



ARCHAEOLOGICAL SURVEYS
GEOPHYSICAL SURVEY REPORT

Malmesbury Town Defences

Resistivity survey

For

North Wiltshire District Council

David Sabin and Kerry Donaldson

June 2006

Ref no. 116 (additional works)

ARCHAEOLOGICAL SURVEYS

Malmesbury Town Defences

Resistivity survey

for

North Wiltshire District Council

Report and fieldwork by David Sabin and Kerry Donaldson

Survey date – **23rd June 2006**

Ordnance Survey Grid Reference - **ST 935 873**

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SUMMARY

A resistivity survey was carried out close to Malmesbury town walls and the surviving remains of the East Gate. The survey area extended on a similar survey carried out by Archaeological Surveys in October 2005. Several anomalies located by the survey could confidently be attributed to underground services, other faint linear anomalies are of uncertain origin. A large area of low resistance corresponds to damp ground adjacent to a stream forming the south eastern boundary of the survey area. It is likely that this low resistance area defines alluvial deposits where environmental indicators may be preserved.

1 INTRODUCTION

1.1 *Survey background*

1.1.1 Archaeological Surveys were commissioned by North Wiltshire District Council to undertake a resistivity survey adjacent to Malmesbury town walls. The survey is close to the surviving remains of the East (Holloway) Gate and a surviving section of town wall that has recently undergone renovation as part of the third phase of repair and reinstatement being carried out by North Wiltshire District Council.

1.1.2 Archaeological Surveys have previously undertaken resistance survey at the site for Cotswold Archaeology and the area considered by this report is an extension to that survey.

1.2 *Survey objective*

1.2.1 The objective of the survey was to use resistivity to locate geophysical anomalies that may be archaeological in origin so that they may be assessed as part of the process of archaeological evaluation. The survey extends on an area of resistivity survey already carried out on the outside of the town walls.

1.3 *Site location*

1.3.1 The survey area is located northeast of Malmesbury town centre at OS reference ST 935 873.

1.4 *Site description*

1.4.1 The survey area lies outside the town wall on permanent pasture that slopes steeply away from the base of the wall to a stream which is a tributary of the River Avon. The area is approximately 30m by 30m, the town wall lies approximately 30m to the northwest, the remains of barns or sheds are located along the north eastern edge with a disused railway embankment to the southwest.



Plate 1 Area of resistance survey.

1.5 Site history and archaeological potential

- 1.5.1 The archaeological potential of the survey area is considered high due to the site location close to the town walls (Scheduled Ancient Monument - Wiltshire 881). The following extract (1.5.2) has been derived from the original brief issued by North Wiltshire District Council.
- 1.5.2 Malmesbury occupies a naturally defensive position on a rocky promontory overlooking the valley of the River Avon. Recent archaeological investigation supports and earlier hypotheses that the foundations of the town lie within an Iron Age Hillfort. This was apparently later re-fortified to become part of the Burgh defence system for Wessex established during the Saxon period under King Alfred. The fortifications were probably strengthened during the Medieval period by the construction of a substantial stone wall along the established line of the ramparts. It is likely that the wall has been subject to periods of reconstruction and alteration at various times, most notably during the Civil War period when it is known to have been partially slighted.
- 1.5.3 Sections of the wall are variously subject to statutory protection, either by being included in the List of Buildings of Special Architectural or Historic Interest or by designation as a Scheduled Ancient Monument.
- 1.5.4 North Wiltshire District Council has undertaken a comprehensive and phased programme of repair and reinstatement along the length of the eastern boundary, with the first two phases having been undertaken during 1998/1999 and 2001/2002. The third and final phase of work will cover the northern extremity adjoining and including the remains of the East (Holloway) Gate.

1.6 *Geology and soils*

- 1.6.1 The underlying geology is mainly Cornbrash of the Jurassic period (BGS, 2001) with overlying alluvial deposits increasing in depth towards the stream (BGS, 1977).
- 1.6.2 The overlying soils belong to the Wickham 3 formation and are typical stagnogley soils (Soil Survey of England and Wales, 1983). The thickness of the soil profile is likely to vary considerably due to a combination of natural slope processes associated with weathering and a range of anthropogenic activities both ancient and modern.

