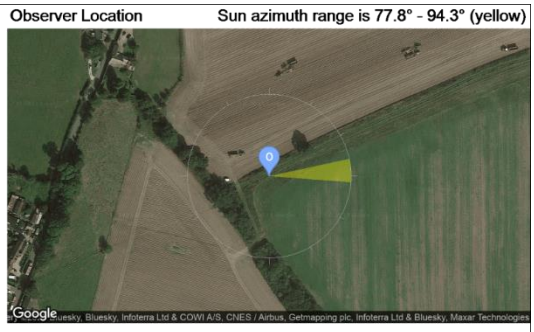
Observer VP3 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 1.6°
Max observer difference angle: 22.7°

Observer Location — Sun azimuth range is 77.8° - 94.3° (yellow)

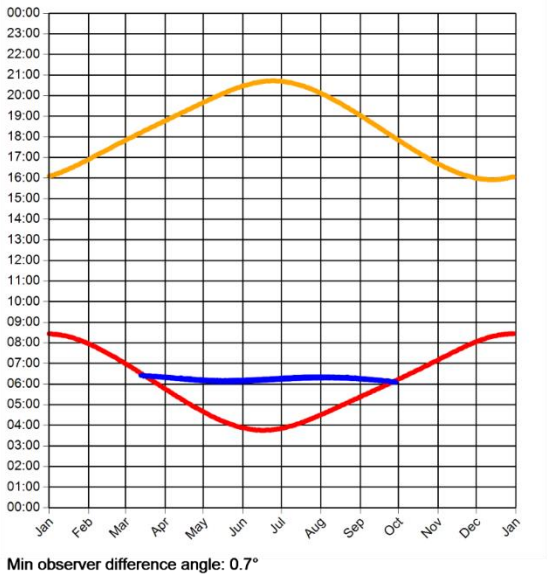


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer VP4 Results

Reflection Date/Time (GMT) Graph

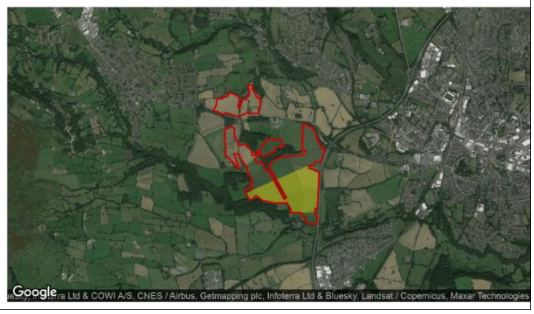


Min observer difference angle: 0.7°
Max observer difference angle: 22.3°

Observer Location — Sun azimuth range is 75° - 92.4° (yellow)

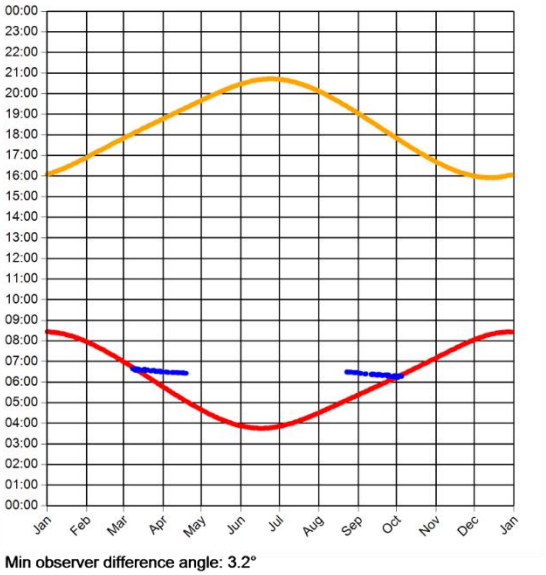


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



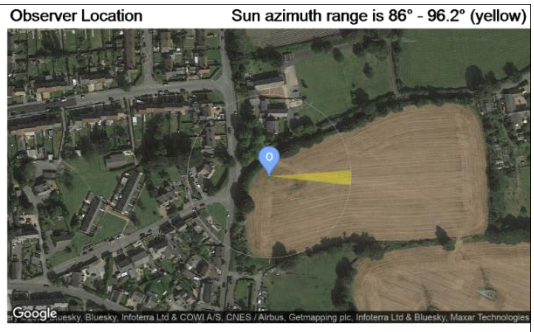
Observer VP5 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 3.2°
Max observer difference angle: 17.3°

Observer Location — Sun azimuth range is 86° - 96.2° (yellow)

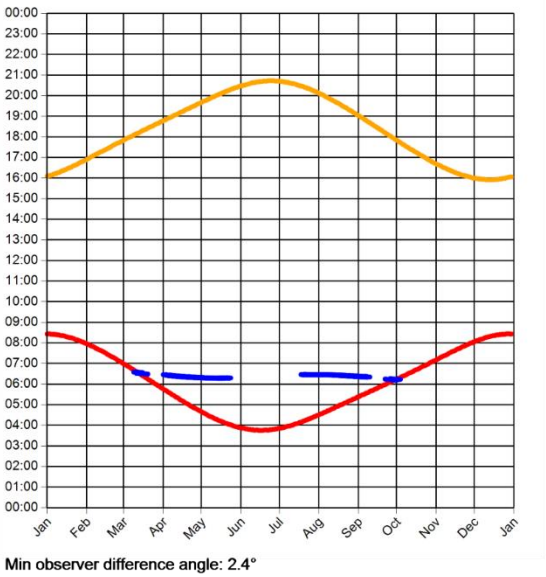


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



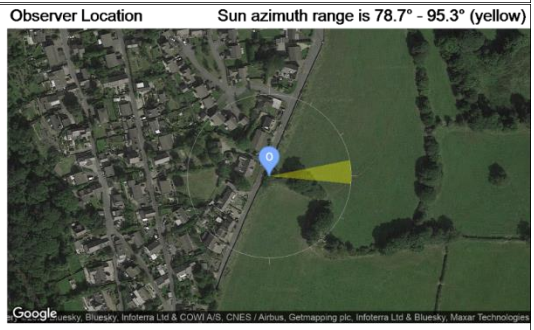
Observer VP6 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 2.4°
Max observer difference angle: 23.4°

Observer Location — Sun azimuth range is 78.7° - 95.3° (yellow)

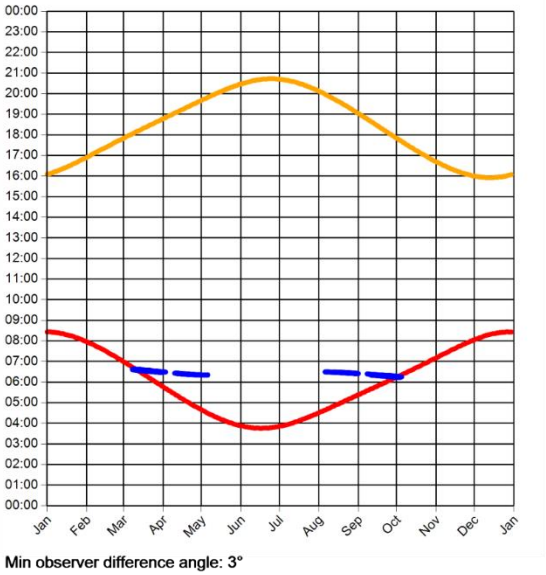


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer VP9 Results

Reflection Date/Time (GMT) Graph

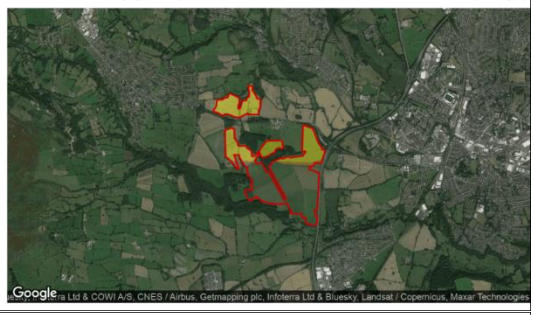


Min observer difference angle: 3°
Max observer difference angle: 20.8°

Observer Location — Sun azimuth range is 82° - 95.9° (yellow)

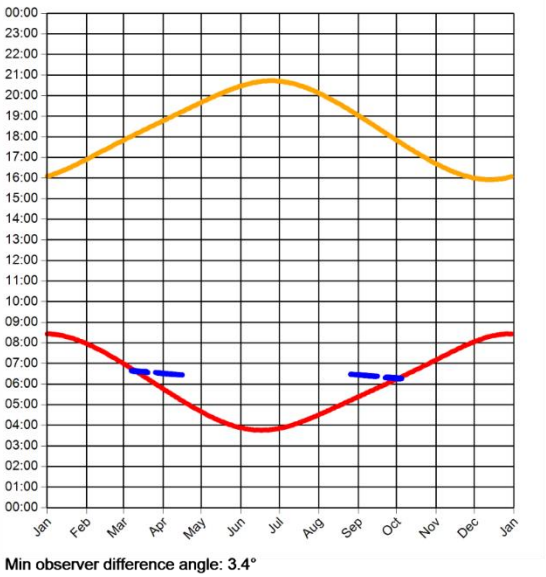


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer VP10 Results

Reflection Date/Time (GMT) Graph

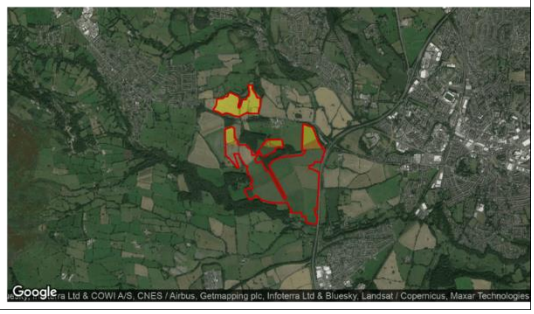


Min observer difference angle: 3.4°
Max observer difference angle: 16.4°

Observer Location — Sun azimuth range is 86.6° - 96.3° (yellow)

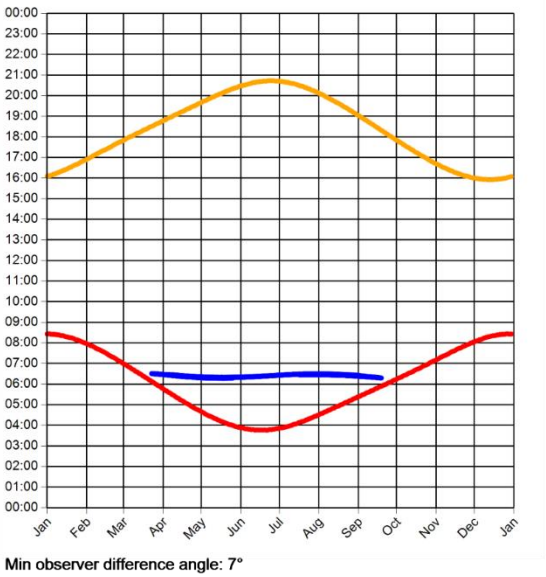


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



Observer VP11 Results

Reflection Date/Time (GMT) Graph



Min observer difference angle: 7°
Max observer difference angle: 26°

Observer Location — Sun azimuth range is 77.1° - 91.7° (yellow)

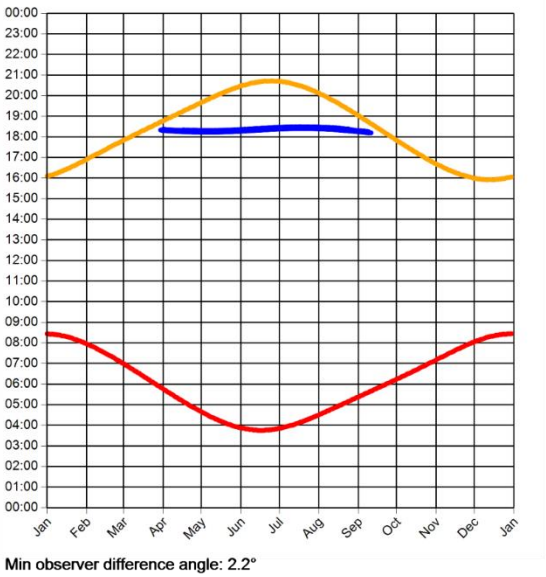


Panels: Reflecting (yellow), that would reflect but Sun is behind terrain (orange)



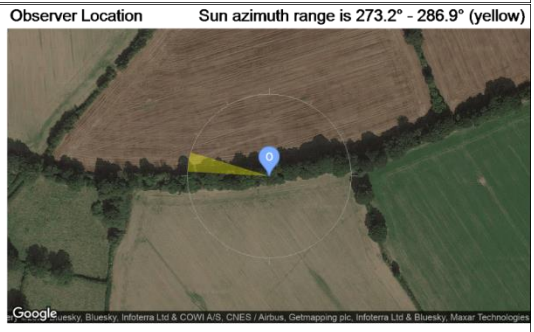
Observer VP13 Results

Reflection Date/Time (GMT) Graph

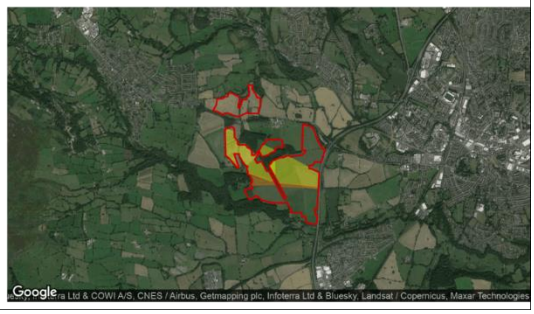


Min observer difference angle: 2.2°
Max observer difference angle: 18.6°

Observer Location — Sun azimuth range is 273.2° - 286.9° (yellow)



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



PAGERPOWER

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PAGERPOWER
Urban & Renewables

Pager Power Statement on Layout Change

RPS Group PLC

Plas Power Estate

13th November 2023

PLANNING SOLUTIONS FOR:

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

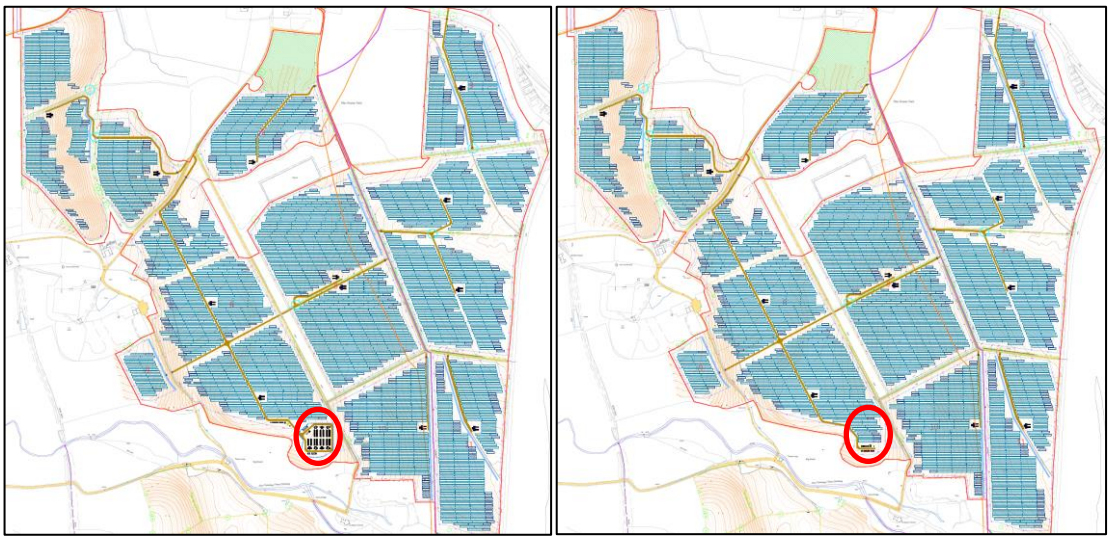
www.pagerpower.com



PAGER POWER STATEMENT ON LAYOUT CHANGE

Pager Power has been previously retained to assess the possible effects of glint and glare from a proposed solar photovoltaic (PV) development located at Plas Power Estate, Wrexham, Wales. The glint and glare assessment pertains to the possible impact upon surrounding road safety, residential amenity, and identified ZTV viewpoints. The latest version of the report is titled '11078B - Plas Power Estate - Solar Photovoltaic Glint and Glare Study - 01Nov2023'.

Pager Power has reviewed the latest layout for the proposed development 'GBR_Plas Power_LP2-PDL-PL_13 (PV only).pdf'. The new layout includes an increased area of PVs within the southern parcel. These PVs replace an area where there was a Battery Energy Storage System on the modelled layout.



Modelled Layout (left) vs Latest Layout (right)

The layout change is not significant such that remodelling is recommended. The additional panels would be screened from most directions by intervening terrain, vegetation, and/or the other solar panels within the development. There are no receptors where the predicted impact level is expected to change as a result of this layout change. This means that there would be no impact on the conclusions of the report.

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Appendix 5.2
Landscape and Visual Impact Assessment Methodology

APPENDIX 5.2: ASSESSMENT METHODOLOGY

Assessment Criteria and Assignment of Significance

Relevant Guidance

1.1 As a matter of best practice, this Landscape and Visual Impact Assessment (LVIA) has been undertaken based on the relevant guidance on landscape and visual impact assessment (LVIA) described in the following documents:

- *Landscape Character Assessment: Guidance for England and Scotland* (The Countryside Agency and Scottish Natural Heritage, 2002);
- *Guidelines for Landscape and Visual Impact Assessment, Third Edition* (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013);
- *An Approach to Landscape Character Assessment* (Natural England, 2014).
- *Technical Guidance Note 2/19 Residential Visual Amenity Assessment* (Landscape Institute, 2019). and
- *Technical Guidance Note 02/21: Assessing landscape value outside national designations* (Landscape Institute, May 2021).

Distinction Between Landscape and Visual Effects

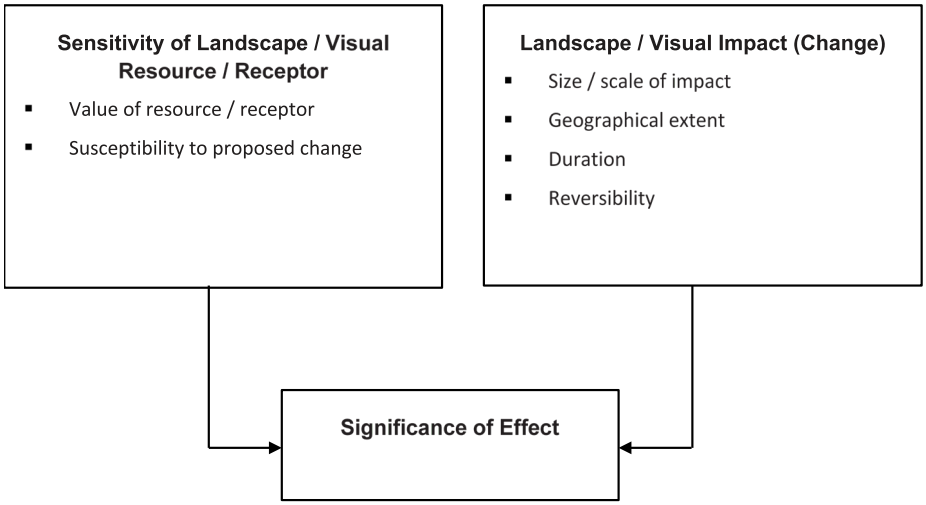
1.2 As set out in the GLVIA3, paragraph 2.21, landscape and visual effects are assessed separately, although the procedure for assessing each is closely linked. A clear distinction has been drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of the proposed development on the physical and other characteristics of the landscape and its resulting character and quality.
- Visual effects relate to the effects on views experienced by visual receptors (e.g. residents, footpath users, tourists etc) and on the visual amenity experienced by those people.

Assessment Criteria and Assignment of Significance of Effects

1.3 GLVIA3 sets out broad guidelines rather than detailed prescriptive methodologies. The methodologies tailored for the assessment of this development is based on GLVIA3 guidance, which recommends that an assessment *"concentrates on principles and process"* and *"does not provide a detailed or formulaic recipe"* to assess effects, it being the *"responsibility of the professional to ensure that the approach and methodology are appropriate to the task in hand"* (preface to GLVIA3). The effects on the landscape resources or visual receptors (people) are assessed by considering the proposed change in the baseline conditions (the impact of the proposal) against the type of landscape resource or visual receptor (including the importance and sensitivity of that resource or receptor). The methodology is set out in detail below and summarised in Diagram 1. These factors are determined through a combination of quantitative (objective) and qualitative (subjective) assessment using professional judgement.

Diagram 1: Assessment Methodology Summary



Sensitivity

Sensitivity of landscape receptors

1.4 The sensitivity of a landscape receptor is a combination of "*judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape*" (GLVIA, para 5.39). For the purpose of this assessment, susceptibility and value of landscape receptors are defined as follows:

- Landscape susceptibility: "*the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed change without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*" (GLVIA, para 5.40).
- Value of the landscape receptor: "*The value of the Landscape Character Types or Areas that may be affected, based on review of designations at both national and local levels, and, where there are no designations, judgements based on criteria that can be used to establish landscape value; and, the value of individual contributors to landscape character, especially the key characteristics, which may include individual elements of the landscape, particularly landscape features, notable aesthetic, perceptual or experiential qualities, and combinations of these contributors*" (GLVIA, para 5.44). An evaluation of the value attached to undesignated landscapes has been considered and reference has been made to the Landscape Institutes Technical Guidance note 02/21 Assessing landscape value outside of national designations.

1.5 Sensitivity is not readily graded into bands. However, descriptions of landscape susceptibility and value are set out in Table 1 below.

Table 1: Definitions of Landscape Sensitivity

Sensitivity	Typical Descriptors Landscape Resource/Receptor Susceptibility	Landscape Resource/Receptor Value
Very High	Exceptional landscape quality, no or limited potential for substitution. Key elements / features well known to the wider public.	Nationally/internationally designated/valued landscape, or key elements or features of

Sensitivity	Typical Descriptors Landscape Resource/Receptor Susceptibility	Landscape Resource/Receptor Value
		nationally/internationally designated landscapes.
High	Strong/distinctive landscape character; absence of landscape detractors.	Regionally/nationally designated/valued countryside and landscape features.
Medium	Some distinctive landscape characteristics; few landscape detractors.	Locally/regionally designated/valued countryside and landscape features.
Low	Absence of distinctive landscape characteristics; presence of landscape detractors.	Undesignated countryside and landscape features.
Negligible	Absence of positive landscape characteristics. Significant presence of landscape detractors.	Undesignated countryside and landscape features.

