A.P.A.C. Ltd.

Archaeological Perspectives Analysis Consultancy

ARCHAEOLOGICAL

Topographical and Geophysical

Survey

SC/JBT/09

Furnace Cottage, Tintern.

Dr N. Phillips

31/12/2009

Contents

Cover photograph. Resistivity Survey, paddock.

List of Figures

1 Non Technical Summary

In September 2009, Dr N Phillips of A.P.A.C. Ltd commenced a series of surveys on the land attached to the property of Furnace Cottage, Tintern.

The purpose of the work was to investigate the possibility of any archaeological evidence to connect the gardens of furnace cottage with the adjacent scheduled ancient monument of Angidy Ironworks If such a connection was found then the owners of the property had expressed a wish to have their land included within the schedule, to assure its future preservation.

The work provided sufficient demonstrable evidence for the owners to pursue their course of action towards the scheduling of this important site.

2 Introduction

In the summer of 2007, Dr N. Phillips A.P.A.C. Ltd, undertook a watching brief at the site of and adjacent to; the Angidy Ironworks, (WB04/AONB/07). The watching brief was commissioned by the AONB as part of their conservation project; an undertaking in response to Monmouthshire County Council; owners of The Angidy Ironworks, commissioned Conservation Plan Brief (MCC 2005, 5).

It was during this work that the potential for as yet unrecorded archaeological resources became apparent. Discussions with the owners of the adjacent property, Mr & Mrs Saunders, as to their knowledge of the area coupled with their enthusiasm to unlock its secrets became an impetus that it was hard to ignore. Other work in the area, such as the desk top assessment DBA/TAP/08 and the archaeological evaluation EV/TAP/08, further suggested, very strongly that the land belonging to Furnace Cottage was unlikely not to have been part of the ironworks.

In September of 2009, work started at the site, using a total station to survey the topography and resistivity to search any appropriate areas for subsurface remains.

2.1 Location and scope of work

Angidy Ironworks, SO5200, is situated south of the Angidy stream, in the steep sided Angidy valley west of Tintern, Monmouthshire, *fig 01*. If travelling north from Chepstow to Monmouth on the A466, the first left turn after Tintern Abbey is the lane to Llanishen which passes by the furnace site after approximately 4 kilometres.

The Angidy Ironworks site is a Scheduled Monument, Cadw reference MM197. It is lozenge shaped measuring some 100m by 35m. The focus of this survey was concentrated on private land adjacent to the Ironworks site; Furnace Cottages, belonging to Mr and Mrs Saunders, fig *01*. Furnace Cottages themselves are Grade II listed buildings: Cadw ref: DB24027. The private land forms part of the garden area of Furnace Cottages and abuts the road opposite the Ironworks site. This land is at present outside of the scheduled area.

Work was concentrated here because visible ground features suggested a continuation of earthworks associated with the furnace on the other side of the road. Furthermore, work undertaken for the desk top assessment DBT/TAP/08 highlighted certain interesting possibilities, especially relating to map progression work.
The work was undertaken as an exploratory exercise, to best advise as to further work needed in order to understand and preserve a potentially important site of industrial heritage.

2.2 Geology and topography

The site is located on the solid geology of the Upper Old Red Sandstone, Tintern Sandstone Group with a drift deposit of Alluvium (OS 1981).

The topography of the site location is a narrow steep sided, wooded valley, centred on the Angidy stream which generally falls in an easterly direction to the Wye at Tintern. The woodland, some of which is owned and managed by the Forestry Commission is a mixture of deciduous and coniferous trees. A broad fire break occurs south west of the site which opens up the aspect of the location.

The site is surrounded by SSSIs and LNRs but is itself not designated

2.3 Archaeological and historical background

As mentioned above, the site has had some archaeological investigation in relation to other works in the vicinity.

There have been three archaeological episodes at the adjacent Ironworks site:

- An excavation centred on the leat and the wheel pit, undertaken by Parr and Tucker in 1975, (Parr & Tucker 1975 V9 .2).
- A second, much larger scale excavation conducted by John Pickin for Gwent County Council between 1979 and 1981.
- The third, an evaluation of the leat above the Angidy Furnace, Phillips EV/TAP/08. A.P.A.C. Ltd.

Further archaeological work has been undertaken on and including the Furnace Cottage garden:

- A watching brief in the north east corner of the garden, to find and clear the drainage culvert from the furnace. Phillips WB04/AONB/07. A.P.A.C. Ltd.
- A desk top assessment on the archaeological resources of the Angidy Valley. Phillips. DBA/TAP/08. A.P.A.C. Ltd.
- A second watching brief to clean up the culvert, WB/AONB2/09.

The historical background to the site is well documented in the above reports as well as in the Monmouthshire County Council 2005 Angidy Ironworks Conservation Plan. Rees provides a very detailed account of the *Iron Works at Tintern* with good primary sourcing, (Rees) 1968. A more easily accessible, general background can be found in *The Water Powered Industries of the Lower Wye Valley*, Coates 1992.

A more specific history of the private garden of Furnace Cottage was recorded in WB04/AONB/07:

> …best derived from cartographic evidence. Fig 2, as has been shown, shows the location of a cottage and open drain. Presumably the drain is that of the wheel pit outflow to the Angidy. The alignment of the cottage with the furnace buildings is interesting suggesting some sort of continuity of building. Conversely, the alignment of the north edge of the cottage with the road would tend to suggest discontinuity. Hence, the present road way is a later addition to the site than the cottage. This discontinuity of alignment is more accurately noted on the map progressions of 1840 and 1902 fig 03. Also shown is that the drain has become covered by 1840 and the ironworks partially

disappeared. This is consistent with the date of 1826 for closure of the furnace… (Parr & Tucker 1975, 5).

3 Aims and Objectives

3.1 Topographic Survey

The aims of survey will be to:

- Inform the owners of the field of the presence of any potential archaeological resources so that they may be better preserved.
- Identify areas for future excavation in order to increase an understanding of the site.
- Such resources were to be used in conjunction with the resistivity survey, to identify any patterns of continuation or alignment to the adjacent scheduled area.

The objectives of the survey will be to:

- The aim of the topographic survey was too accurately record, within the resources available, any structures or features, natural or fabricated, which were visible within the specified area.
- Once these features and structures were electronically recorded, they could be merged with the topographical survey of the scheduled area and assessed as to patterns of continuation or alignment.
- Should any alignments or patterns of continuation occur, then these could be used to inform investigations into the actual size of the original or previous ironworks site.

3.2 Resistivity Survey

The aims of survey will be to:

- Inform the owners of the field of the presence of any potential archaeological resources so that they may be better preserved.
- Identify areas for future excavation in order to increase an understanding of the site.
- Such resources were to be used in conjunction with the topographic survey, to identify any patterns of continuation or alignment to the adjacent scheduled area.

The objectives of survey will be to:

- Conduct systematic subsurface surveys of the site within the guidelines suggested by the IFA: (field evaluation 2008).
- To provide a report of the findings, this will include both raw data and an interpretative study.
- To produce an archive of the work containing raw data and processing details so to enable future study and reinterpretation. The archive will be retained by A.P.A.C. Ltd with a copy to Mr & Mrs Saunders.

- The aim of the resistivity survey was to accurately record, within the resources available, any subsurface structures or features, natural or fabricated, within the specified area.

- Once these features and structures were electronically recorded, they could be merged with the topographical survey of the scheduled area and assessed as to patterns of continuation or alignment.

- Should any alignments or patterns of continuation occur, then these could be used to inform investigations into the actual size of the original or previous ironworks site.

4 Methodologies

4.1 Topographic Fieldwork

The topographic survey was undertaken using a Topcon GPT 3007, Refectorless Total station.

The entire surface of area of the site was measured for the purpose of producing a contour survey calibrated to 0.20m.

All noticeable break lines were recorded as separate strings.

4.2 Topographic Recording

The survey was tied into GPS coordinates produced by JV Surveys for AONB in 2007.

All of the survey data was downloaded into CivilCad 6.7 for processing and the survey was adjusted to the National grid.

The finished data was imported into into Autocad 2007 for interpretative alignment to the geophysics plots and finally exported into Adobe Illustrator for presentation.

4.3 Resistivity Fieldwork

The resistivity survey was carried out using a TR Systems TRCIA 1.31 Resistance meter fitted with 0.5m array. A 1m pitch was used allowing 400 readings per 20m square.

The selected range for area 1 was 2000Ω. Areas 1 – 3 were surveyed at a 200Ω range.

