

AERIAL PHOTOGRAMMETRY SURVEY REPORT

Craswall Priory, Craswall, Herefordshire

Client

Craswall Grandmontine Society

Survey Report

AC-20-AER-005

Date

July 2020



Survey Report AC-20-AER-005: Craswall Priory, Craswall, Herefordshire

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1 SUMMARY OF RESULTS

An aerial photogrammetry survey was conducted on land surrounding Craswall Priory, Herefordshire. The survey has recorded numerous features of probable archaeological interest, including possible building platforms, former land boundaries and hollow ways.

2 INTRODUCTION

2.1 Background Synopsis

SUMO / Aerial-Cam Ltd were commissioned to undertake an aerial photogrammetry survey of Craswall Priory and surrounding land.

2.2 Site Details

| | |
|------------------|--|
| NGR / Postcode | SO 272 376 / HR2 0PX |
| Location | The site is located on land surrounding Craswall Priory, approximately 1.5km north of Craswall, Herefordshire. |
| HER | Herefordshire HER |
| District | County of Herefordshire |
| Parish | Craswall CP |
| Topography | The survey covers the upper reaches of a small valley. Within the area, the valley bottom rises ~35m from SE to NW and the flanks climb ~70m to the NE and ~50 to the SW. |
| Current Land Use | Grassland – pasture. |
| Geology | Bedrock: St. Maughans Formation - Argillaceous rocks and [subequal / subordinate] sandstone, interbedded. Superficial: Head - clay, silt, sand and gravel – recorded in the valley bottom. No superficial deposits recorded elsewhere. (BGS 2020) |
| Archaeology | The survey includes three areas protected together as a scheduled monument under NHLE list entry 1014536. One area encompasses the ruined monastic buildings and precinct walls, along with other features interpreted as associated hollow ways, building platforms and a quarry converted to a fishpond. A second area covers another feature said to be a quarry reused as a fishpond. The third area covers a substantial dam believed to have maintained both a fishpond and a race for a water mill at its north-eastern end. (HE 1996) |
| Survey Methods | Aerial photogrammetry. |
| Study Area | 39.9 ha |

2.3 Aims and Objectives

To locate and characterise any earthworks or other surface features of possible archaeological interest within the study area.

2.4 Location Map

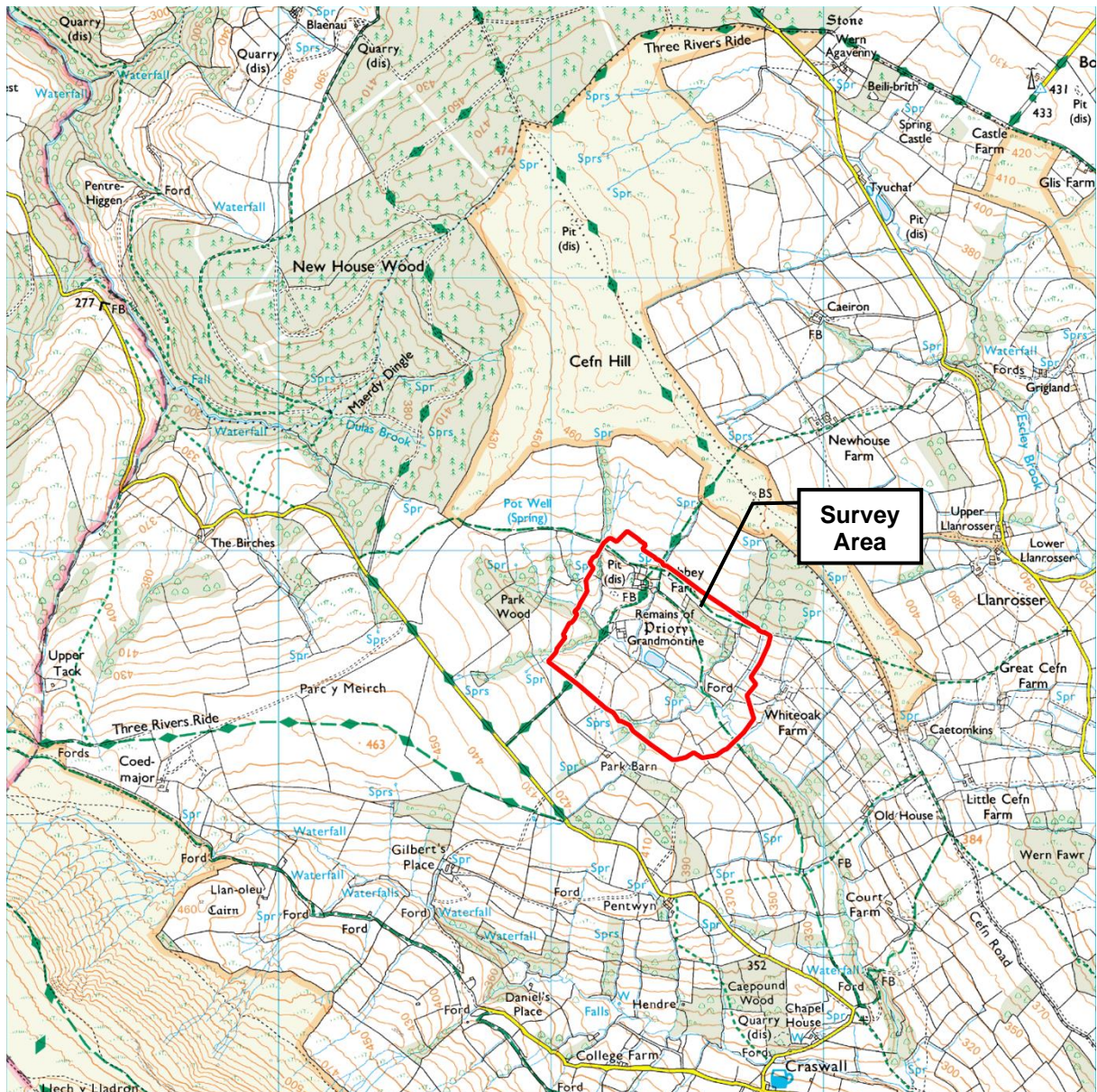


Figure 1 [1:25000] - Site Location

Reproduced from Ordnance Survey's 1:25 000 map with the permission of the controller of Her Majesty's Stationery Office. Crown Copyright reserved. Licence No: AL 50125A

3 METHODS

3.1 Survey Methodology

3.1.1 PHOTOGRAPHY

A UAV with a gimbal mounted camera was flown at 103m above ground level to obtain a spatial resolution of 2.8cm per image pixel.

3.1.2 PHOTOGRAMMETRY

Images were processed in photogrammetry software to produce a 3D pointcloud with a horizontal density of 81 points per square metre. Data were exported as a raster digital elevation model with a 11cm spatial resolution and an orthophoto with a 2.8cm spatial resolution.

3.1.3 REFERENCING

The photogrammetric model was referenced by six ground control points that were distributed around the survey area. These points are visible in the aerial photographs and were also surveyed using high accuracy GPS to facilitate georeferencing to OS coordinates. A best-fit transformation resulted in 3D RMS residual of 8.3cm. Two further points were added for validation which reported a horizontal RMS error of 5.6cm and a vertical RMS error of 1.68m.

3.2 Data Processing and Visualization

3.2.1 DIRECTIONAL LIGHT SHADING

Simulated illumination of the terrain surface from a chosen light source direction. This gives the viewer an intuitive sense of the 3D topography but can fail to reveal some features that are aligned with the light source.

3.2.2 AMBIENT LIGHT SHADING

Simulated illumination of the terrain surface from a continuous encompassing light source. Illumination of a given point is determined by surrounding terrain and other objects which occlude incoming light. It gives the viewer an intuitive sense of the 3D topography but can fail to reveal subtle features near much larger objects.

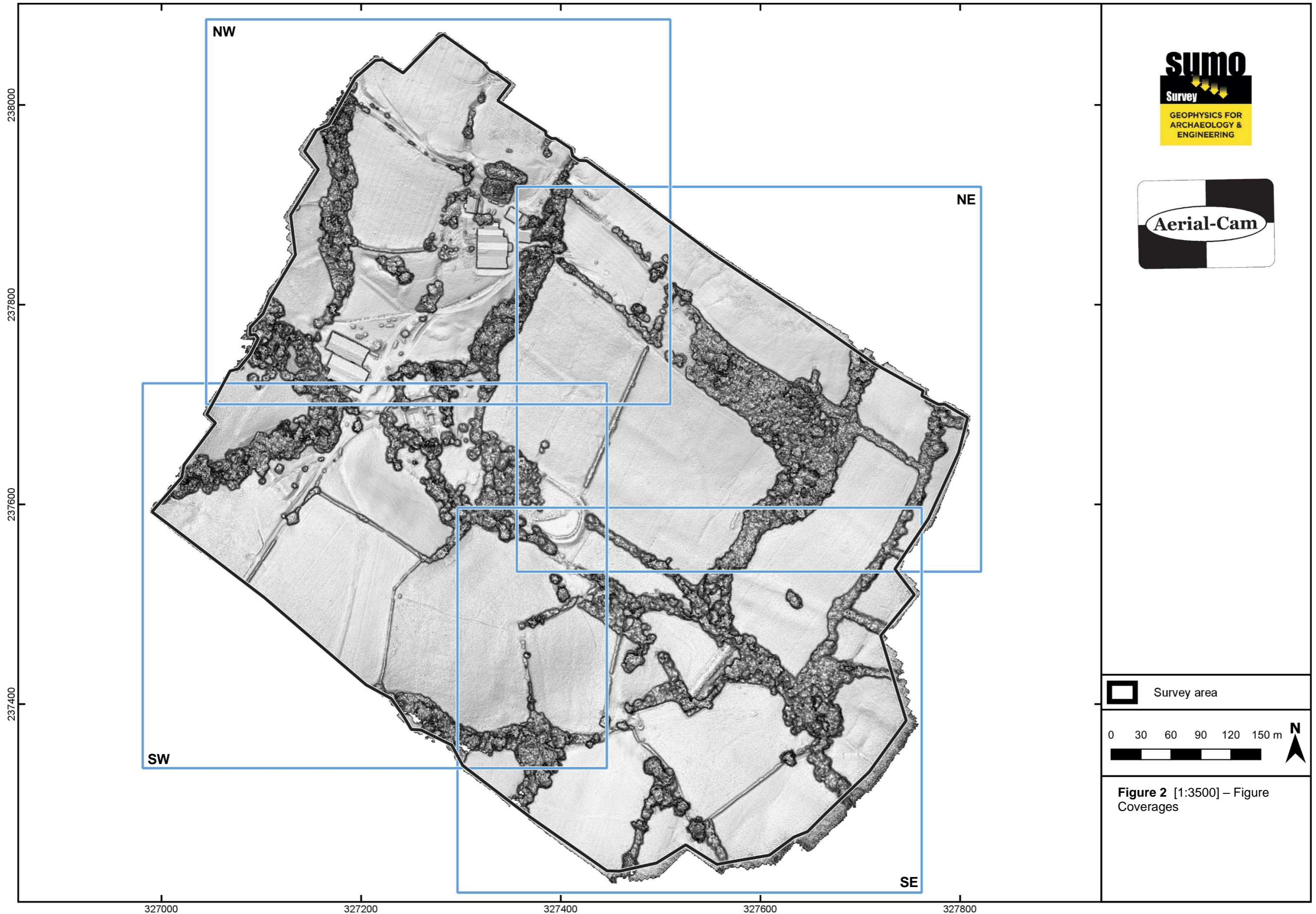
3.2.3 TERRAIN FLATTENING

Terrain flattening entails constructing a mathematical model that approximates broad-scale variation in the topography. This model surface is then subtracted from the original DEM to produce a new dataset that reflects only smaller scale features.