Sensitivity of visual receptors

1.6 Visual receptors are always people. The sensitivity of each visual receptor (the particular person or group of people likely to be affected at a specific viewpoint) *"should be assessed in terms of both their susceptibility to change and in views and visual amenity and also the value attached to particular views"* (GLVIA, para 6.31). For the purpose of this assessment, susceptibility and value of visual receptors are defined as follows:

- Visual susceptibility: "*The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of: The occupation or activity of people experiencing views at the particular locations; and, the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*" (GLVIA, para 6.32).
- Value of views: Judgements made about the value of views should take account of: "*recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations; and, indicators of value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment (such as parking places, sign boards or interpretive material) and references to them in literature or art*…" (GLVIA, para 6.37).

1.7 Sensitivity is not readily graded in bands and GLVIA notes, with regards to visual sensitivity, that the division of who may or may not be sensitive to a particular change "*is not black and white and in reality, there will be a gradation in susceptibility to change*" (GLVIA, para 6.35). In order to provide both consistency and transparency to the assessment process, however, Table 2, below defines the criteria which have guided the judgement as to the intrinsic susceptibility and value of the resource/receptor and subsequent sensitivity to the proposed development.

Table 2: Definitions of Visual Sensitivity

Sensitivity	Typical Descriptors Visual Receptor Susceptibility	Value of View
Very High	Observers, drawn to a particular view, including those who have travelled from around Britain and overseas to experience the views.	See paragraph 1.6 and 1.7, above
High	Observers on the public rights of way network in the countryside are more sensitive to visual change.	See paragraph 1.6 and 1.7, above
Medium	Observers enjoying the countryside from vehicles on quiet/promoted routes or pedestrians on less	See paragraph 1.6 and 1.7, above

Sensitivity	Typical Descriptors Visual Receptor Susceptibility	Value of View
	scenic/urban rights of way are moderately sensitive to visual change.	
Low	Observers in vehicles or people involved in outdoor activities where attention is not focused on landscape are less sensitive to visual change.	See paragraph 1.6 and 1.7, above
Negligible	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change.	See paragraph 1.6 and 1.7, above

Magnitude of Impact

Magnitude of impact on landscape resources and receptors

1.8 The magnitude of impact or change affecting landscape receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: "*The extent of the existing landscape elements that will be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape…; the degree to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components of the landscape or by addition of new ones…"* and, "*whether the effect* [impact] *changes the key characteristics of the landscape, which are critical to its distinctive character*" (GLVIA, para 5.49).
- Geographical extent: Distinct from scale or size, this factor considers the geographical area over which the landscape impacts will be felt, it might, for example, be a moderate loss of landscape receptors or character over a large area, or a large loss of receptors or character over a very localised area. At para 5.50 GLVIA3 notes that *"in general effects* [impacts] *may have an influence at the following scales, although this will vary according to the nature of the project and not all may be relevant on every occasion: at the site level within the development site itself; at the level of the immediate setting of the site; at the scale of the landscape type or character area within which the proposal lies; and, on a larger scale, influencing several landscape types or character areas*." For the purposes of this LVIA, the assessment considers the impact of the proposed development on the published landscape character areas, both at local and national level, i.e. the third and fourth landscape scales.

1.9 Duration and reversibility: Duration is categorised as short, medium or long-term. GLVIA explains that as there are no standard lengths of time within these categories, the appraisal must state what these are and why these have been chosen (GLVIA, para 5.51). Reversibility is described as "*a judgement about the prospects and practicality of the particular effect being reversed in, for example, a generation*" (GLVIA, para 5.52). Projects can be considered to be permanent (irreversible), partially reversible or fully reversible. For the purposes of this assessment the proposed development is considered to be fully reversible.

Magnitude of impact on visual receptors

1.10 As with the magnitude of landscape impacts, the magnitude of impact or change affecting visual receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: Judgements need to take account of: "*the scale of the change [impact] in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development; the degree of contrast or integration of any new features or changes in the landscape with existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour, and texture; and, the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses*" (GLVIA, para 6.39). Our judgement would also take into consideration the potential for, and duration of, solar reflection.
- Geographical extent: This will vary from viewpoint to viewpoint and will reflect: "*the angle [orientation] of view in relation to the main activity of the receptor; the distance of the viewpoint from the proposed development; and, the extent of the area over which the changes [impacts] would be visible*" (GLVIA, para 6.40).

1.11 Duration and reversibility of visual effects: As with landscape impacts, duration should be categorised as short, medium or long-term and projects considered to be permanent (irreversible), partially reversible or fully reversible (GLVIA, para 6.41). For the purposes of this appraisal the impacts on views of the proposed development are considered to be fully reversible.

1.12 The magnitude of the predicted impact has been described using criteria outlined above and Diagram 1 and detailed in methodology below. Magnitude of impact has been classified on a four-point scale (Large, Medium, Small and Negligible). The definitions of terms relating to the magnitude of impact are set out in Table 3, below.

Table 3: Example Definitions of Magnitude of Impact

Magnitude of Impact	Typical Descriptors	
	Landscape Resource	Visual Resource
High	Total loss or addition or/very substantial loss or addition of key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of dominant, uncharacteristic elements with the attributes of the receiving landscape.	Complete or very substantial change in view, dominant involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
Medium	Partial loss or addition of or moderate alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic with the attributes of the receiving landscape.	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e. pre-development view, through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the views would alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.

Magnitude of Impact	Typical Descriptors	
	Landscape Resource	Visual Resource
Low	Minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that may not be uncharacteristic with the surrounding landscape.	Minor change in baseline, i.e. pre-development view, – change would be distinguishable from the surroundings whilst composition and character would be similar to the pre-change circumstances.
Negligible	Very minor loss or addition of or alteration to one or more key elements/features/patterns of the baseline i.e., pre-development landscape and/or introduction of elements that are not uncharacteristic with the surrounding landscape approximating to a 'no-change' situation.	Very slight change in baseline, i.e. pre-development view, – change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of effects

1.13 It is recognised that new development will lead to some landscape and visual effects. However, it should be stressed that not all landscape and visual effects arising will be significant.

1.14 GLVIA3 explains, at paragraph 5.55, that a staged approach can be adopted when assessing landscape significance "*susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance*."

1.15 Within this assessment, the assessment of significance has taken the following into account (as appropriate):

- reference to regulations or standards;
- reference to best practice guidance;
- reference to policy objectives;
- reference to criteria, for example designations or protection status;
- outcomes of consultation to date; and
- professional judgement based on local / regional / specialist experience.

1.16 Significance varies depending on the receptor's sensitivity and the magnitude of impact of the project. The distance to the development can be a major factor in determining the magnitude of the impact. Those resources or receptors closer to the project are likely to experience a greater significance of effects than those further away.

1.17 A significant effect would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects of any proposal are transparently assessed and understood in order that the determining authority can bring a balanced and well-informed judgement to bear when making any decision. This judgement should be based upon weighing up the benefits of the proposal against the anticipated effects, both positive and negative.

1.18 The matrix, at Table 4, has been used to guide the assessment of effects. Where the matrix provides a choice of level of effects, e.g., Minor to Moderate, the assessor has exercised professional judgement in determining which of the levels is more appropriate.

Table 4: Assessment of Significance of Effects Matrix

Sensitivity	Magnitude of Impact				
	No Change	**Negligible**	**Low**	**Medium**	**High**
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

1.19 The significance of effect on landscape, views and visual amenity has been described according to the five-point scale shown in the above matrix (Substantial, Major, Medium, Minor or Negligible). A description of these terms is provided in Table 5, below.

Table 5: Definitions of Significance Criteria

Magnitude	Typical Descriptors Landscape Resource	Visual Resource
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a landscape of exceptional landscape quality (e.g., internationally designated landscapes), or key elements known to the wider public of nationally designated landscapes (where there is no or limited potential for substitution nationally).	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.
Major	Where proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) landscape.	Where proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.
No change	No change	No change

1.20 In this assessment, those effects of Moderate and below are not considered to be significant. Those effects to be Major and above are considered to be significant.

1.21 For the purposes of this assessment, those effects indicated as being of major or substantial significance, as defined in Table 5, are regarded as significant. Effects of moderate and lesser significance have been identified in the assessment but are not considered to be significant. The significance of effects for temporary changes, i.e. those during construction and decommissioning, are likely to be diminished due to their transitory nature.

Appendix 5.3
Planning Policy

APPENDIX 5.3 LANDSCAPE AND VISUAL ASSESSMENT

Planning Policy Context

National Planning Policy Context

Planning Policy Wales (Edition 12, 2024)

1.1 Edition 12 of Planning Policy Wales (PPW) was published in February 2024 by Welsh Government, replacing all previous versions.

1.2 PPW sets out the land use planning policies of the Welsh Government. The conservation and improvement of the natural heritage of Wales is one of its objectives noting the following (paragraph 6.02 and 6.03):

"The special and unique characteristics and intrinsic qualities of the natural and built environment must be protected in their own right, for historic, scenic, aesthetic and nature conservation reasons. These features give places their unique identity and distinctiveness and provide for cultural experiences and healthy lifestyles.

As well as those characteristics regarded as special or unique there are other, environmental qualities of places which are ubiquitous. Environmental components of places, such as clean air, access to open spaces and water quality, are linked to the quality of the built and natural environment. The environmental components of places influence and shape health and wellbeing as well as playing a role in sustaining and creating places which are adaptable and resilient to change. Distinctive and Natural places must maintain or incorporate green infrastructure, recognising the wide ranging role it can play, as key components of their natural and built fabric. Doing so will maximise health and well-being of communities and the environment..".

1.3 PPW also attaches considerable importance to the benefits of good design stating (paragraph 3.10) that:

"In areas recognised for their particular landscape, townscape, cultural or historic character and value it can be appropriate to seek to promote or reinforce local distinctiveness. In those areas, the impact of development on the existing character, the scale and siting of new development, and the use of appropriate building materials (including where possible sustainably produced materials from local sources), will be particularly important."

1.4 In addition, PPW attaches considerable importance to the benefits of renewable energy stating (at paragraph 5.7.7 and 5.9.1) that:

"…benefits of renewable and low carbon energy, as part of the overall commitment to tackle the climate emergency and increase energy security, is of paramount importance... …The planning system should: …optimise energy storage… and …maximise renewable and low carbon energy generation…"
"Local authorities should facilitate all forms of renewable and low carbon energy development…"

Technical Advice Note (TAN) 5: Nature Conservation and Planning (2009)

1.5 TAN 5 provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. This guidance note should be read in conjunction with Planning Policy Wales Edition 11, in particular with Chapter 6: Distinctive and Natural Places, which considers matters including landscaping (Page 133).

Technical Advice Note (TAN) 24: The Historic Environment (2017)

1.6 The purpose of TAN 24 is to provide guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building (LBC) applications. This Technical Advice Note (TAN) should be read in conjunction with Planning Policy Wales (PPW).

Local Planning Policy Context

1.7 The following sections describe the local policies that are considered to be relevant to this assessment. The site lies within the administrative area of Wrexham County Brough Council (WCBC). The current development plan documents for this district and the planning policies of relevance for this Chapter of the Environmental Statement are contained in the following documents;

1.8 The Adopted Wrexham Local Development Plan (LDP) 2013-2028 includes the following relevant policies.

Table 1: Relevant Local Plan Policies

Plan Policy	Details
Wrexham Local Development Plan (LDP) (2013-2028), Adopted December 2023	
Policy SP6: Green Wedge	Within the designated green wedge areas development will only be permitted which accords with national planning policy. Green wedge designations will ensure protection of the openness of the land only for the Plan period and will be reappraised as part of future Plan reviews. In this way the green wedge designations will work with the settlement boundaries (policy SP2) to allow for appropriate spatial growth in the long term. The green wedge designations have been identified, through the Strategic Green Wedge Review (2016), only on those parts of the countryside that are considered to act as buffers between settlements to prevent settlement coalescence in areas under pressure for development. The boundaries have been carefully set to ensure that only those areas that require extra protection to prevent settlement coalescence are included. They work in conjunction with the settlement boundaries to strategically manage built form and settlement edges, assist in safeguarding the countryside from encroachment, protect the setting for the urban area and assist in urban regeneration by encouraging the reuse of derelict and other urban land. The Plan allows for the controlled expansion on the edge of Wrexham, by virtue of the allocated Key Strategic Sites. An assessment that examined the need for green wedge identified the need to include green wedge on the edge of these sites (identified as the area between Wrexham, Bersham, and Rhostyllen, and Wrexham and Wrexham Industrial Estate). Whilst there are other policies in the Plan to control development in the countryside, it is considered important to give extra protection to the

Plan Policy	Details
	green wedge Green Wedges are designated between the following settlements as shown on the proposals map: i. Rossett and Pulford ii. Rossett and Marford iii. Gresford and Wrexham iv. Wrexham and Wrexham Industrial Estate v. Bradley, Rhosrobin, Gwersyllt, Broughton, and Wrexham vi. Brymbo, Broughton, and Southsea vii. Wrexham, Bersham, and Rhostyllen viii. Coedpoeth, Minera , Bwlchgwyn ix. Rhostyllen and Johnstown x. Pen-y-cae, Rhosllanerchrugog, Ruabon xi. Ruabon and Plas Madoc xii. Acrefair, Trevor, Cefn Mawr, and Froncysyllte Within the designated green wedge areas development will only be permitted which accords with national planning policy. The specific areas of countryside identified as green wedge are considered strategically important at preventing settlement coalescence and merit specific protection for this purpose. This is in line with National Planning Policy and Guidance. Planning Policy Wales provides specific guidance on the consideration of planning applications within green wedge designated areas. It emphasises the importance of maintaining the openness of the land, provides a presumption against inappropriate development and outlines the very exceptional circumstances when other considerations outweigh the importance of protecting the openness of the land. In order to be acceptable, extension to or replacement of an existing dwelling in the green wedge should be limited in scale and should not undermine the function of the green wedge, in particular in relation to the openness of the area.
Policy SP14: Natural Environment	Development will only be supported where it protects, conserves and enhances the natural environment including: • Internationally protected Special Areas of Conservation, Special Protection Areas, and Ramsar Sites, • Nationally protected Sites of Special Scientific Interest and National Nature Reserves; • Protected Species and their habitat; • The Clwydian Range and Dee Valley Area of Outstanding Natural Beauty including recognising the importance it has in contributing to the Outstanding Universal Value and setting of the Pontcysyllte Aqueduct and Canal World Heritage Site; • Local Wildlife Sites including the strategic ecological network on Wrexham Industrial Estate and Regionally Important Geological Sites; • Local Nature Reserves; • Special Landscape Areas recognised for their outstanding local landscape character; • natural landscape features such as trees, hedges and woodland and the green networks between them which contribute to the quality and diversity of the natural environment and play an important role in mitigating the impact of climate change; • The quality of natural services including water, air and soils • Developing and maintaining Green Infrastructure links; and • Habitats and species of principal importance to Wales.
Policy SP15: Historic and Cultural Environment	Development will only be supported where it conserves, protects and enhances the following cultural and heritage assets of the County Borough and, where appropriate, their settings: i. Listed Buildings and in particular those on the Buildings at Risk Register; ii. Conservation Areas; iii. Pontcysyllte Aqueduct and Canal World Heritage Site; iv. Registered Historic Parks, Gardens and Landscapes; and v. Scheduled Ancient Monuments and Archaeological Remains.

Plan Policy	Details
Policy SP19: Green Infrastructure	Wrexham's distinctive natural heritage provides a network of green and blue infrastructure. Protection, conservation and enhancement of natural heritage networks needs to be reconciled with the benefits of development. Development will be required to maintain the extent, quality and connectivity of the multi-functional green infrastructure on or near a site, and, where appropriate to enhance it by: i. Creating new interconnected areas of green infrastructure between the proposed site and the existing network, ii. Filling gaps in the existing network to improve connectivity, iii. Protecting the features most valuable for both nature and people, and iv. In instances where loss of green infrastructure is unavoidable, provide mitigation and compe
Policy NE2: Local Designations for Nature Conservation and Geological Importance	Development which impacts on the nature conservation and/or geological importance of locally designated sites, will only be permitted in exceptional circumstances where it can be demonstrated that: i. there is no satisfactory alternative location for the development which avoids nature conservation impacts, and ii. compensation measures are designed to ensure that there is no reduction in the overall nature or geological conservation value of the site.
Policy NE3 Trees, Woodlands and Hedgerows	Development will only be permitted where it does not cause unacceptable harm to trees, woodlands and hedgerows of significant public amenity, natural or cultural heritage value or those that provide important ecosystem services including mitigating the effects of climate change.
Policy NE5: Special Landscape Areas	Priority will be given to protecting, managing and enhancing the character and quality of the following Special Landscape Areas (SLAs) as shown on the proposals map. Within SLAs, development will only be permitted where proposals include measures to protect and enhance the character and quality of the particular landscape features for which the SLA has been designated having regard to: i) The impact, including cumulative impact, of the proposed development on the key features, landscape character and quality of the SLA; and ii) The ability of the development to provide appropriate mitigation and enhancement measures.

Appendix 5.4

LANDMAP Visual and Sensory Data Sheets

A438 Mold Road Corridor

Print View Map

SURVEY DETAILS FOR WRXHMVS065 - 2023-06-19

Area Unique ID: WRXHMVS065

Aspect:Visual and Sensory

Area:A483 Mold Road Corridor

Region:Wrexham

Survey Date:2007-09-21

- Level 1: Lowland
- Level 2: Rolling Lowland
- Level 3: Open Rolling Lowland

Monitoring

Q1 - Date of monitoring?

- 2015-01-26

Q1a - Monitoring undertaken by

- Stages 1, 2 and 3 change detection and amendment completed by Simon White of White Consultants in conjunction with the local planning authority.

Q1b - Has this record been updated following monitoring work?

- This record has been updated following monitoring work, there was a real change in the aspect area
  - Boundary change to accommodate expansion of housing west of Wrexham to east and west of A483.

Q1c - Change indicated by

- OS Data, Aerial Photographs

Q1d - What has changed?

- Boundaries

Q1e - Has the information ever been verified in the field?

- Yes
  - N/A

Q2 - Does this area have a special or functional link with an adjacent area?

- Yes
  - Forms the hinterland lying around Wrexham town and its outlying urban villages

Q2a - During which season(s) was fieldwork carried out?

- Spring, Summer, Autumn and Winter

Description

Q3 - Summary Description

- The area comprises the hinterland low lying land around Wrexham town and its outlying urban villages, generally rural in nature but often with significant noise from A483, adjacent roads and the railway. the area is generally low lying open farmland with a large open field pattern with well defined hedgerow boundaries. The original rural character has been significantly weakened by urban influences with some pockets of interest. Area is classified as rolling lowland farmland but heavily influenced by the A483, Mold Road. Other roads and rail corridors subdivide the wider area, with pylons, views of housing & industry, mining & quarrying a frequent occurrence. Although relatively fragmented by development the area has not suffered as much visual degradation as the adjacent aspect area WRXHMVS038 the area is vulnerable to further fragmentation of the remaining rural areas by development and suburbanisation.

Q4 - Physical Form And Elements: Topographic Form?

- Rolling/Undulating

Q5 - Physical Form And Elements: Landcover Pattern?

- Mixture

Q6 - Physical form and elements: Settlement pattern

- Mixture

Q7 - Physical form and elements: Boundary type

- Mixture

Q8 - Aesthetic Qualities: Scale?

- Medium

Q9 - Aesthetic Qualities: Sense of Enclosure?

- Enclosed

Q10 - Aesthetic Qualities: Diversity?

- Complex

Q11 - Aesthetic Qualities: Texture?

- Medium

Q12 - Aesthetic Qualities: Lines?

- Angular

Q13 - Aesthetic Qualities: Colour?

- Muted

Q14 - Aesthetic Qualities: Balance?

- Balanced

Q15 - Aesthetic Qualities: Unity?

- Neutral

Q16 - Aesthetic Qualities: Pattern?

- Organised

Q17 - Aesthetic Qualities: Seasonal Interest?

- Mixed

Q18 - Other Factors: Level of Human Access?

- Constant

Q19 - Other Factors: Night Time Light Pollution?

- Question 19 night time light pollution data has been moved to question 56. Additional dark skies data is available from questions 57 and 58.

Q20 - Other Factors: Use of Construction Materials?

- Generally Appropriate

Q21 - What materials? Give Details:

- Predominantly traditional red brick - some limited use of local Cefn sandstone in older buildings but rare

Q22 - There are attractive views...

- ....out
  - Generally attractive views and the focus of the viewers attention is to the west and the higher rising upland of Ruabon mountain.

Q23 - There are detractive views...

- ...within
  - Some unattractive views of busy road corridors and into settlements fringes

Q24 - Perceptual and Other Sensory Qualities

- Settled

Q25 - What is the sense of place/local distinctiveness

- Weak
  - Generally the original identity of the area has been greatly weakened by urban influences although there are pockets of local interest the wider area has no distinctive character or sense of place.

Evaluation

Q26 - Value:

- Moderate
  - refer to Q.51

Q27 - Condition:

- Unassessed

Q28 - Trend:

- Declining

Recommendations

Q29 - Existing management

- Generally Inappropriate

Q30 - Existing management remarks:

- The area although still maintaining some rural identity is very vulnerable to fragmentation by development and suburbanisation of areas adjacent to the settlement edge. Management at present appears standard and low key

Q31 - Principal management recommendation:

- Enhance existing vegetation cover with a view to restoring and reinforcing adjacent field patterns where feasible. Promote habitat restoration and establishment with a view to promoting biodiversity. Standard highway management of the road corridor itself and the adjacent highway planting - clearances for sightlines and minimal interference in hedgerow, woodland block planting with operational requirements taking precedence overall. Adjacent farmland is well managed in terms of maintaining field boundaries but is otherwise intensively farmed pasture and occasional arable fields Generally visually an unsatisfactory area, under pressure, and the first impression of the area around Wrexham for many visitors - municipal

Q32 - Guideline

- Medium Term
  - Protect and strengthen remaining areas of countryside, including historic landscapes, promoting biodiversity and habitat creation
- Medium Term
  - Promote urban forestry to help integrate mineral/industry and other developments into countryside
- Medium Term
  - Promote and manage recreational links between urban areas and countryside

Q33 - Define the key qualities that should be conserved:

- Rural open countryside, important green space

Q34 - Define the key qualities that should be enhanced:

- Field pattern and restoring species diversity and age range

Q35 - Define the key qualities that should be changed:

- Limit over expansion of settlement footprint and industrial development

Q36 - Define the key elements that should be conserved:

- Field pattern and open space adjacent to settlement areas

Q37 - Define the key elements that should be enhanced:

- Field boundaries and percentage of vegetation cover in rural areas to integrate settlement and development areas

Q38 - Define the key elements that should be changed:

- Limit development and reduce expansion into surrounding countryside

Tolerance To Change

Q39 - Are there any significant threats to the current integrity and condition of the visual & sensory features of the area?

