

Cottam Solar Project

Environmental Statement Appendix 8.1.5: Photography and Photomontage Methodology Part 1 of 5

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Introduction

A photography and visualisation team was pulled together of leading photography and visualisation specialists from across the UK. Co-ordinated by Lanpro and led by Mike Spence of MSE. Mike brings over 30 years photography and visualisation experience, working on a wide range of complex infrastructure projects, from major Highways schemes, to Carbon Capture, the power station development, tall buildings and solar projects across the UK.

Mike was a key technical author of the Landscape Institute's TGN 06/19 on visualisation of development proposals. He has worked alongside The National Trust, Historic England, English Heritage, RBG Kew, Historic Royal Palaces as well as NatureScot (formerly Scottish Natural Heritage) for whom he is currently working on updates to their windfarm visualisation guidance.

In 2021 Lanpro discussed the scope of the work with Mike Spence to develop a consistent strategy for technical photography and generation of highly accurate visualisations for major solar panel infrastructure. Initial work involved the calculation of the visibility of the solar panels, which were used to identify and agree viewpoints. In the winter of 2022 an initial 67 viewpoints were identified. Winter time photographs were taken between 20 March and 3 April 2022.

Summer photographs were taken from the same locations between 8 July and 13 July 2022. An additional 23 viewpoints were added to the list for which only summer time photography was captured (Viewpoints 68 -90, LCC-C-A to W)

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 a total of 90 viewpoints were identified providing views of the development and visited for summer and winter photography in 2022.



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. Two sets of equipment were used. The equipment was identical.



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 visualisations 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 SP80 & SP85 GNSS smart antennae with Panasonic Toughpad data recorder. Points were saved using DigiTerra software. Photographs of the camera/tripod location was taken.



3D Modelling

MSEnvironmental (MSE) constructed a 3D model using the layout data supplied by Lanpro, OS MasterMap for geo-referencing and Environment Agency LIDAR DTM (2m). 3D point data was used for checking horizontal and vertical alignment.

For all viewpoints a 360 degree view was generated to capture the full extents of the development. This ensured that the full development would be present in the visualisations.

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

Target points were taken from the existing features in the view and built into the 3D model. This allowed the horizontal and vertical alignment of the photograph and 3D model to be checked, cross-referenced and verified.

Cylindrical renders generated using V-Ray 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 Winter View



Existing Summer View



3D Model View (Infrastructure)



AVR 3 Photomontage View (Year 1)



AVR3 Photomontage View (Year 15)



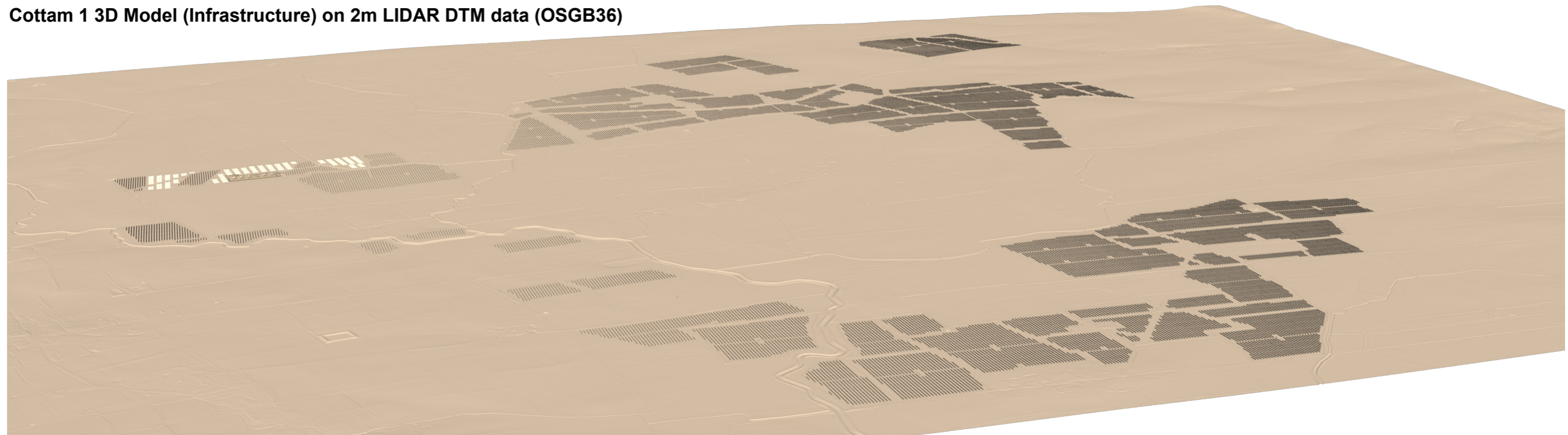
The topography of the site has been generated from Environment Agency LIDAR 2m DTM data, with triangulated surfaces generated using Rhinoterrain.

The model is fully geo-referenced and positioned to correspond with the site layout and elevations supplied in the engineering layouts. Landscaping has been added at two stages: Year 1 & 15. Heights have been specified by Landscape Architects at Lanpro.

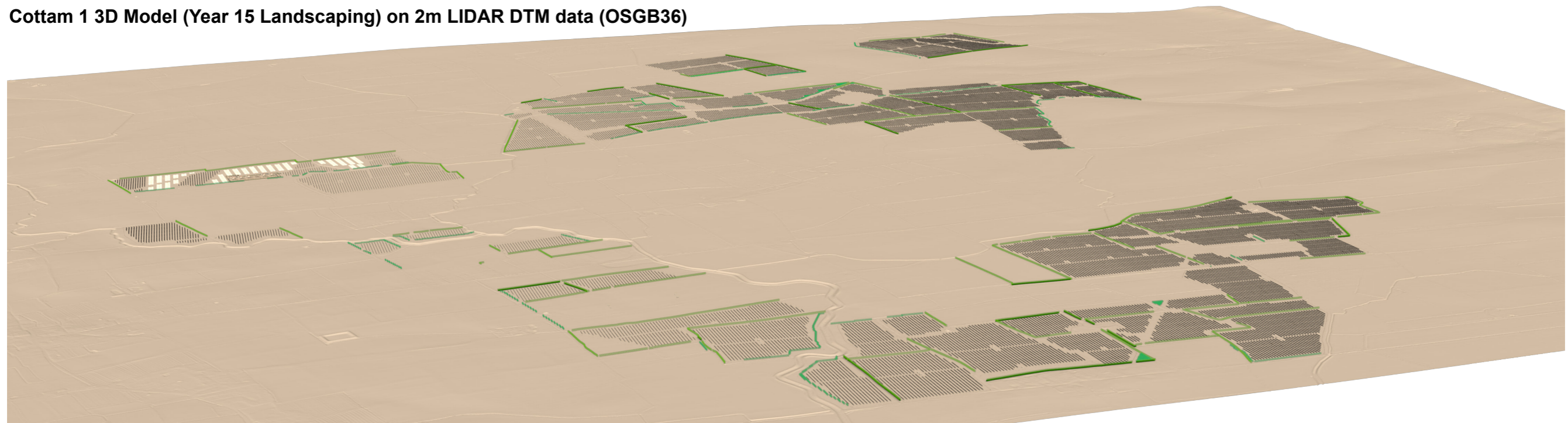
The resultant visualisations are considered to fairly demonstrate the correct scale and massing of the development.

Cameras have been added to the model and the field of view rendered out to precisely match the full 360 degree panoramic cylindrical images using highly precise camera co-ordinates.

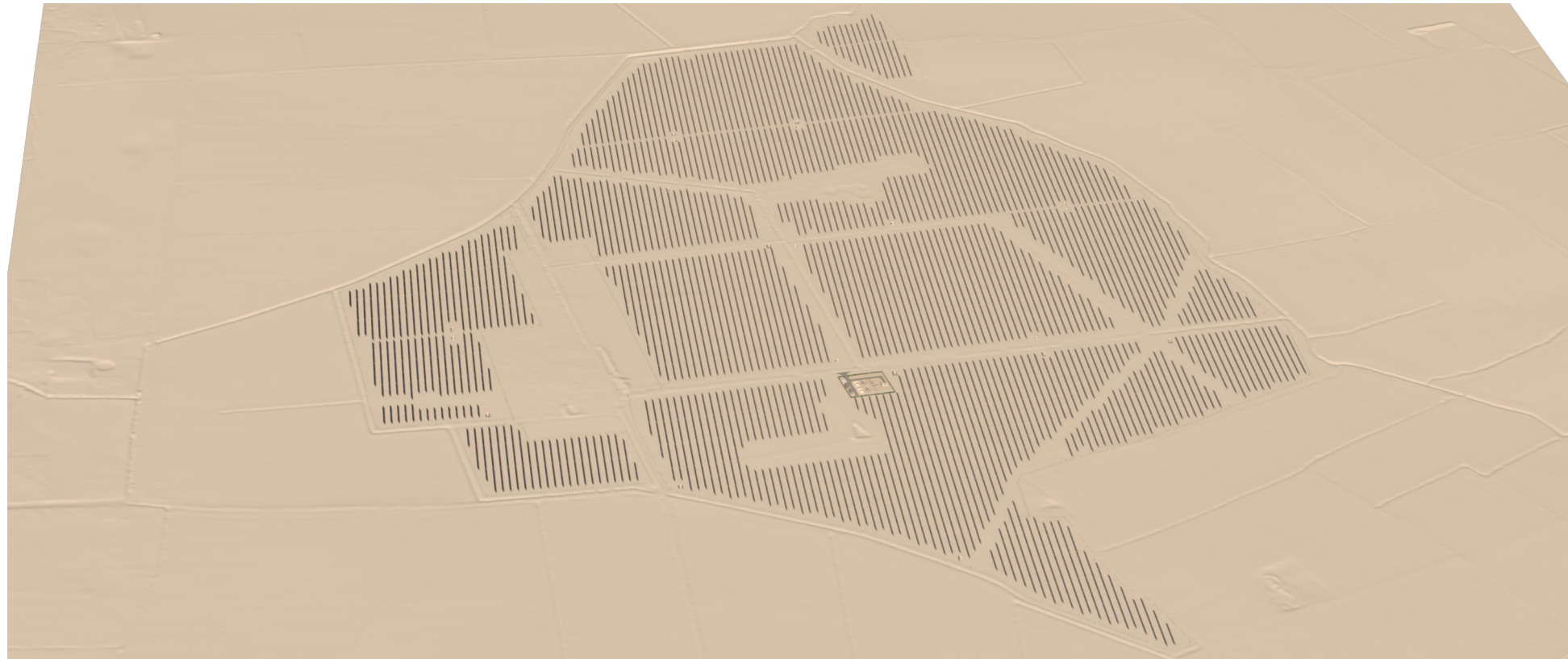
Cottam 1 3D Model (Infrastructure) on 2m LIDAR DTM data (OSGB36)



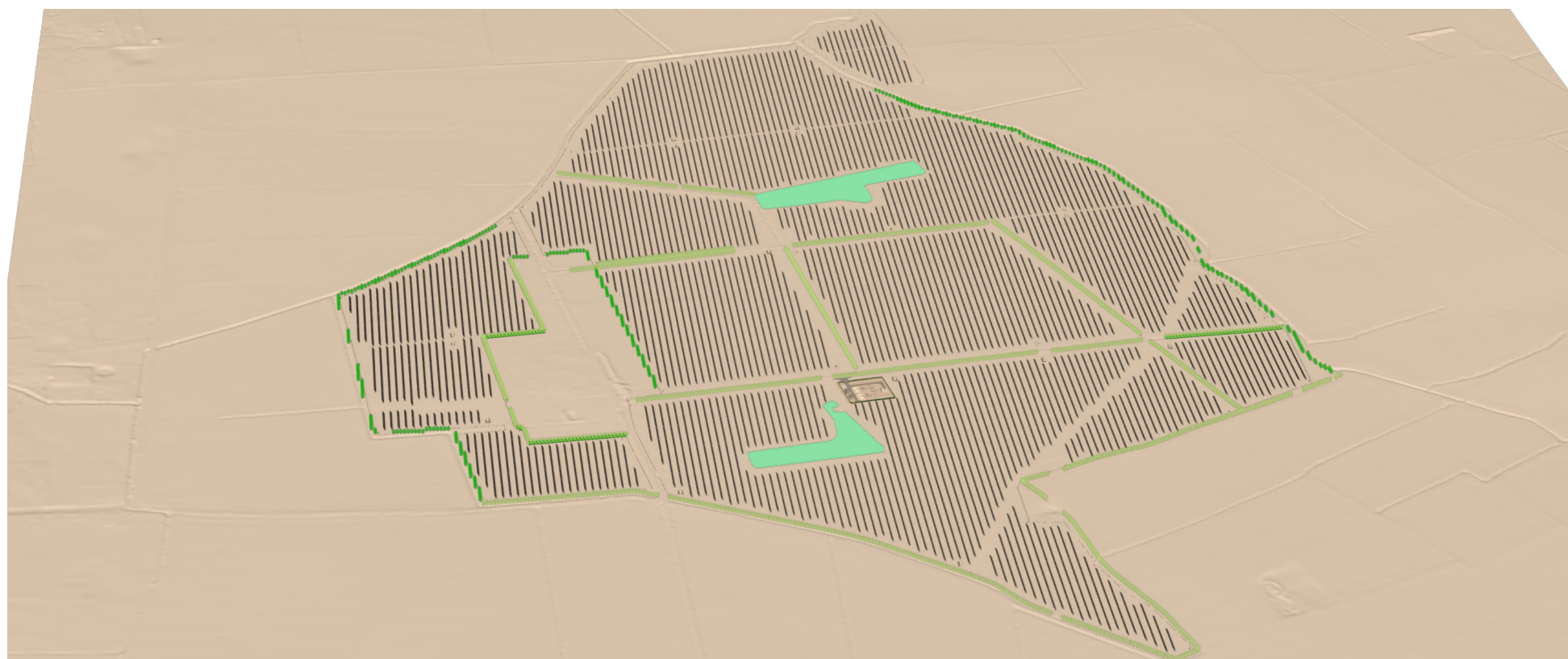
Cottam 1 3D Model (Year 15 Landscaping) on 2m LIDAR DTM data (OSGB36)



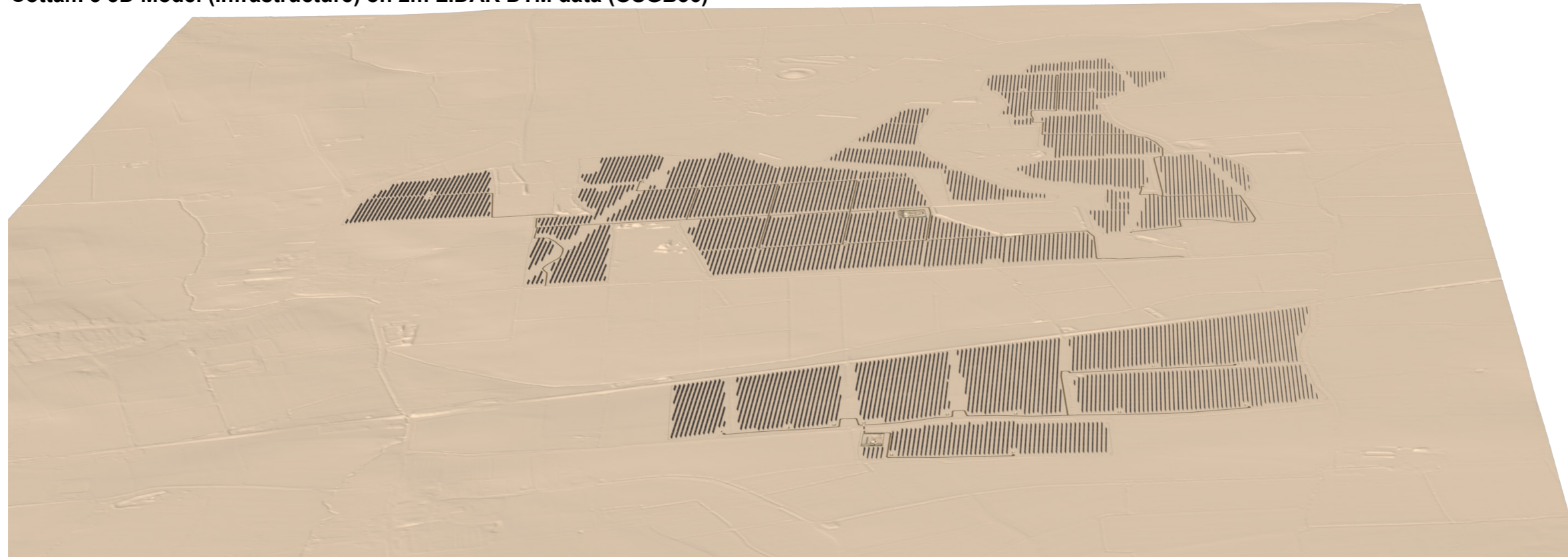
Cottam 2 3D Model (Infrastructure) on 2m LIDAR DTM data (OSGB36)



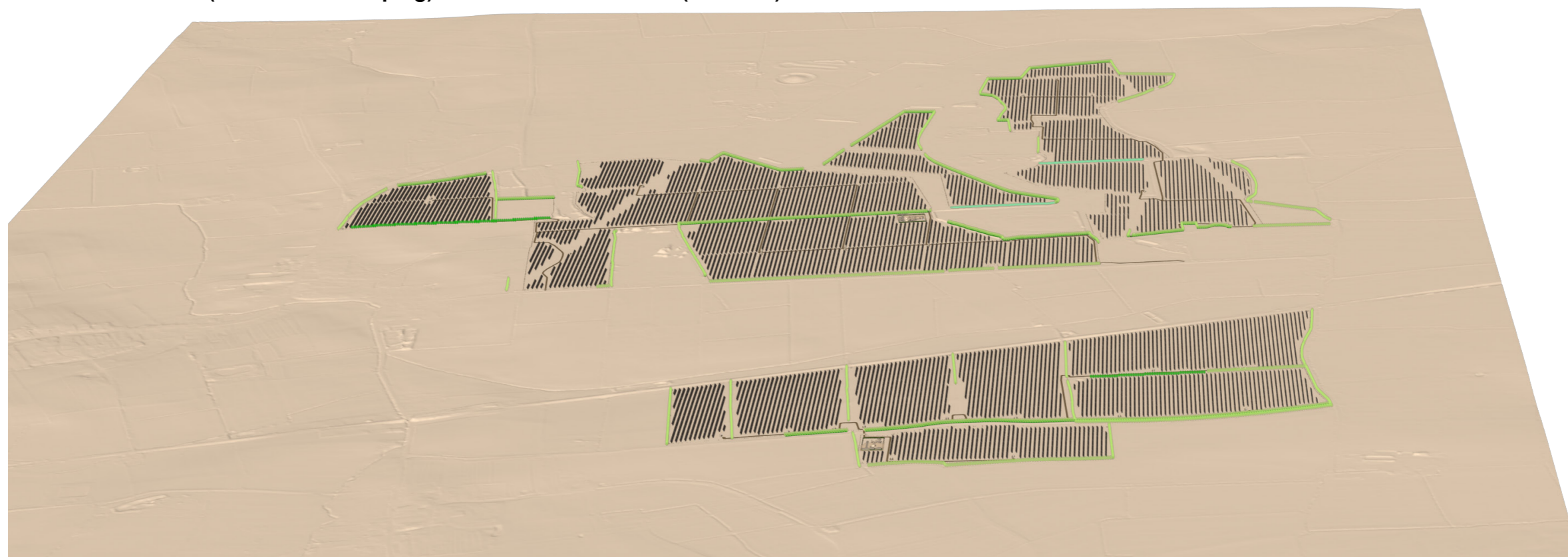
Cottam 2 3D Model (Year 15 Landscaping) on 2m LIDAR DTM data (OSGB36)



Cottam 3 3D Model (Infrastructure) on 2m LIDAR DTM data (OSGB36)



Cottam 3 3D Model (Year 15 Landscaping) on 2m LIDAR DTM data (OSGB36)



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 such as this solar farm, it is rarely possible to fit the development on a single frame image. The alternative is to use a series of overlapping 50mm images and generate a 'cylindrical' perspective view. This can be a full 360 degree wide panorama.

The 3D model renders have been rendered out in cylindrical (multiple frame images) projection to allow the precise image re-mapping to match the photography.

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 at A1 wide x A4 high (841 x 297mm) and in this technical methodology document at A3 (420mm x 297mm), to fully show the original photographic imagery and 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 AVR 3 (photorealistic) and for some views AVR1 (simple dashed line identifying extents).

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 supplied by the engineers and a comprehensive landscaping scheme supplied by Lanpro. An additional check on the vertical scaling has been undertaken using RESOFT Windfarm.

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.