4.4 Resistivity Recording

The data from the fieldwork was collected in September 2009, and transferred from the on board data logger to a laptop containing TRSystems Ltd, Resistivity software V1.32.

Initial processing of data to compile a composite plots and to remove field error was undertaken in this native format before being transferred to Archaeosurveyor 1.3.2.8 and Adobe Photoshop CS for further interpretative processing.

Final graphics for this report were produced in Adobe Illustrator CS to allow for better presentation.

The 3 surveys were undertaken over 4, 3 and 2 full and partial 20m x 20m grid squares; arranged across the separate areas in such a way as to offset from the expected archaeology whilst maximising the efficiency and coverage of the available area. Areas 2 and 3 presented problems due to their small area and enclosing structure which did not allow for offsetting of the alignments relative to the expected archaeology.

In all areas, a grid arrangement was first 'taped out' on the field using a using fibreglass tapes. The 'stake out' was marked with a combination of wooden stakes and marker posts allowing continuous survey.

5 Results

5.1 Soils and ground conditions

Topographic work at the site was conducted over a three month period period. Some equipment failure in the early stages caused delays but this allowed a more detailed survey to be conducted in December when there was less vegetation.

The entire resistivity survey was conducted in a single day in fairly dry conditions.

5.2 Descriptions

Topographic Survey

The results of the topographic survey can be seen in fig 05. The survey shown is a composite of both the present survey and an earlier survey undertaken by J.V. Surveys for the AONB during their work at the Furnace Site. The detail has been removed from the J.V Survey, leaving only the structure of the furnace ruins. The entire J.V Survey is shaded light yellow so as to distinguish its extent.

The present survey is fully detailed and includes contours at 0.2m intervals with survey station coordinates related to GPS DATUM.

It can be seen from the survey that the garden area of Furnace Cottage slopes in a north easterly direction and has a mean gradient of 16.9%, losing 15m over an 89m distance. There are some noticeable steeper slopes to the left of the garage area, all of which have linear aspects arranged across the slope. Running north from Station 6 is a 0.6m slope with a gradient of 37% whilst to the south east of station 6 is a curvilinear bank dropping 4m at 52% gradient. Further east again is a 3.5m drop at 29% gradient and station 1 is situated at the bottom of a 2.2m drop at 28% gradient.

None of these gradient features appear natural unfortunately, there is no way of knowing when or why they were created, from there appearance. However, the last feature may provide a very definite clue as to its form. The next figure, fig 6, has a series of 8 alignment lines added, to aid description.

Line AL1 runs along the directly along the line of the linear bank that station 1 is situated upon; across the road, to align directly with the north wall of the leat pond at the south west side of the furnace building.

Line AL2 runs in alignment with the walls of the furnace buildings and where its projection crosses the road, the cottage ruin annotated as Ruin 1 is aligned to it with cross walls at 90°.

The other projections are AL3 and AL4 which show clearly that Ruin 1 is aligned with the furnace buildings.

AL5 gives similar evidence for Ruin 2 although the survey of this building was not as easy due to its covering of vegetation and unstable nature. However, its alignment is also picked up at a 90° return with AL1.

AL6 and AL7 picks up east and west walls of Ruin 3, showing them to be aligned to the furnace buildings.

Finally, AL8 shows that the tumbled wall to the south west of stations 9 & 20 also copies the alignment of the furnace buildings in the scheduled area.

Resistivity Survey

The results of the first resistivity survey can be seen in Fig 7. In this instance, the clearest graphical expression was shown in green blue scale and this has been included here. The figure shows the top plot with no interpretation with a copy below including interpretation. The darker blue represents high resistance.

The survey was taken of the land behind the house. The ground shows some gentle undulations with one potential feature to the south west. None of the surface undulation matches the resistivity plot.

The most noticeable anomaly is the high resistance feature; top centre which measures some 2m x 2m. It should also be noticed that this feature is surrounded by a low resistance curvilinear feature which separates it from the high resistance block to the North West.

This high resistance block is flanked to the south west by a short linear, high resistance feature measuring some 3mx2m; possibly forming a right angle with another feature to the left, just before the nul readings.

To the extreme left of the plot are a series of high resistance, right angled blocks.

Towards the right of the plot is a vague linear feature measuring 3m x 2m.

The second resistivity survey was located across the front lawn of the house. The area was quite narrow which tends to diminish the usefulness of the data but some features were noticeable, if somewhat faintly. The area, which is now a lawn, has probably been subject to a lot of remodelling. Two walls at least used to run across it (Saunders *pers com.*), separating the then three cottages from one another. It is possible one of those walls has shown up as low resistance in the south east segment.

The very high resistance red semicircle to the west is unusually contrasting; however, it is at the edge a retaining wall and so is unlikely to be a structure of any significance.

The area to the north west is highly visible as a high resistance anomaly. However, the topography in this area would appear to be a bank of sandstone and it has a lot of trees on it. Possibly more interesting is the low resistance feature that cuts its eastern edge.

The third plot was quite small, not even a full 20m x 20m grid but this is the one that seems to have picked up the most important anomalies. The plot is in grey scale as its small size did not lend itself well to colour plotting.

The area to the east is very poorly defined which may be due to its position in shade of a wall with heavy vegetation. The main plot however, has no such variables. The small area seems dominated by one potential structure of which four corners remain. There are also a series of linear features which run down slope.

The last feature to be described is the long linear feature running south east/north west. This anomaly corresponds to the top of the bank described above, which runs from station 1, across the road to align with the leat pond.

The results of the survey were added to the topographic composite as a transparent underlay, in order to investigate any correlation between surface and subsurface features, *fig 10.*

Starting with Plot 1, it can be seen that there is a correlation between a low resistance feature in the centre of the southern grid square and the top and bottom of a curved slope. There is however, no correlation with the high resistance in the bottom of the corner.

In the middle grid square, there are slight variations in surface level which seem to mimic the linear high resistance feature, running north east down hill, ad 90° to the slope.

None of the resistance anomalies in the north western grid and partial grid are confirmed in the contour survey.

In plot 2, both the southern and middle grids have no corresponding agreement between contour and resistivity plots. This is not unexpected as there are no definitive, topographic surface features as the ground is a lawn.

The north western grid however, is a bit more positive showing a clear correlation between the high resistance anomaly and the contour of the slope.

Plot 3; even though less than a full 20m x 20m grid, does present a surprising amount of correlations between topography and resistivity. The central high resistance, rectangular feature is identifiable, not only through the contour plot but also, as in the south corner by both a top of bank and bottom of bank breakline.

There is also some correlation with the small parallel, linear features identified in fig 09, although these are more vague.

As with the topography survey, the resistivity survey has been assessed for alignment with the furnace buildings within the schedule area *fig 11*.

The results produced were less promising with no alignments identifiable with plots 1 and 2.

Plo3 3 however, was more informative with a possible alignment with the rectangular high resistance anomaly.

6 Discussion and Interpretation

6.1 Reliability of field investigation

The topographic survey was marred on the first attempt by an intermittent instrument malfunction, resulting in it being returned to the manufacturer. The majority of the survey was done with a newly calibrated machine which therefore insures its accuracy. The mistakes in data from the initial survey were edited out during processing and have had no effect on the outcome.

A result of the delay allowed the topographic survey to be undertaken later in the season, allowing for greater visibility due to less vegetation cover.

The building, '*Ruin 2*' fig 05, which was surveyed in the first session, produced some vague results due to its heavy vegetation cover. Care had to be taken with this structure because of its apparent instability.

Three points of reference were incorporated from the earlier J.V Surveys, GPS survey which ensures accuracy to the GPS DATUM supplied.

The Resistivity was undertaken during one day in which the weather remained stable. A stability which had been constant for the proceeding days and therefore removes any variables of differential drying or saturation.

6.2 Interpretation

Topographic

As discussed above, *5.2 Descriptions*, There are some identifiable areas around the natural slope that appear to have been modified, resulting in a terracing effect. Of particular interest is the linear bank under station 1 which clearly aligns to the furnace leat pond in the scheduled site, *figs 5, 6, 10 & 11*.

Interest in the leat pond or 'Terminal basin' (Pickin 1982) was expressed by the present author in DBA/TAP/08 (Phillips 2007) where it was noticed that an alignment across the road was possible and that the present road had been added as a raised causeway across the site; probably after the furnace had gone out of production. Although, it has to be noted that the earliest plan of the site, Arum 1763, does show a road in the vicinity of the present one. That caveat made; Pickin earlier interpreted the present road as a raised causeway in his earlier excavation report (Pickin 1982).