- Not known

Aspect Area Boundary

Q40 - To what level was this information site-surveyed?

- Level 3

Q41 - At 1:10,000, how much of the Aspect Area boundary is precise?

- All

Q42 - What baseline information source was used for Aspect Area boundary mapping?

- OS Landline

Q43 - If OS Data was used, what was the scale?

- 1:10,000 and 1:25,000

Q44 - What is the justification for the Aspect Area boundaries?

- Lower lying land focussed upon the A483 highway corridor and that has a direct relationship visually to the road itself. Settlement fringe is the outer limit of the aspect area.

Evaluation Matrix

Q46 - Evaluation Criteria: Scenic quality

- Moderate
  - Area has been classified as Rolling lowland farmland, with medium-large sized fields with hedges, hedgerow trees, but heavily influenced by A483, Mold Road. Outer area has been further fragmented by other roads and rail corridors which subdivide area, pylons, views of housing & industry, mining & quarrying. Views are available predominantly to the west of the road but are rarely of picturesque quality or containing aesthetically pleasing or attractive elements other than at long distance level of the rising upland to the west

Q47 - Evaluation Criteria: Integrity

- Moderate
  - The nature of a road corridor means settlement and industry/commercial retail are associated within and adjacent to the transport corridor - although not of large scale this development is continuous and as such further undermines the integrity of the aspect area and is often inharmonious in its scale, colouring and materials used. However the adjacent land is of a higher quality and standard of maintenance than the similar aspect area of WRXHMVS038

Q48 - Evaluation Criteria: Character

- Moderate
  - There is a relatively strong visual unity within the aspect due to the constant presence of the road corridor and the elements associated with that. However the areas and elements that may make this aspect different from other road corridors elsewhere in the study area and beyond - i.e attractive views, picturesque landscape elements, varied and interesting topography are absent

Q49 - Evaluation Criteria: Rarity

- Low
  - The aspect engenders many of the visual and sensory responses of road corridors throughout the area and displays no or few features that are either rare, representative or of particular value to adjacent aspect areas or visual and sensory criteria

Q50 - Evaluation Criteria: Overall Evaluation

- Moderate
  - 1 Low and 3 Moderate = Moderate

Q51 - Justification of overall evaluation

- The aspect engenders many of the visual and sensory responses of road corridors throughout the area and displays no or few features that are either rare, representative or of particular value to adjacent aspect areas or visual and sensory criteria. There is a relatively strong visual unity within the aspect due to the constant presence of the road corridor and the elements associated with that. However the general quality of the wider rural area and standard of management is of a higher evaluation than the adjacent areas

Bibliography

Q45 - List the key sources used for this assessment

- Pre 2003 methodology LANDMAP study for WCBC

Assessment

Q52 - Additional Assessments

- None

Q53 - Additional Comments

- None

LMP 14 & 09

Q54 - LANDMAP derived landscape types (LMP14)

- Valleys, rolling and flat lowland (grassland >50%, open, <20% wooded, lacking hedgerow trees)

Q55 - LANDMAP derived landscape types (LMP09)

- Lowland open >50% grassland, <20% wooded

Dark Skies

Light Pollution Percentage

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	7.1	41.0	39.1	12.3	0.5	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 57a - 57h collectively provide colour band data by %.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place - Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Light Pollution km²

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	0.5	2.9	2.8	0.9	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 58a to 58h collectively provide colour band data by km2.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place – Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Q56 - Night Time Light Pollution

- Moderate
  - Consultant led night time light pollution assessment conducted at time of survey record or survey update

Q57a - % in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57b - % in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57c - % in brightness colour band 1-2

- 7.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57d - % in brightness colour band 2-4

- 41.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57e - % in brightness colour band 4-8

- 39.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57f - % in brightness colour band 8-16

- 12.3
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57g - % in brightness colour band 16-32

- 0.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57h - % in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58a - km2 in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58b - km2 in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58c - km2 in brightness colour band 1-2

- 0.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58d - km2 in brightness colour band 2-4

- 2.9
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58e - km2 in brightness colour band 4-8

- 2.8
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58f - km2 in brightness colour band 8-16

- 0.9
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58g - km2 in brightness colour band 16-32

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58h - km2 in brightness colour band >32

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Tranquillity & Place

Q59a - % in visually tranquil category 1

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59b - % in visually tranquil category 2

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59c - % in visually tranquil category 3

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59d - % in visually tranquil category 4

- 0.71
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59e - % in visually tranquil category 5

- 22.67
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59f - % in visually tranquil category 6

- 35.13
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59g - % in visually tranquil category 7

- 40.43
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59h - % in visually tranquil category 8

- 1.06
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59i - % in visually tranquil category 9

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59j - % in visually tranquil category 10

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59k - Data Source

- Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, the report and webapp, visit the Storymap available from https://storymaps.arcgis.com/stories/865c1876d9f64280a3dfc6e2769a46a5

SLAs

Q60 - Does the area overlap with Special Landscape Areas (SLA)?

- No Answer

Q61 - Approximately what percentage of the area overlaps with a SLA?

- No Answer

Visible Settings

Q62 - Visible settings of LANDMAP V&S areas

- View a map image showing the visible setting of the area

This is a Zone of Theoretical Visibility (ZTV), calculated using a 30 metre Digital Terrain Model (DTM), using multiple observer points scattered across the area, 1.5m above ground level, and taking into account the Earth's curvature. The data does not extend beyond 35km from an observer point, meaning that more distant views may also be possible.

- Read user guidance that explains the map image
- Bulk download the map images for Wales.
- Read a detailed technical report which explains the data calculations

Q63 - Visible Settings of Designated Landscapes

- View map images showing the visible setting of each National Park and Area of Outstanding Natural Beauty.
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to Designated Landscape areas. Also, for areas not visible, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. See Q62 to access the user guidance and a technical report.

Q64 - Key views into or out from Designated Landscapes

- View map images showing the ZTV and HOBV of a selection of key views for each National Park and Area of Outstanding Natural Beauty in or affecting Wales
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to selected key views into or out from Designated Landscapes. Also, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. It is not an exhaustive key view list. See Q62 to access the user guidance and a technical report.

Clywedog Valley - Bersham

Print View Map

SURVEY DETAILS FOR WRXHMVS019 - 2023-06-19

Area Unique ID: WRXHMVS019

Aspect:Visual and Sensory

Area:Clywedog Valley - Bersham

Region:Wrexham

Survey Date:2007-09-21

- Level 1: Lowland
- Level 2: Lowland Valleys
- Level 3: Wooded Lowland Valleys

Monitoring

Q1 - Date of monitoring?

- 2015-02-06

Q1a - Monitoring undertaken by

- Stages 1, 2 and 3 change detection, field verification and amendment completed by White Consultants, in conjunction with the planning authority.Quality Assurance completed by Land Use Consultants.

Q1b - Has this record been updated following monitoring work?

- This record remains unchanged following monitoring work

Q1c - Change indicated by

- No Answer

Q1d - What has changed?

- No Answer

Q1e - Has the information ever been verified in the field?

- Yes
  - N/A

Q2 - Does this area have a special or functional link with an adjacent area?

- Yes
  - Functional and strong physical link as the continuation of the Upper and lower Clywedog river valley complex

Q2a - During which season(s) was fieldwork carried out?

- Summer

Description

Q3 - Summary Description

- The aspect area is a very clearly defined narrow winding river valley with a very strong wooded vegetation cover. The area has largely been restored/reclaimed from previous industrial uses with some strong evidence still remaining of its ironworking heritage. Mixed woodlands with small and intimate field parcels in open areas remnants of industrial archaeology and heritage, the area also contains some valuable recreational amenities including Clywedog Trail and associated Heritage Centre and Nant Mill visitor centre. Public access is good throughout the area and the valley forms an important green space and link for the adjacent communities. The aspect sites on the edge of Plas Power estate (to the north) and contains Bersham Conservation Area to the east. Generally due to its steep topography and vegetation cover the area feels remote from the surrounding heavily populated areas, however noise of A483 on bridge above valley can be a significant detractor.

Q4 - Physical Form And Elements: Topographic Form?

- Hills/Valleys

Q5 - Physical Form And Elements: Landcover Pattern?

- Woodland

Q6 - Physical form and elements: Settlement pattern

- Clustered

Q7 - Physical form and elements: Boundary type

- Mixture

Q8 - Aesthetic Qualities: Scale?

- Small

Q9 - Aesthetic Qualities: Sense of Enclosure?

- Enclosed

Q10 - Aesthetic Qualities: Diversity?

- Diverse

Q11 - Aesthetic Qualities: Texture?

- Coarse

Q12 - Aesthetic Qualities: Lines?

- Curved

Q13 - Aesthetic Qualities: Colour?

- Muted

Q14 - Aesthetic Qualities: Balance?

- Balanced

Q15 - Aesthetic Qualities: Unity?

- Unity

Q16 - Aesthetic Qualities: Pattern?

- Random

Q17 - Aesthetic Qualities: Seasonal Interest?

- Autumn
    - Particularly in terms of Autumn leaf cover

Q18 - Other Factors: Level of Human Access?

- Frequent

Q19 - Other Factors: Night Time Light Pollution?

- Question 19 night time light pollution data has been moved to question 56. Additional dark skies data is available from questions 57 and 58.

Q20 - Other Factors: Use of Construction Materials?

- Generally Appropriate

Q21 - What materials? Give Details:

- Generally appropriate in terms of their natural appearance i.e. wood, timber brick and stone. Buildings and clustered settlements tend to be traditional red brick some limited use of local stone.

Q22 - There are attractive views...

- ...within
  - A number of attractive and aesthetically pleasing views are available from various locations throughout the wider area of wooded valley and some industrial heritage

Q23 - There are detractive views...

- ...neither in or out
  - N/A

Q24 - Perceptual and Other Sensory Qualities

- Tranquil
- Noisy
  - Tranquil and noisy dependant on position within the area - noise from A483 on viaduct over the valley
- Safe
- Remote
  - In terms of the steep wooded valley sides segregating the viewer from the surrounding settlements
- Other
  - Interesting industrial heritage remnants

Q25 - What is the sense of place/local distinctiveness

- Strong
  - A distinctive wooded valley with a very strong physical form containing an attractive winding river course. Sense of place is further emphasised by the remnant industrial heritage and the steep topography segregating the viewer from the adjacent heavily populated areas.

Evaluation

Q26 - Value:

- Moderate
  - Refer to Q.51

Q27 - Condition:

- Unassessed

Q28 - Trend:

- Constant

Recommendations

Q29 - Existing management

- Generally Appropriate

Q30 - Existing management remarks:

- Management appears relatively stable in terms of displaying a good age range of mixed deciduous woodland. Access is good for local communities and appears to be being maintained.

Q31 - Principal management recommendation:

- Maintain as existing. With a view to further introducing biodiversity and encouraging species diversity of British native plant stock. ensure good access is maintained with local adjacent communities.

Q32 - Guideline

- Long Term
  - Restore and enhance natural and built heritage within woodland setting
- Medium Term
  - Improve age range and species mix of woodland - emphasis on British Native species
- Long Term
  - Encourage sensitive development of recreational potential, avoid intrusive or unsympathetic development. Aim to maintain as an important green space resource for local communities
- Immediate
  - Follow recommendations of Bersham Conservation Area appraisal.

Q33 - Define the key qualities that should be conserved:

- Mixed woodland cover with good access links to local communities

Q34 - Define the key qualities that should be enhanced:

- Woodland composition - improving age range and species mix (British Native)

Q35 - Define the key qualities that should be changed:

- Limit intrusive or unsympathetic development

Q36 - Define the key elements that should be conserved:

- Woodland cover and attractive winding river course with important industrial heritage

Q37 - Define the key elements that should be enhanced:

- Public access and sensitive recreational development

Q38 - Define the key elements that should be changed:

- None

Tolerance To Change

Q39 - Are there any significant threats to the current integrity and condition of the visual & sensory features of the area?

- Not known

Aspect Area Boundary

Q40 - To what level was this information site-surveyed?

- Level 3

Q41 - At 1:10,000, how much of the Aspect Area boundary is precise?

- All

Q42 - What baseline information source was used for Aspect Area boundary mapping?

- OS Landline

Q43 - If OS Data was used, what was the scale?

- 1:10,000 and 1:25,000

Q44 - What is the justification for the Aspect Area boundaries?

- Clearly defined and attractive wooded river valley. Vegetation cover and percentage of settlement is sharply contrasting with adjacent areas and aids the strong sense of place of the aspect area

Evaluation Matrix

Q46 - Evaluation Criteria: Scenic quality

- Moderate
  - A number of attractive and aesthetically pleasing views are available from various locations throughout the wider area of wooded valley and some industrial heritage. Views are easily accessible and often focus upon the attractive winding river course framed by mature mixed woodland. Some visual detractors are present in the form of busy road corridors - A483 and the closely adjacent settlements on the valleys upper slopes

Q47 - Evaluation Criteria: Integrity

- Moderate
  - Generally the area is unspoilt by large scale or intrusive development but the close proximity of settlements on the upper valley slopes and the busy nature of the A483 corridor has slightly degraded the overall integrity of the aspect area

Q48 - Evaluation Criteria: Character

- High
  - Attractive and well wooded river valley with a number of easily accessible views and acting as a valuable recreational resource for the adjacent settlements. The vegetation cover and topographic form of the valley provide a clear visual unity for the area and emphasises the sense of place.

Q49 - Evaluation Criteria: Rarity

- Moderate
  - Attractive winding and wooded river valley displaying an interesting mix of varied woodland, industrial heritage and some aesthetically pleasing an attractively composed views that are easily accessible to the adjacent local communities. Of high local value especially to the adjacent local communities but of moderate value at a regional scale as such features are found elsewhere within the study.

Q50 - Evaluation Criteria: Overall Evaluation

- Moderate
  - 3 Moderate, 1 High = Moderate

Q51 - Justification of overall evaluation

- Attractive winding and wooded river valley displaying an interesting mix of varied woodland, industrial heritage and some aesthetically pleasing an attractively composed views that are easily accessible to the adjacent local communities. Of high local value especially to the adjacent local communities. Generally the area is unspoilt by large scale or intrusive development but the close proximity of settlements on the upper valley slopes and the busy nature of the A483 corridor has slightly degraded the overall integrity of the aspect area. However the attractive nature of the valley complex - well wooded, steep sided river valley with an interesting range of industrial archaeology and heritage that together with the easy access for adjacent communities contribute towards giving the area an overall evaluation of Moderate.

Bibliography

Q45 - List the key sources used for this assessment

- Pre 2003 methodology LANDMAP Study for WCBC

Assessment

Q52 - Additional Assessments

- None

Q53 - Additional Comments

- None

LMP 14 & 09

Q54 - LANDMAP derived landscape types (LMP14)

- Valleys, rolling and flat lowland (wooded >50%)

Q55 - LANDMAP derived landscape types (LMP09)

- Lowland mosaic >20% wooded

Dark Skies

Light Pollution Percentage

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	2.5	59.7	25.7	12.1	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 57a - 57h collectively provide colour band data by %.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place - Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Light Pollution km²

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	0.7	0.3	0.1	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 58a to 58h collectively provide colour band data by km2.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place – Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Q56 - Night Time Light Pollution

- Moderate
  - Consultant led night time light pollution assessment conducted at time of survey record or survey update

Q57a - % in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57b - % in brightness colour band 0.5-1

- 2.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57c - % in brightness colour band 1-2

- 59.7
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57d - % in brightness colour band 2-4

- 25.7
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57e - % in brightness colour band 4-8

- 12.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57f - % in brightness colour band 8-16

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57g - % in brightness colour band 16-32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57h - % in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58a - km2 in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58b - km2 in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58c - km2 in brightness colour band 1-2

- 0.7
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58d - km2 in brightness colour band 2-4

- 0.3
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58e - km2 in brightness colour band 4-8

- 0.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58f - km2 in brightness colour band 8-16

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58g - km2 in brightness colour band 16-32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58h - km2 in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Tranquillity & Place

Q59a - % in visually tranquil category 1

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59b - % in visually tranquil category 2

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59c - % in visually tranquil category 3

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59d - % in visually tranquil category 4

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59e - % in visually tranquil category 5

- 1.36
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59f - % in visually tranquil category 6

- 7.26
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59g - % in visually tranquil category 7

- 51.02
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59h - % in visually tranquil category 8

- 39.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59i - % in visually tranquil category 9

- 1.36
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59j - % in visually tranquil category 10

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59k - Data Source

- Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, the report and webapp, visit the Storymap available from https://storymaps.arcgis.com/stories/865c1876d9f64280a3dfc6e2769a46a5

SLAs

Q60 - Does the area overlap with Special Landscape Areas (SLA)?

- No Answer

Q61 - Approximately what percentage of the area overlaps with a SLA?

- No Answer

Visible Settings

Q62 - Visible settings of LANDMAP V&S areas

- View a map image showing the visible setting of the area

This is a Zone of Theoretical Visibility (ZTV), calculated using a 30 metre Digital Terrain Model (DTM), using multiple observer points scattered across the area, 1.5m above ground level, and taking into account the Earth's curvature. The data does not extend beyond 35km from an observer point, meaning that more distant views may also be possible.

- Read user guidance that explains the map image
- Bulk download the map images for Wales.
- Read a detailed technical report which explains the data calculations

Q63 - Visible Settings of Designated Landscapes

- View map images showing the visible setting of each National Park and Area of Outstanding Natural Beauty.
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to Designated Landscape areas. Also, for areas not visible, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. See Q62 to access the user guidance and a technical report.

Q64 - Key views into or out from Designated Landscapes

- View map images showing the ZTV and HOBV of a selection of key views for each National Park and Area of Outstanding Natural Beauty in or affecting Wales
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to selected key views into or out from Designated Landscapes. Also, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. It is not an exhaustive key view list. See Q62 to access the user guidance and a technical report.

Plas Power Park

Cyfoeth Naturiol Cymru
Natural Resources Wales

Print View Map

SURVEY DETAILS FOR WRXHMVS082 - 2023-06-19

Area Unique ID: WRXHMVS082

Aspect:Visual and Sensory

Area:Plas Power Park

Region:Wrexham

Survey Date:2008-02-05

- Level 1: Lowland
- Level 2: Rolling Lowland
- Level 3: Open Rolling Lowland

Monitoring

Q1 - Date of monitoring?

- 2015-02-06

Q1a - Monitoring undertaken by

- Stages 1, 2 and 3 change detection, field verification and amendment completed by White Consultants, in conjunction with the planning authority.Quality Assurance completed by Land Use Consultants.

Q1b - Has this record been updated following monitoring work?

- This record remains unchanged following monitoring work

Q1c - Change indicated by

- No Answer

Q1d - What has changed?

- No Answer

Q1e - Has the information ever been verified in the field?

- Yes
  - N/A

Q2 - Does this area have a special or functional link with an adjacent area?

- Yes
  - Physical links via footpath and visual link with adjacent Clywedog Valley

Q2a - During which season(s) was fieldwork carried out?

- Winter

Description

Q3 - Summary Description

- A relatively small aspect area that comprises in the main part the remnants of Plas Power Estate. The area is distinct from the surrounding areas to the north in its physical separation of the estate through the presence of high stone estate walls, however the estate itself has been long neglected and the area to the east has been reclaimed following mining activities and has lost much of the original landscape structure of the formal park. The remaining area still has elements of formal landscape features specimen trees, mixed deciduous woodland and some limited evidence of driveway/avenues and the former kitchen garden. The key feature of the area in terms of landscape elements is the clearly defined earthwork of Offas Dyke which forms the western boundary of the aspect. The area provides an important green link between the adjacent Clywedog Valley and settlements at Coedpoeth and Tanyfron / Brynteg. Due to the close proximity of settlements and industry the area is under pressure from recreation and development expansion.

Q4 - Physical Form And Elements: Topographic Form?

- Rolling/Undulating

Q5 - Physical Form And Elements: Landcover Pattern?

- Mixture

Q6 - Physical form and elements: Settlement pattern

- No settlements

Q7 - Physical form and elements: Boundary type

- Stone Walls

Q8 - Aesthetic Qualities: Scale?

- Medium

Q9 - Aesthetic Qualities: Sense of Enclosure?

- Enclosed

Q10 - Aesthetic Qualities: Diversity?

- Simple

Q11 - Aesthetic Qualities: Texture?

- Medium

Q12 - Aesthetic Qualities: Lines?

- Straight

Q13 - Aesthetic Qualities: Colour?

- Muted

Q14 - Aesthetic Qualities: Balance?

- Balanced

Q15 - Aesthetic Qualities: Unity?

- Neutral

Q16 - Aesthetic Qualities: Pattern?

- Regular

Q17 - Aesthetic Qualities: Seasonal Interest?

- Mixed

Q18 - Other Factors: Level of Human Access?

- Infrequent

Q19 - Other Factors: Night Time Light Pollution?

- Question 19 night time light pollution data has been moved to question 56. Additional dark skies data is available from questions 57 and 58.

Q20 - Other Factors: Use of Construction Materials?

- Generally Appropriate

Q21 - What materials? Give Details:

- Some use of Cefn sandstone in the stone boundaries walls

Q22 - There are attractive views...

- ....out
  - Especially to the south over and into the Clywedog Valley

Q23 - There are detractive views...