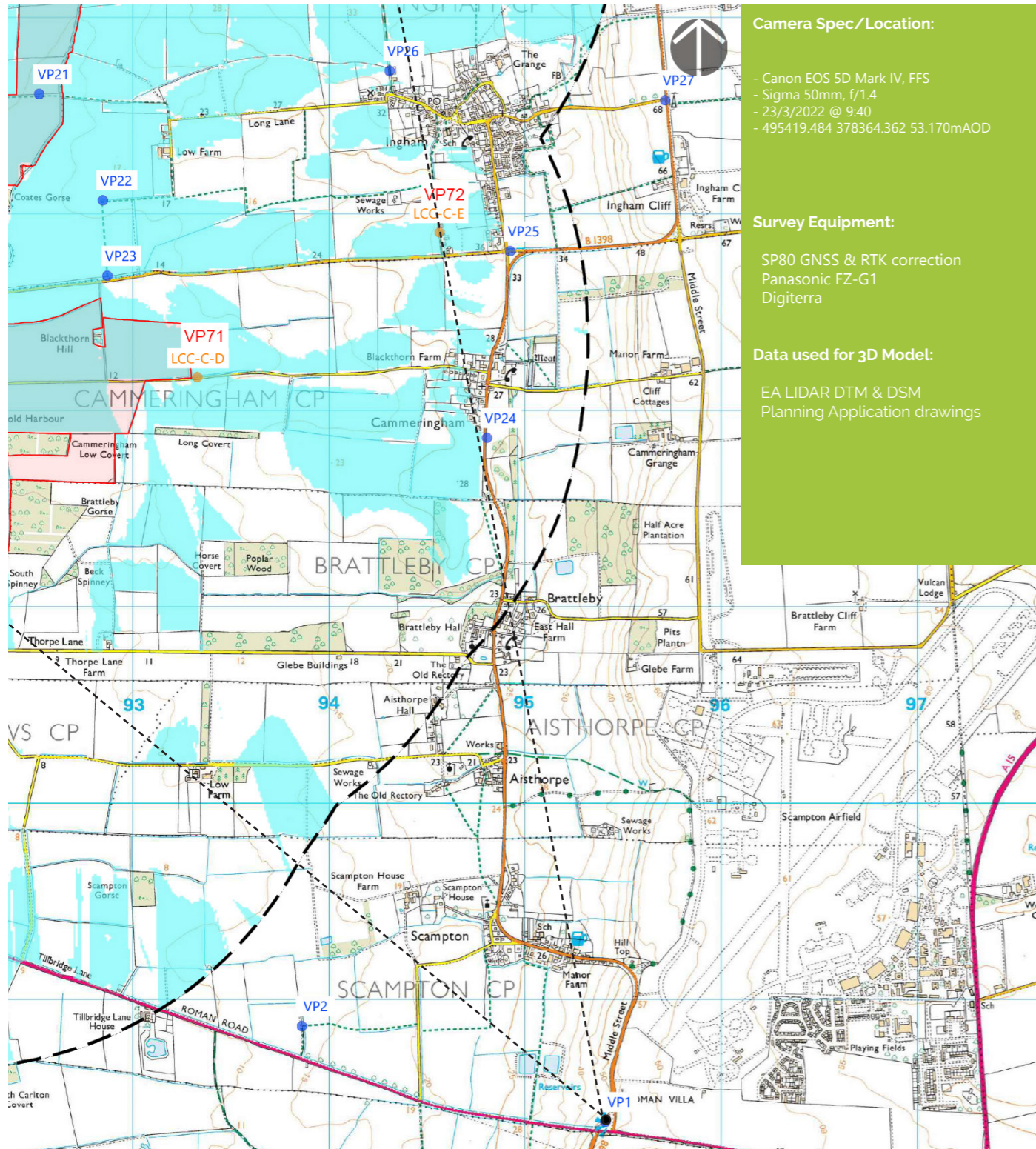


APPENDIX 1.1: VIEWPOINT SEQUENCES



Viewpoint 1 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 23/3/2022 @ 9:40
- 495419.484 378364.362 53.170m AOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

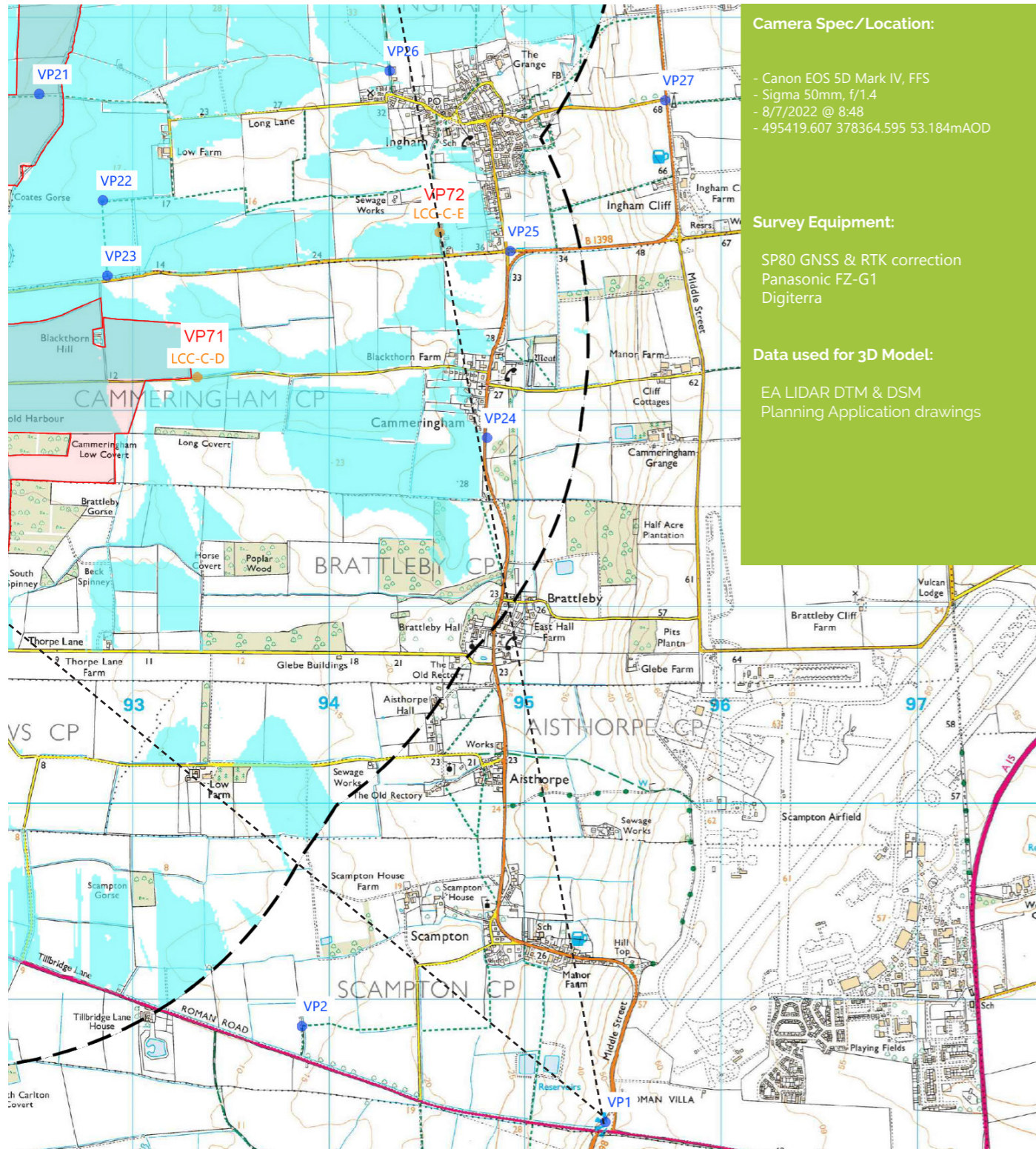
Point of Perspective

Point of Perspective

Viewpoint 1 Single Frame 50mm image (Winter)

Viewpoint 1 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 8/7/2022 @ 8:48
- 495419.607 378364.595 53.184mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

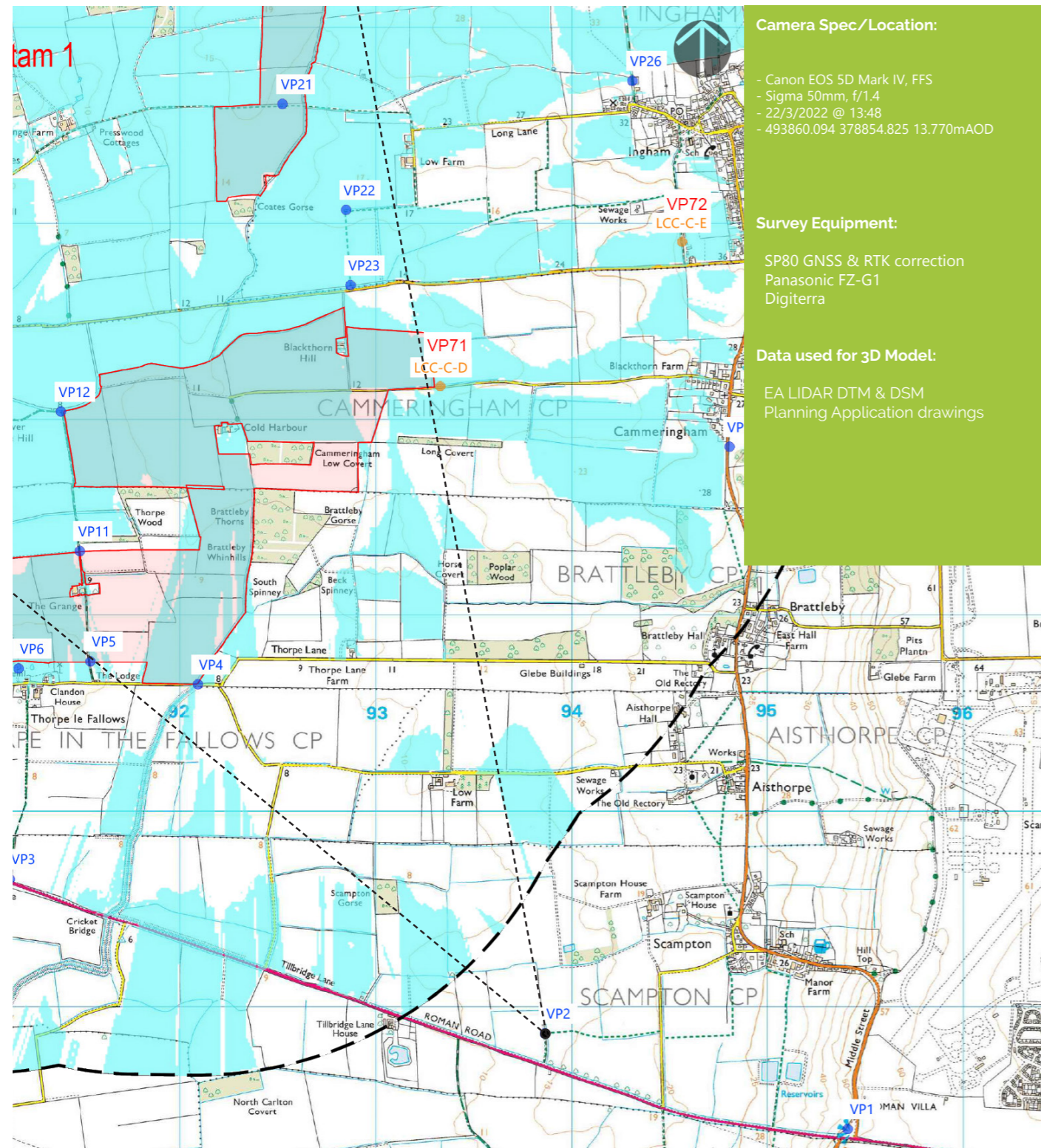
Point of Perspective

Point of Perspective

Viewpoint 1 Single Frame 50mm image (Summer)

Viewpoint 2 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

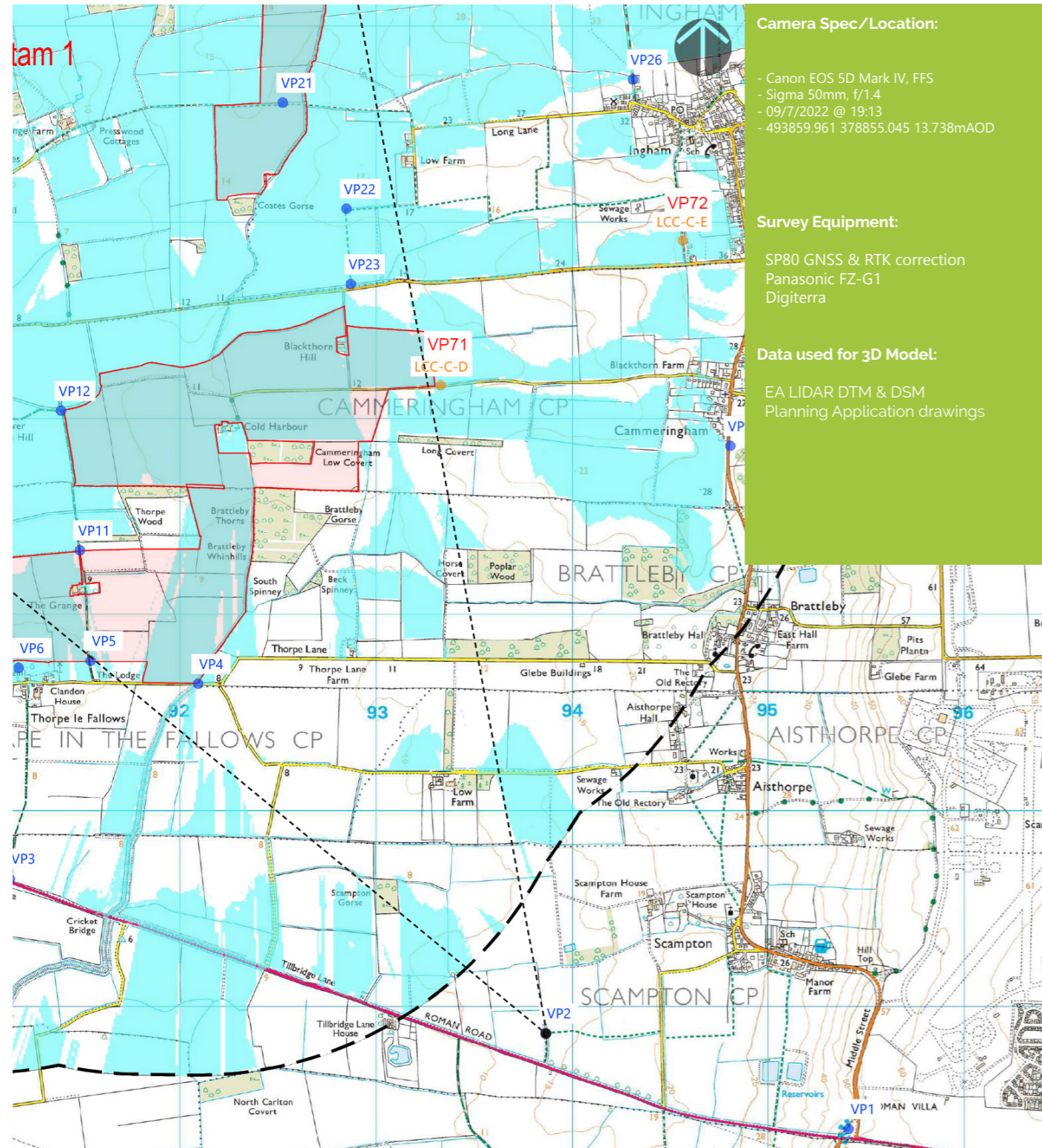
Point of Perspective

Point of Perspective

Viewpoint 2 Single Frame 50mm image (Winter)

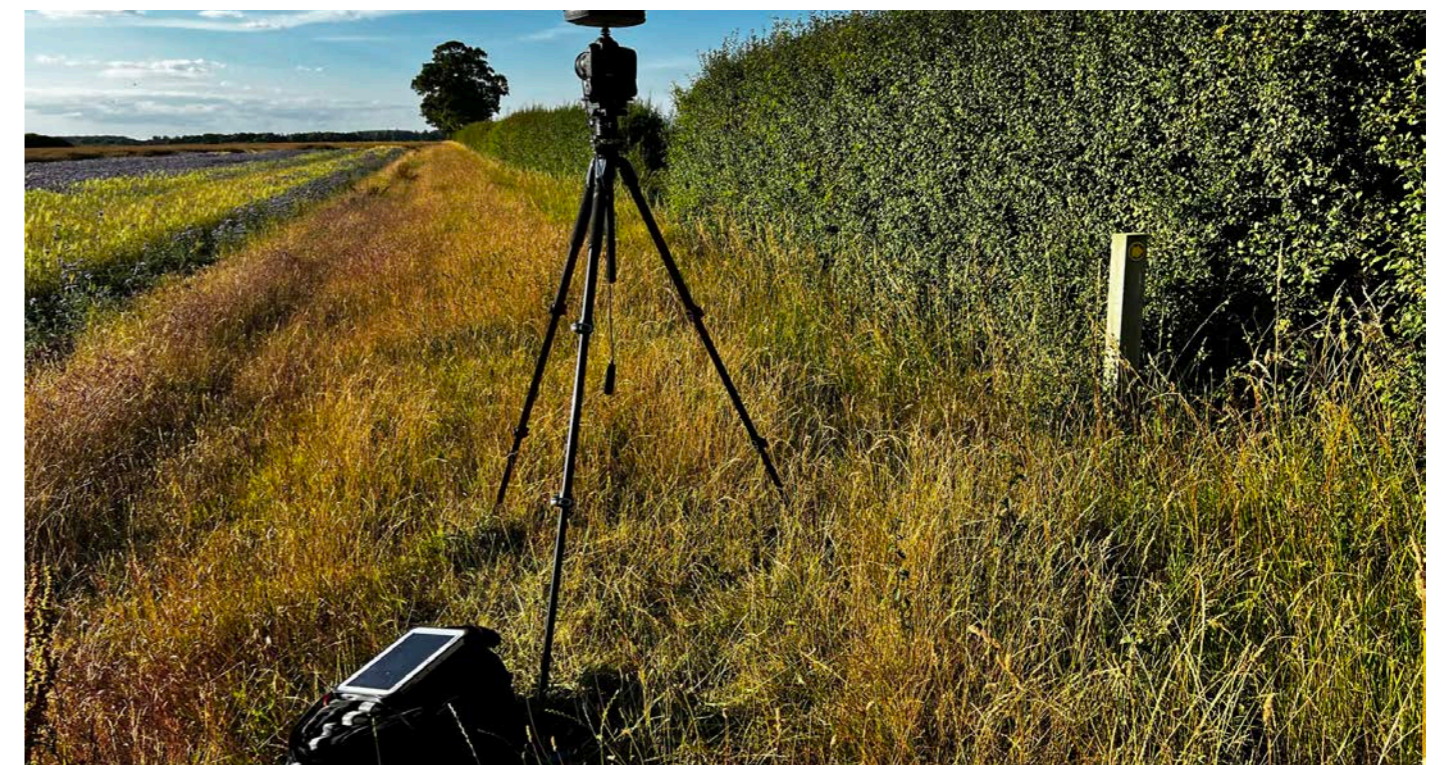
Viewpoint 2 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

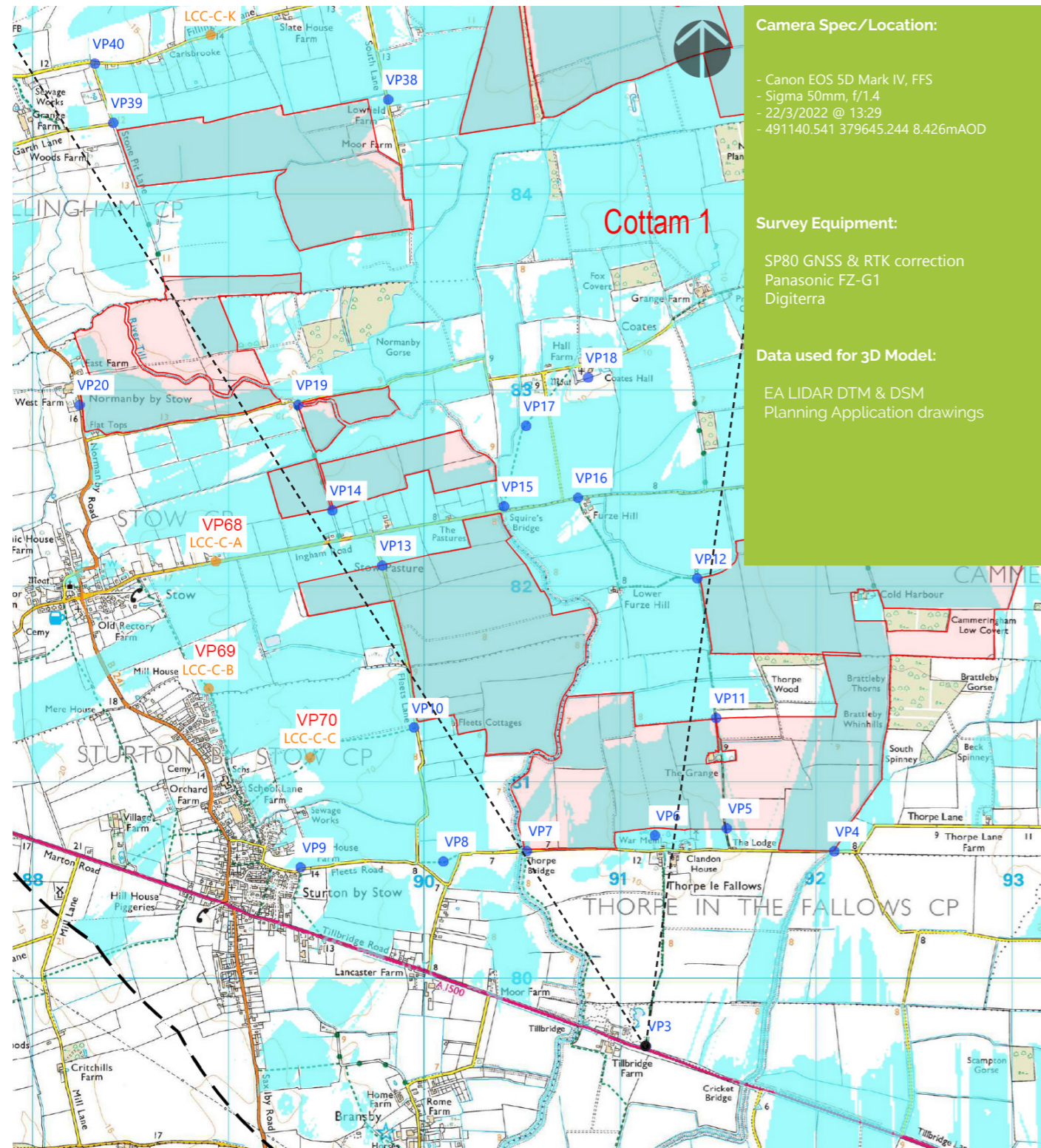
Point of Perspective

Point of Perspective

Viewpoint 2 Single Frame 50mm image (Summer)

Viewpoint 3 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 13:29
- 491140.541 379645.244 8.426mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