Continuing southwards along the line of the terrace is building Ruin 2 which is aligned to the buildings in the schedule area and is possibly identified in the Aram map.

Once the ruined building is passed, the topographic lay of the land continues south where it is cut by a path before disappearing into the undergrowth. It is possible that this extension is recorded in the Aram estate map and if so, it is probable that this is a construction feature than a natural feature.

Ruin 1, to the north of the site is at present a partial ruin and partly reconstructed folly. Although the present owner has done work to this structure to conserve it, nothing has been done to confuse the lay of the original embanked walls. It is therefore possible to accept the present floor plan as original and from this estimate its relationship to other buildings in the area. Referring to *figs 06 & 11*, it can be clearly seen that Ruin 1 is build on exactly the same alignment as those buildings in the scheduled area.

Furthermore, it is quite possible to identify Ruin 1 on the Aram map *fig 12* and from that alone clearly establish its relationship to the scheduled site.

Ruin 3 is not so easily visible in this survey as it was surveyed by J.V. Surveys in 2007 when it was exposed to a greater extent. It was not possible to add any extra detail during the present survey as the structure has now been mostly reburied.

It has however, been investigated for alignment figs 06 & 10, and has again been shown to be exactly related to the alignments of Ruins 1 & 2 as well as the rest of the structures within the scheduled area.

Topographic

The majority of the results of the resistivity were not positive in establishing links with the Furnace Cottage gardens to the scheduled area. With the possible exception of Plot 3, both plots I & 2 would suggest that there are no associated structures relating to the schedule area. However, this is not really a surprise because the 1763 Aram Survey shows there to be no structures in the area *fig 12*. Indeed Furnace Cottages are not recorded until 1821, *fig 02* where they are shown south west of Ruin 1.

The angular anomalies that do show in Plot 1 may be unrelated to the furnace workings and from their position on the slope may be the results of quarrying.

Plot 3 however, does show a possible unrecorded building; although conversely, also not on the 1763 plan. It was hoped that Plot 3 would show an anomaly in relation the raised terrace under station 1 but this was not evident.

6.3 Overall interpretation

It is believed that the work has been able to show quite clearly that the garden area of Furnace Cottages has a range of archaeological resources linking it directly to the scheduled area of Angidy Furnace. The majority of the corroborating evidence is based on remaining structure alignments and their projections, over intervening distances, to one another.

It is felt that these alignments are more than can be dismissed by chance alone and therefore must establish a relationship between those buildings in the scheduled area and those presently not included. Of course the alignments do not in themselves establish a definite contemporaneity between the structures but the addition of their recorded presence on the 1763 estate map does establish that the relationships is at least 248 years old.

Obviously more information on the archaeological resources could be easily obtained through excavation but it is felt that this work has provided sufficient evidence for the Furnace Cottage Gardens to be considered for inclusion within the Angidy Furnace Schedule, MM197.

7 Acknowledgements

Thanks to Mr and Mrs Saunders for access to their land and their wealth of knowledge about the site.

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ARCHIVE COVER SHEET

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NPRN :	-
SAM:	-
Other Ref No:	CAP Report No. 274
NGR:	SO 5890 7405
Site Type:	Medieval
Project Type:	Watching Brief
Project Officer:	Kevin Blockley
Project Dates:	October 2003
Categories Present:	N/A
Location of Original Archive:	Shropshire SMR
Location of duplicate Archives:	N/A
Number of Finds Boxes:	N/A
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Museum Reference:	N/A
Copyright:	CAP Ltd
Restrictions to access:	None

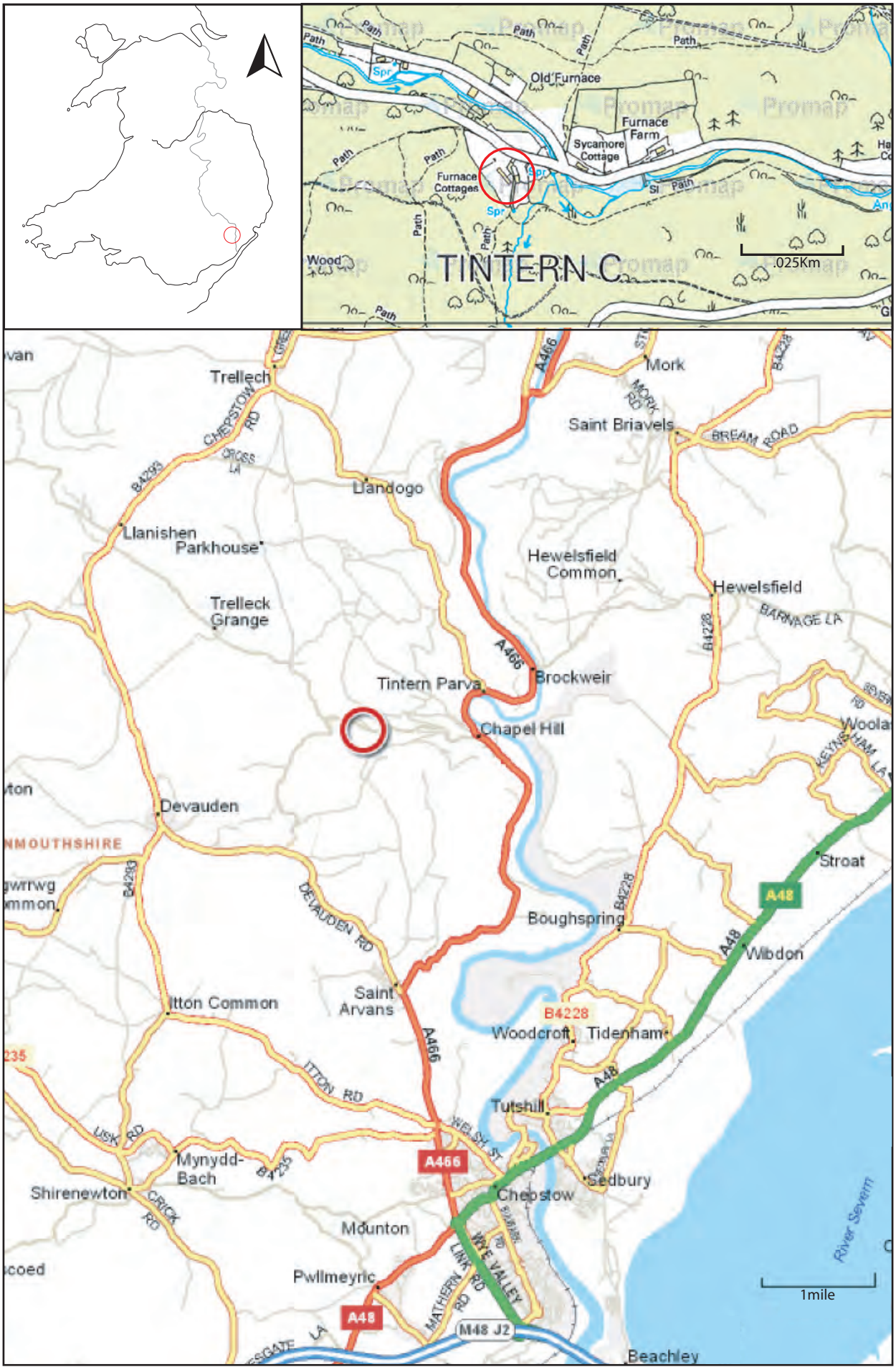
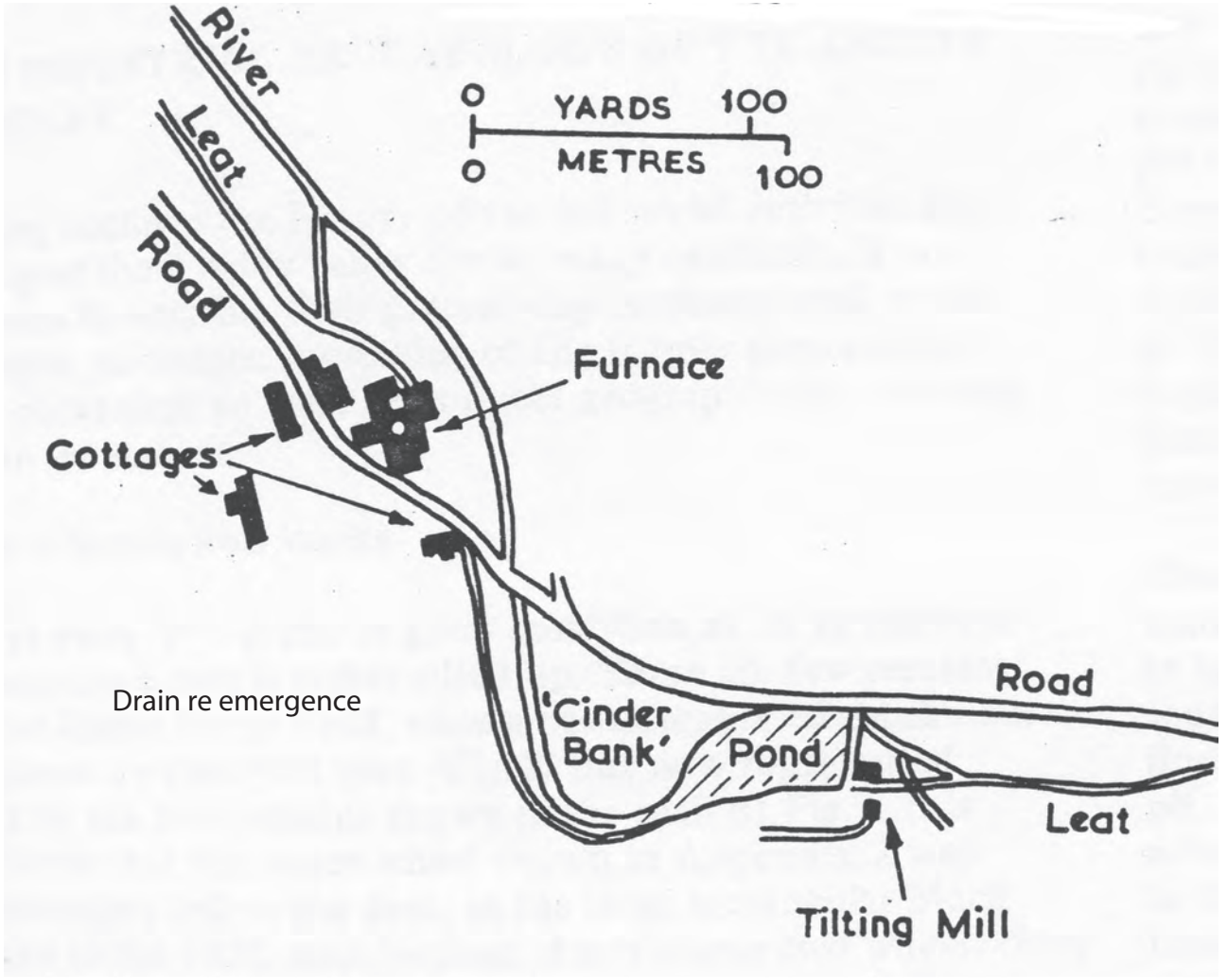


