BROAD TOWN WHITEHORSE TOPOGRAPHIC ANALYSIS 2025 V2B

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Updated Sept, Nov and Dec 2025 to V2B

Broad Town White Horse Topographic Analysis

In response to a tasking received from the Broad Town White Horse Restoration Group (Andrew Law and Derek Greer project directors), fieldwork was undertaken at the Broad Town White Horse (BTWH) site, Broad Town, Wiltshire on the 28th June 2025. The site survey designed was twofold. First, to establish the exact position and condition of the current white horse and surrounding slope. Second, investigate the topography of the white horse for any evidence of its previous incarnations. To achieve both these aims, a detailed topographic analysis was undertaken of the horse itself with a lower resolution survey of the surrounding hillside to establish slope with GNSS (Global Navigation Satellite System) measurements. This data is supplemented with data gathered via UAV (Unmanned Aerial Vehicle) to be processed in Agisoft, Photoscan.

LiDAR Imaging

Prior to any fieldwork being undertaken the Lidar of the rough location of the horse was investigated to establish a basic context to fit any further work into. The LiDAR analysis was conducted utilising Defra's Digital Terrain Model (DTM) and Digital Surface Model (DSM) 1m resolution tiles (DEFRA, *2025*). Both DTM and DSM were processed. The DTM has structures and vegetation removed allowing raw earth analysis of ground and slope. The DSM has these intact allowing an understanding of the current vegetation state and the impact of viewsheds this creates.

The Digital Terrain Model was created was created from 4 5x5km tiles from E:405000 N:170000 - E:415000 N:185000, with a height range of 74.7-270.5m OD. From this other Analyses were performed and stacked to highlight the topography further (Table 1).

Analysis	**Description**	**Range**	**Stretch Type**		**Transparency**
Elevation	Measures Elevation	74.7-270.5m OD	Standard Deviation		50%
Simple Local Relief Model (SLRM)	Measures localised changes in the Topography after a mean from 20 surrounding positions has been normalised	0-161	Standard Deviation		50%
Slope	Measures Slope from the Horizontal	-1 – 74°	Percentage Clip		60%
Multi Directional Hillshade	Computes the direction of slope and shades appropriately	Band 1: Red Band 2: Green Band 3: Blue	Standard Deviation		0%

Table 1: Analyses making up the stacked LiDAR DTM of BTWH

Stretch Type and Transparency Explanation.

GIS allows the enhancement of a images visual appearance by manipulating pixel values to better differentiate features, spreading the original pixel value range across a new, more useful range, often the full dynamic range of the pixel's bit depth:

Max-Min: Displays the full range of values in the raster Image

Percentage Clip: Clips the highest and lowest percentage (0.5%) of the images value removing extremes.

Standard Deviation: Categorises the data based on the Standard Deviation decreasing the impact of the extremes of the value range

Transparency for each layer to create a richer image with all the data being shown simultaneously. The Transparency is set by user to best demonstrate all values as they seek to illustrate.

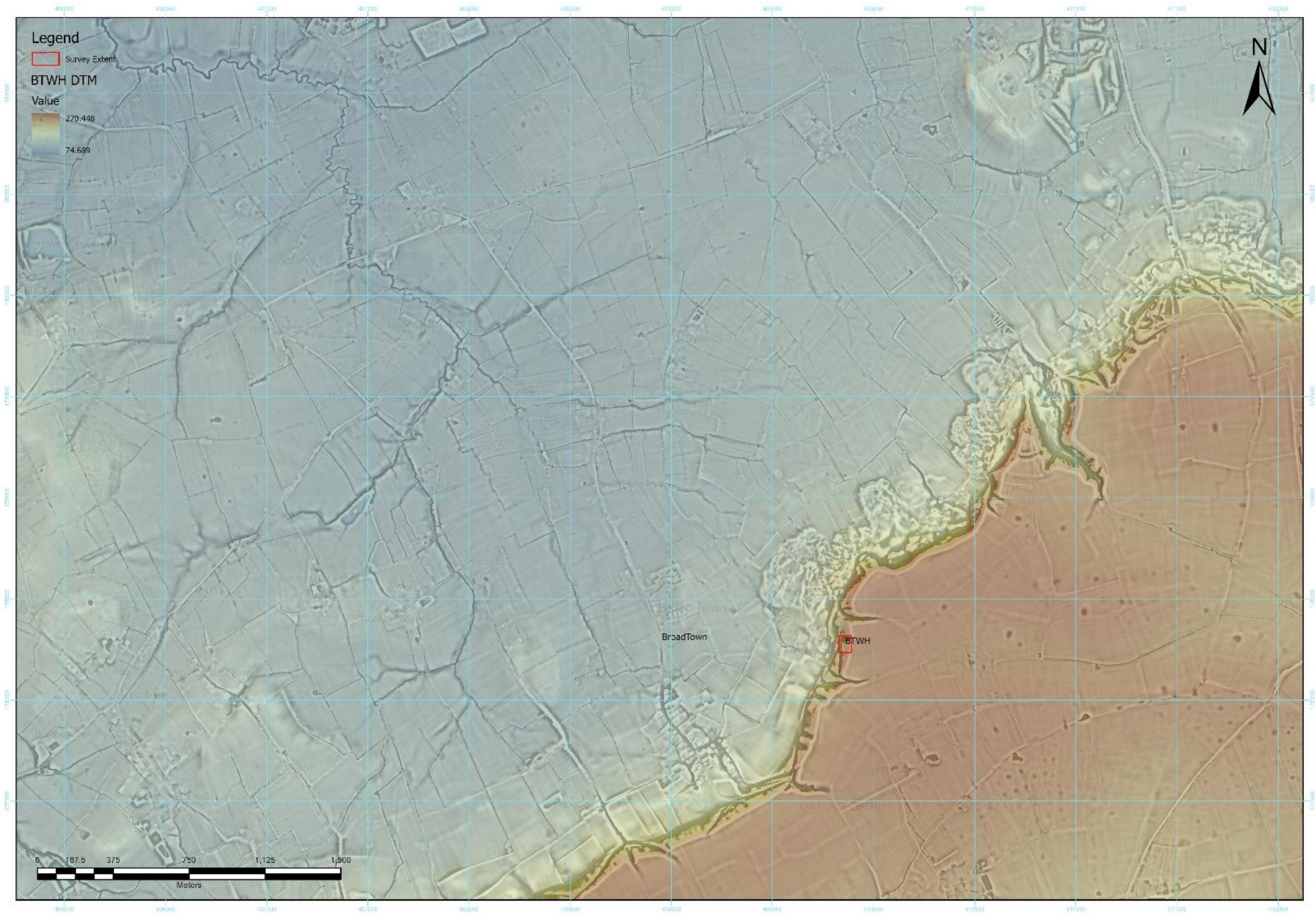


Figure 1: DTM Lidar surrounding BTWH (Approximate Location of analysed area Marked)

The Digital Surface Model was created was created from the same range of 4 5x5km as the DTM (E:405000 N:170000 - E:415000 N:185000), with a height range spanning 74.9-284.4mOD.

Analysis	**Description**	**Range**	**Stretch Type**	**Transparency**
Elevation	Measures Elevation	74.9-284.4m OD	Standard Deviation	50%
Multi Directional Hillshade	Computes the direction of slope and shades	Z Scaled @ 12 times Normal	Standard Deviation	0%

Table 2: Analyses making up the stacked LiDAR DSM of BTWH

Figure 2: DSM Lidar surrounding BTWH (Approximate Location of analysed area Marked)

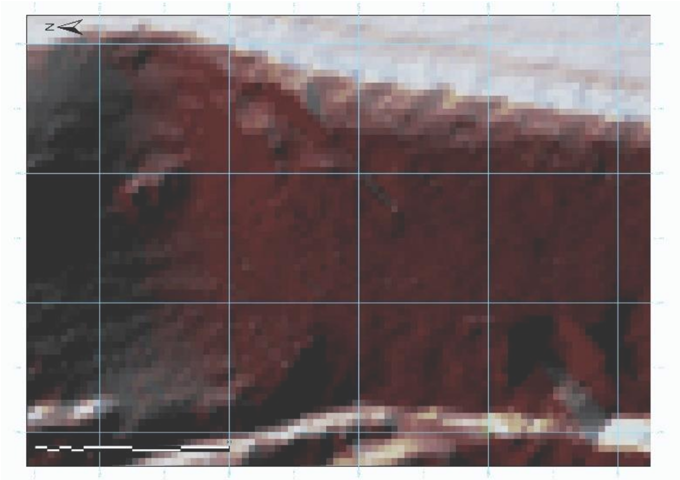


Figure 3: LiDAR Slope and Hillshade analysis zoomed to BroadTown White Horse

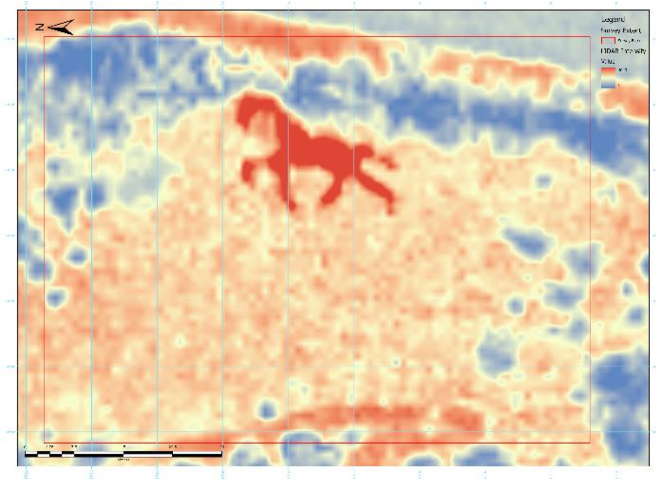


Figure 4: LiDAR Intensity analysis zoomed to BroadTown White Horse

Traces of the horse's outline (the head and neck) can be seen with the slope and multi-directional hillshade analysis but can be made out much more clearly when viewed via the LiDAR Intensity feedback due to the high reflective value of the bare chalk contrasting to the less reflective pasture and low reflective quality of the surrounding hedges. Unfortunately, at the time of writing the only Lidar tiles available for this area were flown in 2019, so no comparisons can be made over time.

The LiDAR data allows the topography to be understood beyond the initial survey and provides information regarding height, slope and aspect. This allows these elements to be investigated outside the higher resolution survey zone. Ideas over the potential visibility of one area to another as well as comparisons of slope can be made utilising these datasets.

Topographic survey methodology

Due to the Terrain of the hillside and the time available for the survey, a hybrid approach was taken: where GNSSs (Leica GS18 and GS18i) were taken to survey in the BTWH manually depicting the outline and any obvious breaks of slope and any other associated features, then auto points taken every 20cm over a grid (north-south and east west) on the horse and direct surroundings which combined allowing a DEM (Digital Elevation Model) to be created of the BTWH. Rough transects were surveyed down the hill to provide an understanding of the slope. With accuracy set at <50mm 3D quality per point. To supplement this data a UAV was also flown (DJI Mavic 3) with high degree of overlap to produce a photogrammetric model of the hillside. To locate the model into OSGB36 space and height a series of control points (marked so visible in Photogrammetry model) were used. These control points were located by a Leica GS18i with correctional data from RTCM-Ref 0158, at a pole height of 1.8m. The 3-dimensional accuracy per point was <0.055m and combined accuracy of 0.029m The UAV photogrammetry method theoretically produces a much more precise model. However, the photogrammetry only depicts what the photographs capture, so cannot pierce the rough pasture to the raw ground level, unlike the GNSSs staff.

The hillside surveyed of the BTWH was between two areas of scrub bounding the BTWH area to the North and South, the chalk of the horse itself, and area directly around the horse that had been strimmed, allowing survey with the GNSS. The surrounding hillside made up of extremely rough pasture, making GNSS survey impractical and was surveyed with UAV photogrammetry survey and supplemented with two GNSS transects. To the east at the top of the slope was a hedge row with a few clearances providing access the Horse from the field above. To the west, at the base of the hill was further scrub and a path fenced off from the hillside

Flight	Flight Pattern Type	Overlap	Camera Angle	Altitude (m above ground level)	Path Distance (m)	Photographic Count	Photograph resolution (cm/pixel from take off elevation)
1	Double Gride	70%	80	30m	754	128	0.88

Table 3: List of flights for the Photogrammetry imaging and metadata of photographs resolution

Control Point	Pole Height	Easting	Northing	Height (m OD)	3DCQ (m)
1	1.8m	409894.385	178280.145	202.057	0.025
2	1.8m	409877.570	178289.965	196.925	0.053
3	1.8m	409850.664	178310.176	181.076	0.031
4	1.8m	409832.897	178292.574	170.842	0.022
5	1.8m	409850.217	178248.262	183.399	0.018
6	1.8m	409873.144	178250.669	198.121	0.026

Table 4: Control Points for model location into OSGB36 co-ordinates

Control Point	X (m)	Y (m)	Z (m)	3D error (m)	Projections	Error (Pixel)
1	0.0059931	-0.0282736	0.103197	0.107168	7	0.842
2	0.0241362	-0.0716493	0.0579234	0.0952434	8	0.465
3	-0.00974417	-0.0874982	-0.0316409	0.0880959	6	0.501
4	-0.0338024	-0.0150227	-0.0709833	0.0800432	4	0.918
5	-0.0846944	0.0670609	-0.0615154	0.0913949	7	0.463
6	0.0317895	0.0399432	0.104157	0.115995	8	0.679
Total	0.0221297	0.057601	0.0749291	0.0970668	**40**	0.647

Table 5: Photogrammetry Control Points Error rate

Model	Image Count	Mesh Faces Count	Area (sq m)	Resolution Model	Resolution of DEM	Error rate (pixels)
BTWH25	128	2,009,461	7013.47	0.008.9m/pix	0.0215m/pix	0.647

Table 6: Photogrammetry Model data

The difference between the various data recording methods, and resulting analysis, is based on both the precision and accuracy. The GNSS hand recorded data has the ability to pierce the overgrowth so is more accurate when recording the data with an error rate of <50mm but only has a resolution of 200mm over the BTWH, creating a set of 6104 viable observations. Whereas the UAV derived data has a resolution of 0.022m with a combined 3-dimensional error of 0.051m but is limited in recording what is visible in the creation of the 3-dimensional model. The table and chart below demonstrate the difference between the GNSS derived data, the photogrammetry derived data, and the 2019 LiDAR data (1m resolution).

