

GEOPHYSICAL SURVEY REPORT
FOR

**Berkeley Castle,
Gloucestershire
(GSMR: 5112)**

REPORT NO: 05/02



Work commissioned by:
Dept of Anthropology & Archaeology,
University of Bristol.

ACKNOWLEDGEMENTS

In the preparation of this geophysical survey report, acknowledgment is made, with many thanks, to the assistance given by the Berkeley Family for their kind permission in allowing this survey to be conducted.

Additionally, thanks are also extended to Dr Stuart Prior, Excavation Director, UoB, David Price, Castle Director and Richard Davies, Surveying Supervisor, UoB, who kindly assisted with the logistics / surveying of the geophysical grids.

Finally, thanks must go to the 1st Year Undergraduates, UoB, who assisted with both the survey itself as well as the collation of the background information needed for the preparation of this report.

My thanks to you all.

ABREVIATIONS

GPS	-	Global Positioning System
GSMR	-	Gloucestershire Sites & Monuments Record
NGR	-	National Grid Reference
OD	-	Ordnance Datum (Sea Level)
UoB	-	University of Bristol

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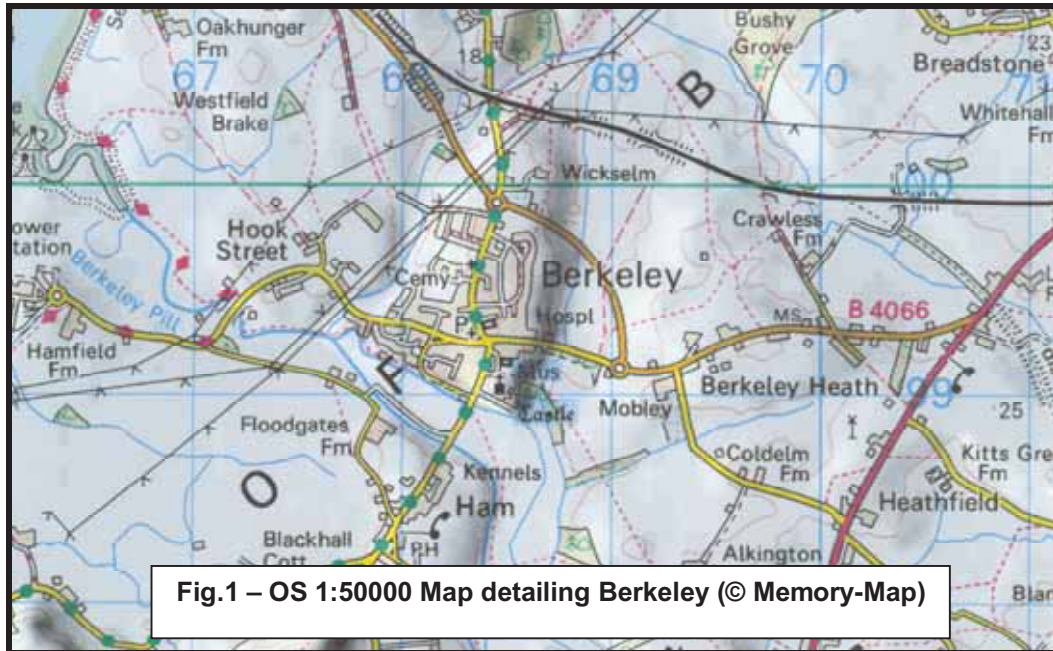
Copyright of the following geophysical survey report, drawings and photographs, unless otherwise stated and referenced, is the property of Mr.P.R.Rowe, University of Bristol, to whom all enquiries should be addressed to: -

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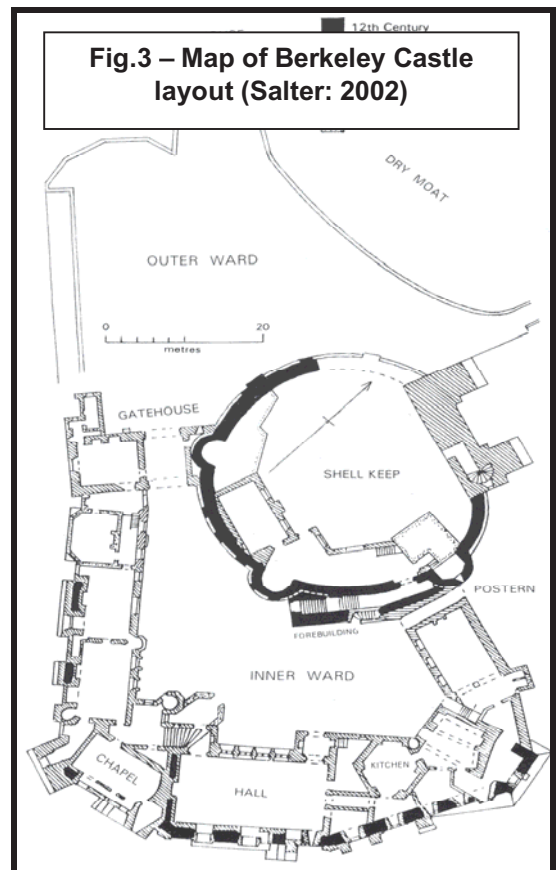
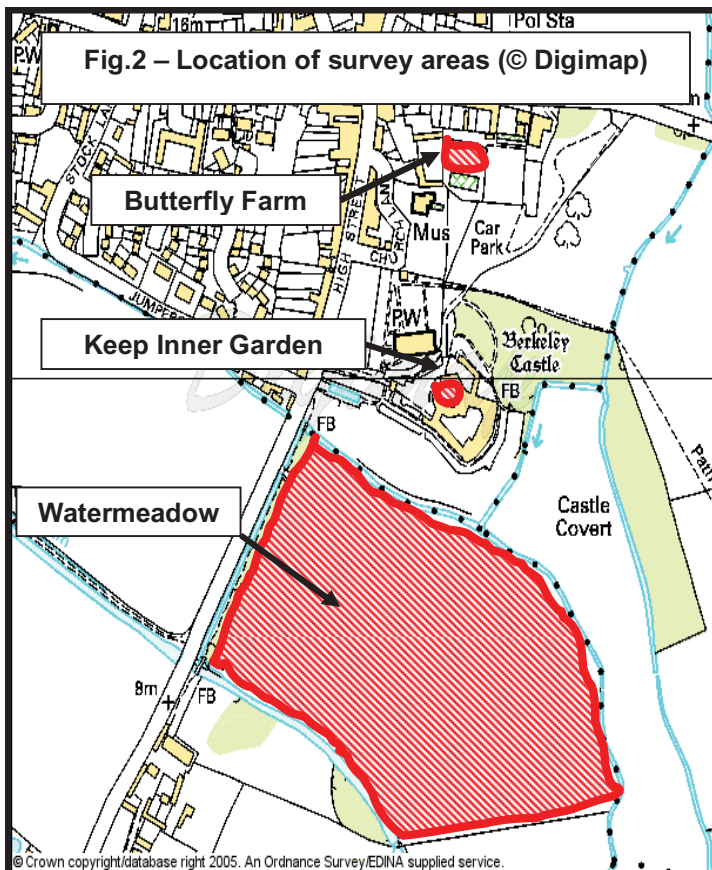
Email – PR1139@Bristol.Ac.UK.

1 - GENERAL INTRODUCTION

1.1 Commissioned to survey areas within / around Berkeley Castle, Gloucestershire (ST 685 990 – **Fig.1**) as identified by the Excavation Director, in addition to instructing 1st Year undergraduate Archaeology & Anthropology students in the use of geophysical equipment; in total three locations (Water meadow, Inner Keep Garden and Butterfly Farm – **Fig.2**) were subsequently surveyed over a two week period late May / early June 2005.

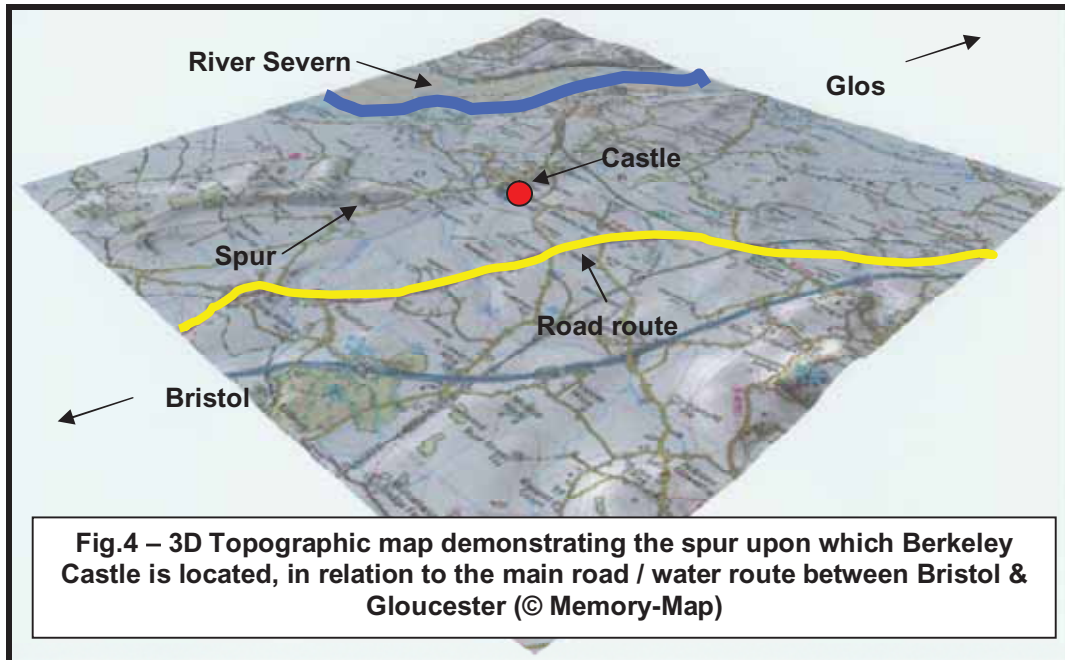


1.2 Producing, as a result, six separate resistance and gradiometer survey report summaries (as detailed from Summary of Results – Paragraph 3.0 onwards), the site of Berkeley Castle was originally founded in 1067 by William FitzOsbern and consists of an ovoid shell keep with an inner and outer bailey (**Fig.3**) (SMR 5112) (**Appendix A**).

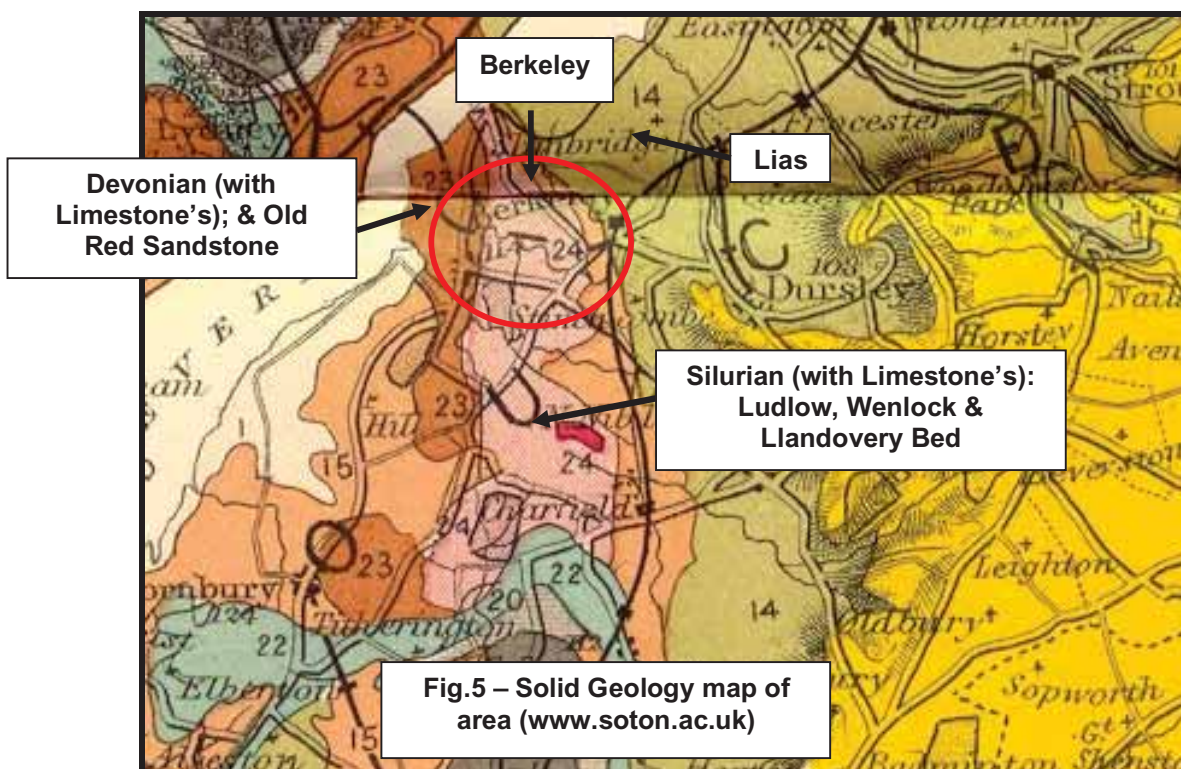


2 - GENERAL LOCATION, TOPOGRAPHY & GEOLOGY

2.1 Recorded in Domesday as being 'In (Sharp) Ness five hides which belong to Berkeley, which Earl William placed outside to build a small castle (Morris: 1982), Berkeley Castle can be seen located on the side of a low lying spur, c.half way between Bristol and Gloucester and dominating the main road route (A38) running between the two cities, as well as commanding a vantage point over the River Severn to the west (Fig.4).



2.2 Lying 21m¹ above OD, the site of Berkeley Castle is situated primarily on solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology, and is surrounded to the west by solid Devonian (with Limestone's); and Old Red Sandstone, with solid Lias geology to the east (Fig.5).



¹ Information obtained using handheld Garmin Etrex 12 Channel GPS system (accuracy to 5m)

3 - RESULTS

3.1 REPORT A - BUTTERFLY FARM

3.1.1 SUMMARY OF RESULTS

SITE RESULTS SUMMARY 1

GEOPHYSICAL SURVEY REPORT NO: 05/02 - A **NGR:** ST 685 990

SITE NAME: Butterfly Farm, Berkeley Castle, Gloucestershire

SITE TYPE: Grassed area

DESCRIPTION: Located c.300m due north from the main castle site, a grassed area located adjacent (c.19m north) to the main greenhouse and running in a northwest – southeast direction within the Butterfly Farm complex was surveyed.

PERIOD: Original 19th / 20th century kitchen garden feature.

GEOLOGY: Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

LAND USE: Grassed area within Butterfly Farm visitor centre.

SURVEY TYPE: Resistance

METHOD: Zig – Zag

INSTRUMENT: Geoscan RM15

SURVEY AREA: 40m x 40m

SAMPLE INT: 1m

TRAVERSE INT: 1m

RESULTS SUMMARY:

A RM15 resistance survey of a total area 40m x 40m (5.5 x 10m² grids) was completed in May 2005, providing, as a result, good geophysical raw data that has assisted with the interpretation of part of the site.

Suggesting the presence of buried building material pertaining to perceived structures, the believed foundations of a building (high resistance) can be clearly identified c.25m northwest of the current main greenhouse, along with an area of low resistance (foundation trenches?) c.25m north, that form a rectangular feature (old greenhouse?)

An area of high resistance c.10m northeast of the main greenhouse further suggests the possible existence of an almost square structure c.4m², with an irregular feature located c.5m east of the greenhouse, implying the location of further possible building material foundations (wall footings?).