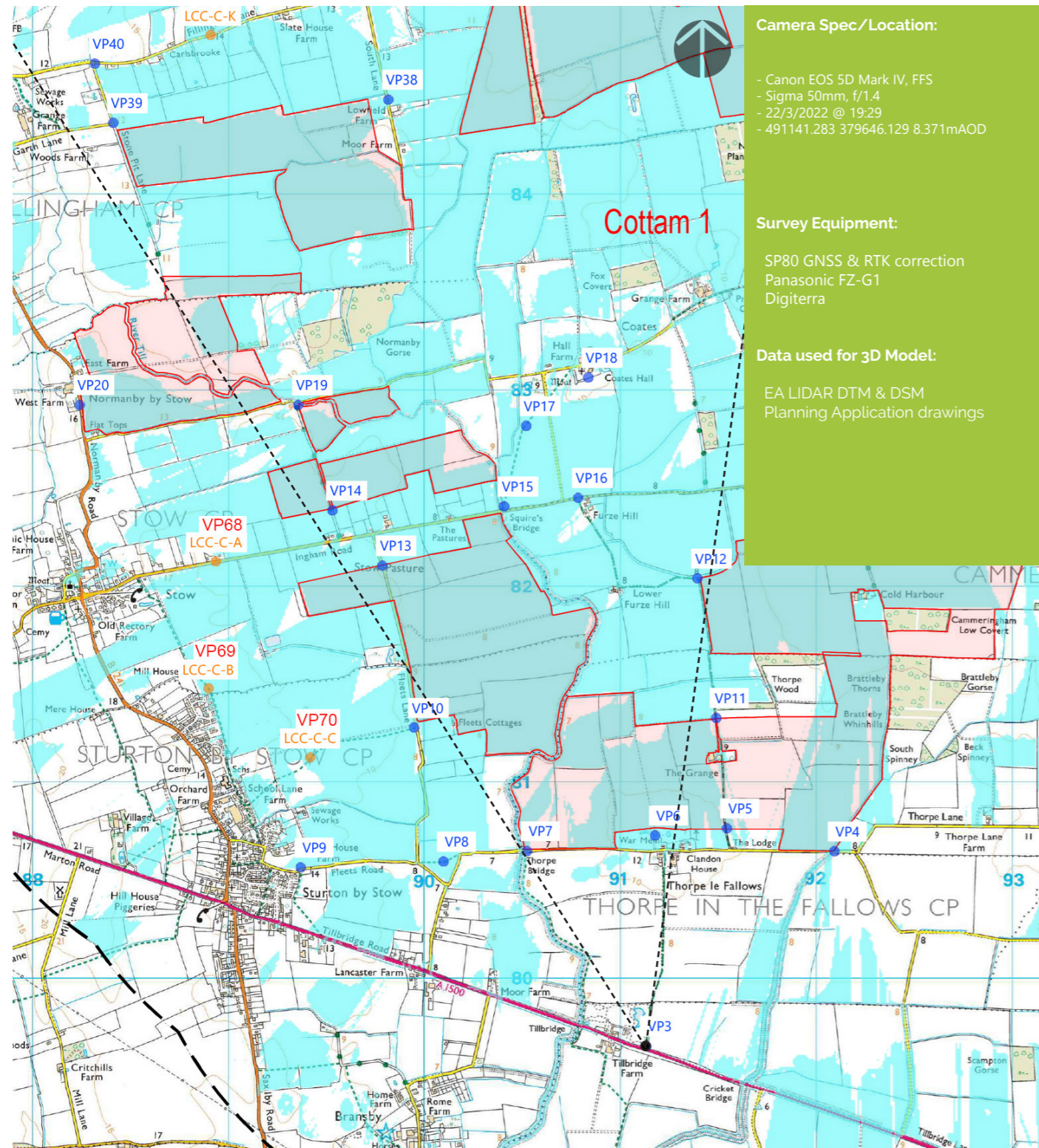
Point of Perspective

Point of Perspective

Viewpoint 3 Single Frame 50mm image (Winter)

Viewpoint 3 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

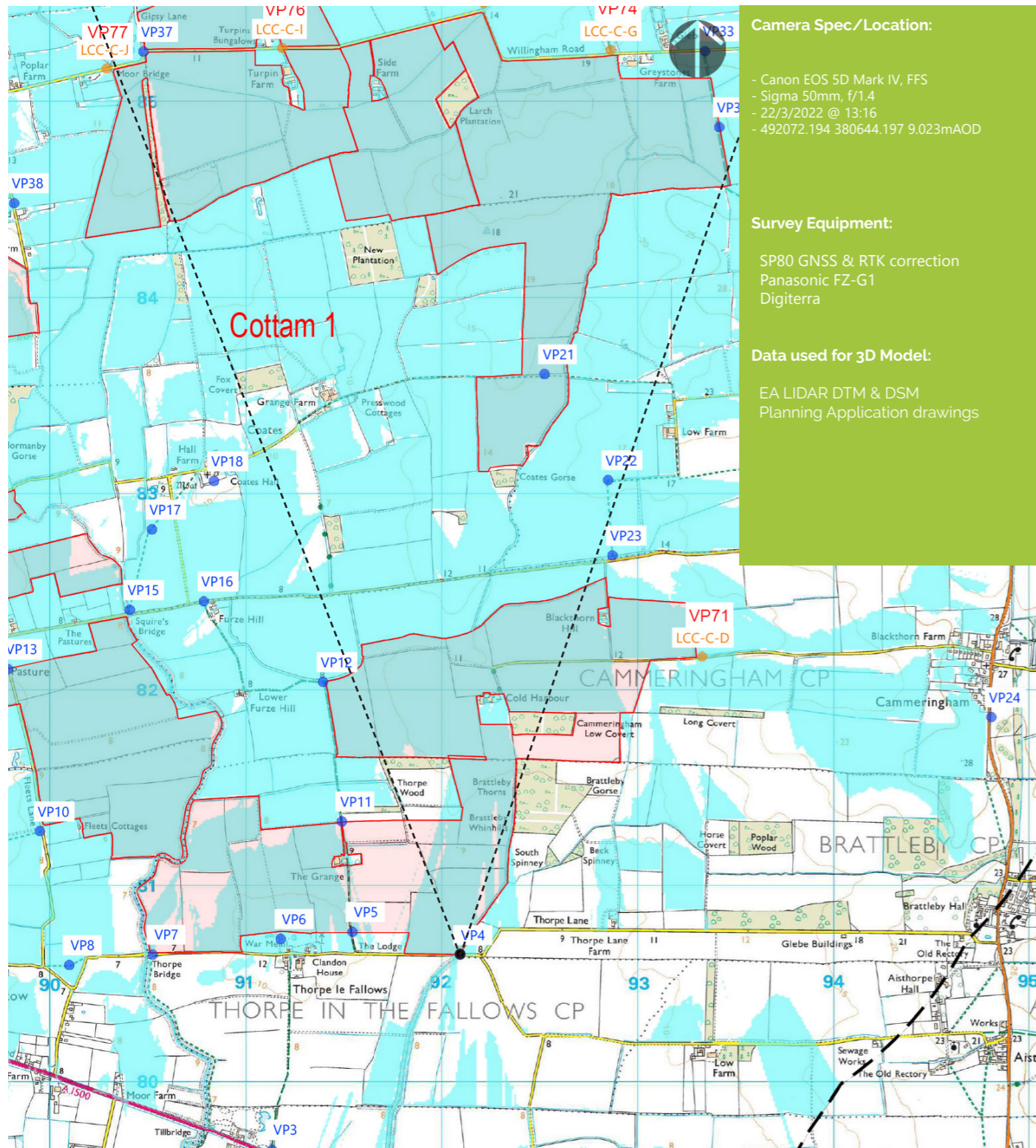
Point of Perspective

Point of Perspective

Viewpoint 3 Single Frame 50mm image (Summer)

Viewpoint 4 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 13:16
- 492072.194 380644.197 9.023mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

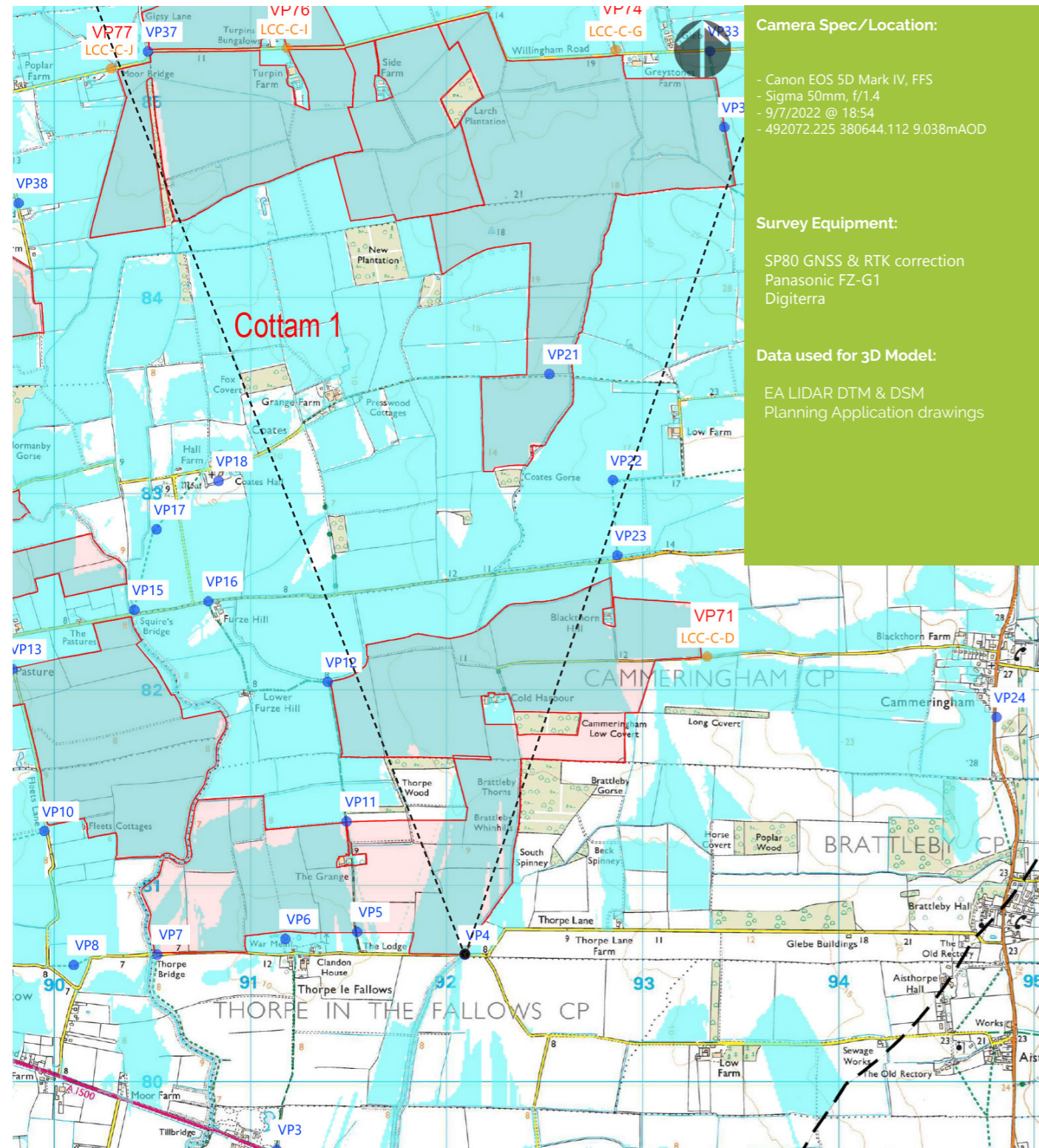
Point of Perspective

Point of Perspective

Viewpoint 4 Single Frame 50mm image (Winter)

Viewpoint 4 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 9/7/2022 @ 18:54
- 492072.225 380644.112 9.038mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

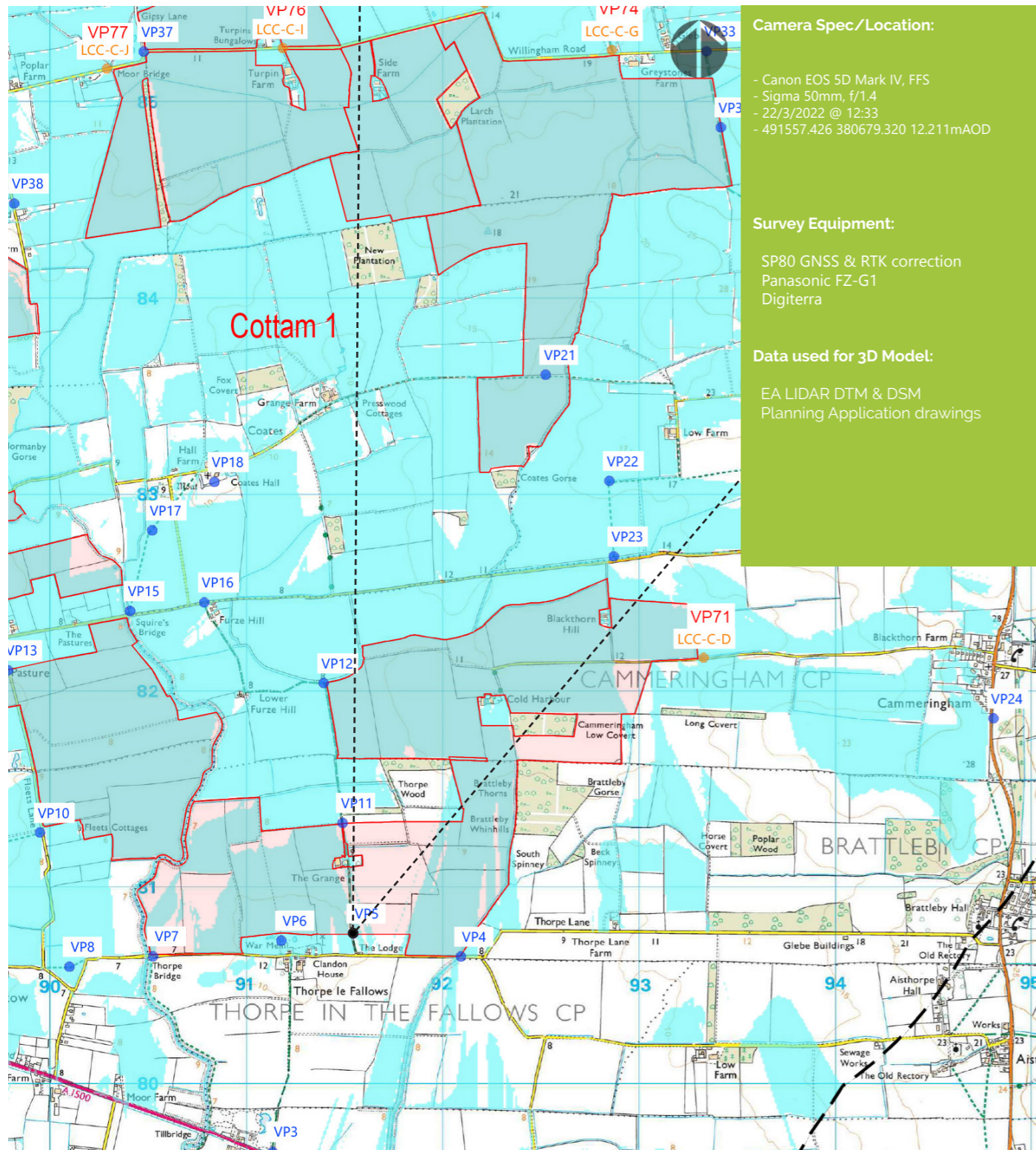
Point of Perspective

Point of Perspective

Viewpoint 4 Single Frame 50mm image (Summer)

Viewpoint 5 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 12:33
- 491557.426 380679.320 12.211mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

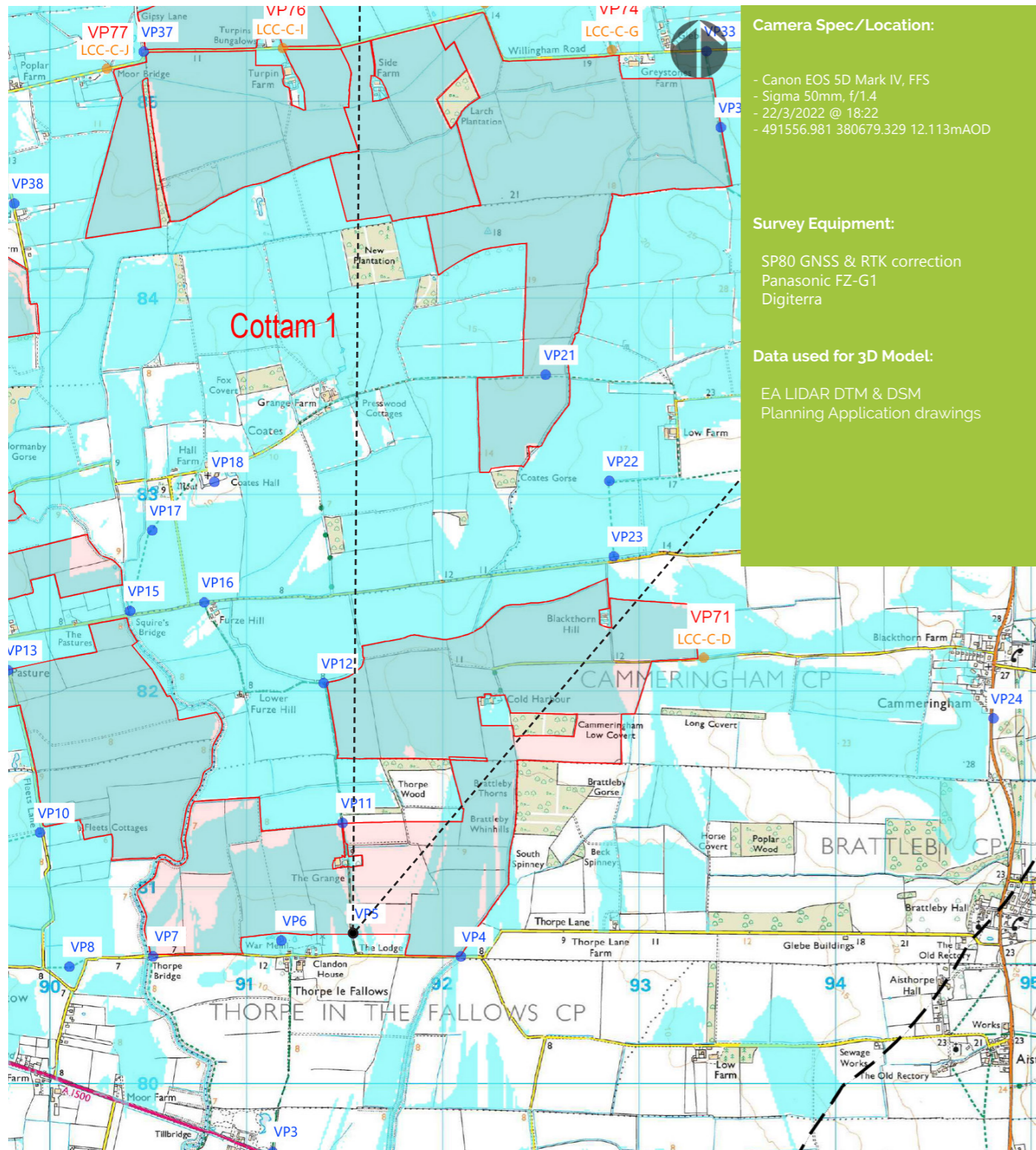
Point of Perspective

Point of Perspective

Viewpoint 5 Single Frame 50mm image (Winter)

Viewpoint 5 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 18:22
- 491556.981 380679.329 12.113mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

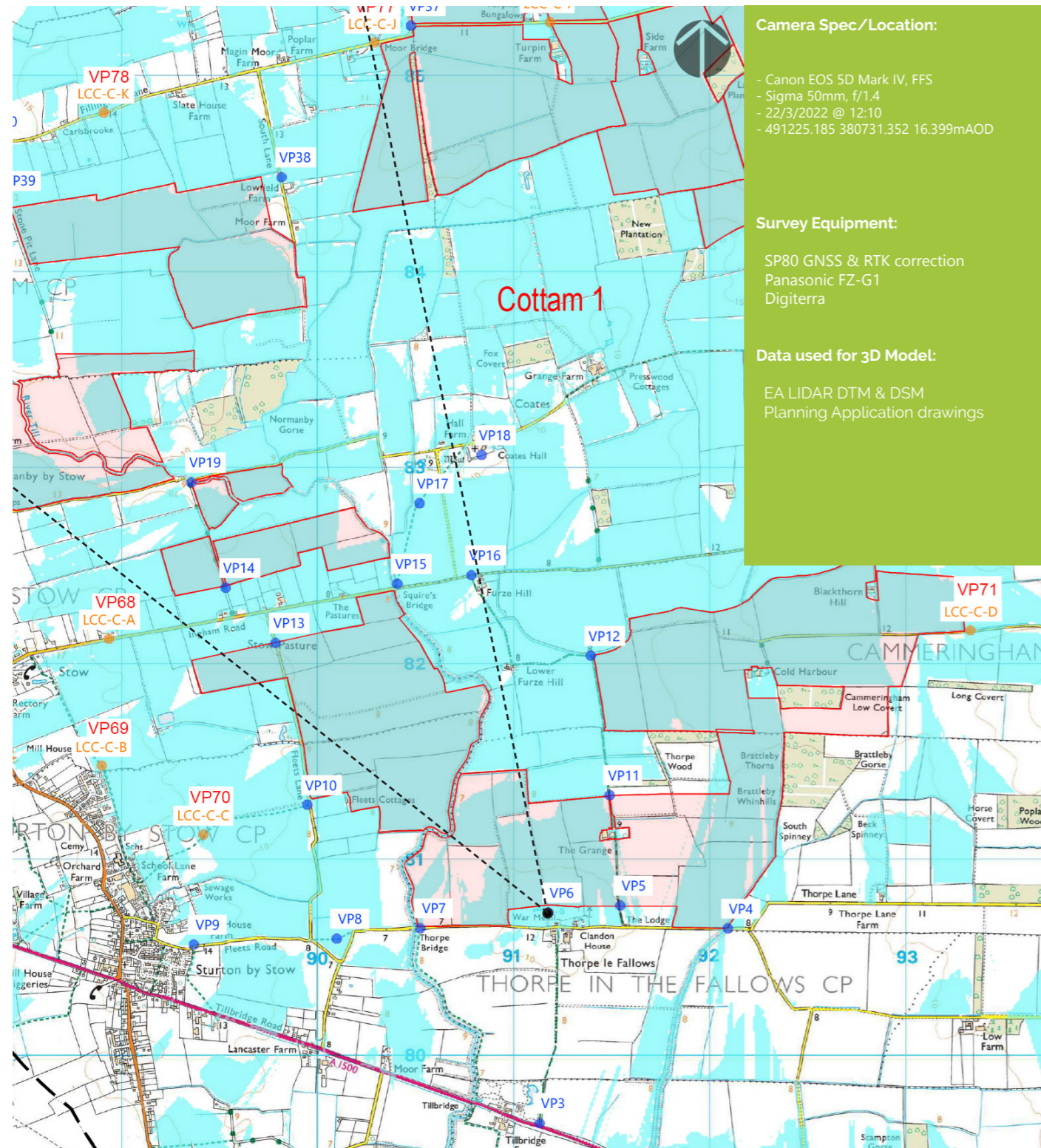
Point of Perspective

Point of Perspective

Viewpoint 5 Single Frame 50mm image (Summer)