	GPS Points Compared to UAV	GPS Point Compared to LiDAR	UAV Points Compared to LiDAR
Mean Difference	0.101m	-0.005m	-0.106m
Standard Deviation	0.167m	0.266m	0.327
Range of Difference	-0.820-1.314m	-1.321-1.012m	-1.366-0.791m

Table 7: Comparative difference of measurements techniques

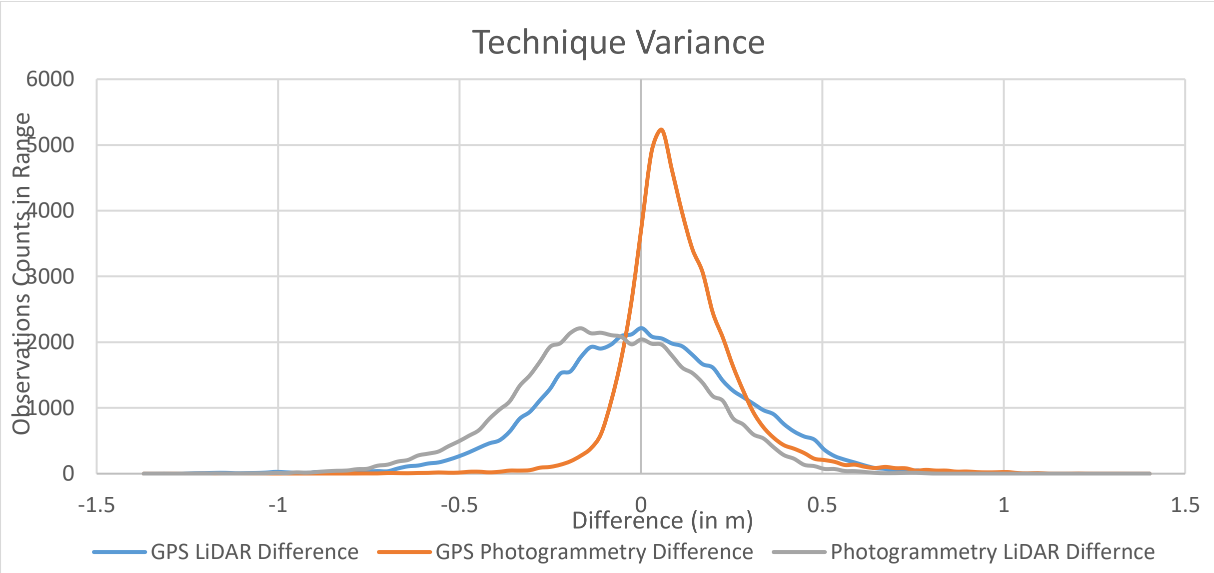


Figure 5: Variance of measurement techniques

Fig 5 demonstrates that although there is a greater difference in the mean, and range with the photogrammetry data compared the both the GNSS and LiDAR the variation is less. The UAV derived Photogrammetry averages a higher surface point as it records the vegetation but has the smallest Standard Deviation. The implication being that the photogrammetry derived is a close facsimile to the GNSS data, but available at much greater resolution. The conclusion being that although the photogrammetry data is recording a higher 'untrue' height compared to the GNSS points the patterns it is recording is the same as what we recorded with the GNSS at the resolution of 20cm.

Results

The BTWH is located on the West - West Northwest facing slope centred at SU0987078279 (Easting: 409878 Northing: 178279) between a height of 188.9-201.4mOD. The hillside surrounding the BTWH slope is between 32° (at the brow of the hill) up to 47°. Whereas the horse sites on a slightly levelled area between 20-25°. The BTWH measures 25.3m in length and 19.1m in height (Measured in relation the slope).

The current BTWH is cut into the hillside on the higher points along the back and tail, then to lesser extent along the upper parts of the outside front and back legs. The lower parts of the body are built up along the face, legs, belly and tail. However, unlike other White Horses these areas are cut at a much steeper angle and the slope revetted as opposed to being ramped with earth decreasing the slope of the built-up ground (as seen with the Marlborough White Horse (Britton *et al* 2015 and Gibbons 2016) the Pewsey White Horse (Horne 2021) and the Lost Roundway White Horse (Horne, 2020)).

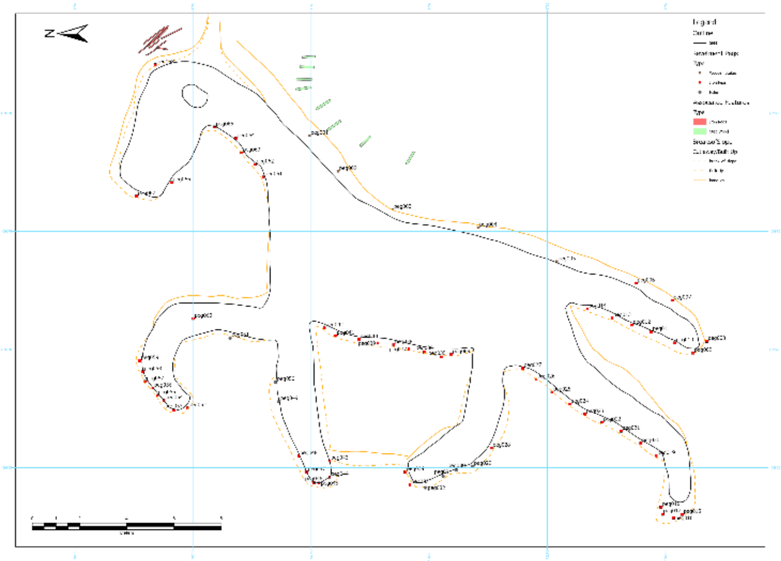


Figure 7: BTWH and Stakes and associated items

At the time of the survey 69 stakes were uncovered: 57 were angle irons, 7 poles, and 5 wood. The wooden stakes exist solely along the cut into the hill that produces the back and tail. The poles are along the front and mid rear leg. Oddly there is a single angle iron (no.60) placed within the chalk of the front leg for no apparent reason. The difference in material may mark different points in time of repair or consolidation. The poles (29-32, 49-51) seem to be placed beyond the obvious points of necessary revetments, implying use at a different date to mitigate slippage etc. The wooden stakes are placed along the cut into the hillside and not at the points of build-up. Here it would seem necessary to use revetment as there was no possibility of ramping without impacting of the chalk/lime of BTWH construction and maintenance.

Beyond the horse itself there is also a cache of angle irons. Presumably not used or discarded at a point of refurbishment. Along the neck of the BTWH are also eight wooden steps pegged into the hillside that led from the field above turning and start to run parallel to the BTWH's back. The lower 4 steps were only uncovered after the initial survey under overgrowth. This demonstrates the encroachment of the hedgerow on the clear space around the BTWH. #

The below set of figures show the results from the GNSS and the UAV data, under the same analyses. The photogrammetry provides a smoother image due its higher resolution but is limited to what is caught by camera. Whereas the GNSS data's lower resolution creates a dimple effect on the images, some of which can mislead the eye.

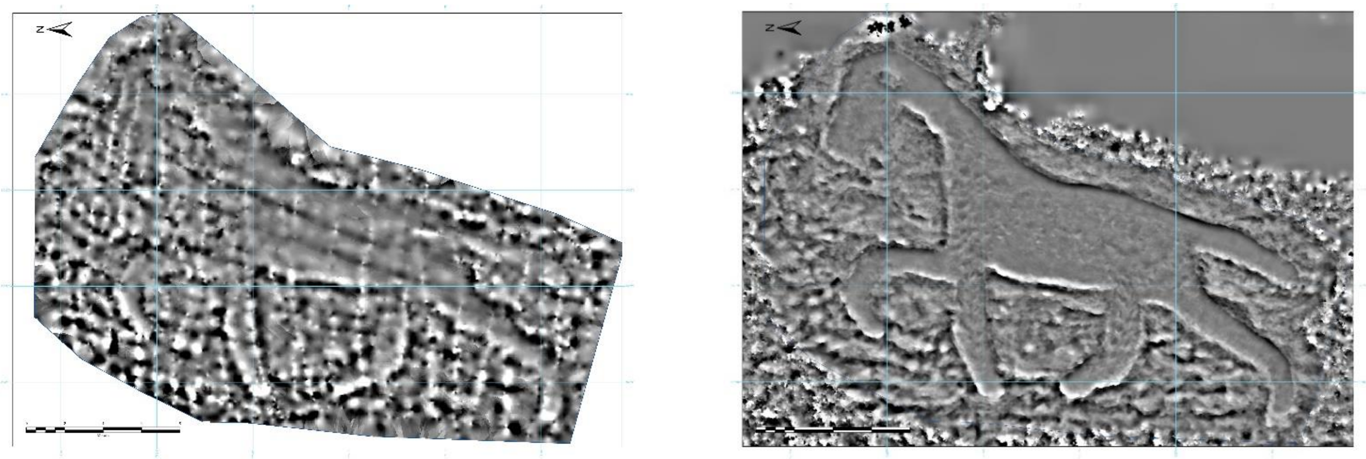


Figure 8: Simple Local Relief Model from GNSS Topographic Survey (left) from UAV (right)

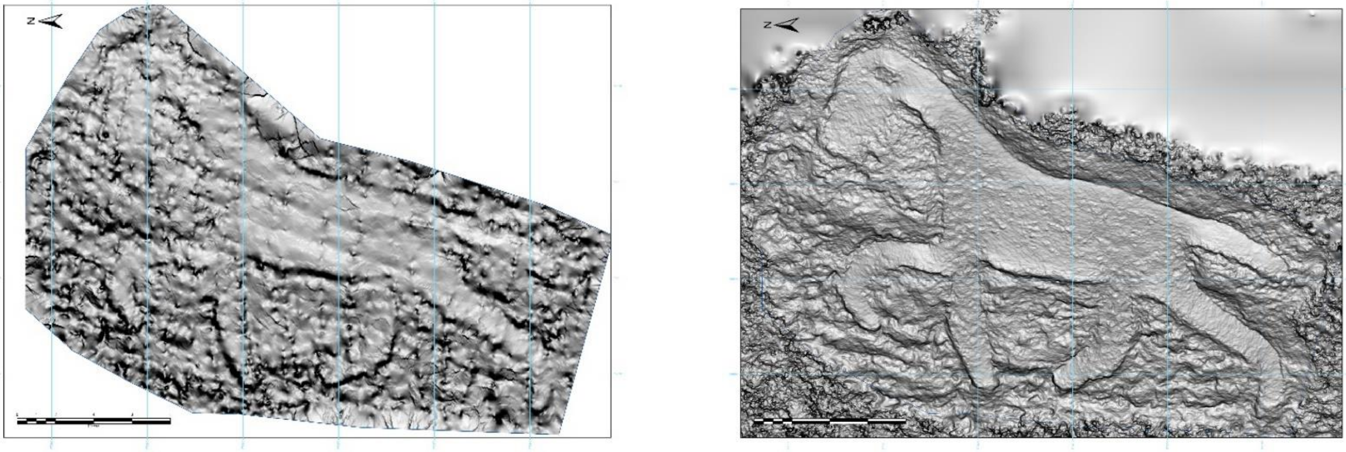


Figure 9: Slope Analysis from GNSS Topographic Survey (left) from UAV (right)

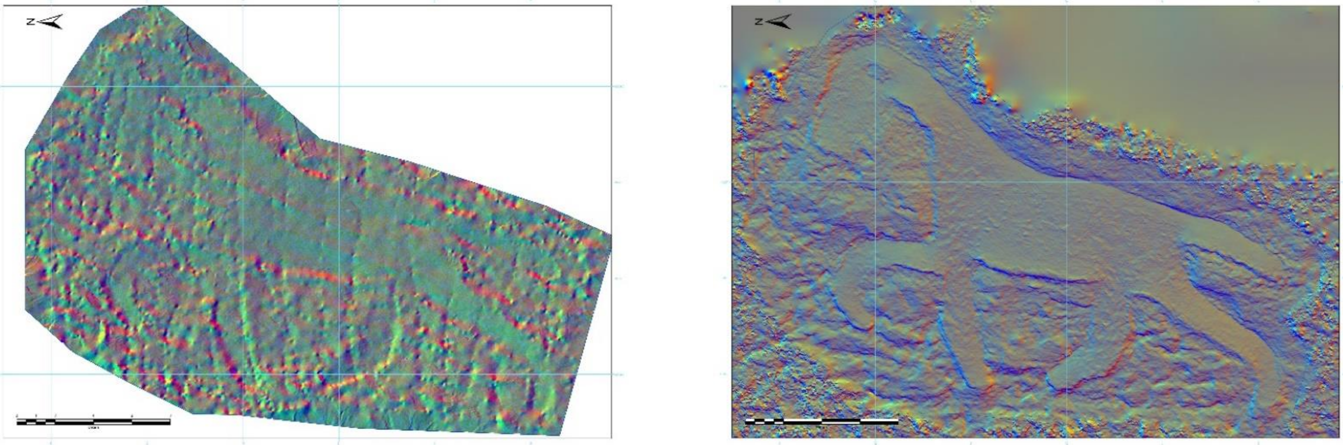


Figure 10: Principal Component Analysis (PCA) from GNSS Topographic Survey (left) from UAV (right)

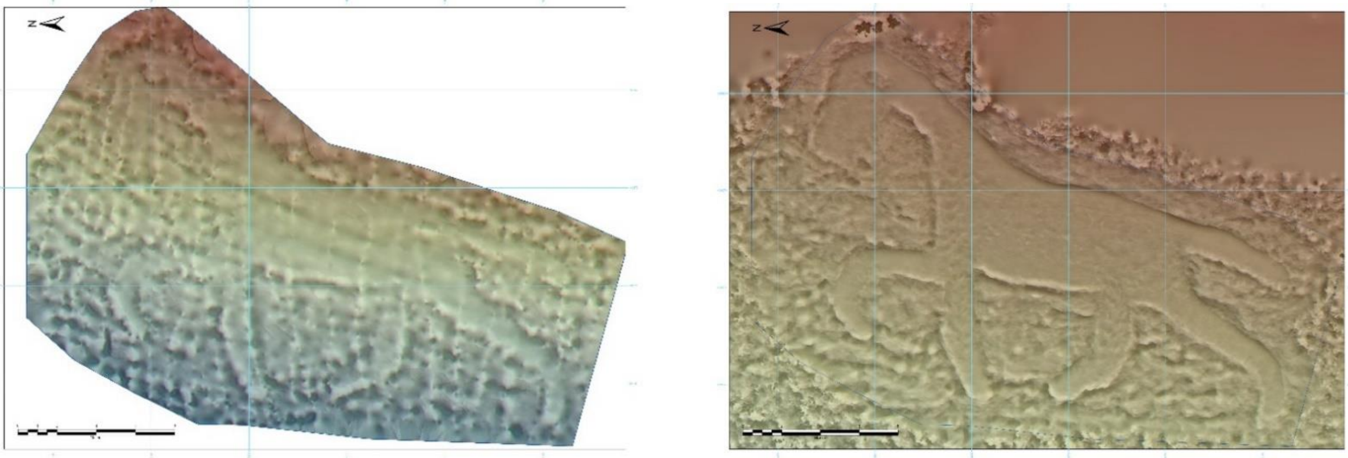


Figure 11: Stacked Model from GNSS Topographic Survey (left) from UAV (right)