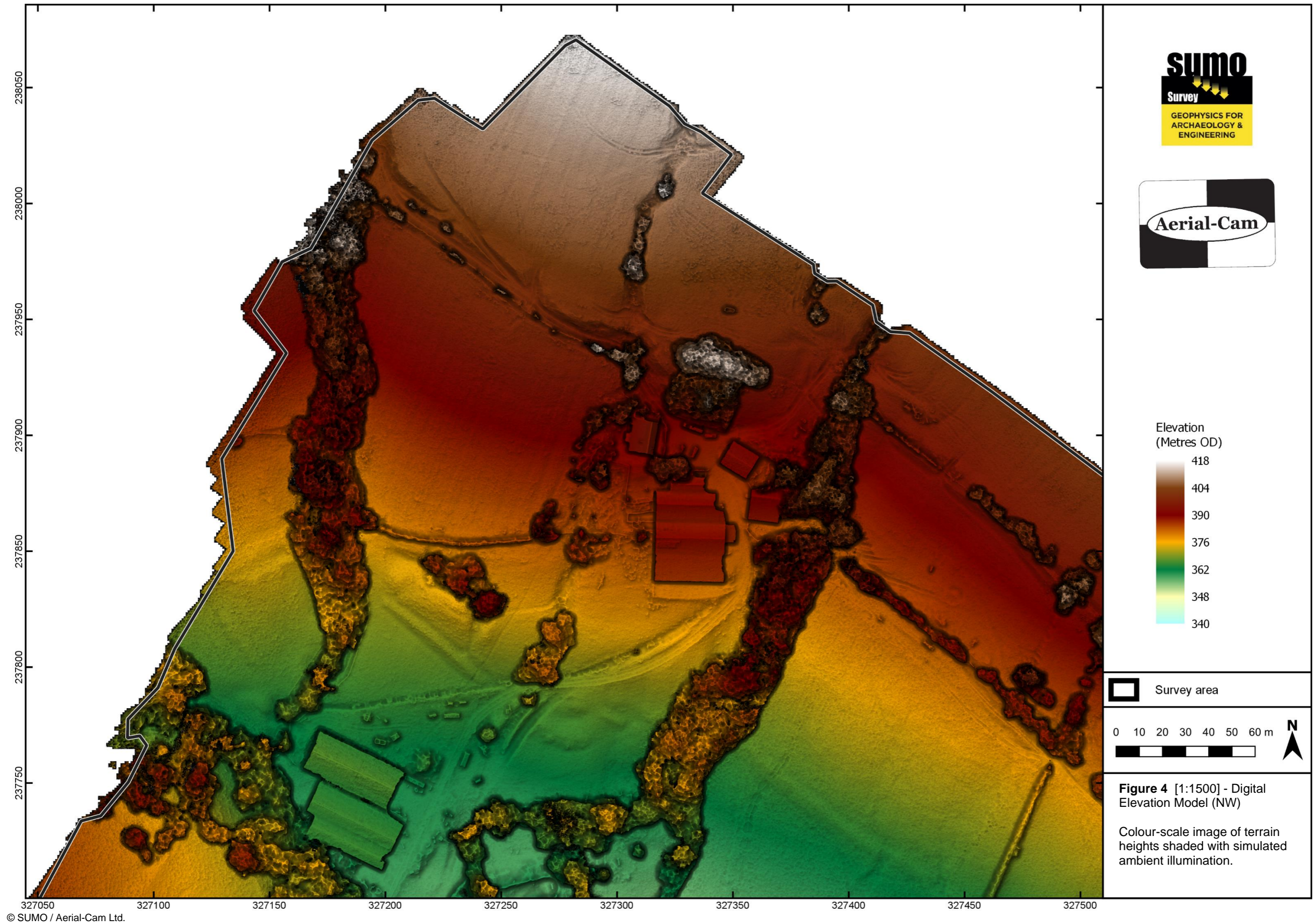
3.2.4 ORTHOPHOTO ENHANCEMENT

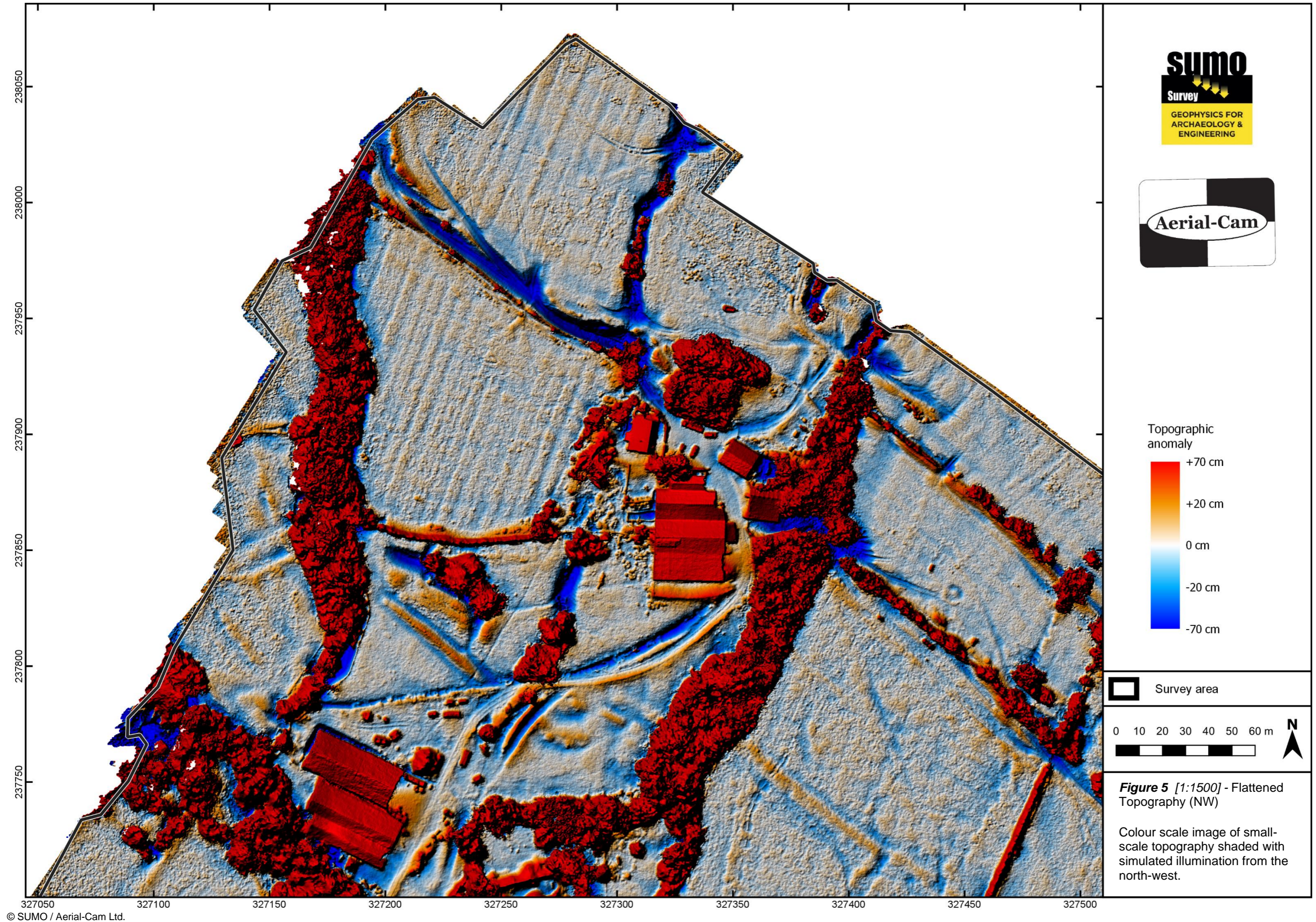
The luminance and colour contrast of the orthophoto image has been enhanced using histogram equalization in the LAB colour space.

