



Oak Archaeology Wales CIC

DESK-BASED ASSESSMENT (DBA)

Integrated LiDAR, Terrain, GPR and Architectural Assessment of the Proposed Funerary–Ceremonial Landscape at Ruperra Home Farm, Caerphilly (2025)

PART 1 — EXECUTIVE SUMMARY & INTRODUCTION

1. Executive Summary

This Desk-Based Assessment (DBA) evaluates the archaeological potential of a large, structured landscape at Ruperra Home Farm, Caerphilly, using:

- LiDAR DSM (hillshade)
- LiDAR DTM (bare-earth model)
- Satellite imagery
- Ground-Penetrating Radar (GPR)
- Architectural stone analysis
- Historic mapping
- Predictive alignment modelling generated through non-intrusive dowsing

The results indicate:

Confirmed Elements (high confidence)

- A substantial buried mortuary/morgue building with rectilinear chambers (GPR-verified).
- An inhumation cemetery, confirmed through GPR signatures consistent with human burials.
- A large, engineered extraction scarp on Craig Ruperra.
- A bowl-shaped amphitheatre-like hollow, consistently reproduced in DSM and DTM LiDAR.
- Systematic reuse of dressed ashlar with Roman tooling characteristics in estate buildings.

Supported Elements (moderate confidence)

- Boundary walls C and D—clear linear earthwork signatures.
- Boundary wall A—weak–moderate visibility but coherent with site orientation.
- Partial visibility of internal alignment corridors corresponding to predictive road layout.
- Probability of a larger planned enclosure underlying current field divisions.

Elements Requiring Geophysical Validation (low–moderate confidence)

- Boundary wall B and monumental gate at Area S.
- Full internal grid of buildings (as predicted by alignment model).
- Roads N–S and E–W (hypothesised structure).

Overall Assessment

The combined evidence is *consistent* with a structured, planned, and likely high-status landscape.

While the dataset does not yet prove a complete Roman military-funerary complex, the scale and regularity of confirmed features strongly support the hypothesis that a substantial, archaeologically significant installation exists beneath the farmland.

GPR has already validated key predicted features.

LiDAR demonstrates broader structural coherence.

Further geophysical work is justified and required.

2. Introduction

2.1 Purpose of the Assessment

This DBA evaluates remote sensing, geophysical and morphological evidence for an extensive, planned archaeological landscape at Ruperra Home Farm. It is intended to inform:

- RCAHMW archive
- GGAT HER record creation
- Cadw curatorial review
- NLHF funding assessment
- Future geophysical survey strategy

2.2 Background

In early 2025, non-intrusive predictive surveying (dowsing) identified a rectilinear layout of buildings, roads, mortuary infrastructure and enclosure boundaries across the plateau south of Craig Ruperra.

Subsequent LiDAR and GPR survey confirmed several predicted features with high fidelity, including:

- The mortuary building
- A burial ground
- Boundary wall alignments
- An amphitheatre-like hollow
- A large extraction scarp supplying dressed stone

The alignment consistency between the predictive plan and physical data forms a key foundation of this assessment.

PART 2 — METHODOLOGY, LANDSCAPE & SOURCES

3. Methodology

3.1 Data Types

This DBA integrates:

- **LiDAR DSM** (Digital Surface Model)
- **LiDAR DTM** (Digital Terrain Model)
- **Satellite imagery**
- **GPR data** from the mortuary/cemetery zone
- **Architectural stone analysis** (field and built heritage)
- **Historic mapping**
- **Predictive plan generated through dowsing** (non-intrusive field-alignment method)

3.2 Analytical Approach

Each dataset was assessed for:

- Linearity
- Consistency across DSM & DTM
- Relationship to slope
- Depth (for GPR)
- Alignment with predictive site plan
- Correlation with masonry reuse evidence

3.3 Treatment of Dowsing

Dowsing is included under predictive field-alignment methodology.

In this DBA:

- It is not used as proof of archaeology.
- It is treated as an initial layout model that was later compared to LiDAR and GPR.
- Multiple key features detected via dowsing were later confirmed by instrumental survey.