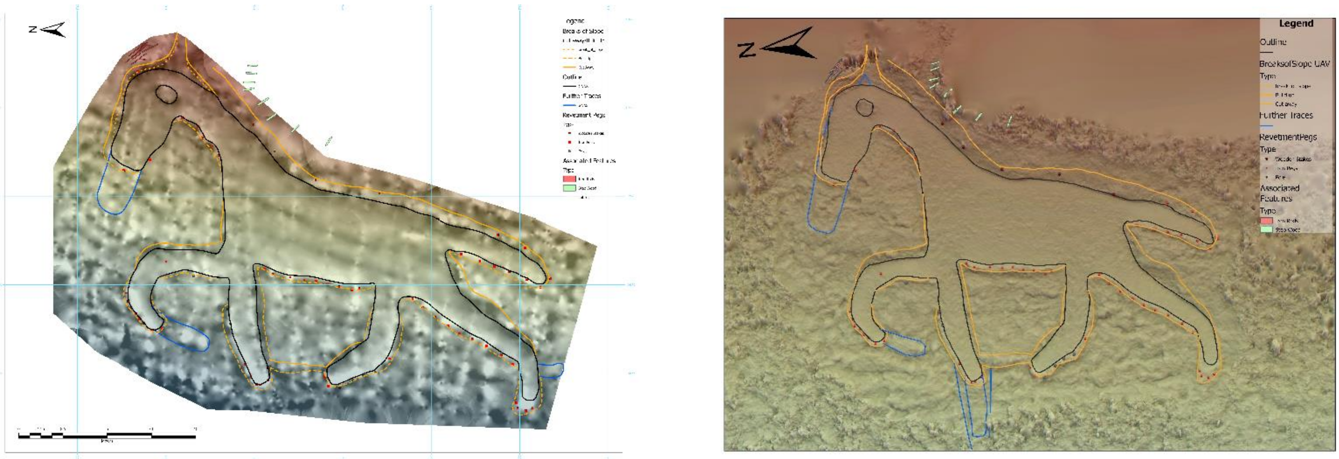


Figure 12: Stacked Model with interpretation from GNSS Topographic Survey (left) from UAV (right)

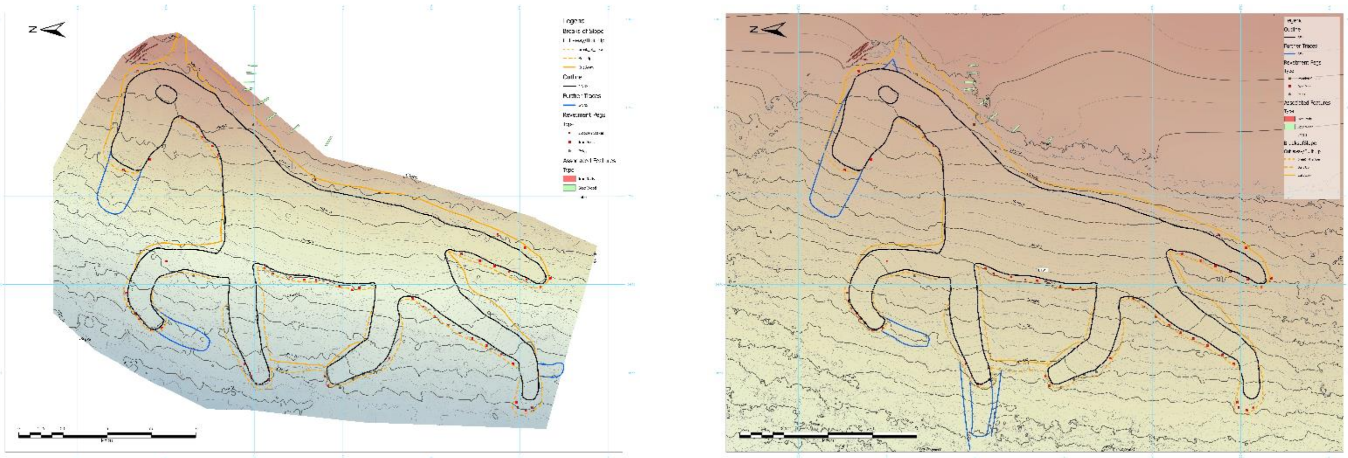


Figure13: Contour Lines with interpretation GNSS Topographic Survey (left) from UAV (right)

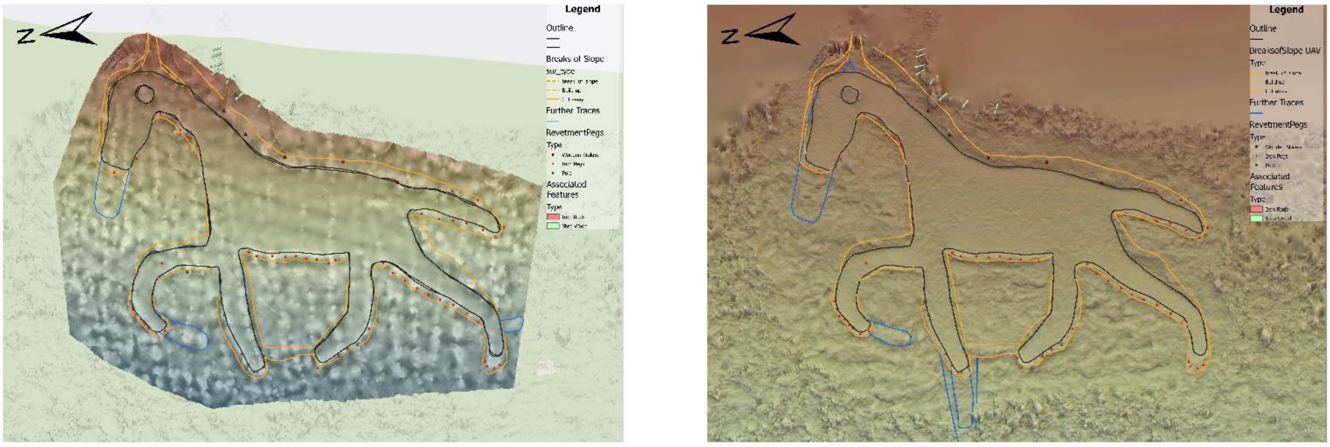


Figure14: Perpendicular to slope view with interpretation: GNSS Topographic Survey (left) from UAV (right)

Figure 15 Perpendicular view of BTWH

Analysis	**Description**	**Range**		**Stretch Type**		**Transparency**	
		GNSS	UAV	GNSS	UAV	GNSS	UAV
Elevation	Measures Elevation	189.039-201.186 mOD	166.72-202.85 mOD	Standard Deviation	Standard Deviation	50%	50%
Simple Local Relief Model (SLRM)	Measures localised changes by utilising the difference in the mean from surrounding positions.	-0.873-0.554	-2.267-2.240	Standard Deviation	Standard Deviation	30%	30%
Slope	Measures Slope from the Horizontal	0 - 90°	0 - 89	Percentage Clip	Percentage Clip	50%	50%
Principal Component Analysis	Summary of the data of Multiple Shade Directions into 3 bands	Red= Band 1 Green = Band 2 Blue = Band 3	Red= Band 1 Green = Band 2 Blue = Band 3	Standard Deviation	Standard Deviation	0%	0%

Table 8: Analyses making up the stacked DEM of RWWH from UAV Topographic Survey

From the analyses generated from the topographic survey, of both the UAV photogrammetry and the GNSS survey, the results are very similar. In regards to the BTWH outline, the cutting into the hillside and the areas build up there is only minor variation between the two variations of recording.

The GNSS survey has evidence of either an elongated head or possible, and more in keeping with the scale of the BTWH, some element of survival of a truncated ramp, which hasn't been completely levelled out when the revetment was placed. There is also the appearance of further elongation of the front raised leg and a possible flick of the rear back leg creating more of a gallop rather than a *levade* standing stance (see figures 12-14 and figure 20).

The photogrammetry data supports the possible ramp at the end of the head and the elongation to the raised front leg. There are also indications of continuation/truncated ramp at the end of the inside front leg. The rear leg doesn't seem to have the extension, possibly due to the longer grass in this area that the GNSS data could penetrate that the photogrammetry couldn't. Finally, there is a greater depression above the head than the expected slope indicating a possible cut for a previous ear.

Element	**Orthographic Distance (m)**	**Ground Distance (m)**
Length	25.07	25.25
Height	17.21	19.09
Head Length	6.12	6.49
Chest-Rump	12.67	12.76
Neck	7.37	8.15
Tail	5.7	5.73
Outside Back Leg	8.24	9.70

Inside Back Leg	5.93	7.06
Outside Front Leg	7.88	7.99
Inside Front Leg	6.25	6.99
Max Belly depth	4.93	5.49

Table 9: Metrics of BTWH

Element	**Area (m2)**
Head and neck	25.46 (26.44-0.98(the eye))
Body	69.97
Tail	7.17
Outside Front Leg	11.15
Inside Front Led	11.68
Outside Back Leg	13.42
Inside Back Leg	10.72
TOTAL	**149.98 (150.52-0.98)**

Table 10: Area of BTWH

Comparing the rotation from an orthographic view (90°) and one tilted to be perpendicular to the hillside (118°) against an 'ideal' dimension of a horse. It is clear that the hillsides slope is the plane the horse was measured against. Nor is there any attempt at elongation of the body of height to account for forced perspective when viewed from the ground below the ridge.

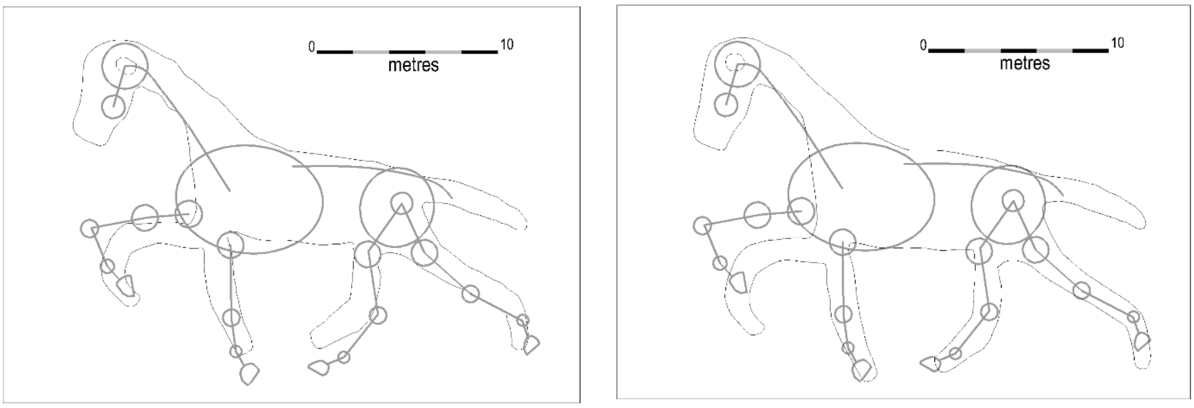
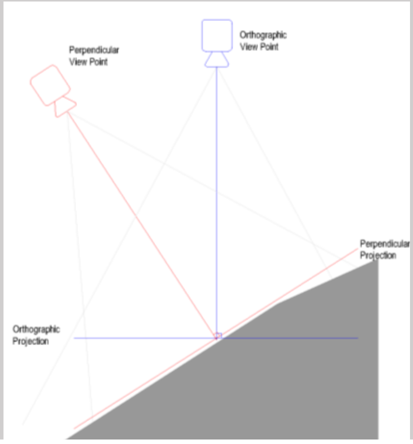


Figure 16: Outline of the Broad Town White Horse with ideal version superimposed: Left an Orthographic view, Right viewed perpendicular to the Hillslope at 118°

Orthographic Projection vs Perpendicular Projection

Orthographic projection refers to the top-down flat projection allowing distances to measured horizontally and vertically. Whereas perpendicular viewpoint views the BTWH from 90 degrees from the slope of the hill allowing ground distances to be calculated, and to test that hypothesis that the white horse was originally measured out this way



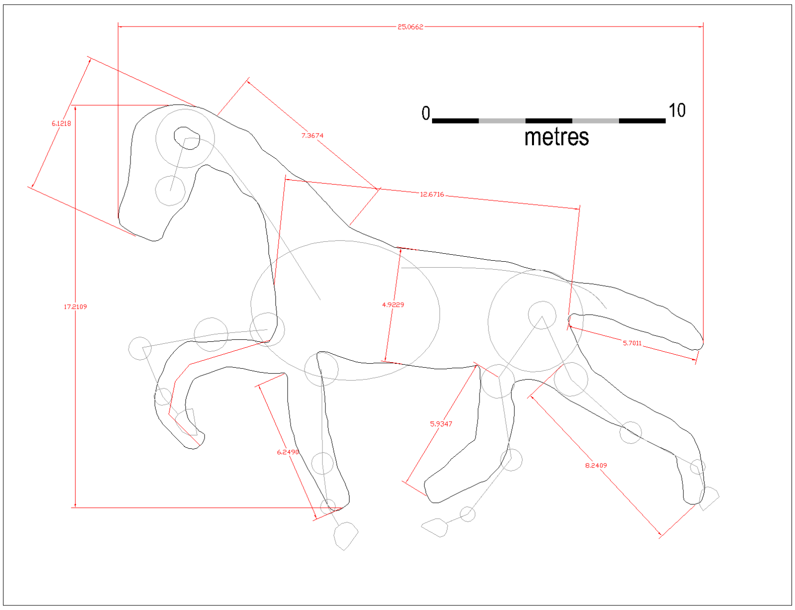


Figure 17 top: Orthographic outline of Broad Town White Horse with positions of orthogrpahic Distance Measurements (as seen on orthographic projection)

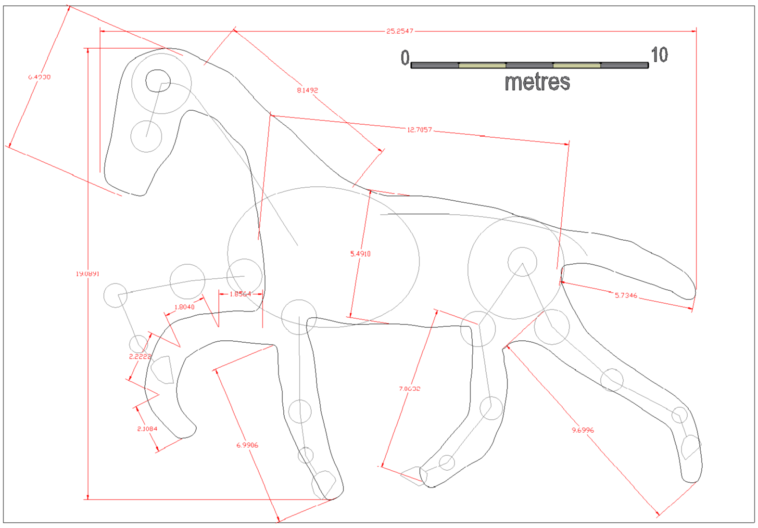


Figure 17 bottom: Perpendicular outline of Broad Town White Horse with positions of Ground Distance Measurements: (as seen on perpendicular projection)

Aerial photograph regression

From Historic England's Aerial Photo Explorer (Historic England. 2025, EAW004160 and EAW004161) two 1946 oblique photographs of the BTWH are present as well as a 1947 orthographic photograph (Historic England 2025, raf_106g_uk_1415_rs_4359#). The two images from 1946 allow a for a basic 3-dimensional model to be created and allow for placement, while compensating for the variation of the heights depicted in the photographs. The orthographic mapping image from 1947 provides temporal correct landmarks to locate the corrected 1946 image over the present BTWH.