SURVEY DATE(S): 26 – 27th May 2005

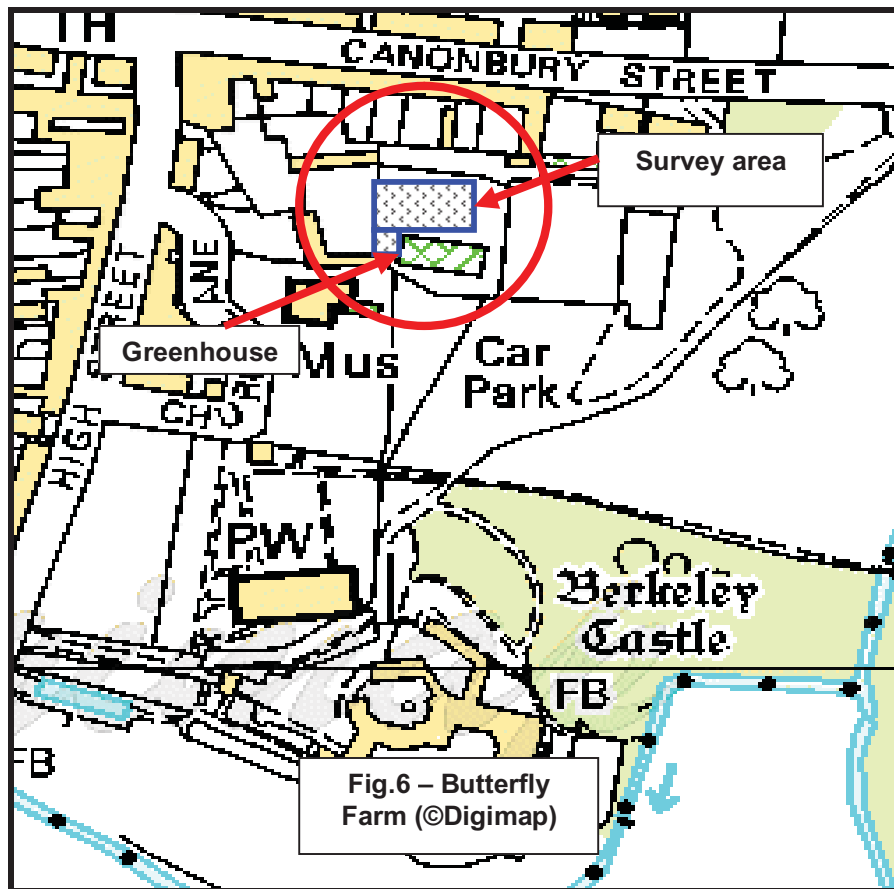
REPORT DATE: 23rd June 2005

COMPLETED BY: 1st Yr Undergraduate Students

REPORT AUTHOR: Philip R Rowe

3.1.2 INTRODUCTION

3.1.2.1 Covering an area detailed by the Excavation Director for surveying, a survey grid area measuring 40m x 40m (5.5 x 10m² grids) was laid out over a grassed area located adjacent (c.19m north) to the main greenhouse and running in a northwest – southeast direction within the Butterfly Farm complex (Fig.6).



3.1.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.1.3.1 Situated north of the main castle car park, located off Canonbury road, c.0.5km east-north-east of the village of Berkeley, Gloucestershire (NGR ST 685990), the surveyed area can be found located adjacent to a Butterfly Farm, c.300m due north from the main castle site and c.19m north of the main greenhouse, running in a northwest – southeast direction.

3.1.3.2 Lying 21m above OD ¹ on the side of a low lying spur, the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.1.4 GEOPHYSICAL SURVEY

3.1.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

3.1.4.2 INSTRUMENTATION

3.1.4.2.1 Resistance Meter – Geoscan RM15: Measuring the electrical resistance of the earth to a current being passed through it via a system of four electrodes (two current and two potential), a twin probe arrangement (0.5m interval) that involves the pairing of

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

electrodes (one current / one potential) was passed over a measured grid, with the results being compared to a back ground reading obtained from a pair of electrodes placed in a 'fixed' position.

3.1.4.2.2 Measured in Ohms and calculated resistivity in Ohm – Metres, the effective dept of penetration for the RM15 resistance meter is approximately 0.75m, although the nature of the overburden as well as underlying geology will cause variations in this generality.

3.1.4.3. SURVEY AREA

3.1.4.3.1 The RM15 resistance survey was completed over a 40m x 40m (5.5 x 10m²) grid area that incorporated the area highlighted in **Fig.7**.

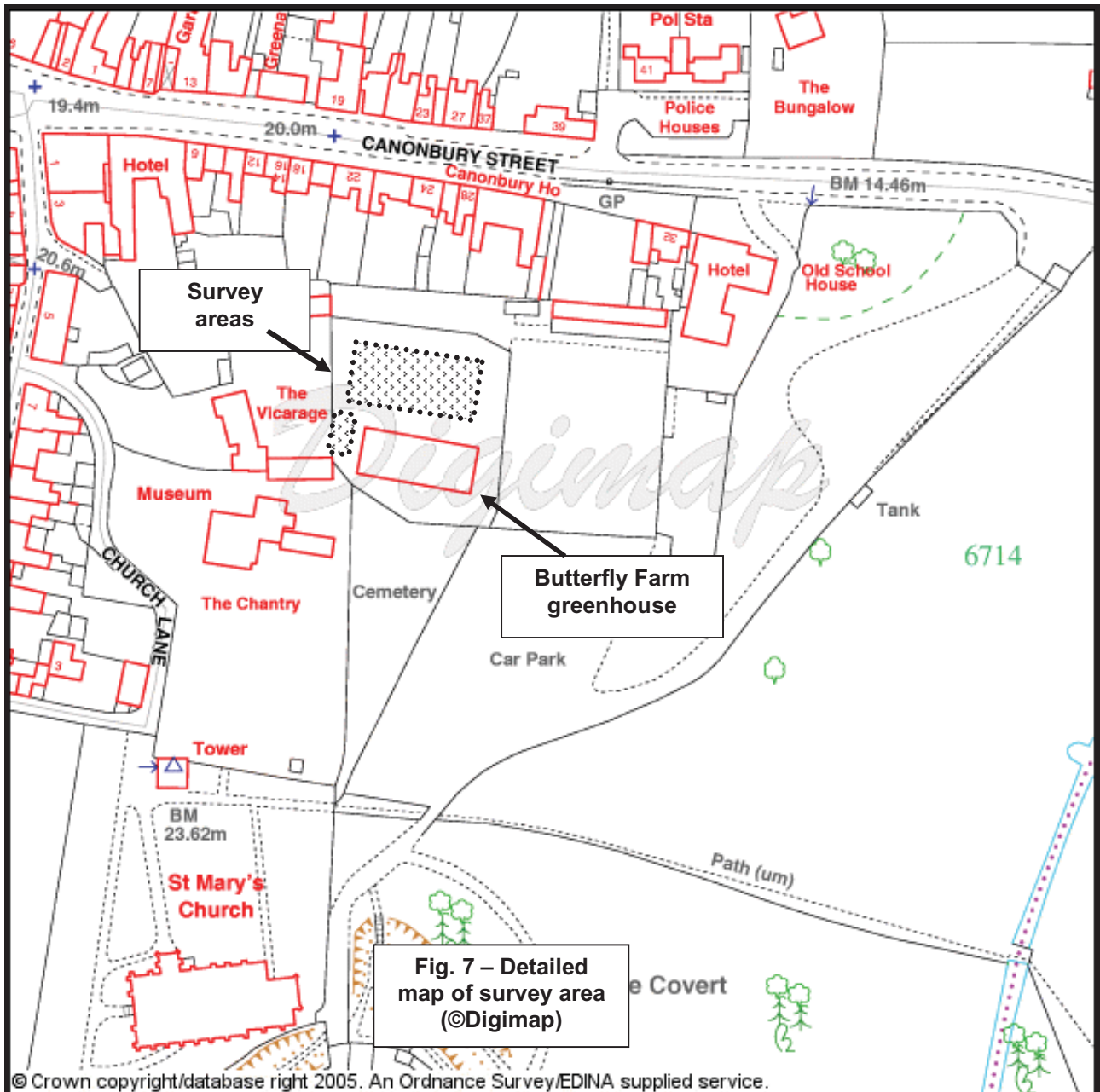
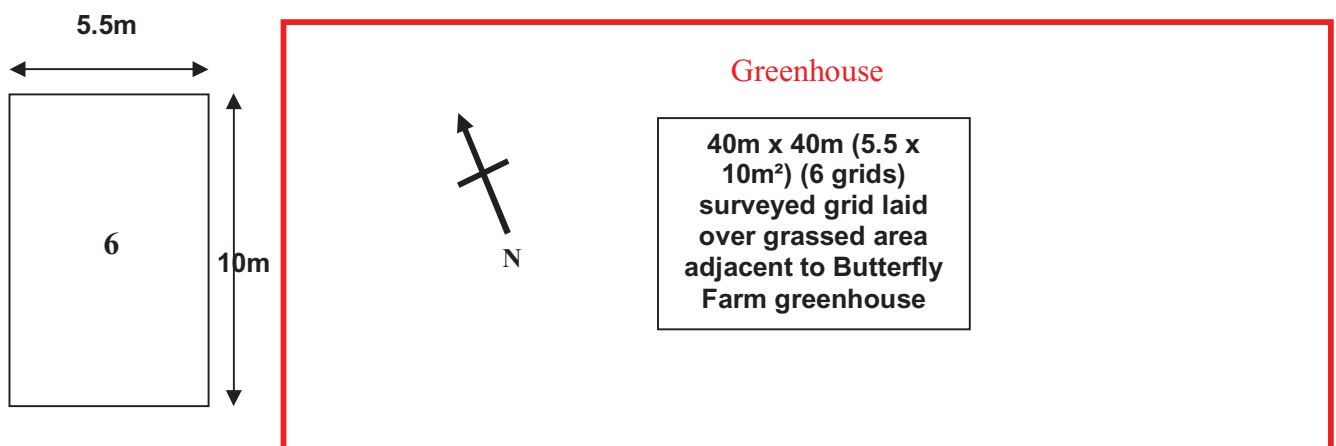
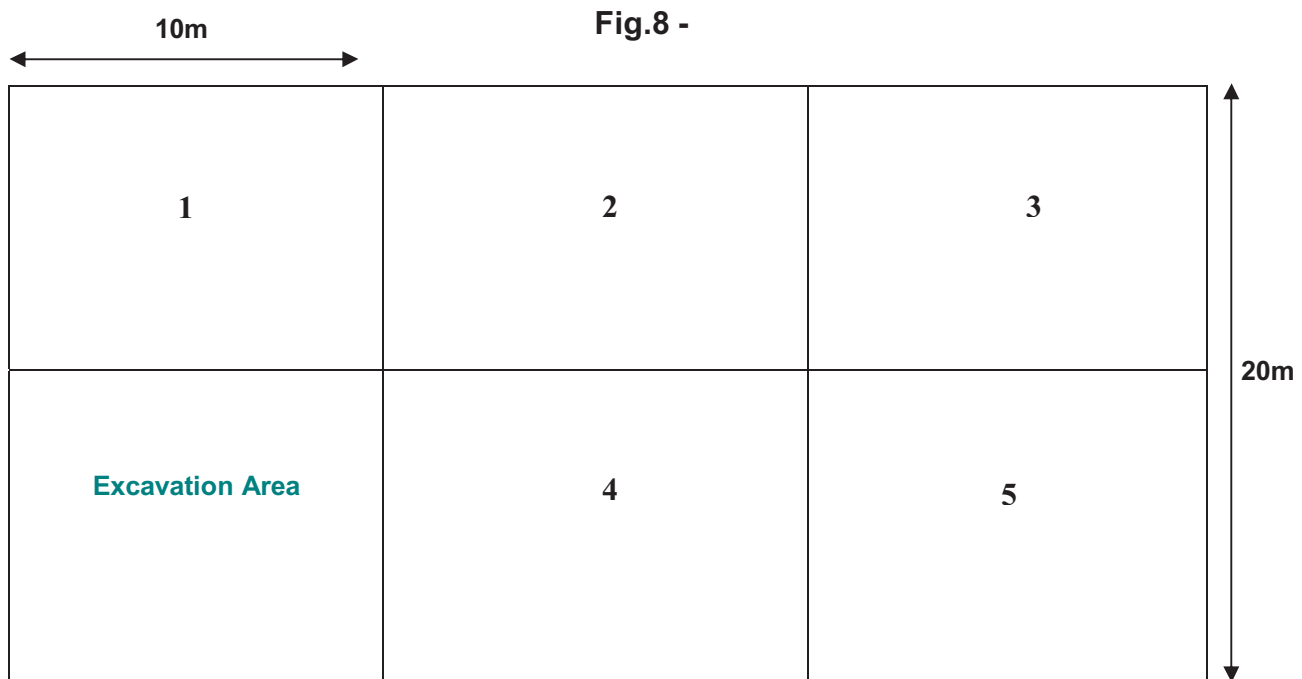


Fig. 7 – Detailed map of survey area (©Digimap)

3.1.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 50m baseline running in a north-west to south-east direction (**Fig.8**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

¹ Full EDM site survey completed and submitted under a separate report heading by R. Davies



3.1.4.4 DISPLAY

3.1.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

3.1.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.1.4.5 COMPLICATING FACTORS

3.1.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though a small part of the survey area was obstructed by the greenhouse that resulted in the logging of 'dummy' readings.

3.1.5 - RESULTS

3.1.5.1 Suggesting the presence of buried building material pertaining to perceived structures, the believed foundations of a building (high resistance) can be clearly identified c.25m northwest of the current main greenhouse, along with an area of low resistance (foundation trenches?) c.25m north, that join to form a rectangular feature (old greenhouse?) (Fig.9) (Appendix B).

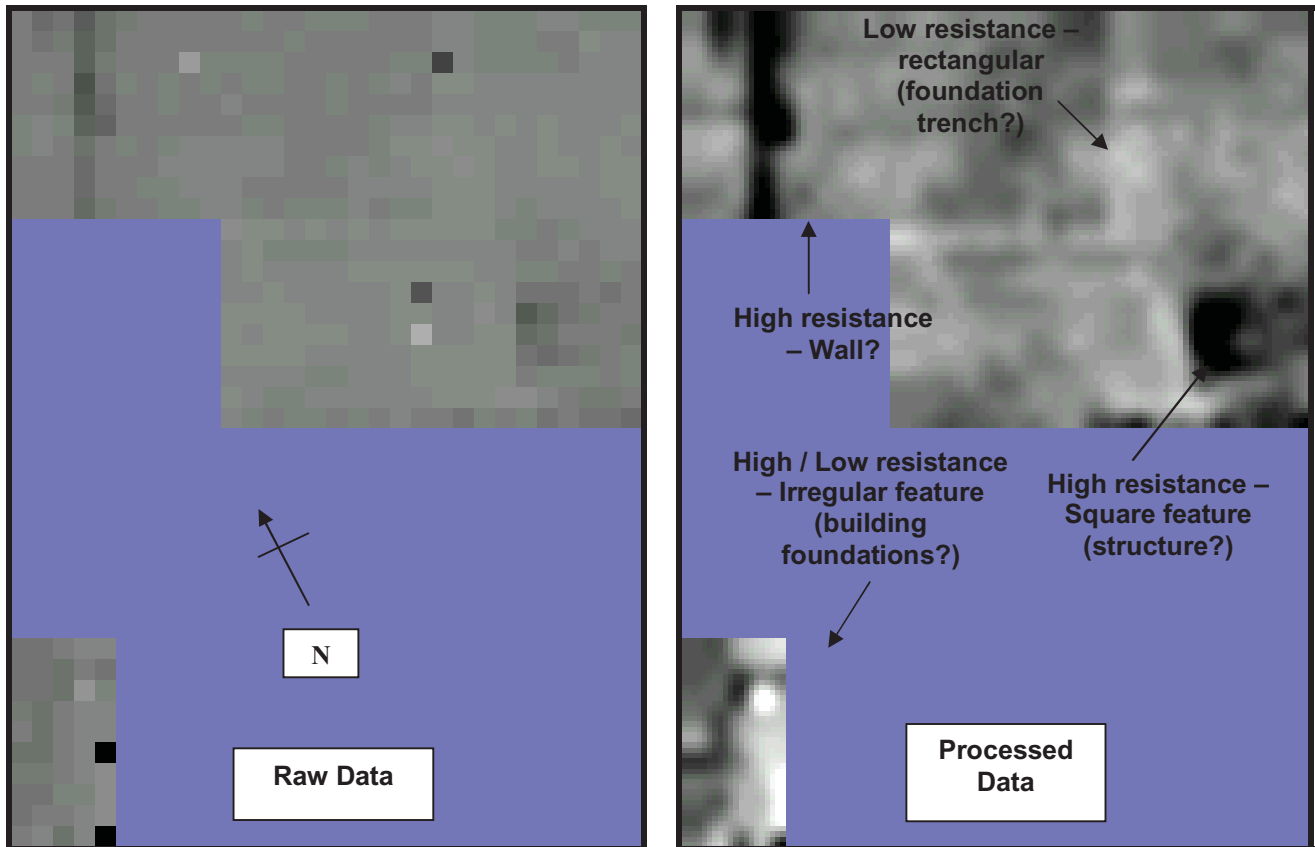


Fig.9 – Raw data (L) / Processed data (R) – RM15 Resistance survey results – Butterfly farm

3.1.5.2 An area of high resistance *c.*10m northeast of the main greenhouse further suggests the possible existence of an almost square structure *c.*4m², with an irregular feature located *c.*5m east of the greenhouse, implying the location of further possible building material foundations (wall footings?).

3.1.6 Conclusion

3.1.6.1 The results of the RM15 resistance survey in the Butterfly Farm suggest the presence of possible buried building material pertaining to structures, possibly that of old greenhouses and / or garden features.

3.1.6.2 Only a full archaeological excavation of the site would fully establish the presence of any building(s) / greenhouse(s), though drawing upon the evidence obtained from the excavation trench adjacent to grid 1 (**Fig.8**), the conclusion that the features pertain to old greenhouses / garden features is probably correct.