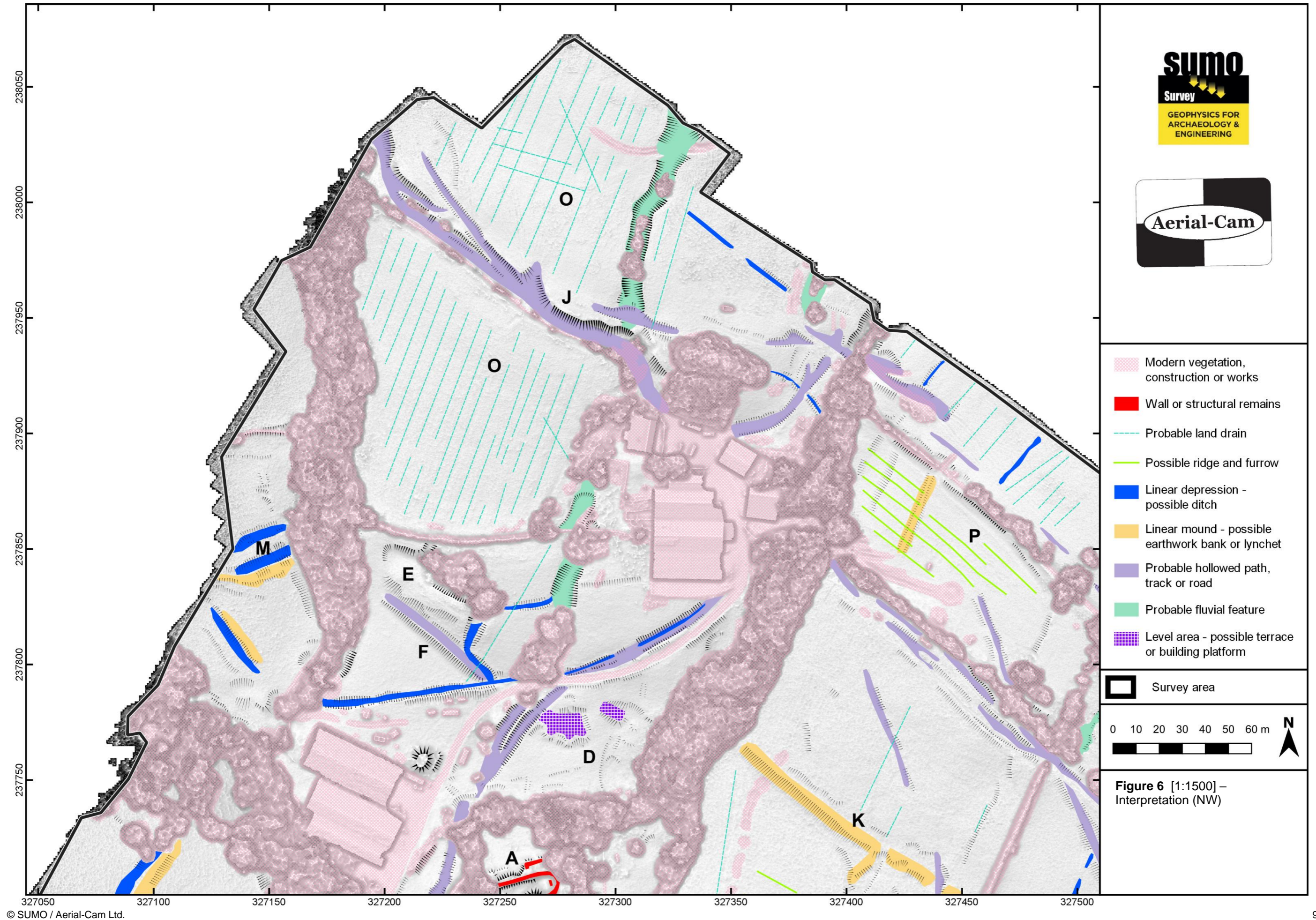
4 RESULTS

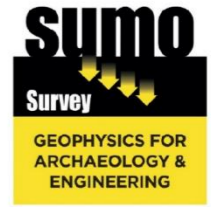













 Survey area

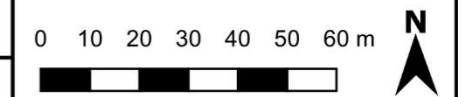
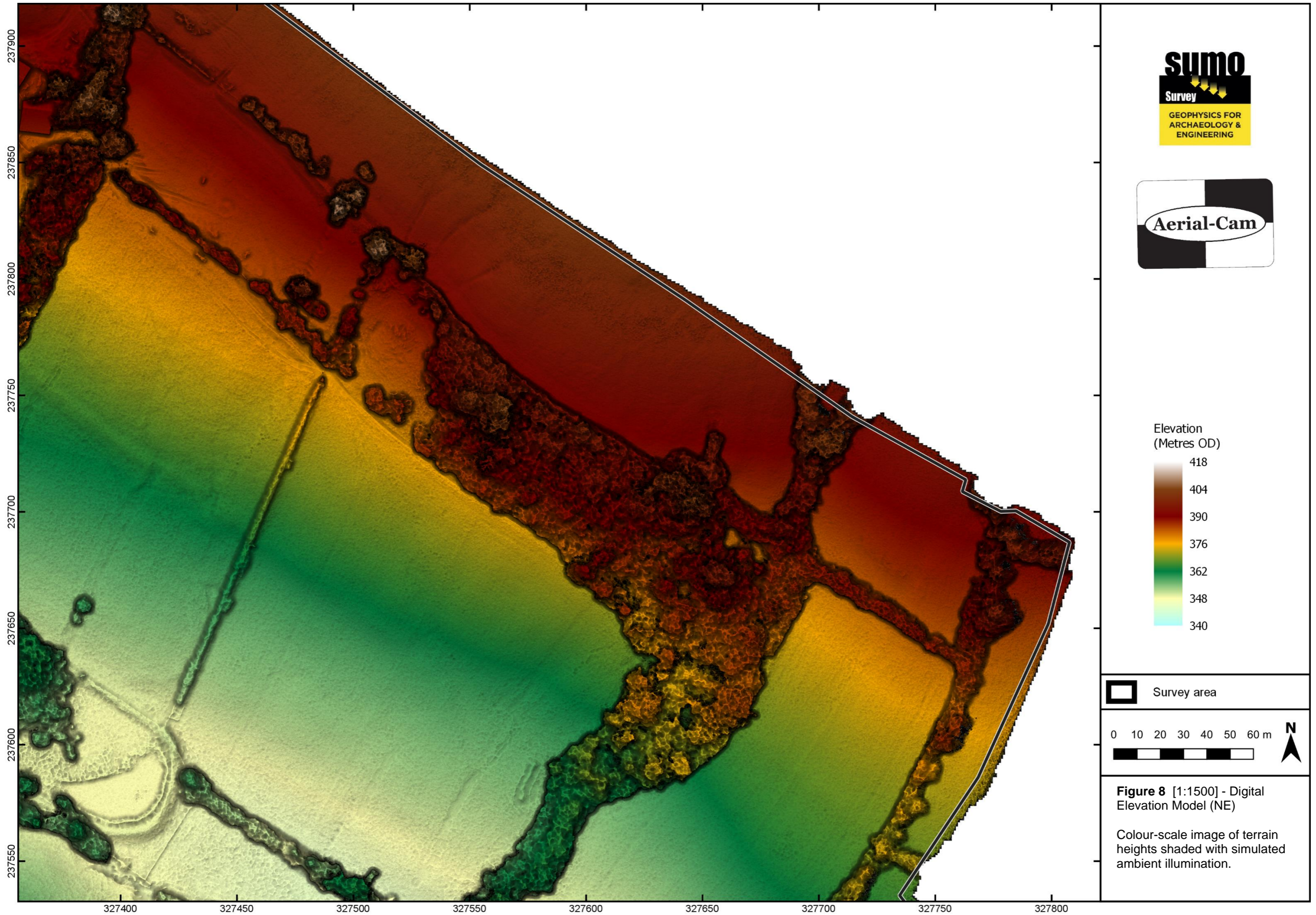
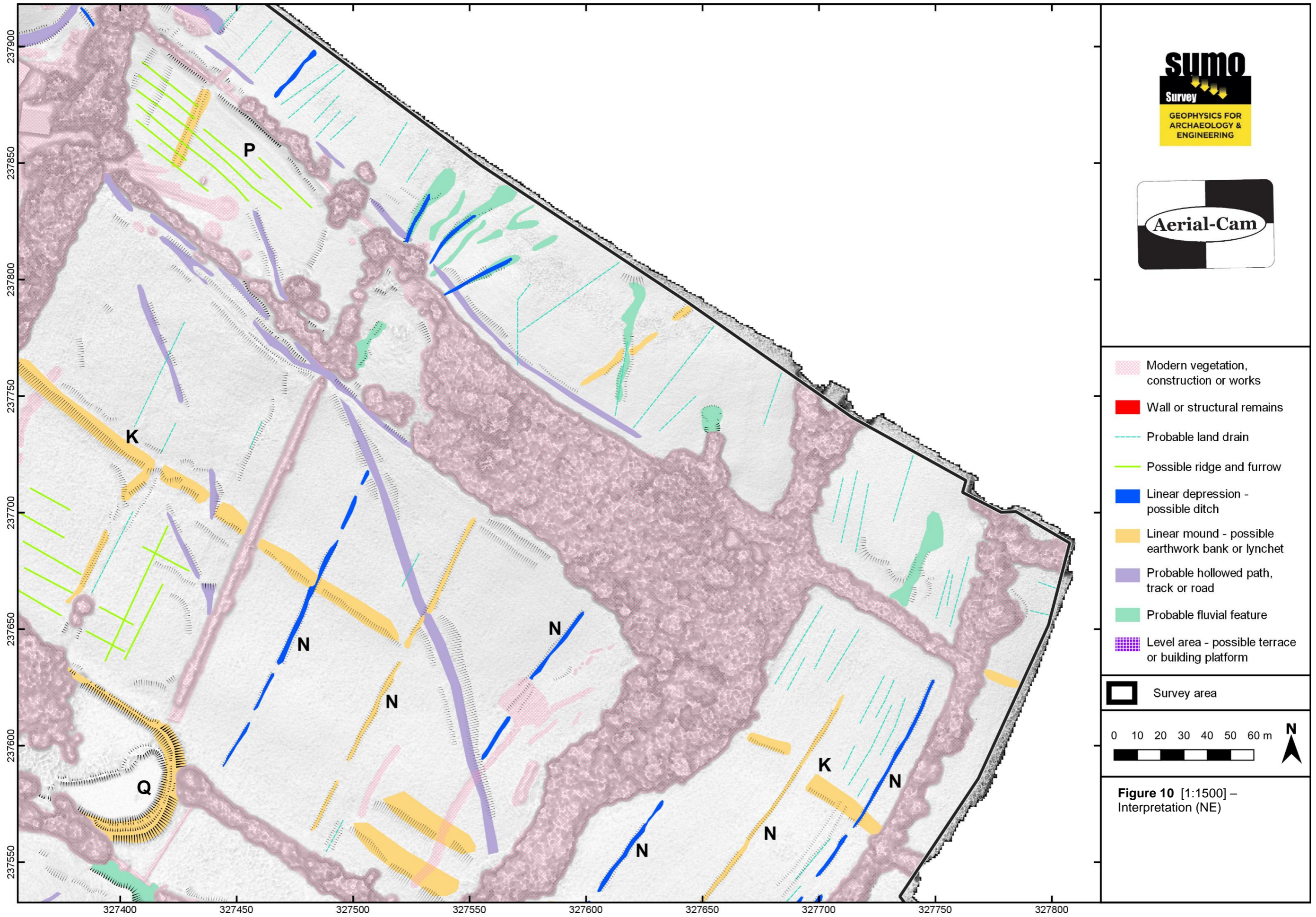
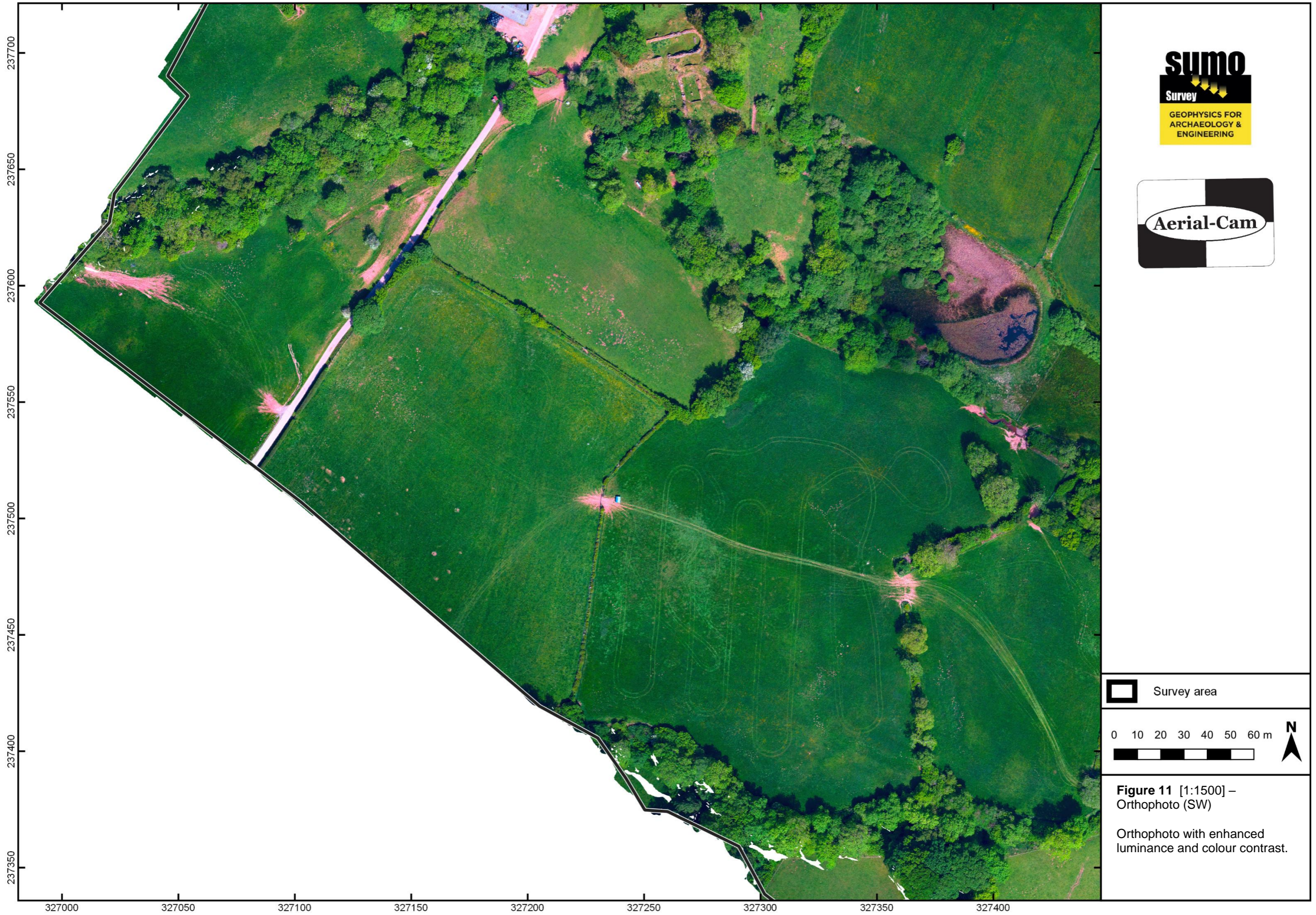