Figure 18: Outlines of the Broad Town White Horse superimposed onto a roughly located 1947 rectified photograph: Left an Orthographic view, Right viewed perpendicular to the Hillslope at 118° Source: Historic England Archive

The placement essentially works. However, the limited number of photographs limits the accuracy to a potential error of up to 0.64m on the x axis and 0.7m on the y axis. There is also a limitation of any greater analysis, as the resolution of the two combined photographs is only 120mm per pixel.
The images from the 1946 photographs illustrate the BTWH to be generally more slender, with a straight inside front leg, the existence of a wider tail and an ear as well as a much more slender face. Some of this can be seen in the earlier interpretations from the topography with the possible ear and stretched outside back leg. The greatest potential difference is the extension of the legs into a longer version and the increase in the breadth of the body.

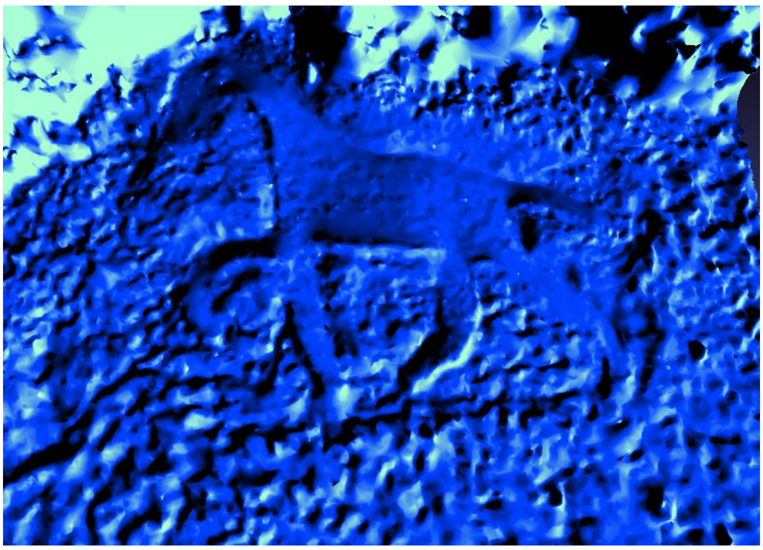


Figure 19: 'Toon' shading light from low altitude from the NW

With the correct shading effect lit from unnatural angles, there are traces of the thinner earlier face within the current outline, the remains of the ear and an indication of the inside front leg position.
There is also the obvious fact that the current hedgerow at the top of the field has dramatically encroached on to the BTWH clear space.
What the addition of this evidence cannot specify is whether the BTWH ramped or revetted at this point in time.

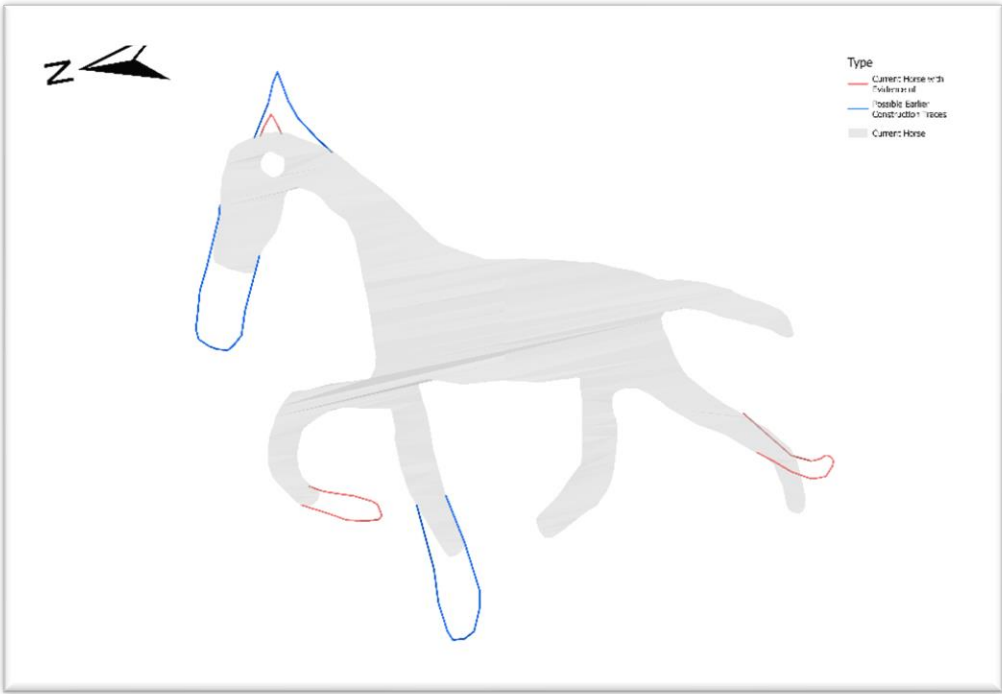


Figure 20: Interpretation of possible previous WhiteHorse constructions

Viewsheds

As the Wiltshire White Horses were placed presumably to be viewed by the local, and visiting, populus an understanding of the ideal viewing location can potentially shed light on the desired audience of these geoglyphs, and by extension the creators, and their potential intentions.

The viewshed analysis, based on the 2019 Digital Surface Model (DSM), indicates that the BTWH would have been widely visible, with sightlines extending from the west-southwest to the west-northwest, including Broad Town itself. In the 19th century, prior to 20th-century developments, it would likely have been visible from most of Royal Wootton Bassett.

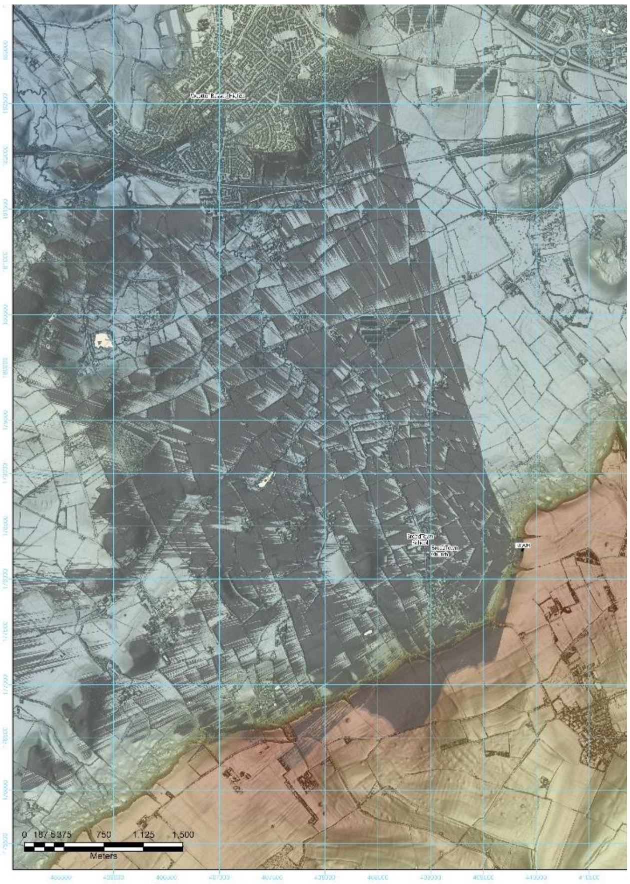


Figure 21: 2019 DSM viewshed set a 1m and 1.6m above ground level

Although potentially visible from the Broad Town Road the BTWH visibility would first disappear approximately only 220m after the Broad Town School, going north towards Royal Wootton Bassett, then reappear periodically, before disappearing after Goldborough Farm as the topography dips. Then reappearing at the approach of Royal Wootton Bassett as the topography rises again. This interrupted view would be further exasperated by roadside hedgerows impeding vision further. With this disrupted view it seems unlikely the BTWH was meant to be continually viewed from the Road between Broad Town and Royal Wootton Bassett but rather a singular viewing location.

Four possible locations have been posited (Greer, pers. comm., 28th June and 7th Aug. 2025) The Broad Town Church, the Broad Town School, Royal Wootton Bassett at the intersection of the High Street and Station Road and from the nearby farm of Little Town Farm

With the aspect of the hillside at the BTWH at curving slightly from 273°at the tail 280°at the belly and 293°at the head the ideal viewpoint is about 120m directly north of the Broad Town School, however here the potential view is disrupted by vegetation and doesn't seem to have any specific landmark now, nor any depicted on the earliest Ordnance map consulted (1888-1913) . (National Library of Scotland, 2024).

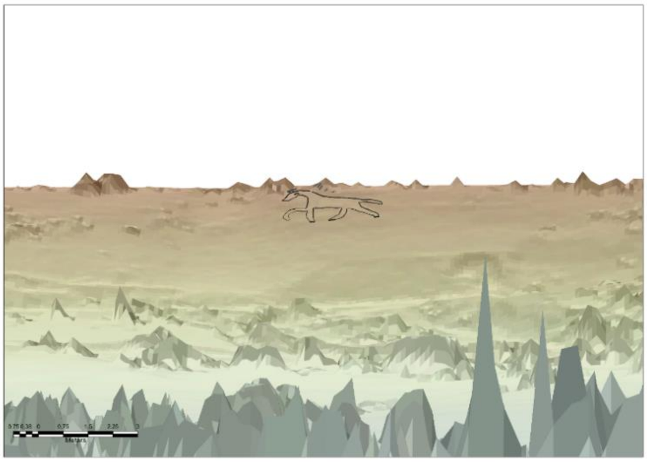


Figure 22: View of BTWH from Broad Town Church

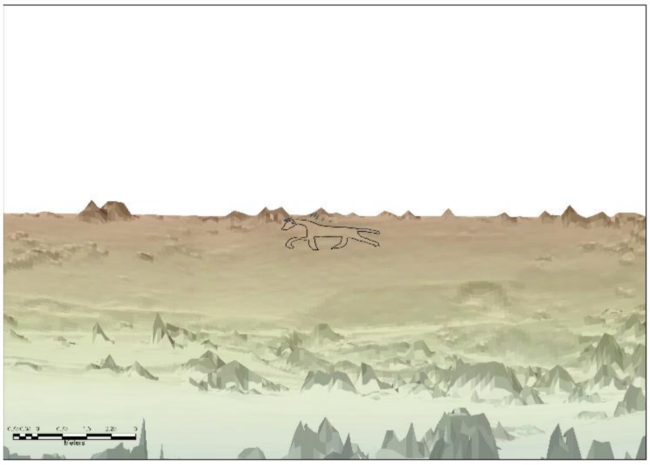


Figure 23: View of BTWH from Broad Town School

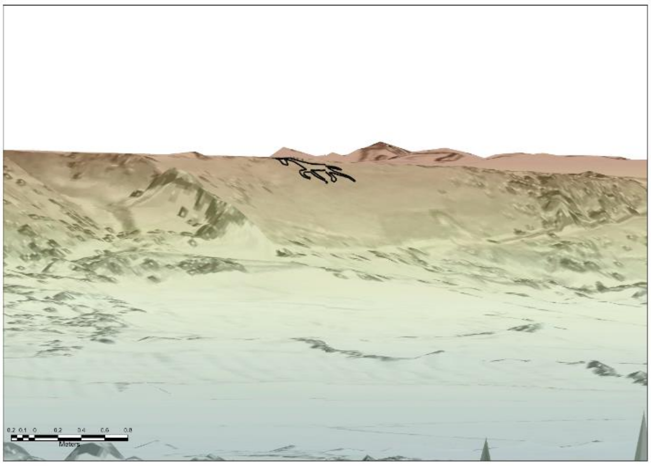


Figure 24: View of BTWH from Intersection of Royal Wootton Basset High St and Station Rd.

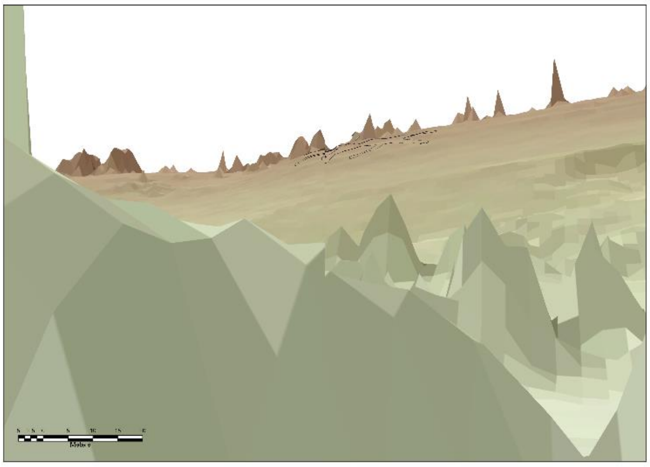


Figure 25: View of BTWH from Outside Little Town Farm.

The view from Royal Wootton Bassett is unobstructed but is very far (5.1km) requiring a tight field of view, The aspect of 39° from the ideal means there is foreshortening along the length of the body, and the slight change in slope cuts off the top of the head from this vantage point. If Royal Wootton Bassett was the intended view point a better location would have been approximately 300m North-West along the ridge where the aspect is more to the North and the slope is even steeper (app 45°) providing an even better slope. Obviously, such hypotheticals discount constraints of ownership or other logistic challenges of the time.

The view from outside Little Town Farm is near the base of the slope. The BTWH is visible but extremely foreshortened and is certainly not an ideal location for observation.

There is little difference in view from between the view from the church or the school, but the school has the least difference in aspect meaning it has a slightly superior view of the Horse, making it the most likely point of the intended viewpoint of the BTWH.

