MSE your means to envision

Appendix 1

Technical Methodology:
Photography, 3D Modelling and Verified Visualisations

Ely Valley Solar

May 2025

Sirius Planning

Landscape Institute Registered Practice

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Contents

Introduction

Michael Spence BA (Hons), MLD, CMLI, REIA, FRGS is one of the UK's leading independent exponents of technical photography, verified photomontages and visualisations. Since 2013 Mike has been a technical advisor to the Landscape Institute on 'photography and photomontage in landscape and visual impact assessment', and has been undertaking this technical work for over 25 years. He is one of the main authors of the Landscape Institute's TGN 06/19 and provided technical support to Scottish Natural Heritage(NatureScot) on their windfarm visualisation guidance. He is a current member of the Landscape Institute Technical Committee. His background as a Chartered Landscape Architect, Registered EIA Practitioner and Fellow of the Royal Geographical Society working on strategic infrastructure projects has meant that the accuracy of the visualisation work is paramount, and technical photography, together with extensive surveying experience, use of GIS and detailed 3D modelling using real world co-ordinates ensures that the visualisations produced follow a clear and transparent methodology to ensure they are as accurate as possible.

Recent projects include the UNESCO World Heritage Sites at Valletta (Malta), Royal Botanic Gardens at Kew, Fountains Abbey for The National Trust, and West Cumbria Coal Mine for Friends of the Earth. Mike has also been working closely with Bath City Council on proposed development in the UNESCO World Heritage City of Bath. Mike's work and objective technical checks have been used at numerous Public Inquiries and Planning Hearings, on behalf of both local authorities, Historic England, the National Trust, Friendfs of the Earth and developers.

In early 2025 Sirius contacted MSE to request Technical Photography, GNSS/RTK Surveying, 3D Modelling and preparation of visualisations to illustrate the proposed impact of a solar farm development in Llantrisant.

Verified Photography and 3D Modelling

The photographs were taken with a full frame camera (Canon EOS 5D Mark IV) and 50mm lens combination consistent with Landscape Institute's TGN 06/19, GLVIA3 and the emerging understanding of the requirement for technical photography for visualisation work. As part of the work 10 viewpoints were identified providing views of the site and visited in March 2025. The weather was sunny with clear visibility.

Technical Photography

The camera was mounted on a Manfrotto 303 SPH panoramic tripod head, levelled using a Manfrotto Leveller, supported on a Manfrotto Tripod. The tripod head was levelled using a spirit level, to avoid pitch and roll. The camera was set with the centre of the lens 1.60m above ground level. Photographs were taken in Manual mode with an aperture of f/8 or f/11 and a fixed focal length throughout. Photographs were taken in landscape orientation. A Sigma 50mm f/1.4 lens was used for all viewpoint photographs.

A Single Frame 50mm photograph is insufficient to capture the extents of a wide, linear development. Each view was taken with a series of overlapping 50mm images, as shown above.

To ensure consistent geometry each image was cylindrically re-projected, as above. This ensures that a full 360 degree panorama can be created to match the 3D model view, as shown below:

From the 360 degree panorama a 90 (or 180 degree) degree portion can be extracted to present the context view as shown below:

Surveying

The position of each camera location was surveyed using Spectra Precision GNSS equipment with Real Time Kinematic Correction (RTK) which achieves an accuracy down to 1cm in eastings, northings and height (metres Above Ordnance Datum). The equipment included Spectra Precision SP85 GNSS smart antennae with Panasonic Toughpad data recorder. A photograph of the camera location was taken.

3D Modelling

Using a 3D model built by MSE with added 3D LIDAR DTM height data into a geo-referenced model.

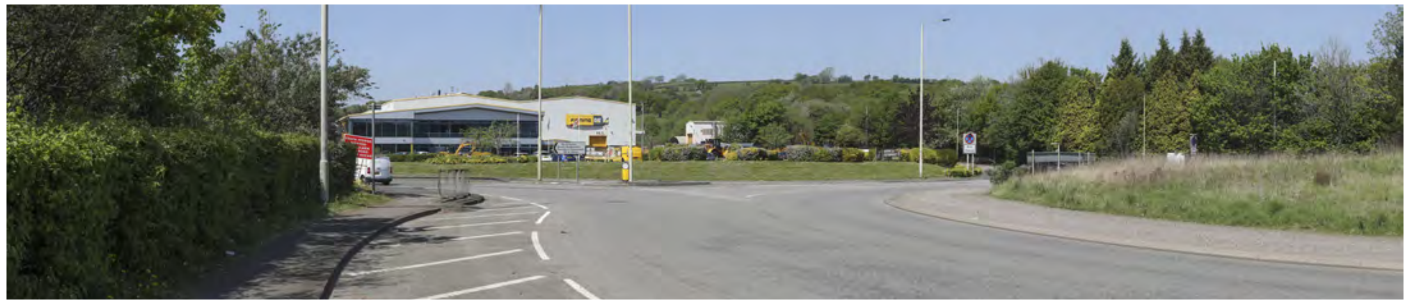
Camera locations surveyed on site were added to the geo-referenced 3D model.

Cylindrical renders generated using VRay for Rhino were exported from the 3D modelling software and used to overlay the cylindrical images. Target points from both the photograph and the model view were aligned to ensure a precise fit between the two images.

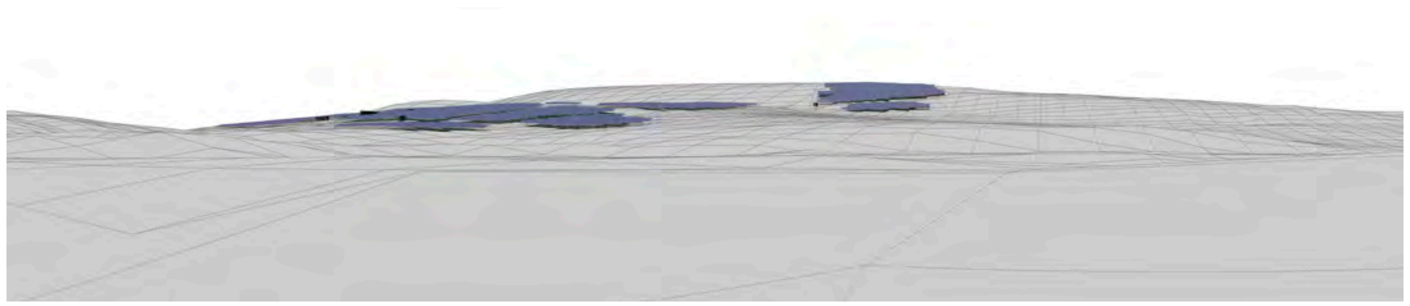
Visualisations are presented as either AVR 0, 1, 2 or 3. The differences are explained in the Landscape Institute's Technical Guidance Note 06/19: Visualisation of Development Proposals.