2 **METHODOLOGY**

2.1 *Technical synopsis*

- 2.1.1 The electrical resistance or resistivity of the soil depends mainly upon moisture content and distribution within the soil. Buried features such as walls can affect the moisture distribution and are usually more moisture resistant than other features such as the infill of a ditch. A stone wall will generally give a high resistance response and the moisture retentive content of a ditch can give a low resistance response.

2.2 *Equipment details and configuration*

- 2.2.1 The resistivity survey was carried out using TR Systems Ltd Resistance Meter TRCIA 1.31 using a mobile Twin Probe array.
- 2.2.2 Readings were taken at 0.5m intervals across both survey areas giving 3600 readings within a full 30m x 30m grid.
- 2.2.3 Survey grids are assembled to form an overall composite of data (composite file contains only 1 grid for this survey) creating a dataset of the complete survey area. Appendix A contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor.

2.3 *Surveying and referencing*

- 2.3.2 A baseline was set out and referenced using a Topcon APL1 robotic total station, see Figure 02 points A and B. From this a 30m grid was established using wooden pegs.
- 2.3.3 The underlying Ordnance Survey base mapping of the survey area contains a number of features that are no longer present on the site and land boundaries do not appear to be mapped to high accuracy. Referencing measurements shown in Figure 02 represent horizontal distances measured on site and may differ slightly to those scaled from the base mapping.

2.4 *Data processing and presentation*

2.4.1 Data logged by the resistance meter is downloaded and processed within ArcheoSurveyor software. Raw data is analysed and displayed within the report as well as processed data. The following processing has been carried out on data in this survey:

- processed data has been clipped at 2SD to enhance any possible archaeological anomalies
- processed data has passed through a high pass filter in order to enhance features.

(Further details on the processing sequence can be found in Appendix A)

2.4.2 The results are presented in the form of greyscale plots for both raw and processed data with an additional abstraction and interpretation plot using coloured linear and area symbols where appropriate.

2.5 *Archive*

2.5.1 Survey results are produced in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). In addition digital data created during the survey is supplied on CD. Further information on the production of the report and the digital formats involved in its creation are set out below.

2.5.2 This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.0.4.3 (geophysical data analysis)
- Paint Shop Pro 8 (graphic rotation)
- AutoCAD LT 2007 (report figures)
- Microsoft Word 2000 (document text)
- PDF Creator version 0.9 (PDF archive).

2.5.3 Digital data is supplied on CD ROM and includes the following files:

- ArcheoSurveyor grid and composite files for all geophysical data
- CSV files for raw and processed composites
- Composite graphics as Windows bitmaps
- AutoCAD DWG file in 2000 version
- Microsoft Word 2000 doc file
- PDFs of all figures
- Photographic record in JPEG format

2.5.4 The CD ROM structure is formed from a tree of directories under the title J116a Malmesbury – CD. Directory titles include Data, Documentation, CAD,

PDFs and Photos. Multiple directories exist under Data; each directory holds grid, composite and graphic files with CSV composite data held in export.

- 2.5.5 The CAD file contains embedded graphics as bitmaps with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen.

3 RESULTS

- 3.1.1 Faint high resistance linear anomalies, numbered 1 Figure 05, are of uncertain origin although may be associated with adjacent pipelines and an inspection chamber to the north.
- 3.1.2 A high resistance linear anomaly, number 2 Figure 05, crosses the survey area with a northeast to southwest orientation. The anomaly tends to correspond with a linear parch mark visible at the time of surveying and it is likely that this represents a buried service.
- 3.1.3 An area of high resistance, number 3 Figure 5, occurs around an inspection chamber and faint high resistance linear anomalies radiating from the feature may represent pipelines.
- 3.1.4 A distinct low resistance area, number 4 Figure 5, is very likely to define damp alluvial soil adjacent to the nearby stream.

4 DISCUSSION

- 4.1.1 Although a number of resistive anomalies were located within the survey area there is little evidence to suggest that they belong to features of archaeological significance, several anomalies can be attributed to underground services.
- 4.1.2 A clear distinction exists between an area of low resistance on the lowest ground adjacent to the stream and higher resistance where land starts to rise. The low resistance is likely to define the extent of damp alluvial soils and may well indicate a suitable environment for the survival of environmental remains.