Viewpoint 6 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 12:10
- 491225.185 380731.352 16.399m AOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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- Planning Application drawings

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Tripod:



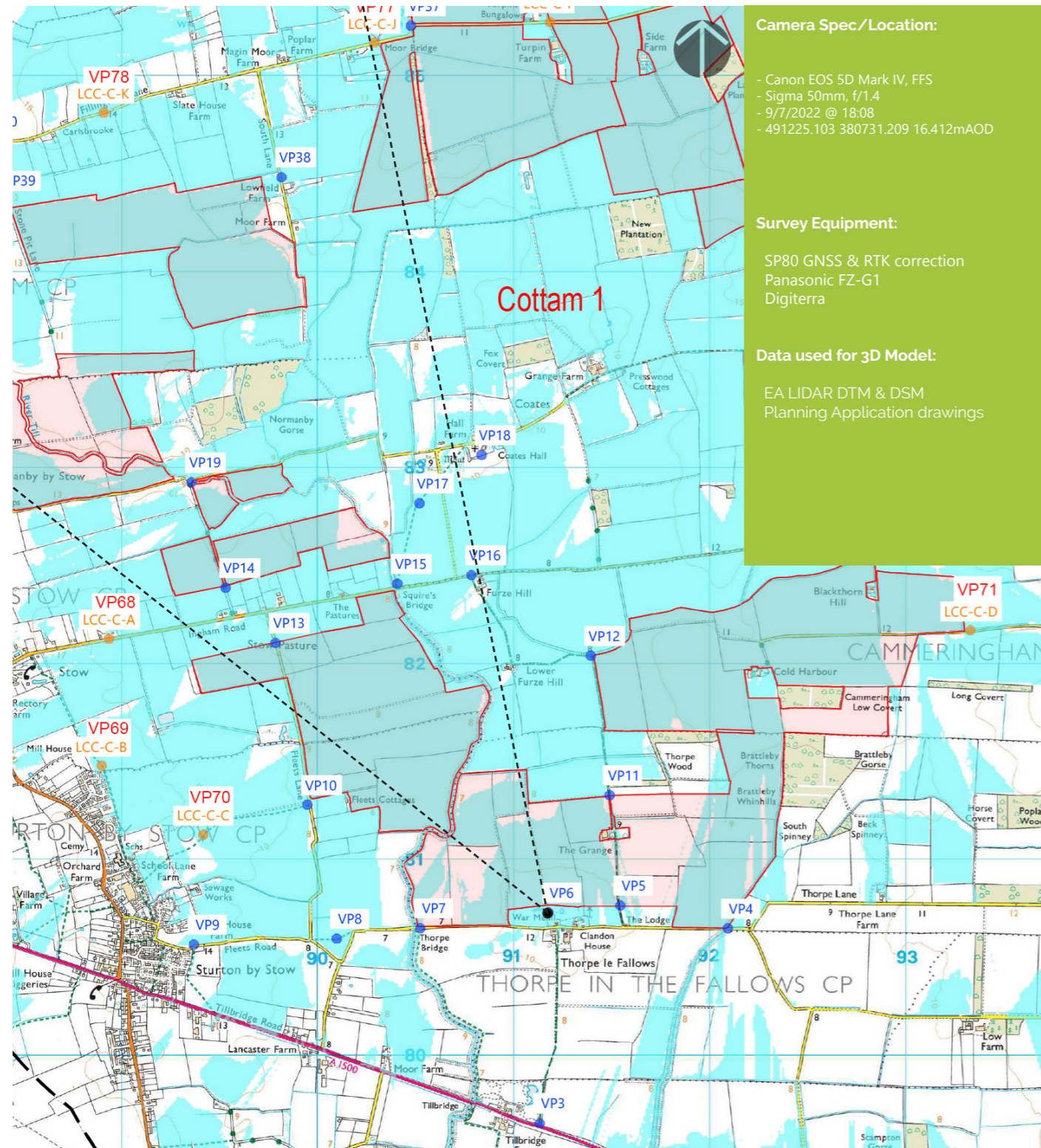
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 6 Single Frame 50mm image (Winter)

Viewpoint 6 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

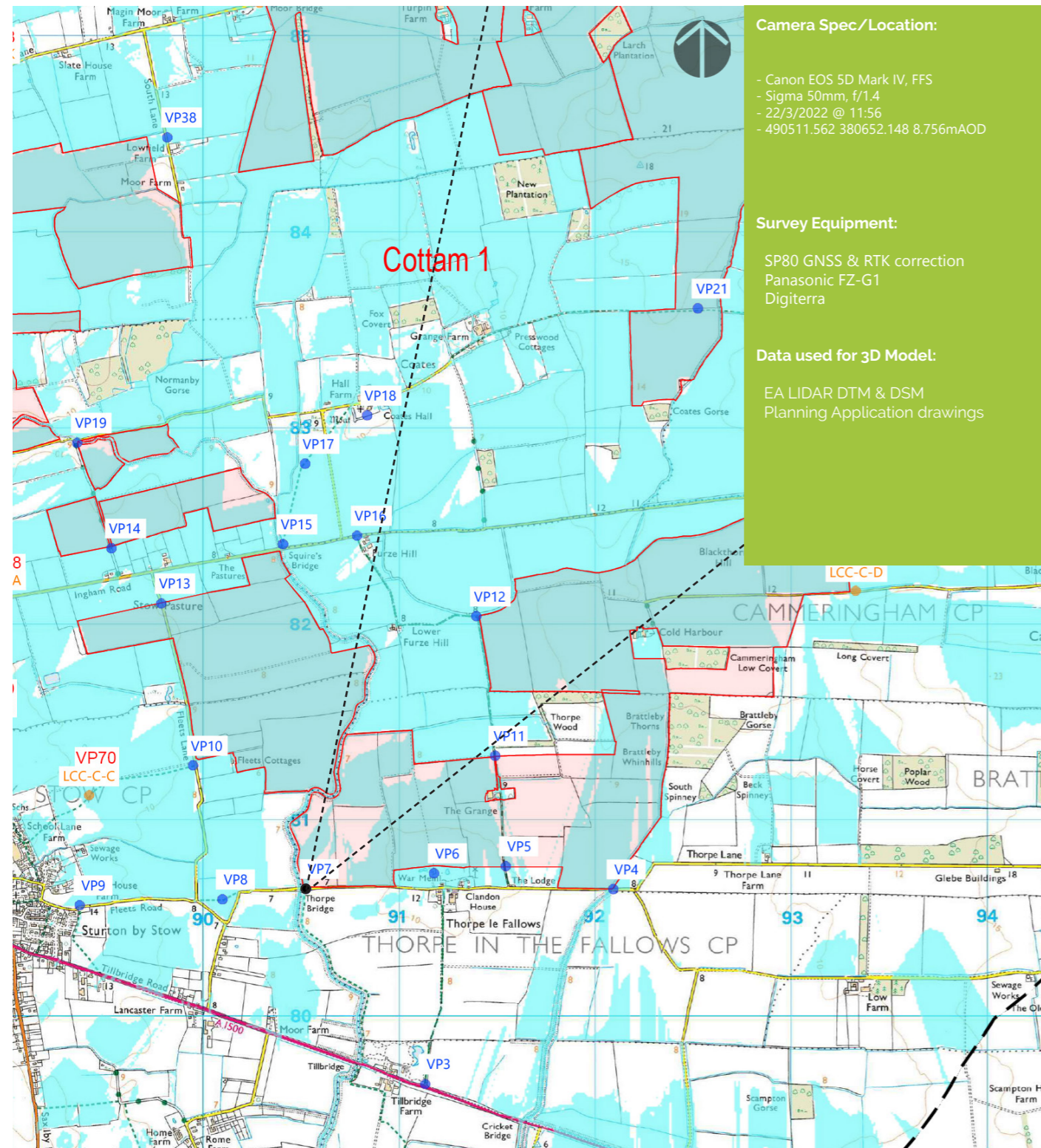
Point of Perspective

Point of Perspective

Viewpoint 6 Single Frame 50mm image (Summer)

Viewpoint 7 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

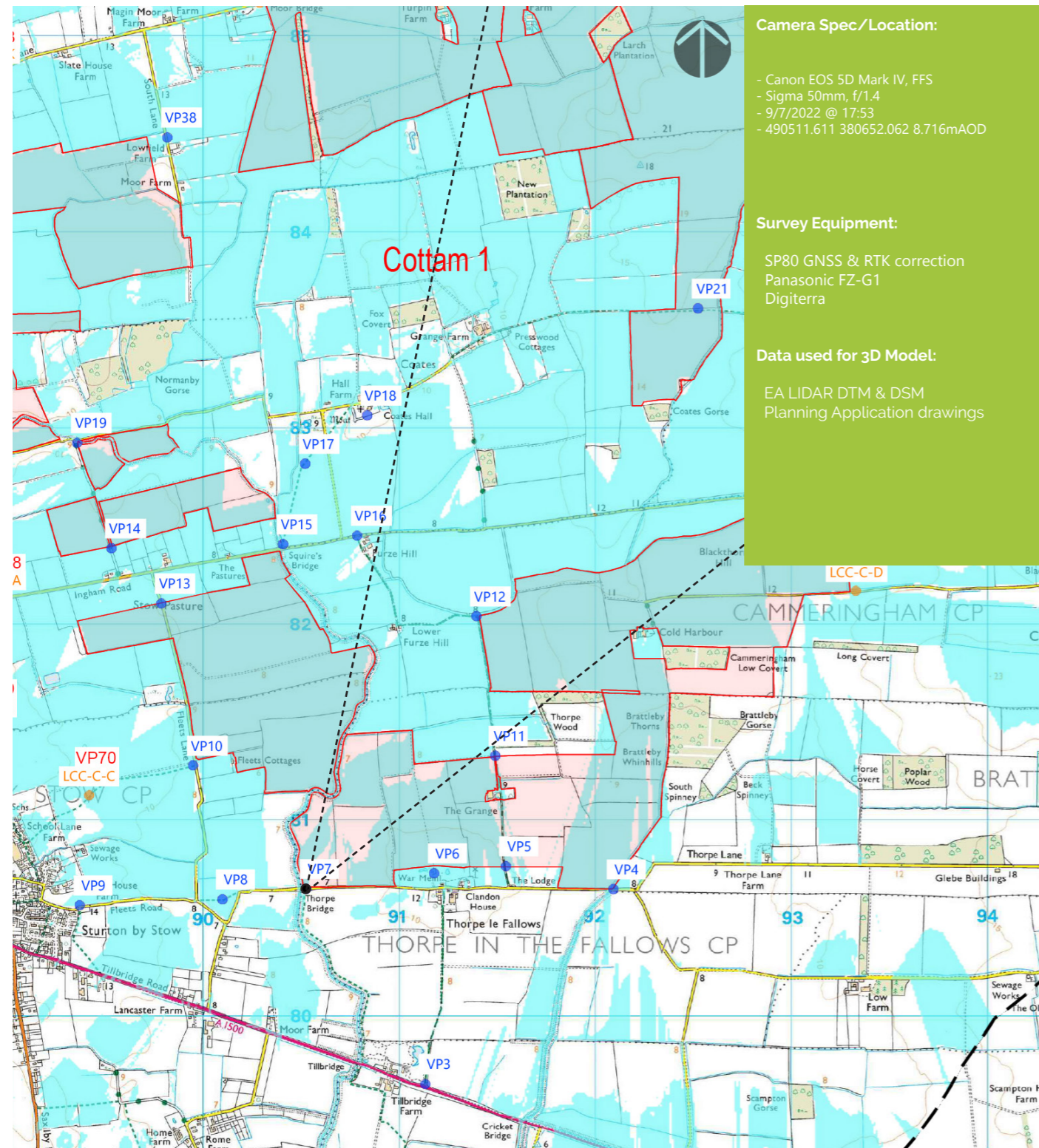
Point of Perspective

Point of Perspective

Viewpoint 7 Single Frame 50mm image (Winter)

Viewpoint 7 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

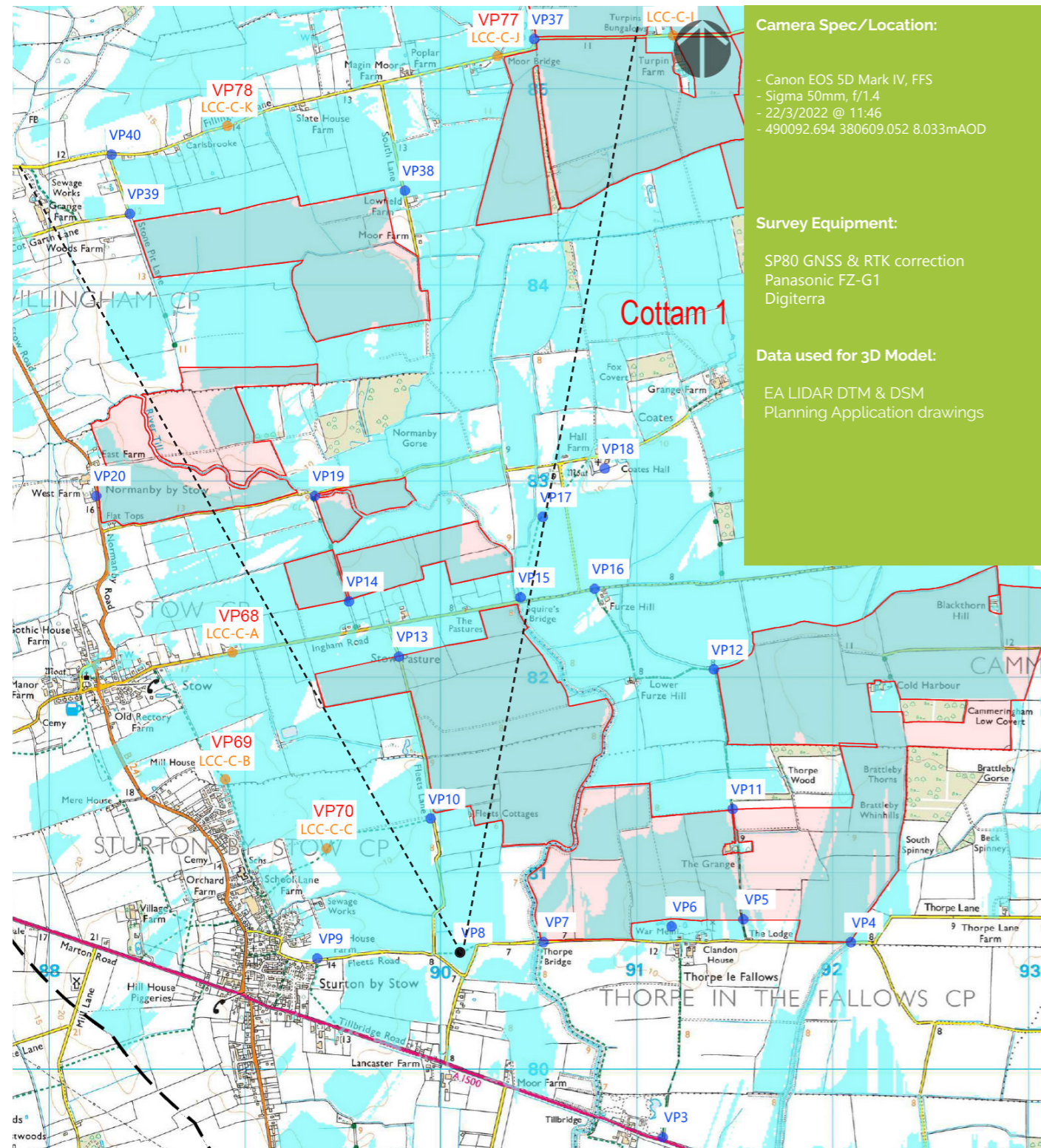
Point of Perspective

Point of Perspective

Viewpoint 7 Single Frame 50mm image (Summer)

Viewpoint 8 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

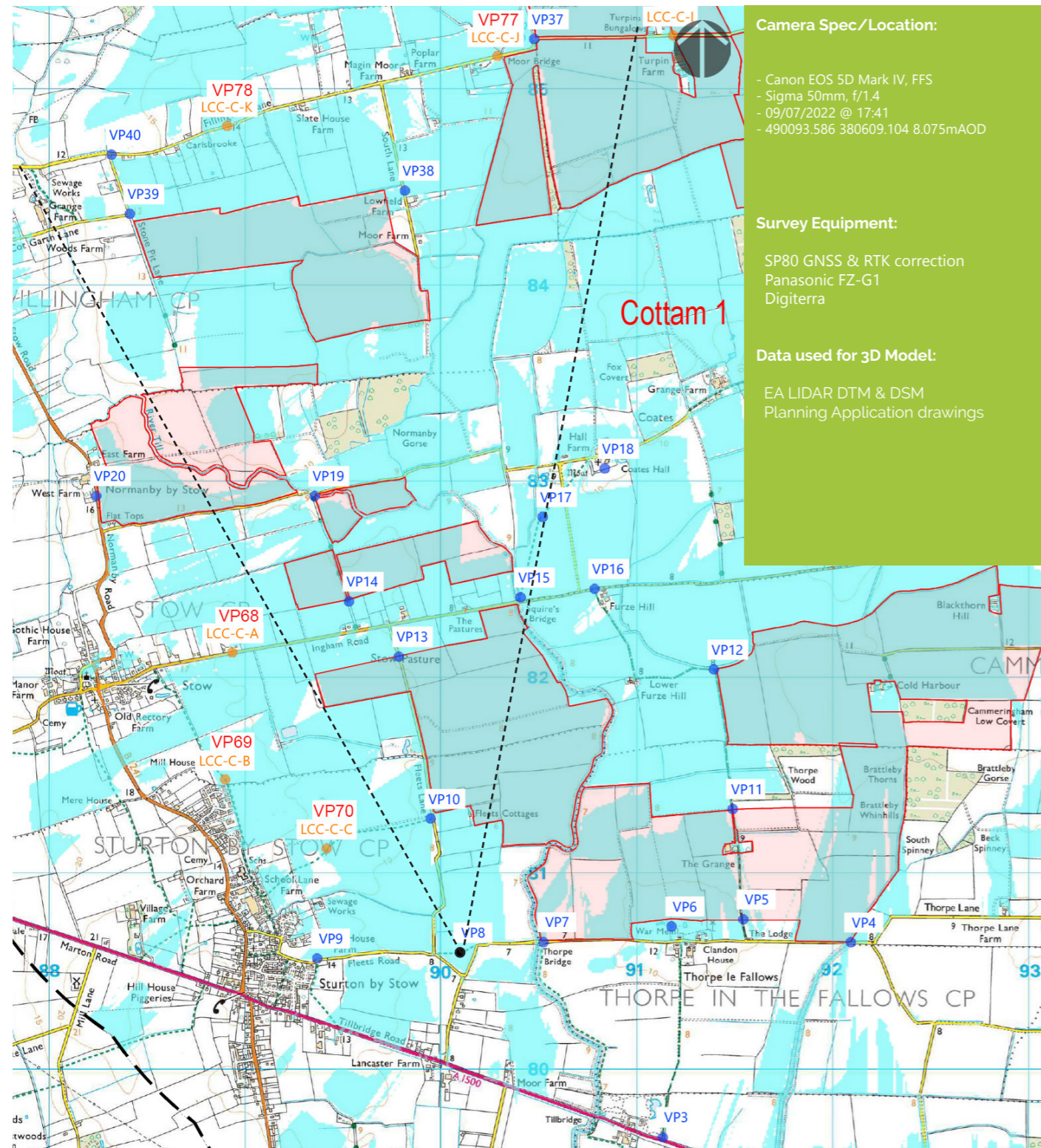
Point of Perspective

Point of Perspective

Viewpoint 8 Single Frame 50mm image (Winter)