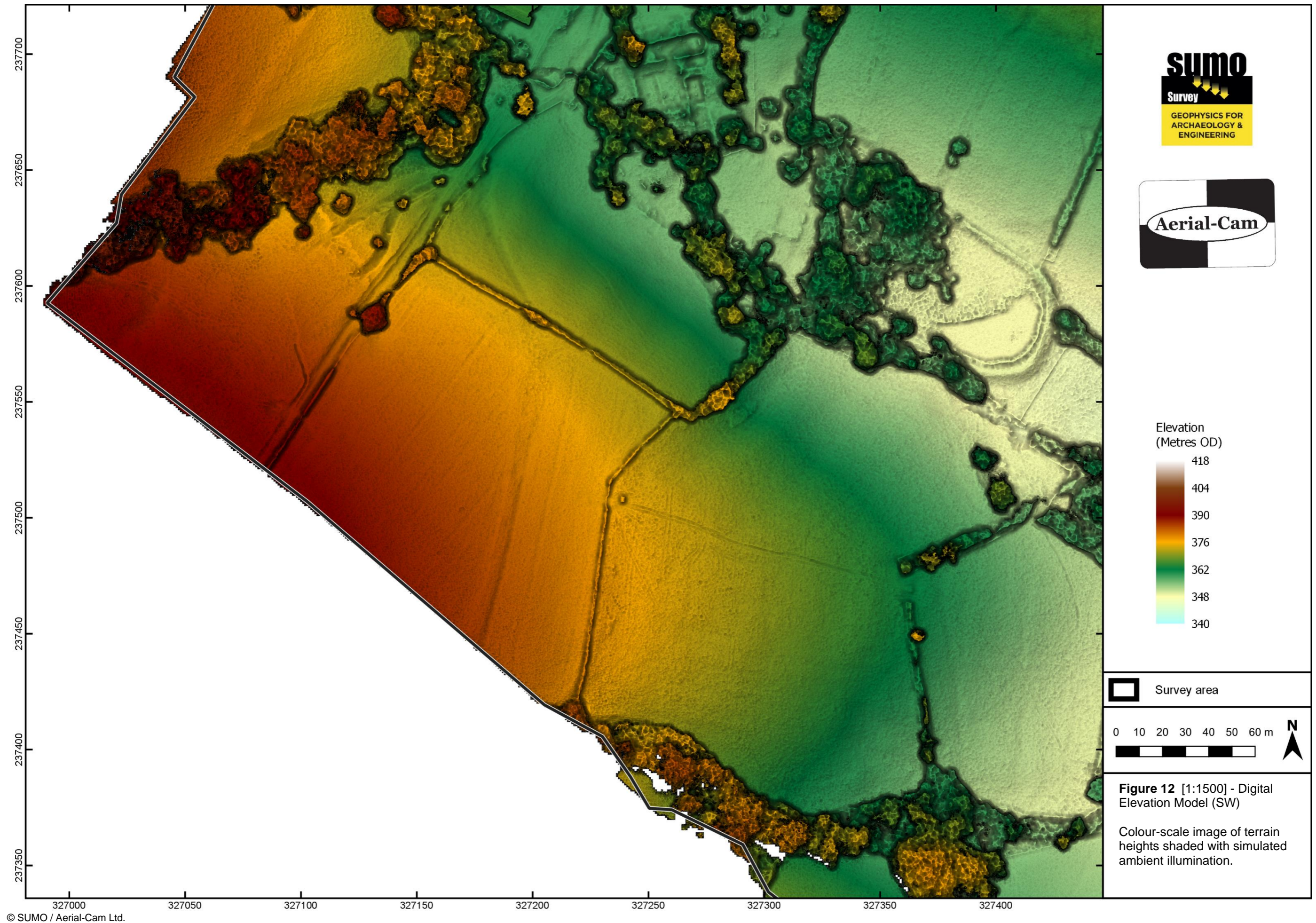
Figure 7 [1:1500] – Orthophoto (NE)

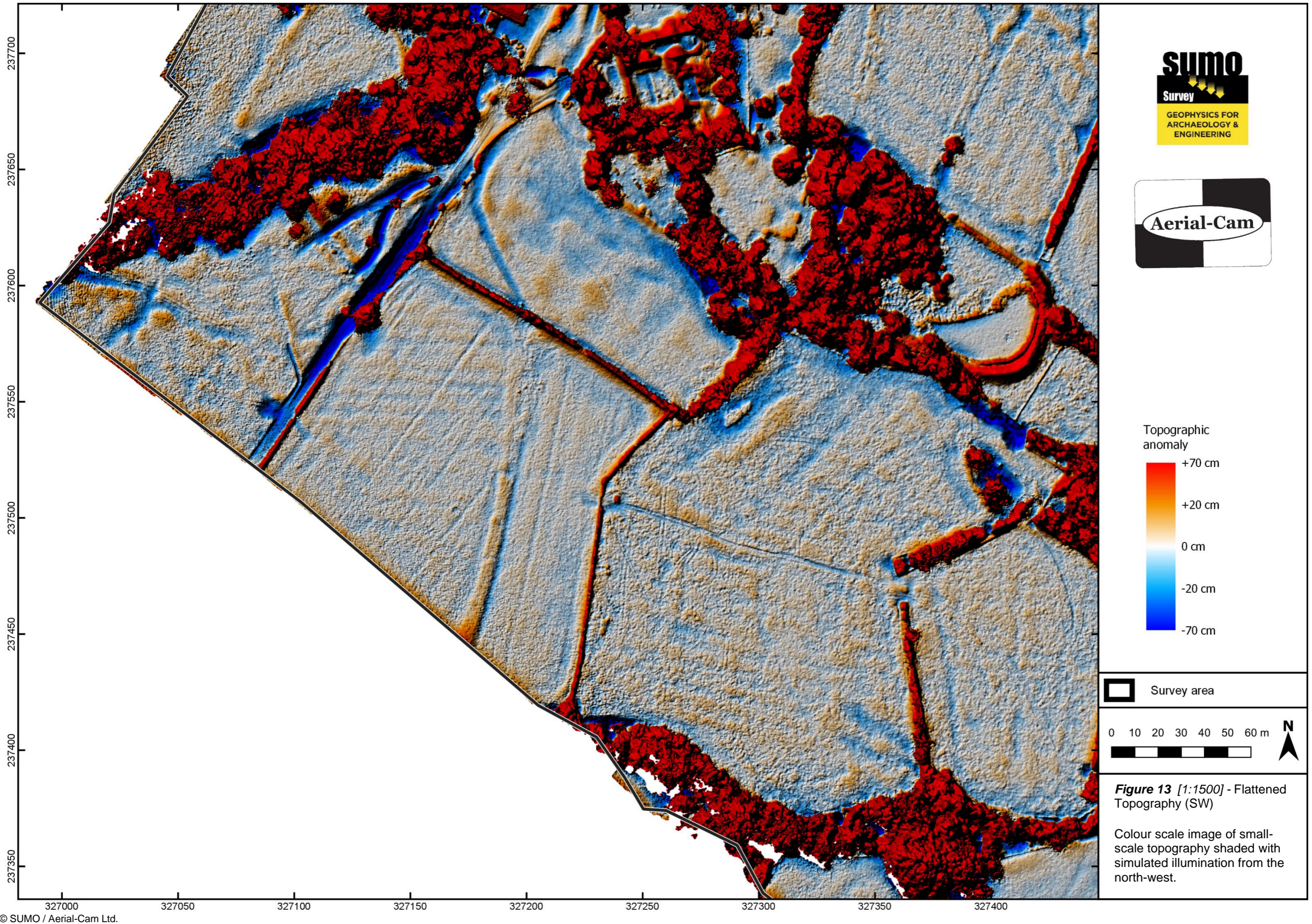
Orthophoto with enhanced luminance and colour contrast.