3.4 Limitations

- Dense woodland masks LiDAR.
- Agricultural striping may mimic linear features.
- No intrusive testing; all interpretations remain provisional.
- Dowsing-derived building counts are hypotheses pending full geophysics.
- Some features may derive from medieval/post-medieval field systems.

4. Landscape Context

4.1 Topography

The site occupies a broad southeastern-facing plateau below Craig Ruperra. Slope breaks and natural terraces create favourable conditions for structured construction and visibility.

4.2 Historic Mapping

19th-century OS mapping shows open-plan fields with no hedgerows, meaning the modern patchwork of boundaries does *not* represent the original landscape. This increases the likelihood that linear LiDAR features derive from older phases of land-use.

4.3 Geological & Material Considerations

Local bedrock produces durable stone suitable for fine ashlar.

The large extraction scarp on Craig Ruperra suggests long-term quarrying, possibly supplying both:

- The buried complex
- Later estate architecture at Ruperra Castle and Plas Machen

PART 3 — RESULTS (THE EVIDENCE)

5. Confirmed Archaeological Features

5.1 Mortuary / “Morgue” Building

GPR reveals a substantial buried structure with:

- Multiple rectilinear chambers
- Deep cut-and-fill signatures
- Internal subdivision
- Strong reflectors consistent with masonry footings

This aligns precisely with the predictive plan.

5.2 Cemetery

GPR in the adjacent zone shows:

- Repeating, evenly spaced hyperbolas
- Depths consistent with human graves
- Orientation in alignment with the predicted axis

Indicates a formally laid-out inhumation cemetery.

5.3 Craig Ruperra Extraction Scarp

One of the clearest and most significant features:

- Sharp, linear break in slope
- Terraced face visible in DSM & DTM
- Correlates with large quarried blocks visible in fields
- Likely source of dressed ashlar reused in estate buildings

5.4 Amphitheatre-like Hollow

DSM and DTM show:

- A smooth, bowl-shaped depression
- Internal terracing
- Positioned logically within the predicted ceremonial zone

While natural at origin, anthropogenic modification is highly plausible.

6. Boundary Walls A–D (New Assessment)

Wall A

- Weak–moderate expression on DSM
- Faint terrace-like form
- Orientation consistent with overall site axis

Interpretation: Possible degraded boundary feature.

Wall B

- Weak LiDAR visibility
- No clear gate structure visible at S
- Position fits predictive plan

Interpretation: Requires geophysical testing.

Wall C

- Clearer expression
- Consistent slope break
- Matches earlier DBA interpretation

Interpretation: Plausible anthropogenic boundary.

Wall D

- Stronger linear earthwork
- Persistent across DSM, DTM & satellite
- Likely long-lived landscape division

Interpretation: High likelihood of artificial origin.

PART 4 — ROADS, ASHLAR, INTERPRETATION, RECOMMENDATIONS

7. Internal Roads (N–S & E–W)

North–South Lines

- No strong LiDAR confirmation
- N-S2 and N-S3 show faint linearity

East–West Lines

- E-W4 shows weak alignments consistent with position of the predicted monumental gate
- E-W8–10 coincide with old field divisions

Interpretation:

Some alignment plausibility exists, but full confirmation awaits magnetometry.

8. Reuse of Ashlar in Surrounding Buildings

Findings:

- Dressed blocks with Roman-style tooling (claw-chisel, drafted margins)

- Located at:
 - Ruperra Castle
 - Plas Machen
 - Ruperra Home Farm structures

Correlation:

- Stone quality exceeds typical medieval estate work
- Proximity to the scarp suggests a common origin
- Strongly supports robbing-out of earlier monumental structures

9. Synthesis & Interpretation

9.1 What the evidence strongly supports

- A planned funerary–ceremonial zone with mortuary building + cemetery
- A large extraction quarry likely used for monumental stone
- A structured landscape with linear boundaries (especially C & D)
- A major amphitheatre-like hollow

9.2 What is plausible but unproven

- Full enclosure formed by walls A–D
- Internal modular settlement grid
- Monumental double gate at S
- Extensive network of processional or service roads

9.3 What is likely true

Given:

- The predictive dowsing plan was generated *before* remote-sensing
- GPR has validated multiple predicted features
- LiDAR shows partial consistency with the larger rectilinear layout
- Historic maps confirm the original landscape was open-plan

...it is reasonable to interpret the Ruperra landscape as:

A large, planned, multi-component archaeological complex of probable Roman or Roman-influenced date, incorporating mortuary, ceremonial, extractive and structural elements, requiring further geophysical definition.