- ....out
  - Of dense settlement areas to the east and north of the area

Q24 - Perceptual and Other Sensory Qualities

- Tranquil
  - Certainly in terms of the adjacent areas. Estate walls enclose the former estate and provide a element of separation and tranquility

Q25 - What is the sense of place/local distinctiveness

- Moderate
  - Elements of former landscape features create a relatively distinct sense of place separate from the surrounding areas

Evaluation

Q26 - Value:

- Moderate
  - Refer to Q.51

Q27 - Condition:

- Unassessed

Q28 - Trend:

- Constant

Recommendations

Q29 - Existing management

- Generally Appropriate

Q30 - Existing management remarks:

- Generally appropriate but requires greater management in terms of enhancing biodiversity and restoring historic landscape elements to improve overall appearance

Q31 - Principal management recommendation:

- Restore historic landscape character through re-establishing landscape elements and improve biodiversity

Q32 - Guideline

- Medium Term
  - Improve biodiversity through introduction of British native species and introducing woodland planting and reinforcing field boundaries
- Immediate
  - Improve green links with adjacent settlements and Clywedog Valley
- Medium Term
  - Enhance and interpret cultural heritage

Q33 - Define the key qualities that should be conserved:

- Open green space with good public access

Q34 - Define the key qualities that should be enhanced:

- Re-establish historic landscape elements and improve biodiversity of existing woodland and field boundaries

Q35 - Define the key qualities that should be changed:

- Improve management of remnant historic park to improve overall quality

Q36 - Define the key elements that should be conserved:

- Remnant historic landscape elements

Q37 - Define the key elements that should be enhanced:

- Biodiversity and introduction of British native species

Q38 - Define the key elements that should be changed:

- None

Tolerance To Change

Q39 - Are there any significant threats to the current integrity and condition of the visual & sensory features of the area?

- Not known

Aspect Area Boundary

Q40 - To what level was this information site-surveyed?

- Level 3

Q41 - At 1:10,000, how much of the Aspect Area boundary is precise?

- All

Q42 - What baseline information source was used for Aspect Area boundary mapping?

- OS Landline

Q43 - If OS Data was used, what was the scale?

- 1:10,000 and 1:25,000

Q44 - What is the justification for the Aspect Area boundaries?

- Distinctive area that has a number of historic elements that provide a valuable and relatively attractive character of higher quality than the area to the north

Evaluation Matrix

Q46 - Evaluation Criteria: Scenic quality

- Moderate
  - Scenic quality it considered to be Moderate/Low there is are a number of relatively attractive aesthetically pleasing views largely based upon the remnants of the historic landscape park. However the area has been badly neglected and much of the former character has been degraded.

Q47 - Evaluation Criteria: Integrity

- Moderate
  - The area has no large scale or visually intrusive development within the area however the adjacent large settlement areas of Coedpoeth and Tanyfron/Brynteg are evident through nighttime light pollution and distant noise - traffic etc.

Q48 - Evaluation Criteria: Character

- Moderate
  - Elements of the former historic landscape park are still evident and the perimeter stone walls are attractive and emphasise the overall character of the area. Generally, although degraded through long term neglect and post mining restoration, the area has a tranquility and relative calm compared to the northern settlement areas and farmland. The visual unity of the area is further emphasised by the perimeter stone boundary walls.

Q49 - Evaluation Criteria: Rarity

- Low
  - The qualities and landscape features still present within the aspect are not uncommon in terms of the overall study area and areas of higher quality and in better condition are found elsewhere, hence the Low evaluation

Q50 - Evaluation Criteria: Overall Evaluation

- Moderate
  - 3 Moderate and 1 Low = Moderate overall

Q51 - Justification of overall evaluation

- Elements of the former historic landscape park are still evident and the perimeter stone walls are attractive and emphasise the overall character of the area. Generally, although degraded through long term neglect and post mining restoration, the area has a tranquility and relative calm compared to the northern settlement areas and farmland. The qualities and landscape features still present within the aspect are not uncommon in terms of the overall study area and areas of higher quality and in better condition are found elsewhere, furthermore the adjacent large settlement areas of Coedpoeth and Tanyfron/Brynteg are evident through nighttime light pollution and distant noise - traffic etc. The area however is an important green space and interface between the settlements to the north and the wooded Clywedog Valley to the south and is therefore to be considered to be of Moderate value.

Bibliography

Q45 - List the key sources used for this assessment

- Pre 2003 methodology LANDMAP study for Wrexham CBC

Assessment

Q52 - Additional Assessments

- None

Q53 - Additional Comments

- None

LMP 14 & 09

Q54 - LANDMAP derived landscape types (LMP14)

- Valleys, rolling and flat lowland (grassland >50%, open, <20% wooded, lacking hedgerow trees)

Q55 - LANDMAP derived landscape types (LMP09)

- Lowland open >50% grassland, <20% wooded

Dark Skies

Light Pollution Percentage

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	92.5	7.5	0.0	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 57a - 57h collectively provide colour band data by %.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place - Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Light Pollution km²

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	1.1	0.1	0.0	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 58a to 58h collectively provide colour band data by km2.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place – Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Q56 - Night Time Light Pollution

- Slight
  - Some inherited light pollution from the adjacent settlement areas to the east and north Consultant led night time light pollution assessment conducted at time of survey record or survey update

Q57a - % in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57b - % in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57c - % in brightness colour band 1-2

- 92.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57d - % in brightness colour band 2-4

- 7.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57e - % in brightness colour band 4-8

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57f - % in brightness colour band 8-16

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57g - % in brightness colour band 16-32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57h - % in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58a - km2 in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58b - km2 in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58c - km2 in brightness colour band 1-2

- 1.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58d - km2 in brightness colour band 2-4

- 0.1
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58e - km2 in brightness colour band 4-8

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58f - km2 in brightness colour band 8-16

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58g - km2 in brightness colour band 16-32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58h - km2 in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Tranquillity & Place

Q59a - % in visually tranquil category 1

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59b - % in visually tranquil category 2

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59c - % in visually tranquil category 3

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59d - % in visually tranquil category 4

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59e - % in visually tranquil category 5

- 0.00
  - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59f - % in visually tranquil category 6

- 17.18
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59g - % in visually tranquil category 7

- 69.98
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59h - % in visually tranquil category 8

- 12.84
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59i - % in visually tranquil category 9

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59j - % in visually tranquil category 10

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59k - Data Source

- Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, the report and webapp, visit the Storymap available from https://storymaps.arcgis.com/stories/865c1876d9f64280a3dfc6e2769a46a5

SLAs

Q60 - Does the area overlap with Special Landscape Areas (SLA)?

- No Answer

Q61 - Approximately what percentage of the area overlaps with a SLA?

- No Answer

Visible Settings

Q62 - Visible settings of LANDMAP V&S areas

- View a map image showing the visible setting of the area

This is a Zone of Theoretical Visibility (ZTV), calculated using a 30 metre Digital Terrain Model (DTM), using multiple observer points scattered across the area, 1.5m above ground level, and taking into account the Earth’s curvature. The data does not extend beyond 35km from an observer point, meaning that more distant views may also be possible.

- Read user guidance that explains the map image
- Bulk download the map images for Wales.
- Read a detailed technical report which explains the data calculations

Q63 - Visible Settings of Designated Landscapes

- View map images showing the visible setting of each National Park and Area of Outstanding Natural Beauty.
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to Designated Landscape areas. Also, for areas not visible, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. See Q62 to access the user guidance and a technical report.

Q64 - Key views into or out from Designated Landscapes

- View map images showing the ZTV and HOBV of a selection of key views for each National Park and Area of Outstanding Natural Beauty in or affecting Wales
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to selected key views into or out from Designated Landscapes. Also, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. It is not an exhaustive key view list. See Q62 to access the user guidance and a technical report.

West Wrexham Lower Slopes

Print View Map

SURVEY DETAILS FOR WRXHMVS073 - 2023-06-19

Area Unique ID: WRXHMVS073

Aspect:Visual and Sensory

Area:West Wrexham Lower Slopes

Region:Wrexham

Survey Date:2007-09-21

- Level 1: Upland
- Level 2: Hills, Lower Plateau & Scarp Slopes
- Level 3: Hill & Lower Plateau Grazing

Monitoring

Q1 - Date of monitoring?

- 2015-02-06

Q1a - Monitoring undertaken by

- Stages 1, 2 and 3 change detection, field verification and amendment completed by White Consultants, in conjunction with the planning authority.Quality Assurance completed by Land Use Consultants.

Q1b - Has this record been updated following monitoring work?

- This record remains unchanged following monitoring work

Q1c - Change indicated by

- No Answer

Q1d - What has changed?

- No Answer

Q1e - Has the information ever been verified in the field?

- Yes
  - N/A

Q2 - Does this area have a special or functional link with an adjacent area?

- Yes
  - Displays many similar characteristics to the adjacent lowland. Physically the area is linked lower slopes of Ruabon Mountain.

Q2a - During which season(s) was fieldwork carried out?

- Summer

Description

Q3 - Summary Description

- This aspect comprises a fragmented area between settlements where there have been many changes to the landscape. Lying on the lower slopes of Ruabon mountain and sloping broadly in a west to east direction the general landform is undulating predominantly open pasture land but also includes a wider range of mixed landuse including the core area of Plas Power estate (sharply defined by boundary stone walls), Plas Power tip near Southsea, parts of Offa"s Dyke and the River Gwenfro valley. Generally the area has a similar character to the adjacent lowland to the east but is clearly physically part of the lower slopes of Ruabon Mountain. Generally the area has been fragmented by settlement and built elements such as pylons and roads but in wider areas hasa well defined field system - medium to large scale fields bounded by sparsely vegetated hedgerows with over mature hedgerow trees. Cefn sandstone and red brick are traditional materials with modern materials also commonly found.

Q4 - Physical Form And Elements: Topographic Form?

- Rolling/Undulating

Q5 - Physical Form And Elements: Landcover Pattern?

- Field Pattern/Mosaic

Q6 - Physical form and elements: Settlement pattern

- Mixture

Q7 - Physical form and elements: Boundary type

- Managed Hedge

Q8 - Aesthetic Qualities: Scale?

- Medium

Q9 - Aesthetic Qualities: Sense of Enclosure?

- Enclosed

Q10 - Aesthetic Qualities: Diversity?

- Complex

Q11 - Aesthetic Qualities: Texture?

- Medium

Q12 - Aesthetic Qualities: Lines?

- Angular

Q13 - Aesthetic Qualities: Colour?

- Muted

Q14 - Aesthetic Qualities: Balance?

- Balanced

Q15 - Aesthetic Qualities: Unity?

- Neutral

Q16 - Aesthetic Qualities: Pattern?

- Organised

Q17 - Aesthetic Qualities: Seasonal Interest?

- Mixed

Q18 - Other Factors: Level of Human Access?

- Frequent

Q19 - Other Factors: Night Time Light Pollution?

- Question 19 night time light pollution data has been moved to question 56. Additional dark skies data is available from questions 57 and 58.

Q20 - Other Factors: Use of Construction Materials?

- Generally Appropriate

Q21 - What materials? Give Details:

- Local Cefn sandstone and traditional red brick are found in older buildings and settlements with modern materials of all kinds also found

Q22 - There are attractive views...

- ...neither in or out
  - The area has a fragmented and relatively disturbed nature in terms of previous landuse and current mixed development and fragmented nature. Views though not unattractive are not particularly memorable or remarkable

Q23 - There are detractive views...

- ....out
  - Into adjacent development and settlement fringes, but generally unremarkable in composition and quality.

Q24 - Perceptual and Other Sensory Qualities

- Settled
- Other
  - Unremarkable and relatively utilitarian

Q25 - What is the sense of place/local distinctiveness

- Weak
  - The area has a fragmented and relatively disturbed nature in terms of previous landuse and current mixed development and fragmented nature. General views are not unattractive are not particularly memorable or remarkable and the area as a whole fells relatively unremarkable and utilitarian n scale content and visual interest. There is no distinctive or characteristic sense of place or feeling of unity to the area.

Evaluation

Q26 - Value:

- Low
  - Refer to Q.51

Q27 - Condition:

- Unassessed

Q28 - Trend:

- Constant

Recommendations

Q29 - Existing management

- Generally Inappropriate

Q30 - Existing management remarks:

- The aspect area appears under pressure from further development of housing, services, communications. Without adequate mitigation and long term management of the existing countryside this could lead to further degradation of the area. The existing field pattern is poorly managed and largely over mature.

Q31 - Principal management recommendation:

- Enhance and restore existing field boundaries - improve age range and species diversity. Promote opportunity to create green links into the countryside and integrate settlement with surrounding areas. Promote habitat creation and biodiversity within settlement. Avoid unsympathetic expansion of developments.

Q32 - Guideline

- Long Term
  - Encourage development of urban forest to integrate development with countryside
- Medium Term
  - Protect and strengthen remaining areas with rural character. re-establish and enhance field boundaries
- Medium Term
  - Manage recreational use of countryside, promote links between settlements
- Immediate
  - Promote habitat creation and biodiversity objectives within settlements and on settlement fringes

Q33 - Define the key qualities that should be conserved:

- Open areas of field pattern and field boundaries

Q34 - Define the key qualities that should be enhanced:

- Rural fringe and wider countryside - re-establish field pattern and strengthen as framework for recreational use and access

Q35 - Define the key qualities that should be changed:

- Limit over expansion of settlement edge. Reduce/limit development within rural areas

Q36 - Define the key elements that should be conserved:

- Field pattern

Q37 - Define the key elements that should be enhanced:

- Field boundaries and field margins, improve age range and biodiversity.

Q38 - Define the key elements that should be changed:

- Blanket expansion of adjacent developments

Tolerance To Change

Q39 - Are there any significant threats to the current integrity and condition of the visual & sensory features of the area?

- Yes
  - Potential expansion of adjacent settlements further eroding the character of the wider area and causing greater fragmentation of the countryside. Future development should be limited and if necessary should include mitigation proposals to improve access/ green links, provide for habitat creation and improve biodiversity. Further development should respect existing field patterns and reinforce them where possible

Aspect Area Boundary

Q40 - To what level was this information site-surveyed?

- Level 3

Q41 - At 1:10,000, how much of the Aspect Area boundary is precise?

- All

Q42 - What baseline information source was used for Aspect Area boundary mapping?

- OS Landline

Q43 - If OS Data was used, what was the scale?

- 1:10,000 and 1:25,000

Q44 - What is the justification for the Aspect Area boundaries?

- An area displaying similar characteristics lying on the lower slopes of Ruabon mountain. The area is distinctive in its fragmented nature and high proportion of built elements within a poorly managed semi rural field pattern.

Evaluation Matrix

Q46 - Evaluation Criteria: Scenic quality

- Low
    - The area has been highly fragmented by development and the construction of transport and service corridors to serve the adjacent settlements. Furthermore the areas" rural parts are suffering from neglect and are generally poorly maintained with an over mature species composition. As a result views are generally of a lower quality and are relatively unremarkable - views are rarely of long distance or have many aesthetically pleasing elements.

Q47 - Evaluation Criteria: Integrity

- Low
    - The high proportion of development and fragmentation of the rural parts of the aspect area have led to a Low evaluation in terms of Integrity. Settlement sprawl and fringes are generally unsightly and degraded the overall integrity of the area.

Q48 - Evaluation Criteria: Character

- Low
    - Due to the unremarkable nature of the aspect area and high percentage of settlement expansion and intrusive visual elements within the wider rural area (i.e. pylons, overhead powerlines and transport corridors) the overall character of the area has been degraded. The rural parts of the area are over mature and appear poorly managed thus weakening the rural setting and reducing the overall character of the area.

Q49 - Evaluation Criteria: Rarity

- Low
    - There are no or very few characteristics which appears visually valuable or distinctive within the this area. Landscape elements and features are commonly found all over the wider study area and do not bring any strong identity to this aspect.

Q50 - Evaluation Criteria: Overall Evaluation

- Low
    - 4 Lows = Low overall evaluation.

Q51 - Justification of overall evaluation

- The area has been highly fragmented by development and the construction of transport and service corridors to serve the adjacent settlements. Furthermore the areas" rural parts are suffering from neglect and are generally poorly maintained with an over mature species composition. There is very little to recommend the area and visually lacks a clear sense of place, character or identity. The aspect as a whole could be anywhere. An unremarkable and relatively bland aspect area that has suffered from fragmentation by development and road corridors. The area has been significantly fragmented by settlement that in places has sprawled to have an ill defined boundary and is poorly integrated with its surroundings. Pylons and overhead powerlines are a distinctive characteristic and further emphasise the fragmentation of the area.

Bibliography

Q45 - List the key sources used for this assessment

- Pre 2003 methodology LANDMAP study for WCBC

Assessment

Q52 - Additional Assessments

- None

Q53 - Additional Comments

- None

LMP 14 & 09

Q54 - LANDMAP derived landscape types (LMP14)

- Upland valleys, hillsides, lower plateau and scarps (grassland >50%, open, predominantly unwooded)

Q55 - LANDMAP derived landscape types (LMP09)

- Upland open >50% grassland

Dark Skies

Light Pollution Percentage

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	31.8	47.8	20.5	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 57a - 57h collectively provide colour band data by %.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place - Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Light Pollution km²

< 0.5	0.5 - 1	1 - 2	2 - 4	4 - 8	8 - 16	16 - 32	> 32
0.0	0.0	1.0	1.5	0.6	0.0	0.0	0.0

Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies. Questions 58a to 58h collectively provide colour band data by km2.

Further information: 11365 Wales Dark Skies (arcgis.com). Green C, Manson D, Chamberlain K 2021. Tranquillity and Place – Dark Skies. NRW Report No: 514, 70pp. Data download from Lle/DataMapWales.

Data source: December 2019 composite image of monthly average night light produced by the Earth Observation Group at Colorado School of Mines. Derived from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) senor from Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, National Oceanic and Atmospheric Administration (NOAA).

Q56 - Night Time Light Pollution

- Moderate
  - Consultant led night time light pollution assessment conducted at time of survey record or survey update

Q57a - % in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57b - % in brightness colour band 0.5-1

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57c - % in brightness colour band 1-2

- 31.8
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57d - % in brightness colour band 2-4

- 47.8
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57e - % in brightness colour band 4-8

- 20.5
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57f - % in brightness colour band 8-16

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57g - % in brightness colour band 16-32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q57h - % in brightness colour band >32

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58a - km2 in brightness colour band <0.5

- 0.0
  - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58b - km2 in brightness colour band 0.5-1

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58c - km2 in brightness colour band 1-2

- 1.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58d - km2 in brightness colour band 2-4

- 1.5
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58e - km2 in brightness colour band 4-8

- 0.6
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58f - km2 in brightness colour band 8-16

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58g - km2 in brightness colour band 16-32

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Q58h - km2 in brightness colour band >32

- 0.0
    - Data has been classified into eight colour bands of brightness values (nw/cm2/sr). <0.5 (darkest); 0.5 - 1; 1 - 2; 2 - 4; 4 - 8; 8 - 16; 16 - 32 and > 32 (brightest). Lower values equate to lower light pollution and darker skies.

Tranquillity & Place

Q59a - % in visually tranquil category 1

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59b - % in visually tranquil category 2

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59c - % in visually tranquil category 3

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59d - % in visually tranquil category 4

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59e - % in visually tranquil category 5

- 0.08
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59f - % in visually tranquil category 6

- 17.13
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59g - % in visually tranquil category 7

- 75.98
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59h - % in visually tranquil category 8

- 6.81
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59i - % in visually tranquil category 9

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59j - % in visually tranquil category 10

- 0.00
    - Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, t

Q59k - Data Source

- Sourced from the nationally consistent Tranquillity & Place Visually Tranquil Areas 2022 (rural themes 1, 2 and 3 combined). The visually tranquil categories range from 1 (least visually tranquil) to 10 (most visually tranquil). For further information, the report and webapp, visit the Storymap available from https://storymaps.arcgis.com/stories/865c1876d9f64280a3dfc6e2769a46a5

SLAs

Q60 - Does the area overlap with Special Landscape Areas (SLA)?

- No Answer

Q61 - Approximately what percentage of the area overlaps with a SLA?

- No Answer

Visible Settings

Q62 - Visible settings of LANDMAP V&S areas

- View a map image showing the visible setting of the area

This is a Zone of Theoretical Visibility (ZTV), calculated using a 30 metre Digital Terrain Model (DTM), using multiple observer points scattered across the area, 1.5m above ground level, and taking into account the Earth's curvature. The data does not extend beyond 35km from an observer point, meaning that more distant views may also be possible.

- Read user guidance that explains the map image
- Bulk download the map images for Wales.
- Read a detailed technical report which explains the data calculations

Q63 - Visible Settings of Designated Landscapes

- View map images showing the visible setting of each National Park and Area of Outstanding Natural Beauty.
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to Designated Landscape areas. Also, for areas not visible, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. See Q62 to access the user guidance and a technical report.

Q64 - Key views into or out from Designated Landscapes

- View map images showing the ZTV and HOBV of a selection of key views for each National Park and Area of Outstanding Natural Beauty in or affecting Wales
    - These are Zones of Theoretical Visibility (ZTV), as per Q62, but applied to selected key views into or out from Designated Landscapes. Also, colour-steps show the Height of an object before it would become visible (HOBV), up to 350m high. It is not an exhaustive key view list. See Q62 to access the user guidance and a technical report.

Appendix 5.5

LANDMAP Wrexham Character Area Sheets

Character Areas (Onsite) – Rhosllannerchrugog – Rhostyllen Ruabon – Penycae



Rhosllannerchrugog - Rhostyllen Ruabon - Penycae

7c

This is one of a series of Local Planning Guidance Notes based on Wrexham LANDMAP (adopted November 2004), setting out recommendations for each Landscape Character area.