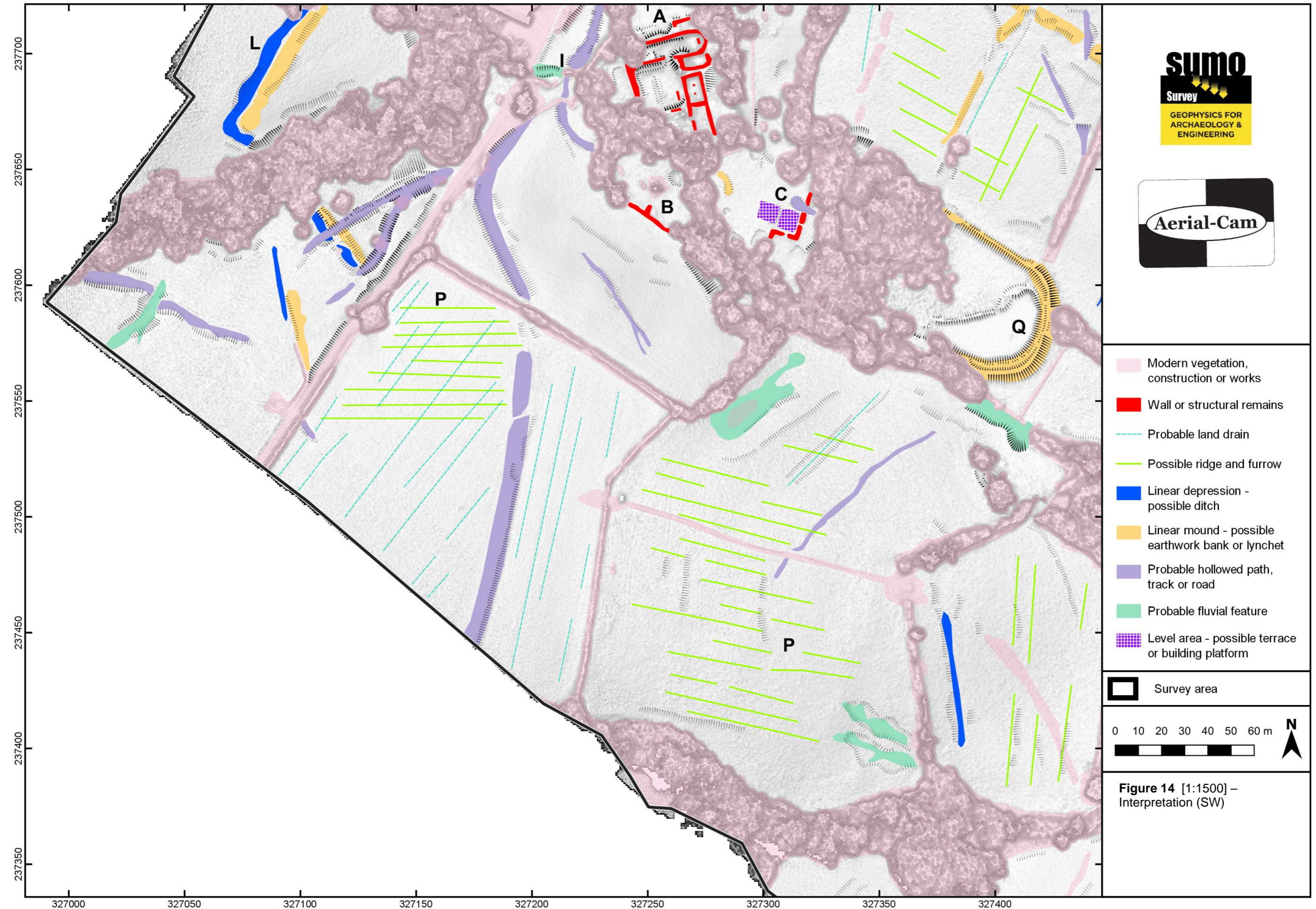


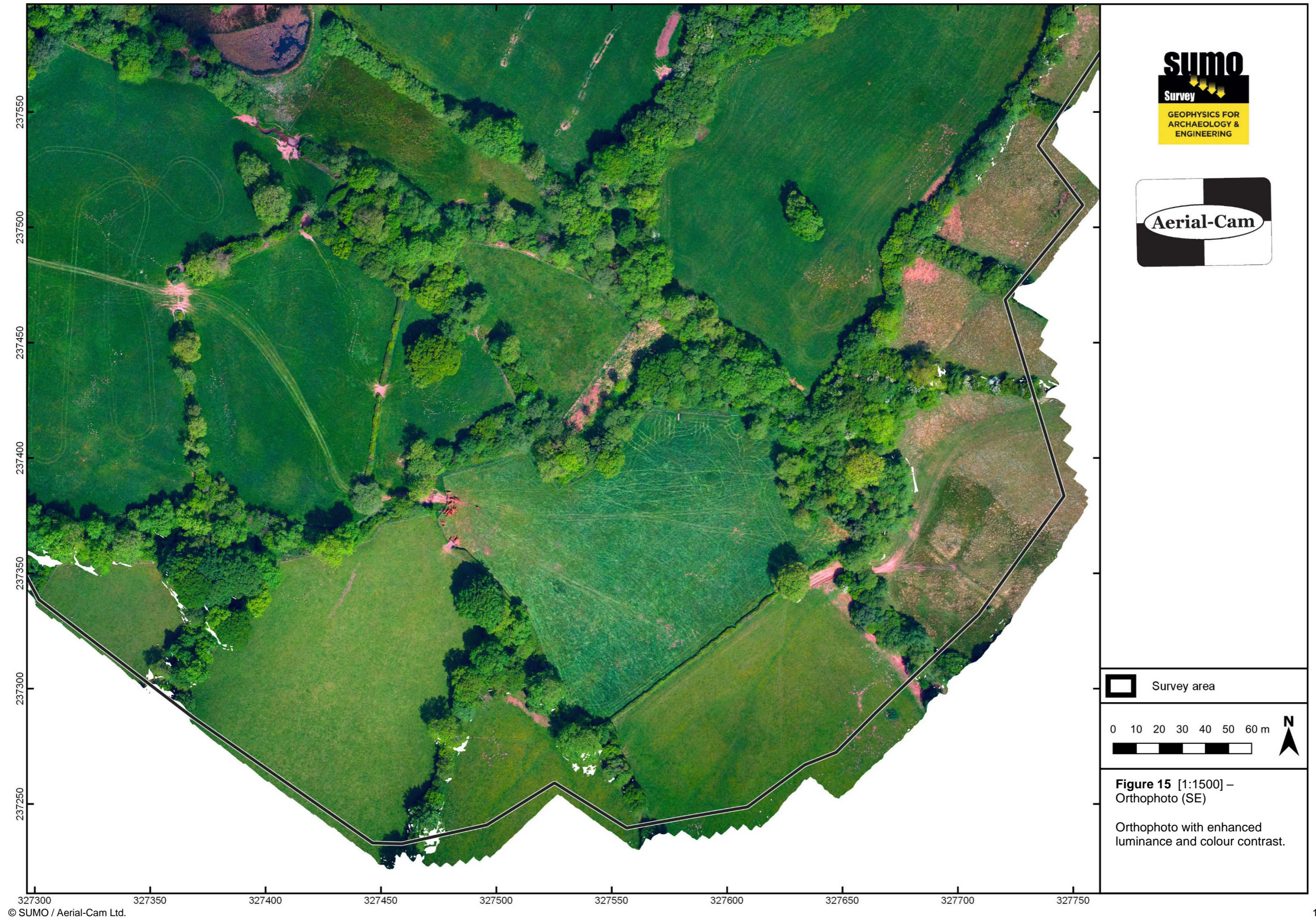


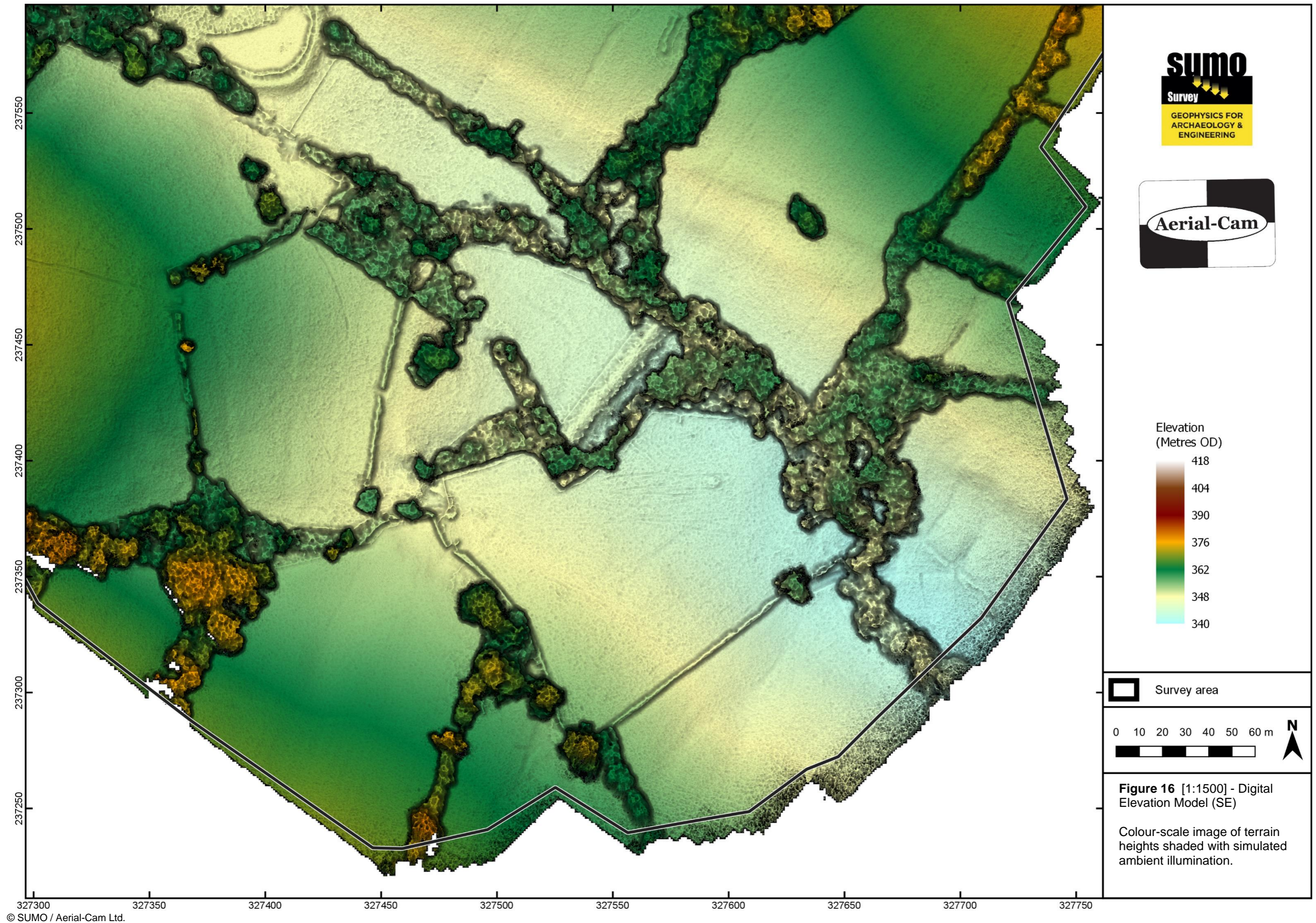


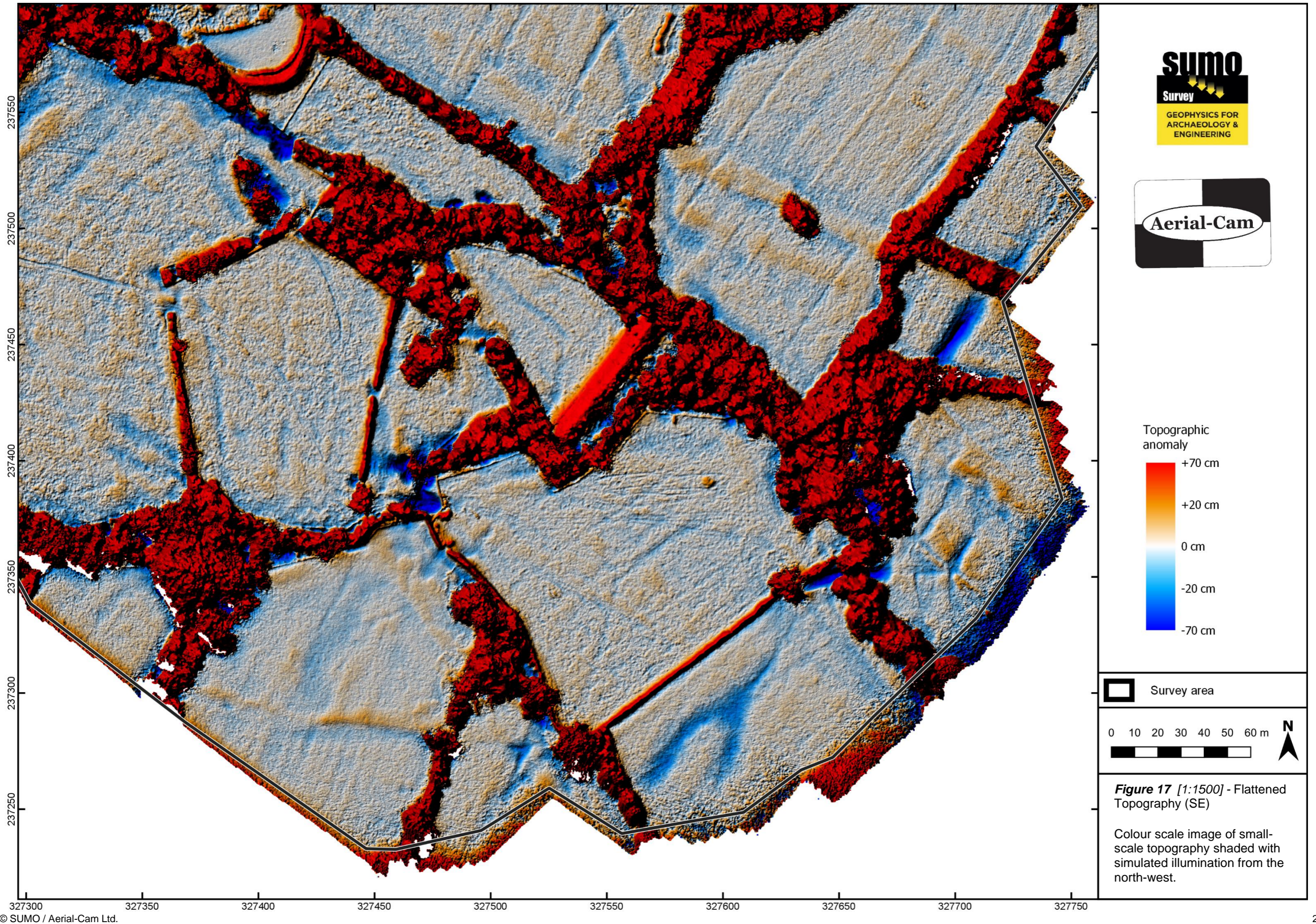


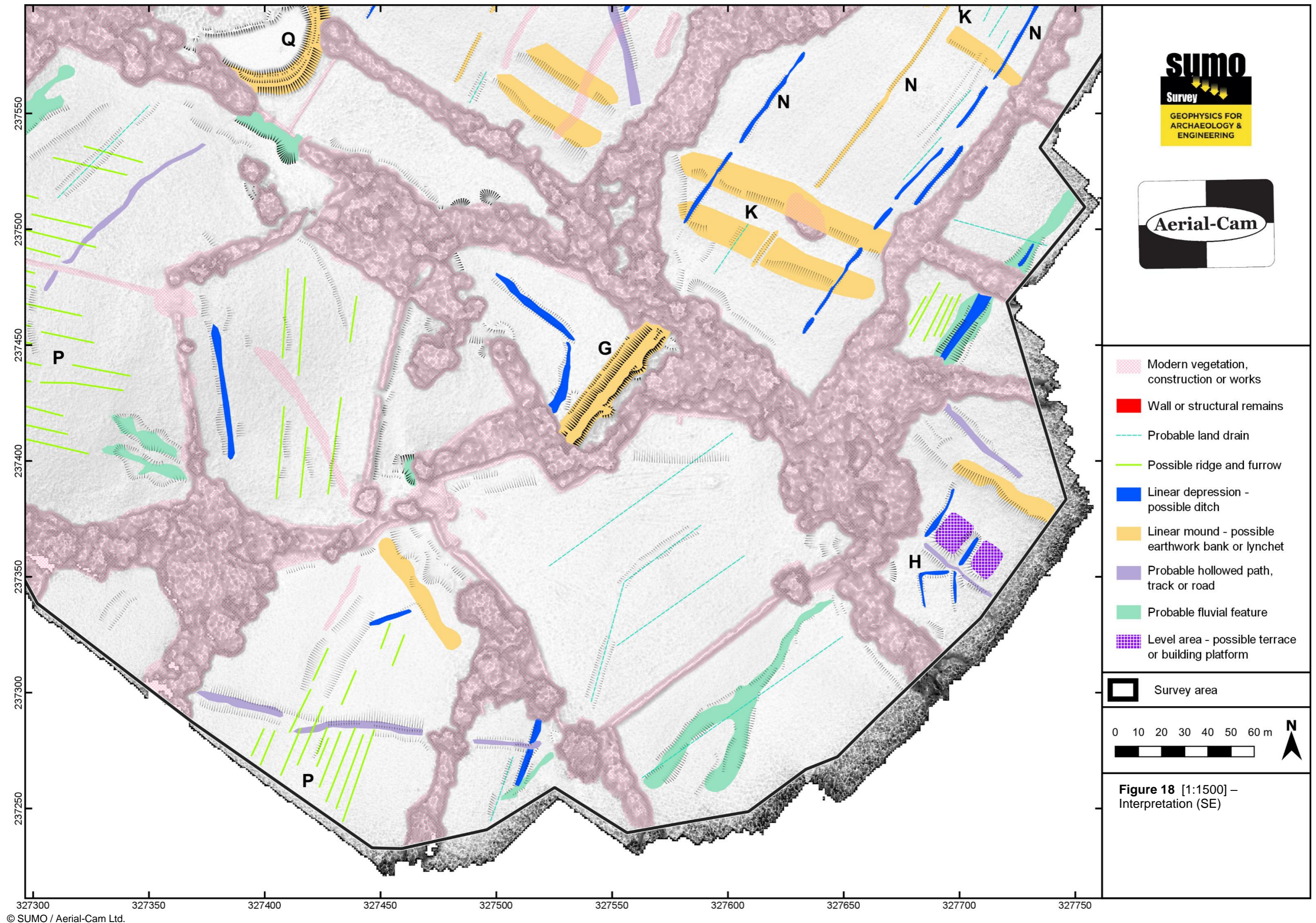