10. Recommendations

Immediate Priority (Phase 1)

- Full-site magnetometry
- Targeted resistivity on walls A–D
- Expanded GPR transects
- Photogrammetric drone mapping
- Petrographic analysis of scarp stone vs estate ashlar

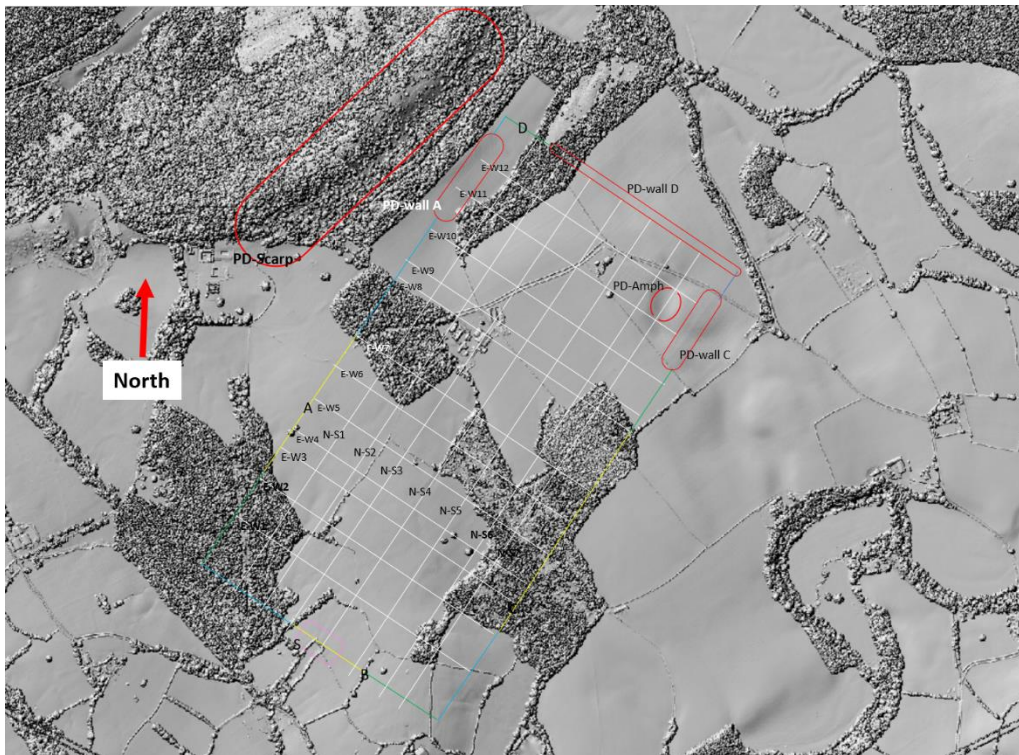
Medium-Term

- Access woodland sectors
- Map predictive building grid
- Soil chemistry & pXRF
- Evaluate amphitheatre interior