Slope Analysis

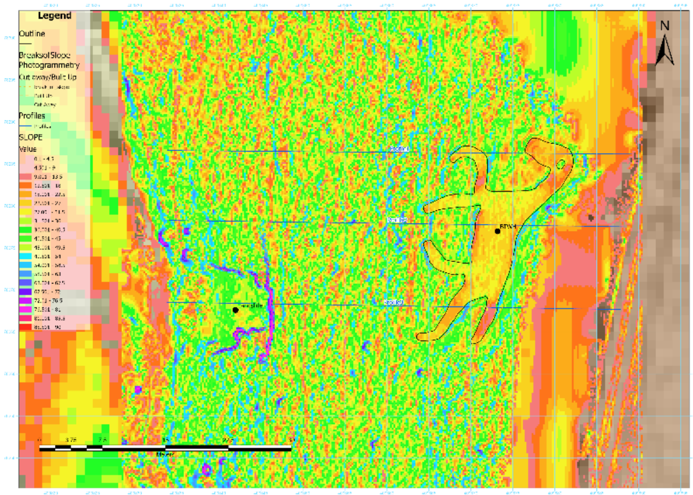


Figure 26: Slope derived from the UAV survey

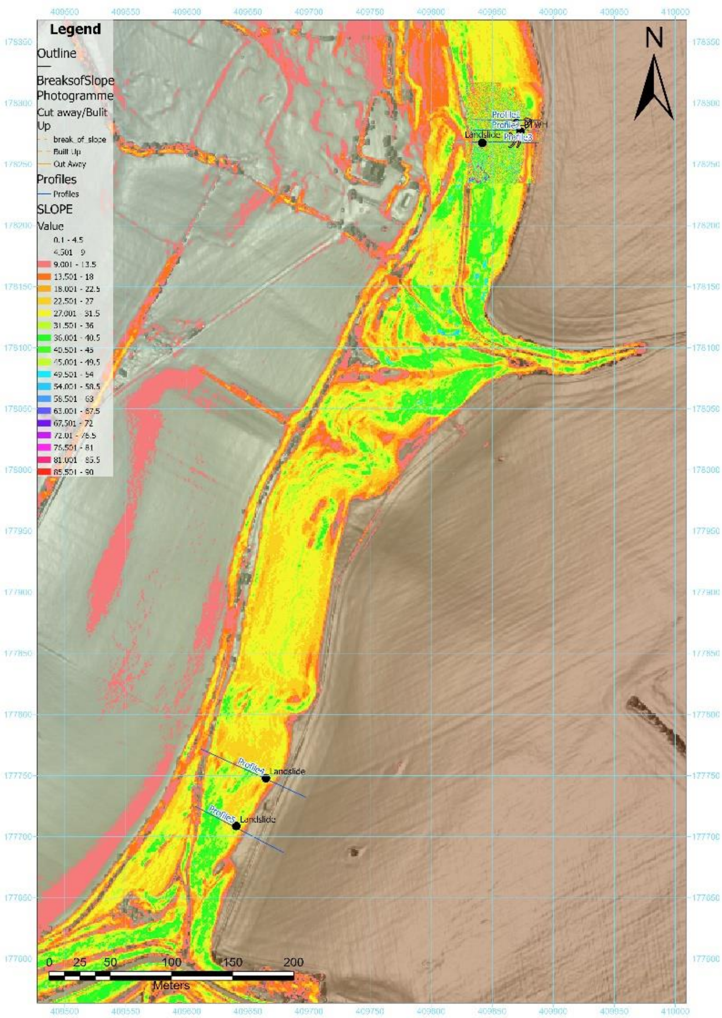


Figure 27: Slope derived from 2019 LiDAR DTM

The BTWH is situated on a slope ranging between 32° (at the brow of the hill) and 47°, at the steepest point. Over the winter of 2023-2024 there has been a landslip at the base of the hill directly below the BTWH, and other landslips to the south, along the same ridge. Through this analysis the slopes can be compared to see the likelihood of collapse around the BTWH.

The UAV-photogrammetry survey indicate that the current collapse is spreading longitudinally, but not upwards. The slope that collapsed under the BTWH occurred at about 46° whereas the BTWH sits on the more secure slope of 28-34°. With the natural underlying slope, presumably is similar to the slope adjacent to the BTWH which is around 35° with a maximum of 44°. The reason for collapse is most likely not solely due the incline as the point of collapse is on the interface between the West Melbury Chalk Formation and the Upper Greensands formation (*BGS Geological Viewer'* accessed July 25). It is the interface of the differing underlying geology along with the slope that increases potential of slip. The other landslips to the south also exist on two meeting Geologies but rather than the Upper Greensand formation the slips are occurring just under the interface between the Zig Zag chalk formation above the West Melbury Chalk Formation (*BGS Geological Viewer'* accessed July25) and sits on a slope of app.33°.

Any issue regarding the BTWH is most likely the heightened slope created by revetment of the cut slope and built-up areas creating artificial slopes of up to 90°, well into the area of viable collapse if the revetement mitigations fail. This potential for collapse/slip is mitigated in other white horses via ramping of the lowers body parts seen with the Marlborough White Horse (Britton *et al* 2015 and Gibbons 2016) the Pewsey White Horse (Horne 2021) and the Lost Roundway White Horse (Horne, 2020), and in so decreasing the likely hood of slip and the need for revetment.

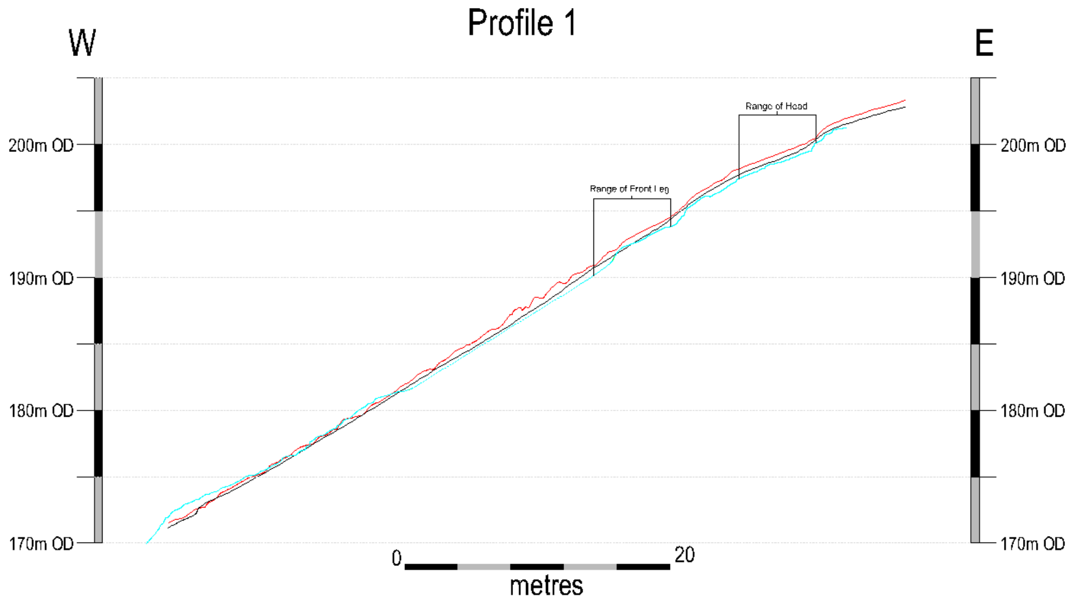


Figure 28: Profile 1, crossing head and front leg. (red line photogrammetry, cyan line GNSS survey, grey line 2019 LiDAR)

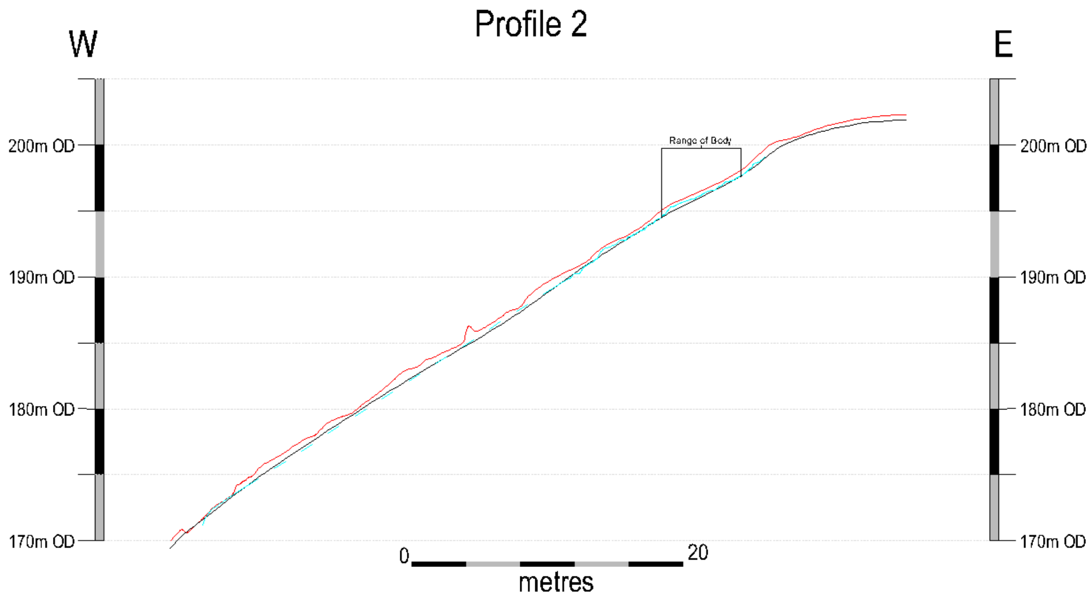


Figure 29: Profile 2, crossing body. (red line photogrammetry, cyan line GNSS survey, grey line 2019 LiDAR)

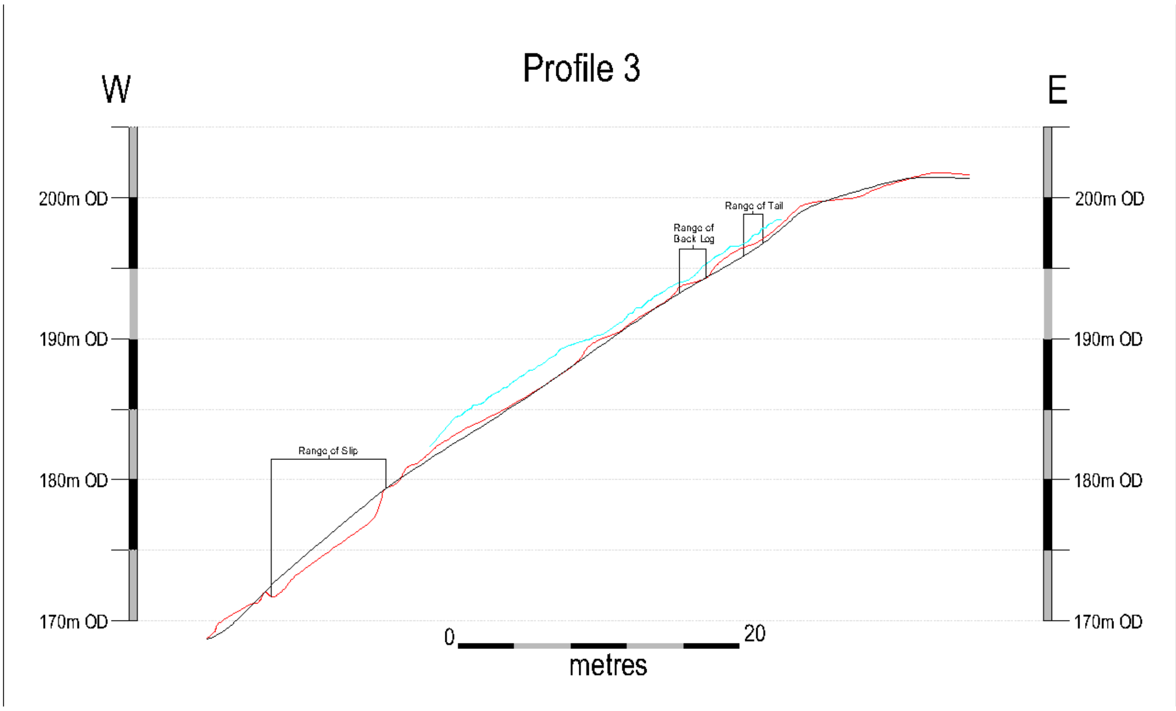


Figure 30: Profile 3, crossing tail and back leg and area of collapse. (red line photogrammetry, cyan line GNSS survey, grey line 2019 LiDAR)

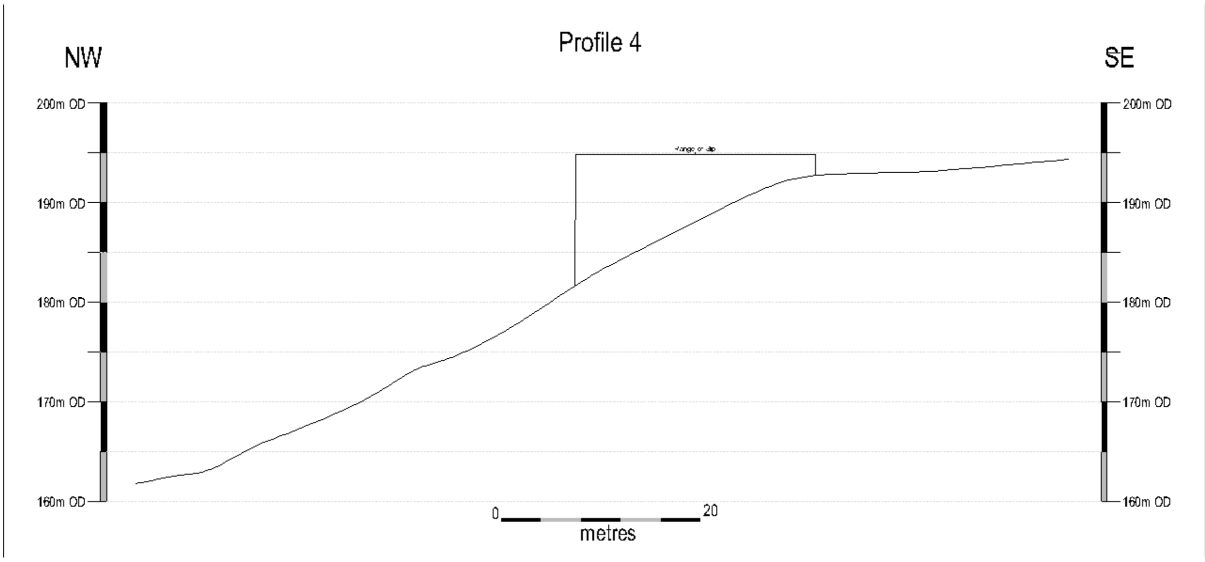


Figure 31: Profile 4, crossing area of collapse 1 to the south of BTWH. (2019 LiDAR only)