Viewpoint 8 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

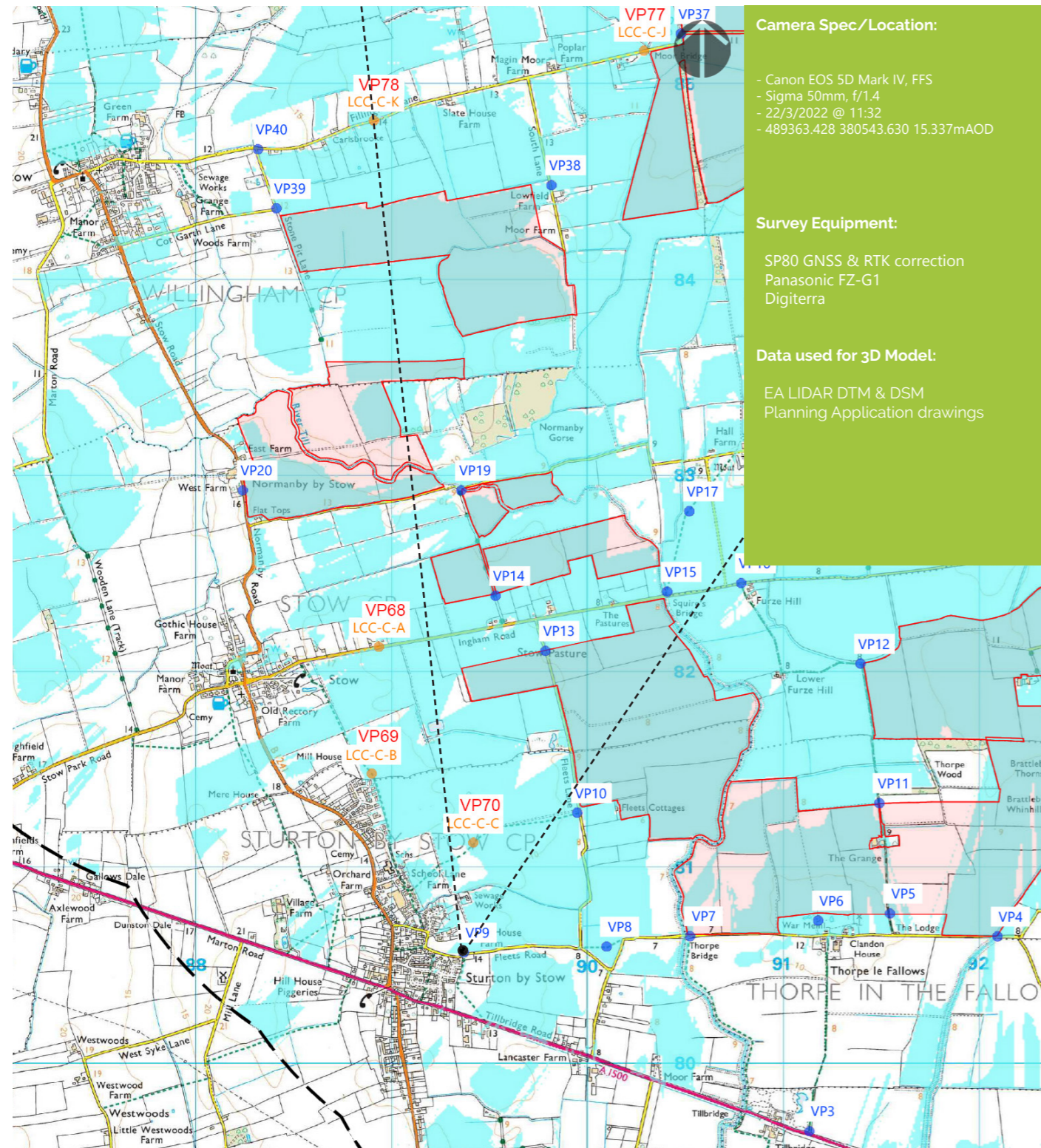
Point of Perspective

Point of Perspective

Viewpoint 8 Single Frame 50mm image (Summer)

Viewpoint 9 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 11:32
- 489363.428 380543.630 15.337m AOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)

Point of Perspective



Point of Perspective

Point of Perspective

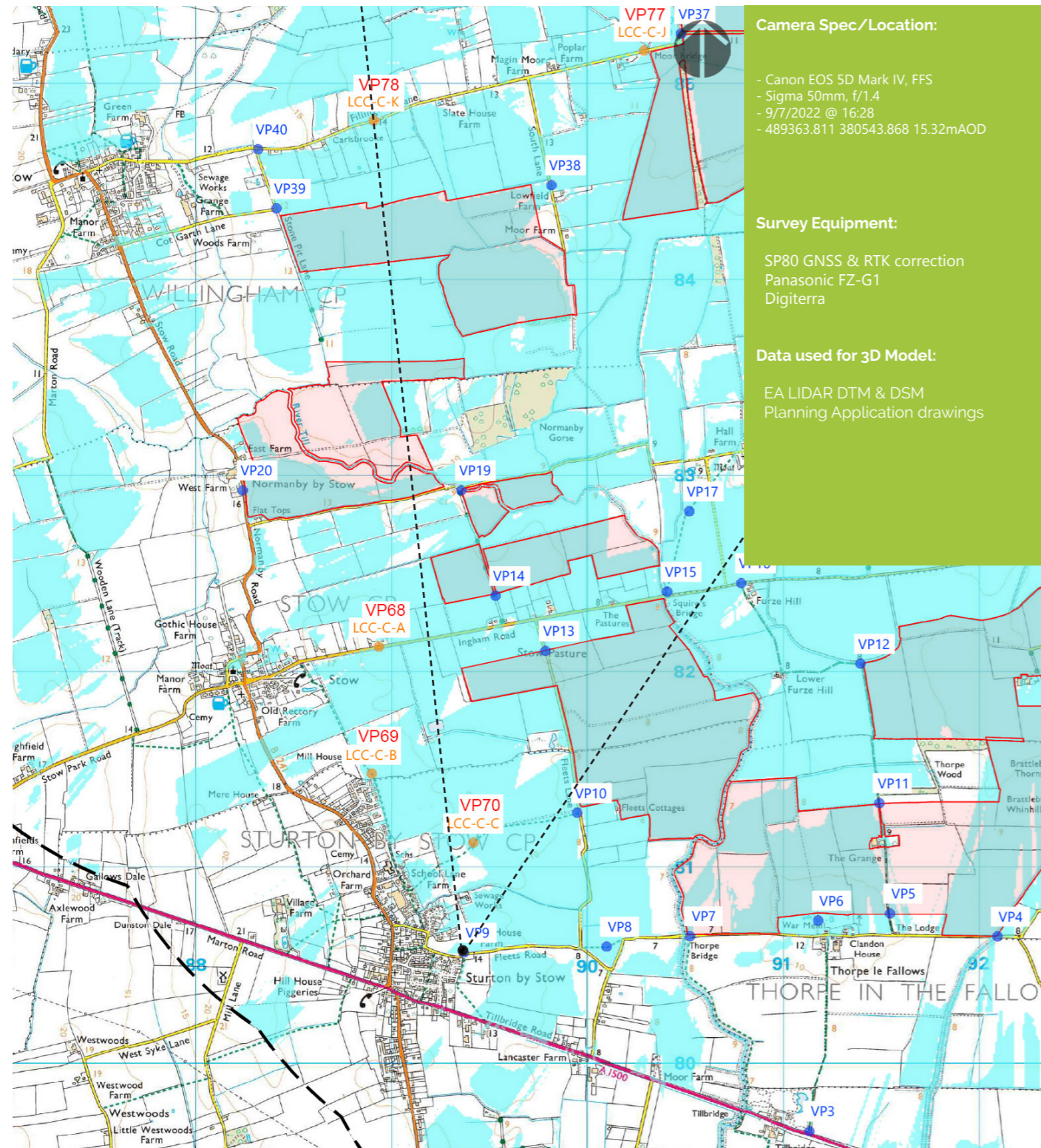
Point of Perspective

Viewpoint 9 Single Frame 50mm image (Winter)

Cottam Solar Project

Viewpoint 9 (Summer)

Camera Location:



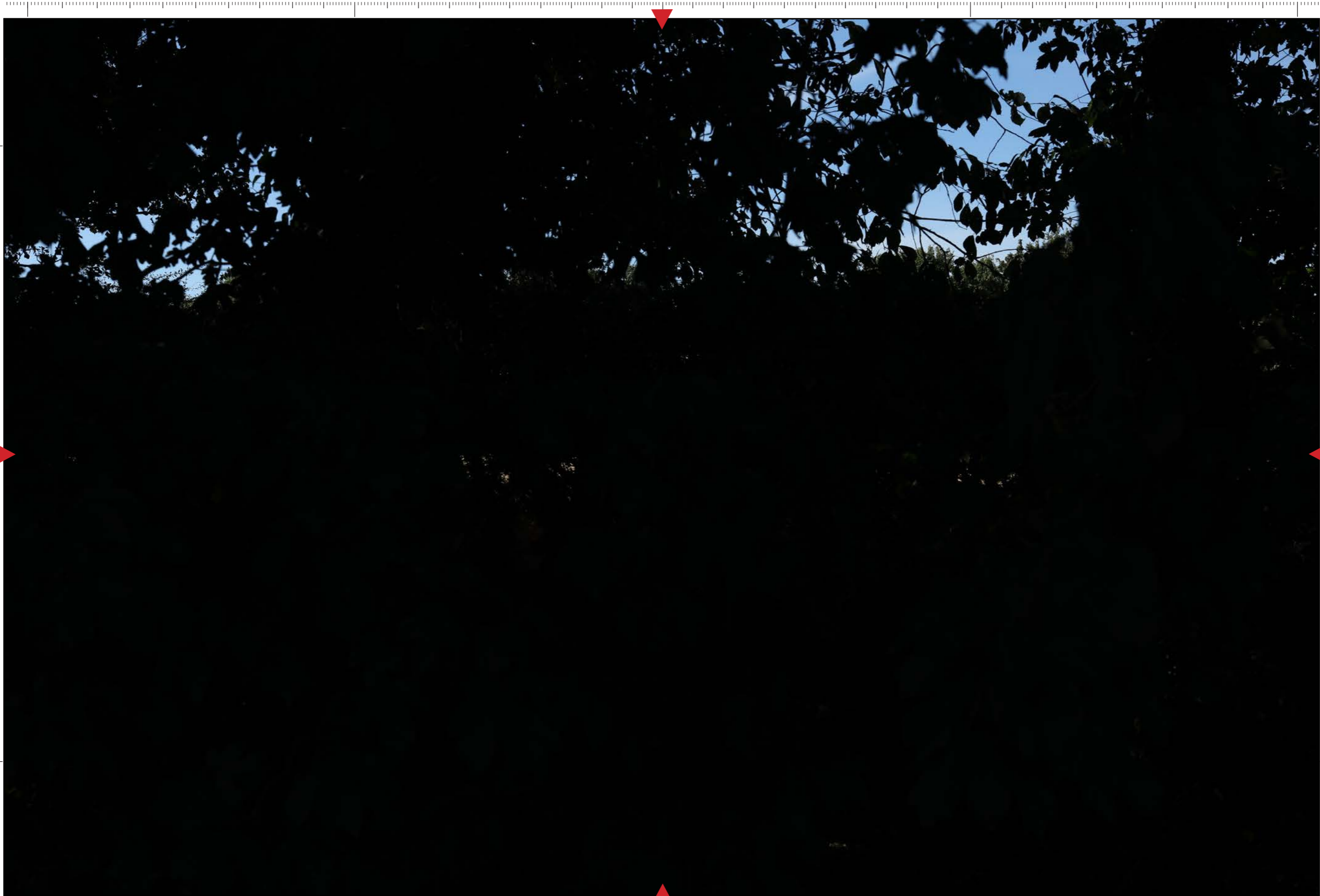
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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)

Point of Perspective



Point of Perspective

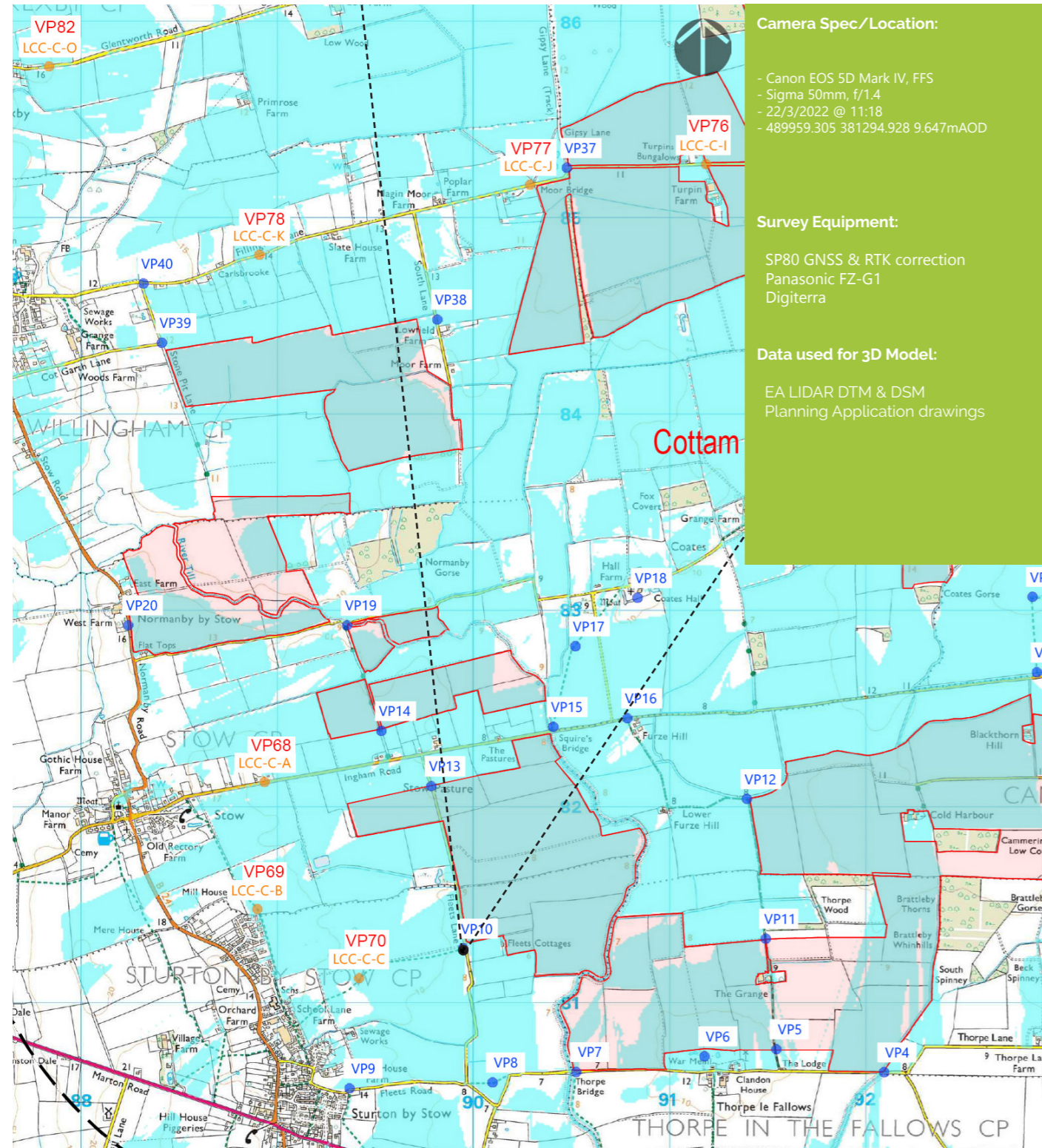
Point of Perspective

Point of Perspective

Viewpoint 9 Single Frame 50mm image (Summer)

Viewpoint 10 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

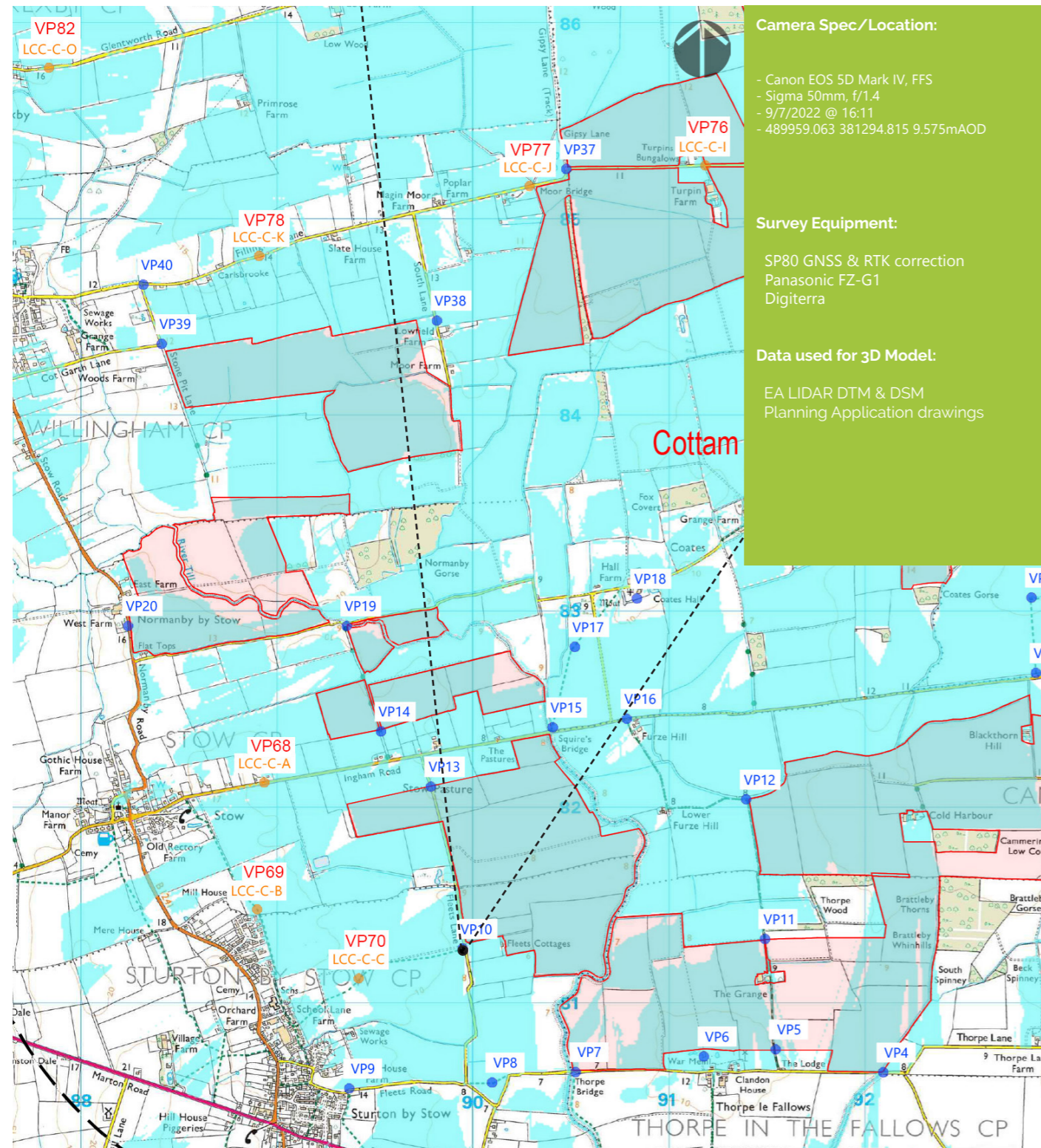
Point of Perspective

Point of Perspective

Viewpoint 10 Single Frame 50mm image (Winter)

Viewpoint 10 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 9/7/2022 @ 16:11
- 489959.063 381294.815 9.575mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



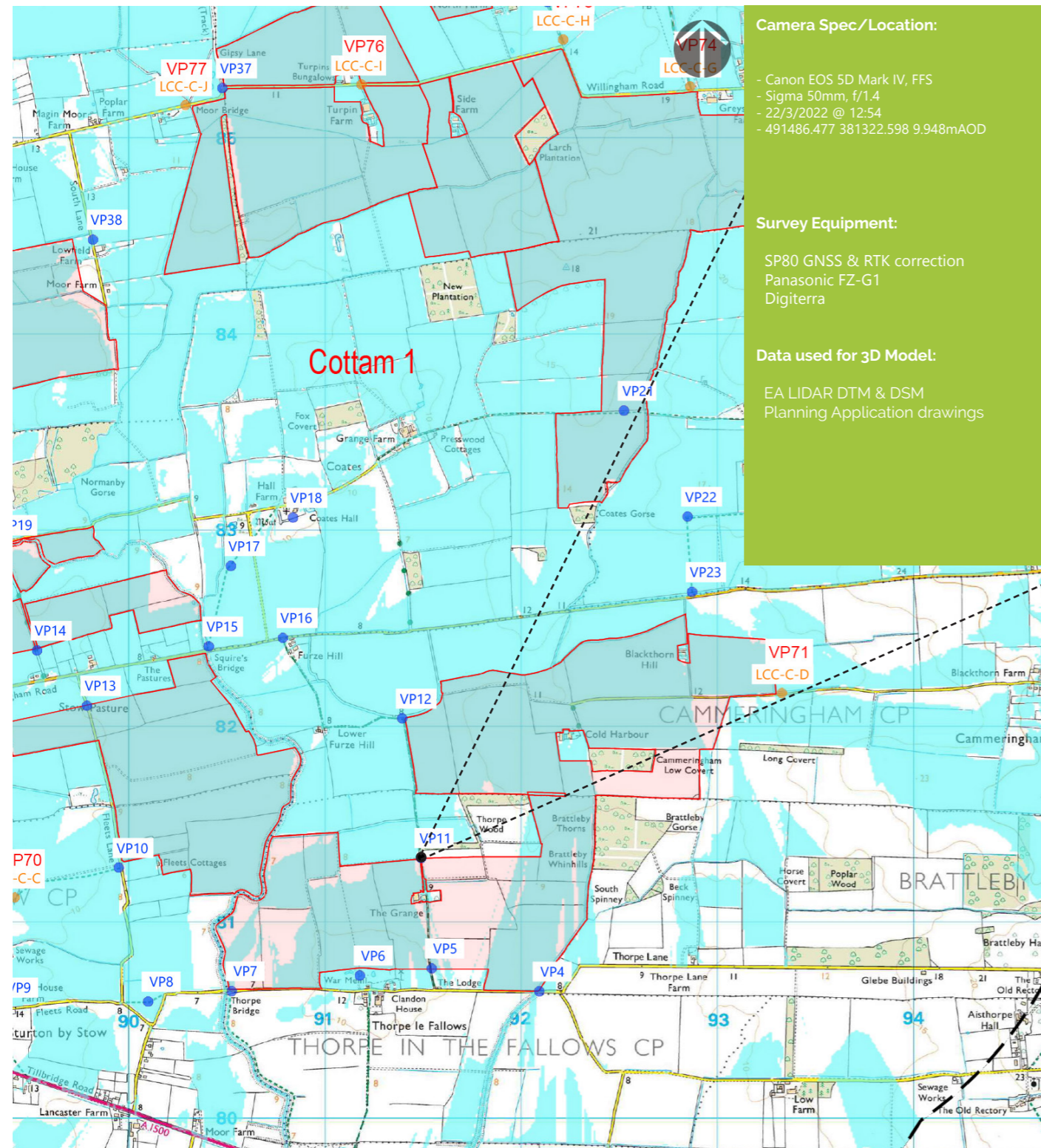
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 10 Single Frame 50mm image (Summer)

Viewpoint 11 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 12:54
- 491486.477 381322.598 9.948mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