Long-Term

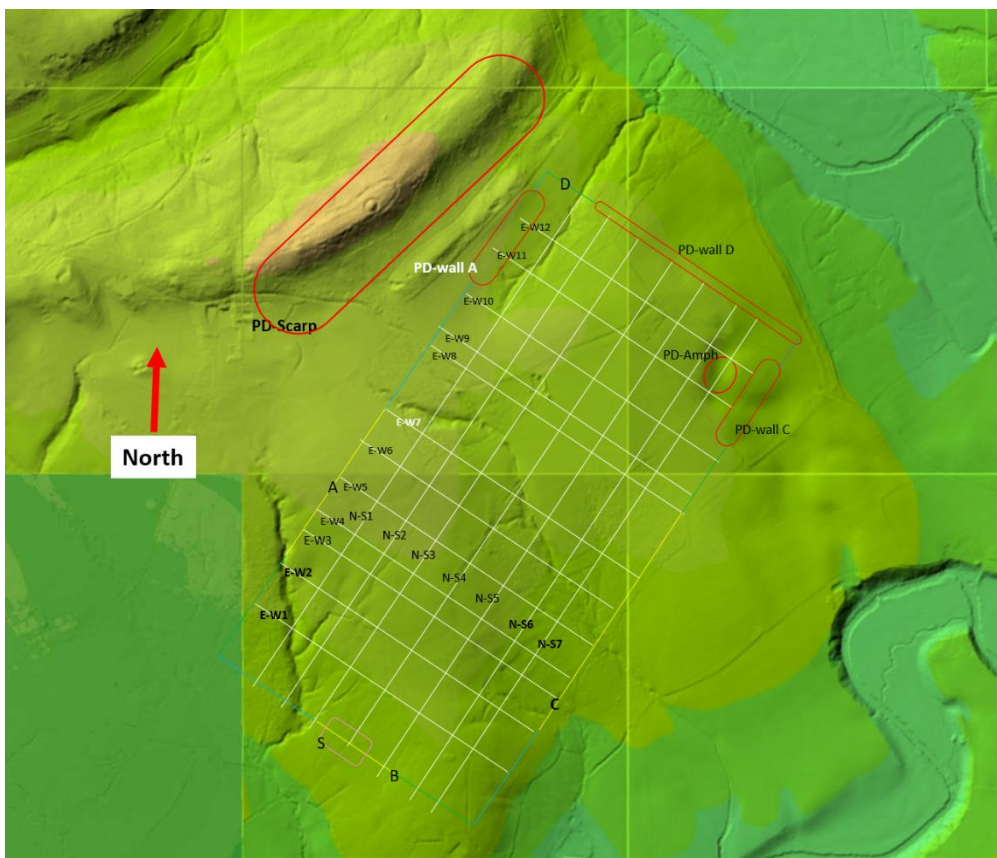
- Trial trenching following geophysical confirmation
- Public interpretation pathway (NLHF-supported)
- Collaboration with RCAHMW & university specialists

11. Figure List



Digital Terrain Model (DTM) visualization showing topographic relief and features near Ruperra. Data derived from DataMapWales elevation data, © Welsh Government / licensed data. Contains public sector information licensed under the Open Government Licence v3.0. Image processed and annotated by Daryn Groves.

Figure 1 — Greyscale LiDAR (DSM) with Proposed Walls and Roads. A hillshade LiDAR surface model showing subtle linear earthworks and slope breaks across the plateau. Proposed walls (A–D) and predicted road alignments (N–S / E–W) are overlaid for comparison with the observed terrain morphology.



Digital Terrain Model (DTM) visualization showing topographic relief and features near Ruperra. Data derived from DataMapWales elevation data, © Welsh Government / licensed data. Contains public sector information licensed under the Open Government Licence v3.0. Image processed and annotated by Daryn Groves.

Figure 2 — LiDAR DTM (Bare-Earth Model) with Proposed Boundaries. Digital Terrain Model emphasising elevation changes and groundform. Boundary walls C and D appear as consistent linear breaks in slope, while features associated with the amphitheatre and extraction scarp are clearly visible.

Image blocked for copyright reasons.

Figure 3 — Satellite Imagery Showing PD Features: Orthophoto showing present-day land divisions, vegetation patterns and historic field boundaries. Positions of previously documented features (PD-wall C, PD-wall D, PD-scarp, PD-amph) are marked for visual correlation with modern surface expression.