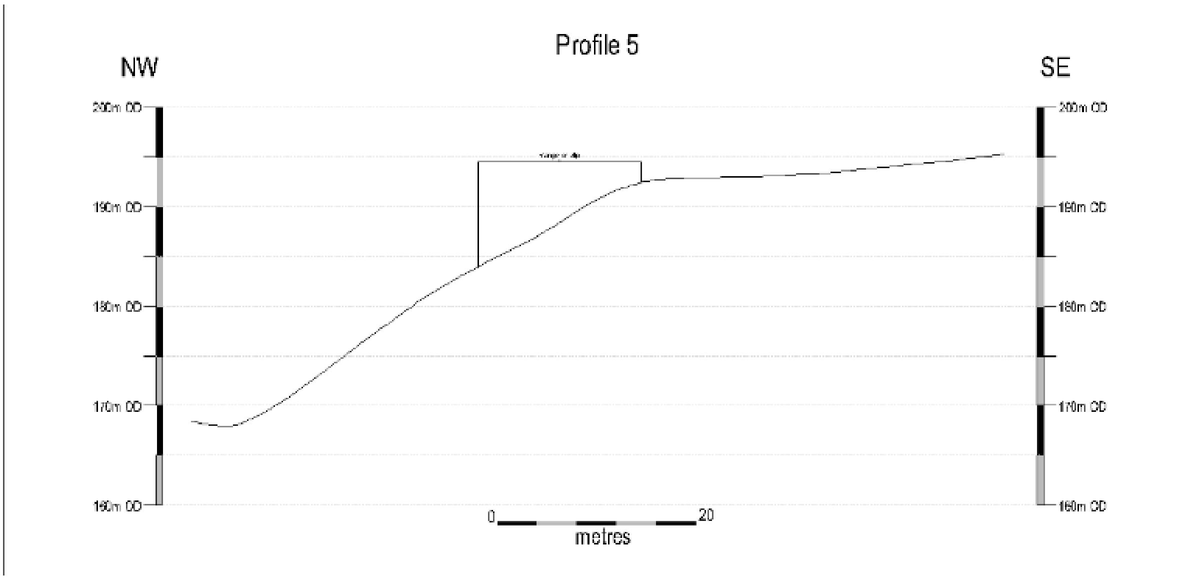


Figure 32: Profile 5, crossing area of collapse 2 to the south of BTWH. (2019 LiDAR only)

Conclusions

The integrated topographic survey and analysis of the Broad Town White Horse (BTWH) have provided a detailed and multidimensional understanding of the monument's current form, structural condition, and potential historical development. By combining GNSS ground-based data with high-resolution UAV photogrammetry and LiDAR, the survey has successfully identified subtle features of the chalk figure, such as possible remnants of an earlier form—suggesting elongation of the limbs, a potential ear, and remnants of a former ramped construction at the head and legs.

The comparative analysis between GNSS, UAV, and 2019 LiDAR data demonstrates high consistency, while also highlighting the limitations and strengths of each method. The GNSS data proved invaluable in penetrating vegetation to capture accurate terrain, while the UAV model offered a more detailed and visually interpretable surface. Together, they presented a clearer picture of the BTWH's topographic form and physical evolution over time.

Structural elements such as revetments and stakes reveal a patchwork of interventions, likely from multiple restoration periods. Their placement—particularly the contrasting use of materials—may indicate a history of targeted repairs or modifications in response to erosion or slippage. The micro topography shows some subtle feature alluding to previous incarnations. The Aerial photograph regression further supports this with a more slender incarnation of the horse, corroborating subtle features found in the recent terrain models.

With the premise that the placement and orientation of the BTWH was, for the most part, intentional, the viewshed analysis indicates that the BTWH was most likely intended to be seen from a fixed location—most plausibly near the Broad Town School—rather than along a traveling route or other points in the vicinity.

The danger of land slips directly effecting the BTWH seems to be relatively low as the local landslips seemingly occurring at both higher inclines and at junctions of various geologies. The risk of localised failure around the horse may be a factor particularly where revetments have created inclines exceeding 60°.

Overall, this survey enhances understanding of the BTWH's current state and visual impact but also reveals previously obscured elements of its history and construction. The combination of the surveying techniques and historic imagery demonstrates the evolving relationship between landscape, monument, and observer—and offers a robust foundation for future conservation, research, and public interpretation.

Acknowledgements

The work was commissioned by Broad Town White Horse Restoration Group and funded by the Bluefield Solar Fund administered via Broad Town Parish Council.
Survey Assistance from Megan Cameron-Heffer

Archive

The data gathered for this report will be stored with the Broad Town White Horse Restoration Group including the raw survey data and unused analytical graphics not used in this report.

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Appendix A: Selected Enlarged Figures with Readable Legends