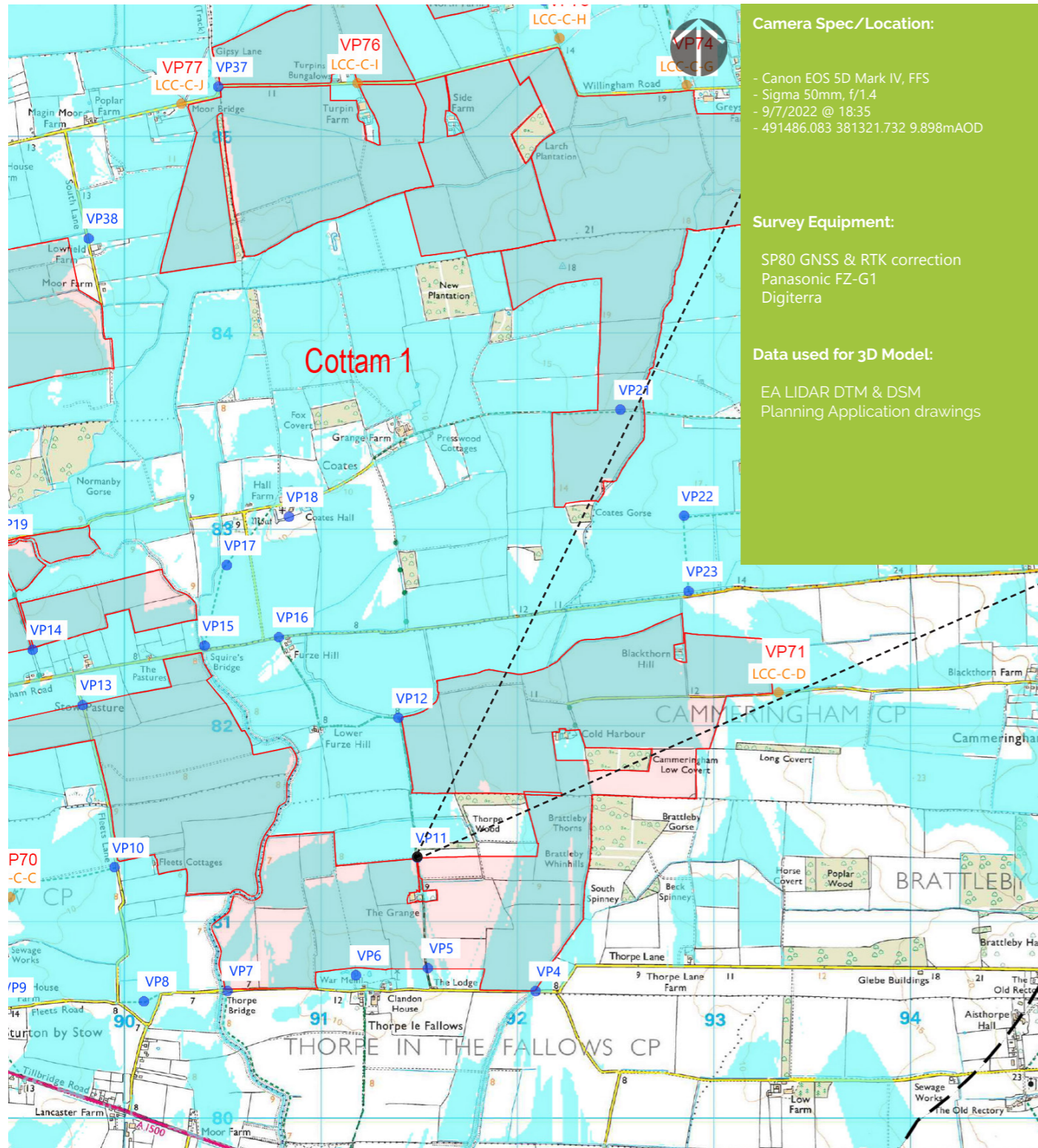
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 11 Single Frame 50mm image (Winter)

Viewpoint 11 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 9/7/2022 @ 18:35
- 491486.083 381321.732 9.898mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

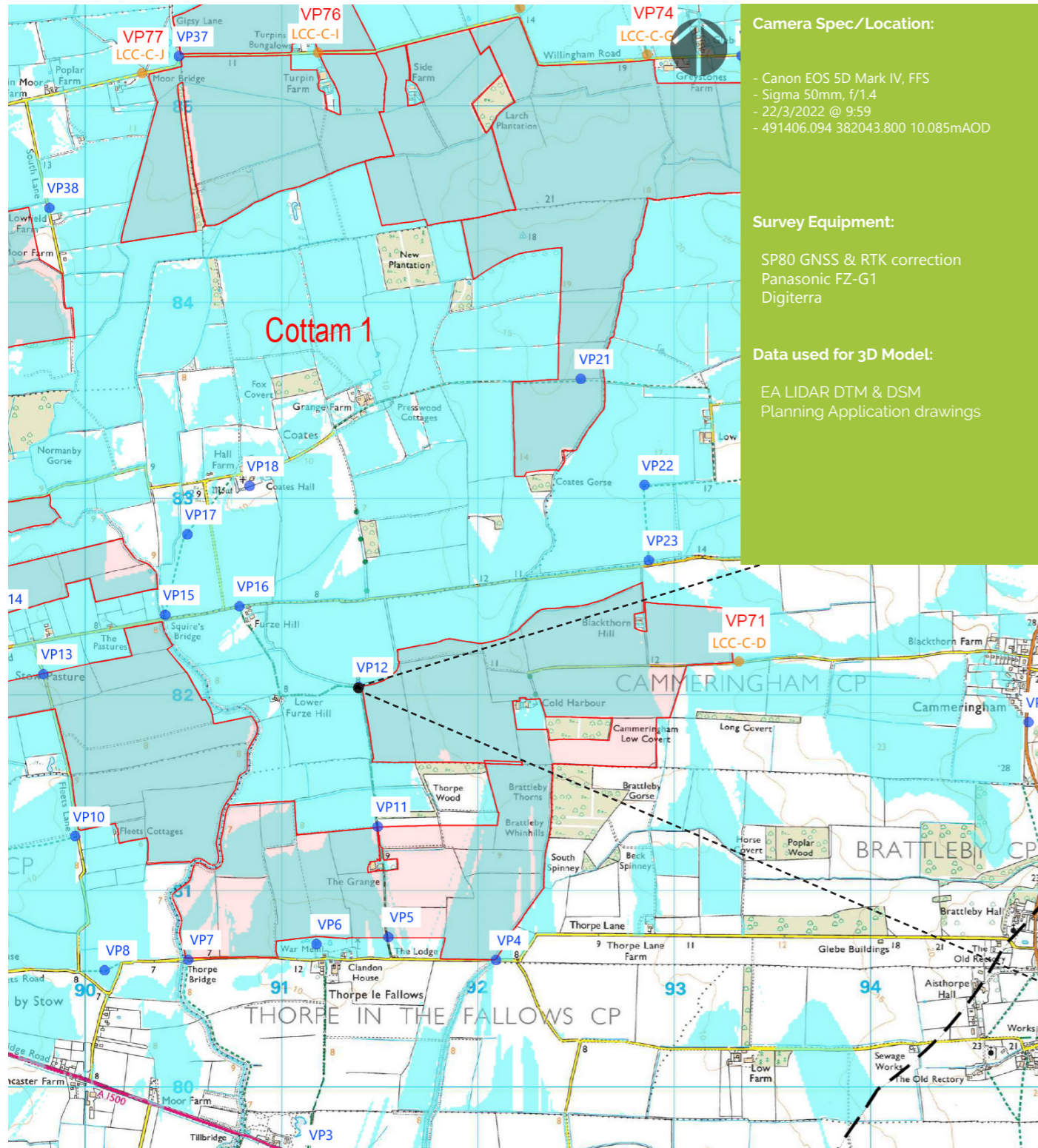
Point of Perspective

Point of Perspective

Viewpoint 11 Single Frame 50mm image (Summer)

Viewpoint 12 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 9:59
- 491406.094 382043.800 10.085mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

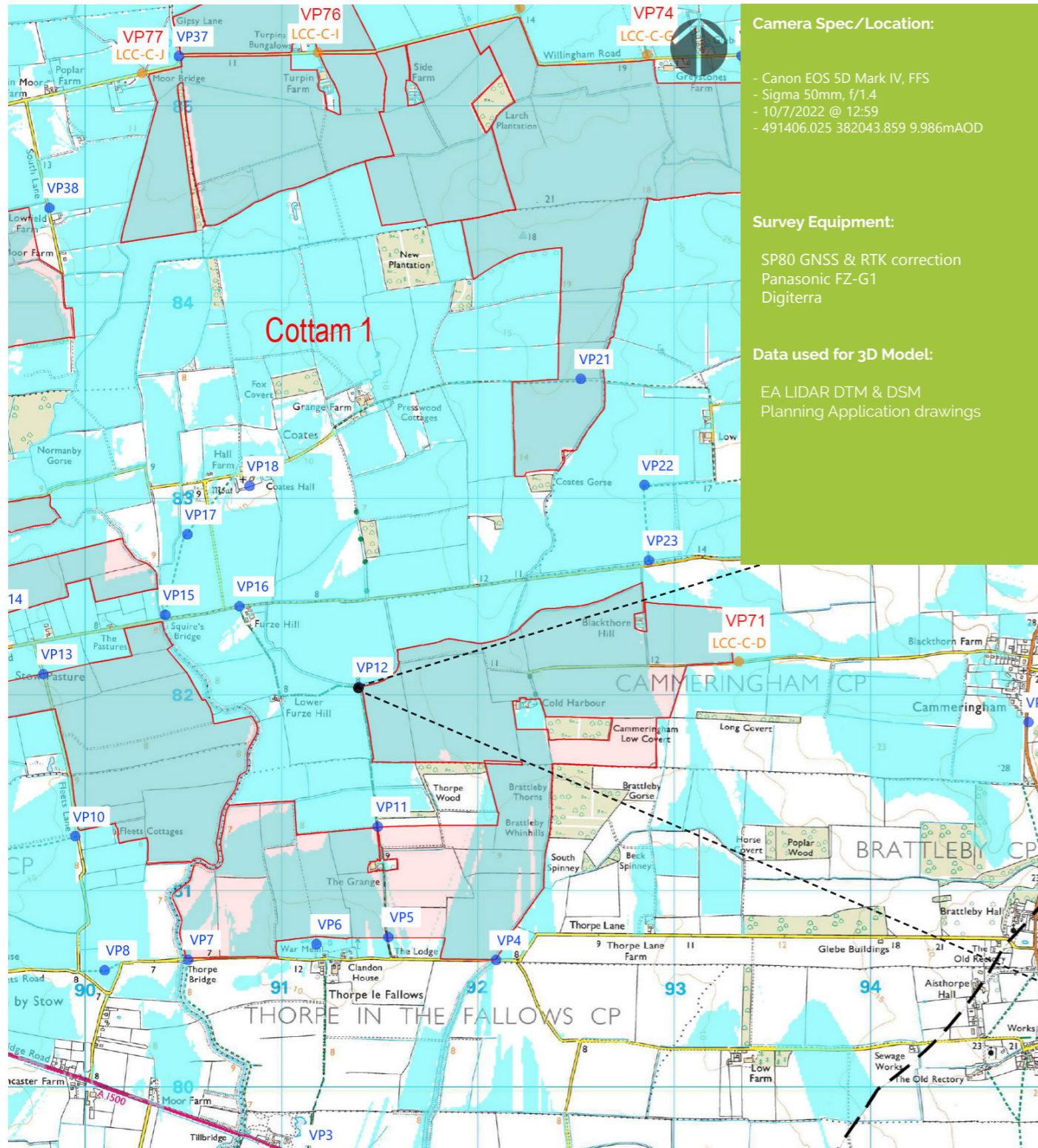
Point of Perspective

Point of Perspective

Viewpoint 12 Single Frame 50mm image (Winter)

Viewpoint 12 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 10/7/2022 @ 12:59
- 491406.025 382043.859 9.986mAOD

Survey Equipment:

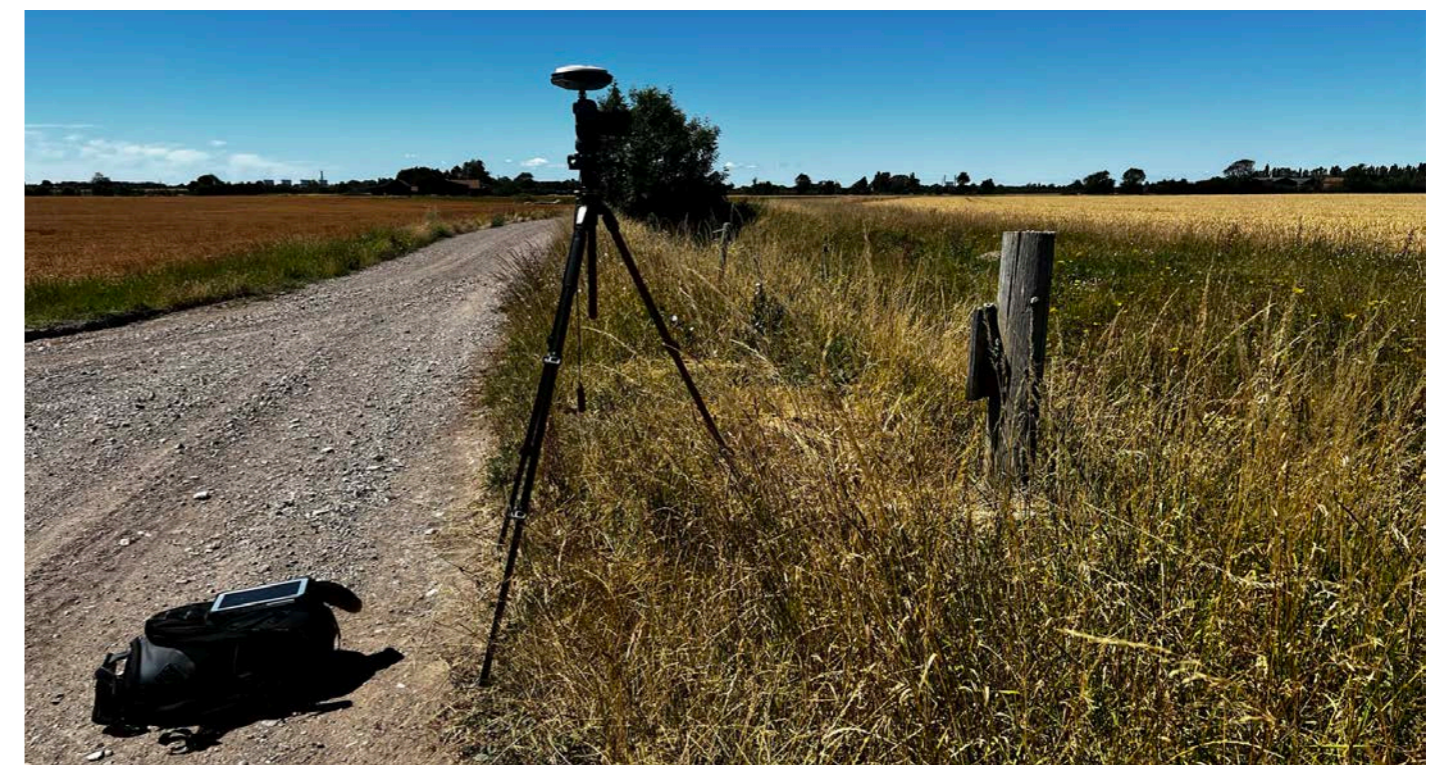
- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

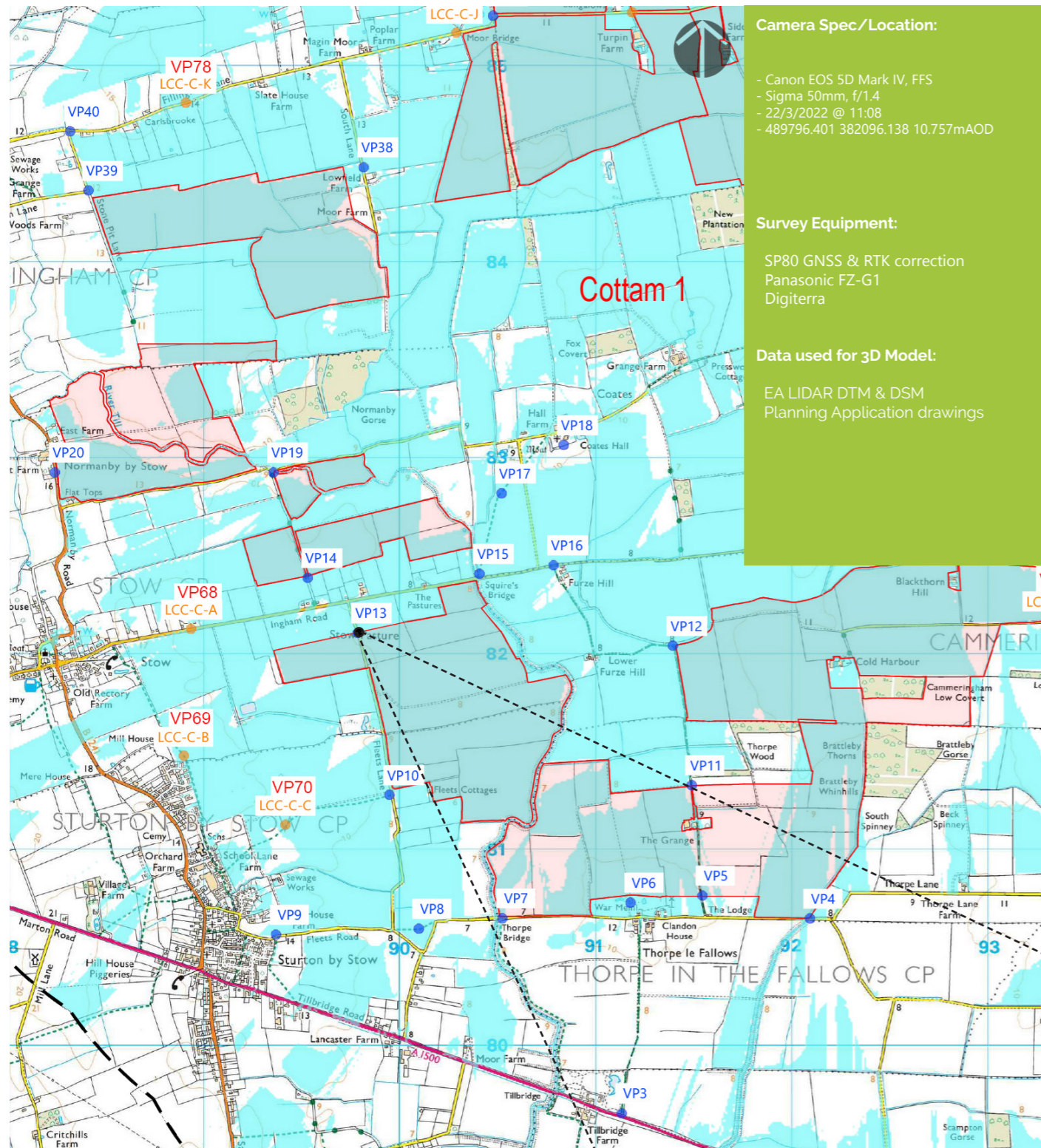
Point of Perspective

Point of Perspective

Viewpoint 12 Single Frame 50mm image (Summer)

Viewpoint 13 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 11:08
- 489796.401 382096.138 10.757m AOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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- Planning Application drawings

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Tripod:



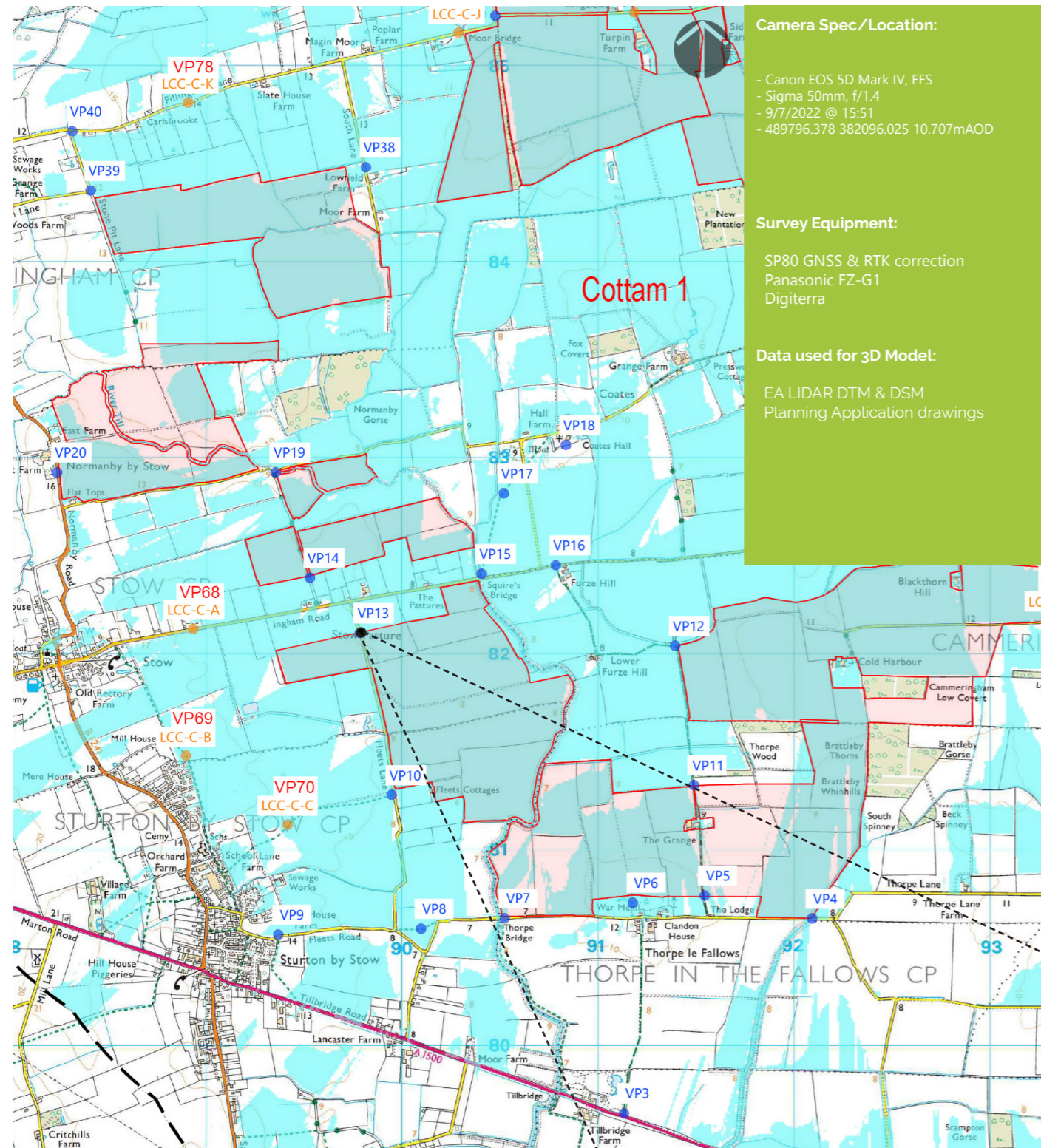
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 13 Single Frame 50mm image (Winter)