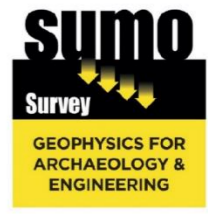
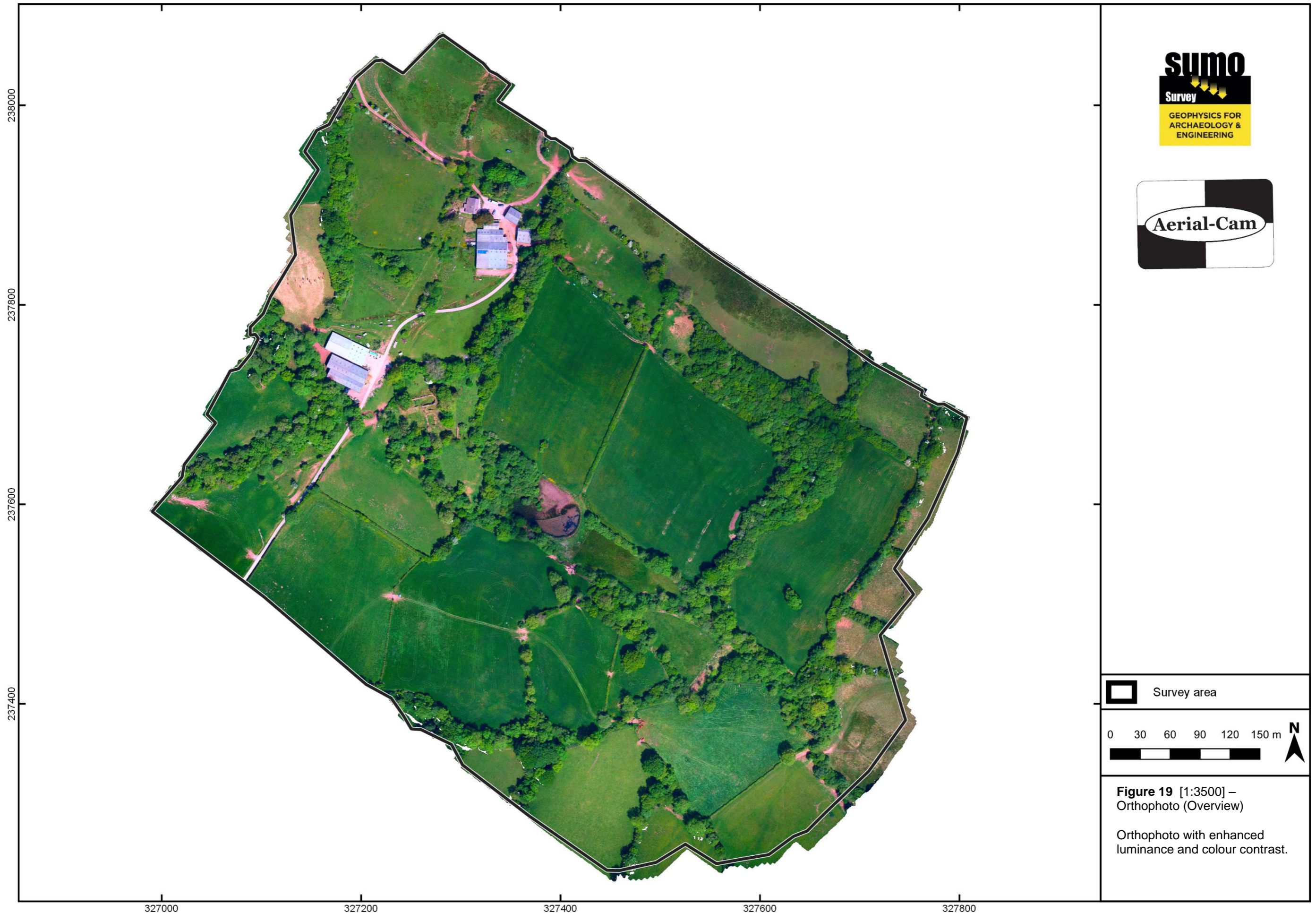












Survey area

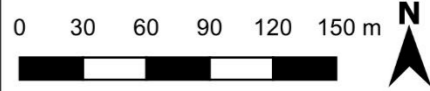
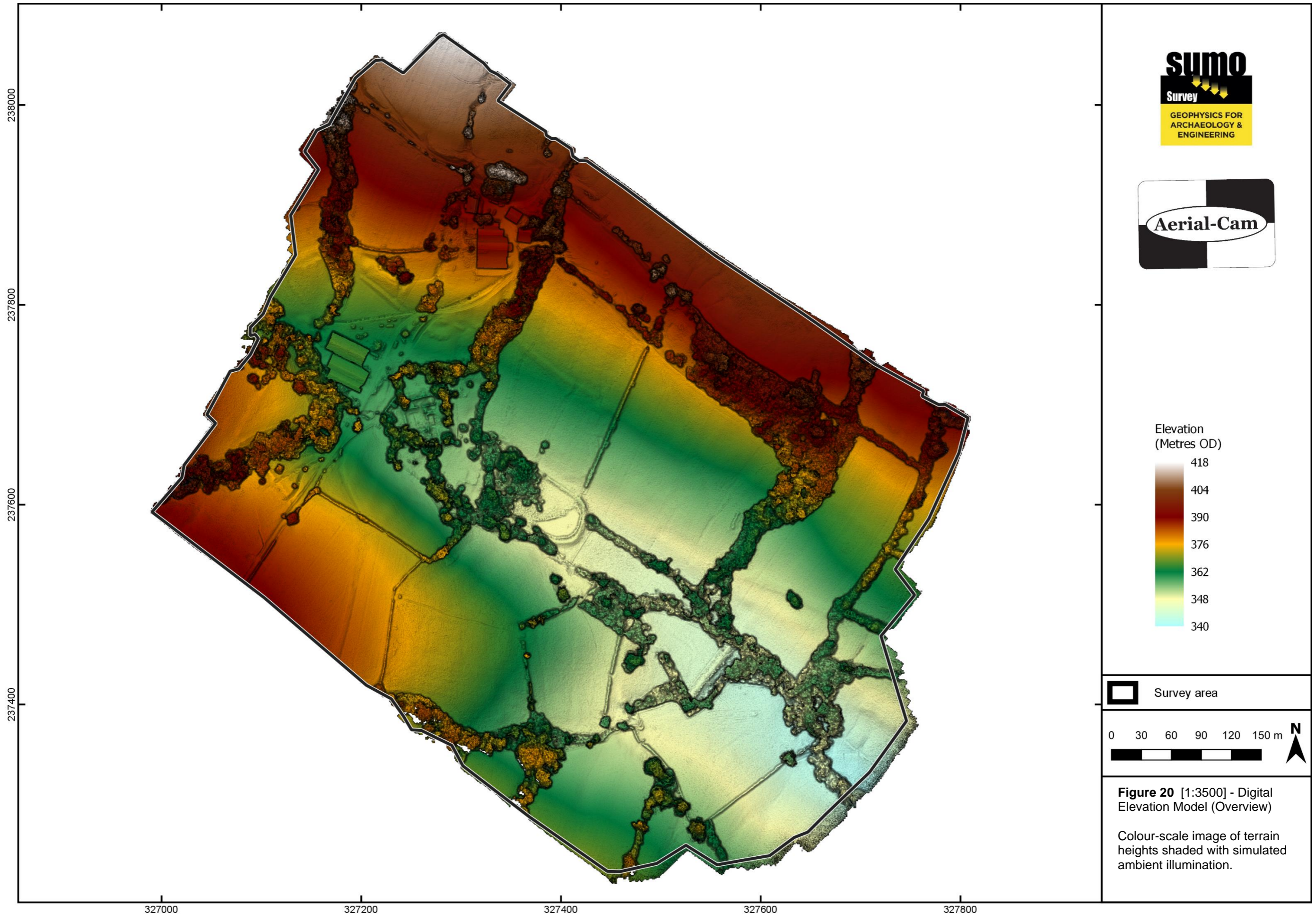
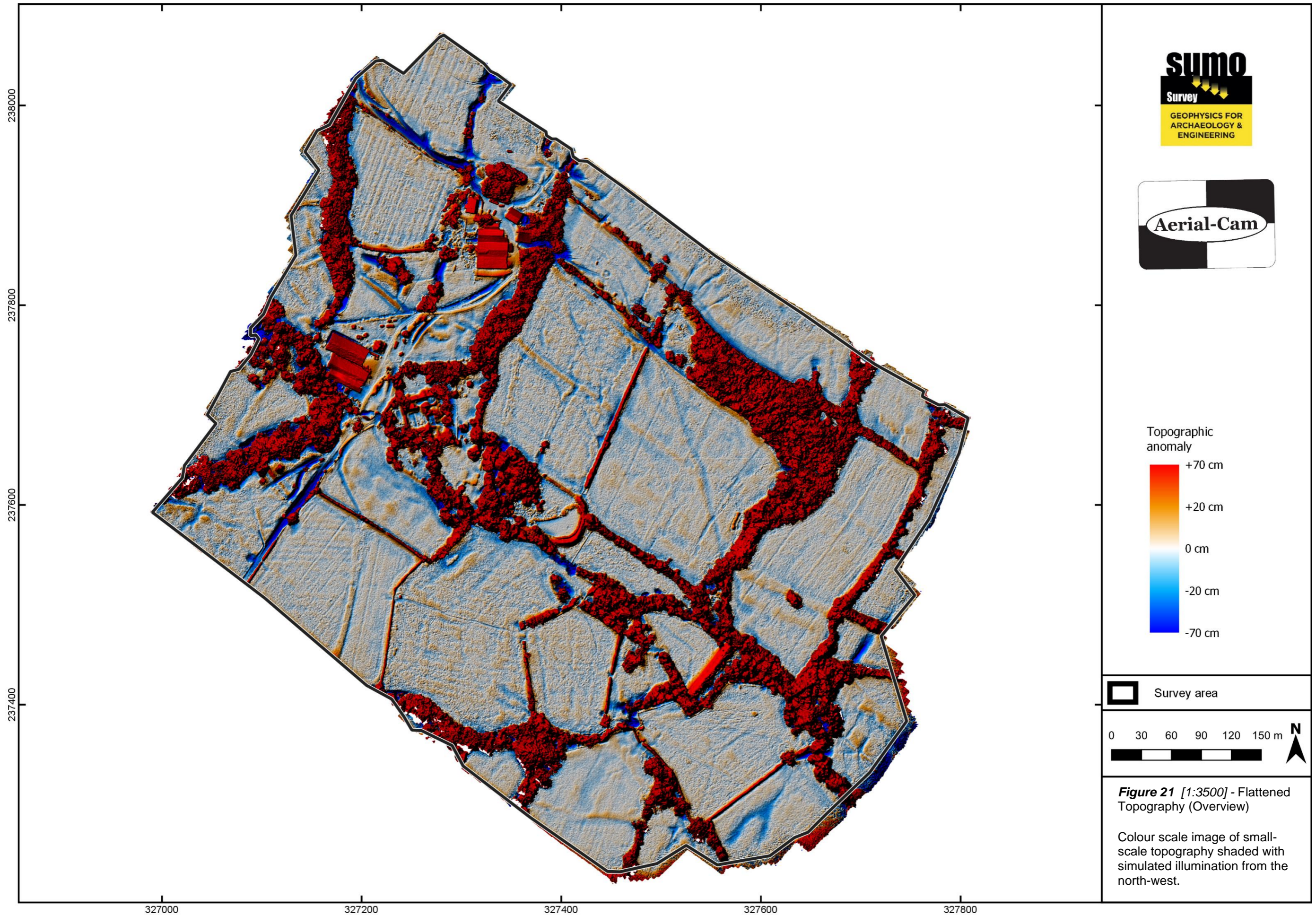