Project Co-ordinator: P R Rowe

Project Assistant: R Davies

Field work survey completed 26th / 27th May 2005

Survey Report 23rd June 2005

3.2 REPORT B - INNER KEEP GARDEN

3.2.1 SUMMARY OF RESULTS

SITE RESULTS SUMMARY 2

GEOPHYSICAL SURVEY REPORT NO: 05/02 - A **NGR:** ST 685 989

SITE NAME: Inner Keep Garden, Berkeley Castle, Gloucestershire

SITE TYPE: Grassed area

DESCRIPTION: Located inside the main castle complex, a grassed area within the main shell keep of the castle was surveyed.

PERIOD: Not known – Possible site of early castle well, in addition to 19th/20th water feature.

GEOLOGY: Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

LAND USE: Private grassed area within shell keep.

SURVEY TYPE: Resistance

METHOD: Zig – Zag

INSTRUMENT: Geoscan RM15

SURVEY AREA: 20m x 10m

SAMPLE INT: 1m

TRAVERSE INT: 1m

RESULTS SUMMARY:

A RM15 resistance survey of a total area 20m x 10m (2 x 10m² grids) was completed in May 2005, providing, as a result, mixed geophysical raw data that has partly assisted with the interpretation of the site.

Suggesting the presence of buried building material pertaining to the collapsed shell keep wall breached during the English Civil War, high resistance can be clearly identified c.3m east of the current main wall located west of the gridded area.

Additionally, an area of low resistance c.5m east of the centre of the gridded area further suggests the possible existence of an oval type feature c.3m², possibly that of the 19th / 20th century garden water feature, whilst due north, dead centre of the gridded area can be seen a c.0.5m² feature of low resistance suggesting the site of the early castle well

SURVEY DATE(S): 24 – 25th May 2005

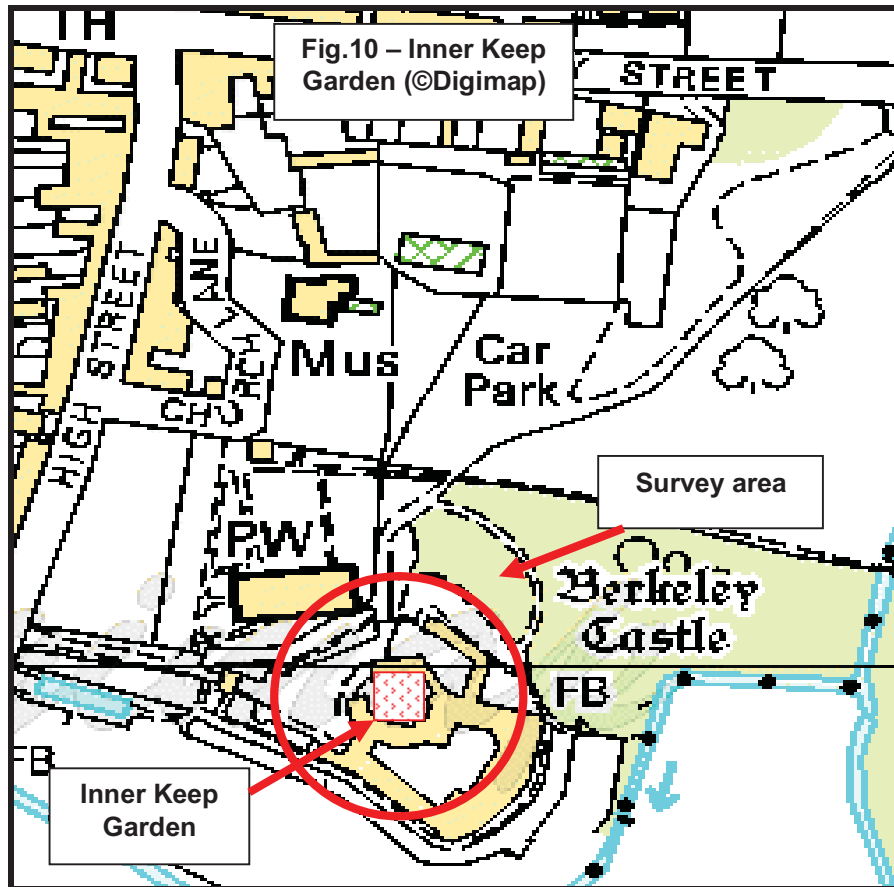
REPORT DATE: 23rd June 2005

COMPLETED BY: 1st Yr Undergraduate Students

REPORT AUTHOR: Philip R Rowe

3.2.2 INTRODUCTION

3.2.2.1 Covering an area measuring 20m x 10m (2 x 10m² grids), a survey grid was laid out over a grassed garden located inside the shell keep area of the main castle complex (Fig.10).



3.2.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.2.3.1 Situated c.200m south of the main castle car park, c.0.5km east-north-east of the village of Berkeley, Gloucestershire (NGR ST 685989), the surveyed area can be found located within the centre of the castle shell keep.

3.2.3.2 Lying 21m above OD ¹ on the side of a low lying spur, the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.2.4 GEOPHYSICAL SURVEY

3.2.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

3.2.4.2 INSTRUMENTATION

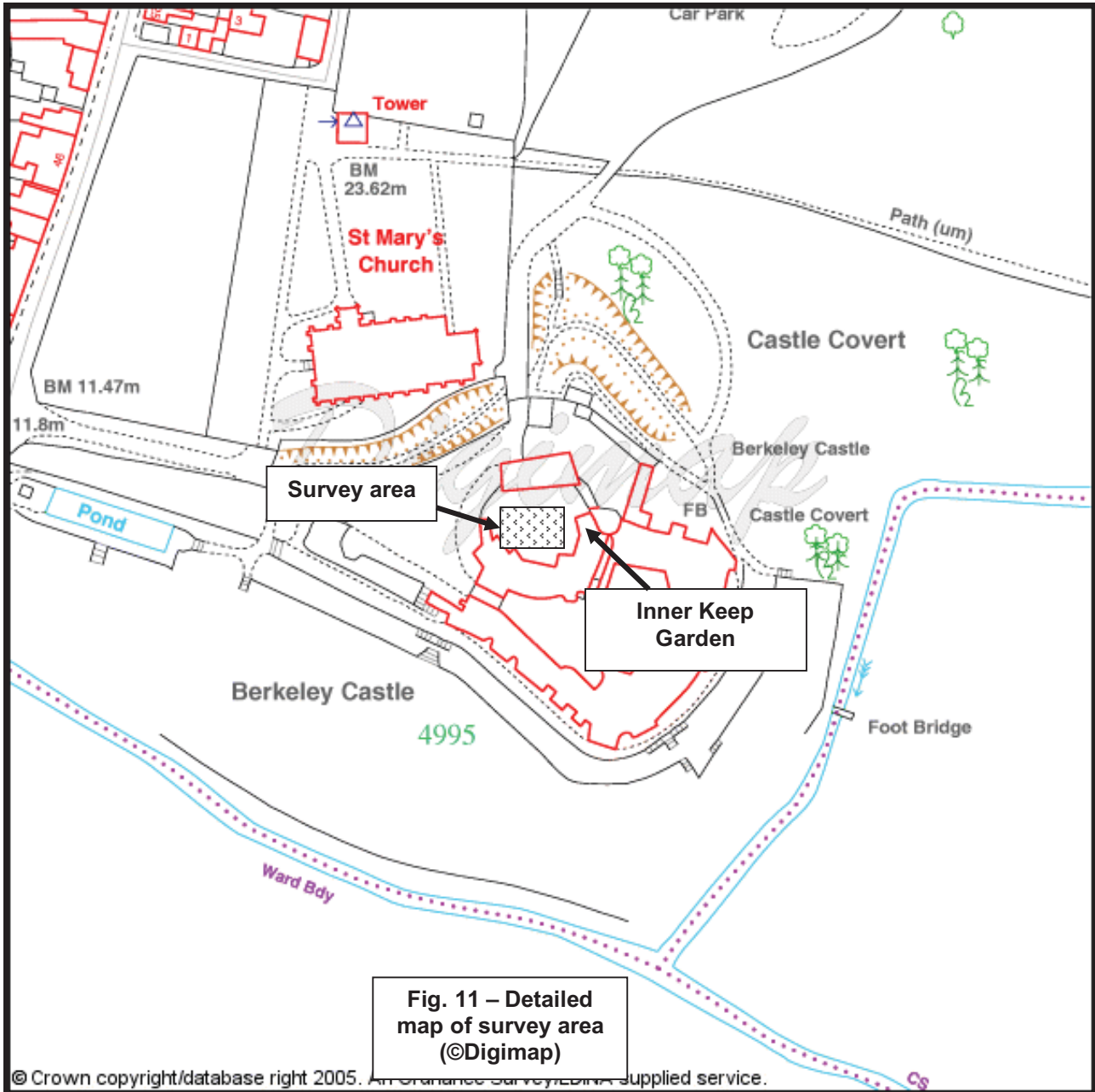
3.2.4.2.1 Resistance Meter – Geoscan RM15: Measuring the electrical resistance of the earth to a current being passed through it via a system of four electrodes (two current and two potential), a twin probe arrangement (0.5m interval) that involves the pairing of electrodes (one current / one potential) was passed over a measured grid, with the results being compared to a back ground reading obtained from a pair of electrodes placed in a 'fixed' position.

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

3.2.4.2.2 Measured in Ohms and calculated resistivity in Ohm – Metres, the effective dept of penetration for the RM15 resistance meter is approximately 0.75m, although the nature of the overburden as well as underlying geology will cause variations in this generality.

3.2.4.3. SURVEY AREA

3.2.4.3.1 The RM15 resistance survey was completed over a 20m x 10m (2 x 10m²) grid area that incorporated the area highlighted in **Fig.11**.

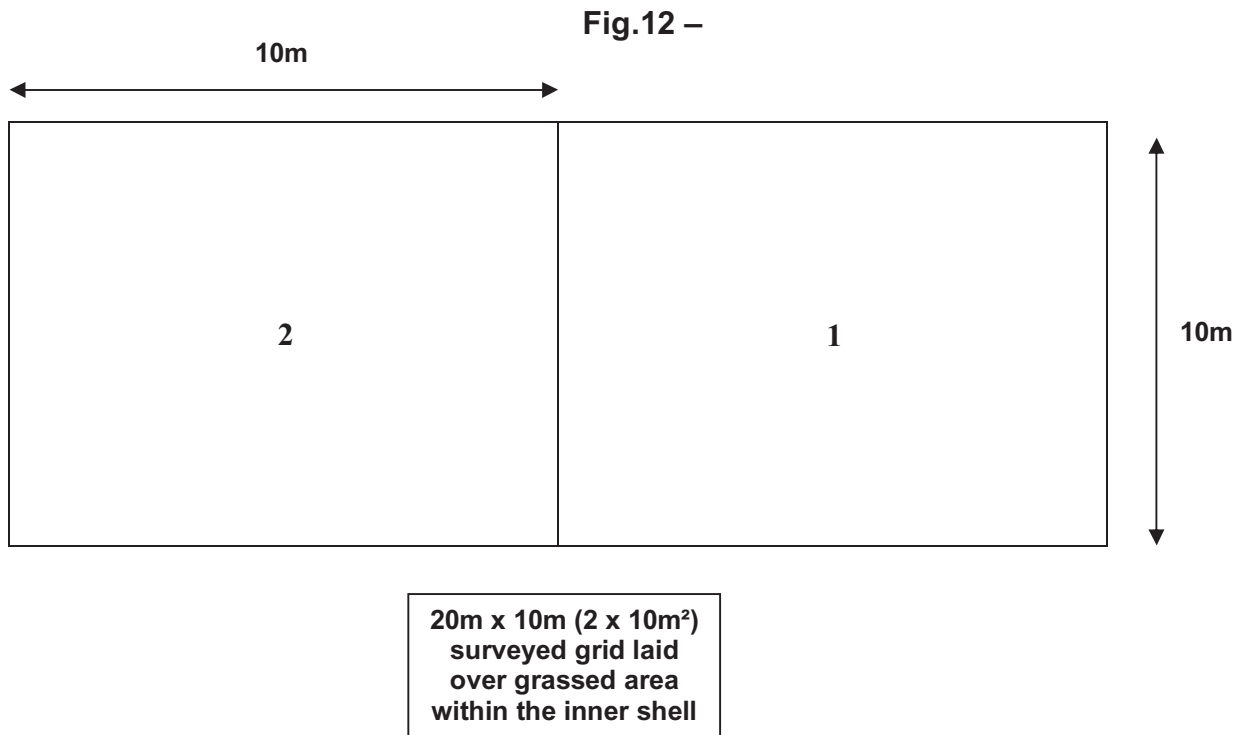


3.2.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 20m baseline running in west to east direction (**Fig.12**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

3.2.4.4 DISPLAY

3.2.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

¹ Full EDM site survey completed and submitted under a separate report heading by R. Davies



3.2.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.2.4.5 COMPLICATING FACTORS

3.2.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though a small part of the survey area was obstructed by bushes / partially metalled footpath that resulted in the logging of 'dummy' readings.

3.2.5 - RESULTS

3.2.5.1 Suggesting the presence of buried building material pertaining to the missing shell keep wall breached during the English Civil War, high resistance can be clearly identified c.3m east of the current main wall located west of the gridded area (**Fig.13**) (**Appendix C**).

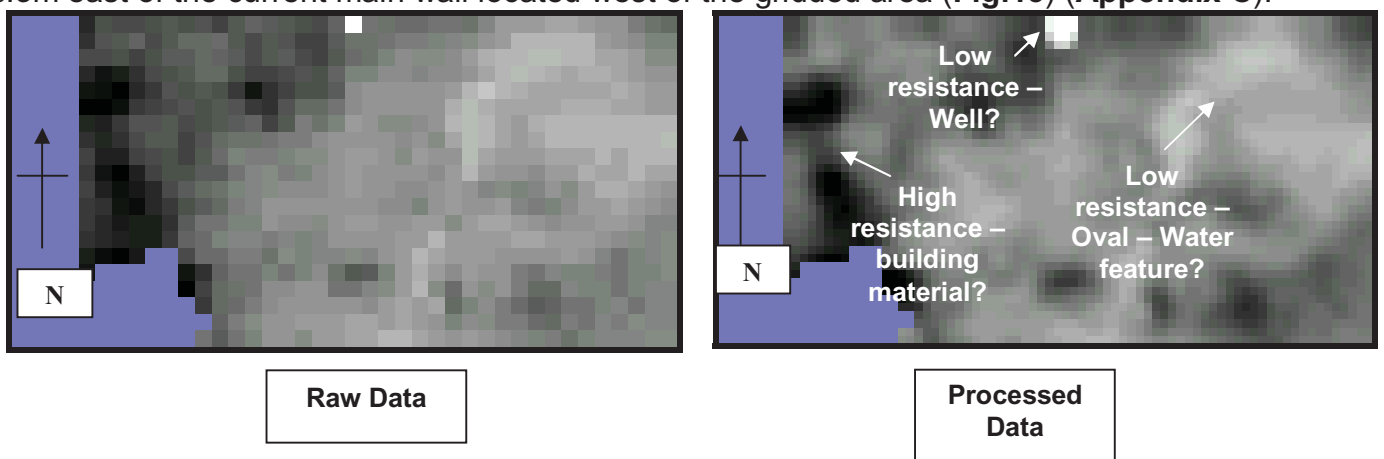


Fig.13 – Raw data (L) / Processed data (R) – RM15 Resistance survey results – Inner Keep Garden

3.2.5.2 Additionally, an area of low resistance c.5m east of the centre of the gridded area further suggests the possible existence of an oval type feature c.3m², possibly that of the 19th / 20th century garden water feature, whilst due north, dead centre of the gridded area can be seen a c.0.5m² feature of low resistance suggesting the site of the early castle well.

3.2.6 CONCLUSION

3.2.6.1 The results of the RM15 resistance survey within the inner shell keep garden suggest the presence of possible buried building material pertaining to the outer wall, either as collapsed rubble or possibly foundation structure as well as the possible existence of an oval type garden water feature, in addition to the possible site of the early castle well.