Rhosllannerchrugog Rhostyllen - Ruabon Penycae summary

- Rural and urban areas affected by history of mining and quarrying
- Villages (Rhos, Penycae, Rhostyllen, Ruabon) characterised by high density and use of Ruabon red brick
- Prehistoric military border area - Gardden hill fort and Offa's Dyke
- Much accessible natural greenspace forming ecological network, including woodland and grassland habitats of high value
- The A483 and railway follow the lower edge of area

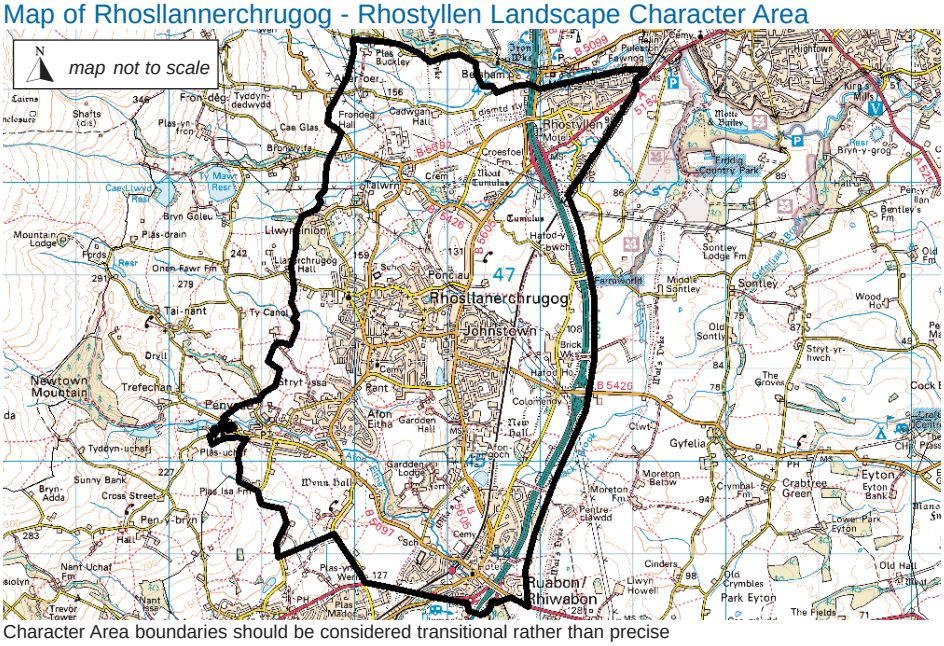


Closely-built former mining communities with a rich cultural heritage, located on the lower slopes of Ruabon Mountain, and distinguished by the widespread use of local Ruabon red brick

Landscape context

Rhosllannerchrugog - Rhostyllen is one of four character areas in Wrexham which have a mixed rural and urban landscape. The other areas are Chirk, Cefn Mawr and West Wrexham Ridges and Valleys

Map of Rhosllannerchrugog - Rhostyllen Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Lower slopes of Ruabon Mountain consisting of undulating farmland, with residential and industrial development.
- Bersham colliery and tip, and the former Hafod tip, now restored, are landmarks

Geological character:

- Gentle Carboniferous Coal Measure slopes (sandstone) mostly overlain by glacial till, although Rhosllannerchrugog centre is built on an outcrop
- A sandstone ridge, highest at Gardden Hill and followed to the north by Offa's Dyke (part now under Johnstown) runs through the centre of the character area
- To the east of Johnstown, Etruria Marl has been quarried to make the characteristic red bricks and tiles

Ecological character:

- Most farmland is improved grassland of low biodiversity value
- Some former industrial sites are now of high wildlife value, including Stryt Las (great crested newts), the former Hafod tip (a young broadleaved woodland), and birch woodland north of Rhos
- Fragmented areas of semi-natural vegetation include broadleaved scrub, neutral grassland, upland oak woodland along the Afon Eitha valley, beech woodland on Gardden Hill, neutral grassland at Legacy substation, lowland pasture, and oak/ash/sycamore woodlands around the Crematorium and Llwyneinion

Historical character:

- Settlements are mainly of 19th -20th century origin but Penycae and Ruabon have older centres
- Coal mining remains are frequent but Bersham Colliery, with its coal spoil tip and remaining headgear is of particularly high value. Industrial sites are linked by a network of disused industrial railways
- Border area - prehistoric military hillfort at Gardden and Offa's Dyke, marking a former political and military boundary

Cultural character:

- Rhostyllen, with modern industrial and commercial areas next to the A483, is now closely linked to Wrexham town
- Johnstown, once linked with the brickworks and Hafod colliery, is a mainly English-speaking community.
- Rhosllannercrugog is a culturally rich community with strong Welsh culture and language
- Surrounding farming is under pressure, with part time holdings and increase in 'horsiculture'
- Hafod y Bonc Country Park is a former tip now important for environmental education and recreation

Landscape sensitivity:

The distinctive Welsh identity of the area is vulnerable to development pressure, particularly infill housing of standardised design and materials.The A483 corridor is visually threatened by nearby landfill, masts, building development and power lines. Surrounding farmland is also very vulnerable to urban pressures

Overall management strategy:

Enhancement, conservation and sustainable development

Management guidance

Aims	Guidelines
Enhance visual character	● Promote urban forestry and enhance remaining areas of neglected or derelict land ● Rationalise/reduce overhead power line clutter ● Survey and assess use of sandstone and local brick in walls and buildings
Develop an accessible green network	● Retain and improve environment for pedestrians and cyclists within settlements through the development of accessible natural green space and green network (refer to Green Strategy due March 2007)
Conserve geological features	● Maintain morphological integrity of landform and assess new exposures
Enhance and extend existing habitats for wildlife	● Develop wildlife corridors as part of a green network, linking areas of fragmented habitats (refer to Green Network Strategy due March 2007) ● Maintain ponds and protected great crested newts ● Maintain, enhance and expand: scrub, broadleaved woodland, lowland pasture and hedges ● Diversify improved grassland and farmland and reduce chemical use in agriculture
Preserve archaeological features	● Preserve mining remains, especially winding house, headgear and tip at Bersham, maintain and repair ● Development which adversely affect the site or setting of Offa's Dyke or Gardden Hill Fort would not be permitted ● Preserve historic core of Ruabon, including mills and chapels
Survey area of potential archaeological interest	● Evaluate historic core of settlements prior to development and assess in relation to wider historic landscape ● Carry out surveys of former colliery sites, railway lines and quarries, and assess in context of wider industrial landscape.Conserve historic transport routes
Strengthen cultural identities of settlements	● Preserve coal mining heritage at Bersham Colliery as visible reminder of Wrexham's former industrial base ● Preserve character of lower Ruabon slopes e.g. field systems, industrial sites ● Support Welsh-language cultural initiatives, and culturally distinct communities



For further information contact:
Planning Environment
Planning Department
Wrexham County Borough Council
Lambpit Street, Wrexham. LL11 1AR
Tel:01978 292019
www.wrexham.gov.uk/planning

All our information is available in accessible formats

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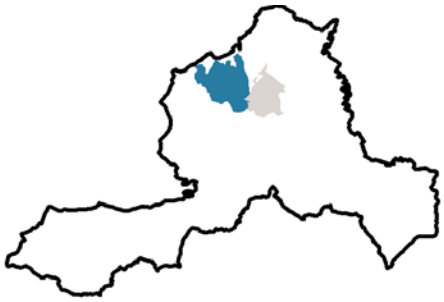
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Character Areas (Onsite) – West Wrexham Ridges and Valleys



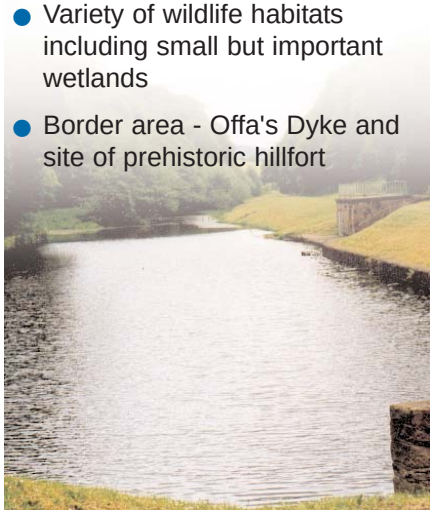
West Wrexham Ridges and Valleys 7d

This is one of a series of Local Planning Guidance Notes based on Wrexham LANDMAP (adopted November 2004), setting out recommendations for each Landscape Character area.



West Wrexham Ridges and Valleys summary:

- Mixed rural and urban village character
- Strong NW-SE orientation, with alternating ridges and valleys
- Hilltop villages separated by woodland, former industrial land and farmland
- Widespread use of local Cefn sandstone in older buildings, and distinctive stone walls
- Changing landscape as post mining restoration and regeneration continue
- Variety of wildlife habitats including small but important wetlands
- Border area - Offa's Dyke and site of prehistoric hillfort

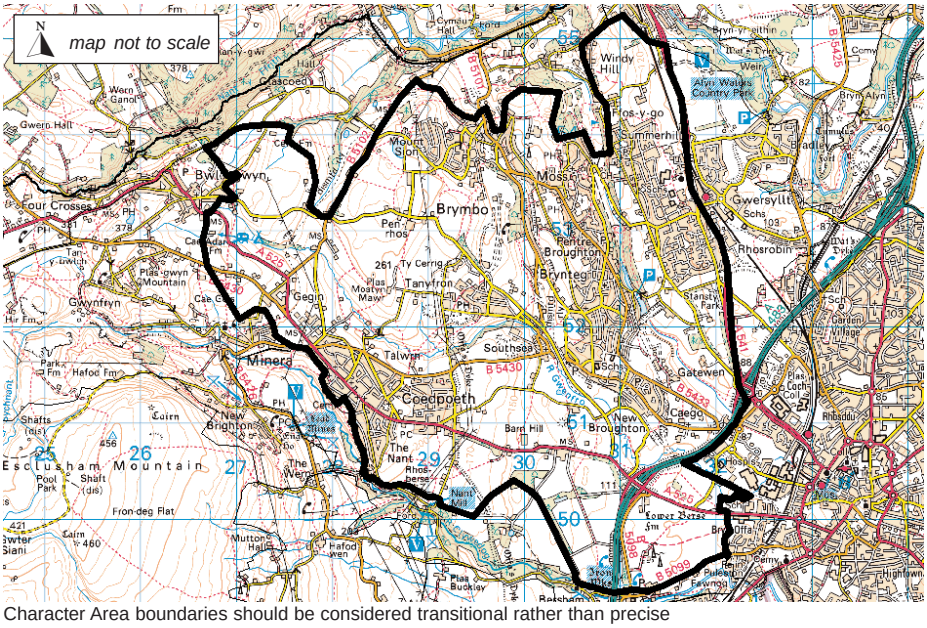


A complex area of former mining villages, industry, farmland and woodland in a landscape of distinct ridges and valleys which are aligned towards Wrexham town

Landscape context

West Wrexham Ridges and Valleys is the largest and most varied of four character areas in Wrexham which have a mixed rural and urban landscape. The other areas are Chirk, Rhosllannerchrugog - Rhostyllen, and Cefn Mawr

Map of West Wrexham Ridges and Valleys Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Visually varied and complex, including lowland, valleys and hill and scarp areas
- Characteristic undulating hill slopes with wooded valleys
- Views towards Wrexham and the lowlands
- Urban villages and Wrexham linked by roads crossing open lowland farmland area
- Scattered groups of buildings in local Cefn sandstone and stone-built village cores, individuality in later additions but much standardised modern housing development

Geological character:

- The complex landform is related to geological faults, with alternating series of resistant sandstone ridges, and Coal Measure valleys of Carboniferous age
- Villages are built on outcrops of Cefn Rock (sandstone) which has been quarried for local building stone
- Glacial till covers much of the lower areas, with glacial sands and gravels towards Wrexham
- Many artificial landforms including the former Brymbo steelworks site

Ecological character:

- Much of the non-built area is improved grassland or arable of relatively low value

- Important wetlands include reed mace swamp at Gatewen Moss and rich swamp and marshy grassland at Higher Berse Marsh. Gwenfro valley has wet woodland and areas of valuable lowland pasture
- Plas Power tip and the former Brymbo Steelworks site are being restored mainly to broadleaved woodland

Historical character:

- Countryside has remnants of ridge and furrow, regular and irregular fields, but much land has been disturbed
- Most settlement is related to 19th and 20th century mining and industry
- Remnants of Bryn y Gaer prehistoric military hillfort at Pentre Broughton and the route of Offa's dyke can be identified
- Brymbo steelworks heritage area and Plas Power colliery buildings have been preserved
- Network of disused industrial railway lines crosses area

Cultural character:

- Urban villages retain their own cultural identity, but this is becoming weakened
- Area is affected by A483 corridor, which separates it from Wrexham, but increases accessibility to commuters
- Agriculture is still of some importance but horsiculture is an increasing land use

Landscape sensitivity

This area continues to accommodate profound changes, but is vulnerable to further loss of local distinctiveness, and coalescence of villages because of continuing development pressure. The small scale of the ridges and valleys means they are sensitive to large scale development, masts and power lines, and inappropriate engineered landfoms

Overall management strategy:

Conservation

Management Guidance

Aims	Guidelines
Enhance character of hill villages and wooded valleys	● Promote urban forestry, strengthen, restore and enhance wooded valleys ● Keep settlements separate and maintain green barrier between villages and Wrexham town ● Encourage the restoration and repair of rural and urban stone walls using local stone ● Avoid standardised new developments using non-local materials and inappropriate highway design
Develop an accessible green network	● Maintain and develop green corridors for wildlife and people, linking rural and urban green spaces
Promote positive management of urban fringe countryside	● Encourage hedgerow retention and management and new hedgerow and tree planting along the urban fringe ● Promote agri-environment agreements to encourage management for public access and wildlife as well as sustainable agricultural production ● Areas for Horsiculture are to conserve traditional field boundaries Avoid the proliferation of fences, structures and buildings within the countryside, where this would erode character
Conserve geological features	● Maintain continuity and integrity of rock and glacial exposures and landforms
Enhance and extend existing habitats for wildlife	● Maintain high water table in wetland habitats and extend wetland habitats ● Maintain secondary habitats in industrial redevelopments ● Protect potential bat and owl roosting sites in old buildings and walls ● Manage and extend woodlands to improve structure and wildlife value
Preserve archaeological features	● Maintain green areas to preserve surviving archaeology, carry out field and desk studies of fieldscape ● Preserve by record Bryn y Gaer hillfort, evaluate in advance of any development or groundworks ● Evaluate industrial sites in urban villages in advance of development ● Preserve disused railway lines, and assess in wider industrial context ● No development on or near Offa's Dyke - contact Cadw
Preserve local distinctiveness	● Support community cultural initiatives in urban villages, preserve historic appearance of buildings and settlements



For further information contact:

Planning Environment
Planning Department
Wrexham County Borough Council
Lambpit Street, Wrexham. LL11 1AR

Tel:01978 292019

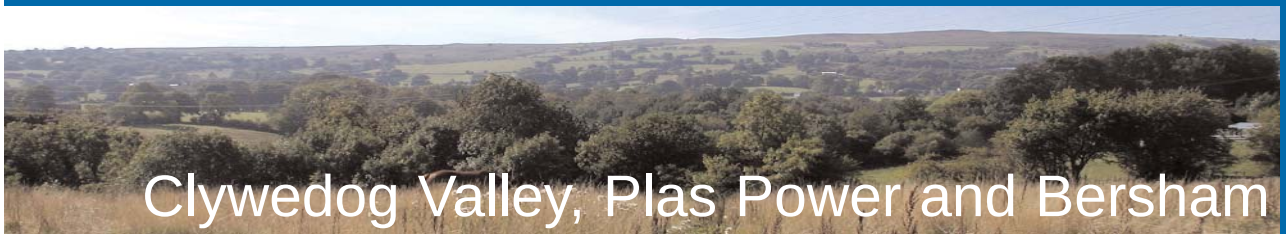
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Character Areas (Onsite) – Clywedog Valley, Plas Power and Bersham



Clywedog Valley, Plas Power and Bersham 9a

This is one of a series of Local Planning Guidance Notes based on Wrexham LANDMAP (adopted November 2004), setting out recommendations for each Landscape Character area



Clywedog Valley, Plas Power and Bersham summary

- Cut-off areas of countryside, and wooded valley to the east of Wrexham town
- Woodlands of high nature conservation value
- Country parks at Nant Mill and Minera
- High potential for recreation, linking town and country
- Heritage centre and ironworks at Bersham
- Plas Power estate adjoining Clywedog Valley, surrounded by a magnificent stone wall

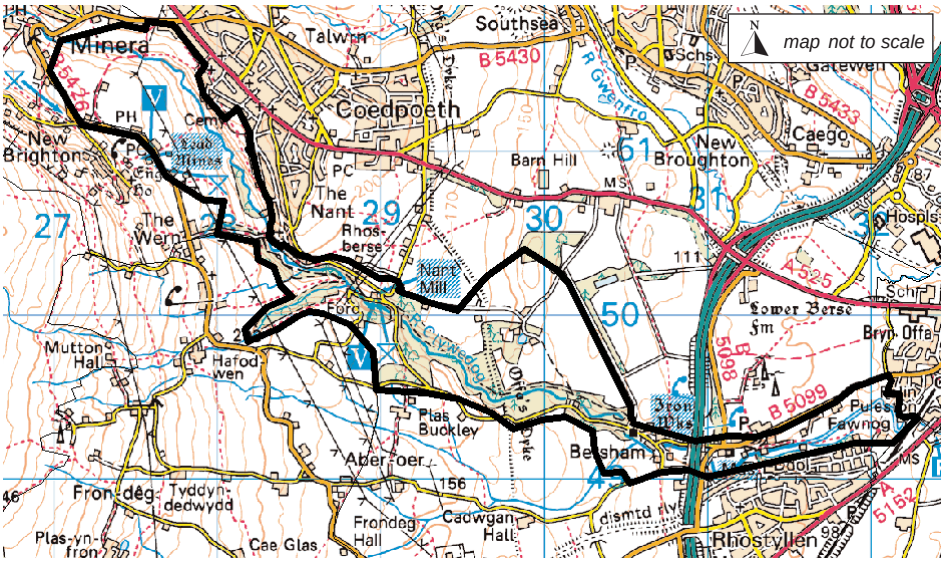


Small wooded valley from Wrexham to Minera, providing woodland walks with industrial archaeology and nature conservation interest, historically linked to Plas Power estate and Bersham iron works

Landscape context

This is one of several minor river valleys which are well wooded, with features showing former industrial uses. Adjacent farmed and wooded estate countryside is also included in this character area. The other valleys of this type are the River Alyn valley (9b), Ffrith Valley (9c) and Dee Valley - Froncysyllte to Newbridge (9d)

Map of Clywedog Valley, Plas Power and Bersham Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Varied visual character but area, though close to settlements, is separated from them by walls, roads or topography and has a more tranquil character
- Upper Clywedog valley is overlooked by Coedpoeth and Minera, middle section is a wooded rocky gorge, and lower section is more shallow with a mosaic of lowland farmland and woodland
- Substantial Cefn sandstone stone walls of the Plas Power estate surround approximately a square mile of parkland

Geological character:

- In this area the upper Clywedog Valley follows a course between Esclusham Mountain to the south and Coal Measure areas to the north, separated by fault lines. The lower valley cuts through part of the terrace of sands and gravels known as the Wrexham delta terrace, on which Wrexham sits
- The river is incised into the landform, and where it cuts through resistant Cefn sandstone in the area of Nant Mill Country Park there are steep slopes and rock exposures
- There is much disturbed land or woodland, but soils are generally derived from alluvium or glacial drift.

Ecological character:

- Several valuable habitats associated with the river, valley bottom and floodplain
- River Clywedog is an aquatic habitat of high value



- Upland mixed ash woodland of high value and oak/ash/sycamore woodland are found in the valley and Plas Power estate

Historical character:

- The area is crossed by Offa's Dyke, a prehistoric military feature of outstanding archaeological value
- The eastern half of the Plas Power estate is restored land, following post war opencast coal mining, and the remaining designed landscape is in poor condition
- North of Bersham, the farmland retains a pattern of small fields

Cultural character:

- Recreational and educational area with Clywedog Trail from Wrexham to Minera, Bersham Heritage Centre and Minera lead mining centre, and the Nant Mill Country Park
- Bersham, now a Conservation Area, was a centre for iron working, and originally the trees from the valley provided charcoal for smelting. John Wilkinson (1728-1808) known as 'the father of the iron trade' is of international renown - the ironworks supplied clients throughout Europe
- The valley is linked to the Plas Power estate, of which the central core (the Hall has been lost) and the higher parts survive

Overall management strategy:

Conservation and Restoration

Management guidance

Aims	Guidelines
Enhance existing visual character	● Retain wooded valley character ● Protect and restore remaining historic landscape features of interest in Plas Power estate, ensure appropriate land uses
Conserve geological features	● Maintain continuity and integrity of rock exposures and Landforms and assess new exposure ● Maintain integrity of fluvial and glacial landforms
Enhance and extend wildlife habitats	● Enhance river bank habitats and minimise hard bank engineering such as canalisation or retaining walls ● Replace coniferous trees with native broadleaved trees in woodlands, increase diversity in woodland structure, retain old/dead trees standing or fallen, restrict grazing ● Enhance lowland pastures ● Encourage agri-environment agreements for sustainable land management ● Refer to Green network strategy due March 2007 to identify potential sites
Conserve historical features	● Preserve evidence of former industrial uses along river ● Assess archaeology prior to any new developments ● No development on or near Offa's Dyke - contact Cadw ● Preserve important elements of designed landscapes, and seek to reinstate original design intent, where in decline or degraded
Enhance and interpret cultural heritage	● Support Clywedog Trail and Bersham Heritage Centre ● Manage valley woodlands and historic landscape features for recreation and education ● Strengthen links into Wrexham Town, and up to Minera Quarry and Esclusham Mountain (refer to Green Network Strategy)

Landscape sensitivity:

The scale of the valley is very small, and any incongruous development within it or nearby, or loss of tree cover could affect its character. The Plas Power estate and Bersham areas are vulnerable to recreational and residential development because of their proximity to Wrexham town.