Figure 19 [1:3500] –
Orthophoto (Overview)
Orthophoto with enhanced
luminance and colour contrast.



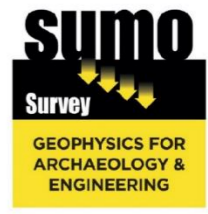




- Modern vegetation, construction or works
- Wall or structural remains
- Probable land drain
- Possible ridge and furrow
- Linear depression - possible ditch
- Linear mound - possible earthwork bank or lynchet
- Probable hollowed path, track or road
- Probable fluvial feature
- Level area - possible terrace or building platform

Survey area
 0 30 60 90 120 150 m

Figure 22 [1:3500] – Interpretation (Overview)



Survey area

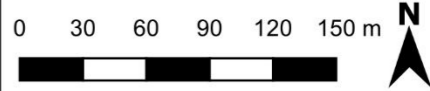


Figure 23 [1:3500] – Locations of profile lines

4.1 Priory Ruins and Precinct

The surviving priory ruins (**A**) are well recorded in the survey where exposed, though significant parts are obscured by fallen debris and vegetation cover.

Two sections of the precinct wall are discernible in the data, one to the south of the priory ruins and another to the south-east.

The section to the south (**B**) is visible for a length of ~20m but probably continues beneath tree cover beyond both ends. It has a small ~4m-long branch-segment projecting NNE.

The section to the south-east (**C**) is visible for a length of ~35m but is also likely to continue beneath tree cover at both ends. It turns in two right angle bends, one of which creates an interior corner that contains a notably level area – possibly a platform for a building. Immediately WNW of this platform is a small scarp creating a second, slightly higher platform where a second building might have existed.

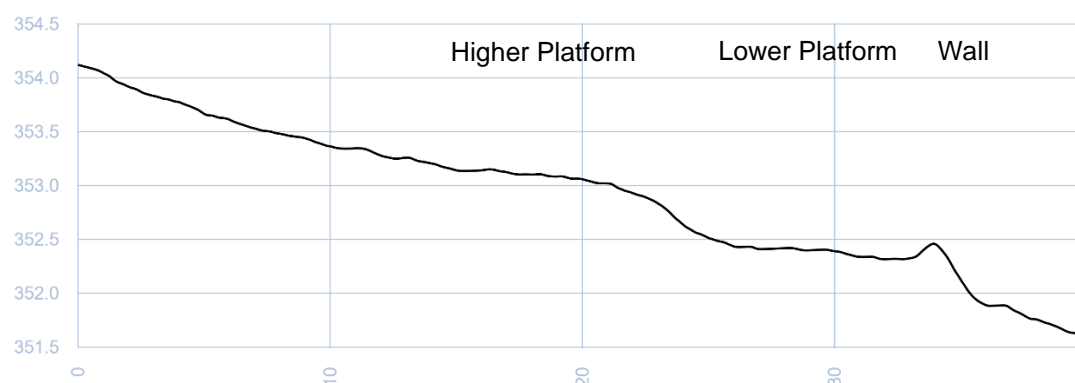


Figure 24 - Profile 1, NW-SE across precinct SE interior and wall

A gap towards the northern end of the south-east precinct wall is passed through by a linear depression. This may be a hollowed path indicating an entrance to the precinct.

Elsewhere in the precinct area there are further subtle scarps, mounds and hollows that may represent interior features, but which lack clear structure.

Most of the remaining length of the precinct boundary is known or inferred to lie close to watercourses and present-day land boundaries (HE 1996). These areas are largely obscured by tree cover and this survey is not able to provide further evidence.

4.2 Terraces / Building Platforms

Roughly 60-80m N-NNE of the priory ruins lies an area of sloped ground that has been landscaped to create two or more level spaces (**D**). These might have been cultivation terraces or platforms for buildings. One is markedly rectangular in shape (~5x10m), while the second is larger (~10x20m) and appears to have two distinct protrusions on its southern, downslope margin.

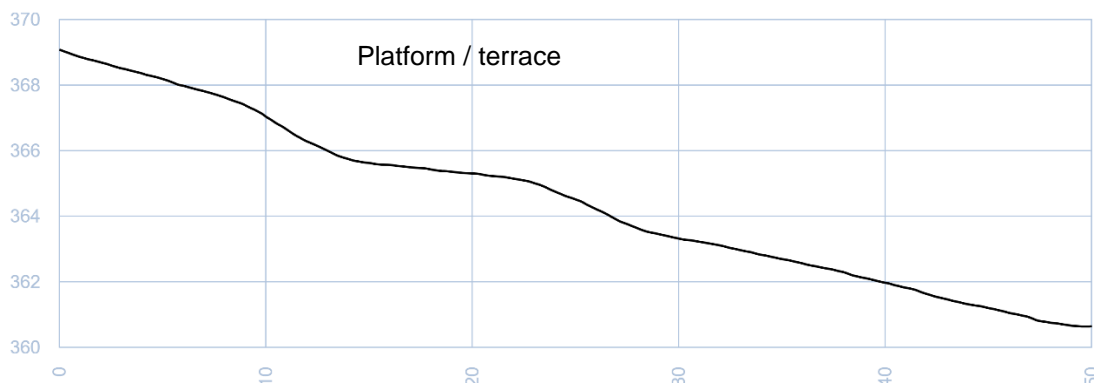


Figure 25 - Profile 2, NNE-SSW across terraced slope north of priory

4.3 Quarry / Fishpond

150m north-west of the priory ruins lies a former quarry pit (**E**), apparently already abandoned on the earliest (1887) detailed Ordnance Survey map. While its date of use is otherwise unknown, there is a high probability that it provided stone for the priory construction.

In Historic England's (HE 1996) scheduling description, this quarry is described as containing remains of a dam and sluice, creating a fishpond. Unfortunately, tree cover has prevented the survey from recording these features.

A narrow ditch runs downslope into this quarry from a stream channel to the north-east. This might have provided a water source to maintain the level of the fishpond. Another ditch exits the quarry downslope to the south and may be an outflow.

Along the south-west side of the quarry lies a distinct linear feature (**F**) of uncertain purpose. It has a consistent ~4m width, a level surface and is almost perfectly straight. These attributes most closely match a track or road (it is drawn onto the interpretation plot as a 'hollowed path, track or road', though it is a positive built structure, not a negative cut feature). While it has the characteristics of a track, it is only ~60m long and does not appear to lead anywhere. It does span most of the gap between two water courses and has a consistent downhill gradient from NW to SE, so a second possibility is that it might have channelled water.



Figure 26 - Profile 3, NW-SE along linear feature south-west of quarry

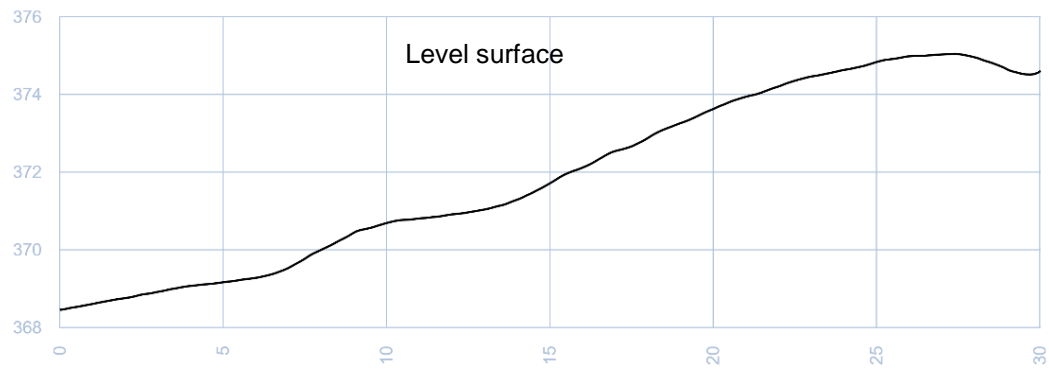


Figure 27 - Profile 4, SW-NE across linear feature south-west of quarry

4.4 Dam, Fishpond & Possible Watermill

400m south-east of the priory ruins lies a substantial dam structure (G) which spans the base of the valley. Roughly 60m of the dam are recorded in the survey data, though both ends are obscured by trees. This dam is understood to have created a fishpond which was part of the priory.

The dam rises ~4m above ground level to its south-east, but only ~1.5m above the ground level to its north-west. This might indicate the presence of substantial sediment deposits in the former pond area, potentially containing preserved archaeological and palaeoecological remains.

Historic England (HE 1996) cite evidence of a watermill once existing beside the north-eastern end of the dam. However, the area is partly obscured by trees and no features could be identified in the survey data to verify this.