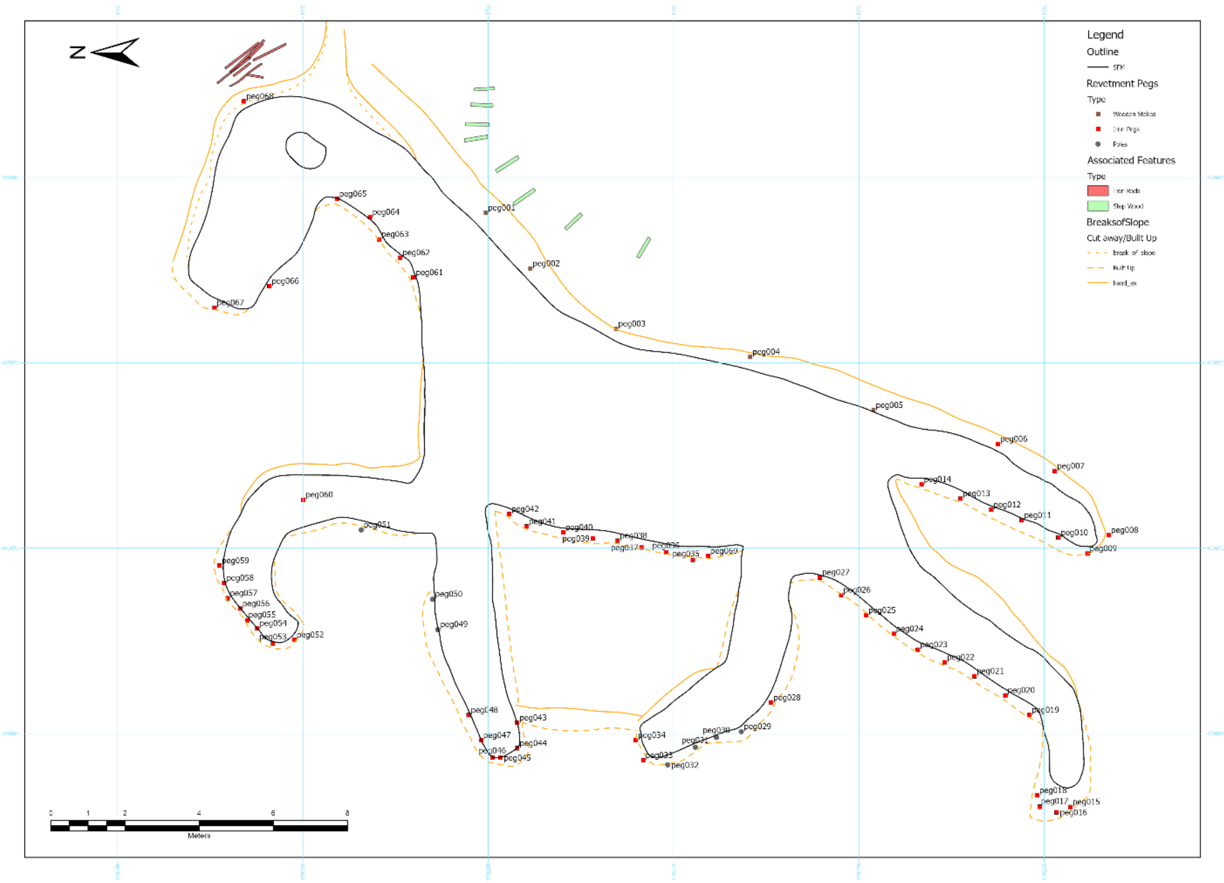

Fig 7: BTWH and Stakes and Associated Items

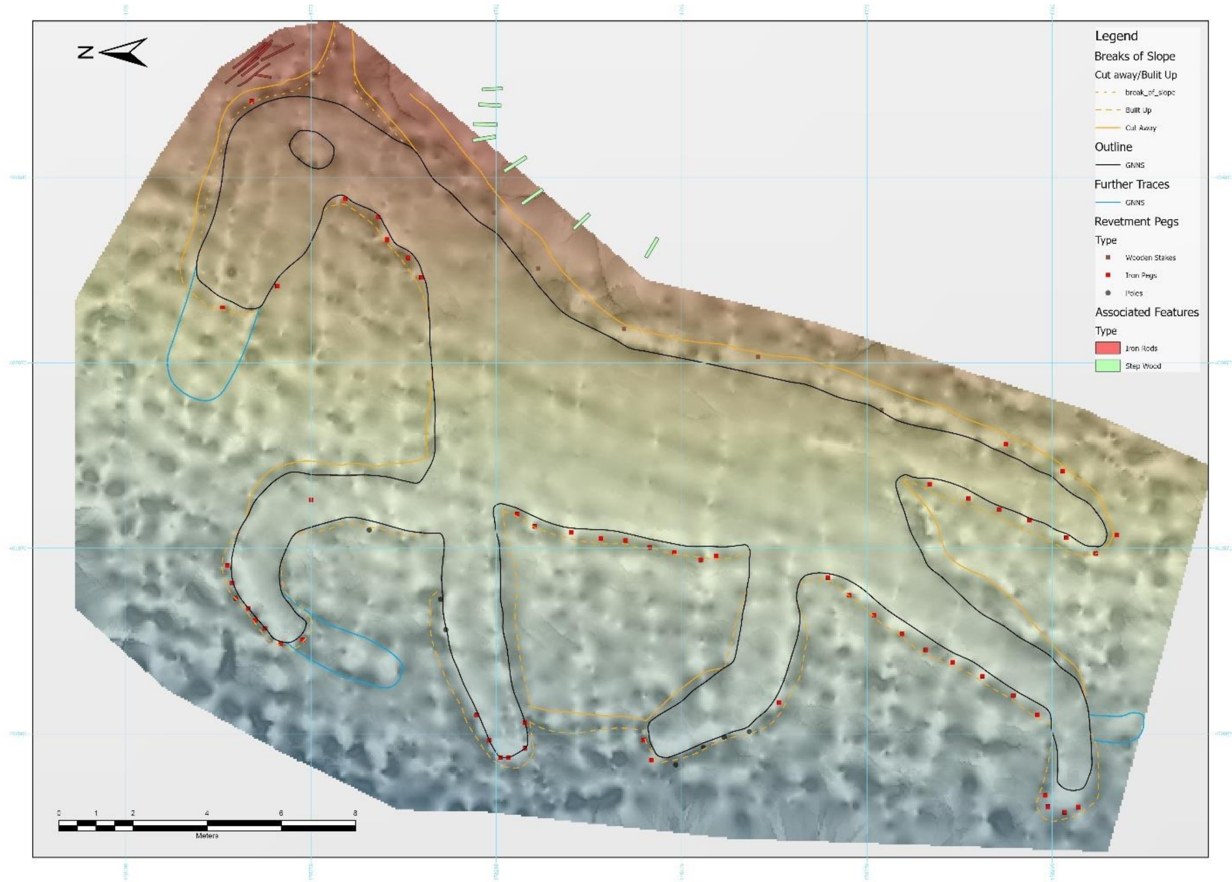

Figure 12 left: Stacked Model with interpretation from GNSS Topographic Survey

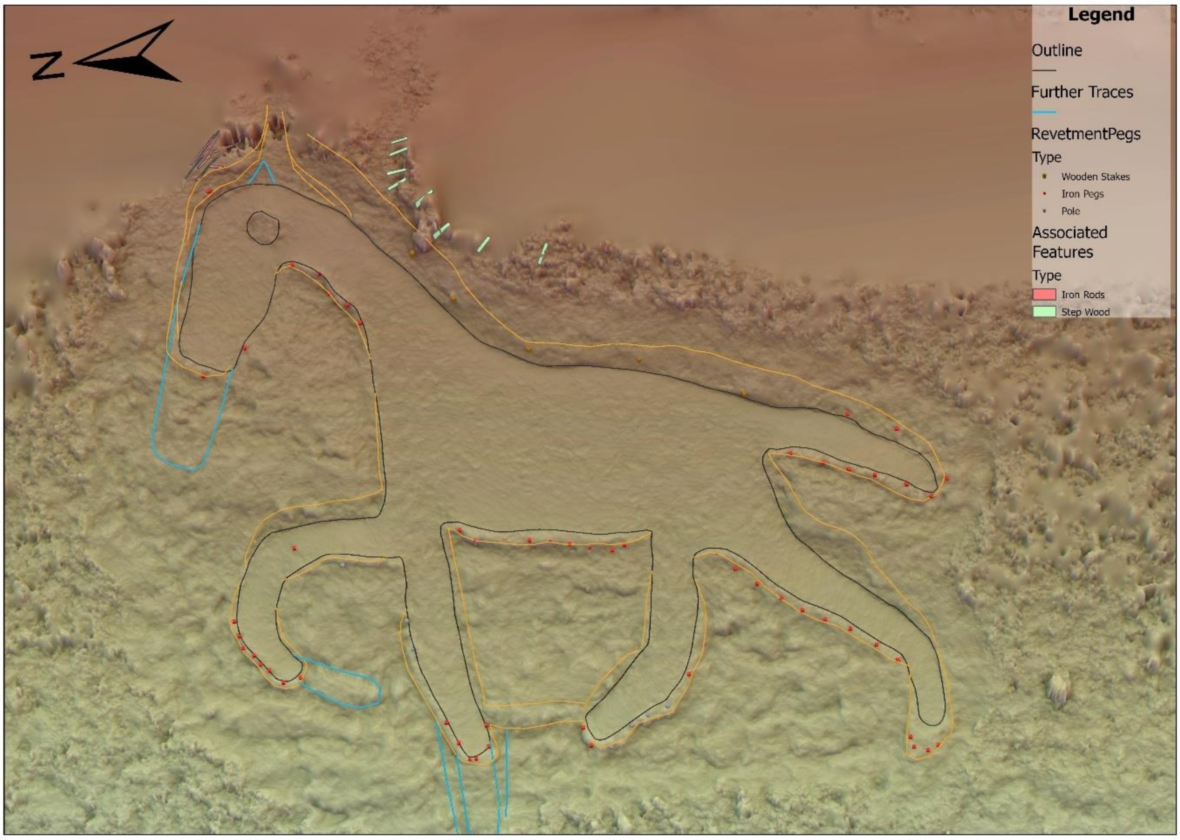

Figure 12 right: Stacked Model with interpretation from UAV Survey

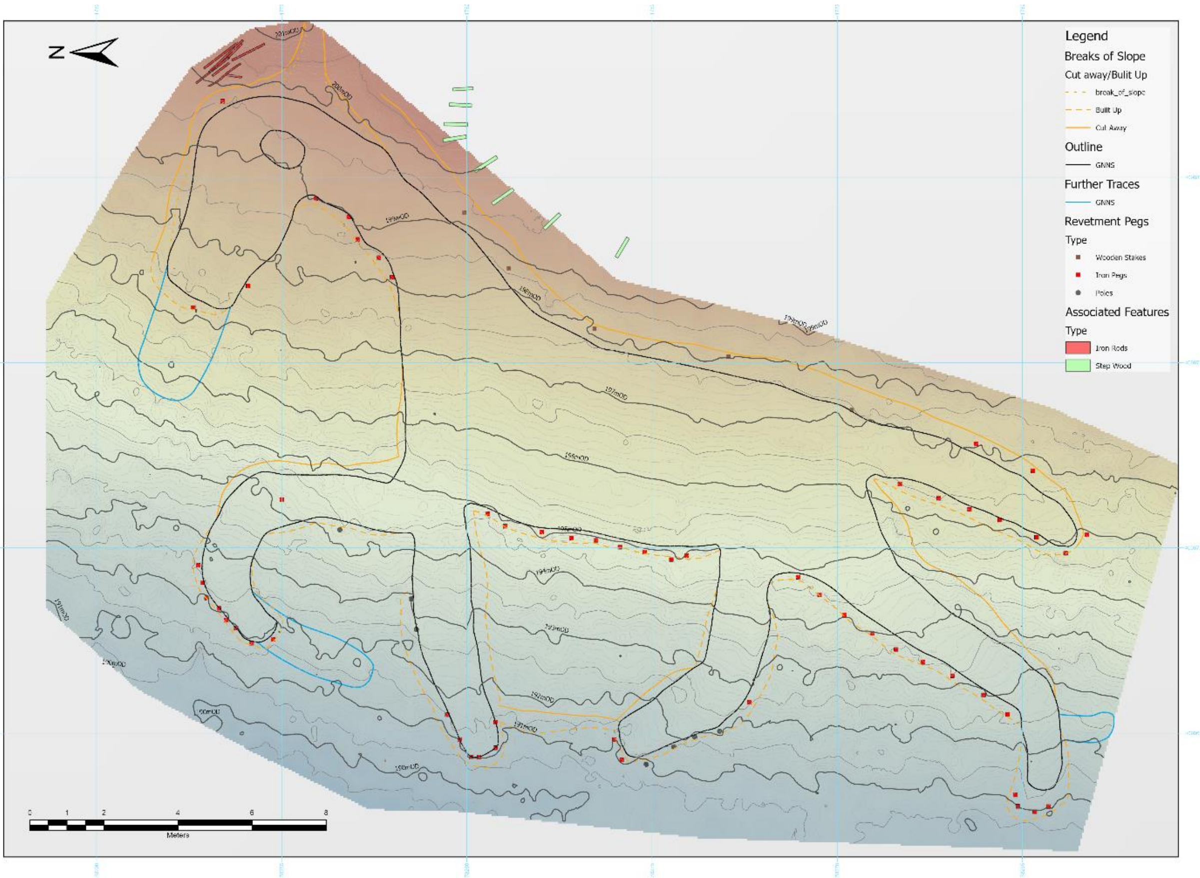

Figure 13 left: Contour Lines with interpretation GNSS Topographic Survey

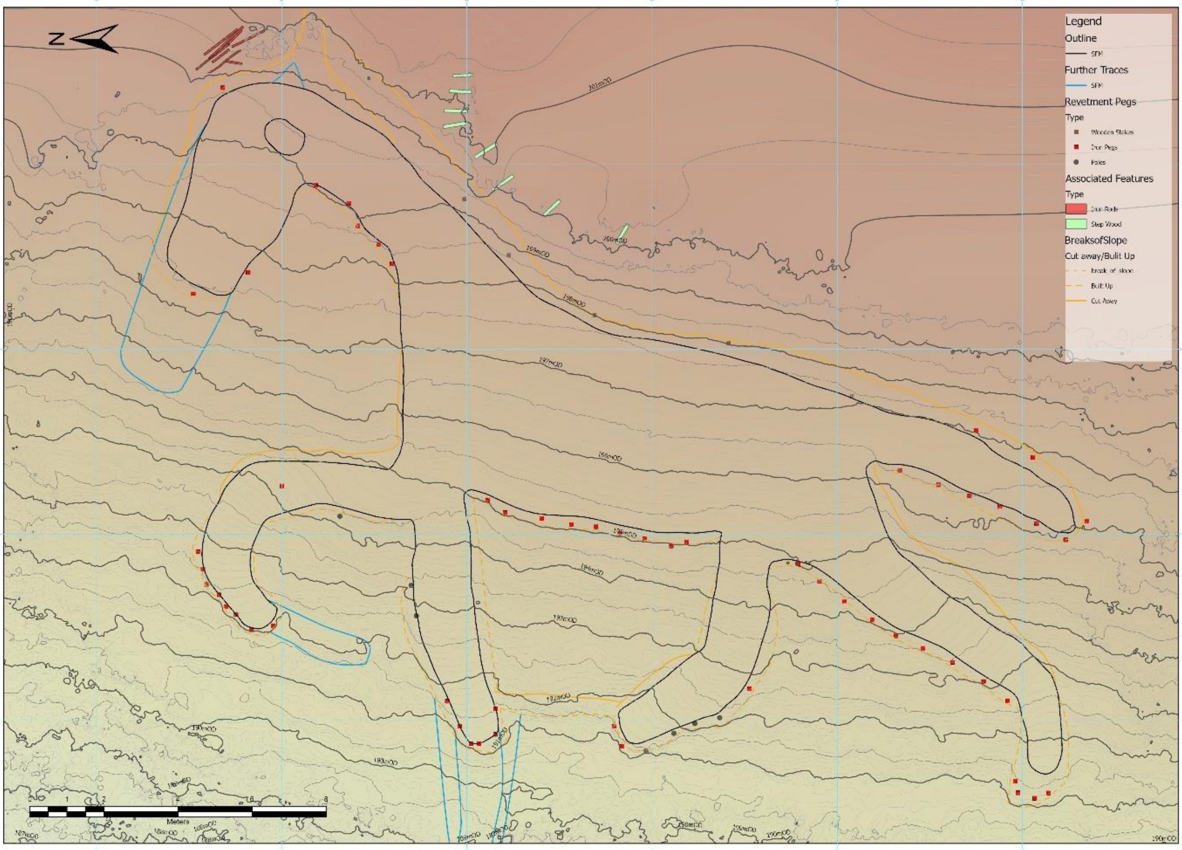

Figure 13 right: Contour Lines with interpretation UAV Survey

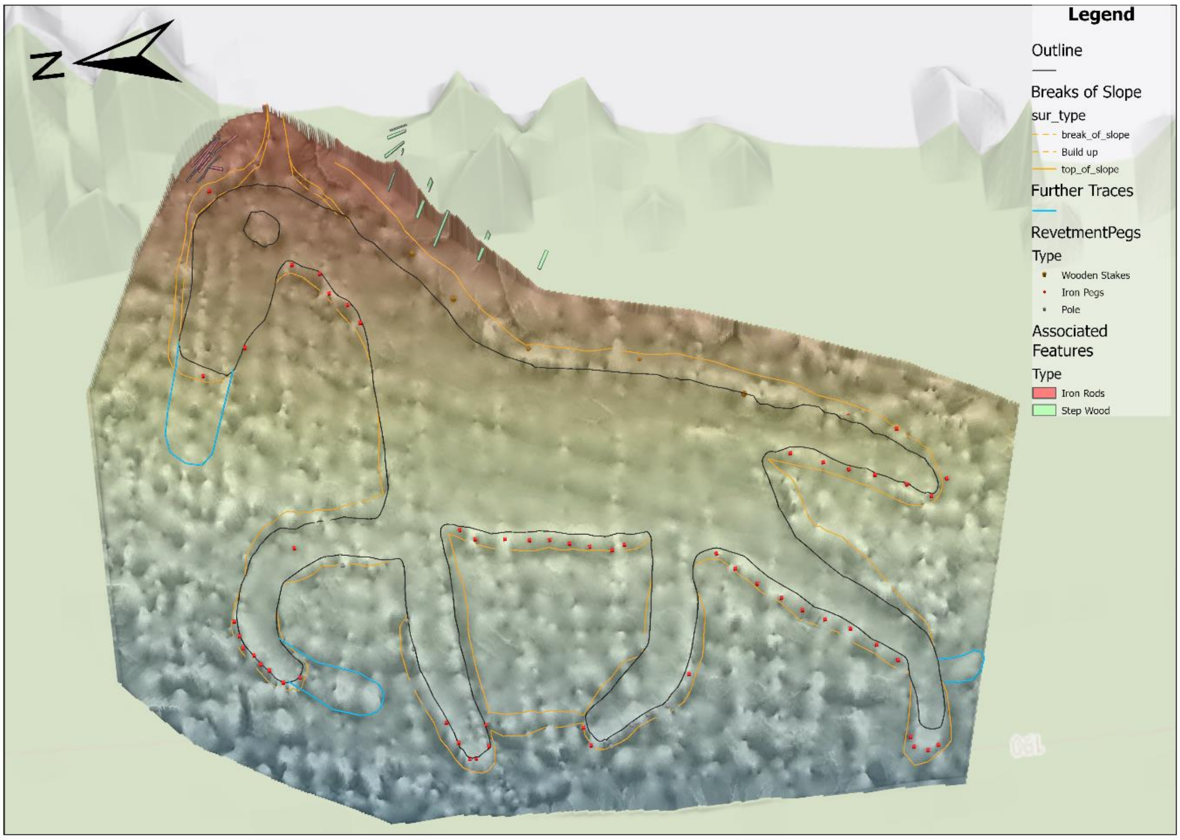

Figure 14 left: Perpendicular to slope view with interpretation: GNSS Topographic Survey

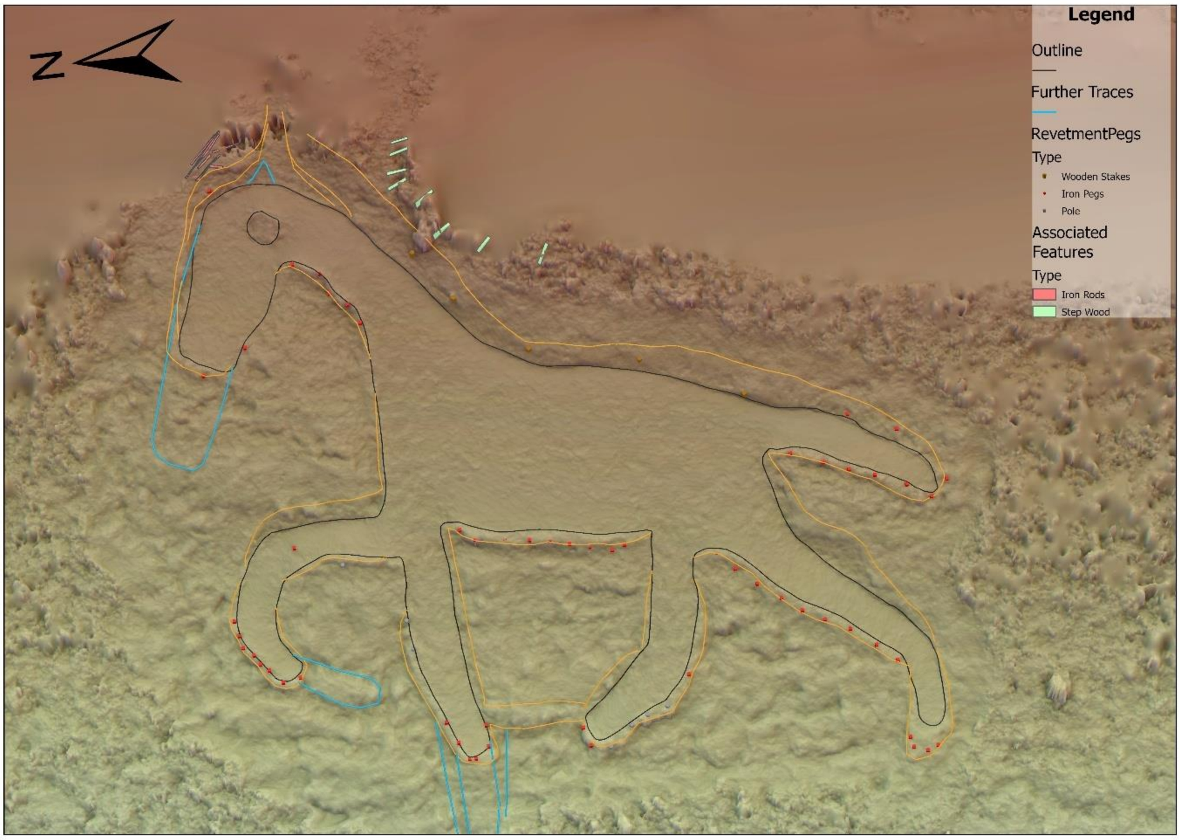

Figure 14 right: Perpendicular to slope view with interpretation: GNSS Topographic Survey