5 CONCLUSION

- 5.1.1 The resistance survey provides no evidence for features of significant archaeological potential. High resistance linear anomalies of uncertain origin may indicate the presence of minor structural remains but equally these anomalies may indicate relatively modern features or underground services.
- 5.1.2 Resistance survey carried out by Archaeological Surveys immediately to the northwest for Cotswold Archaeology, revealed a number of anomalies that

could not be confidently interpreted but there is no indication that these anomalies extend into the new survey area.

- 5.1.3 A large area of low resistance is likely to indicate the presence of damp alluvial deposits adjacent to the stream. There is no evidence to indicate any anthropogenic activity or modification of this alluvial environment although it is possible that useful environmental indicators survive within anaerobic conditions.

6 REFERENCES

British Geological Society, 2001, *Solid Geology Map, UK South Sheet, 1:625 000 scale, 4th edition*.

British Geological Society, 1977, *Geological Survey Ten Mile Map, South Sheet, 1:625000 scale, First Edition (Quaternary)*.

English Heritage, 1995, *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No 1*.

Soil Survey of England and Wales, 1983, *Soils of England and Wales, Sheet 5 South West England*.

7 Appendix A – survey metadata and information

Raw resistance data

Filename: J116a.xcp
Instrument Type: TR/CIA (Resistance)
Units: ohm
Surveyed by: on 23/06/2006
Assembled by: on 23/06/2006
Collection Method: ZigZag
Dummy Value: -2147483648
Origin: Zero

Dimensions

Composite Size (readings): 60 x 60
Survey Size (meters): 30 m x 30 m
Grid Size: 30 m x 30 m
X Interval: 0.5m
Y Interval: 0.5m

Stats

Max: 191.57
Min: 9.31
Std Dev: 8.09
Mean: 16.17

Processes: 1
1 Base Layer

Source Grids: 1

1 Col:0 Row:0 grids\J116a-01.asg

Processed resistance data

Filename: J116a-proc.xcp
Instrument Type: TR/CIA (Resistance)
Units: ohm
Surveyed by: on 23/06/2006
Assembled by: on 23/06/2006
Collection Method: ZigZag
Sensors: 0 @ 0.00 m spacing.
Dummy Value: -2147483648
Origin: Zero

Dimensions

Composite Size (readings): 60 x 60
Survey Size (meters): 30 m x 30 m
Grid Size: 30 m x 30 m
X Interval: 0.5m
Y Interval: 0.5m

Stats

Max: 16.11
Min: -8.57
Std Dev: 2.74
Mean: 0.08

Processes: 3

- 1 Base Layer
- 2 Clip at 2 SD
- 3 High pass Uniform filter: Window: 21 x 21

Source Grids: 1

- 1 Col:0 Row:0 grids\J116a-01.asg

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Map of survey area

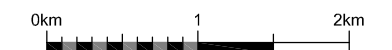
Reproduced from OS Landranger map no.173 1:50 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100043739.