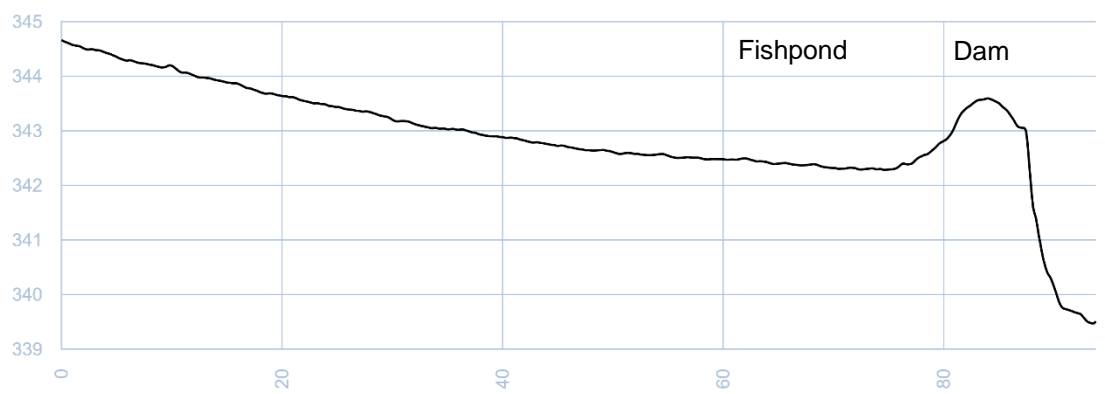


Figure 28 - Profile 5, NW-SE along former fishpond and across dam

4.5 Possible Structures East of Dam

At the far east of the survey there is an area of relatively complex topographical features (**H**) which includes several right angles – possibly indicating the remains of structures. In particular, there are two rectangular areas that are more level than their surroundings and which could represent building platforms.

Separating these areas are a set of roughly downslope-oriented ditches, possibly related to water drainage, and one across-slope linear feature which may be a hollowed path or track.

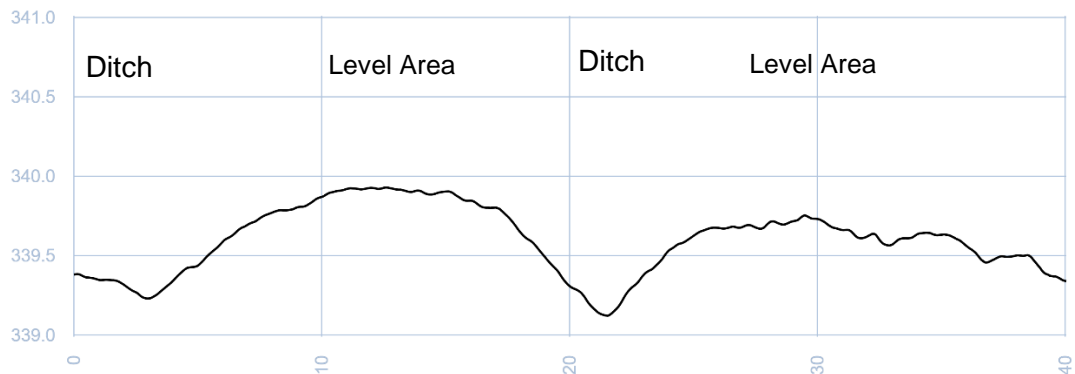


Figure 29 - Profile 6, NW-SE across possible building platforms

4.6 Hollow Ways

Numerous apparent hollowed paths, tracks and roads are visible in the survey data. These differ significantly in size and form, and are likely to represent various types of activity over a long time period. Many are in current use, and rutted bare earth on the orthophoto indicates that some are subject to active erosion from present-day traffic.

The most prominent system of hollow ways runs SSW to NNE through the western third of the survey area. Multiple routes converge to cross a ford (**I**) 20m west of the priory ruins. North of the ford, the route continues NNE towards Abbey Farm, splitting into two, which run almost parallel for around 50m. Beyond Abbey Farm the routes diverge, with the most deeply eroded tracks turning left (**J**) to leave the area to the north-west. Much of this system corresponds with a road shown on Ordnance Survey maps from the earliest (1887) onwards, and which was replaced by the modern lane between 1963 and 1973. This is likely to have been the primary road through the area over much of the 19th and 20th centuries, and perhaps also preceding centuries. As such, relatively modern activity could account for its depth and there may be no reason to assume it was in use during the mediaeval period. Additionally, historic Ordnance Survey maps show this route cutting obliquely through the precinct walls – possibly indicating a later date.

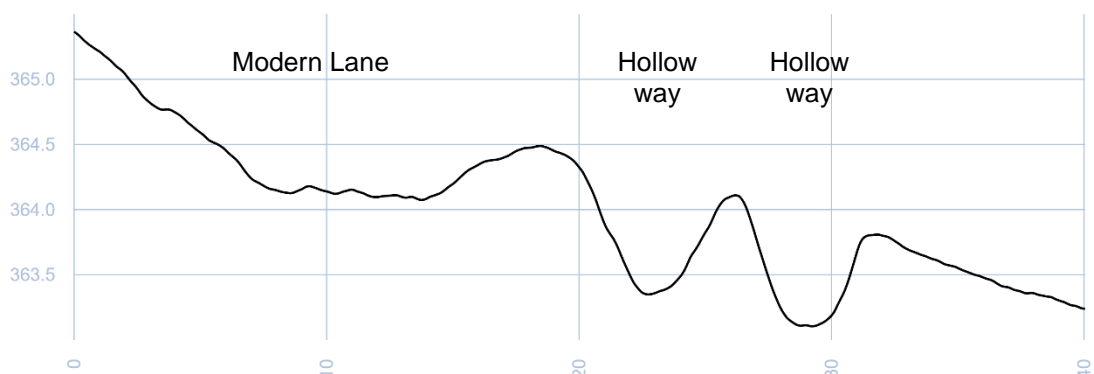


Figure 30 - Profile 7, NW-SE across close parallel hollow ways

4.7 Former Field and Land Boundaries

Several broad and slight linear features across the site may represent former land or field boundaries. Two such features are shown as field boundaries on the 1887 Ordnance Survey map. Those not shown are likely to have been abandoned and removed prior to this date.

Some of these features (**K**) have a morphology consistent with lynchets and might have existed only as hedgerows.

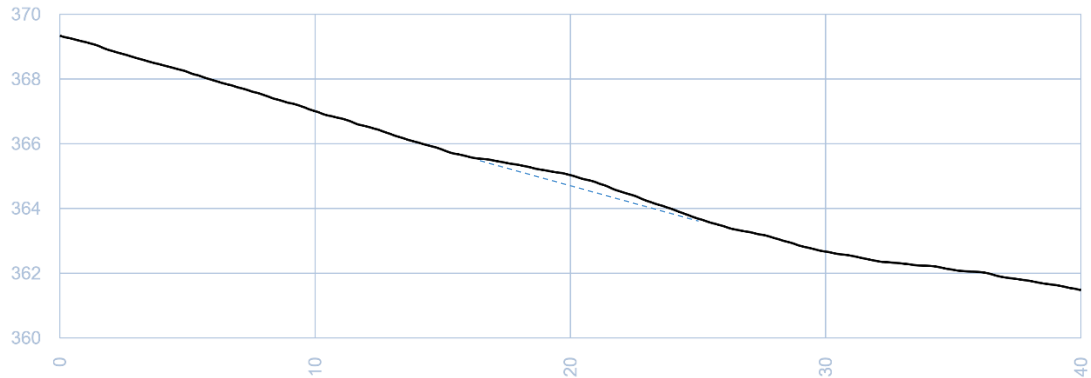


Figure 31 - Profile 8, NE-SW across earthwork bank or lynchet

Others have forms that suggest deliberate construction as banks and/or ditches. One (**L**) appears to be formed primarily as a ditch, perhaps with very slight banks on either side. Another (**M**) may be comprised of two ditches. These features may be more significant than just field boundaries – perhaps marking the bounds of an estate, for example.

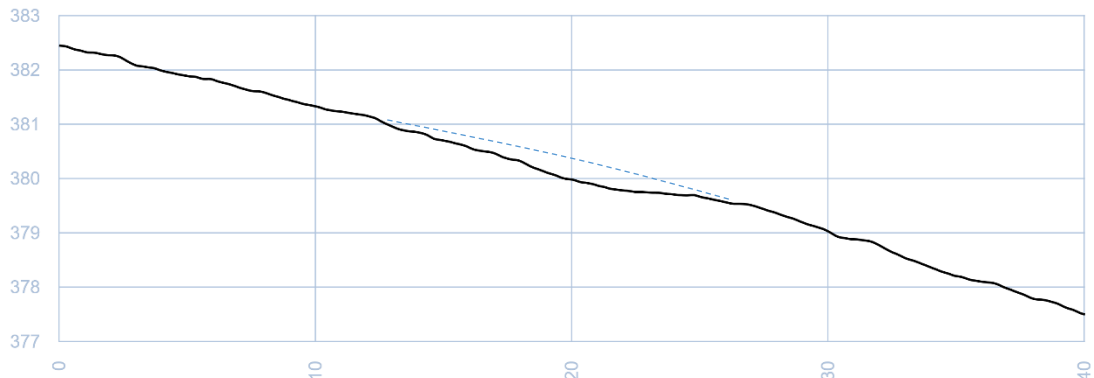


Figure 32 - Profile 9, NW-SE across possible boundary ditch

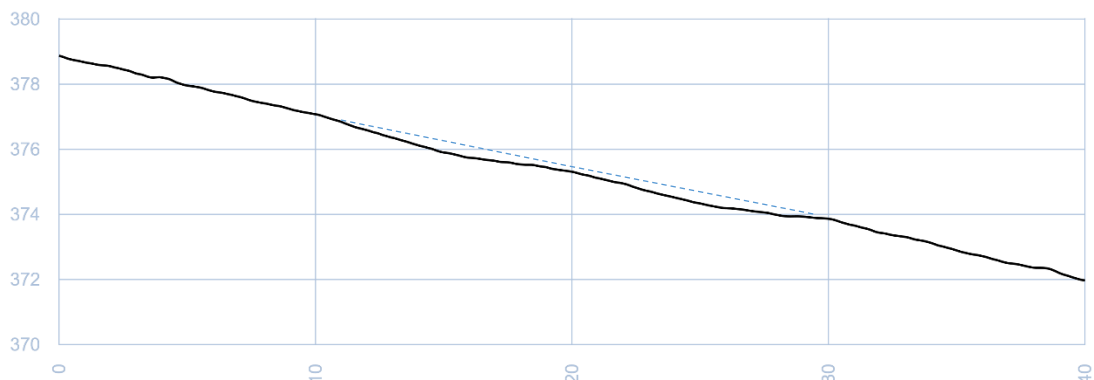


Figure 33 - Profile 10, NNW-SSE across possible double-ditch boundary

On the valley side west of the priory ruins are a series of narrow downslope earthworks (**N**) that might also represent some sort of land division. They are discernible in two present-day fields, and in each case there are three features which alternate ditch-bank-ditch. At least one of these features cuts (and therefore post-dates) an earthwork associated with a field boundary shown on 20th-century Ordnance Survey maps – probably indicating a modern origin.

4.8 **Land Drainage**

There are a considerable number of features, particularly across the upland regions of the site, that are likely to relate to land drainage.

Some of these features are singular ditches, often augmenting a natural fluvial channel or gully. These could originate from any era, and some may be of archaeological interest.

The majority of apparent land drainage activity take the form of evenly spaced parallel lines (e.g. **O**). In these cases, it is almost certain to be modern.

4.9 **Possible Ploughing Remains**

There are several areas where apparent parallel ridges (e.g. **P**) may represent the remains of historic agricultural activity. In all cases the features are eroded and lack clear and distinctive form that might indicate their age.

4.10 **Modern Pond**

An arcuate bank in the centre of the site embays a pond (**Q**). This is described by Historic England (HE 1996) as having been constructed in the 1970s.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

The photogrammetry survey has produced a detailed model which has adequately resolved surface features smaller than 0.4m in size.

Comparison with Environment Agency lidar data reveals a vertical discrepancy that varies between -1.7m (in the north-east of the site) and +3.2m in the west and south-east.

6 CONCLUSION

The aerial photogrammetry survey at Craswall has provided a detailed dataset which is able to clearly resolve a number of features of probable archaeological interest. These include possible building platforms, former land and field boundaries and hollow ways.

7 REFERENCES

- | | |
|----------|---|
| BGS 2020 | British Geological Survey - Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html (Accessed 10/07/2020) |
| HE 1996 | Historic England - Craswall Priory, associated building remains, pond bays and hollow ways. https://historicengland.org.uk/listing/the-list/list-entry/1014536 (Accessed 10/07/2020) |