Fig 01: Location



from Parr & Tucker 1975

Fig 02. 1821 map

from Abbey Furnace, Tintern WB04/ANOB1/07

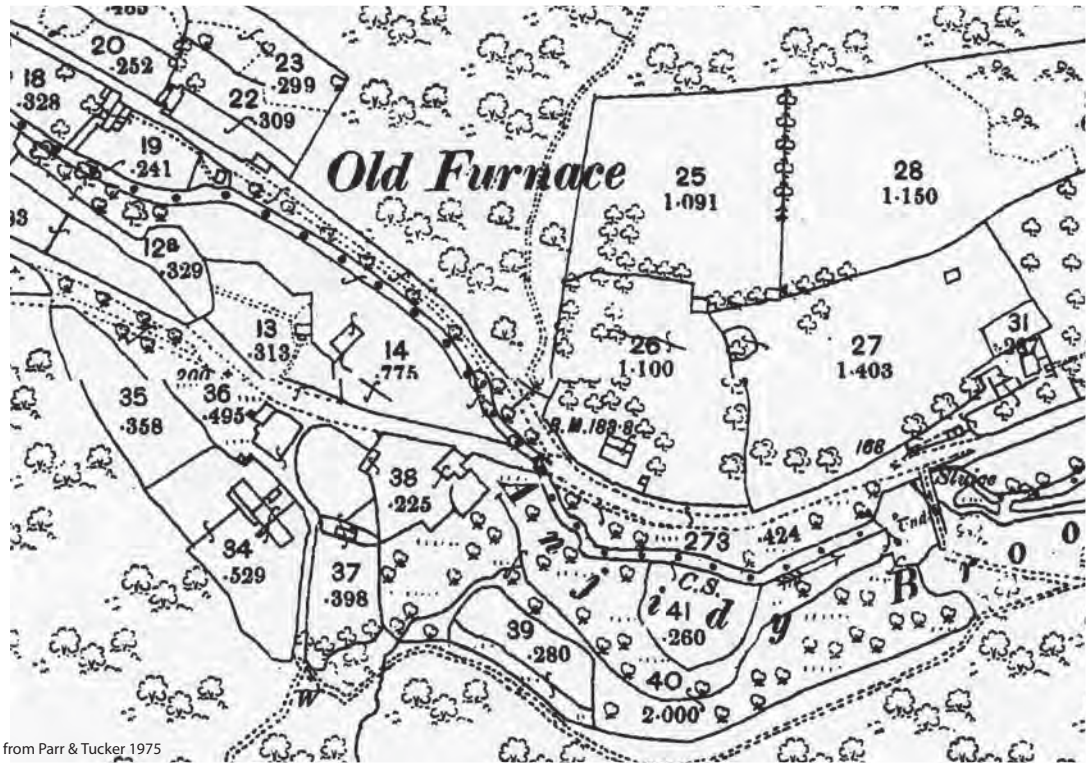


Fig 03: 1840

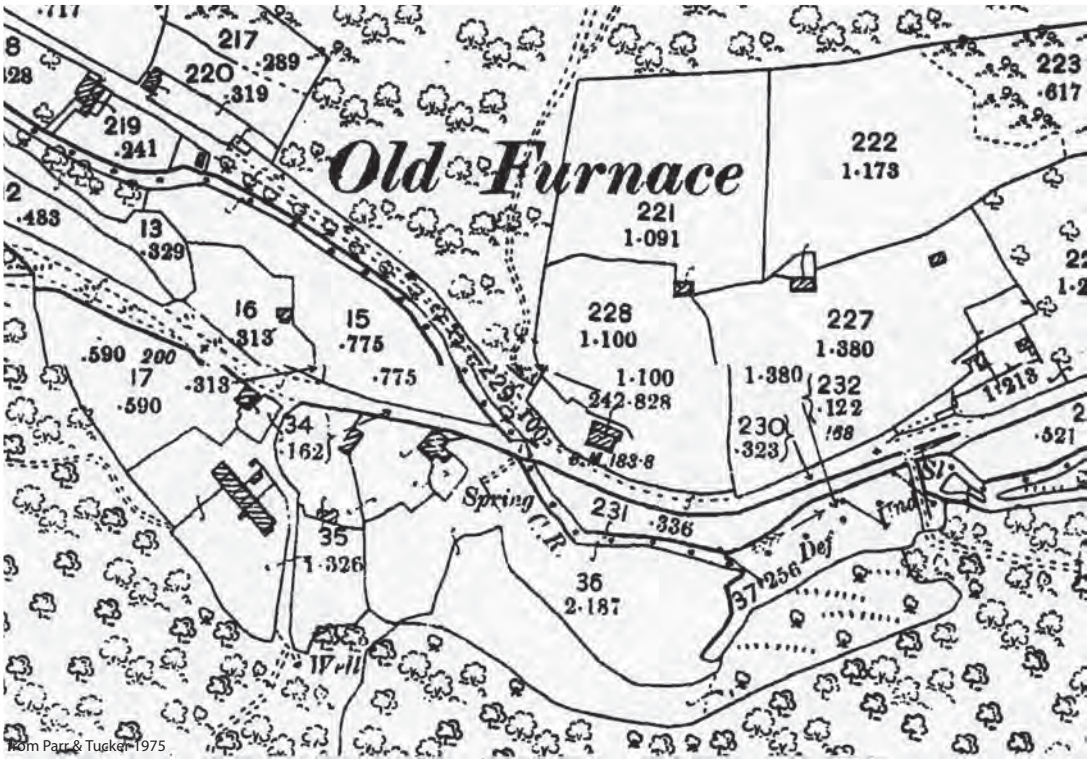
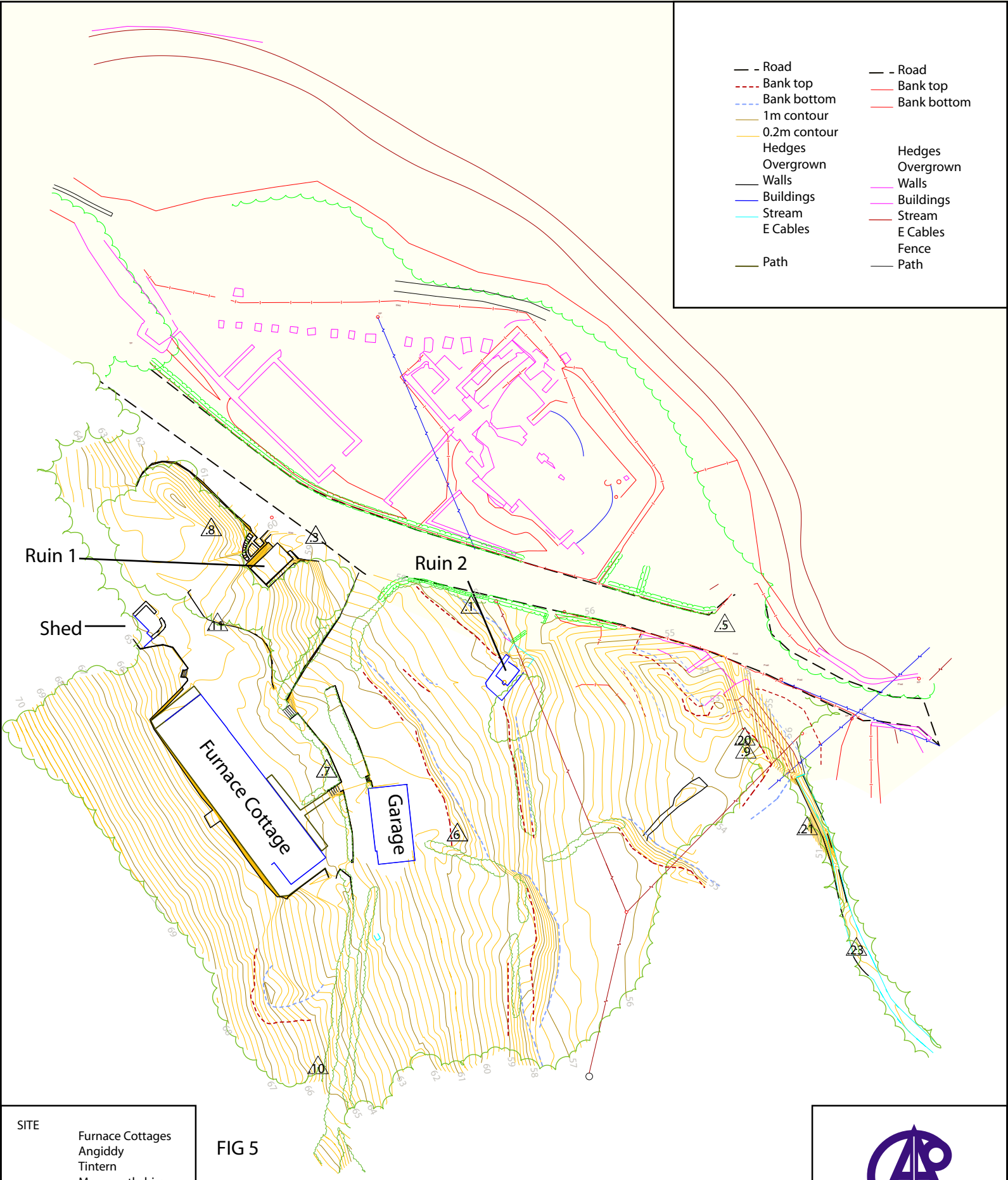


Fig 04: 1900



SITE
Furnace Cottages
Angiddy
Tintern
Monmouthshire.

FIG 5

JOB No:
SC/JBT/09

SCALE 0 5 10 20 30 40 50 m

NEW SURVEY 0.65 Ha
(Combined) 1.42 Ha

TITLE
Topographic
Survey
Composite

STATION COORDINATES

1	E 351366.513 N 200263.037 Z 57.244	9	E 351406.748 N 200241.809 Z 54.219
2	E 351343.747 N 200273.270 Z 58.958	10	E 351344.080 N 200195.583 Z 62.652