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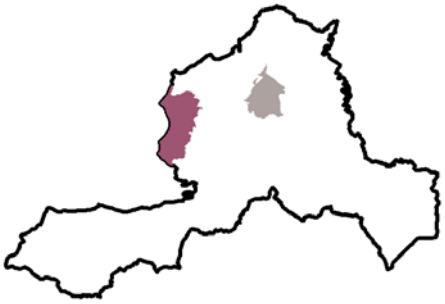
Character Areas (ZTV) – Ruabon and Esclusham Mountain



Ruabon and Esclusham Mountain 1b

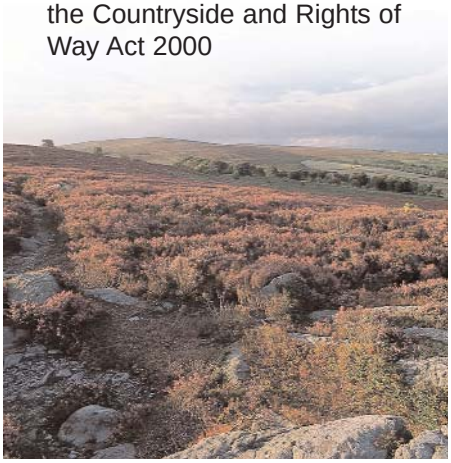
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Unenclosed and uninhabited upland moorland plateau seen from the Wrexham lowlands, valued for its scenery, dry heath vegetation, wildlife and archaeological remains



Eastern Slopes of Ruabon Mountain summary:

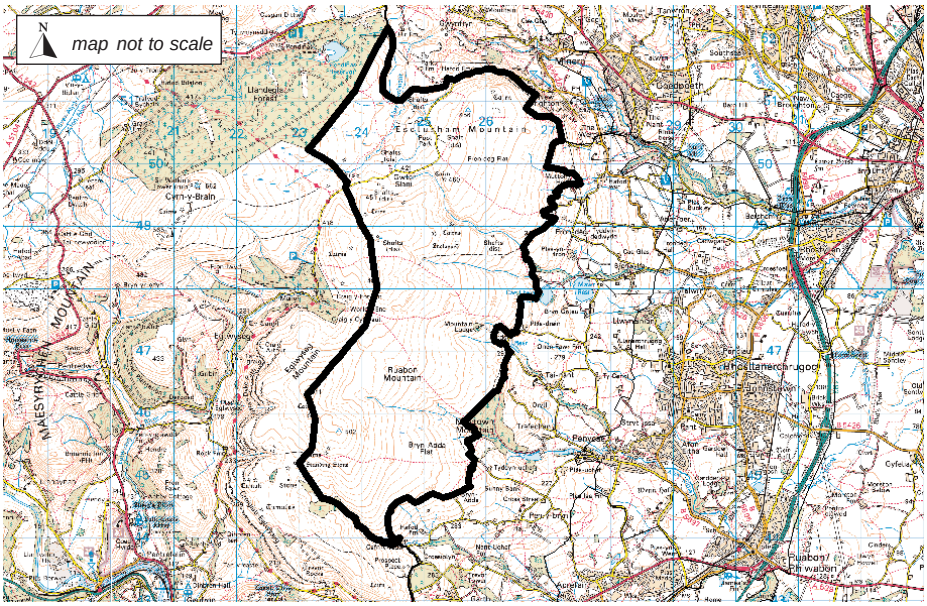
- Upland moorland plateau
- Forms smooth unbroken skyline viewed from Wrexham and Cheshire Plain
- Seen as relatively wild and natural
- Tranquil and remote
- Significant weather and seasonal changes
- Of high value for wildlife
- Important archaeological remains
- Of value for informal recreation
- Most is open access land under the Countryside and Rights of Way Act 2000



Landscape context

This character area is one of two extensive areas of upland moorland in Wrexham, the other being Berwyn Mountain, although at between 350 and 450 m above sea level, Ruabon and Esclusham Mountain is considerably lower. Most of the moorland plateau slopes gently eastwards towards Wrexham.

Map of Ruabon and Esclusham Mountain Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Large scale landscape, high and open with good long distance views
- Strong contrast between the open purple or brown moorland and the green farmed areas below
- Highest point at Cyrn y Brain in Denbighshire has a wireless mast visible from parts of Wrexham

Geological character:

- Carboniferous millstone grit (Cefn y Fedw sandstone) underlies most of the area
- Minera Carboniferous limestone, important for its mineralogy and caves, outcrops to the north
- To the north west, Silurian mudstones extend towards Cyrn y Brain in Denbighshire
- Blanket bog (deep peat soil) is found only on the highest part of Ruabon Mountain. Elsewhere coarse loamy podzolic soils, or seasonally waterlogged loams are found

Ecological character:

- Dry upland heath vegetation, with crowberry, cowberry, heather, moss, grassland and bracken
- Habitat supports a collection of breeding birds including protected and rare species

Historical character:

- Of national importance for archaeological interest, with numerous prehistoric remains and much potential for discovery because the land is generally uncultivated.
- Spoil heaps left by former lead mining are widespread

Cultural character:

- No settlement; one minor road from Minera to World's End and the Eglwyseg Crags
- Land use is extensive sheep grazing, with some parts managed by burning and mowing for grouse shooting. SSSI designation constrains agricultural use
- Few footpaths, but most is open access land under the Countryside and Rights Of Way Act 2000

Landscape sensitivity

Smooth profile seen from the eastern lowlands is vulnerable to development which might break the skyline, such as masts. The heather moorland vegetation is sensitive to changes in climate, changes in management and increased recreational pressure

Overall management strategy:

Conservation

Management Guidance

Aims	Guidelines
Retain unbroken skyline	● Retain open unenclosed character - resist all built development, forestry and vehicular access ● Assess visual impact of any proposed new features from at least 15 km distance
Strengthen sense remoteness and 'wilderness'	● Encourage reduction of sky glare from lighting in lowland settlements ● Ensure new features to improve access are low key and sensitively designed.
Preserve geological features	● Continue current geological management but assess new exposures ● Manage grazing and recreational use to prevent erosion of peat. Any erosion control measures are to respect the 'wilderness' character of the area
Maintain and extend upland heath and blanket bog habitats	● Follow SSSI guidelines including restrictions on drainage and ploughing ● Refer to Upland Moorland Habitat Action plan (Wrexham Biodiversity Action Plan)
Conserve archaeological features	● Protect and conserve prehistoric and later mining remains ● Undertake more detailed surveys and assessments generally, and in particular assess and record archaeology before any development ● Protect peat deposits which hold a record of past environmental conditions and land use. ● Avoid planting, enclosure, overgrazing and agricultural 'improvement' ● Avoid off-road vehicular access and minimise physical impact of public access
Encourage local sustainable tourism initiatives	● Refer to Local Access Forum, link with adjoining areas ● Promote sustainable land management through agri environment schemes

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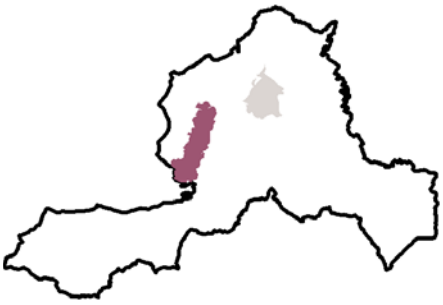
Character Areas (ZTV) – Eastern Slopes of Ruabon Mountain



Eastern Slopes of Ruabon Mountain 5b

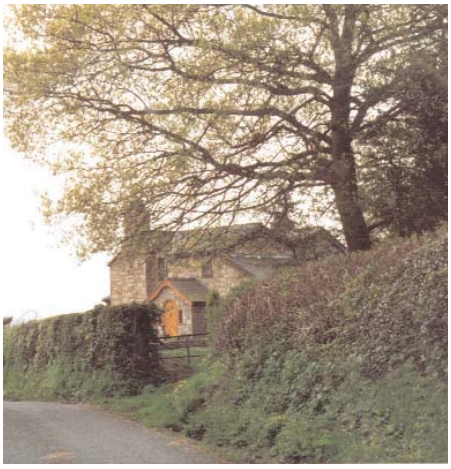
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East-facing slopes of Ruabon/Esclusham Mountain below the moorland edge, with a landscape of relatively unspoilt pastoral farmland, small farms, woodlands and reservoirs.



Eastern Slopes of Ruabon Mountain summary:

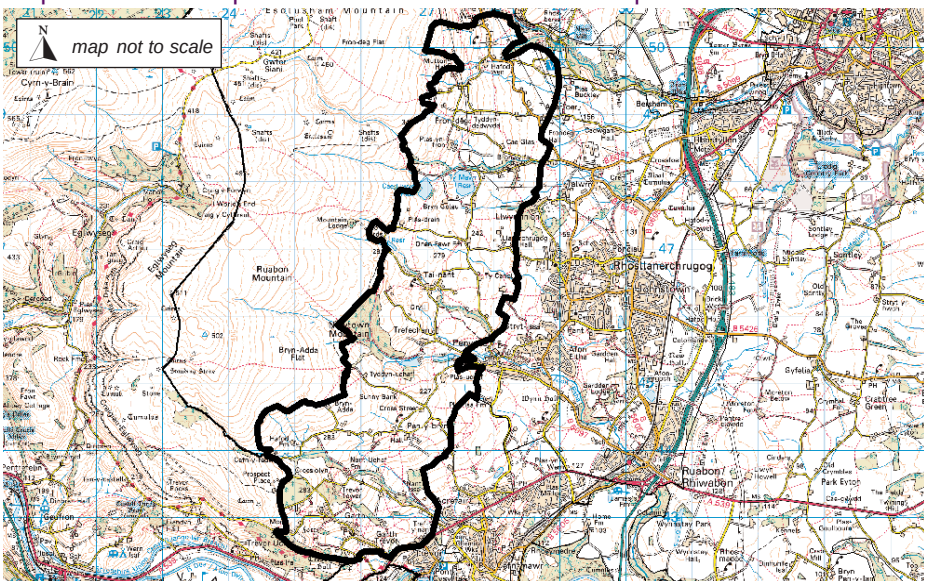
- Scenic area between moorland and developed lowlands
- Small irregular fields on east facing slopes, used for pasture
- Sharp boundary between farmland and moorland
- Linear woodlands and reservoirs in minor valleys
- Remnants of historic mining, although area appears undisturbed
- Isolated farms and very small hamlets



Landscape context

This landscape type lies on the edge of the uplands facing towards the lowlands, with a transition from steeper upper slopes to gentler lower slopes. There are two such areas in Wrexham, the other being Chirk Estate to Froncysyllte.
The eastern slopes of Ruabon and Esclusham Mountain form a constant background to Wrexham town and other areas of lowland, with the green landscape of small fields contrasting with the open heather moorland above.

Map of Eastern Slopes of Ruabon Mountain Landscape Character Area



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Key characteristics

Visual character:

- Open farmland with small scale field pattern, with more woodland to south, with a small wooded valley at Newtown Mountain
- Network of narrow winding lanes enclosed by mixed hedges with much holly, sometimes with stone retaining walls
- Vernacular buildings often in local Cefn sandstone
- Reservoirs are local features, collecting water to supply lowland settlements
- Excellent views, where hedges permit, over both lowlands and moorland

Geological character:

- East-facing slopes from between 180 m to 350 m above sea level form the flanks of the Ruabon Mountain plateau
- Carboniferous Cefn-y-Fedw Sandstone (Millstone Grit) underlies the steeper upper slopes, and Coal Measures the gentler lower slopes
- Bedrock is generally overlaid with glacial deposits, with better drained soils found on glacial sands and gravels and seasonally waterlogged fine loamy soils on glacial clays

Ecological character:

- Most farmland is agriculturally

improved grassland, but the dense network of hedgerows forms a valuable habitat for wildlife

- Semi-natural ancient woodland, including mixed ash woodland, is found in small valleys, forming wildlife corridors. Conifer plantations and mixed plantation woodland are found in the Garth area
- Some small vulnerable grassland habitats on moorland margins
- Reservoirs are aquatic habitats of moderate value

Historical character:

- The small irregular fields characteristic of the area evolved from progressive enclosure of the commons
- At Newtown Mountain the conifer plantation contains significant archaeological remains of abandoned upland lead and coal mining village and smallholdings and there are other remnants of historic mining activity in the area
- Former military border area - Pen y Gaer hillfort is strategically sited to the north west of Ruabon, above the Vale of Llangollen
- Historically rich area with potential for further discovery

Cultural character:

- Predominantly rural, although farm buildings are increasingly being converted to non-agricultural uses, mainly residential, with consequent changes to local character and culture
- The small lanes and footpaths are used by walkers and cyclists
- Rich cultural heritage

Overall management strategy:

Conservation

Management Guidance

Aims	Guidelines
Maintain rural character	● Resist unsympathetic development and conversion of farmstead ● Ensure that any new development is integrated within the landscape in local and distant views, through appropriate siting, form of development, retention of vegetation and traditional hedgerow/stone wall boundaries to minimise visual impact ● Restore and maintain stone buildings and walls ● Further develop 'green' links into urban areas
Retain unbroken skyline	● Avoid development which would be seen on skyline and assess proposals from at least 15 km distance
Preserve geology new exposures	● Maintain integrity and continuity of geological exposures and mines ● Continue current management practices and assess any
Maintain, extend and link habitats	● Maintain, enhance and expand lowland acid grassland, lowland pasture and upland mixed ash woods ● Maintain existing wildlife corridors (e.g. woodlands, hedgerows, road verges) and extend where possible
Manage woodlands for biodiversity	● Replace coniferous trees with native species
Preserve archaeology	● Preserve and record village at Newtown Mountain, discourage new planting over structures ● Preserve Pen y Gaer hillfort and associated structures, discourage woody vegetation, avoid overgrazing ● Preserve existing field pattern, farmsteadings and early industrial archaeology and carry out further surveys
Preserve and raise awareness of cultural heritage	● Liaise with local history societies, Welsh Mines Preservation Trust, Clwyd Powys Archaeological Trust and County Archaeologist
Maintain traditional farming	● Promote agri-environment schemes, and sensitive economic diversification where required ● Ensure recreational interests and access do not conflict with farming interests

Landscape sensitivity

Very sensitive - the area is high and open but close to settlements, and is very vulnerable to loss of vernacular building character and development of masts and power lines, as well as changes in agricultural practices due to economic and climatic factors



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Character Areas (ZTV) – Wrexham Town



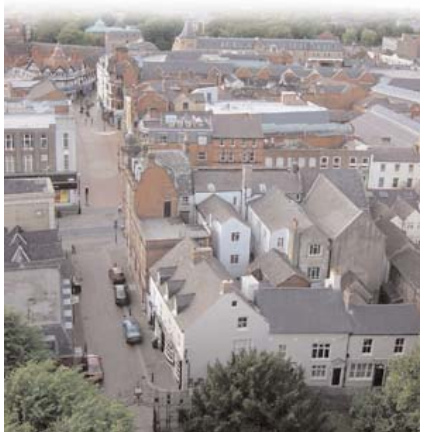
Wrexham Town 10

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Wrexham Town summary

- Historic market town, regional centre and transport nexus
- Border town with Welsh and English influences
- Largest town in North Wales, with many of the functions of a city
- Located on a lowland plateau surrounded by farmland, historic estates and sand quarries
- St Giles church tower is a landmark seen from hills and lowlands
- Linked to ex-mining communities as well as agricultural lowlands
- Extensive post-war residential estates

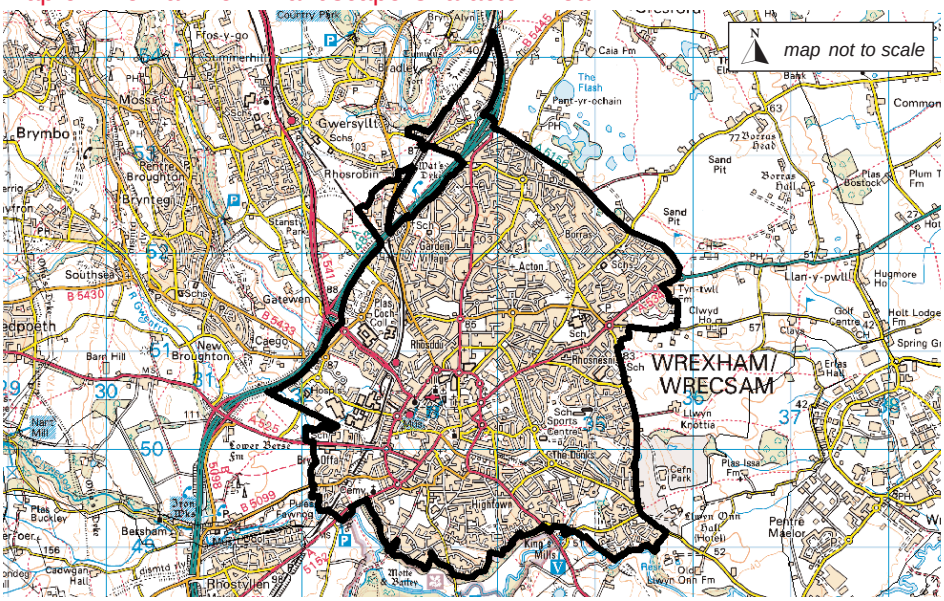


Wrexham is a large thriving historic market town set on a lowland plateau, forming a regional and local centre with strong cultural traditions

Landscape context

Buildings and other development are the dominant features of the landscape, with the underlying physical landscape covered over or altered to a significant extent. The other extensive area where this occurs is Wrexham Industrial Estate

Map of Wrexham Town Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Gently undulating terrain
- Views to Ruabon and Esclusham Mountain, purple, green or brown according to season
- St Giles church and Police headquarters are focal points
- Central historic and retail core, surrounded by areas of non-residential uses and remaining areas of older housing
- Extensive outer areas of post-war and recent housing, including planned garden village estates, public housing and cul-de-sac modern estates
- Acton Park is a remnant area of historic parkland with old parkland trees of high value

Geological character:

- Located on the Wrexham Delta Terrace, a gently undulating lowland plateau of glacial sand and gravels sloping eastwards
- The small River Gwenfro flows through Wrexham, joining with the River Clwyedog whose valley forms the southern boundary of the town. Parts of the Gwenfro are culverted
- The town has expanded over well-drained sandy loam soils, formerly good quality farmland

Ecological character:

- Built areas of Wrexham town are of low ecological interest, but mature trees, gardens, open spaces, former industrial sites, ponds and rivers provide valuable habitats, with potential for improvement



- Disused railway lines, Acton Park and the River Gwenfro provide the largest natural habitats within Wrexham town
- Bats, song thrushes, linnets and great crested newts are Biodiversity Action Plan species present within the town

Historical character:

- Wrexham has medieval origins, with prehistoric and industrial archaeology also present
- Wat's Dyke is a medieval military feature of outstanding importance which runs north-south, with some sections still visible
- Focus for roads and railways, with several disused industrial railway lines still present
- Wrexham Cemetery, on Watt's Dyke, is a Victorian cemetery on the Cadw Register of Parks and Gardens

Cultural character:

- Cultural hub of county borough with strong educational, sporting, and commercial functions and a rich and varied architectural heritage
- Gresford industrial estate is the location of the Gresford pit disaster of 1934,one of the most serious industrial accidents in British history; nearby the pit-head wheel forms a memorial
- Notable people from Wrexham include Elihu Yale, providing a connection to the US

Overall management strategy:

Conservation and Enhancement and Sustainable Development

Management guidance (Refer also to Sub-Character Area Guidelines)

Aims	Guidelines
Protect and enhance local distinctiveness, views, open space network and quality of townscape	● See Grosvenor Road, Salisbury Road, Fairy Road, Town Centre and Hightown Conservation Area assessments ● Protect and restore historic parkland of Acton Park and link with wider green network ● Protect , restore and enhance the valley of the River Gwenfro and link with other areas of green space within the town ● Implement Green Network Strategy due March 2007 for Wrexham town
Protect and restore natural landforms and processes	● Maintain integrity of glacial and fluvial landforms ● Take opportunities to restore natural river channels and processes ● Protect floodplains from development
Conserve and enhance biodiversity	● Develop and enhance accessible natural greenspace in Wrexham ● Preserve existing natural habitats, including brownfield sites with natural regeneration ● Refer to garden Habitat Action Plan in Wrexham Biodiversity Action Plan ● Protect mature and veteran trees, and replant for the future ● Retain and develop natural habitats along rivers
Preserve evidence and increase understanding of Wrexham's development and archaeological heritage	● Archaeological intervention in advance of development in core areas, including line of River Gwenfro ● Preserve early street plan, and Scheduled Ancient Monuments and Listed buildings ● Development which would adversley affect the site or setting of Wat's Dyke would not be permitted - contact Cadw ● Maintain original form of Wrexham Cemetery, with no further inhumations within Dyke ● Preserve the line of disused railways, and carry out further studies of wider industrial landscape context
Retain cultural significance and diversity of Wrexham	● Carry out proactive conservation of historic townscape and consider Open Heritage days ● Encourage local history/community initiatives ● Conserve significant transport features ● Preserve surviving features associated with Gresford Colliery



Landscape sensitivity:

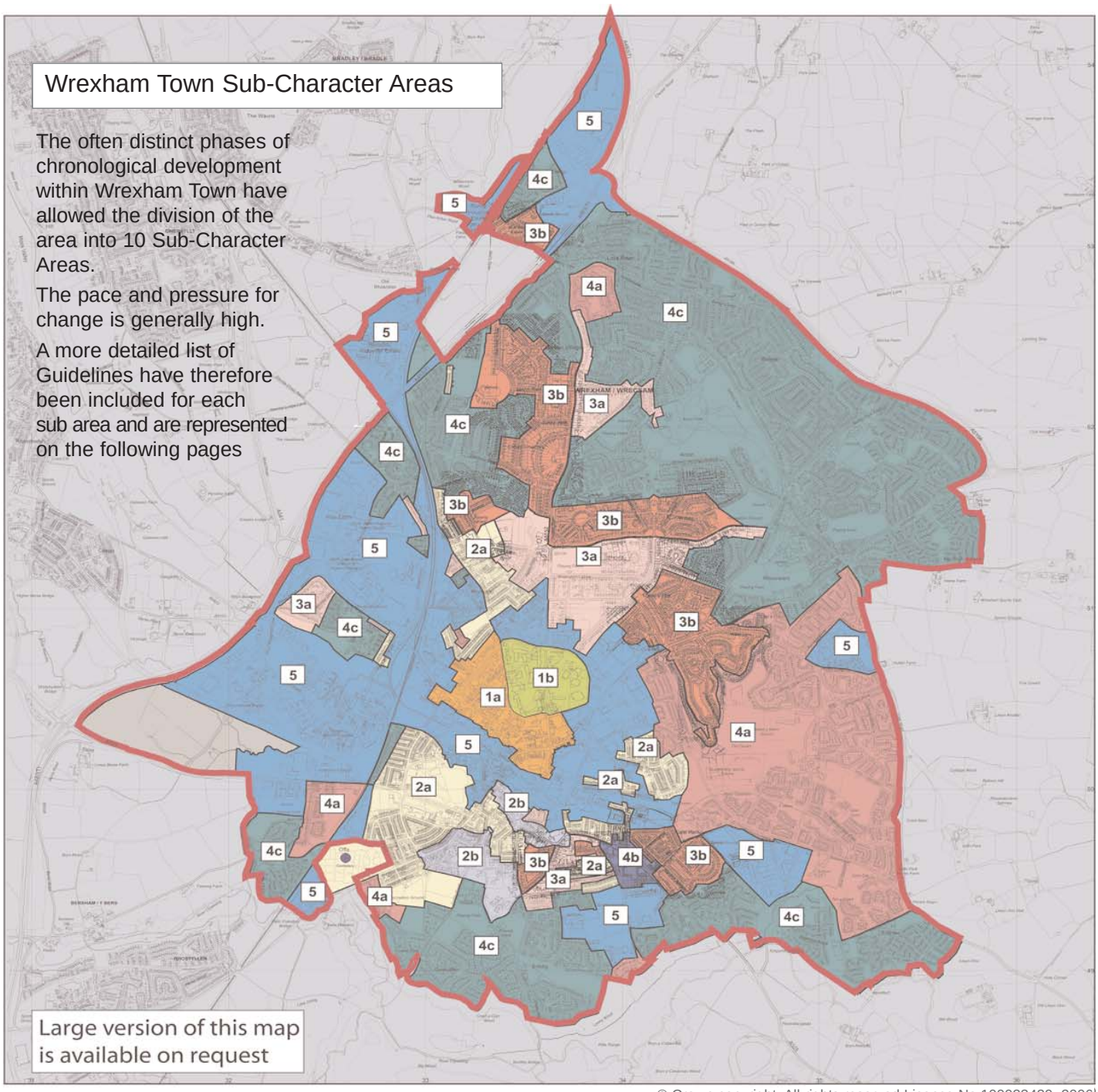
Wrexham town is vulnerable to new development which takes insufficient account of existing character, scale, physical characteristics, open space network, archaeology or other factors. It is very sensitive to the cumulative impact of small changes which can erode local distinctiveness.