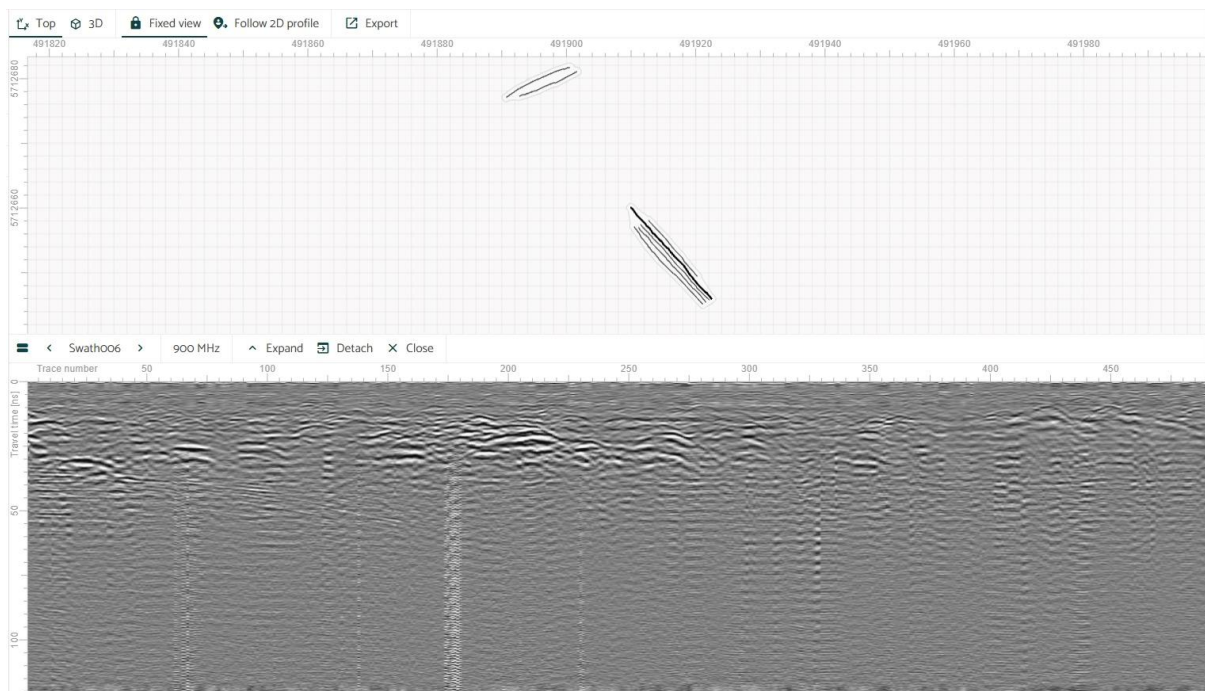
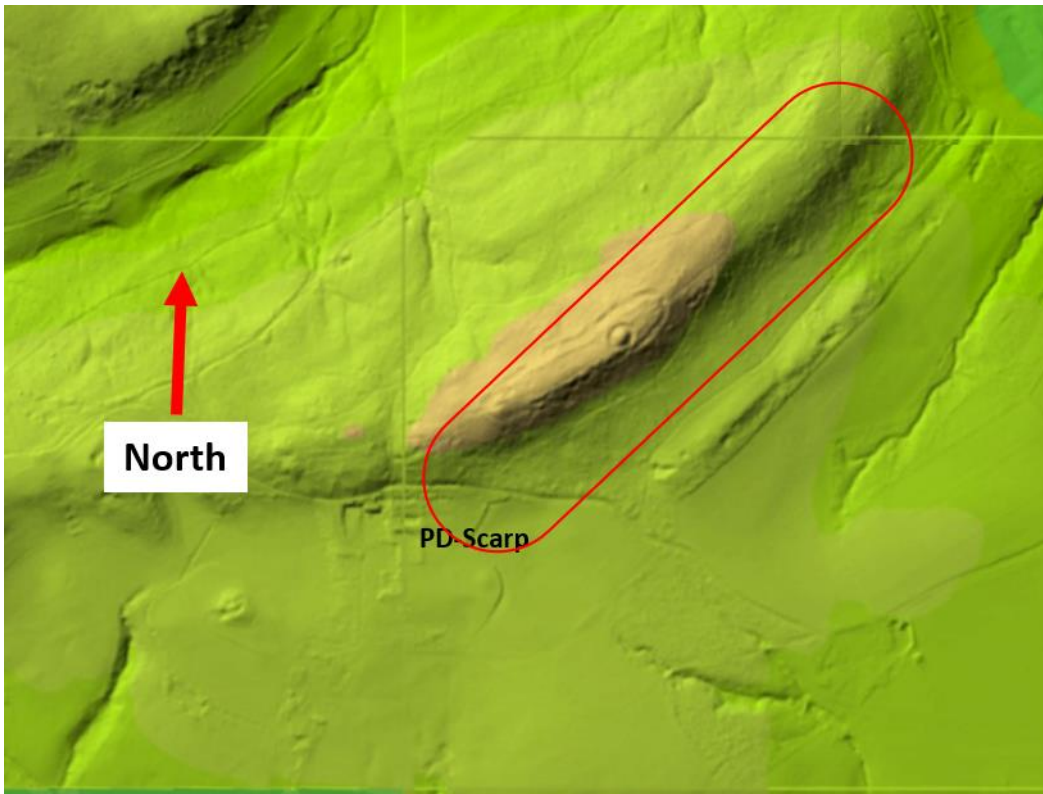