● Survey location

Site centred on OS NGR
ST 935 873

SCALE 1:50 000



Survey location

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Referencing information

A - B 30m A - C 28.9m A - G 18.57m

B - F 26.2m B - H 10.4m

A - B Baseline

C Corner of wall

E Corner of outbuilding

F Corner of building

G Corner of building

H Corner of pen

→ Start position and traverse direction

SCALE 1:500

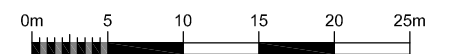
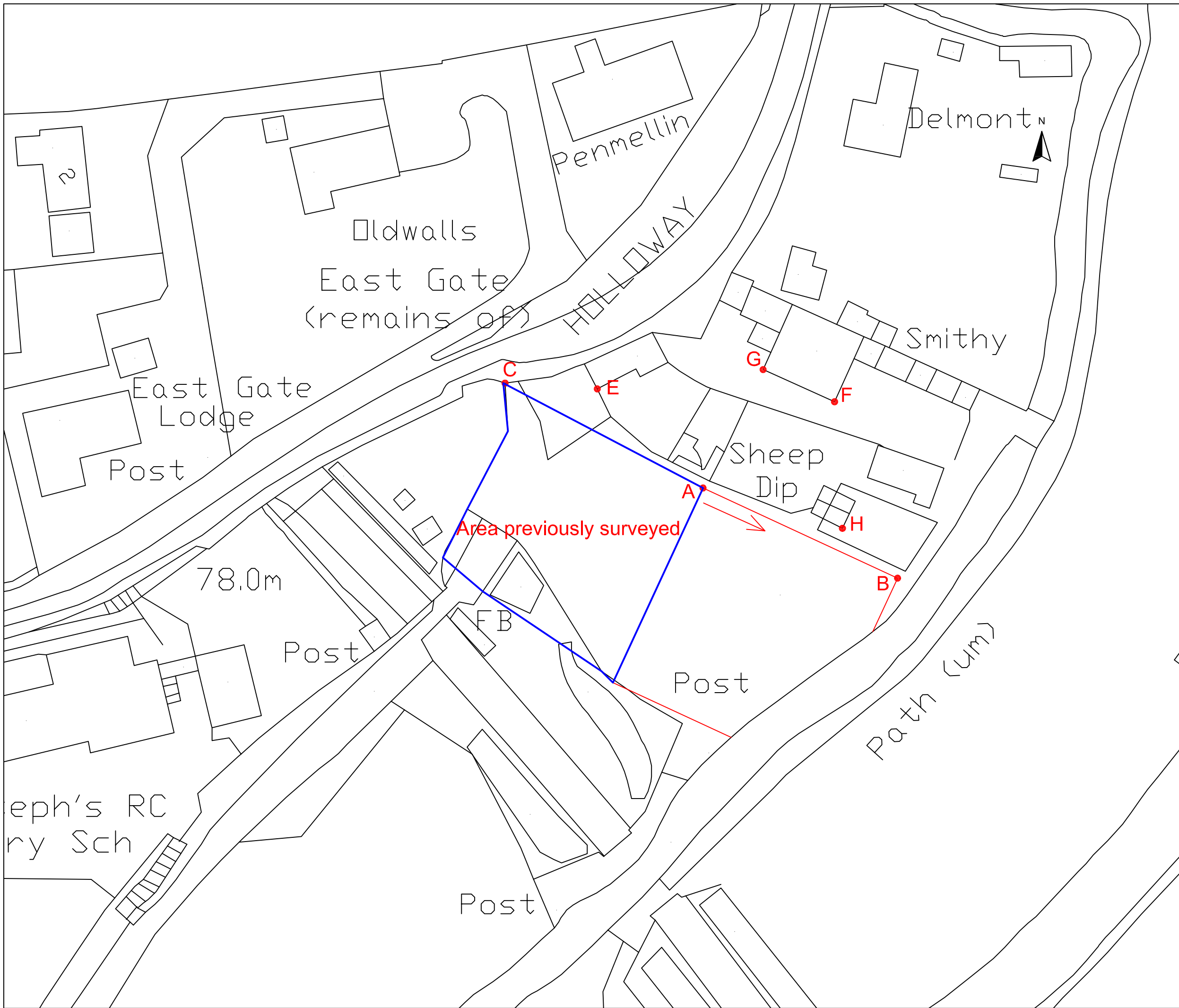