Wrexham Town Sub-Character Areas

The often distinct phases of chronological development within Wrexham Town have allowed the division of the area into 10 Sub-Character Areas.

The pace and pressure for change is generally high.

A more detailed list of Guidelines have therefore been included for each sub area and are represented on the following pages



Large version of this map is available on request

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Key to areas

- Settlement Limit
- 1a Historic Core
- 1b Civic Centre
- 2a Traditional Terraced
- 2b Pre WW1Suburban
- 3a Interwar Suburban
- Area undeveloped at time of Urban Landscape Character Assessment
- 3b Interwar Planned Suburbs
- 4a Early Post WW2 Estates
- 4b Hightown Flats
- 4c Recent Estates
- 5 Mixed Non-Residential
- Wrexham Cemetery - CADW Register of Historic Parks and Gardens

1a Historic Core

Strategy for change:
Conservation
Restoration
Encouragement of diversity

- Refer to existing Conservation Area Guidance and forthcoming Enhancement Proposals



1b Civic centre

Strategy for change:
Enhancement
Encouragement of diversity

- Retain and strengthen public spaces with pedestrian and cycle links radiating out to surrounding and outlying areas of Wrexham
- Promote use of high quality design and high quality materials
- Encourage innovative building design in scale with existing in an appropriate landscape setting
- Break up extensive areas of car parking with trees and shrubs
- Follow existing Conservation Area Guidance where relevant



2a Traditional Terrace

Strategy for change:
Enhancement
Encouragement of conformity

- Retain and enhance all areas of communal open space
- Conserve building form, density and detailing
- Resist loss of existing buildings
- Follow Local Planning Guidance Note No 11 for Terraced Housing in Wrexham for building conservation and restoration
- New housing to respect existing density, building form, building line, materials and boundary features of adjacent buildings
- Retain original stone or brick boundary walls and varied copings, discourage replacements by fencing or alternative materials

OPPORTUNITY ACTIONS

- Improve pavements and general conditions for pedestrians and cyclists
- Encourage removal /rationalisation of telegraph poles and unnecessary signage and 'clutter'
- Improve on-street parking where feasible, discourage parking in front gardens



2b Pre World War 1 Suburban

Strategy for change:
Conservation
Restoration

- Refer to existing Conservation Area Assessment, and forthcoming Enhancement Guidelines



3a Interwar Suburban

Strategy for change:
Conservation
Restoration
Enhancement

- Conserve and enhance existing highway verges and street trees
- Require sensitive improvements and alterations to dwellings, which retain and recreate existing architectural detailing
- Conserve low density of development and resist over-development of plots or insensitive backland development
- Conserve existing stone or brick boundary walls
- Conserve hedges

OPPORTUNITY ACTIONS

- Enhance existing highway verges and street trees



4a Early Post World War 2 Estates

Strategy for change:
Enhancement and/or redevelopment
Encouragement of diversity

- Ensure that landscape/townscape issues are given early consideration in any proposals for enhancement or redevelopment
- Retain old lamp posts, ensure new ones are at similar scale
- Encourage rationalisation/removal of telegraph poles as opportunities arise
- Retain stone walls, ensuring repointing is done with a mortar mix weaker than the stone. Use hedging rather than fences on top of stone retaining walls
- Retain hedges (e.g. beech, privet), but if replaced use timber palisade rather than chainlink fencing. Where open plan front gardens are enclosed use hedging (preferable), or stained timber palisade fencing to match existing

OPPORTUNITY ACTIONS

- Determine existing and required functions of areas of public open space and develop landscape accordingly
- Clarify public/private boundaries, with planting, walls and fences
- Where opportunities arise provide high quality detailing needed to give greater richness to streetscape, greater individuality to localities, and to upgrade image of area
- Improve condition of narrow pavements
- Create additional car parking areas where needed on edge of grassed open space, with surrounding planting
- Use opportunities available in extensive areas of public open space to plant larger trees, provide footpaths and cycleways
- Enhance all areas of open space to give areas more interest and identity streetscape, greater individuality to localities, and to upgrade image of area



3b Interwar planned suburbans

Strategy for change:
Conservation
Restoration
Enhancement
Encouragement of conformity

- Encourage retention and replacement of hedges



- Encourage retention of original 'Arts and Crafts' design features to buildings and original landscape lamp posts, mature trees in grass verges

OPPORTUNITY ACTIONS

- Look at alternative solutions to parking problems
- Reinstate lost verges
- Encourage cost-effective estate-wide maintenance which protects and enhances important features
- Improve conditions for pedestrians
- Encourage traffic calming using materials appropriate to location
- Improve conditions for pedestrians

4b Hightown Flats

Strategy for change:
Enhancement and/or redevelopment
Encouragement of diversity

- Promote alterations which help break up scale of buildings, help integration into surroundings and improve image
- Replace losses in public open space as often as required

OPPORTUNITY ACTIONS

- Enrich landscape with high quality street furniture where appropriate
- Use colour to break up scale of buildings
- Encourage planting on balconies
- Intensify planting in public open space
- Resurface pedestrian paths with high quality materials

4c Recent Estates

Strategy for change:
Enhancement
Encouragement of diversity

- Introduce large trees where possible which will contribute more to future amenity than 'garden' size trees.
- Encourage use of alternative hedging species to reduce future problems with fast-growing Leyland and Lawson cypresses
- Provide landscape buffer for new developments on the edge of the countryside and incorporate former countryside features into new development. Provide links into surrounding countryside as well as links into existing urban areas
- In new developments, consider road layouts which depart from the standard guidelines to encourage innovative housing schemes which are not designed around the car
- Encourage planting of street trees and boundary hedges in new developments

OPPORTUNITY ACTIONS

- Look for opportunities to increase pedestrian and cycle linkage between cul-de-sacs to reduce the dominance and impact of the car
- Introduce large trees where possible





5 Mixed Non-Residential

Strategy for change:
Enhancement
Redevelopment (some)
Encouragement of diversity

- Retain the best of the existing landscape in new developments, including areas of ecological interest (even if not designated), hedgerows, stone walls, watercourses and any other features of historic or other value
- Keep the use of security fencing to a minimum, particularly palisade fencing, if fencing is necessary use dark green colour or black, with posts of the same colour.
- Maintain and create links into surrounding housing and the town centre, using opportunities for separate footways/cycleways and also new bus stops/shelters which are attractive, safe and comfortable to use
- Retain and protect existing mature trees and Integrate large retail developments into townscape by use of recessive colours for walls and roofs, and large scale tree planting. 'Green roofs' may be an option for the future. Break up rooflines to reduce apparent scale (e.g. old 'sawtooth' factory roofs with northfacing lights are energy efficient and fit in with scale of domestic roofs)
- Avoid large scale cut and fill operations which destroy the original landform and create unnatural cuttings and embankments. Consider split level developments as an alternative
- Maintain a landscape buffer zone next to watercourses and water bodies
- Introduce new planting where appropriate

OPPORTUNITY ACTIONS

- Break up extensive car parking areas with tree and shrub planting and contrasting surfacing
- Plant replacement trees



For further information contact:
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All our information is available in accessible formats

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Character Areas (ZTV) – Welsh Maelor



Welsh Maelor 13a

This is one of a series of Local Planning Guidance Notes based on Wrexham LANDMAP (adopted November 2004), setting out recommendations for each Landscape Character area.



Attractive undulating lowland farmland to the south of Wrexham town and west of the River Dee, containing a number of large estates

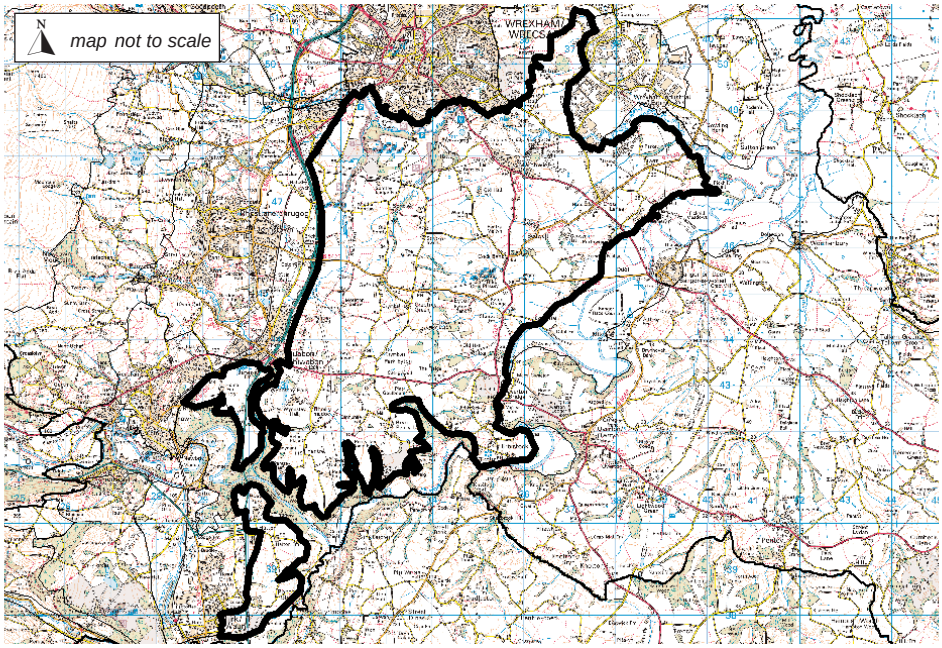
Landscape context

This lowland rural area is similar to the English Maelor and Dee Terraces, and to the Cheshire and North Shropshire Plain beyond the Wrexham boundary. However it is geographically and historically separated from the English Maelor by the River Dee, and former administrative boundaries, and is currently more affected by proximity to urban areas

Welsh Maelor summary:

- Undulating, mainly pastoral lowland farmland
- Well-managed hedges with hedgerow trees and small woodlands
- Historic designed estates influence a large propotion of this area
- Field ponds abundant on areas with clay soils
- Historic settlement pattern with remnants of medieval ridge and furrow
- Erddig estate important for tourism, recreation, nature conservation and heritage
- Wat's Dyke runs north-south through area
- Patches of valuable semi-natural habitats, especially in Clywedog valley
- Affected by urban pressures and economic changes to farming

Map of Welsh Maelor Landscape Character Area



Character Area boundaries should be considered transitional rather than precise

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Key characteristics

Visual character:

- Good views to the hills and over the Dee Valley from higher ground
- Undulating estate farmland with mosaic of farmland and trees (N. and S. areas) and undulating open farmland in the central area
- Designed parks and gardens
- Generally an abundance of well managed hedgerows and hedgerow trees
- Traditional red brick farmsteadings but many barns now converted to residential uses
- Tranquillity and landscape quality affected by A483 and pylons to west

Geological character:

- Deep deposits of glacial drift overlie bedrock of Carboniferous and Triassic age
- Glacial till (boulder clay) covers a large part of the character area, with glacial sands and gravels found mainly in the area immediately to the south of Wrexham town, and in the river terrace on which Eyton Grange is situated
- The area drains to the Clywedog in the north and to the River Dee in the east and south

Ecological character:

- The River Clywedog valley south of Wrexham town has a diverse range of valuable semi-natural habitats including wet woodlands, lowland meadows and nationally important wetlands (especially for invertebrates) with areas of fen sedge, herb-rich swamp and rush pasture
- Farm orchards are now rare, but a valuable old orchard survives at Erddig
- Semi-natural upland mixed ash woodlands, other broadleaved woodlands and plantations are characteristic of the northern and southern areas, forming a mosaic of woodland and farmland. Mixed plantations are also found in the south
- Although most grassland is improved, remnants of high value neutral grassland survive in the central and northern areas
- The Welsh Maelor has valuable remnants of estate parkland or wood pasture with mature and veteran trees - a Biodiversity Priority Habitat
- Field ponds are frequent, and valuable for wildlife

Historical character:

- Medieval military feature - Wat's Dyke earthern bank and ditch cuts across farmland
- Widespread evidence of medieval open fields - ridge and furrow remnants of the Wrexham Lowlands
- Important designed parklands on Cadw Register at Erddig, Wynnstay and Brynkinalt, as well as Penylan, Erbistock and Rosehill
- Non-planned settlement with medieval origins at Gyfelia and Crabtree Green
- 19th/20th century ribbon development at Marchwiel
- Disused Ellesmere railway
- Remnants of former ordnance depot at Parkey area south of Wrexham Industrial Estate



Cultural character

- Still predominantly agricultural, with dispersed farms
- Farmsteads and villages affected by commuter pressure, with residential conversions and new housing
- Sense of place - Erddig and Wynnstay in particular
- Wynnstay Estate once culturally dominated the southern part of the Welsh Maelor but the buildings of the core area are being converted to residential accommodation, enabling restoration of the Grade 1 Capability Brown pleasure gardens
- High level of recreational use in Erddig and Clywedog Valley, and extensive network of small lanes and rights of way in all parts except Wynnstay

Landscape sensitivity

The traditional Welsh Maelor landscape is very vulnerable to continuing development and recreational pressures, to economic changes which threaten traditional farming, and from land use practices and development which do not take historical landscape features into account.

For further information contact:

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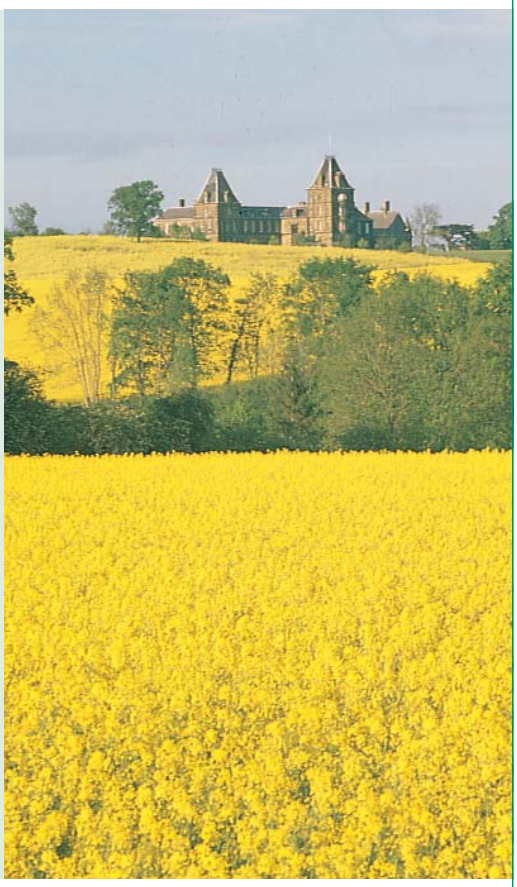
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Welsh Maelor - North Central and South

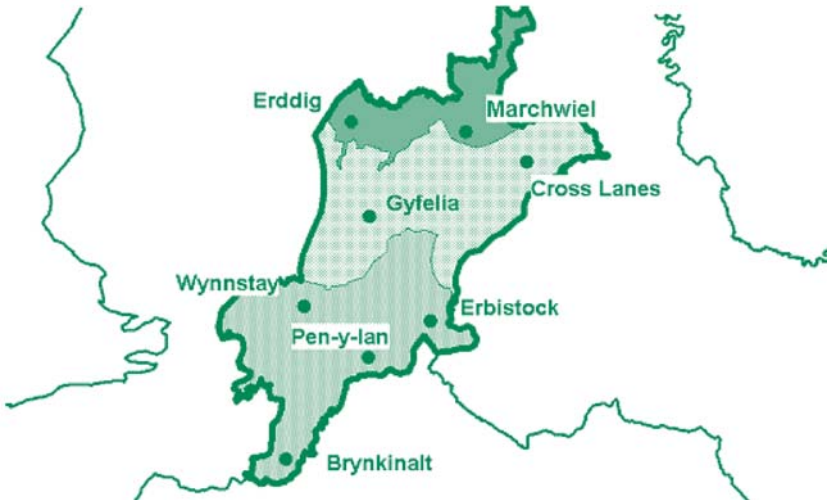
The northern part, nearest to Wrexham drains into the River Clywedog, and has a high proportion of land belonging to the estates of Erddig, Marchwiel, Bryn y grog and Cefn Park. This area is particularly valuable for nature conservation and informal recreation.

The southern part also has a high proportion of land in former or existing estate management, including Wynnstay, Penylan and Brynkinalt. Some of these estates also extend into the Dee-Ceiriog Wooded Valley landscape character area.

The central part is generally open farmland with dispersed farms and hamlets where former estate influence is weaker. It includes a small semicircular flat area around Eyton Grange which is a terrace of the River Dee.
Attractive undulating lowland farmland to the south of Wrexham town and west of the River Dee, containing a number of large estates.



The Welsh Maelor can be subdivided into 3 areas:





Overall management strategy:

Conservation and sustainable rural development

Management Guidance

Aims	Guidelines
Conserve rural character	● Promote replacement planting of hedgerow trees, particularly oaks and ash to ensure perpetuation of characteristic landscape ● The area is particularly sensitive to the 'suburbanisation' of farm steadings - resist ● The character of rural villages and their settings are particularly sensitive to new development ● Encourage Village Design statements by local residents ● Areas for Horsiculture are to conserve traditional field boundaries and avoid the proliferation of fences, structures and buildings within the countryside, where this would erode character
Protect and enhance historic landscape	● Protect estate landscapes and estate-influenced landscapes and consider Cadw listing of stone boundary walls and other significant designed landscape features not protected at present ● Protect fieldscape and areas of medieval ridge and furrow ● Increase awareness and appreciation of historical landscape character ● Preserve surviving features in designed landscapes and avoid subdivision or development of parklands ● Prevent woodland regeneration on Wat's Dyke and Erddig Motte and Bailey ● No development on or near Wat's Dyke - contact Cadw ● Preserve Gyfelia field boundaries ● Preserve by record medieval features at Crabtree Green
Preserve geodiversity	● Preserve disused railway, relate to wider industrial landscape
Conserve and manage ponds and other aquatic and wetland habitats	● Maintain integrity of landforms, including glacial and fluvial landforms, and assess new exposures ● Maintain high pond density, restore and enhance ponds.Protect species associated with ponds, eg bats, newts, water vole, lesser silver diving beetle ● Enhance river bank habitats and minimise hard bank engineering; such as canalisation and retaining walls; protect otters and water voles ● Refer to River and Pond Habitat Action Plans and Otter Species Action Plan of Wrexham Biodiversity Action Plan ● Restrict drainage in wetland sites
Enhance and restore biodiversity of historic parklands	● Enhance and expand wood-pastures and retain veteran trees and fallen timber ● Protect wood-pasture from agricultural intensification
Manage farmland for nature conservation	● Diversify general agricultural land and enhance and extend hedgerows ● Develop green networks to link fragmented habitats and species ● Maintain arable headlands and wide field margins ● Enhance and extend orchards and preserve historic fruit varieties
Conserve and manage woodlands	● Maintain, expand and link fragmented native woodlands ● Replace coniferous trees with native broadleaved trees in woodlands and increase diversity in woodland structure and retain old/dead standing or fallen trees ● Restrict grazing in woodlands
Manage grassland to increase biodiversity	● Protect and manage lowland meadows and enhance lowland pastures ● Encourage cattle grazing in rush pastures
Preserve rural heritage and encourage sustainable rural development	● Maintain historic appearance of area, encourage local businesses ● Support National Trust initiatives ● Develop strategy for sympathetic new build in rural villages ● Preserve local distinctiveness, in particular agricultural buildings

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Appendix 5.6
Landscape Value Table

APPENDIX 5.6 - LANDSCAPE VALUE TABLE

To inform the sensitivity judgement of the Site, a judgement on Landscape Value has to be made. An evaluation of the value attached to undesignated landscapes has been completed for the Site utilising the guidance provided within GLVIA and the Landscape Institutes Technical Guidance note 02/21 - Assessing landscape value outside of national designations. A value table has been produced detailing the range of factors that can be considered when identifying landscape value of non-designated landscapes within the site.

Table 5.1 – Site and Immediate Surrounds Value Table (TGN 02/21)

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
Natural heritage	Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest which contribute positively to the landscape	Presence of wildlife and habitats of ecological interest that contribute to sense of place Extent and survival of seminatural habitat that is characteristic of the landscape type Presence of distinctive geological, geomorphological or pedological features Landscape which contains valued natural capital assets that contribute to ecosystem services, for example distinctive ecological communities and habitats that form the basis of ecological networks Landscape which makes an identified contribution to a nature	Landscape character assessment	Wrexham LANDMAP Supplementary Planning Guidance (2007) – The majority of the Site is within **West Wrexham Ridges and Valley 7d**: *"Changing landscape as post mining restoration and regeneration continue* *…Variety of wildlife habitats including small but important wetlands* *…Much of the non-built area is improved grassland or arable of relatively low value" Part of the site"* Part of the Southern Parcel is within **Clywedog Valley, Plas Power and Bersham 9a**: *"Woodlands of high nature conservation value* *… River Clywedog is an aquatic habitat of high value* *…Upland mixed ash woodland of high value and oak/ ash/ sycamore woodland are found in the valley and Plas Power estate"* Further site level information is included within Para 5.97 – 5.106 of the LVIA Topic Chapter 5.

[1] These examples are not exhaustive.