The results are presented as a sequence of visualisations as follows:

Existing View

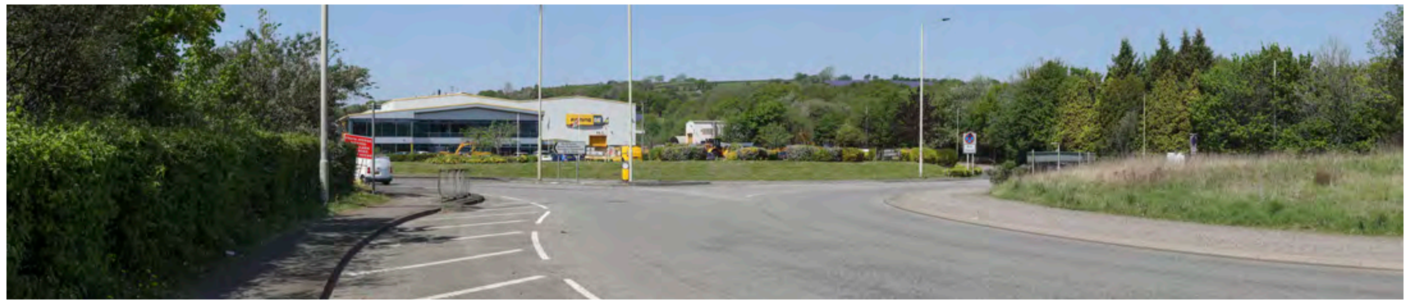


3D Model View



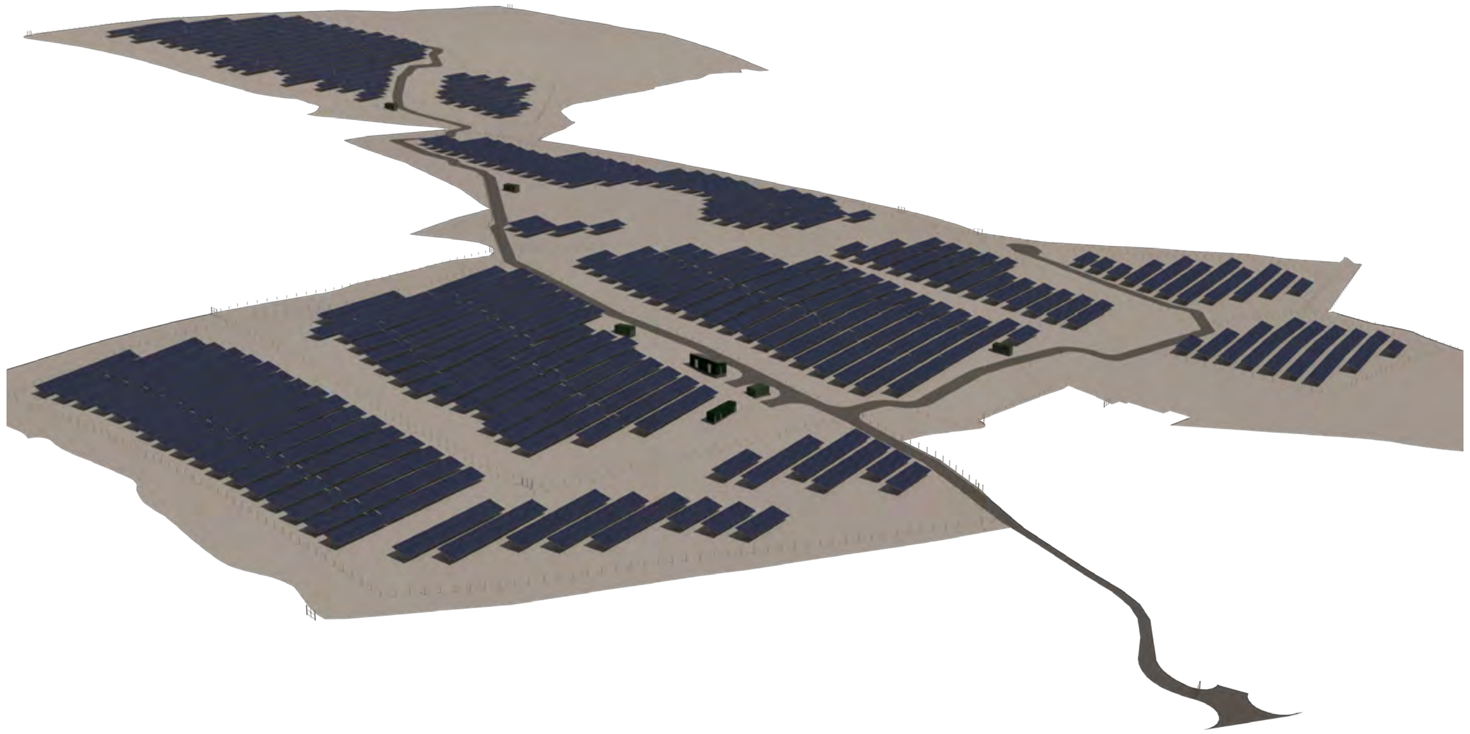
3D Model Composite View

Photomontage (AVR3)



The following images illustrate the combination of LIDAR Terrain 5 built by MSE which includes the 3D model of the proposed development built by MSE from elevations supplied by Sirius.