3.2.6.2 Only a full archaeological excavation of the site would fully establish the presence of any of these features.

Project Co-ordinator: P R Rowe

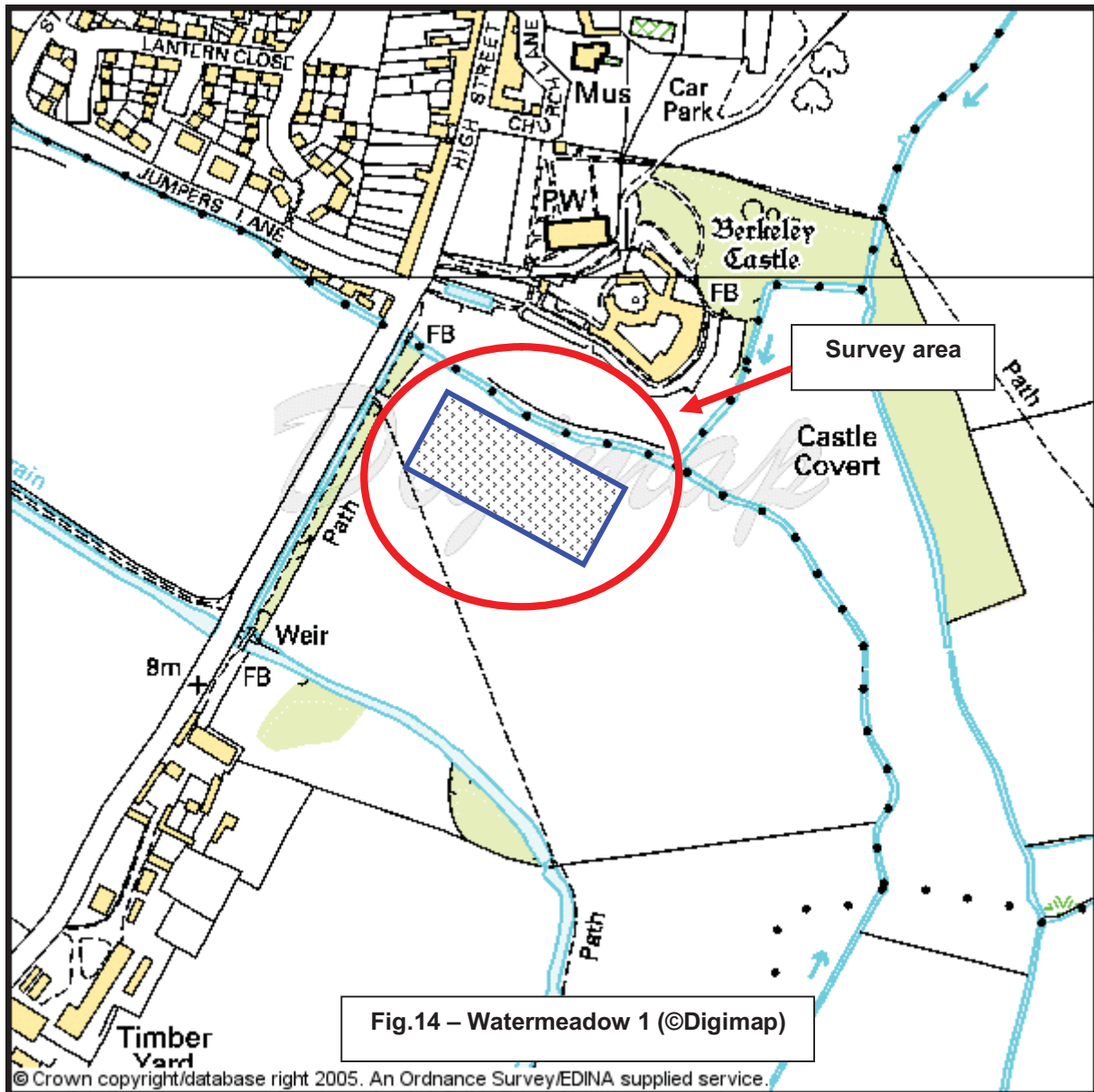
Project Assistant: R Davies

Field work survey completed 24th / 25th May 2005

Survey Report 23rd June 2005

3.3.2 INTRODUCTION

3.3.2.1 Covering an area detailed by the Excavation Director, a survey grid measuring 140m x 40m (13 x 20m² grids) was laid out over a grassed area located c.100m southwest from the main castle site, adjacent to the main complex / gardens and surveyed (**Fig.14**).



3.3.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.3.3.1 Situated c.100m southwest of the main castle complex / gardens, c.0.5km east-north-east of Berkeley village, Gloucestershire (NGR ST 684 988) in a field known as the Watermeadow, the surveyed area can be found to cross both a slight linear depression that runs in a diagonal across the survey site as well as a few parallel low lying earthworks.

3.3.3.2 Lying just 8m above OD ¹ on a flat flood prone level that suggests an overlying deposit of alluvium (depth not known), the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.3.4 GEOPHYSICAL SURVEY

3.3.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

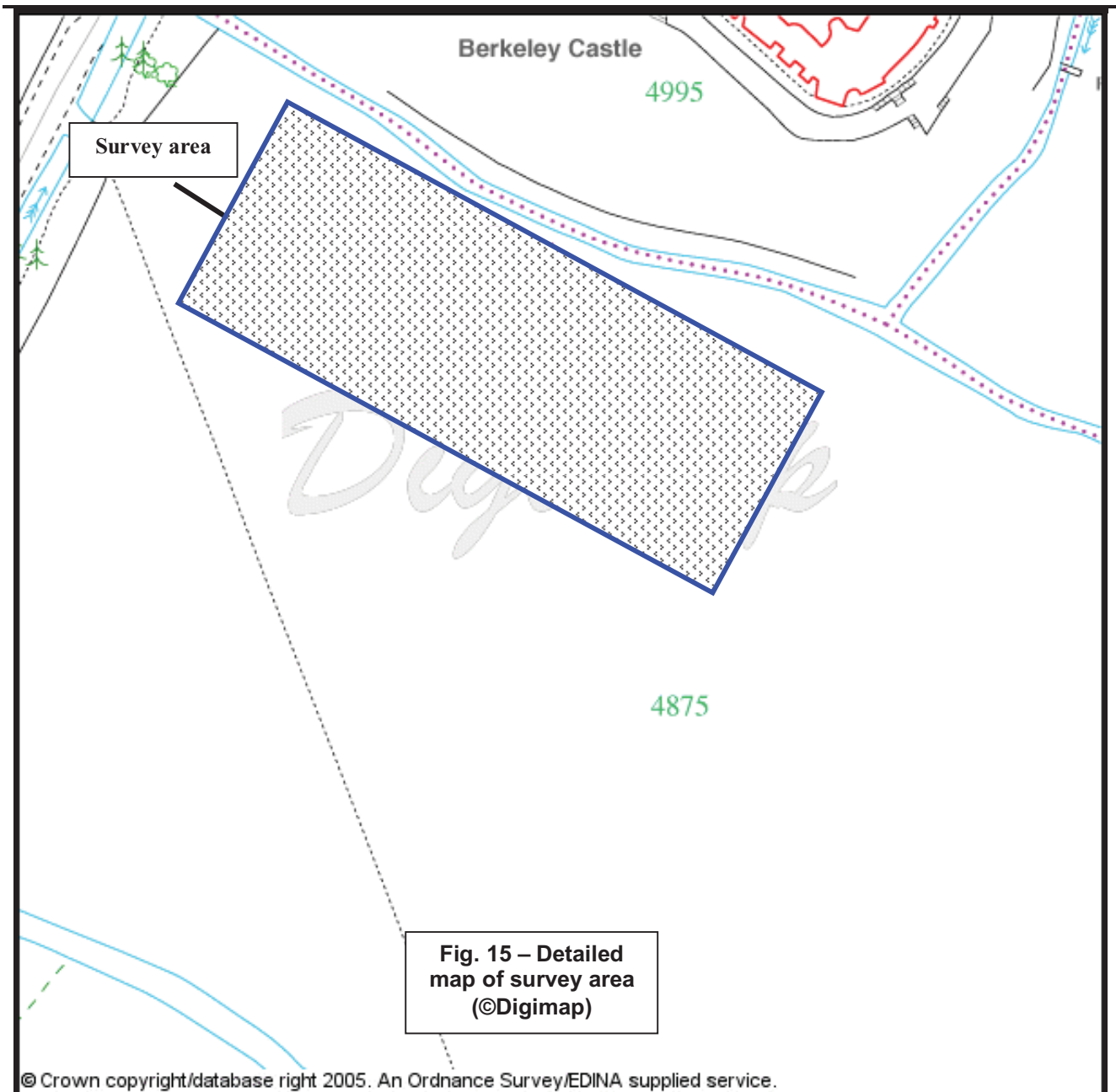
3.3.4.2 INSTRUMENTATION

3.3.4.2.1 Resistance Meter – Geoscan RM15: Measuring the electrical resistance of the earth to a current being passed through it via a system of four electrodes (two current and two potential), a twin probe arrangement (0.5m interval) that involves the pairing of electrodes (one current / one potential) was passed over a measured grid, with the results being compared to a back ground reading obtained from a pair of electrodes placed in a 'fixed' position.

3.3.4.2.2 Measured in Ohms and calculated resistivity in Ohm – Metres, the effective dept of penetration for the RM15 resistance meter is approximately 0.75m, although the nature of the overburden as well as underlying geology will cause variations in this generality.

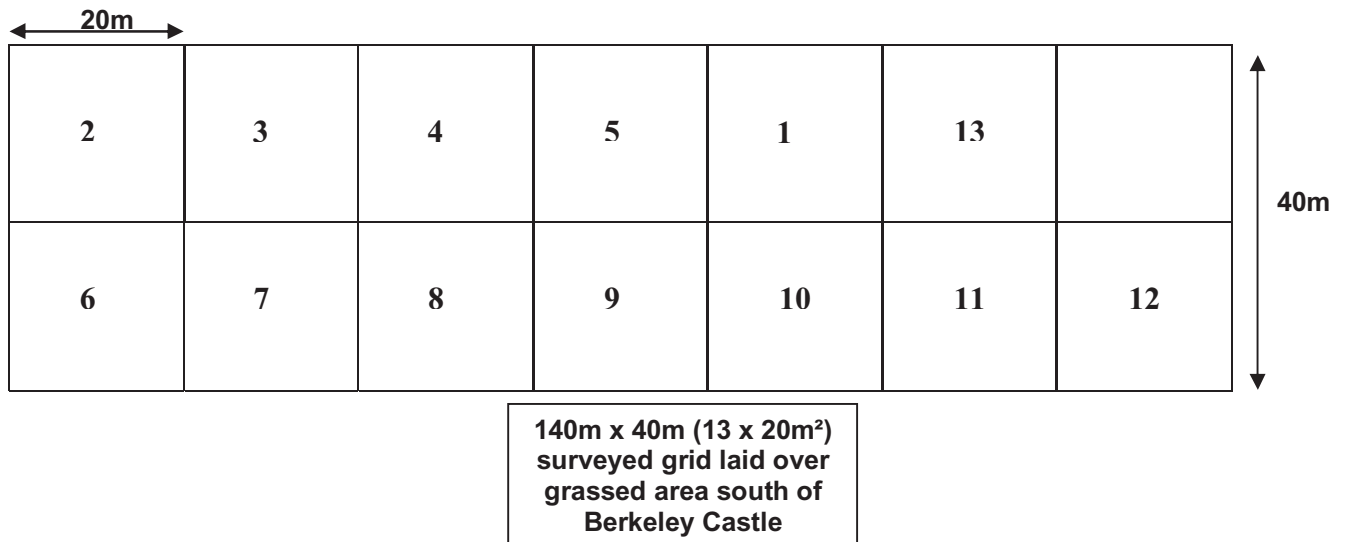
3.3.4.3. SURVEY AREA

3.3.4.3.1 The RM15 resistance survey was completed over a 140m x 40m (13 x 20m²) grid area that incorporated the area highlighted in Fig.15.



3.3.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 140m baseline running in a north-west to south-east direction (**Fig.16**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

Fig.16 –



3.3.4.4 DISPLAY

3.3.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

3.3.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.3.4.5 COMPLICATING FACTORS

3.3.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though it must be noted that as the site has been prone to flooding in the past, alluvium deposits if over 1m may obscure all but recent archaeology.

3.3.5 - RESULTS

3.3.5.1 Noted during initial site evaluations, an earthwork survey by undergraduate students revealed a slight linear depression that runs in a diagonal across the survey site and is supported by mid – low resistance results that are banked by parallel lines of higher resistance (**Fig.17**) (**Appendix D**).

3.3.5.2 Suggesting a possible trackway, the feature can be seen starting mid field from a present watercourse giving credence to the theory of an earlier linear watercourse crossing the site, though it must be noted that this is not conclusive.

3.3.5.3 In addition to this, situated c.50m to the east of the depression is a parallel linear feature of high resistance with a 90° offsetted high resistance feature running from it in a westerly direction (**Fig.17**). Concurrent with surviving low lying earthworks, no known modern services (pipes etc) that would give a high resistance result are present therefore the suggestion of it being banking for fishponds it feasible, though again not conclusive.

¹ Full EDM site survey completed and submitted under a separate report heading by R. Davies

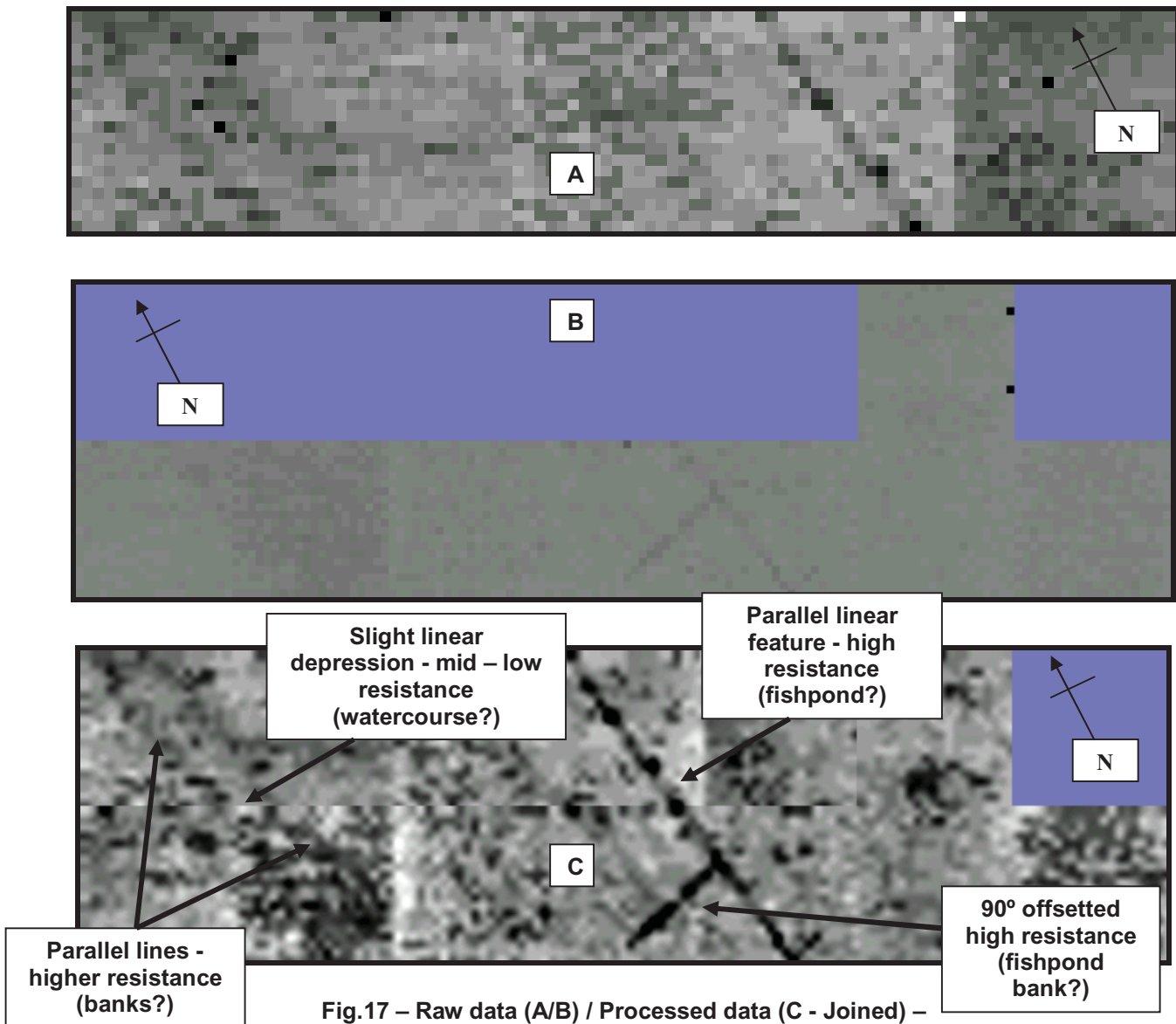


Fig.17 - Raw data (A/B) / Processed data (C - Joined) -
RM15 Resistance survey results - Watermeadow 1

3.3.6 - Conclusion

3.3.6.1 The results of the RM15 resistance survey in the Watermeadow 1 support the layout of the earthworks within the field, with the linear diagonal running depression displayed as a faint bank and ditch feature supporting a watercourse notion rather than a Holloway (trackway).

3.3.6.2 The presence of a diagonal running parallel feature of high resistance initially suggested the possibility of buried modern services (pipes etc) however working in conjunction with the earthworks surveyed, it is quite feasible to support the notion of the feature being material pertaining to fishponds.