5	E 351260.337 N 200260.337 Z 55.273	11	E 351329.360 N 200260.483 Z 55.251
6	E 351364.495 N 200229.697 Z 60.524	20	E 351406.602 N 200243.709 Z 54.422
7	E 351345.328 N 200239.025 Z 62.793	21	E 351415.722 N 200230.593 Z 52.126
8	E 351328.442 N 200274.381 Z 63.746	23	E 351422.947 N 200212.934 Z 50.534

N

DRAWN BY:
N Phillips

DATE
30/12/09

NOTES
Shaded area: adapted from John Vincent Surveys Ltd. 2007. Levels related to Ordnance Survey GPS DATUM

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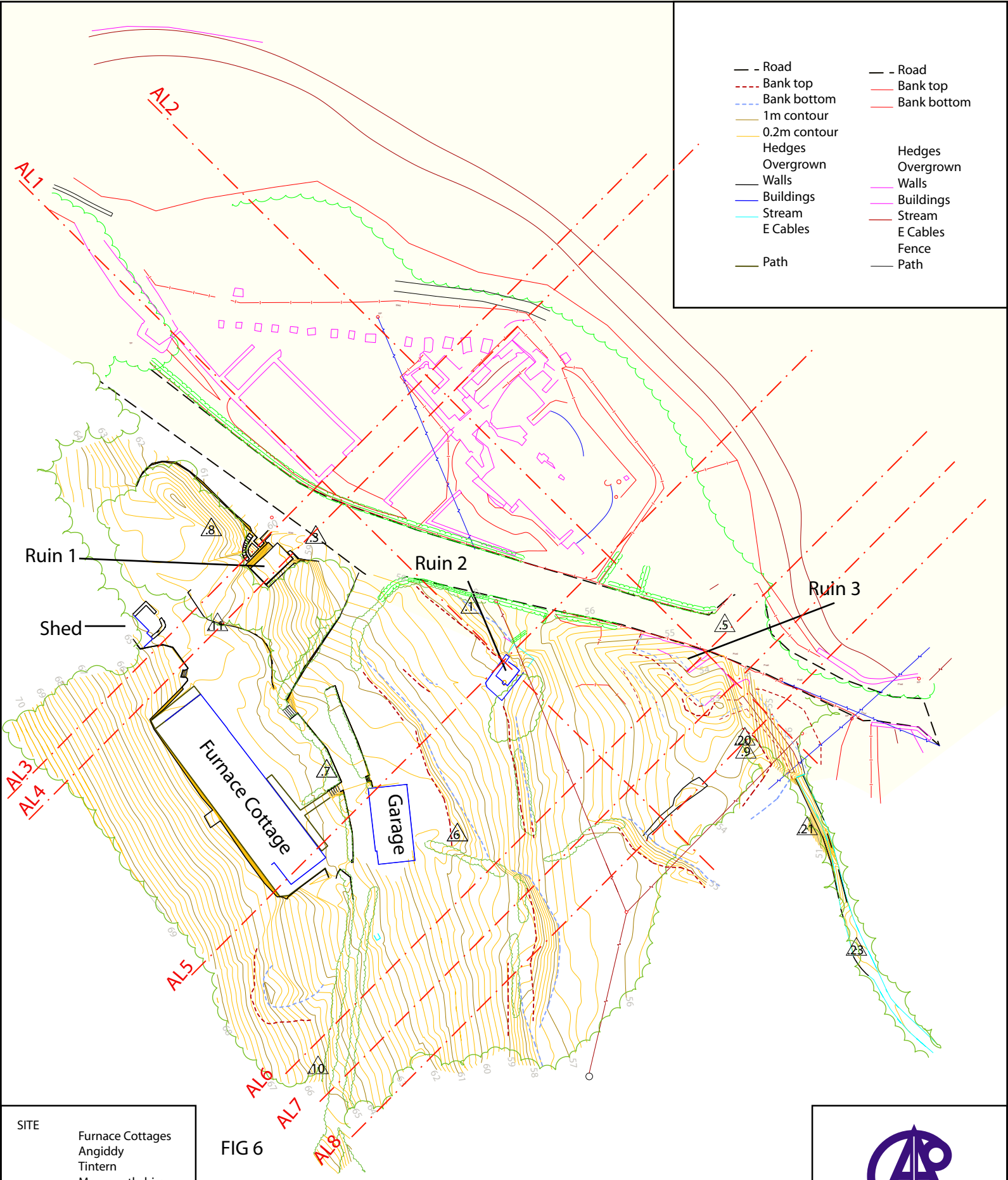

SITE
Furnace Cottages
Angiddy
Tintern
Monmouthshire.