Viewpoint 13 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 9/7/2022 @ 15:51
- 489796.378 382096.025 10.707mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



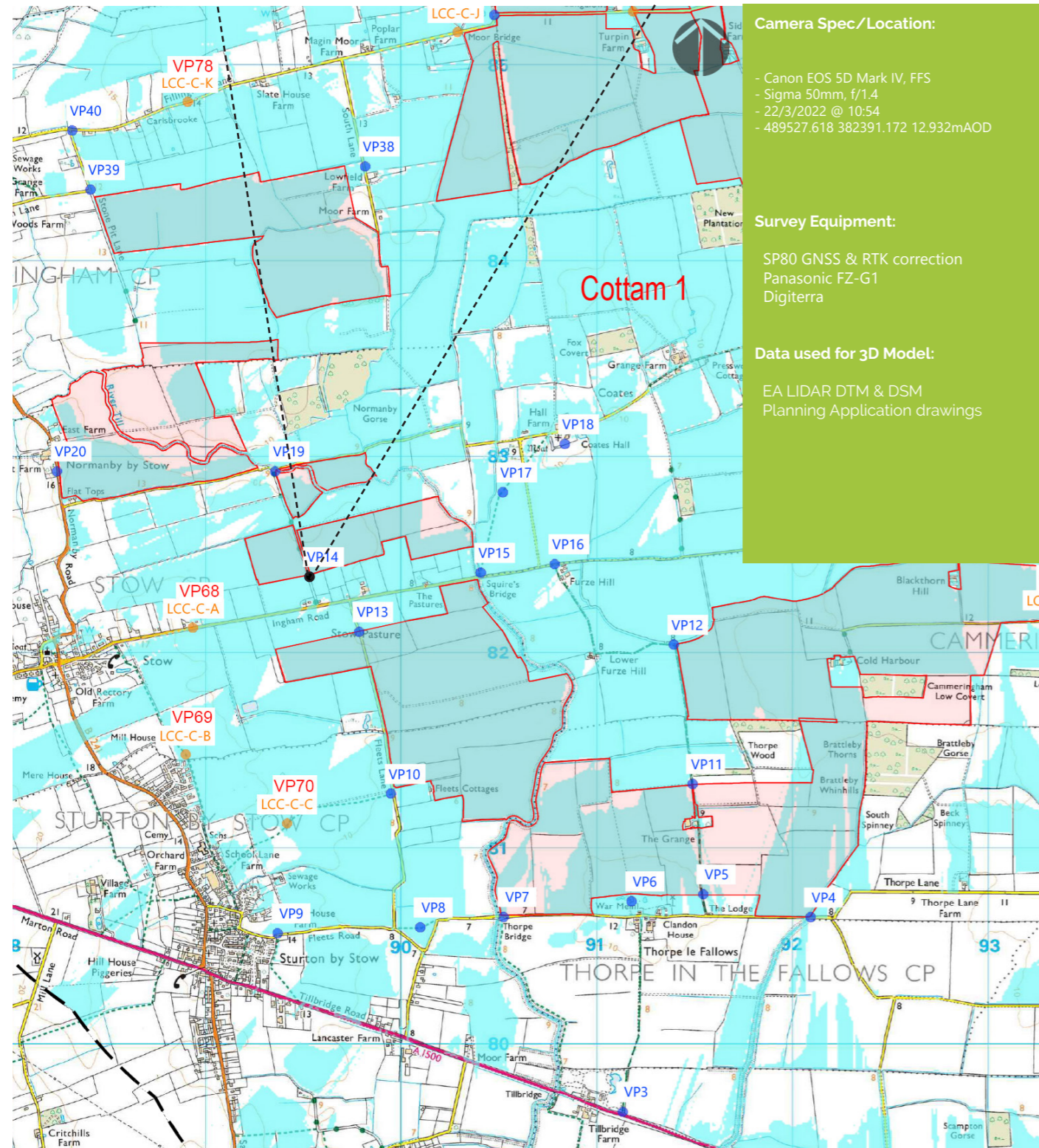
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 13 Single Frame 50mm image (Summer)

Viewpoint 14 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 10:54
- 489527.618 382391.172 12.932mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

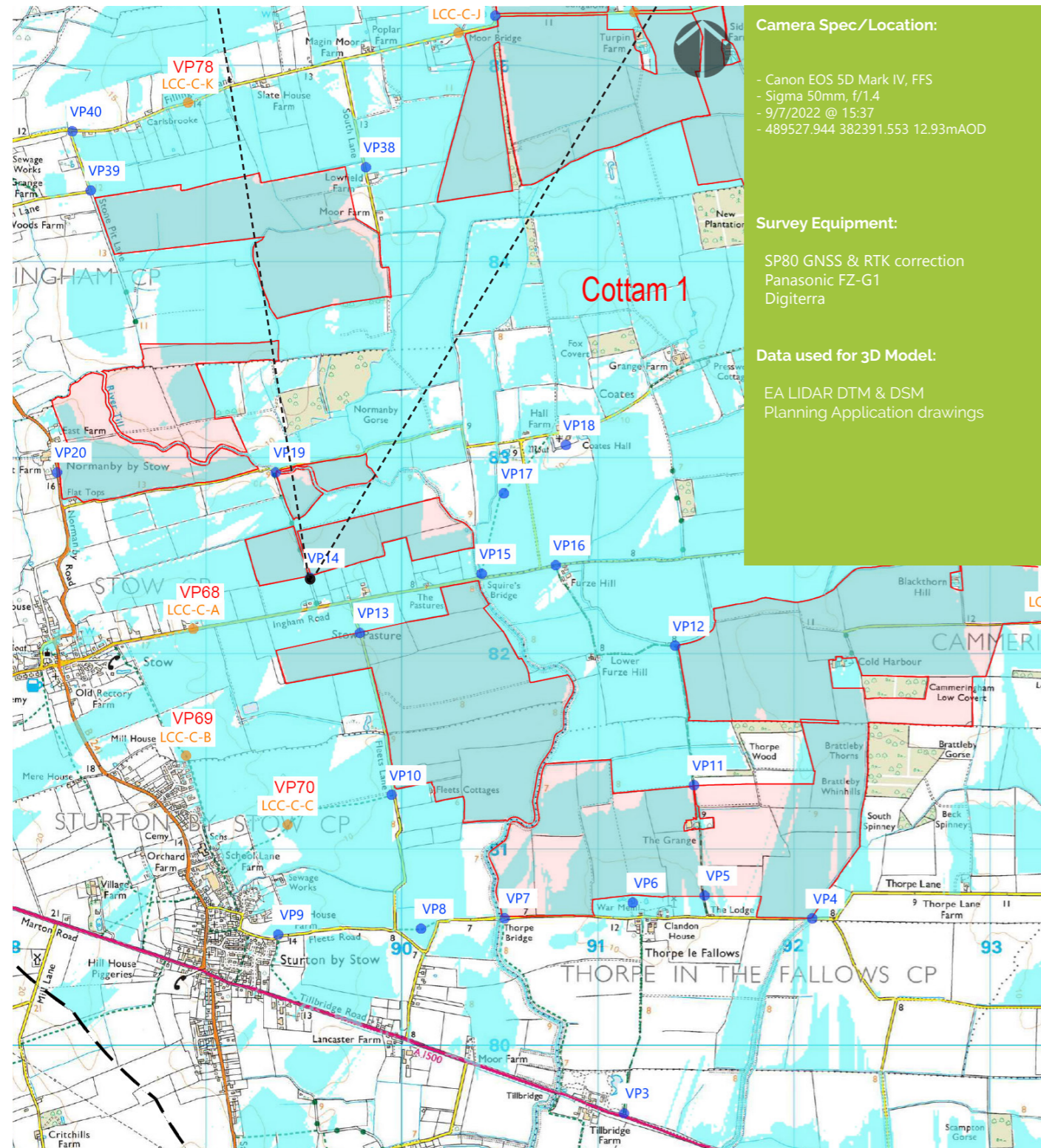
Point of Perspective

Point of Perspective

Viewpoint 14 Single Frame 50mm image (Winter)

Viewpoint 14 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 9/7/2022 @ 15:37
- 489527.944 382391.553 12.93mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

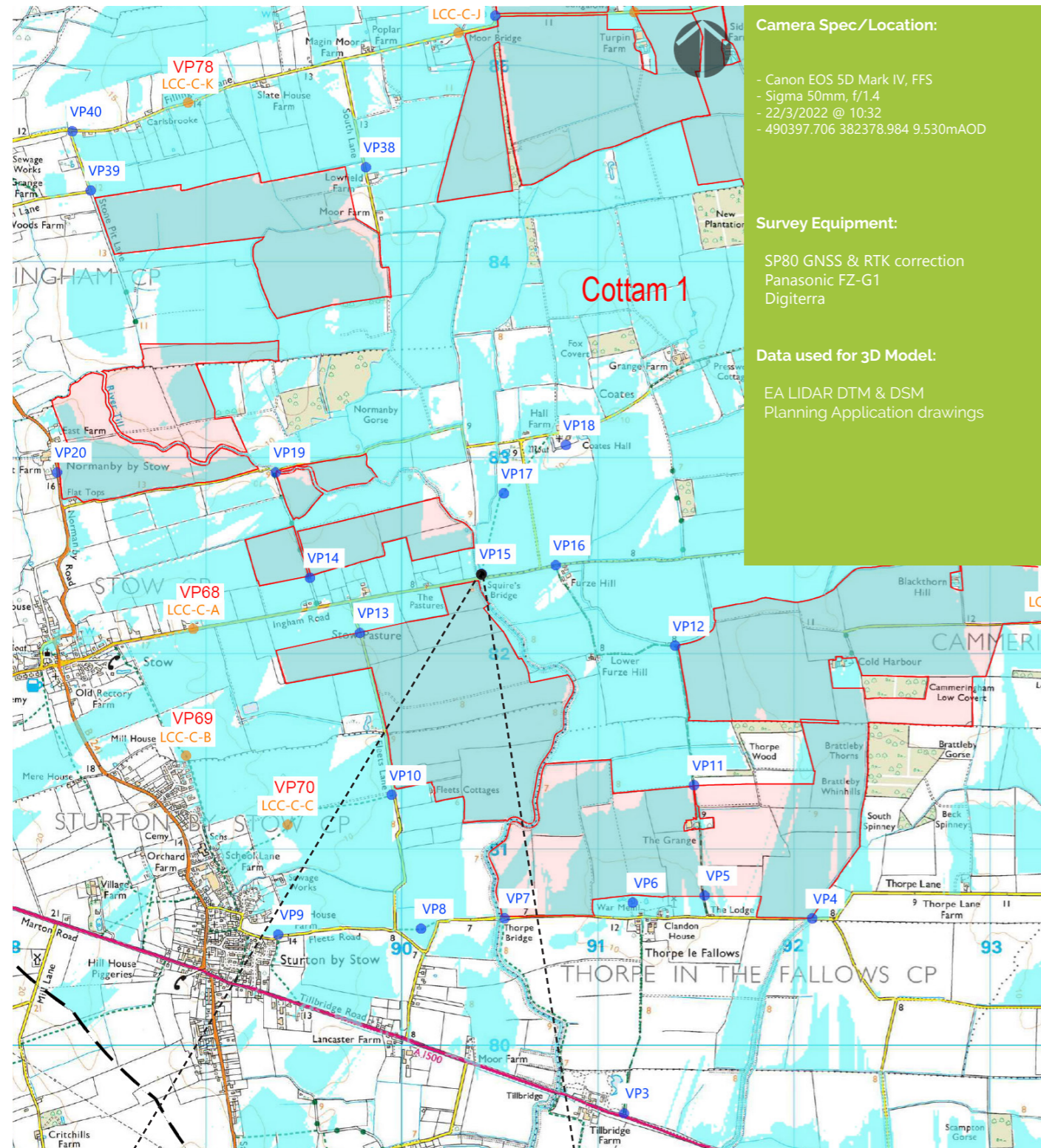
Point of Perspective

Point of Perspective

Viewpoint 14 Single Frame 50mm image (Summer)

Viewpoint 15 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

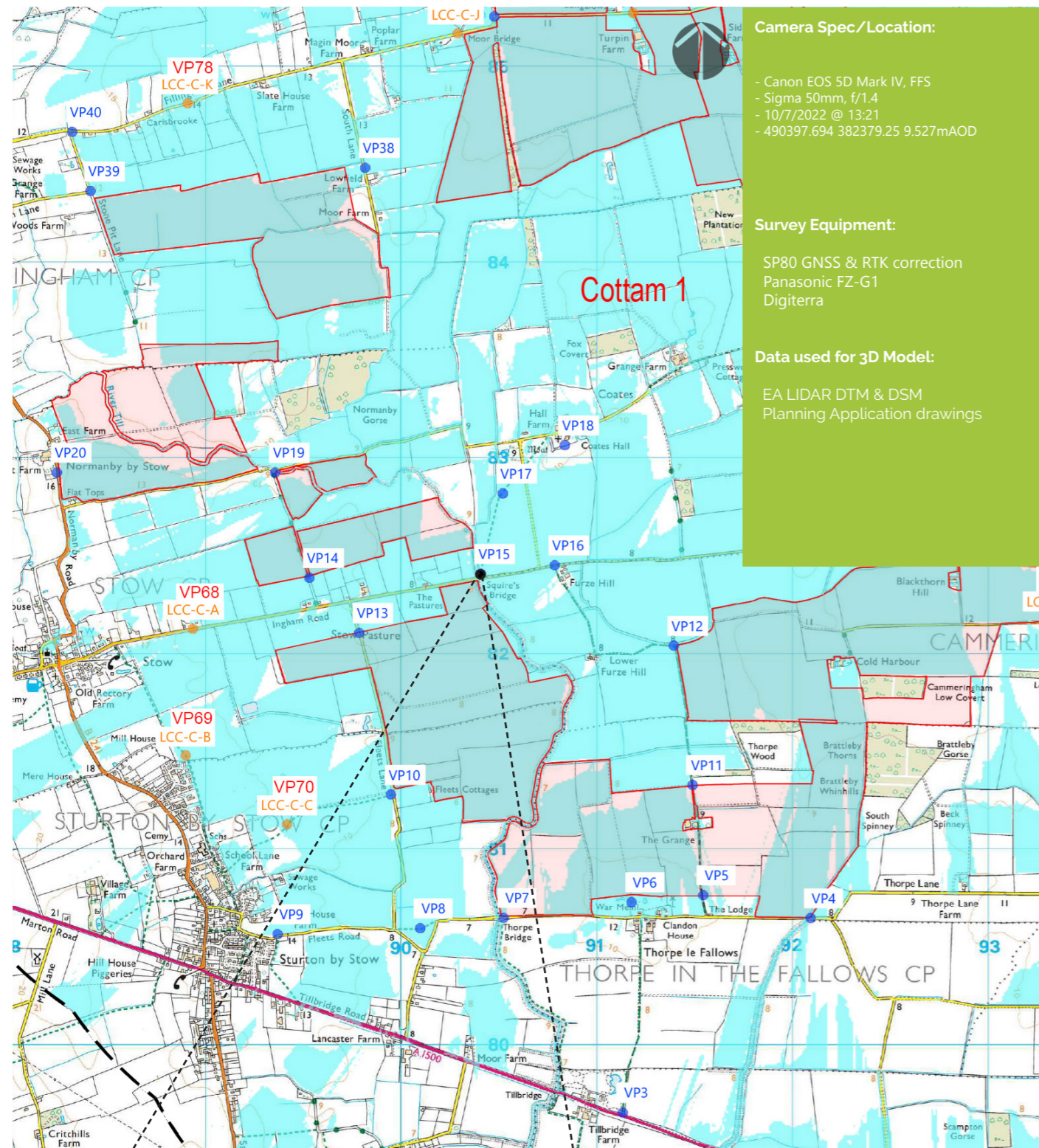
Point of Perspective

Point of Perspective

Viewpoint 15 Single Frame 50mm image (Winter)

Viewpoint 15 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

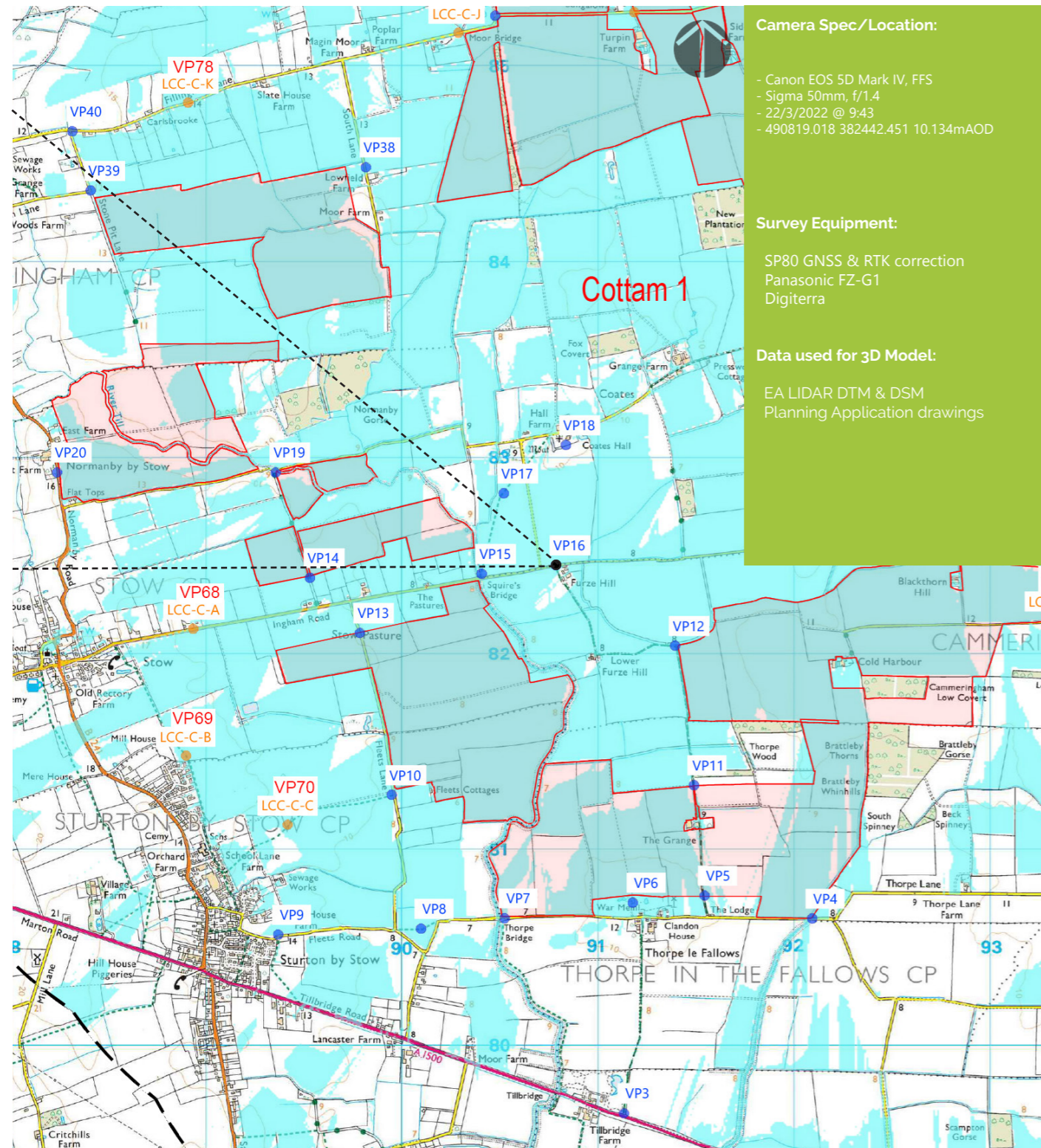
Point of Perspective

Point of Perspective

Viewpoint 15 Single Frame 50mm image (Summer)

Viewpoint 16 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 9:43
- 490819.018 382442.451 10.134m AOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