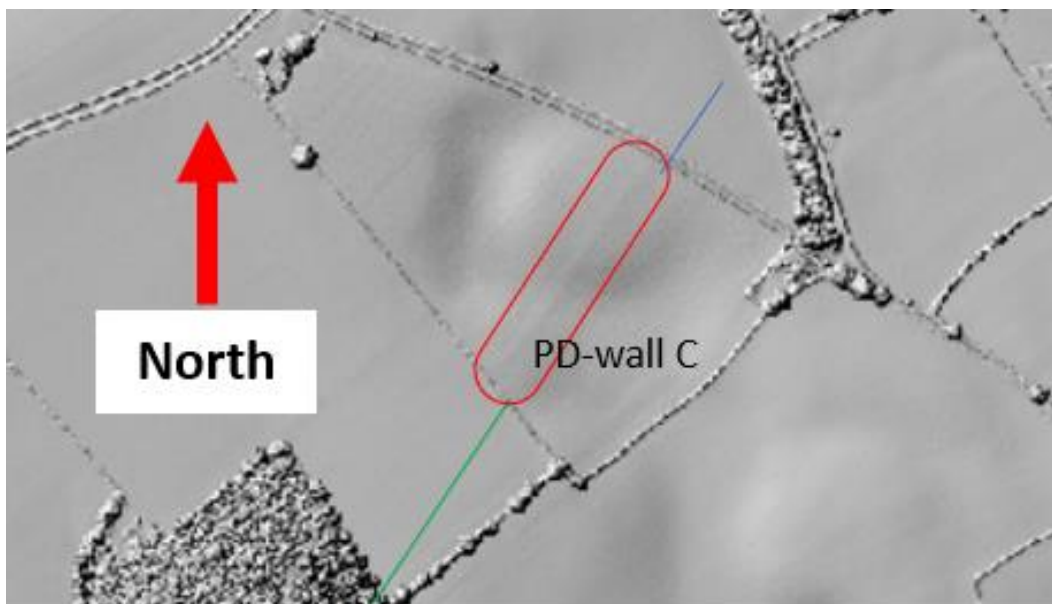