FIG 6

JOB No:
SC/JBT/09

SCALE 0 5 10 20 30 40 50 m

NEW SURVEY 0.65 Ha
(Combined) 1.42 Ha

TITLE
Standing structures
projected alignments

STATION COORDINATES

1	E 351366.513 N 200263.037 Z 57.244	9	E 351406.748 N 200241.809 Z 54.219
2	E 351343.747 N 200273.270 Z 58.958	10	E 351344.080 N 200195.583 Z 62.652
3	E 351260.337 N 200260.337 Z 55.273	11	E 351329.360 N 200260.483 Z 55.251
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N

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DATE
30/12/09

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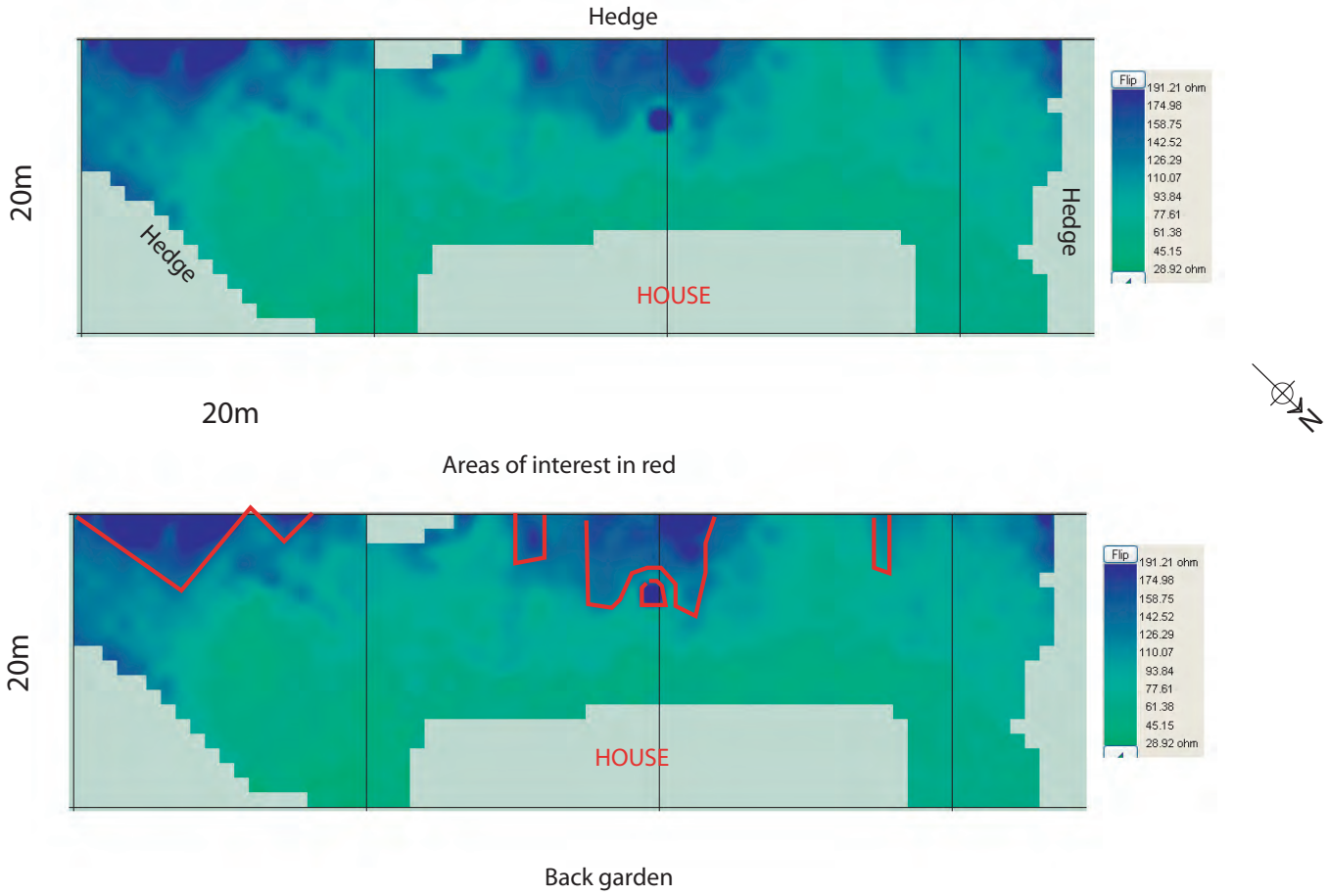


Fig 07: Resistivity plot, back garden

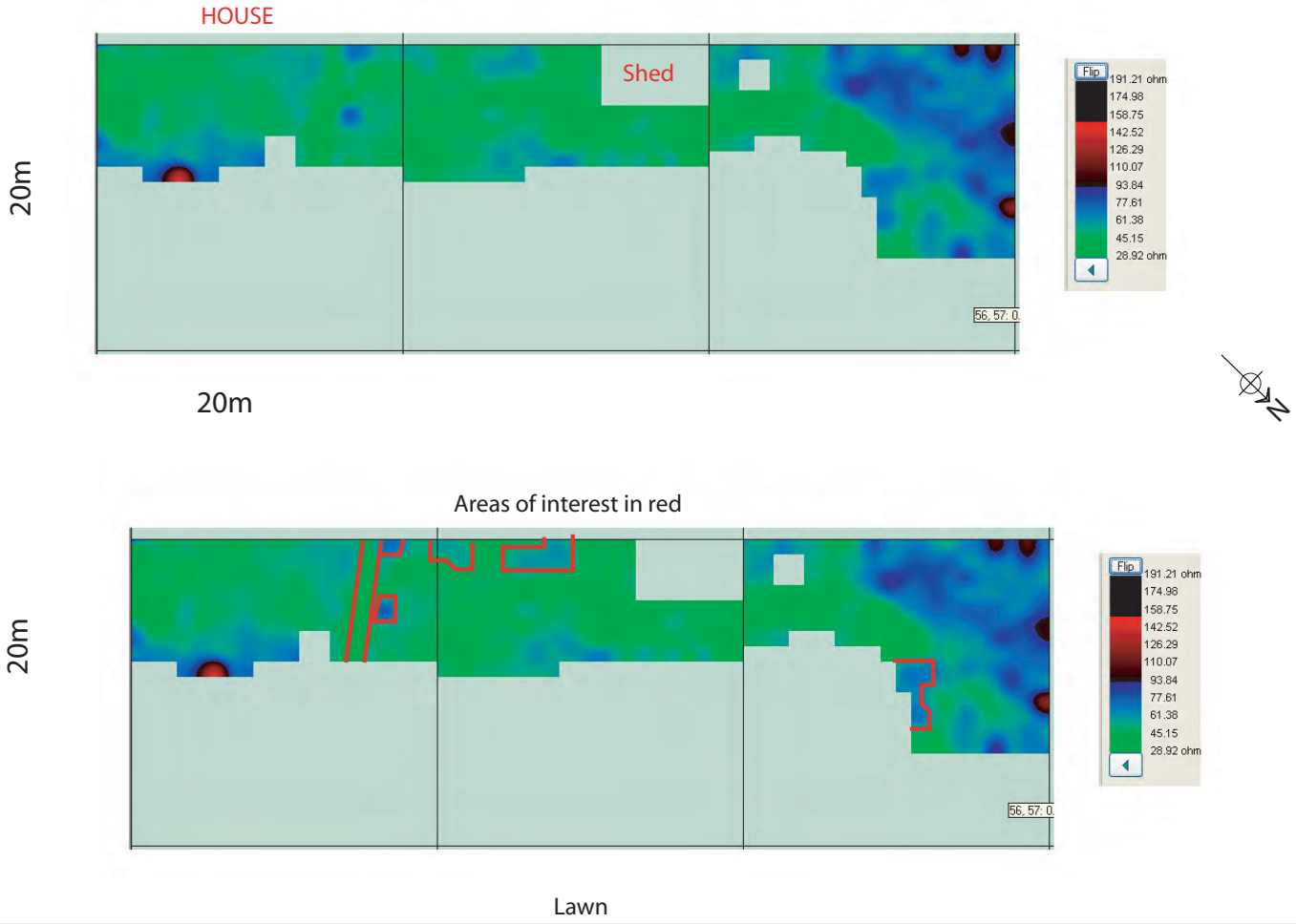
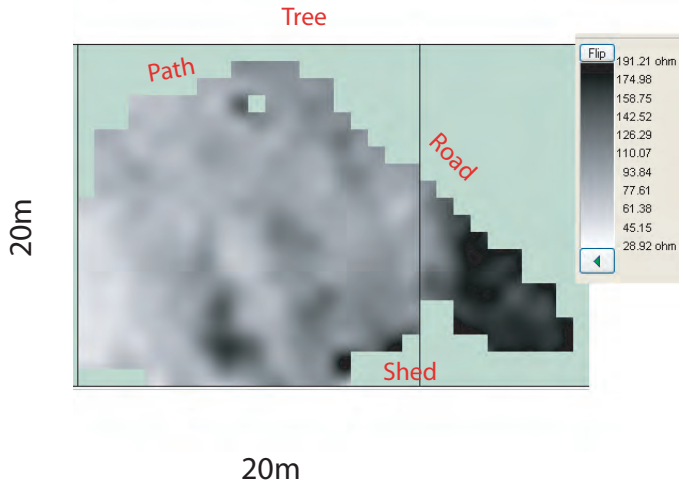