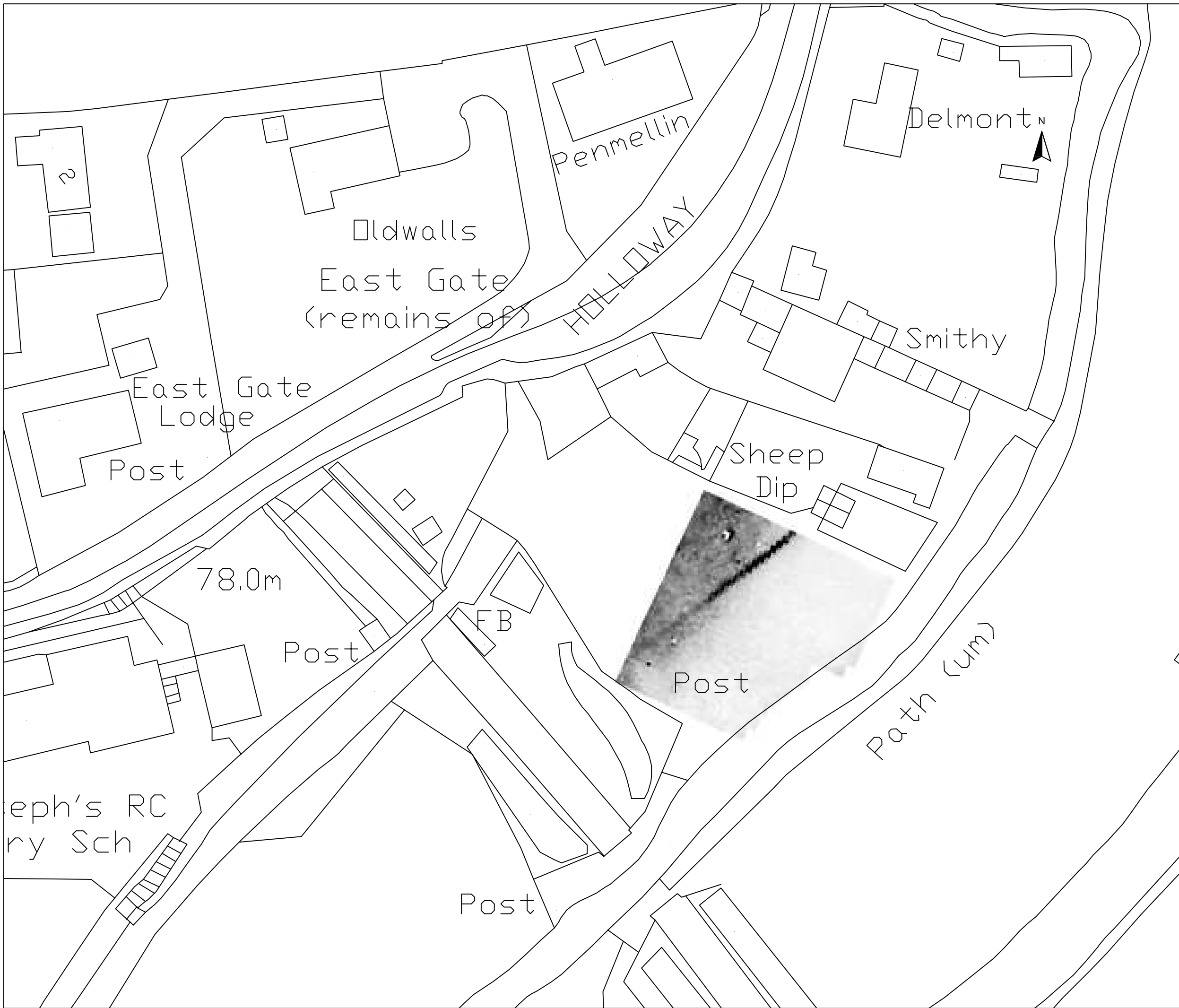
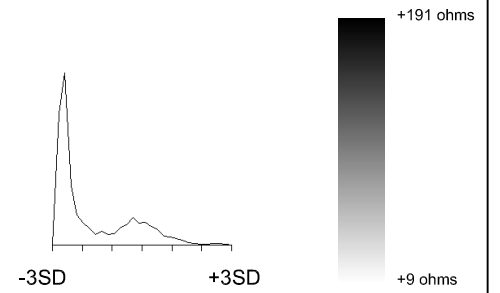
FIG 02



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Greyscale plot of raw resistance data