3.3.6.3 Full archaeological excavation of the site is needed to fully establish the presence of fishponds etc.

Project Co-ordinator: P R Rowe **Field work survey completed:** 27 – 28th May 2005

Project Assistant: R Davies **Survey Report:** 23rd June 2005

3.4 REPORT D - WATERMEADOW 1

3.4.1 SUMMARY OF RESULTS

SITE RESULTS SUMMARY 4

GEOPHYSICAL SURVEY REPORT NO: 05/02 - A **NGR:** ST 684 988

SITE NAME: Watermeadow, Berkeley Castle, Gloucestershire

SITE TYPE: Grassed area

DESCRIPTION: Located c.100m southwest from the main castle site, a wide grassed area located adjacent to the main complex / gardens was surveyed.

PERIOD: Not known – Earthwork analysis suggest possible fishponds / water course.

GEOLOGY: Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology – Known to be prone to flooding by the River Severn suggesting an overlying deposit of alluvium (depth not known)

LAND USE: Grassed area with public footpath crossing site.

SURVEY TYPE:	Fluxgate Gradiometer	METHOD:	Zig – Zag
INSTRUMENT:	Geoscan FM36	SURVEY AREA:	140m x 60m
SAMPLE INT:	0.25m	TRAVERSE INT:	1m

RESULTS SUMMARY:

A FM36 gradiometer survey of a total area 140m x 60m (20 x 20m² grids) was completed in May 2005, providing, as a result, mixed geophysical raw data that has assisted with part interpretation of the site.

An earthwork survey of the site revealed a slight linear depression running in a diagonal across the site, however few readings of magnetic variation in this area was found suggesting an absence of disturbed soils normally associated with banks / ditches. This further supports the notion of a linear watercourse crossing the site, though again it must be noted that this is not conclusive as pathways (holloways) can produce the same results.

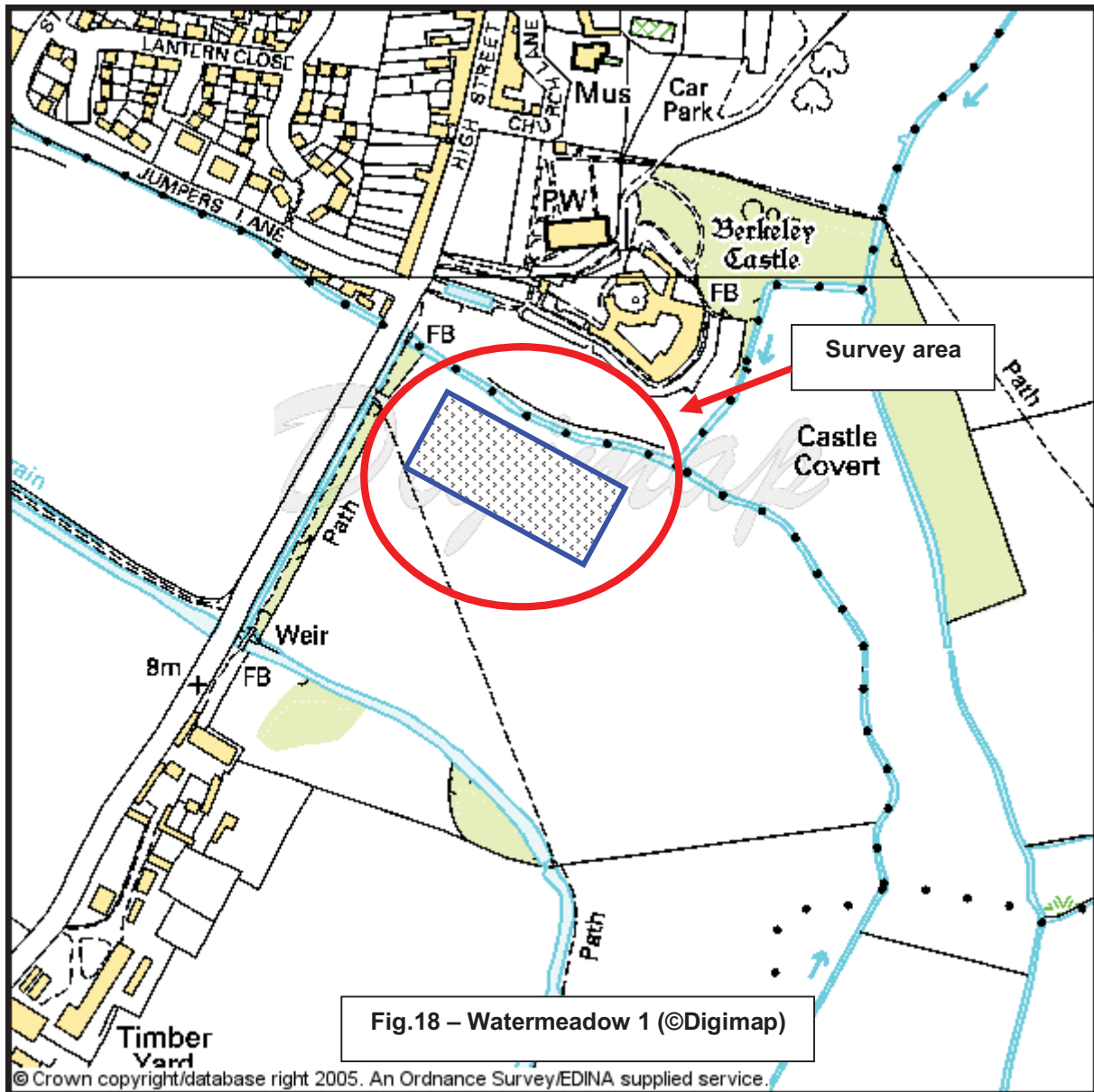
Situated c.25m to the east of the depression can be seen an area of high readings suggesting a feature of either disturbed soils or an area of metal / burning. No shape in particular it is quite possible it relates to modern activity.

Further east, c.60m, is two anomalies of interest; the upper displaying high readings set out in a vertical rectangular pattern, and the lower set out in a horizontal rectangular pattern. Not found during the resistance survey, suggesting no building material, the interpretation of these features is unclear, though it has been suggested to possibly relate to 20th century horse jumps. Only excavation with fully answer this question.

SURVEY DATE(S): 27 – 28 th May 2005	REPORT DATE: 23rd June 2005
COMPLETED BY: 1 st Yr Undergraduate Students	REPORT AUTHOR: Philip R Rowe

3.4.2 INTRODUCTION

3.4.2.1 Covering an area detailed by the Excavation Director, a survey grid measuring 140m x 60m (20 x 20m² grids) was laid out over a grassed area located c.100m southwest from the main castle site, adjacent to the main complex / gardens and surveyed (**Fig.18**).



3.4.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.4.3.1 Situated c.100m southwest of the main castle complex / gardens, c.0.5km east-north-east of Berkeley village, Gloucestershire (NGR ST 684 988) in a field known as the Watermeadow, the surveyed area can be found to cross both a slight linear depression that runs in a diagonal across the survey site as well as a few parallel low lying earthworks.

3.4.3.2 Lying just 8m above OD ¹ on a flat flood prone level that suggests an overlying deposit of alluvium (depth not known), the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.4.4 GEOPHYSICAL SURVEY

3.4.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

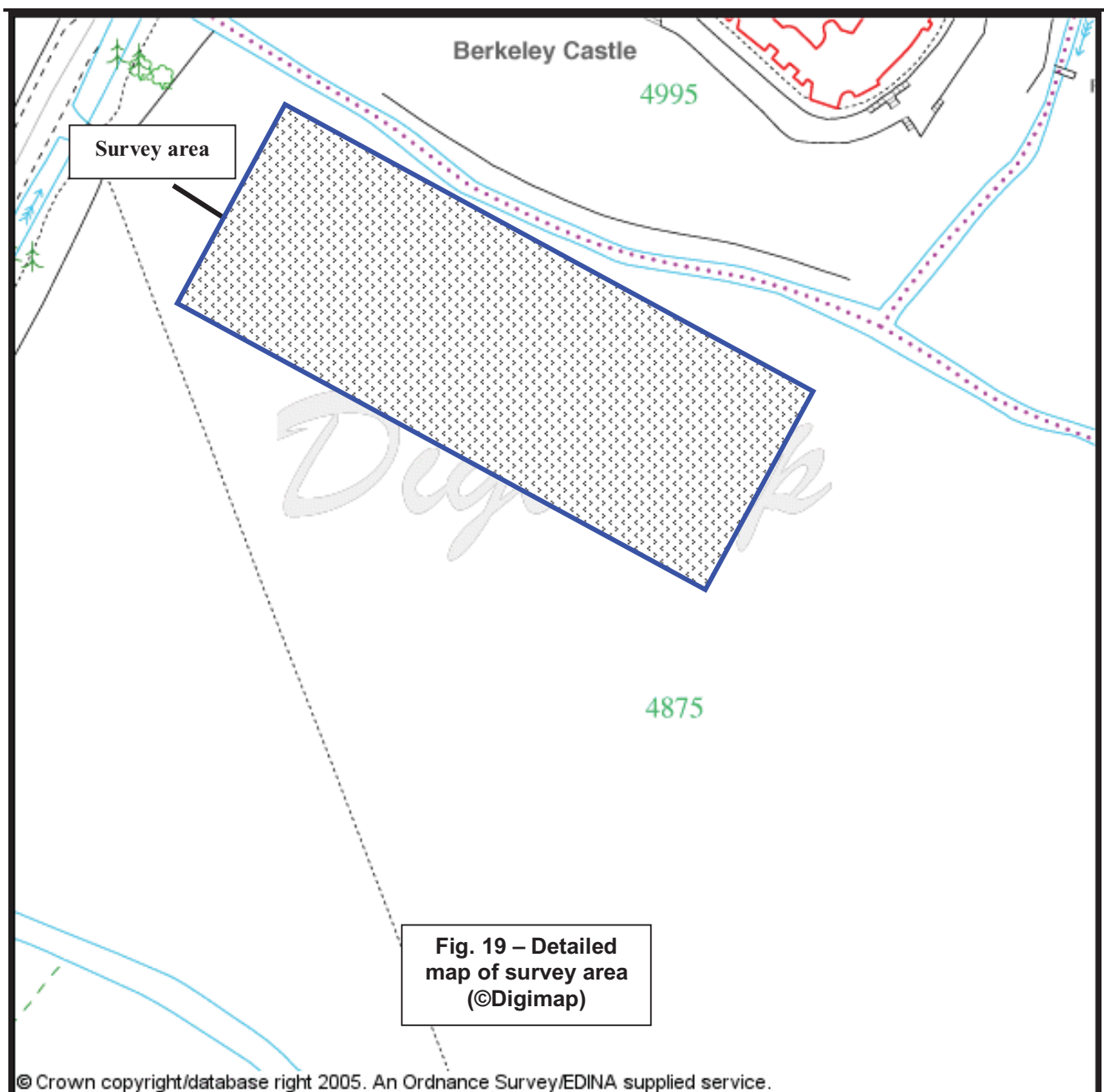
3.4.4.2 INSTRUMENTATION

3.4.4.2.1 Fluxgate Gradiometer – Geoscan FM36: Carried by hand with the bottom sensor c.0.1 – 0.3m from the ground, two fluxgate sensors are mounted vertically within the instrument, c.0.5m apart.

3.4.4.2.2 Reading the difference in the magnetic field at each survey station, the measurements are taken in nanoTesla (nT) or gamma and are effective to a dept of penetration approximately 1m, with the fluxgate gradiometer suppressing any diurnal / regional effects.

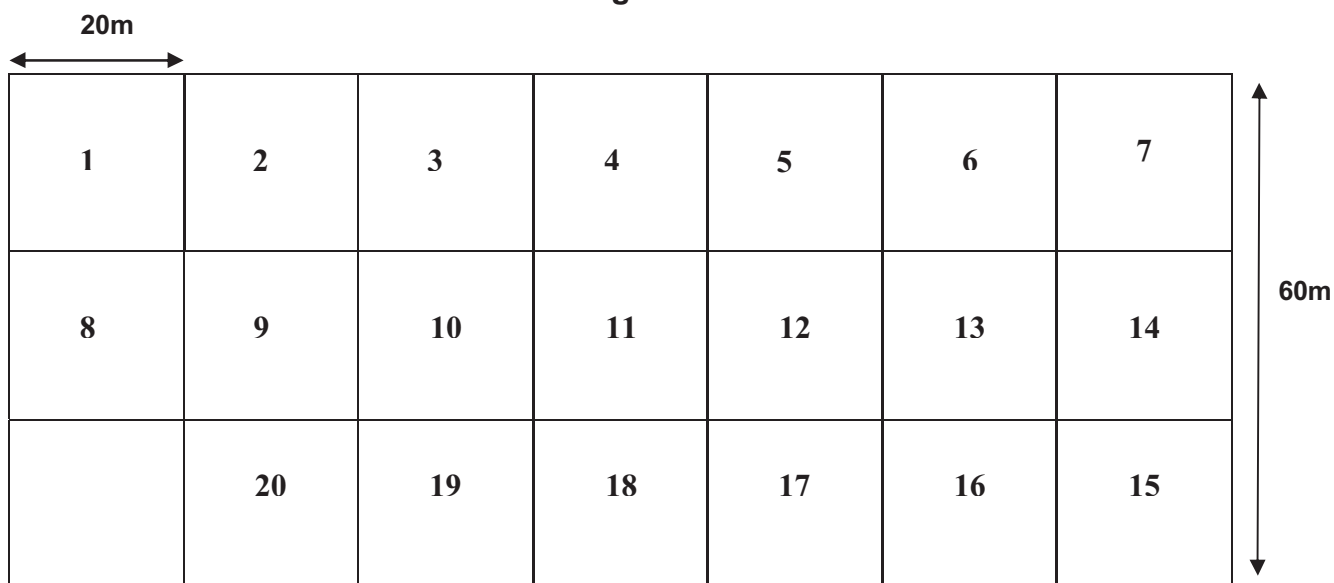
3.4.4.3. SURVEY AREA

3.4.4.3.1 The FM36 gradiometer survey was completed over a 140m x 60m (20 x 20m²) grid area that incorporated the area highlighted in **Fig.19**.



3.4.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 140m baseline running in a north-west to south-east direction (**Fig.20**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

Fig.20 –



**140m x 60m (20 x 20m²)
 surveyed grid laid over
 grassed area south of
 Berkeley Castle**

3.4.4.4 DISPLAY

3.4.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

3.4.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.4.4.5 COMPLICATING FACTORS

3.4.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though it must be noted that as the site has been prone to flooding in the past, alluvium deposits if over 1m may obscure all but recent archaeology.

3.4.5 - RESULTS

3.4.5.1 Few readings of magnetic variation in area of the slight linear depression that runs in a diagonal across the site was found suggesting an absence of disturbed soils normally associated with banks / ditches. This can further support the notion of a linear watercourse crossing the site, though it must be noted that this is not conclusive as pathways (holloways etc) can, if not metalled or banked, produce the same results (**Fig.21**)(**Appendix E**).

3.4.5.2 Situated c.25m to the east of the depression can be seen an area of high readings suggesting a feature of either disturbed soils or an area of metal / burning. No shape in particular it is quite possible it relates to modern activity.

¹ Full EDM site survey completed and submitted under a separate report heading by R. Davies

3.4.5.3 Further east, c.60m, is two anomalies of interest; the upper displaying high readings set out in a vertical rectangular pattern, and the lower set out in a horizontal rectangular pattern. Not found during the resistance survey, suggesting no building material present, the archaeological interpretation of these features is unclear, though it has been suggested to possibly relate to 20th century horse jumps. Only excavation with fully answer this question.

3.4.5.4 One point to note: Few readings are present with regard to the fishpond banks, a factor that whilst is positive in terms of possibly ruling out modern services such as pipes / fences etc, is conversely negative as it is thought the disturbed material contained within the banks would of shown up during the gradiometer survey.