[2] Evidence may be set out in development plans (or evidence that sits alongside development plans). Online mapping may also provide useful information

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
		recovery/ green infrastructure network	LANDMAP Geological Landscape	Site falls within the 'Lowland Glacial Outwash Plain / Field' LANDMAP Geological Aspect area.
			LANDMAP Landscape Habitats Aspects	Site falls within the 'Mosaic' LANDMAP Habitats Aspect area.
			Ecological and geological designations	Site adjoins Big Wood Wildlife Site and Higher Berse Marsh Wildlife Site. Other sites are over 1km from the site. Further details are provided in the PEA. The Site falls within the LANDMAP 'Mosaic' category that has value for wildlife. Most of the habitats within the site such as short grazed improved grassland and arable have limited ecological value. Higher value habitats such as scrub and woodland are outside of the Site.
			SSSI citations and condition assessments	Provided in the PEA.
			Geological Conservation Review	N/A
			Habitat surveys	Majority of site is improved grassland and arable of low value. Higher value habitats (see below) are present along field boundaries / adjoining site. Further details are in the PEA.
			Priority habitats	Hedgerows – species rich in Northern Parcel of site. Mature trees (within hedgerows). Ponds adjoining site. Woodlands adjoining sites.
			Nature recovery networks/ nature pathways	No assessment completed.
			Habitat network opportunity mapping/ green infrastructure mapping	No assessment completed. Hedgerows within the site link blocks of offsite woodland. These could be enhanced to increase connectivity.
			Catchment management plans	N/A

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
			Ecosystem services assessment/ schemes	No assessment completed. The Site is primarily under use for grazing and some areas of arable crop. The existing green infrastructure offering includes mature hedgerows, some specimen trees of varying age and condition, adjoining areas of existing mature woodland and plantation woodland. Some of which has ancient woodland classification. Value of the existing vegetation and green infrastructure connections could be enhanced through new planting and management.
			Specialist ecological studies	Protected species surveys undertaken – otter, great crested newt, wintering birds, breeding birds. The habitats within and adjoining the site support good assemblages of breeding and wintering birds. Otter and great crested newt use habitats adjoining the site. Further details are provided in the PEA and survey reports.
Cultural heritage	Landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape	Presence of historic landmark structures or designed landscape elements (e.g. follies, monuments, avenues, tree roundels) Presence of historic parks and gardens, and designed landscapes Landscape which contributes to the significance of heritage assets, for example forming the setting of heritage assets (especially if identified in specialist studies) Landscape which offers a dimension of time depth. This includes natural time depth, e.g. presence of features such as glaciers and peat bogs and cultural time depth e.g. presence	Landscape character assessment	Wrexham LANDMAP Supplementary Planning Guidance (2007) – The majority of the Site is within **West Wrexham Ridges and Valley 7d**: *"Countryside has… regular and irregular fields, but much land has been disturbed* *…the route of Offa's dyke can be identified* *… Plas Power colliery buildings have been preserved* *…Area is affected by A483 corridor, which separates it from Wrexham, but increases accessibility to commuters"* Part of the Southern Parcel is within **Clywedog Valley, Plas Power and Bersham 9a**: *"Heritage centre and ironworks at Bersham Plas Power estate adjoining Clywedog Valley, surrounded by a magnificent stone wall* *…The area is crossed by Offa's Dyke, a prehistoric military feature of outstanding archaeological value"*

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
		of relic farmsteads, ruins, historic field patterns, historic rights of way (e.g. drove roads, salt ways, tracks associated with past industrial activity)		Further site level information is included within Para 5.97 – 5.106 of the LVIA Topic Chapter 5.
			LANDMAP Historic Landscape and Cultural Landscape Services Aspect	The relevant LANDMAP Cultural Landscape Aspect areas are as follows: The Southern Parcel of the Site falls within the 'Plas Power Park - Open Rolling Lowland' and 'A483 Mold Road Corridor - Open Rolling Lowland'. The Northern Parcel of the Site falls within 'West Wrexham Lower Slopes - Hill & Lower Plateau Grazing'. The cable route is located within the West and South of Rhos, Cywedog Valley Bersham, A483 and environs – Rhostyllen to Ruabon. The relevant LANDMAP Historic Landscape Aspect areas are as follows: The Southern Parcel of the Site falls within the 'Plas Power – Regular Fieldscapes'. The Northern Parcel of the Site falls within 'Windy Hill – Irregular Fieldscapes'.
			Historic environment and archaeological designations	No historic environment / archaeological designations are located within the main parts of the Site itself. The cable route options cross the line of Offa's Dyke, a Scheduled Monument. The Southern Parcel of the Site adjoins the Bersham Conservation Area, which contains 16 Listed Buildings and the scheduled Bersham Ironworks. Relics of the Plas Power Estate are evident within and immediately adjacent to the Site. Within the Site these comprise a small number of parkland trees, whilst those adjacent comprise the former stables, ice house, bath house, game larder and dairy, which are all listed buildings, and fallen gate posts, a ha-ha, and parkland trees/designed landscape remnants. At greater remove from the Site are the western estate wall, gates, a lodge house and cottage, which are listed buildings. Although in some cases these are in a poor condition, they do add some cultural value to the adjoining Site. There are a

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
				number of other Listed Buildings also within the vicinity of the Site. They offer limited value to the Site.
			Conservation Area appraisals, Village Design Statements	Bersham Conservation Area Assessment & Management Plan (2009): *The special character of the area has been greatly influenced by the valley landscape setting and the historical and architectural association with John Wilkinson's ironworks and the Plas Power Estate. A number of factors contribute to the special character of the area and these are now outlined below:* *The Iron work buildings and sites...* *The numerous bridges and remains of the river weirs, sluice gates and leats...* *The wooded valley sides and banks of the River Clywedog...* *The strong architectural influence of the Plas Power Estate – Bersham Lodge, St Mary's Church, and the Estate Cottages are landmark buildings creating a strong sense of place and identity...* *Boundary details – Sandstone boundary walls of various types with differing capping styles are a common and distinctive feature of the Conservation Area... The hedging consists of a variety of mixed indigenous species including hawthorn, holly, hazel, yew, and sycamore. In the Ddol area, Ruabon red engineering brick walls and cast iron railings and gates take precedence.* *The historic place, street and house names...* *Y Ddol – A compact area of high-density buildings set into the steep valley side close to the river, creating a sense of compactness...* The cable route passes through Character Area 'The Area to the West Ironworks Site'. There is limited intervisibility between the Site, and the Conservation Area and its Listed Buildings.

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
			Historic maps	Historic mapping dating to 1879 shows the greater part of the Site as part of the Plas Power Estate, wrapping around the now demolished Plas Power. The estate landscape was characterised by parkland punctuated by trees and clumps of trees with areas of woodland and a large fishpond. In 1946-7 the house was demolished. Subsequently, an opencast colliery was opened that occupied the eastern part of the parkland and much of the Site. Once worked out the opencast was backfilled and a large rectangular reservoir constructed. The northern part of the Site lay outside the estate and is shown on the 1879 map as being occupied by irregular fields. Although some boundaries have been removed, the present field-system is largely as depicted on this map.
			Historic landscape character assessments[3] Historic Land Use Assessment[4] and Historic Area Assessments[5]	The main body of the Site lies within WRXHMHL014: *Area of former landscape parkland on gently undulating plateau north of Bersham and the river Clywedog associated with the 18th-century and later Plas Power country house, demolished in the mid 20th-century. Former parkland is now largely converted to farmland. Regular, straight-sided fields with hedged boundaries representing subdivision and enclosure of the former parkland. Mixed deciduous and coniferous woodland along the steeply-sloping valley sides of the river Clywedog to the south and elsewhere. Modern settlement confined to Home Farm, the former estate farm. Some surviving structures and features related to*

[3] Historic Landscape Characterisation has developed as a GIS mapping tool to capture how land use has changed and the 'time-depth' of the present-day landscape.

https://historicengland.org.uk/research/methods/characterisation/historic-landscape-characterisation/

[4] Mapping of Scotland's Historic Landscape: https://hlamap.org.uk/

[5] https://historicengland.org.uk/images-books/publications/understanding-place-historic-area-assessments/

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
				the country house and its parkland. The area is crossed by the early medieval Offa's Dyke. *Overall Evaluation: Moderate - Although still recognisable as parkland, its poor condition brings down its value despite the passage of Offa''s Dyke* The northern part lies within WRXHMHL008: *Swath of mixed irregular predominantly hedged fields occupying the Gwenfro and Moss valleys to the west and east of Brymbo and its former industrial areas... The area is characterised by isolated post medieval farmsteads and a wide variety of mines, collieries, brick and tile works and other industrial remains... It also contains the minor settlement of Berse Drelincourt and an isolated moated site at Lower Berse, and a small area of very degraded parkland at Gwersyllt... The south of the area is crossed by Offa's Dyke and it is bounded on its north by the line of the Roman road from Caer Gai to Chester.* *Overall Evaluation: Moderate - Diffuse area of mixed fields wrapped around a number of industrial settlements but lacking significant historical foci, although the passage of Offa''s and Wat''s Dykes lifts its value slightly*
			Place names	N/A
			Specialist heritage studies	The Site has been the subject of a Desk-Based Assessment, Built Heritage Statement and Geophysical Surveys. All of these were undertaken in respect of the Project.
Landscape condition	Landscape which is in a good physical state both with regard to individual elements and overall landscape structure	Good physical condition/ intactness of individual landscape elements (e.g. walls, parkland, trees) Good health of elements such as good water quality, good soil health Strong landscape structure (e.g.	Landscape character assessment	Wrexham LANDMAP Supplementary Planning Guidance (2007) –Within **West Wrexham Ridges and Valley 7d**: *"Urban villages retain their own cultural identity, but this is becoming weakened"* Part of the Southern Parcel is within **Clywedog Valley, Plas Power and Bersham 9a**: *"The eastern half of the Plas Power estate is*

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
		intact historic field patterns) Absence of detracting/ incongruous features (or features are present but have little influence)		*restored land, following post war opencast coal mining, and the remaining designed landscape is in poor condition"* Further site level information is included within Para 5.97 – 5.106 of the LVIA Topic Chapter 5.
			LANDMAP condition and trend questions (Q27 and Q28)	Within Southern Parcel: **Plas Power Park:** Condition **-** Unassessed, Trend - Constant, **A483 Mold Road Corridor:** Condition - Unassessed, Trend – Declining, **Cywedog Valley Bersham;** Condition **-** Unassessed, Trend – Constant. Within Northern Parcel: **Wrexham Lower Slopes;** Condition **-** Unassessed, Trend – Constant.
			Hedgerow / Tree Surveys	Tree Survey is within Appendix 5.8 of the LVIA Topic Chapter 5.
			Observations about intactness/ condition made in the field by the assessor	Arable and improved grassland have low ecological value. Species-rich hedgerows, mature trees and adjoining woodland and pond have higher value. The condition of the hedgerows, woodland and ponds vary. Areas of the fencing within, and along the boundaries to, the Site is in some places damaged on unintact. Some hedgerows are also in a poor, fragmented condition.
			SSSI condition assessments	N/A
			Historic landscape character assessments/ map regression analysis	N/A
Associations	Landscape which is connected with notable people, events and the arts	Associations with well-known literature, poetry, art, TV/film and music that contribute to perceptions of the landscape Associations with science or other technical achievements Links to a notable historical event	Information about arts and science relating to a place	*"The special character of the area has been greatly influenced by the valley landscape setting and the historical and architectural association with John Wilkinson's ironworks and the Plas Power Estate…. The remains of Wilkinson's Ironworks are an important link with the area's industrial past. The old blast furnace, now known as The Mill, and the octagonal foundry, are both particular landmark*

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
		Associations with a famous person or people		*buildings"* (Ref: Bersham CA Assessment & Management Plan 2009). Although these buildings are not directly visible from within the Site, they fall in its setting. ***"The Plas Power Estate*** *2.13 Plas Power Park lies directly to the north of the Conservation Area. The estate dates back to the middle of the 15th century when it was owned by Robert Bellot. In the 17th century the Power family inherited the estate and changed the name to Plas Power. By 1747 it belonged to William Lloyd who, in that same year, demolished the original house and replaced it with a typically Georgian square mansion of red brick with stone dressings. He also decided to enclose the parkland with a massive stone wall. The wall still exists today and is a very strong characteristic of the area. William Lloyds' daughter, Mary Fitzhugh inherited the estate, which was subsequently left to her son Thomas Lloyd Fitzhugh who, in 1858, enlarged and remodelled the house under the direction of the architect John Gibson. Around 1860 they also remodelled the distinctive South Gate lodge and built the bridge and the distinctive estate cottages of Mill Terrace. The Gate lodge and Mill cottages are extremely picturesque and display the decorative bargeboards and diamond lattice windows, which identify them as once belonging to Plas Power Estate.* (Ref: Bersham CA Assessment & Management Plan 2009).
			Historical accounts, cultural traditions and folklore	*"St Mary's Church, Grade II*, also known as Plas Power Chapel, was built by Thomas Fitzhugh in 1875, the tower was added later in 1893 in memory of Captain Godfrey Fitzhugh."* This Church is located to the immediate south of the Site. It was designed by architect John Gibson designed it in 1875 for Plas Power Estate owner Thomas Fitzhugh, for the use of the Plas Power household and its dependants (Ref: Bersham CA

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
				Assessment & Management Plan 2009).
			Guidebooks/ published cultural trails	The Woodlands Trust – Plas Power Woods which adjoins the Site, has a number of waymarked walks including the National Trail "Clywedog Trail". This long-distance trail passes the through the cable route part of the Site, and the south of the Southern Parcel of the main site. Other trails within Plas Power Woods are King Offa Family Trail and a Seasonal Loop, details of which are available on the Woodlands Trust website (https://www.woodlandtrust.org.uk/visiting-woods/woods/plas-power-woods/)
Distinctiveness	Landscape that has a strong sense of identity	Landscape character that has a strong sense of place (showing strength of expression of landscape characteristics)	Landscape character assessment	Site specific assessment completed within this LVIA, at Para 5.97 – 5.106 of the LVIA Topic Chapter 5. LANDMAP character information specific to the Study Area and Site is provided within Appendix 5.4.
		Presence of distinctive features which are identified as being characteristic of a particular place Presence of rare or unusual features, especially those that help to confer a strong sense of place or identity Landscape which makes an important contribution to the character or identity of a settlement Settlement gateways/approaches which provides a clear sense of arrival and contribute to the character of the settlement (may be ancient/historic)	LANDMAP Visual & Sensory question 3 and 25, – Historic Landscape question 4	Within Southern Parcel **Plas Power Park -** Q3 '*the estate itself has been long neglected and the remaining area still has elements of formal landscape features*. Q25 – sense of place is moderate. **A483 Mold Road Corridor – Q3** *'generally rural but often with significant noise …original rural character has been significantly weakened by urban influences.* Q25 - sense of place is weak. **Cywedog Valley Bersham** Within Parcel B **West Wrexham Lower Slopes** **North** – Q3 '*the area has been fragmented by settlement and built elements… but the wider area has a well defined field structure'.* Q25 - sense of place is weak.
			Observations about identity/ distinctiveness made in the field by the assessor	As already detailed within the associations section, references to The Plas Power Estate and the Bersham Ironworks within the immediate setting to the Site provide historic refence and distinctiveness to this local landscape. One of the most noticeable

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
				observations from field work was the distinctive Plas Power Estate boundary walling and remnants of the designed landscape associated with the Plas Power Estate, albeit a lot of this is in a poor condition.
Recreational	Landscape offering recreational opportunities where experience of landscape is important	Presence of open access land, common land and public rights of way (particularly National Trails, long distance trails, Coastal Paths and Core Paths) where appreciation of landscape is a feature	Definitive public rights of way mapping/ OS map data	PRoW Footpath BER/1 runs within Southern Parcel and PRoW Footpath BER/8 runs within Northern Parcel.
			National Trails, long distance trails, Coastal Paths	Offa's Dyke long-distance footpath / National Trail and Clywedog Trail run close to the Site. Waymarked routes within the Plas Power Woods.
		Areas with good accessibility that provide opportunities for outdoor recreation and spiritual experience/ inspiration	Open access land (including registered common land)	Not within the Site
		Presence of town and village greens	Database of registered town or village greens	Not within the Site
		Other physical evidence of recreational use where experience of landscape is important	Visitor surveys/ studies	Not assessed.
		Landscape that forms part of a view that is important to the enjoyment of a recreational activity	Observations about recreational use/ enjoyment made in the field by the assessor	PRoW Footpath BER/1 provides recreational opportunity within Southern Parcel of the Site and Footpath BER/8 provides recreational opportunity within the Northern Parcel. Neither of these footpaths were seen to be used during visit. For site work completed for the RVAA, local residents say they use the footpaths through the Site regularly. The area to the south of Southern Parcel of the Site provides a number of recreational opportunities including: a National Trail, River Clywedog, Plas Power Woods and Bersham Ironworks Museum.
Perceptual (Scenic)	Landscape that appeals to the senses, primarily the visual sense	Distinctive features, or distinctive combinations of features, such as dramatic or striking landform or harmonious combinations of land cover	Landscape character assessment	Wrexham LANDMAP Supplementary Planning Guidance (2007) – Within **West Wrexham Ridges and Valley 7d**: *"Views towards Wrexham and the lowlands* *Scattered groups of buildings in local Cefn sandstone and stone-built village cores, individuality in later additions but much standardised modern*
		Strong aesthetic qualities such as scale, form, colour and texture		

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
		Presence of natural lines in the landscape (e.g. natural ridgelines, woodland edges, river corridors, coastal edges) Visual diversity or contrasts which contributes to the appreciation of the landscape Memorable/ distinctive views and landmarks, or landscape which contributes to distinctive views and landmarks		*housing development"* Part of the Southern Parcel is within **Clywedog Valley, Plas Power and Bersham 9a**: *"Varied visual character but area, though close to settlements, is separated from them by walls, roads or topography and has a more tranquil character"* Further site level information is included within Para 5.97 – 5.106 of the LVIA Topic Chapter 5. The field assessment completed within the LVIA.
			LANDMAP Visual and Sensory scenic quality question 46 (Evaluation Criteria)	Site falls within the **'Open Rolling Lowland'** (Southern Parcel), **'Hill & Lower Plateau Grazing'** (Northern Parcel) and **'Wooded Lowland Valleys'** (cable route only) LANDMAP Visual and Sensory Aspect Areas. These areas are further divided within Southern Parcel of the Site to include '**Plas Power Park'** and **'A483 Mold Road Corridor'**. These aspect areas have an overall evaluation of Moderate. Visual and Sensory Aspect areas within Northern Parcel of the Site include **'West Wrexham Lower Slopes'**, that has an overall evaluation of Low. The cable route are located within the '**North, West and South of Rhos'**, the **'A483 and environs – Rhostyllen to Ruabon'** and the '**Cywedog Valley Bersham'** aspect areas that all have an overall evaluation of Moderate, See Appendix 5.5.
			Protected views, views studies	No views / photographs of the Site noted in the Local Plan and there is no neighbourhood plan for the area.
			Areas frequently photographed or used in images used for tourism/ visitor/ promotional purposes, or views described or praised in literature	The Plas Power Waterfall and Plas Power Wood have been used on internet sites to promote leisure activities in the area.

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
			Conservation Area Appraisals	Bersham Conservation Area Assessment and Management Plan Adopted (December 2009)
			Village Design Statements, or similar	N/A
Perceptual (Wildness and tranquillity)	Landscape with a strong perceptual value notably wildness, tranquillity and/or dark skies	High levels of tranquillity or perceptions of tranquillity, including perceived links to nature, dark skies, presence of wildlife/ birdsong and relative peace and quiet[6] Presence of wild land and perceptions of relative wildness (resulting from a high degree of perceived naturalness[7], rugged or otherwise challenging terrain, remoteness from public mechanised access and lack of modern artefacts) Sense of particular remoteness, seclusion or openness Dark night skies A general absence of intrusive or inharmonious development, land uses, transport and lighting	Tranquillity mapping and factors which contribute to and detract from tranquillity	No tranquillity mapping been carried out for the Site. See Site Survey observations below for factors that contribute and detract from tranquillity within the Site. The main fact to reducing the Sites Tranquillity is the A483 corridor which adjoins the eastern boundary of the site and also the A525 which is located between the Northern and Southern Parcels.
			Dark Skies mapping	LANDMAP Light Pollution Q56 – Night Time Light Pollution Visual and Sensory Aspect areas within Parcel A of the Site include: **A483 Mold Road Corridor** and **Cywedog Valley Bersham that both have a** Moderate Night Time Light Pollution. **Plas Power Park** has Slight Night Time Light Pollution. Visual and Sensory Aspect area within Parcel B of the Site include **West Wrexham Lower Slopes** that has a Moderate Night Time Light Pollution.
			Wildness mapping, and Wild Land Areas in Scotland	N/A
			Land cover mapping	The Site land cover is described at paragraph 3.15 of this LVIA

[6]More about tranquillity can be found in Landscape Institute Technical Information Note 01/2017 (Revised; Landscape Institute, 2017).

[7] Relating to extensive semi-natural vegetation, presence of wildlife and presence of natural processes/ lack of human intervention.

Range of factors that can be considered when identifying landscape value				
Factor	**Definition**	**Examples[1] of Indicators of landscape value**	**Example[2] of evidence**	**Evidence present**
			Field survey	The site visit identified isolated areas of tranquillity along: PRoW Footpath BER/1, in the middle, south and west of Southern Parcel and PROW Footpath BER/8 of the Northern Parcel. The A483, A525 and pylons located adjacent to the west of the Site detract from tranquillity and wildeness. In addition, overhead powerlines located within the Northern Parcel form visual detractors within the Site.
			LANDMAP Visual and Sensory Aspect	LANDMAP Tranquillity and Place Q59 – Tranquillity categories range from 1 (least visually tranquil) to 10 (most visually tranquil). Visual and Sensory Aspect area **A483 Mold Road Corridor** Is mostly in visually tranquil category 5-7. Aspect area **Plas Power Park** and **Cywedog Valley Bersham** are mostly in category 7.
Functional	Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape	Landscapes and landscape elements that contribute to the healthy functioning of the landscape, e.g. natural hydrological systems/ floodplains, areas of undisturbed and healthy soils, areas that form carbon sinks such as peat bogs, woodlands and oceans, areas of diverse landcover (benefits pest regulation), pollinator-rich habitats such as wildflower meadows Areas that form an important part of a multifunctional Green Infrastructure network Landscapes and landscape elements that have strong physical or functional links with an adjacent national landscape designation, or are important to the appreciation of the designated landscape and its special qualities	Land cover and habitat maps	No published landcover maps have been published for the Site. The Phase 1 survey undertaken on the Applciation Site. Reported in Appendix 5.1: Ecology and Nature Conservation.
			Ecosystem services assessments and mapping (particularly supporting and regulating services)	No assessment undertaken.
			Green infrastructure studies/strategies	The Site does not form part of a designated Green Wedge under Policy SP6 at a local level within the Wrexham LDP (Adopted 2023).
			Development and management plans for nationally designated landscapes, Local Plans and SPDs	The Site is not a nationally or locally designated landscape and therefor there is no published information relating to the management of the Site.