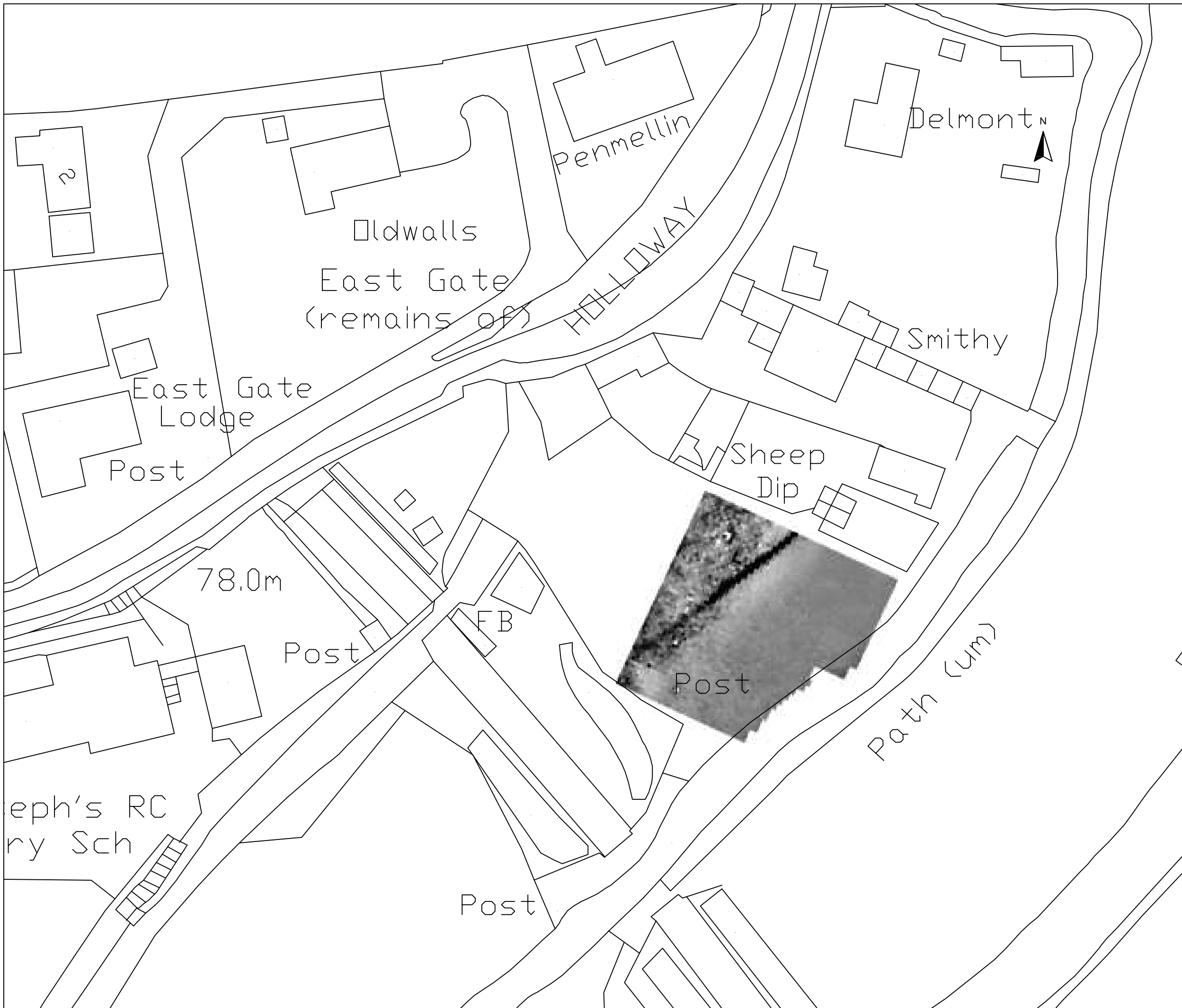
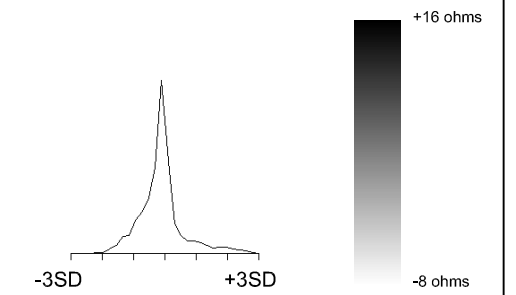
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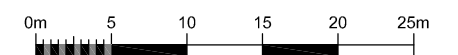
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Greyscale plot of processed resistance data