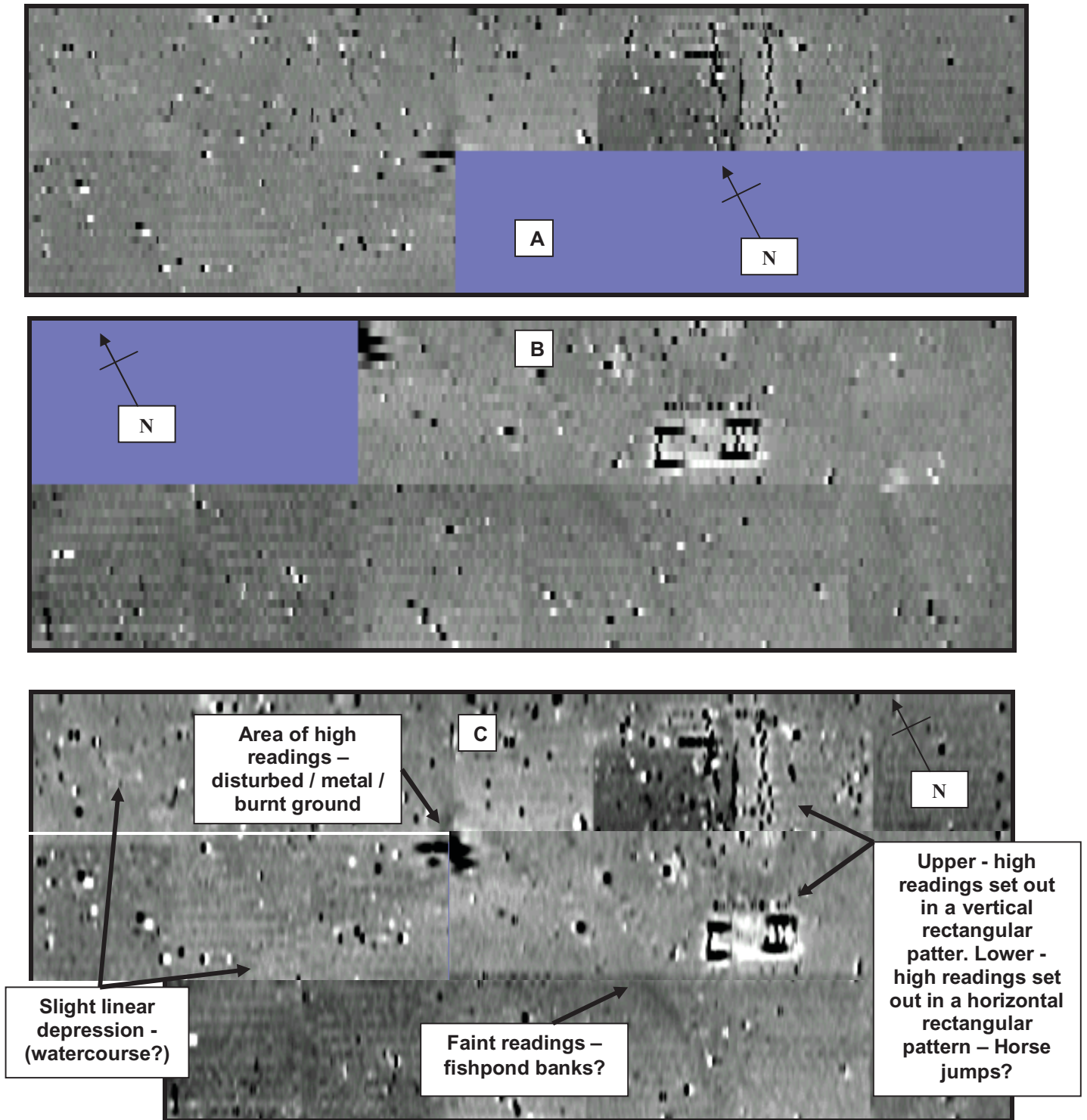


Fig.21 – Raw data (A/B) / Processed data (C - Joined) – FM36 Fluxgate gradiometer survey results – Watermeadow 1

3.4.6 - Conclusion

3.4.6.1 The results of the FM36 Fluxgate gradiometer survey in the Watermeadow 1 provided mixed results, with limited support for the layout of the earthworks within the field. The linear diagonal running depression can be seen displayed as a very faint feature that can be used to support a watercourse notion, though again it must be noted that this is not conclusive as pathways (holloways etc) can, if not metalled or banked, produce the same results.

3.4.6.2 The presence of a feature with high readings situated c.25m to the east of the depression suggests a feature of either disturbed soils or an area of metal / burning. Being no shape in particular it is quite possible it relates to modern activity.

3.4.6.3 c.60m east can be found two anomalies of particular interest; with the upper one displaying high readings set out in a vertical rectangular pattern, and the lower one set out in a horizontal rectangular pattern. Not found during the resistance survey, the archaeological interpretation of these features is unclear; with the suggestion of them relating to 20th century horse jumps is one that is quite feasible.

3.4.6.4 Few readings, interestingly, are present with regard to the fishpond banks, a factor that whilst is positive in terms of possibly ruling out modern services such as pipes / fences etc, is conversely negative as it is thought the disturbed material contained within the banks would of shown up during the gradiometer survey.

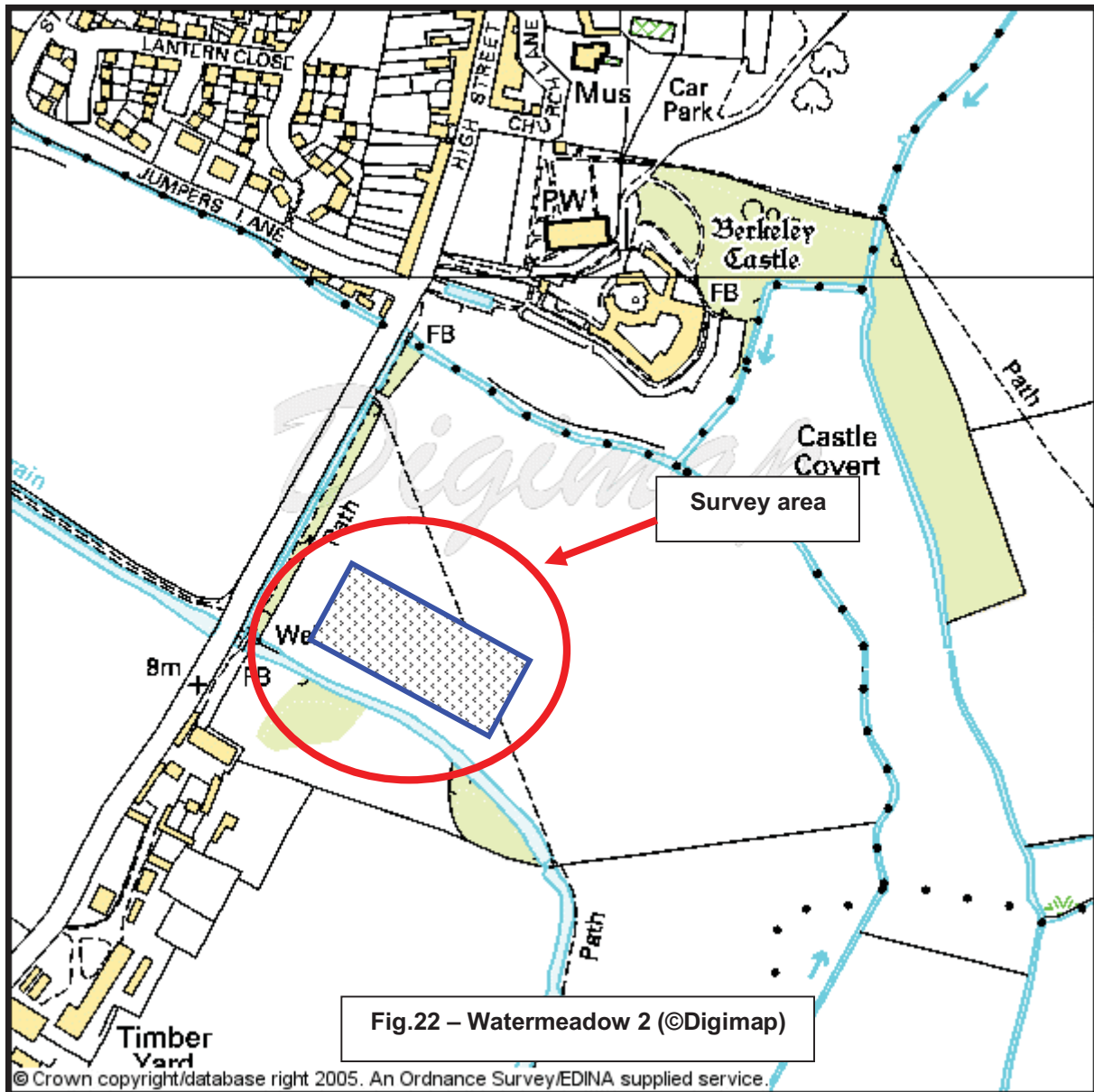
3.4.6.5 A full archaeological excavation of the site is needed to fully establish the presence of fishponds etc.

Project Co-ordinator: P R Rowe **Field work survey completed:** 27 – 28th May 2005

Project Assistant: R Davies **Survey Report:** 23rd June 2005

3.5.2 INTRODUCTION

3.5.2.1 Covering an area detailed by the Excavation Director, a survey grid measuring 140m x 60m (16 x 20m² grids) was laid out over a grassed area located c.350m southwest from the main castle site, adjacent to the main complex / gardens and surveyed (Fig.22).



3.5.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.5.3.1 Situated c.350m southwest of the main castle complex / gardens, c.0.5km east-north-east of Berkeley village, Gloucestershire (NGR ST 683 987) in a field known as the Watermeadow, the surveyed area can be found to cross both a slight linear depression that runs in a diagonal across the survey site as well as a few low lying earthworks.

3.5.3.2 Lying just 8m above OD ¹ on a flat flood prone level that suggests an overlying deposit of alluvium (depth not known), the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.5.4 GEOPHYSICAL SURVEY

3.5.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

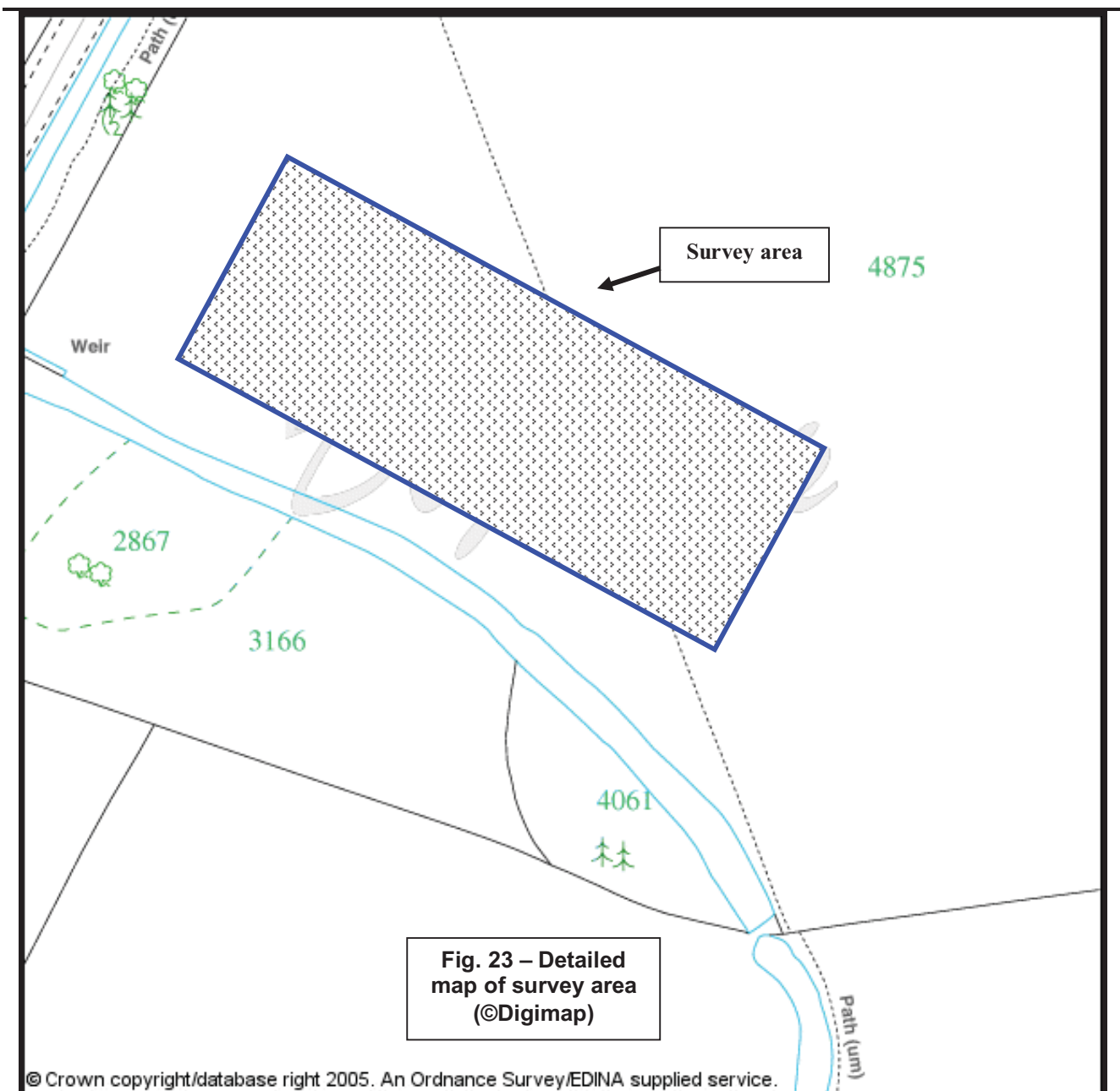
3.5.4.2 INSTRUMENTATION

3.3.4.2.1 Resistance Meter – Geoscan RM15: Measuring the electrical resistance of the earth to a current being passed through it via a system of four electrodes (two current and two potential), a twin probe arrangement (0.5m interval) that involves the pairing of electrodes (one current / one potential) was passed over a measured grid, with the results being compared to a back ground reading obtained from a pair of electrodes placed in a 'fixed' position.

3.5.4.2.2 Measured in Ohms and calculated resistivity in Ohm – Metres, the effective dept of penetration for the RM15 resistance meter is approximately 0.75m, although the nature of the overburden as well as underlying geology will cause variations in this generality.

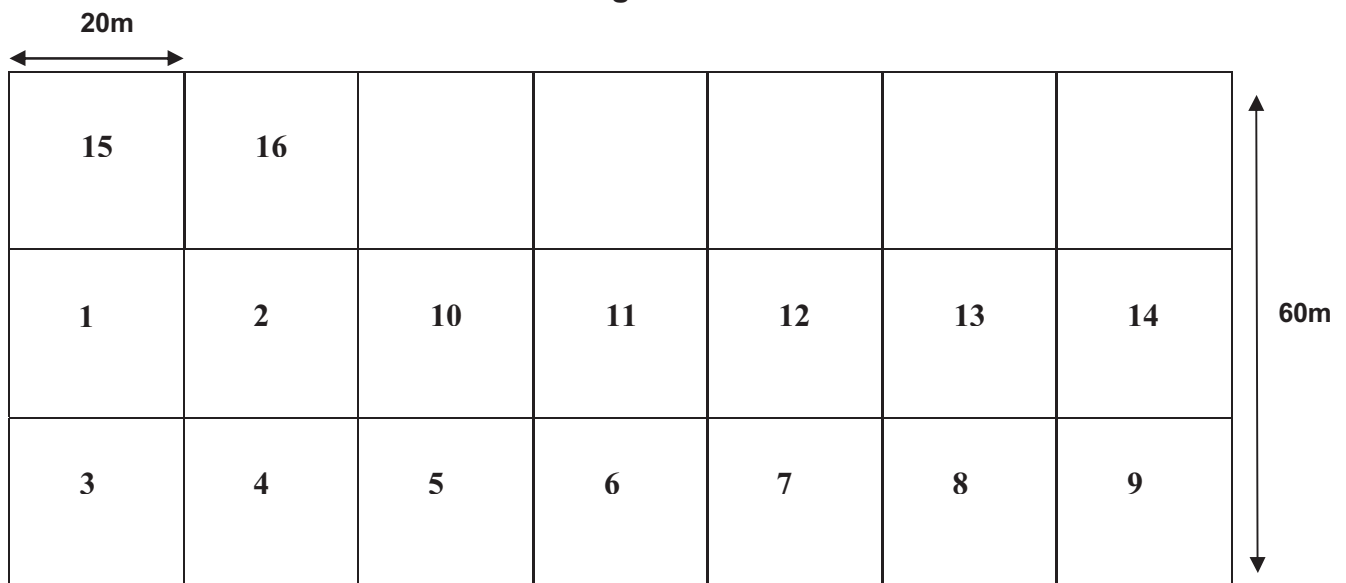
3.5.4.3. SURVEY AREA

3.5.4.3.1 The RM15 resistance survey was completed over a 140m x 60m (16 x 20m²) grid area that incorporated the area highlighted in Fig.23.



3.5.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 140m baseline running in a north-west to south-east direction (**Fig.24**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

Fig.24 –



140m x 60m (16 x 20m²)
surveyed grid laid over
grassed area south of
Berkeley Castle

3.5.4.4 DISPLAY

3.5.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

3.5.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.5.4.5 COMPLICATING FACTORS

3.5.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though it must be noted that as the site has been prone to flooding in the past, alluvium deposits if over 1m may obscure all but recent archaeology.

3.5.5 - RESULTS

3.5.5.1 Supporting the evidence obtained following an earthwork survey of a slight linear depression that runs in a diagonal across the survey site, mid – low resistance banked by parallel lines of higher resistance can be seen located in the eastern side of the survey grid, (**Fig.25**) (**Appendix F**) supporting the theory of a linear watercourse crossing the site, though once again it must be noted that this is not conclusive.