Fig 08: Resistivity plot, front lawn



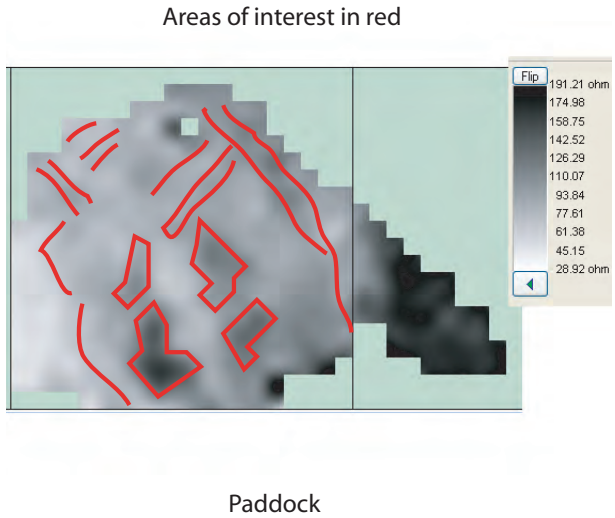


Fig 09: Resistivity plot, paddock

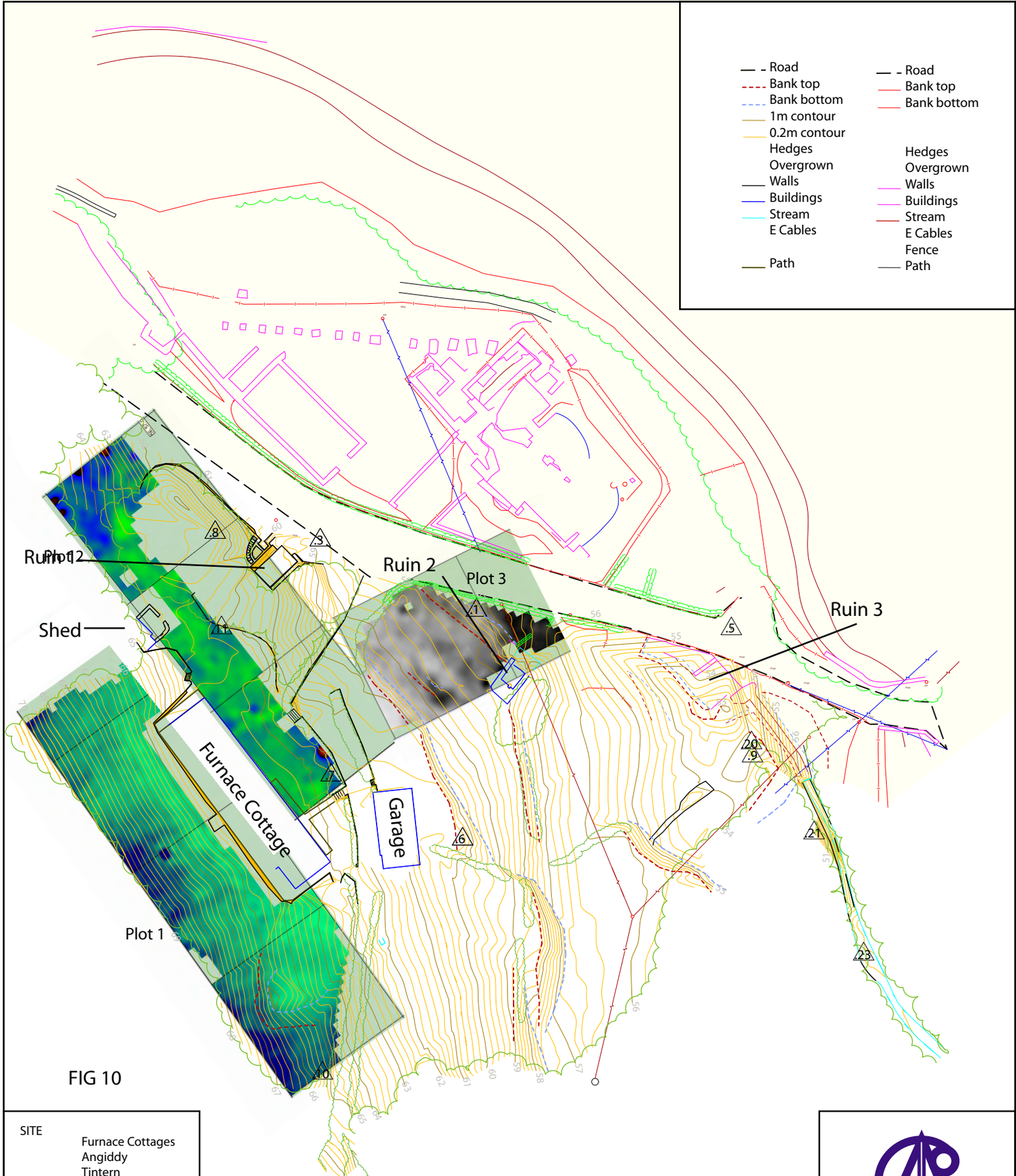


FIG 10

SITE
Furnace Cottages
Angiddy
Tintern
Monmouthshire.

JOB No:
SC/JBT/09

TITLE
Topographic &
Resistivity surveys
Composite

DRAWN BY:
N Phillips

DATE
30/12/09

SCALE 0 5 10 20 30 40 50 m

Resistivity areas:
1 1400m² 2 1200m²
3 440m²

STATION COORDINATES

1	E 351366.513 N 200263.037 Z 57.244	9	E 351406.748 N 200241.809 Z 54.219
3	E 351343.747 N 200273.270 Z 58.958	10	E 351344.080 N 200195.583 Z 62.652
5	E 351260.337 N 200260.337 Z 55.273	11	E 351329.360 N 200260.483 Z 55.251
6	E 351364.495 N 200229.697 Z 60.524	20	E 351406.602 N 200243.709 Z 54.422
7	E 351345.328 N 200239.025 Z 62.793	21	E 351415.722 N 200230.593 Z 52.126
8	E 351328.442 N 200274.381 Z 63.746	23	E 351422.947 N 200212.934 Z 50.534

N

NOTES
Shaded area: adapted from John Vincent Surveys Ltd. 2007. Levels related to Ordnance Survey GPS DATUM