3D Model on DTM



3D Model on DTM

50mm lens on Full Frame Sensor Camera

For decades it has been accepted that a 50mm lens on a full frame sensor camera provides the optimum image to replicate what is seen by the human eye. there are important differences between the human eye (binocular) and the camera lens (monocular). These have been explored in research by The Highland Council & the University of Stirling, as well as by myself through the Landscape Institute. We know that a single frame 50mm image on an A3 sheet of paper provides the same view as that gained in the field by someone with one eye closed. As we are binocular, and normally use both eyes, a different size of image is required, and the reason why we have presented the images as effectively a 75mm image on A2 paper. This gives what The Highland Council, University of Stirling, Scottish Natural Heritage (NatureScot) and the Landscape Institute agree is the most representative size of image to understand the nature and scale of a development on a photograph.

Planar or Cylindrical Projection

All photographs are taken as single frame planar images. Each single frame image has a single point of perspective lying at the centre of the image.To correctly match and align with the 3D modelling software the camera must be mounted on a levelled tripod, and directed towards the proposed development.

When a viewpoint is close to the development, or a development is wide or you want to show the context of a view, a wider panorama is required. The alternative is to use a series of overlapping 50mm images and generate a ‘cylindrical’ perspective view,.

The 3D model renders have been rendered out in cylindrical projection to allow the precise image re-mapping to match the 90 degree cylindrical photograph.

3D Modelling software

The work has largely been undertaken using Rhino 3D. All 3D modelling has been undertaken in metres and geo-referenced to align with OSGB36. RESOFT Windfarm was also used which is a 3D modelling package which we use to check on vertical and horizontal alignment of the 3D model against the precise image geometry. This is also set up to OSGB36. RESOFT Windfarm has been used to generate the geometric grid from LIDAR DTM data present in all 3D model visualisations.

Viewing Printed Images

The visualisations have been prepared to be printed in the Technical Methodology at at A3 (420 x 297mm) and in the separate ‘Verified Visualisations’ document at A1 (841mm/420mm x 297mm), to show the scale of the proposed development.

The image size is considered to give a fair representation of the view for everyone, and the scale of the development in that view.

Summary

This work has been undertaken in accordance with the the Landscape Institute TGN 06/19 and the developing understanding of visualisation work. The accuracy of camera locations and 3D modelling conforms with the Landscape Institute’s Type 4 (the highest level of accuracy). The 3D modelling has been produced to AVR3 (photo-realistic).

The photography has been undertaken in an extremely robust manner, using professional full frame sensor DSLR and 50mm lens with levelled tripod. The camera position has been surveyed using highly accurate GNSS equipment, giving high levels of accuracy of camera location. The 3D model has been built in Rhino 3D using detailed information contained in the planning application drawings. An additional check on the vertical scaling has been undertaken using RESOFT Windfarm. The development perfectly aligns to the underlying LIDAR DTM.

The resultant visualisations are highly accurate.

The photography, surveying and 3D modelling have followed a transparent methodology, and the resultant visualisations and the size at which they are presented are considered robust and fit for purpose to illustrate the positioning, and scale and massing of the proposed scheme in its local and wider context.

M.A.Spence BA(Hons), MLD, CMLI, REIA, FRGS 30 May 2025
Principal, MSEnvision Ltd

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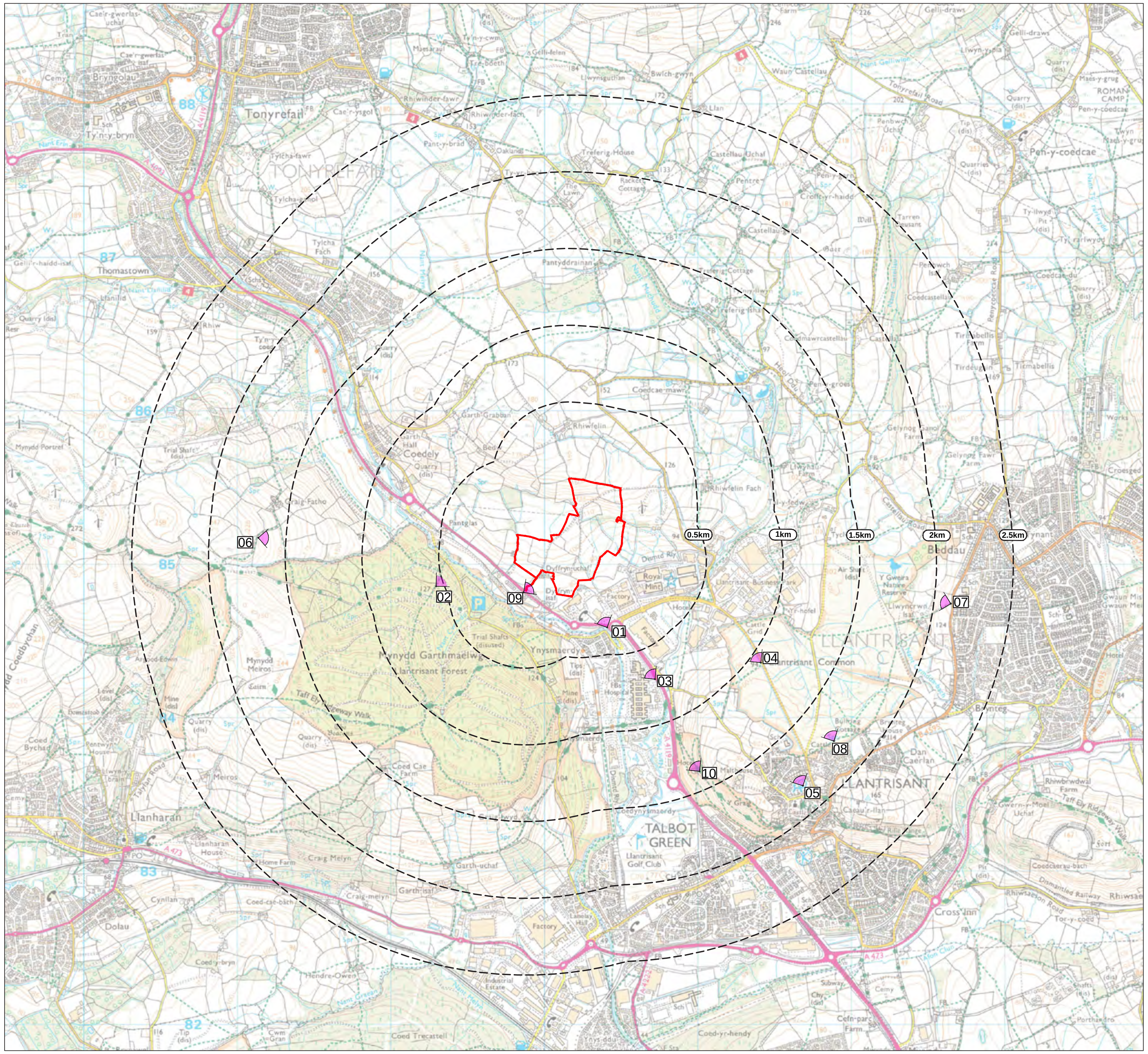