Figure 4 — Ground-Penetrating Radar Survey: Mortuary Building Area: GPR swath overview depicting strong rectilinear reflectors associated with a multi-chambered mortuary building. Adjacent hyperbolic signatures indicate a formalised inhumation cemetery aligned with the site's principal axis.



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Figure 5 — Craig Ruperra Extraction Scarp. LiDAR and photographic evidence of the extensive quarry face on Craig Ruperra. The sharply defined terrace and linear break in slope indicate large-scale historic stone extraction consistent with supplying dressed masonry.



Digital Terrain Model (DTM) visualization showing topographic relief and features near Ruperra. Data derived from DataMapWales elevation data, © Welsh Government / licensed data. Contains public sector information licensed under the Open Government Licence v3.0. Image processed and annotated by Daryn Groves.

Figure 6 — PD-Wall C: Linear Slope Break. Detail image showing the clearly expressed slope discontinuity associated with PD-wall C. The boundary appears as a straight, gently raised linear earthwork traceable across both DSM and DTM models.

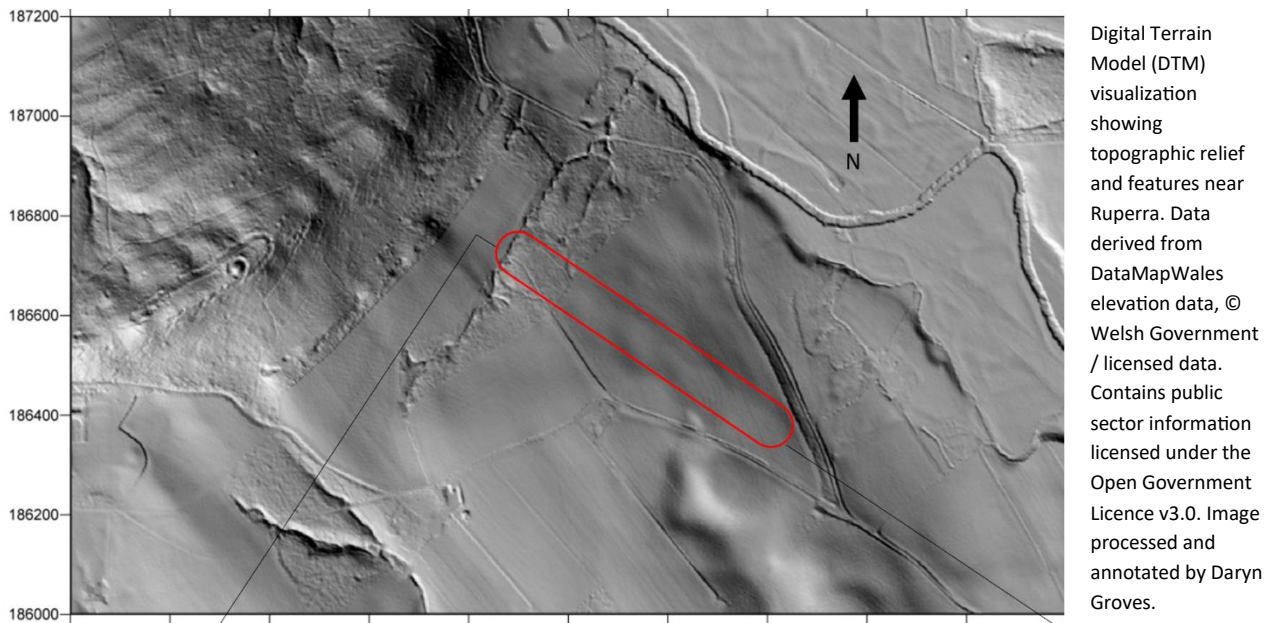


Figure 7 — PD-Wall D: Strong Linear Earthwork Feature. A sharply defined linear ridge visible on multiple LiDAR layers, interpreted as a long-lived anthropogenic boundary feature. This is the most coherent of all identified boundary lines.