3.5.5.2 One grid c.60- 80m east along the survey base line can be seen to display high areas of resistance, suggesting the possibility of buried building material, however it must be noted that being an obviously darker grid when compared to the others, there is a

¹ Full EDM site survey completed and submitted under a separate report heading by R. Davies

Possibility of it being a grid where poor raw data was collected. Excavation or resurvey will confirm.

3.5.5.3 Additionally west in the survey area (grids 3,1,15) can be seen a faint line of mid resistance that appears to run possibly in a semi-circular pattern vertically for c.40m, though again as before this could be down to the quality of the raw data collected and without a resurvey or excavation, archaeological interpretation is unable to be made.

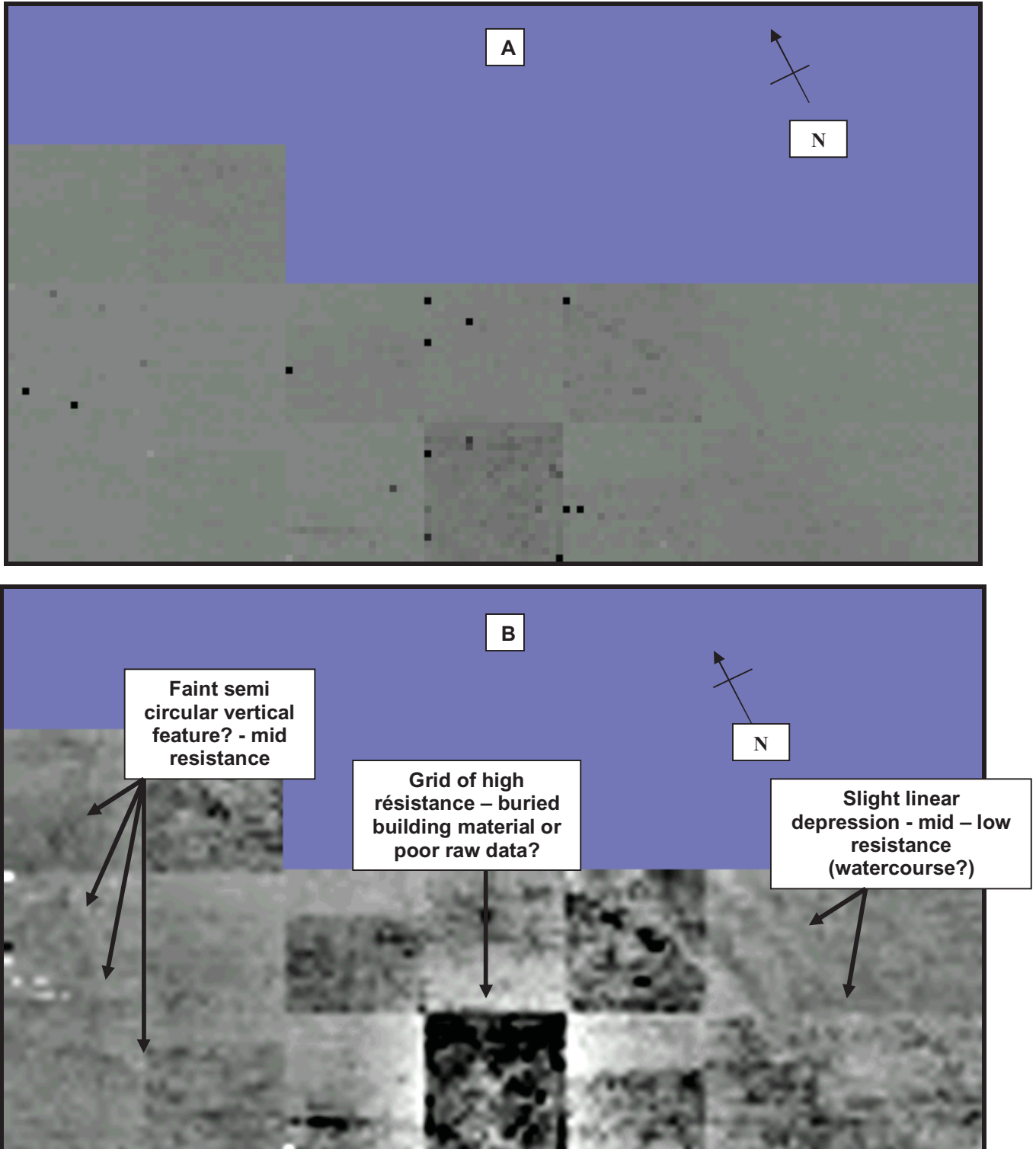


Fig.25 – Raw data (A) / Processed data (B) –
RM15 Resistance survey results – Watermeadow 2

3.5.6 - Conclusion

3.5.6.1 The results of the RM15 resistance survey in the Watermeadow support the layout

of the earthworks within the field, with the linear diagonal running depression displayed as a faint bank and ditch feature supporting a watercourse notion rather than a Holloway (trackway).

3.5.6.2 One grid c.60- 80m east along the survey base line does display high areas of resistance, suggesting the possibility of buried building material, however with it being an obviously darker grid when compared to the others; there is a possibility of it being a grid where poor raw data was collected. Only excavation or a re-survey will confirm this.

3.5.6.3 In addition to this, looking west in the survey area (grids 3,1,15) there can be seen a faint line of mid resistance that appears to run in a semi-circular pattern vertically for c.40m, though again as before this could be down to the quality of the raw data collected and without a re-survey or excavation, archaeological interpretation is unable to be made.

Project Co-ordinator: P R Rowe **Field work survey completed:** 27 – 28th May 2005

Project Assistant: R Davies **Survey Report:** 23rd June 2005

3.6 REPORT F - WATERMEADOW 2
3.6.1 SUMMARY OF RESULTS

SITE RESULTS SUMMARY 6

GEOPHYSICAL SURVEY REPORT NO: 05/02 - A **NGR:** ST 683 987

SITE NAME: Watermeadow, Berkeley Castle, Gloucestershire

SITE TYPE: Grassed area
DESCRIPTION: Located c.350m southwest from the main castle site, a wide grassed area located adjacent to the main complex / gardens was surveyed.
PERIOD: Not known – Earthwork analysis suggest possible fishponds / water course.

GEOLOGY: Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology – Known to be prone to flooding by the River Severn suggesting an overlying deposit of alluvium (depth not known)
LAND USE: Grassed area with public footpath crossing site.

SURVEY TYPE:	Fluxgate Gradiometer	METHOD:	Zig – Zag
INSTRUMENT:	Geoscan FM36	SURVEY AREA:	140m x 100m
SAMPLE INT:	0.25m	TRAVERSE INT:	1m

RESULTS SUMMARY:

A FM36 Fluxgate gradiometer resistance survey of a total area 140m x 100m (31 x 20m² grids) was completed in May / June 2005, providing, as a result, varied geophysical raw data that has assisted with part interpretation of the site.

An earthwork survey of the site revealed a slight linear depression running in a diagonal across the site, with an area of magnetic variation in the vicinity suggesting disturbed soils normally associated with banks / ditches. This supports the theory of a linear watercourse crossing the site, though this is not conclusive.

To the east c.20m of the linear feature appears another slight area of higher readings, possibly that of a ditch but with poor raw results obtained above it an archaeological interpretation is difficult. A re-survey of the whole upper area needs to be completed.

Situated c.40m to the west of the depression can be seen an area of high readings suggesting a feature of either disturbed soils or an area of metal / burning. No shape in particular it is quite possible it relates to modern activity. Interestingly, the location is concurrent with the grid of high resistance indicated in the RM15 resistance survey leading to the suggestion of further investigation to resolve this query.

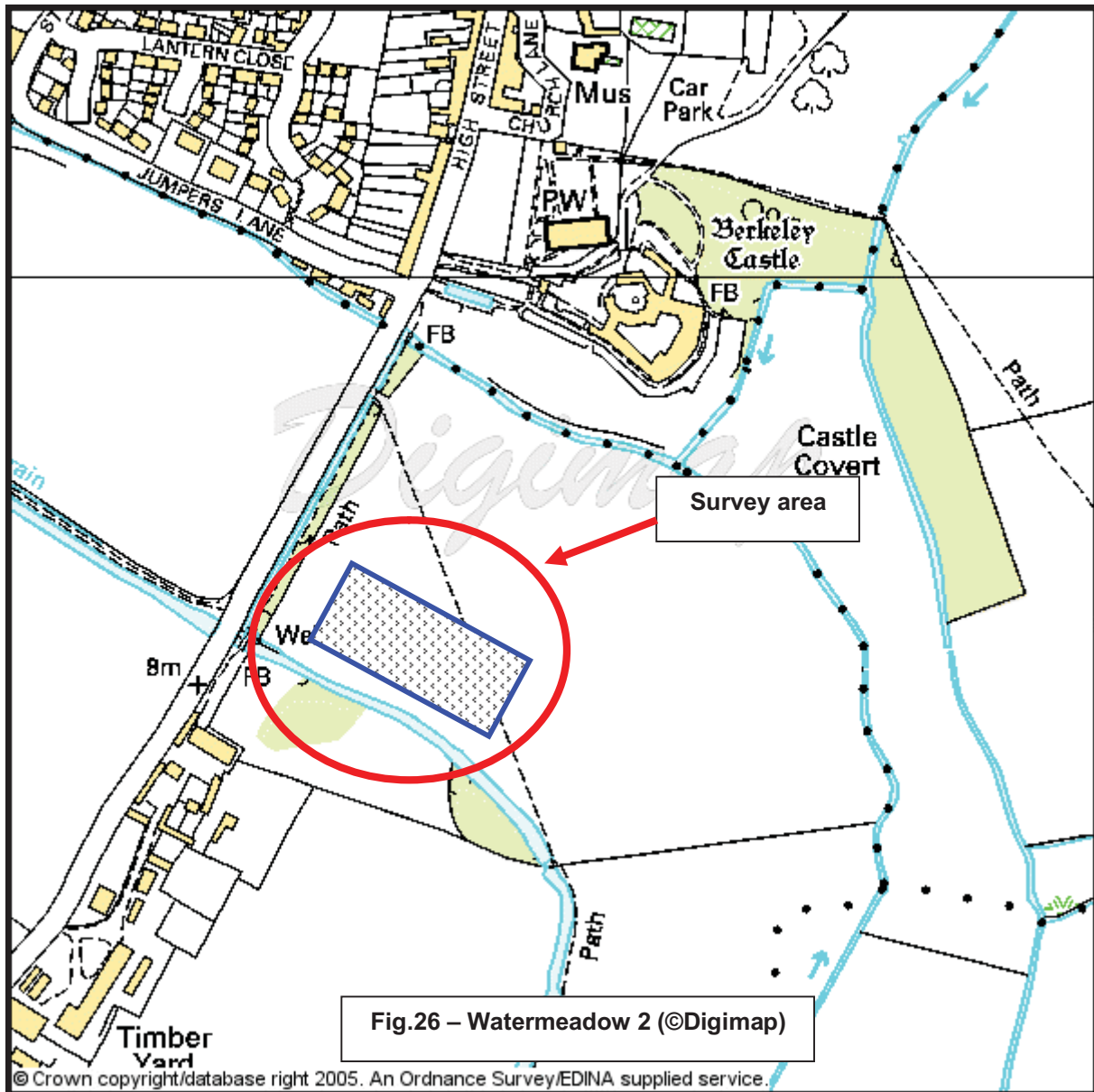
Further west, c.100m, is two anomalies of interest; the upper displaying high readings set out in a diagonal linear pattern, concurrent with surviving earthworks suggesting a bank, whilst the lower possible circular pattern of mid readings, possibly identified in the RM15 survey as a faint line, could be ditch.

Readings north of these features, c.60-100m from the baseline appear to differ from the rest, with an area of dark readings suggesting that the raw data within this area is of poor quality, leading to the recommendation of a re-survey to be completed in order to complete the archaeological picture.

SURVEY DATE(S): 31st May – 3 rd June 2005	REPORT DATE: 23rd June 2005
COMPLETED BY: 1 st Yr Undergraduate Students	REPORT AUTHOR: Philip R Rowe

3.6.2 INTRODUCTION

3.6.2.1 Covering an area detailed by the Excavation Director, a survey grid measuring 140m x 100m (31 x 20m² grids) was laid out over a grassed area located c.350m southwest from the main castle site, adjacent to the main complex / gardens and surveyed (Fig.26).



3.6.3 LOCATION, TOPOGRAPHY AND GEOLOGY

3.6.3.1 Situated c.350m southwest of the main castle complex / gardens, c.0.5km east-north-east of Berkeley village, Gloucestershire (NGR ST 683 987) in a field known as the Watermeadow, the surveyed area can be found to cross both a slight linear depression that runs in a diagonal across the survey site as well as a few low lying earthworks.

3.6.3.2 Lying just 8m above OD ¹ on a flat flood prone level that suggests an overlying deposit of alluvium (depth not known), the site can be seen to lie upon a Solid Silurian (with Limestone's): Ludlow, Wenlock and Llandovery Bed geology.

3.6.4 GEOPHYSICAL SURVEY

3.6.4.1 Point of Note: Whilst all survey reports are produced as correctly as possible, the

¹ Information obtained using handheld Garmin *Etrex* 12 Channel GPS system (accuracy to 5m)

resulting information is based on the accuracy of the equipment therefore no responsibility is taken for any errors or omissions.

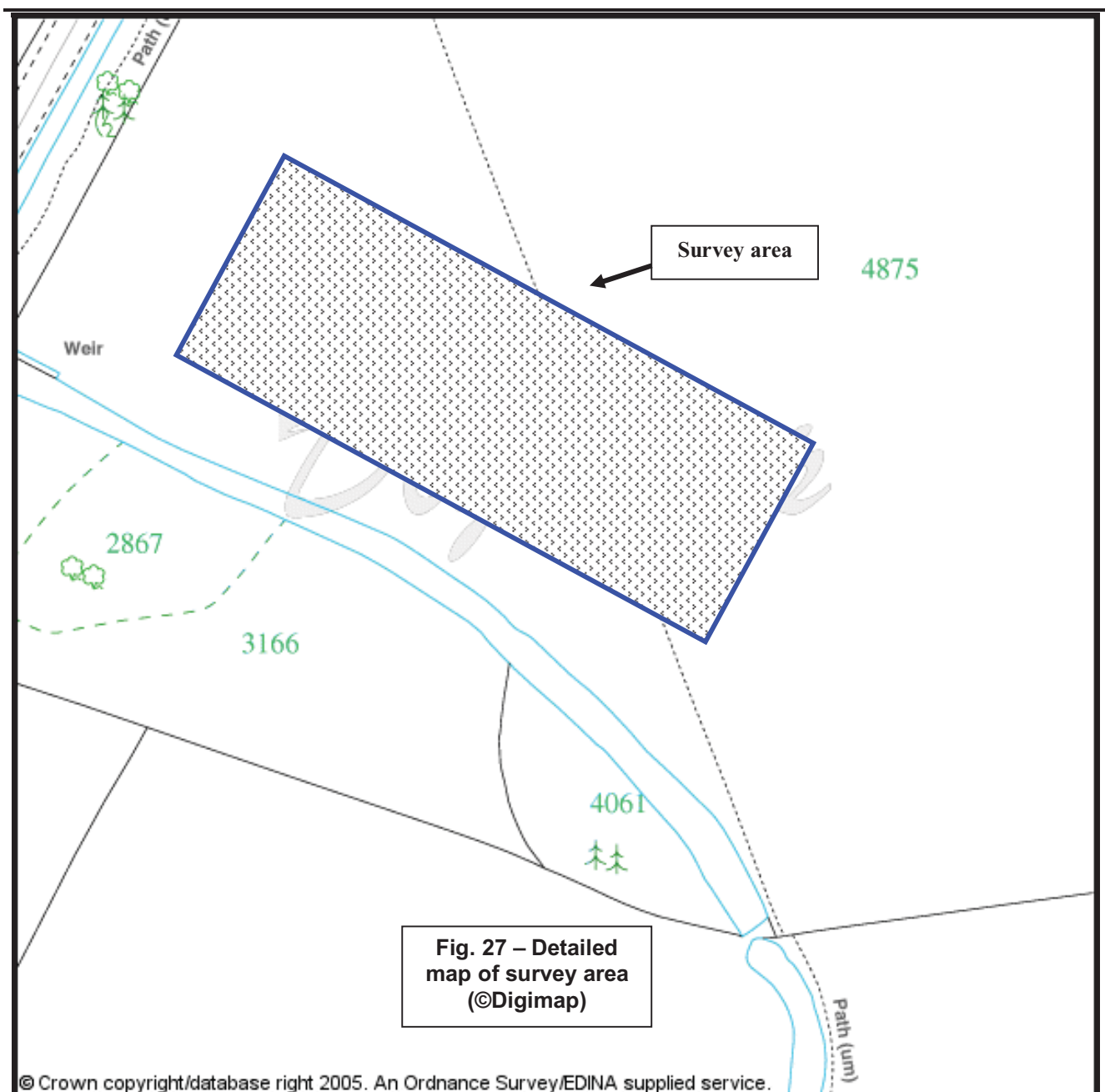
3.6.4.2 INSTRUMENTATION

3.6.4.2.1 Fluxgate Gradiometer – Geoscan FM36: Carried by hand with the bottom sensor c.0.1 – 0.3m from the ground, two fluxgate sensors are mounted vertically within the instrument, c.0.5m apart.