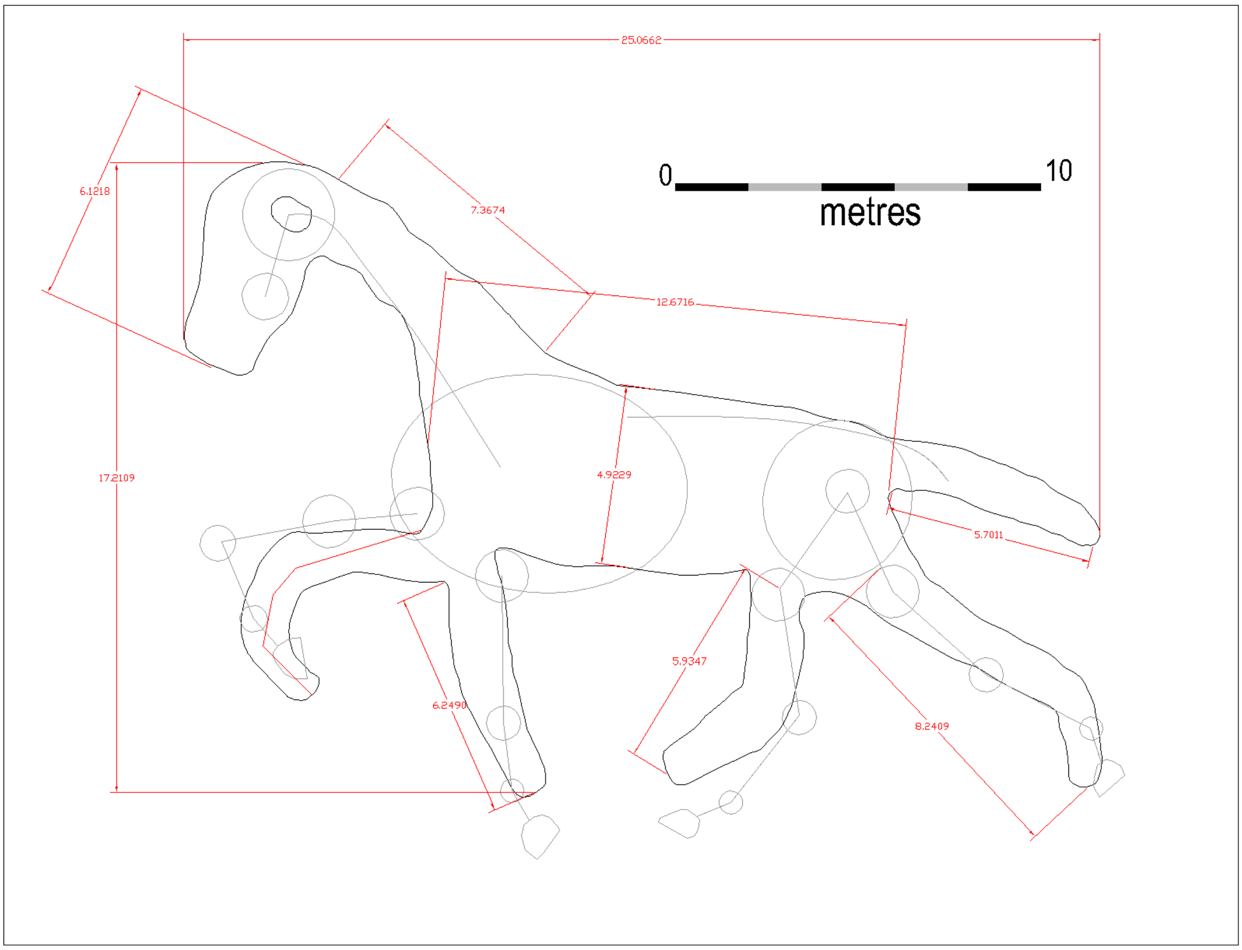

Figure 17 top: Orthographic outline of Broad Town White Horse with positions of Orthographic Distance Measurements (as seen on orthographic projection)

Element	**Orthographic Distance (m)**	**Ground Distance (m)**
Length	25.07	25.25
Height	17.21	19.09
Head Length	6.12	6.49
Chest-Rump	12.67	12.76
Neck	7.37	8.15
Tail	5.7	5.73
Outside Back Leg	8.24	9.70
Inside Back Leg	5.93	7.06
Outside Front Leg	7.88	7.99
Inside Front Leg	6.25	6.99
Max Belly depth	4.93	5.49

Table 9: Metrics of BTWH

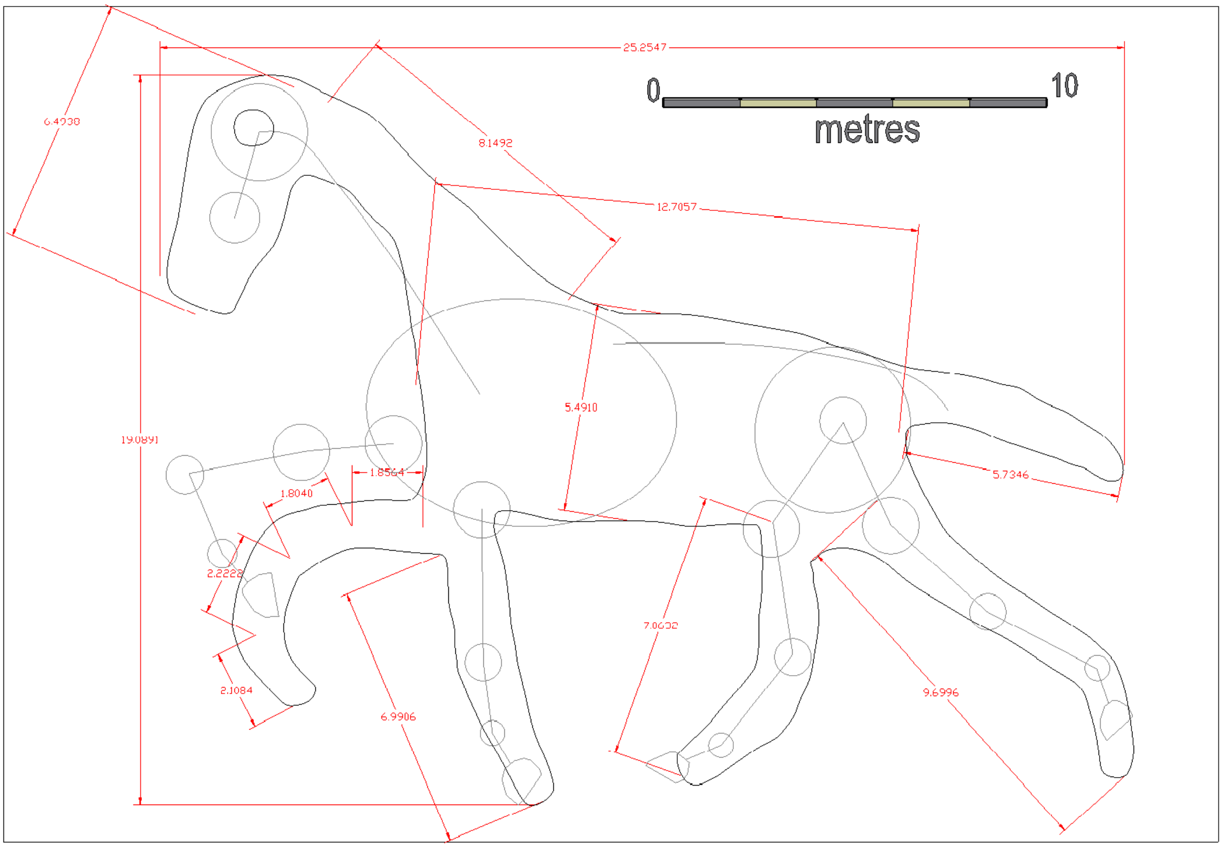

Figure 17 bottom: Perpendicular outline of Broad Town White Horse with positions of Ground Distance Measurements (as seen on perpendicular projection)

Element	**Orthographic Distance (m)**	**Ground Distance (m)**
Length	25.07	25.25
Height	17.21	19.09
Head Length	6.12	6.49
Chest-Rump	12.67	12.76
Neck	7.37	8.15
Tail	5.7	5.73
Outside Back Leg	8.24	9.70
Inside Back Leg	5.93	7.06
Outside Front Leg	7.88	7.99
Inside Front Leg	6.25	6.99
Max Belly depth	4.93	5.49

Table 9: Metrics of BTWH

Appendix B Additional Useful Figures

Fig 33: GNSS Measurement Points (excluding chalk outline)

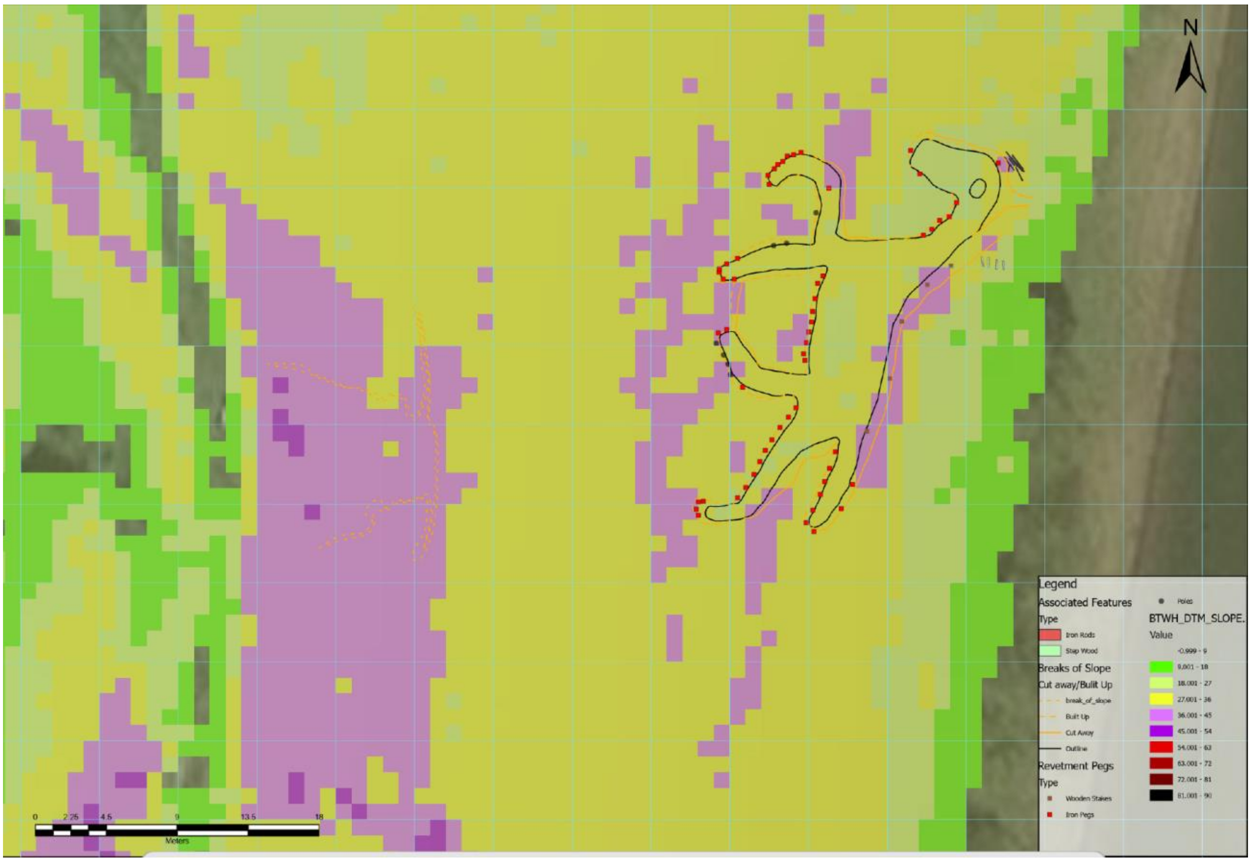

Fig 34: Slope Steepness near Broad Town White Horse

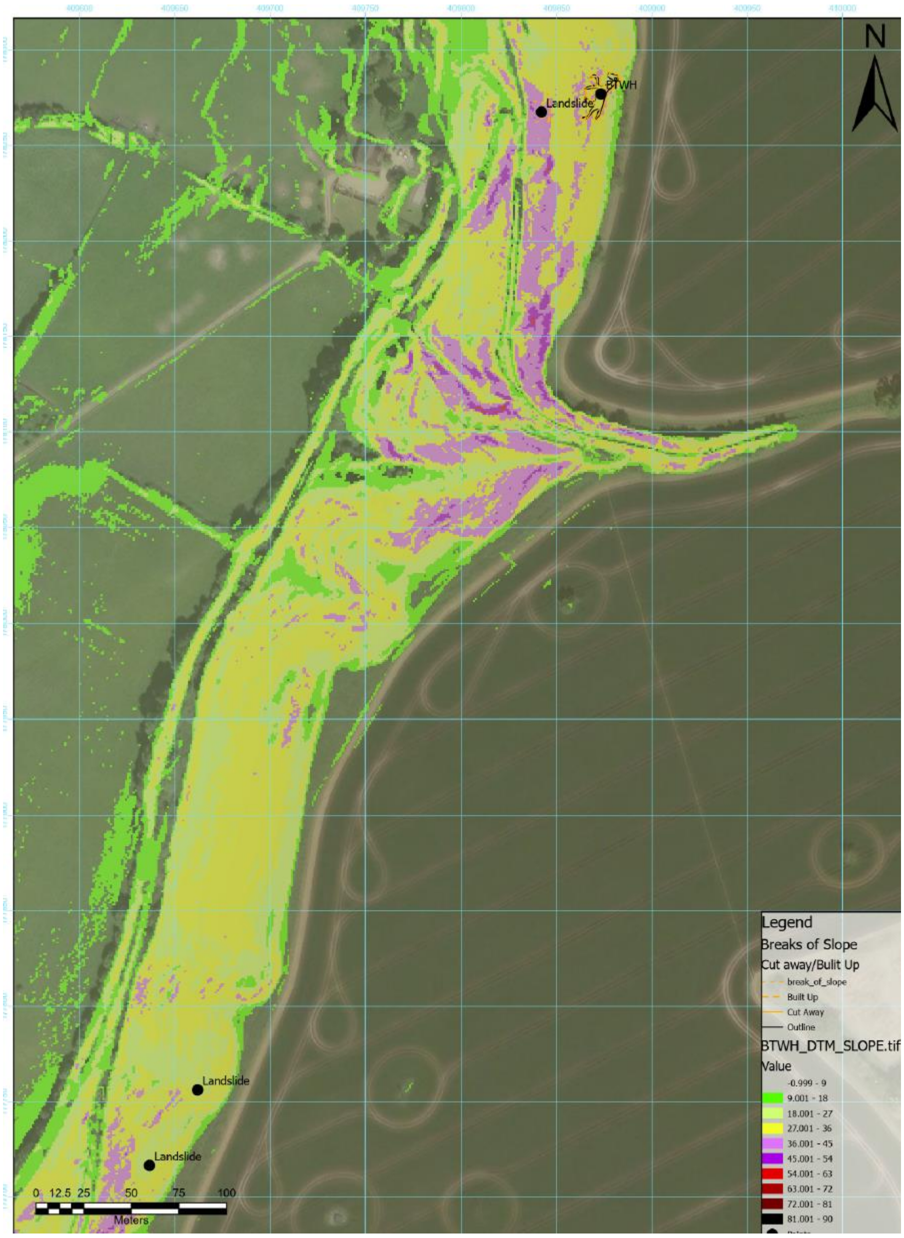

Fig 35: Slope Steepness along whole Broad Town Escarpment (LIDAR data)

Change Record

V1 Issued July 2025 by D.Horne

V2 Issued September 2025 – corrections in phrasing, typos and addition of some figures by D. Horne

V2a Issued November 2025 – addition of Annexes with larger images of Figures which had been difficult to read at original size by D. Greer

Issue V2b Issued December 2025 – correction of minor typos and labelling of Figure 17 and inclusion of Change Record by D. Greer