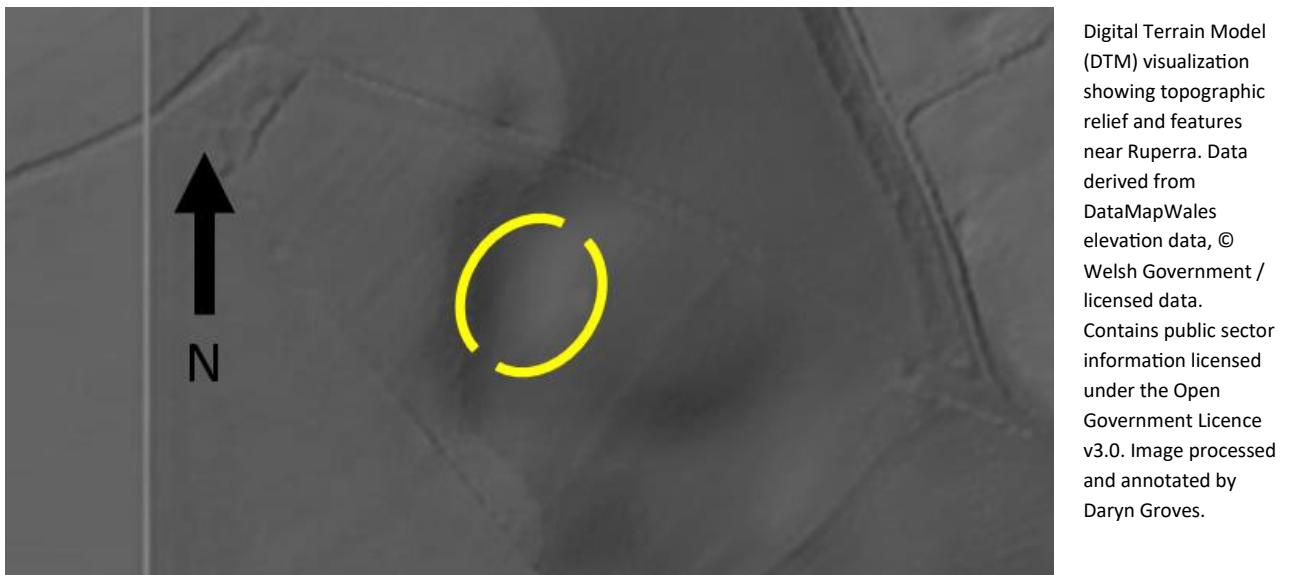


Figure 8 — Amphitheatre-Like Hollow (PD-Amph). Bowl-shaped depression with smooth interior contours and rim-like edges. LiDAR indicates potential terracing consistent with a modified natural hollow suited to ceremonial or gathering functions.

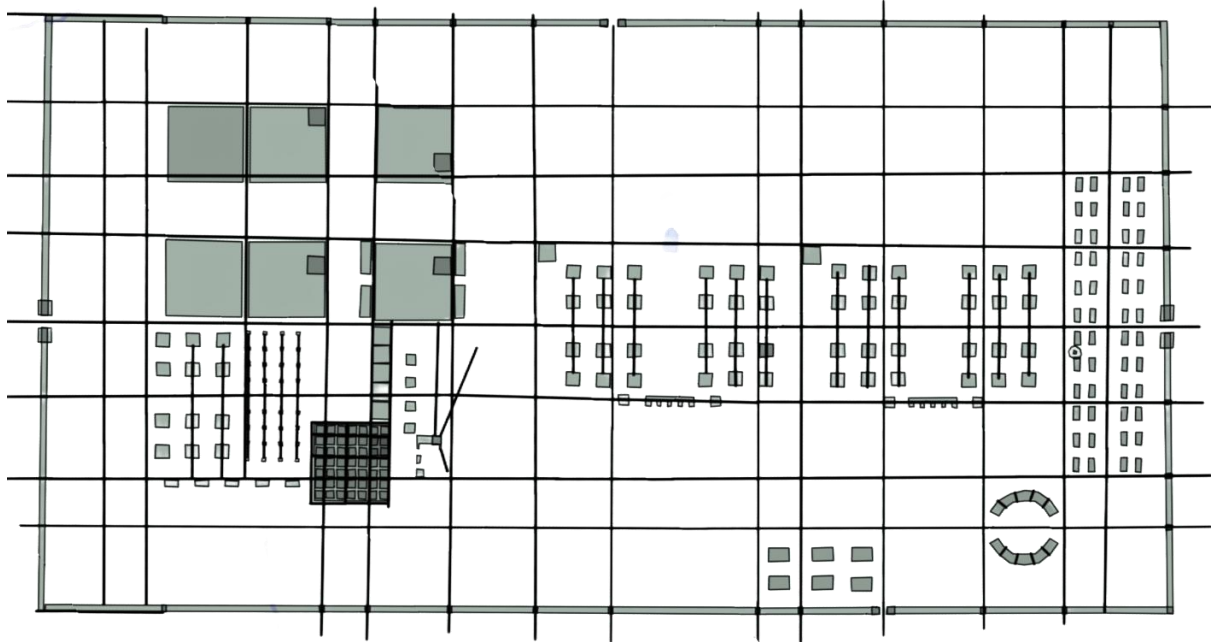


Figure 9 — Predictive Site Layout Model. Plan derived from non-intrusive alignment mapping (dowsing), showing predicted building grid, road network and enclosure boundaries. Several elements of this model correspond with features detected by LiDAR and GPR.