3.6.4.2.2 Reading the difference in the magnetic field at each survey station, the measurements are taken in nanoTesla (nT) or gamma and are effective to a dept of penetration approximately 1m, with the fluxgate gradiometer suppressing any diurnal / regional effects.

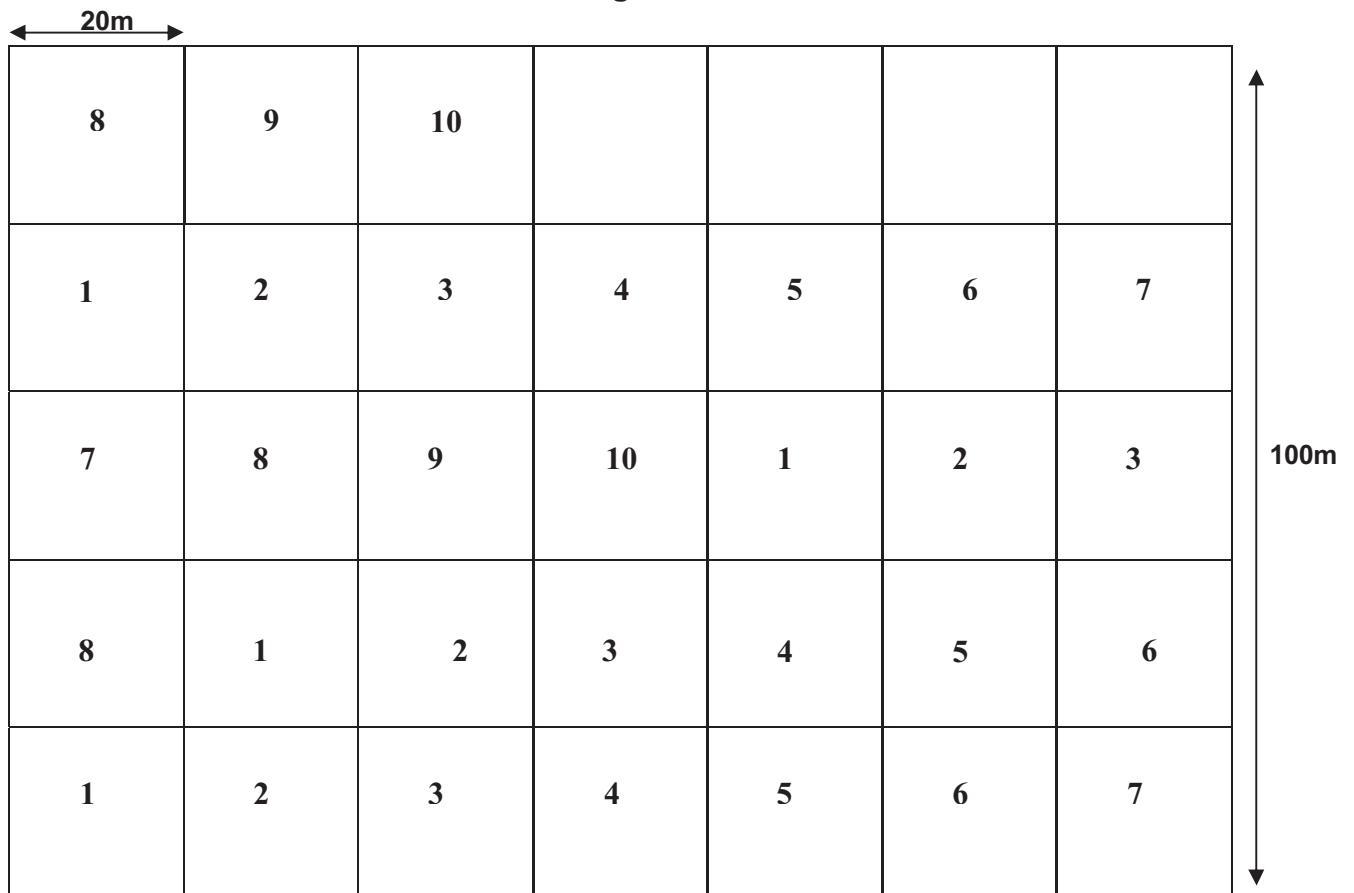
3.6.4.3. SURVEY AREA

3.6.4.3.1 The FM36 Fluxgate gradiometer survey was completed over a 140m x 100m (31 x 20m²) grid area that incorporated the area highlighted in **Fig.27**.



3.6.4.3.2 Set out by undergraduate students with the aid of P R Rowe, the survey grid was measured in using taped offsets from a 140m baseline running in a north-west to south-east direction (**Fig.28**), and was surveyed into the current Ordnance Survey mapping system by undergraduate students under the guidance of Richard Davies ¹.

Fig.28 –



140m x 100m (31 x 20m²) surveyed grid laid over grassed area south of Berkeley Castle

3.6.4.4 DISPLAY

3.6.4.4.1 Displayed as greyscale images, this visual format divides a given range of predefined arrangement of dots / shades of grey readings into a set number of classes.

3.6.4.4.2 Increasing in intensity as the value increases, the resulting image is displayed as a toned / grey scale enabling fast and accurate interpretation of any sub-surface archaeological features discovered.

3.6.4.5 COMPLICATING FACTORS

3.6.4.5.1 Overall, the survey conditions of the site were acceptable, with the ground being relatively flat and under short grass, though it must be noted that as the site has been prone to flooding in the past, alluvium deposits if over 1m may obscure all but recent archaeology.

3.6.5 - RESULTS

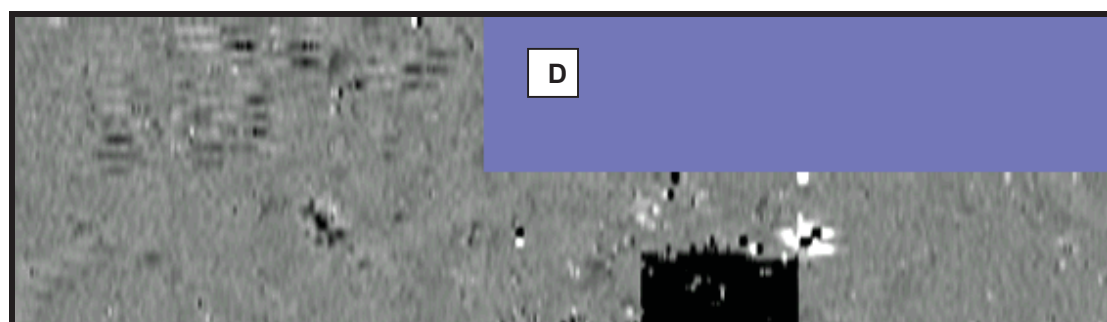
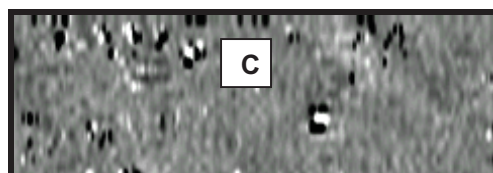
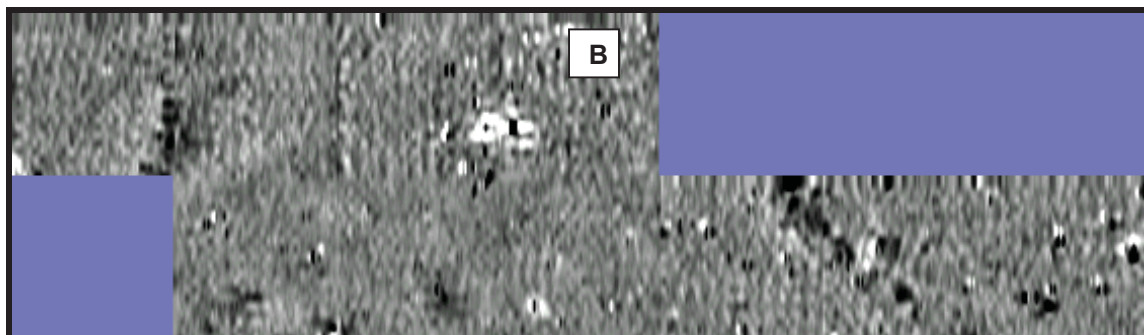
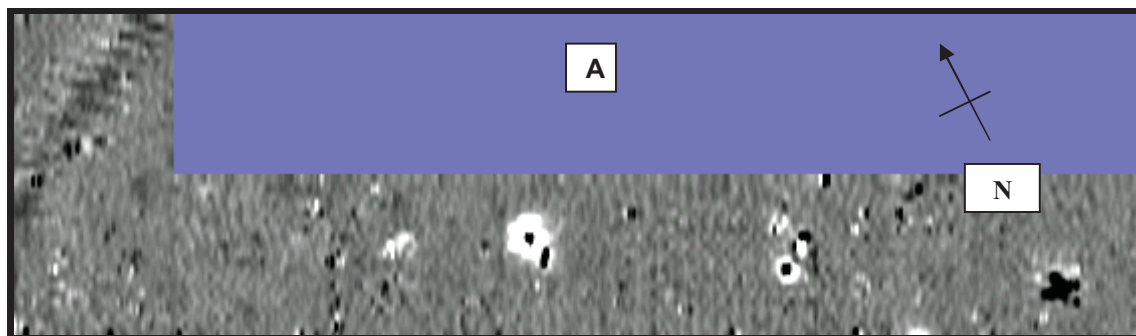
3.6.5.1 An area of magnetic variation in the vicinity of the linear depression suggests disturbed soils normally associated with banks / ditches. This supports the notion of a linear watercourse crossing the site, though this is not conclusive (**Fig.29**) (**Appendix G**).

3.6.5.2 East, c.20m of the linear feature appears another slight area of higher readings, possibly that of a ditch but with poor raw results obtained above it, any archaeological interpretation is difficult. A re-survey of the whole upper area is therefore suggested in order to establish the presence of any feature.

3.6.5.3 c.40m west of the depression appears an area of high readings suggesting a feature of either disturbed soils or an area of metal / burning. No shape in particular, it is quite possible it relates to modern activity. Interestingly, the location is concurrent with the grid of high resistance indicated in the RM15 resistance survey leading to the suggestion of possible buried features of unknown interpretation. Further investigation to resolve this query is needed.

3.6.5.4 Further west, c.100m of the depression, is two anomalies of interest; the upper displays high readings set out in parallel diagonal linear patterns, concurrent with surviving earthworks that suggest a bank, whilst the lower possible circular pattern of mid readings, possibly identified in the RM15 survey as a faint line, could be interpreted as a ditch.

3.6.5.5 All readings north of these features, c.60-100m from the baseline appear to differ from the rest, with an area of dark readings suggesting that the raw data within this area is of poor quality. This leads to the recommendation of a re-survey to be completed in order to complete the archaeological picture of the area.



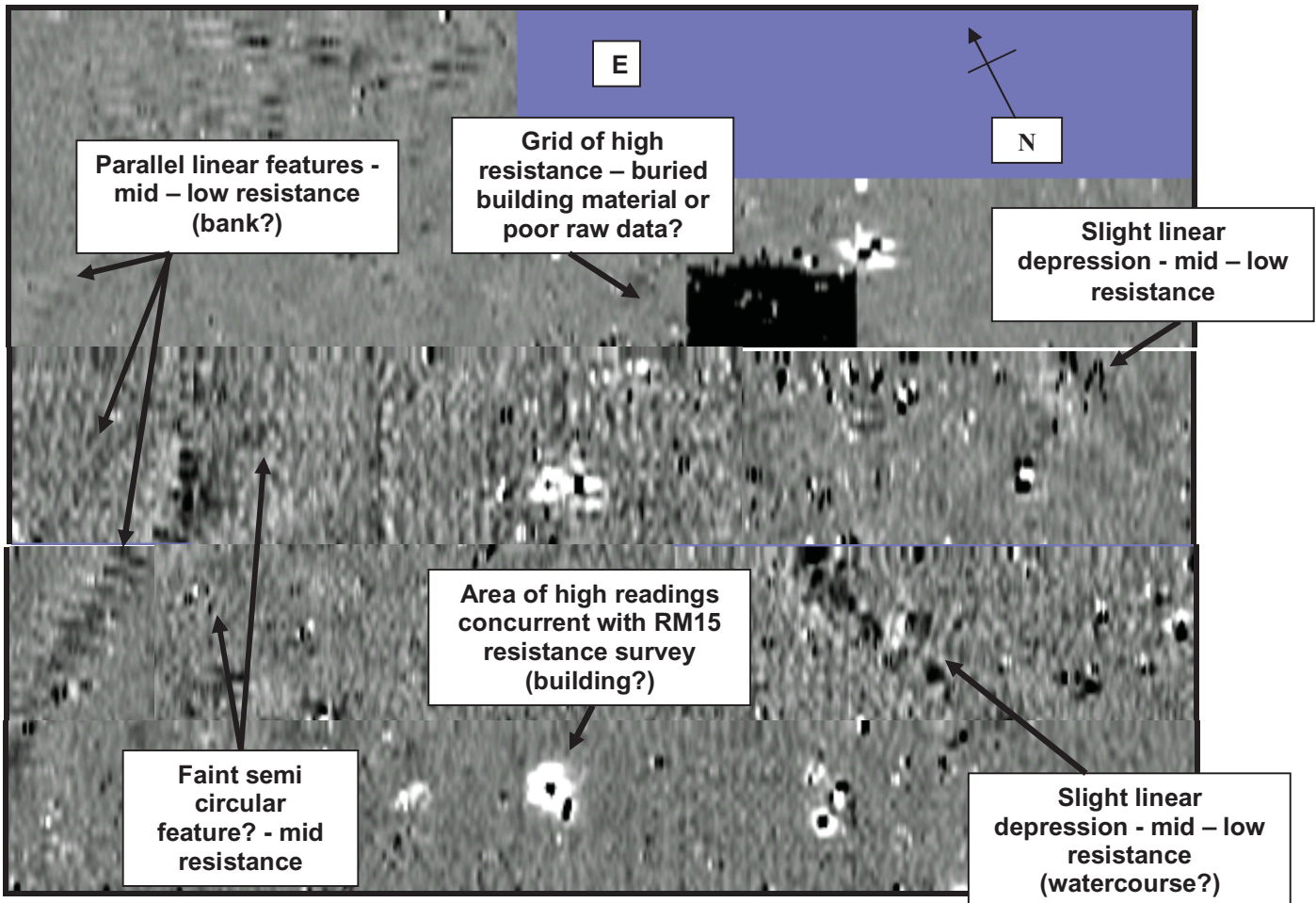


Fig.29 – Raw data (A - D) / Processed data (E) – FM36 gradiometer survey results – Watermeadow 2

3.6.6 - Conclusion

3.6.6.1 An earthwork survey of the site revealed a slight linear depression running in a diagonal across the site, with an area of magnetic variation in the vicinity suggesting disturbed soils normally associated with banks / ditches. This supports the theory of a linear watercourse crossing the site, though this is not conclusive.

3.6.6.2 c.20m east of the linear feature appears another slight area of higher readings, possibly that of a ditch but with poor raw results obtained above it any archaeological interpretation is difficult. A re-survey of the whole upper area needs to be completed in order to answer this question.

3.6.6.3 Located c.40m to the west of the depression can be seen an area of high readings suggesting a feature of either disturbed soils or an area of metal / burning. No shape in particular, it is quite possible it relates to modern activity. Interestingly, the location is concurrent with the grid of high resistance indicated in the RM15 survey.

3.6.6.4 c.100m to the west are two anomalies of interest; the upper displaying high readings set out in parallel diagonal linear patterns, concurrent with surviving earthworks suggesting a bank, whilst the lower possible circular pattern of mid readings, possibly identified in the RM15 survey as a faint line, could be that of a ditch. Readings north of these features, c.60-100m from the baseline appear to differ from the rest, with an area of dark readings suggesting that the raw data within this area is of poor quality, leading to the recommendation of a re-survey to be completed in order to complete the archaeological picture.

Project Co-ordinator: P R Rowe **Field work survey completed:** 27 – 28th May 2005
Project Assistant: R Davies **Survey Report:** 23rd June 2005

4 - BIBLIOGRAPHY

Digimap - © Crown copyright/database right 2004 – Ordnance Survey / Edina Supplied Service.

Memory-Map Inc – Ordnance Survey Licensed – Crown Copyright 2003.

Morris, J (ed) (1982) *Domesday Book – Gloucestershire* (Chichester) Phillimore & Co Limited.

Salter, M (2002) *The Castles of Gloucestershire and Bristol* (Malvern) Folly Publications.

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