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KEY

- PLANNING APPLICATION BOUNDARY
- 500m SITE OFFSETS (upto 2.5km study area)
- PROPOSED VIEWPOINT (ASSESSMENT)

REV	DESCRIPTION	DATE	

CLIENT

WINDEL SOLAR 8 LIMITED

sirius Planning

4245 Park Approach, Thorpe Park, Leeds. LS15 8GB. 0113 264 9960

JOB TITLE

DYFFRYN SOLAR FARM

DRAWING TITLE

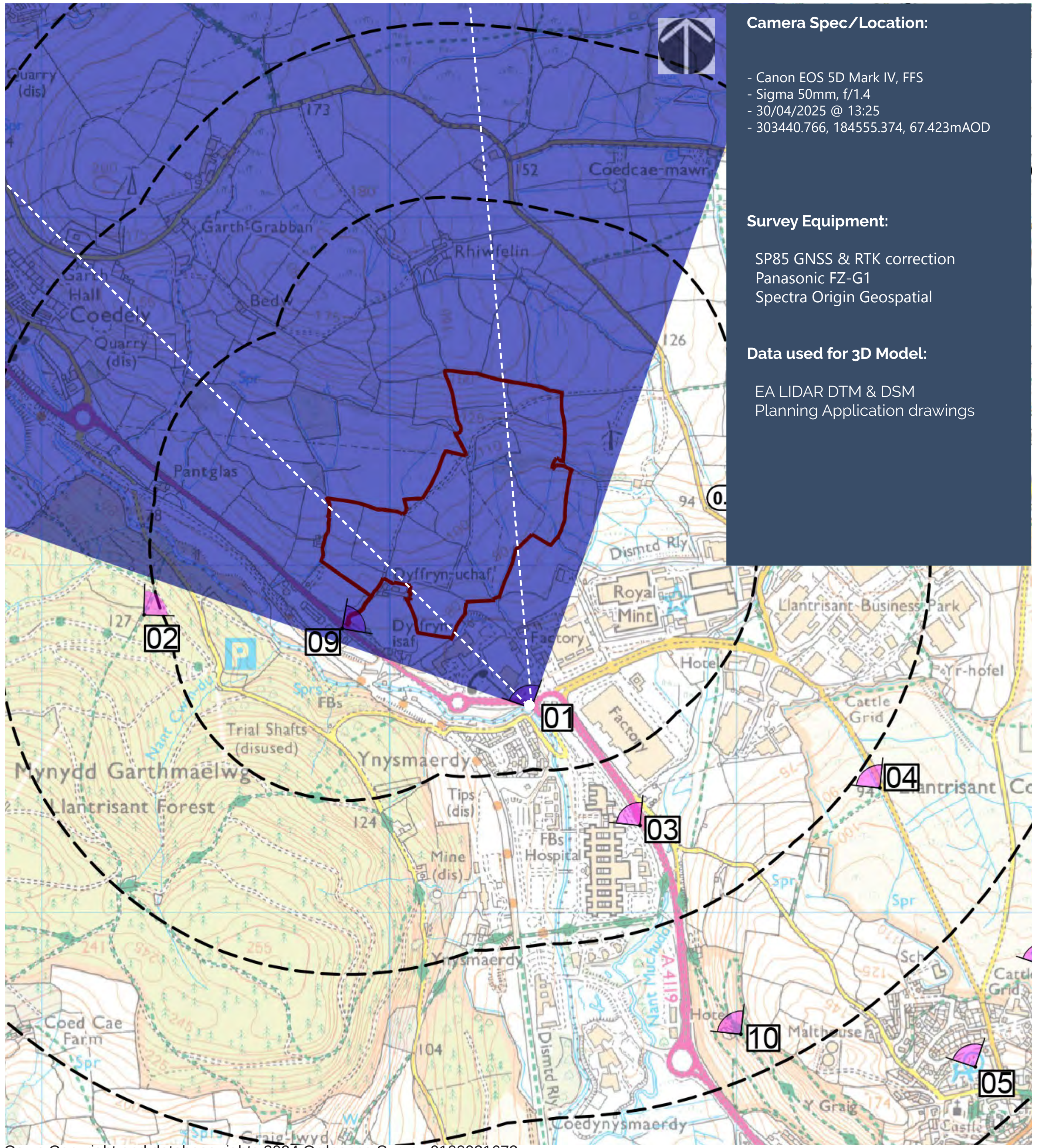
Photographic Viewpoint Location Plan

DRAWN	DATE	APPROVED	DATE
R.B	29/12/2023	A.S	25/4/2025

SCALE	SHEET	DRAWING NUMBER	REVISION
NTS	1	WN1011 07 05	1

Viewpoint 1

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 30/04/2025 @ 13:25
- 303440.766, 184555.374, 67.423mAOD

Survey Equipment:

SP85 GNSS & RTK correction
Panasonic FZ-G1
Spectra Origin Geospatial

Data used for 3D Model:

EA LIDAR DTM & DSM
Planning Application drawings

Tripod:

Point of Perspective

Point of Perspective

Point of Perspective

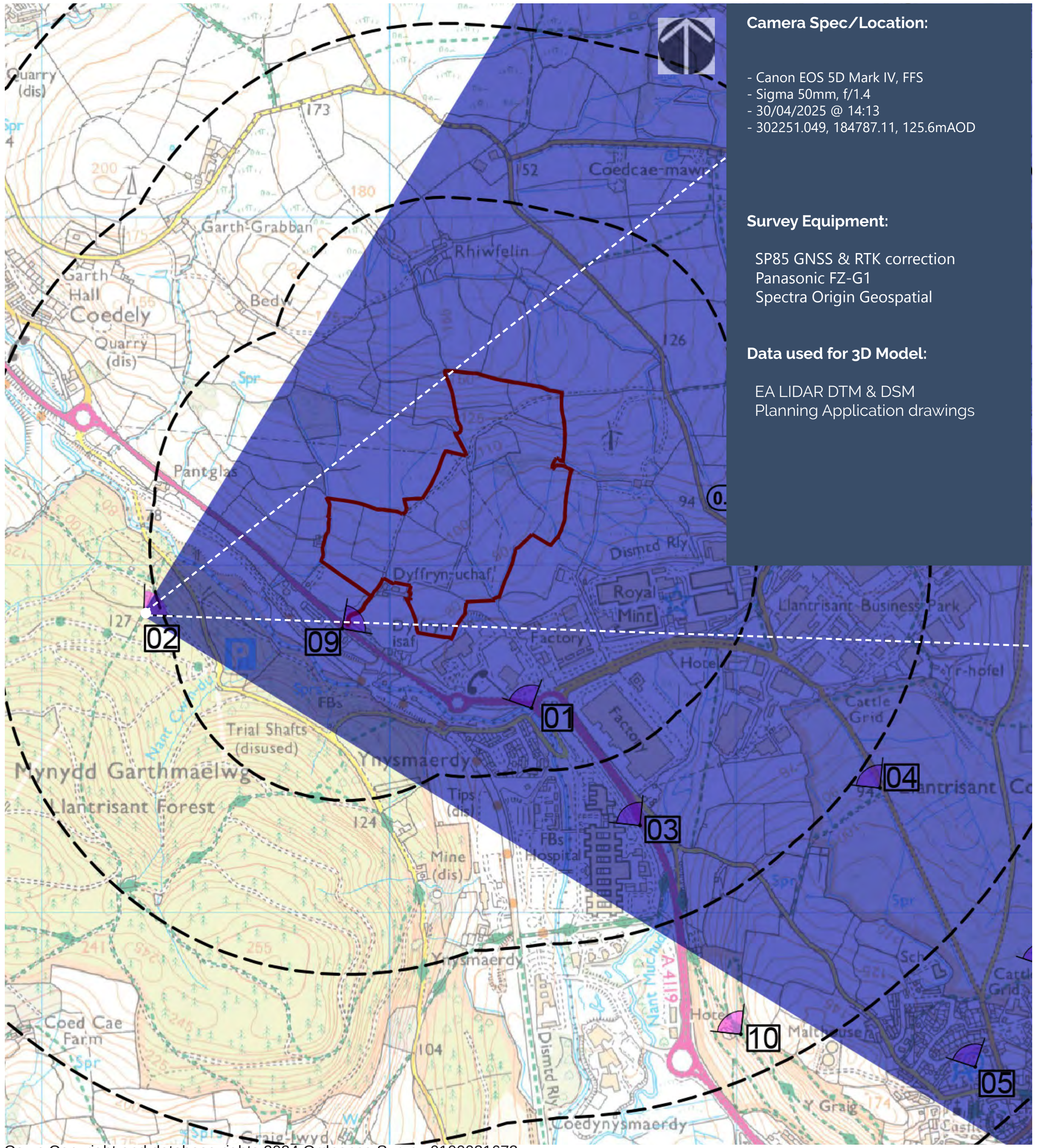
50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Point of Perspective

Viewpoint 1 Single Frame 50mm Reference image

Viewpoint 2

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 30/04/2025 @ 14:13
- 302251.049, 184787.11, 125.6mAOD

Survey Equipment:

SP85 GNSS & RTK correction
Panasonic FZ-G1
Spectra Origin Geospatial

Data used for 3D Model:

EA LIDAR DTM & DSM
Planning Application drawings

Tripod:

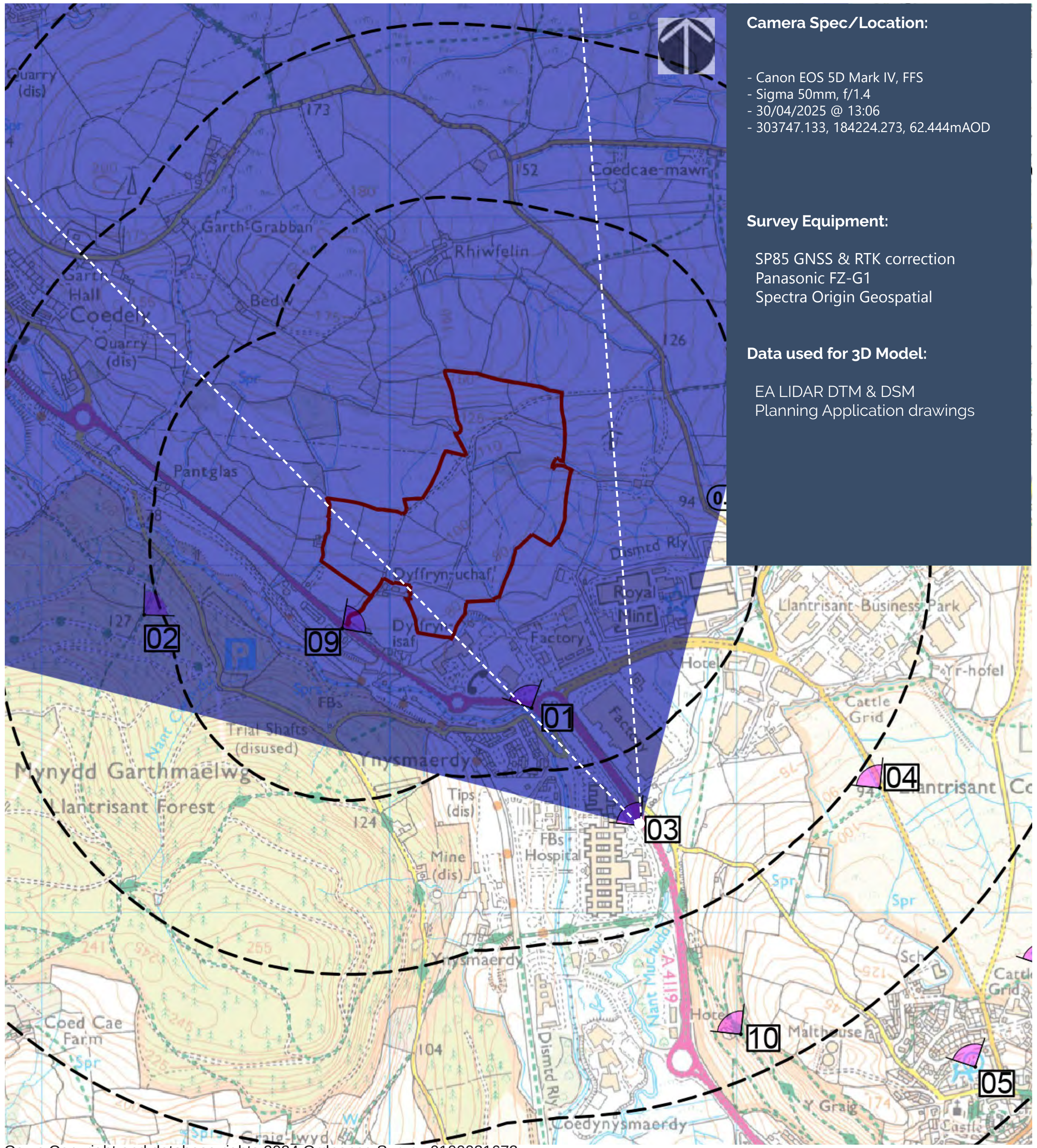
Point of Perspective

Point of Perspective

50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Viewpoint 2 Single Frame 50mm Reference image

Camera Location:



Tripod:

Point of Perspective

Point of Perspective

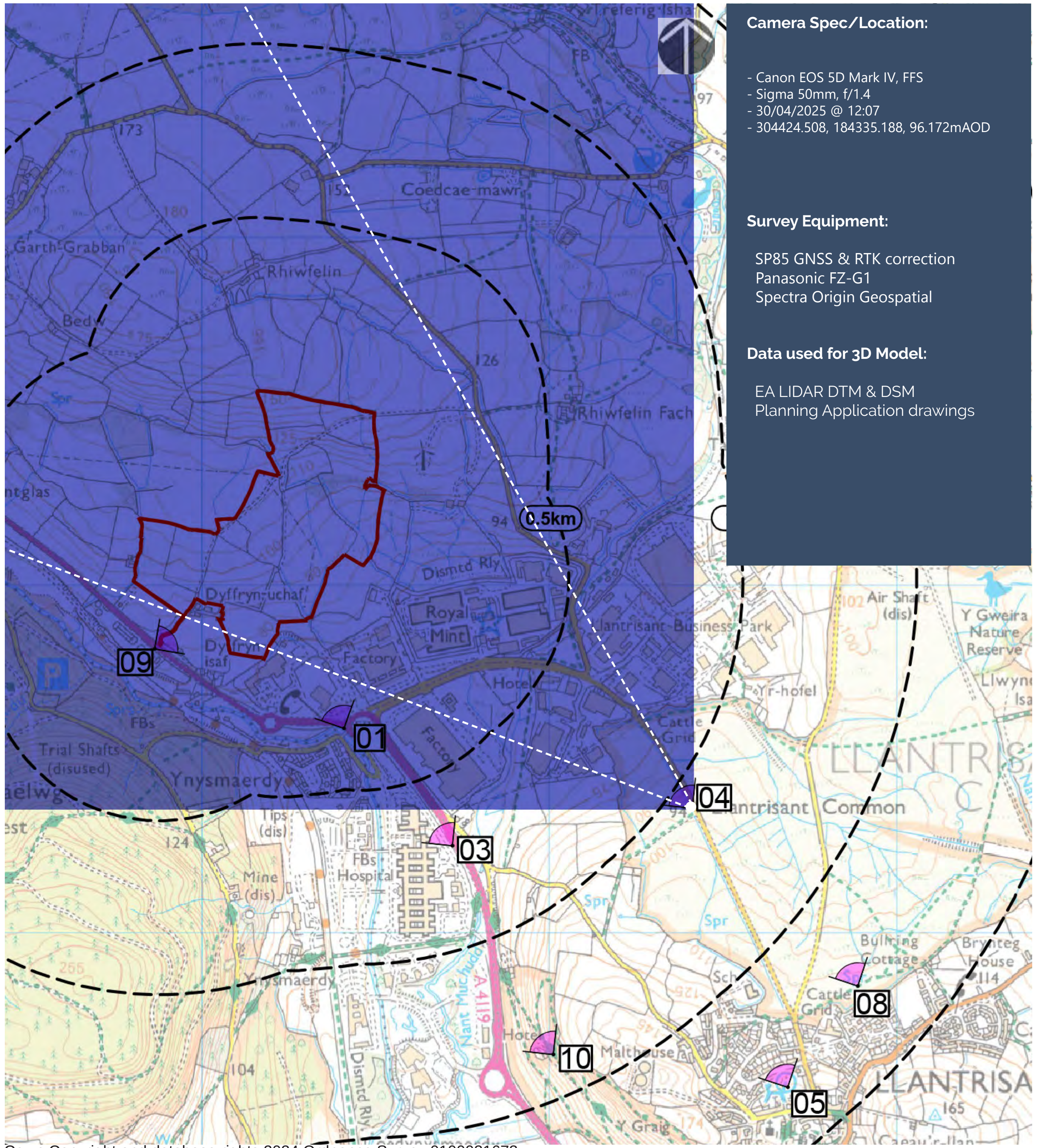
Point of Perspective

50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Point of Perspective

Viewpoint 3 Single Frame 50mm Reference image

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 30/04/2025 @ 12:07
- 304424.508, 184335.188, 96.172mAOD

Survey Equipment:

SP85 GNSS & RTK correction
Panasonic FZ-G1
Spectra Origin Geospatial

Data used for 3D Model:

EA LIDAR DTM & DSM
Planning Application drawings

Tripod:

Point of Perspective

Point of Perspective

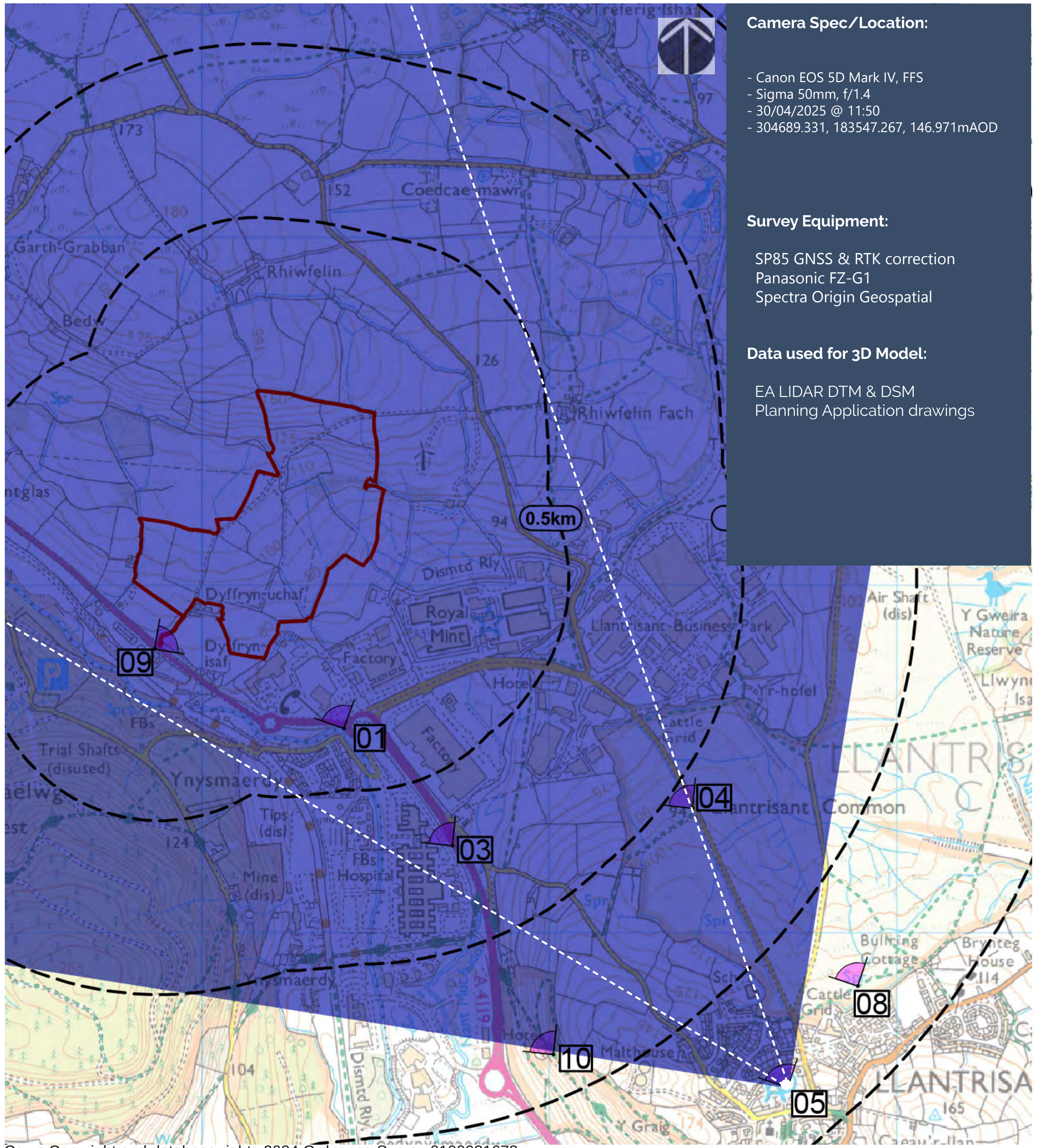
Point of Perspective

Point of Perspective

50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Viewpoint 4 Single Frame 50mm Reference image

Camera Location:



Tripod:

Point of Perspective

Point of Perspective

Point of Perspective

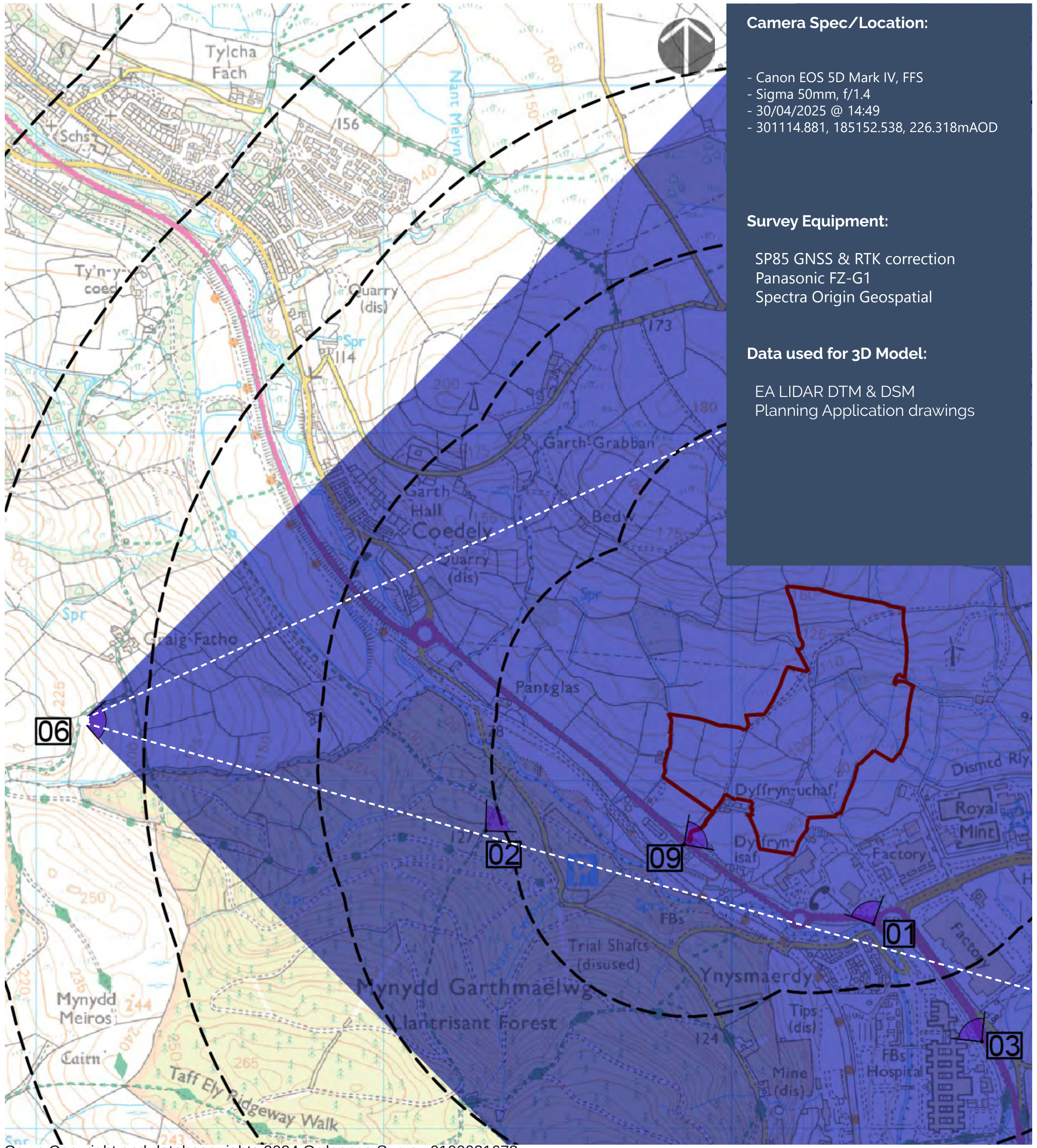
50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Point of Perspective