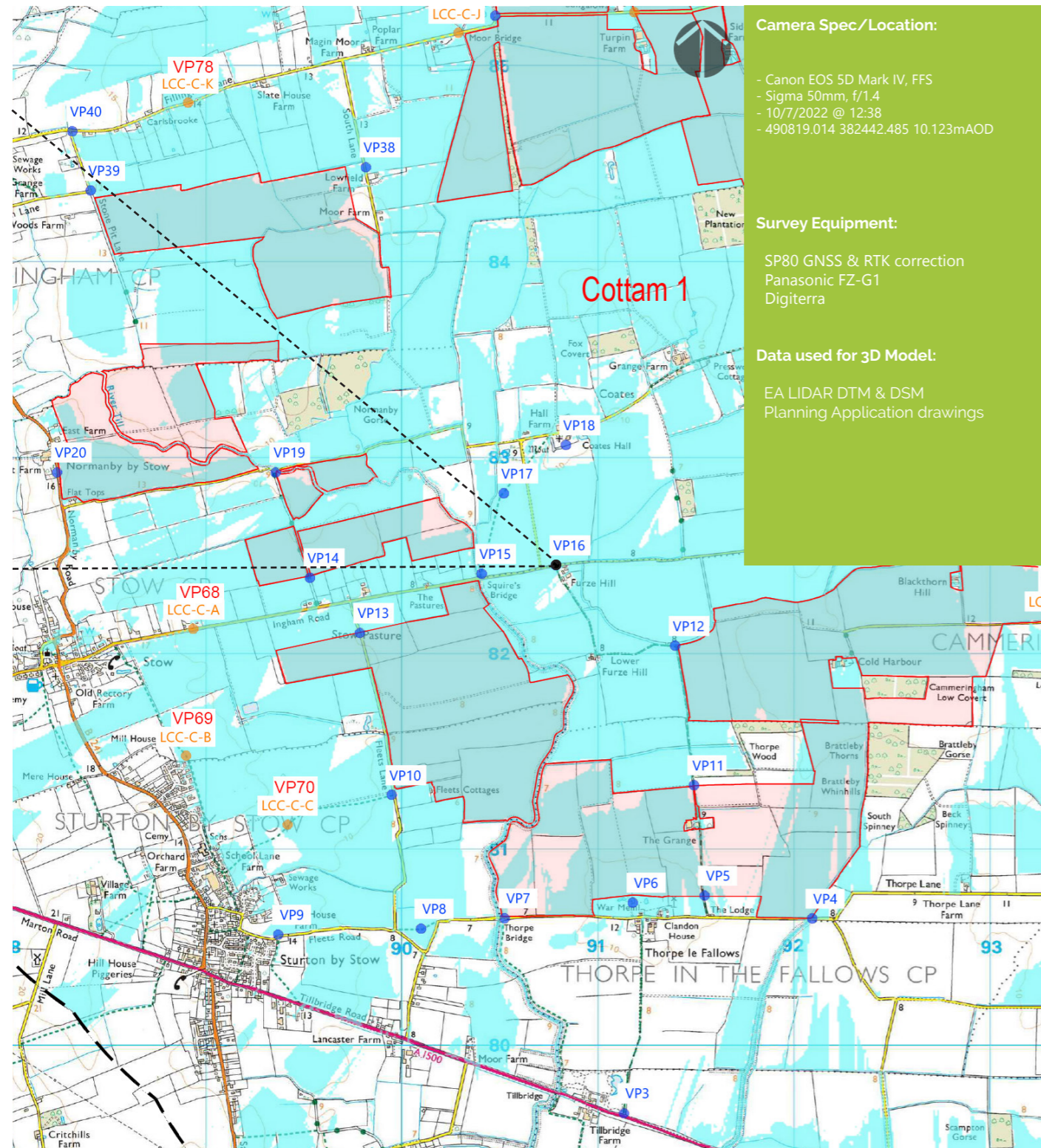
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 16 Single Frame 50mm image (Winter)

Viewpoint 16 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 10/7/2022 @ 12:38
- 490819.014 382442.485 10.123mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

- EA LIDAR DTM & DSM
- Planning Application drawings

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

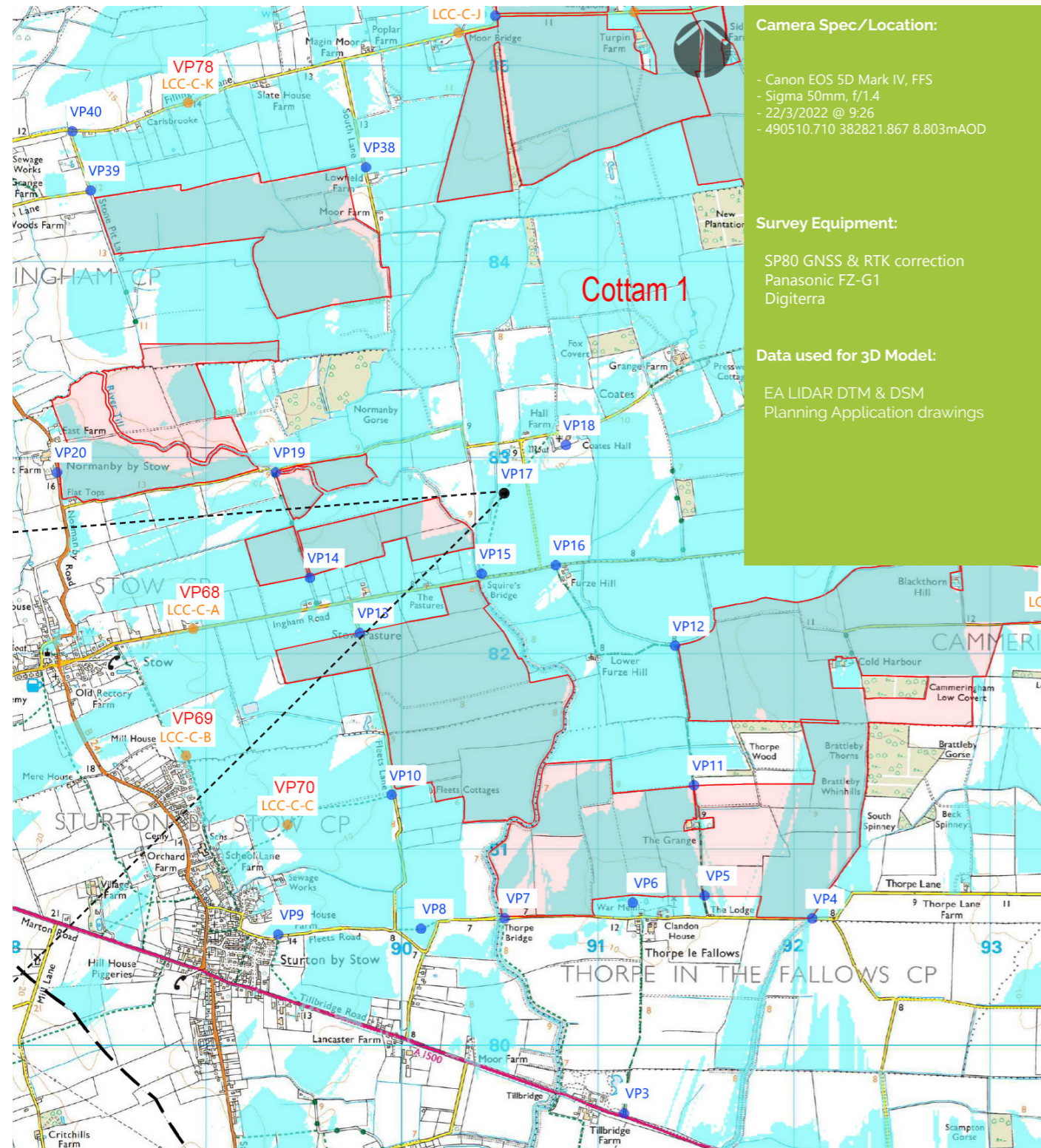
Point of Perspective

Point of Perspective

Viewpoint 16 Single Frame 50mm image (Summer)

Viewpoint 17 (Winter)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 22/3/2022 @ 9:26
- 490510.710 382821.867 8.803mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



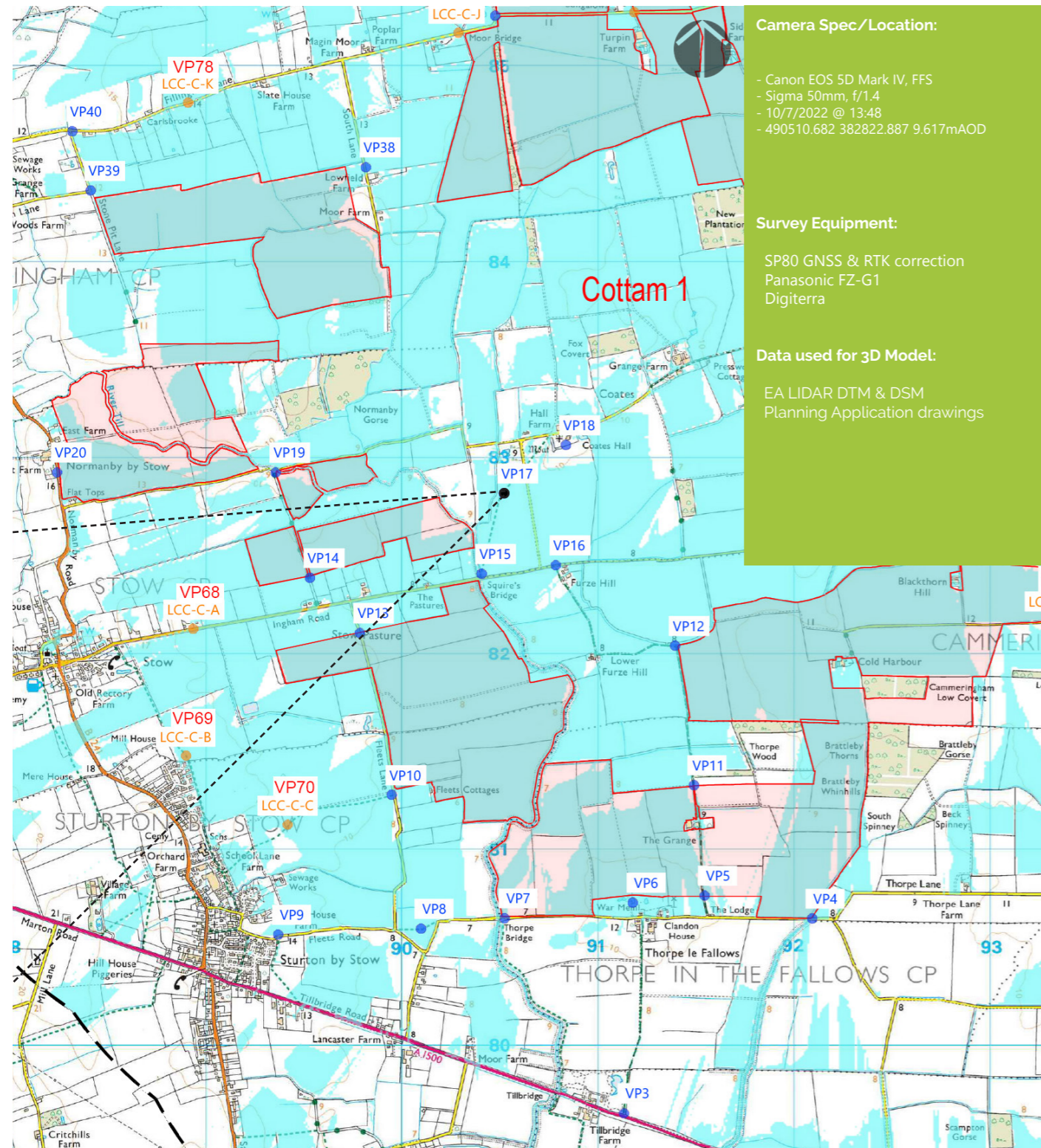
50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Viewpoint 17 Single Frame 50mm image (Winter)

Viewpoint 17 (Summer)

Camera Location:



Camera Spec/Location:

- Canon EOS 5D Mark IV, FFS
- Sigma 50mm, f/1.4
- 10/7/2022 @ 13:48
- 490510.682 382822.887 9.617mAOD

Survey Equipment:

- SP80 GNSS & RTK correction
- Panasonic FZ-G1
- Digiterra

Data used for 3D Model:

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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

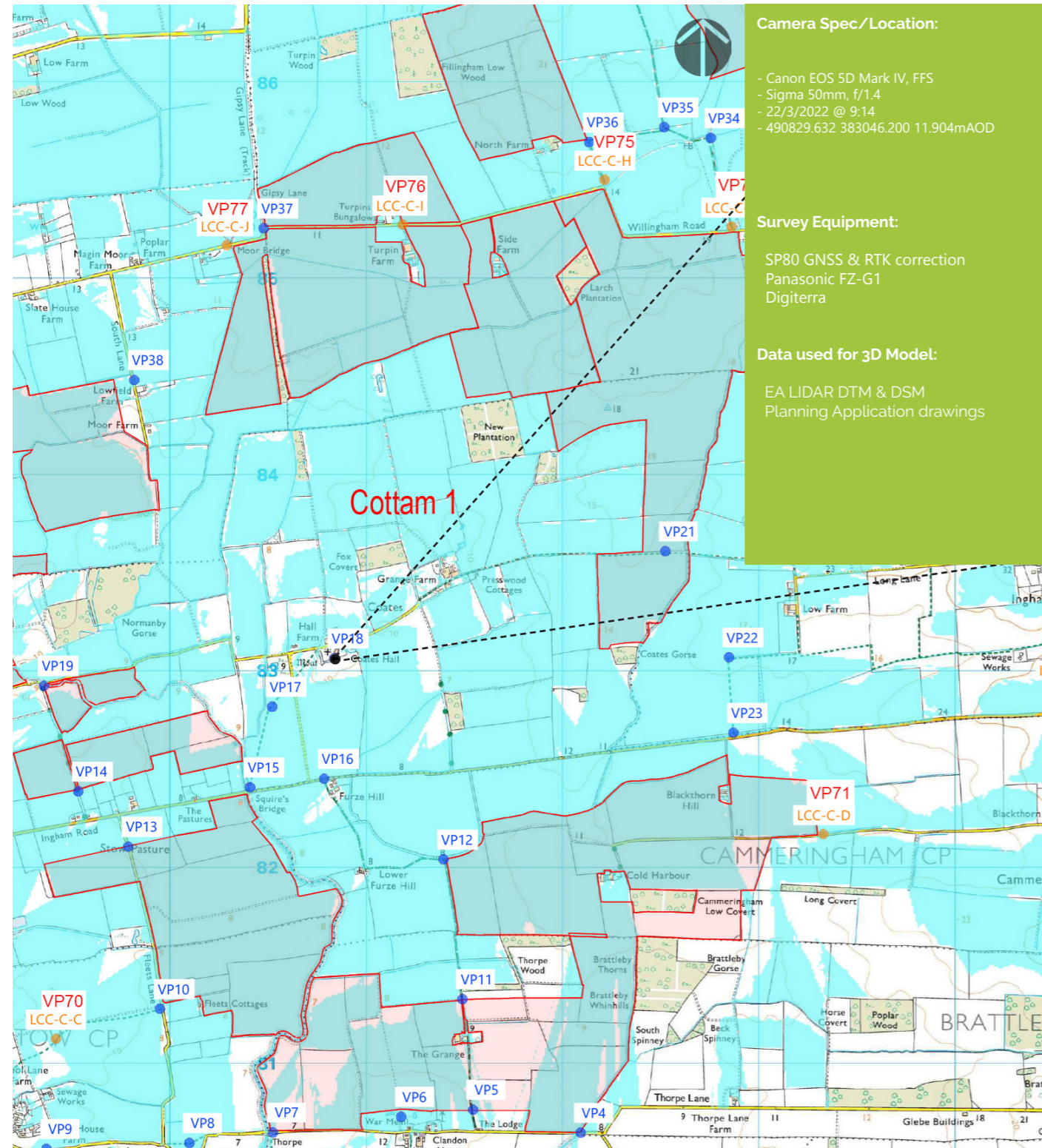
Point of Perspective

Point of Perspective

Viewpoint 17 Single Frame 50mm image (Summer)

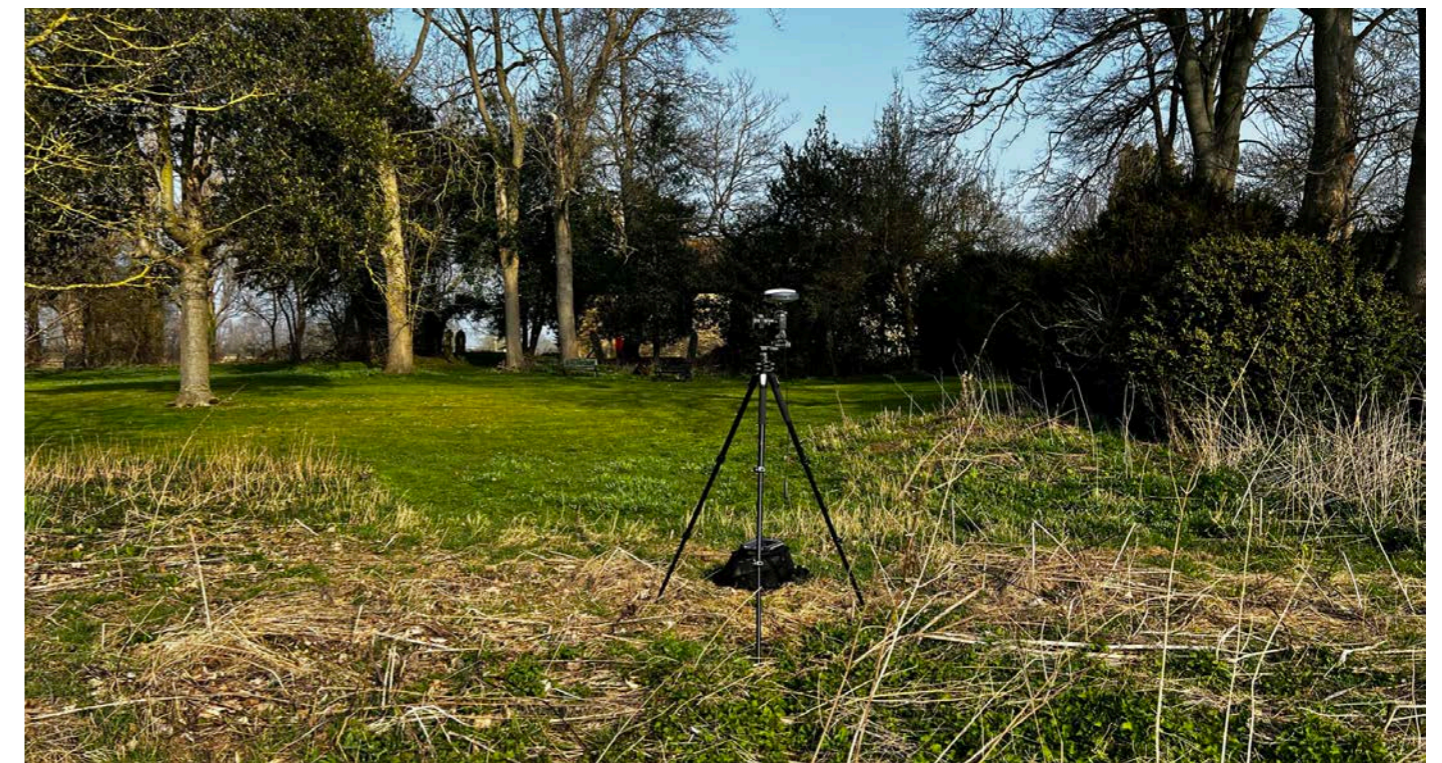
Viewpoint 18 (Winter)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)



Point of Perspective

Point of Perspective

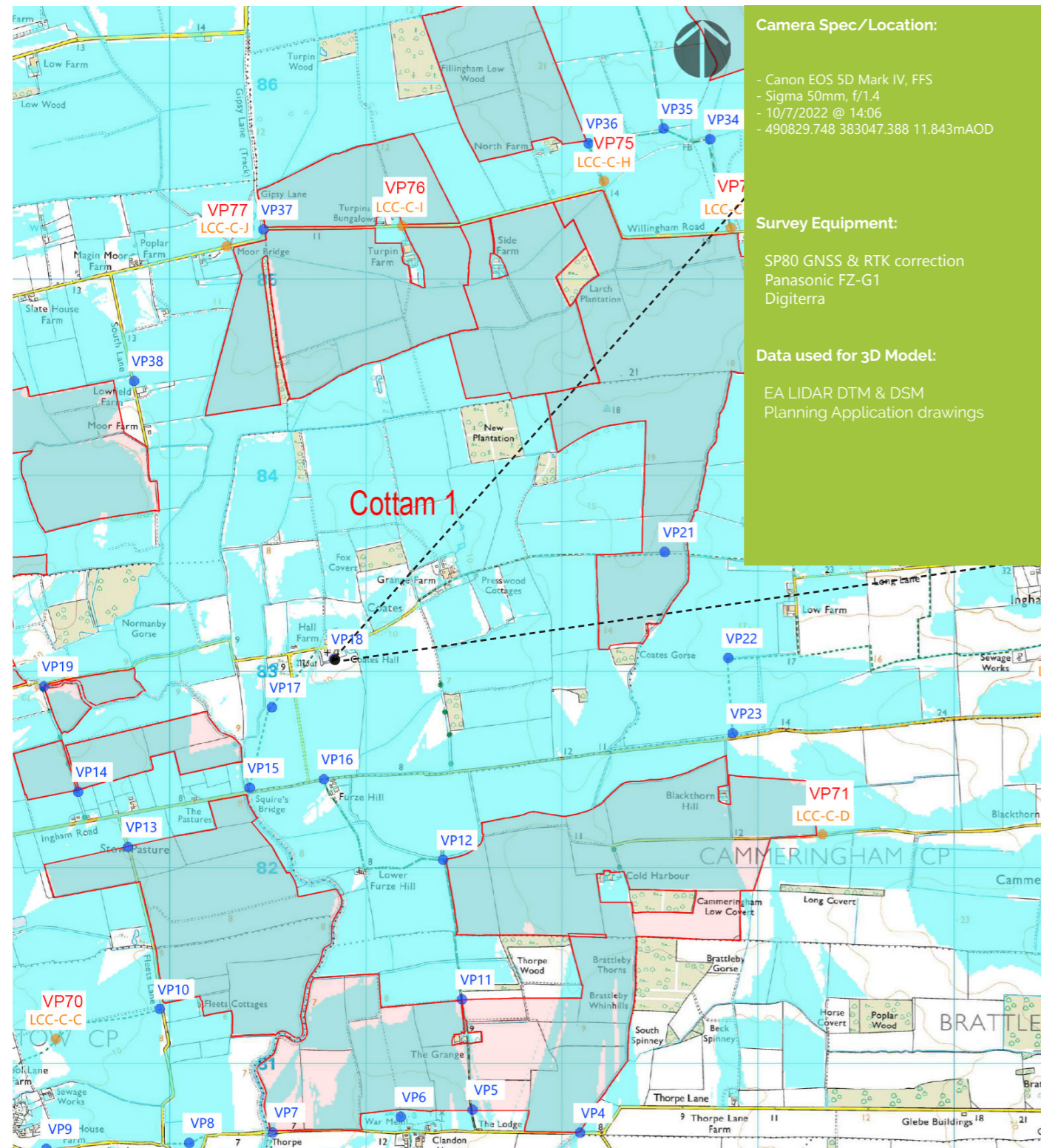
Point of Perspective

Point of Perspective

Viewpoint 18 Single Frame 50mm image (Winter)

Viewpoint 18 (Summer)

Camera Location:



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Tripod:



50mm Lens Planar Projection (actual 49.7mm; 39.9 deg HFOV)

Point of Perspective



Point of Perspective

Point of Perspective

Point of Perspective

Viewpoint 18 Single Frame 50mm image (Summer)