SCALE 1:500

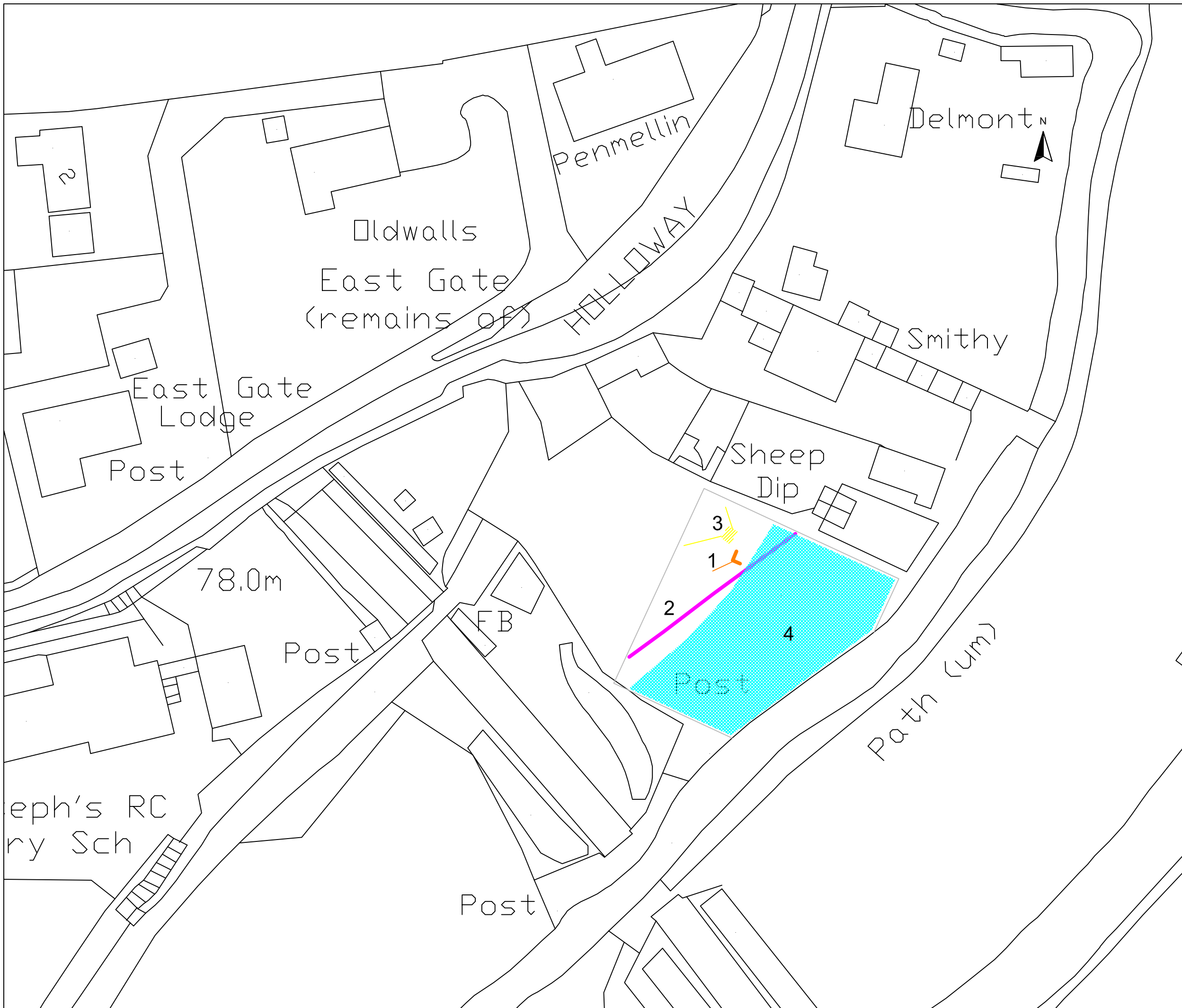


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Abstraction and interpretation of resistance anomalies

- High resistance linear anomaly - uncertain origin
- High resistance linear anomaly - possible pipeline
- High resistance linear anomaly - probable service - visible as parch-mark
- Area of high resistance surrounding an inspection chamber
- Area of low resistance associated with alluvial deposits



SCALE 1:500

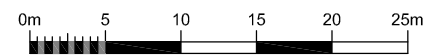


FIG 05