A.P.A.C. Ltd
36 Hatherleigh Rd,
Abergavenny,
Monmouthshire.
NP7 7RG.
Tel: 07734962919

apac.philips@btinternet.com

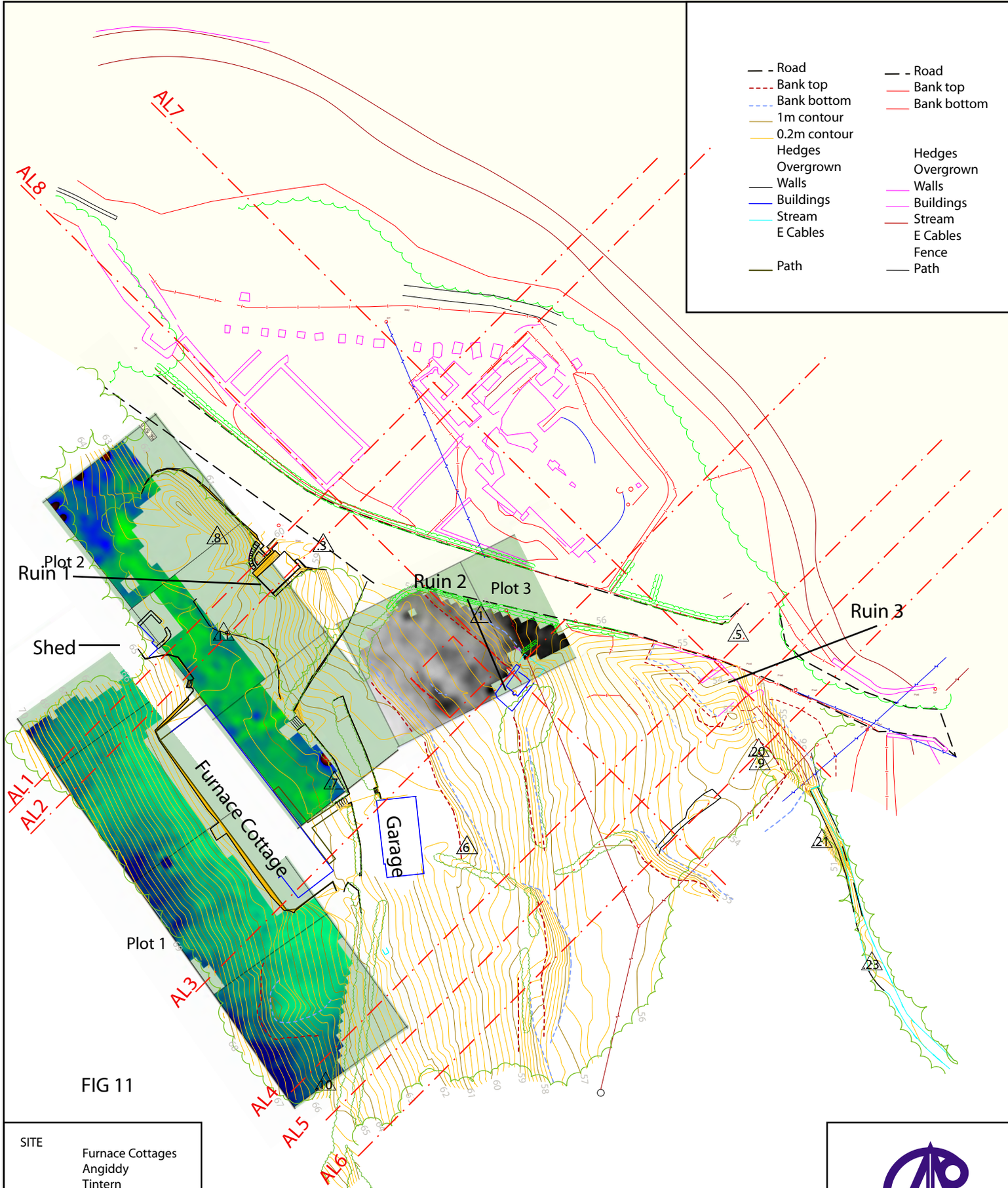


FIG 11

SITE: Furnace Cottages, Angiddy, Tintern, Monmouthshire.		
JOB No: SC/JBT/09	SCALE 0 5 10 20 30 40 50 m	Resistivity areas: 1 1400m² 2 1200m² 3 440m²
TITLE: Alignments with Resistivity surveys Composite	STATION COORDINATES	N
DRAWN BY: N Phillips		
DATE: 31/12/09	NOTES: Shaded area: adapted from John Vincent Surveys Ltd. 2007. Levels related to Ordnance Survey GPS DATUM	

STATION COORDINATES

1	E 351366.513 N 200263.037 Z 57.244	9	E 351406.748 N 200241.809 Z 54.219
3	E 351343.747 N 200273.270 Z 58.958	10	E 351344.080 N 200195.583 Z 62.652
5	E 351260.337 N 200260.337 Z 55.273	11	E 351329.360 N 200260.483 Z 55.251
6	E 351364.495 N 200229.697 Z 60.524	20	E 351406.602 N 200243.709 Z 54.422
7	E 351345.328 N 200239.025 Z 62.793	21	E 351415.722 N 200230.593 Z 52.126
8	E 351328.442 N 200274.381 Z 63.746	23	E 351422.947 N 200212.934 Z 50.534

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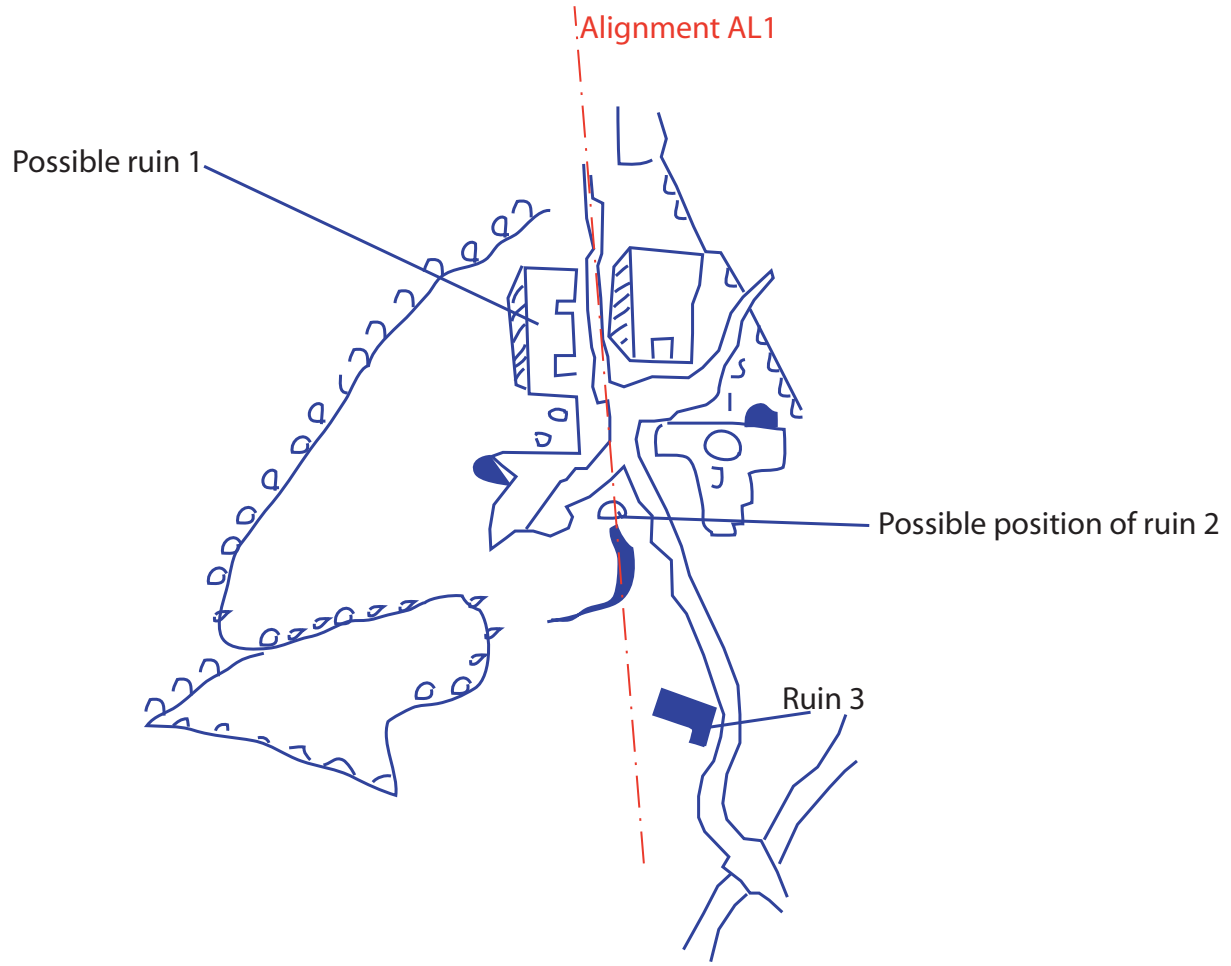

from J Aram

Fig 12. 1763 estste map