Viewpoint 5 Single Frame 50mm Reference image

Viewpoint 6

Camera Location:



Tripod:

Point of Perspective

50mm Lens Planar Projection (actual 49.6mm; 39.9 deg HFoV)

Point of Perspective

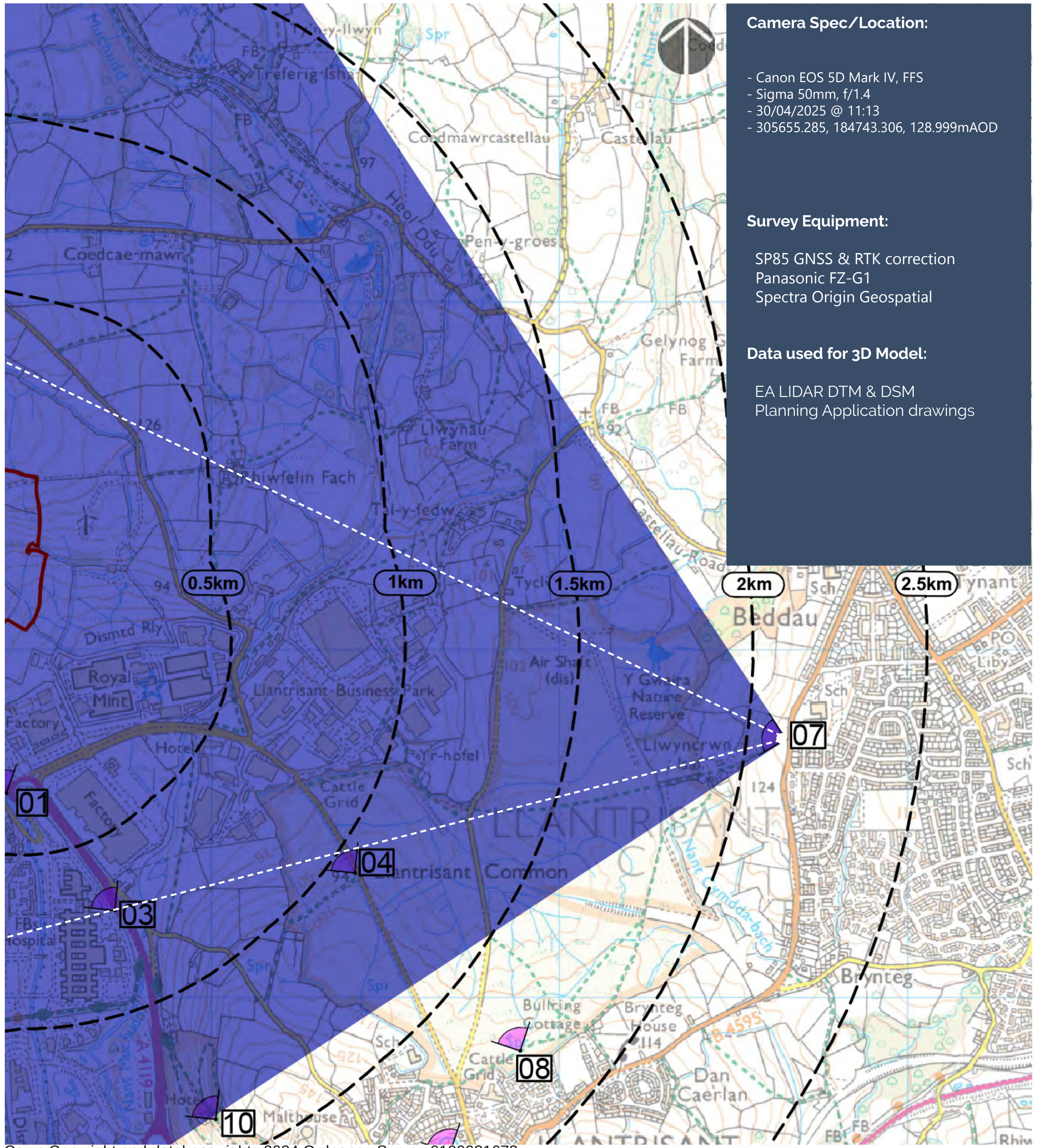
Point of Perspective

Point of Perspective

Viewpoint 6 Single Frame 50mm Reference image

Viewpoint 7

Camera Location:



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Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 30/04/2025 @ 11:13
- 305655.285, 184743.306, 128.999mAOD

Survey Equipment:

SP85 GNSS & RTK correction
Panasonic FZ-G1
Spectra Origin Geospatial

Data used for 3D Model:

EA LIDAR DTM & DSM
Planning Application drawings

Tripod: