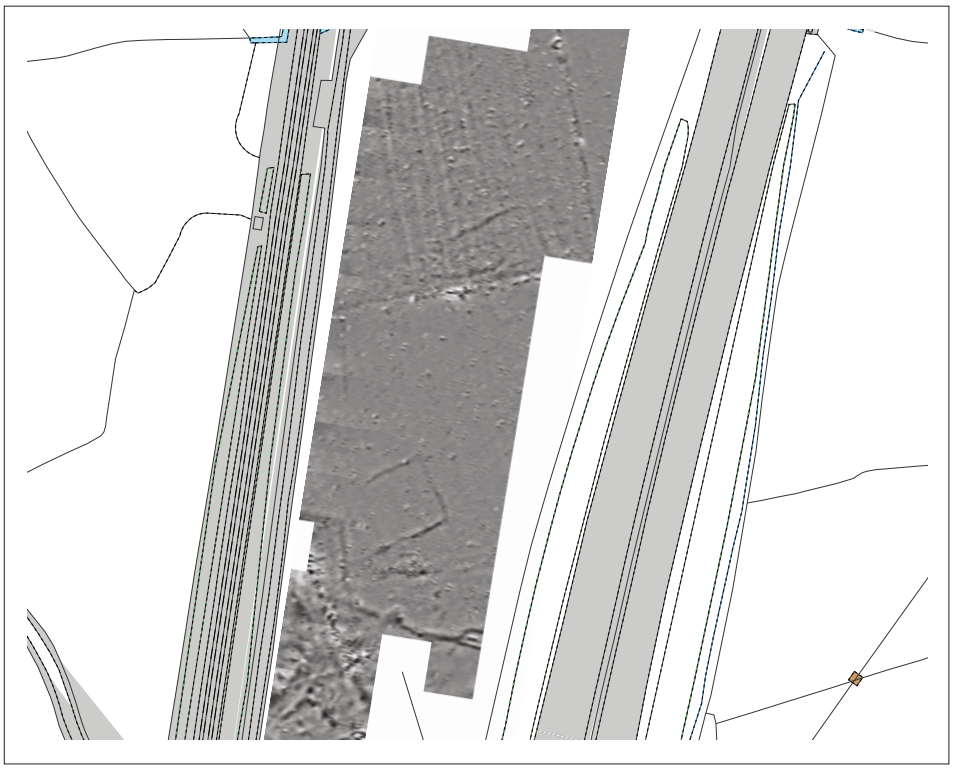
Archaeology Wales

Puriton Landfill Solar Farm
Somerset

Geophysical Survey



By
Chris E Smith BA (Hons) MA MIfA

Report No. 1241

Archaeology Wales Limited,
Rhos Helyg, Cwm Belan,
Llanidloes, Powys, SY18 6QF
Tel: +44 (0) 1686 440371
Email: admin@arch-wales.co.uk

Archaeology Wales

Puriton Landfill Solar Farm Somerset

Geophysical Survey

Prepared For: Stratus Environmental Ltd

Edited by: Mark Houliston
Signed: Mark Houliston
Position: MD
Date: 18/8/14

Authorised by: Mark Houliston
Signed: Mark Houliston
Position: MD
Date: 18/8/14

By
Chris E Smith BA (Hons) MA MIfA

Report No: 1220

Date: August 2014

Archaeology Wales Limited,
Rhos Helyg, Cwm Belan,
Llanidloes, Powys, SY18 6QF
Tel: +44 (0) 1686 440371
Email: admin@arch-wales.co.uk

CONTENTS

List of Figures

List of Appendices

Non-Technical Summary

This report results from work undertaken by Archaeology Wales Ltd (AW) for Stratus Environmental Ltd. It draws on the results of a geophysical survey that took place on land at Puriton, Somerset, which was carried out in support of a proposed planning application for the construction of a solar farm over three parcels of land with associated landscaping, access and infrastructure.

The survey identified archaeological features including two rectilinear enclosures, a twin curvilinear feature and possible settlement evidence.

The features are likely to relate to an adjacent area of Roman settlement, the presence of which was located during construction of the M5 and the M5 junction to the south.

1 Introduction

1.1 Location and scope of work

1.1.1 In July 2014 Archaeology Wales Ltd (AW) carried out a geophysical survey on land at Puriton, Somerset. The assessment area was centred on NGR ST 31540 41843 (Figs 1&2). The work was carried out at the request of Stratus Environmental Ltd in order to support a proposed planning application submission for the construction of a solar farm in the area.

1.1.2 The area subject to the geophysical survey had been noted as being of potential archaeological significance after a desk based assessment (Smith, 2014) highlighted the possibility of Roman settlement in the area.

1.1.3 An in-house works specification was drawn up by Chris E Smith (MIfA) of Archaeology Wales Ltd (AW). This is contained within Appendix 2.

1.2 Geology and topography

1.2.1 The underlying solid geology of the assessment area lies on the border between two distinct geological areas. The southern half of the site overlays Triassic Mudstones, including Keuper Marl, Dolomitic Conglomerate and Rhaetic, of the Permian and Triassic periods whilst the northern half of the site overlays Lower Lias limestone of the lower Jurassic period (Geological Survey Map, 2001).

1.2.2 The solid geology in the south of the assessment area is overlain by shallow, freely draining, lime rich soils whilst the northern half of the assessment area is overlain by naturally wet, loamy and clayey soils characteristic of coastal flats with naturally high groundwater (Geological Survey Map, 2001).

1.3 Archaeological and Historical Background

1.3.1 A desk based assessment has previously been undertaken covering the archaeological and historical background to the area (Smith, 2014).

1.3.2 The following is a summary of the findings from the desk based assessment relating to the area subject to geophysical survey, referred to as Area C in all previous documentation.

1.3.3 Area C, located between the railway to the west and the M5 to the east, contains the highest piece of land of the three assessment areas. At its southern end the land in this area is approximately 16m above sea level and gradually falls to 6m above sea level at its northern extent.

1.3.4 Anecdotal evidence from the landowner, received verbally during the site visit (2014), suggests that at the southern end of the site, on the higher ground, the natural solid geology is within 0.4 to 0.5m of the surface. This higher ground would have been located above the coastal marsh prior to any formal draining of the lower areas.

1.3.5 Whilst shallow soils such as this will negate any possibility of waterlogged remains surviving, the majority of later (Roman period onwards) settlement activity appears to be located on slightly higher ground. Evidence of Roman settlement activity on the higher ground comes from PRNs 10705 (A large Roman settlement uncovered during topsoil stripping near Down End as part of the M5 construction, archaeological features extended both east and west of the M5) and 10702 (Roman material exposed in the railway bank cutting at Down End). Indeed the southern end of Area C is shown as being part of a Roman settlement in an English Heritage Urban Survey: An Archaeological Assessment of Down End (Gathercole, 2003).

1.3.6 The remainder of Area C is very similar in both ordnance datum height and appearance to Area B. The presence of ridge and furrow ploughing, as evidenced by aerial photography in the northern half of Area C, is again suggestive of a landscape dry enough in the medieval period for agriculture to have taken place.

1.3.7 Owing to the presence of Roman and later settlement on higher ground in the area, as evidenced by Gathercole (2003) and PRNs 10705 & 10702, the potential for Roman settlement activity within the southern half of Area C is deemed to be high.

1.3.8 Owing to its comparatively low height above sea level and the possible waterlogged/anaerobic conditions present within the soil, the northern half of Area C is felt to have a moderate to high potential for prehistoric features, a moderate to high potential for preserved organic materials as well as moderate to high palaeoenvironmental potential.

1.3.9 The potential for features of later date (Roman to Post-medieval) within the northern half of Area C is felt to be moderate to high based on the evidence of the HER data.

2 Aims and Objectives

2.1 Geophysical Survey

2.1.1 The geophysical survey was undertaken in order to:

- Locate any features of likely archaeological significance within the area of proposed development
- Provide sub-surface data to inform any future on-site works

3 Methodology

3.1 Geophysical Survey

3.1.1 A single Bartington Grad 601 magnetometer was used to undertake the survey. Previous research has shown that fired, or cut and backfilled archaeological features such as kilns and hearths, ditches and pits often have an anomalously higher magnetic susceptibility than the surrounding subsoil due to burning and biological processes. Differences in magnetic susceptibility within the subsoil and archaeological features can be detected as changing magnetic flux by an instrument such as a magnetometer. Data from this may be mapped at closely spaced regular intervals, to produce an image that may be interpreted to locate buried archaeological features (Clark, 1997) (Aspinall *et al*, 2011).

3.1.2 The machine used for the survey was a Bartington Grad601 Magnetometer using the mapped survey mode. Detailed survey was carried out in grids of 20m x 20m along parallel traverses spaced at 2m intervals, recording data points spaced at 0.25m intervals to a maximum instrument sensitivity of 0.1nT in accordance with English Heritage Guidelines. The survey mode was set to bi-directional (traverses walked alternately south-north/north-south). At regular intervals the data was downloaded in the field onto a laptop computer for storage and assessment. The location of the survey area was then surveyed using a Topcon GTS 725 total station.

3.2 Data Processing and Presentation

3.2.1 Following the completion of the detailed survey, processing and analysis took place using the Terrasurveyor software package. After downloading, the results were plotted in 2D. The most typical method of visualising the data is as a greyscale image. In a greyscale, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A number of standard operations (including destriping and despiking) were carried out to process the data. The mean level of each traverse of data was reduced to zero and all grids matched so that there were no differences between background levels. The data was then analysed using a variety of parameters and styles and the most useful of these were saved as *JPEG images and displayed using Adobe

Illustrator software. The results of the survey were then overlaid onto a digital map of the study area. This was then used to produce interpretation figures.

3.2.2 All works were undertaken in accordance with the IfA's Standards and Guidance for a geophysical survey (2008) and current Health and Safety legislation.

3.2.3 The on-site work was undertaken by Hywel Keen and Andrew Shobbrook whilst the overall management of the project was undertaken by Chris E Smith (MIfA).

4 Geophysical Survey Results

4.1 Ground Conditions

4.1.1 The survey was undertaken during a period of extended sunny and dry weather. Conditions on the day were dry and bright and ground conditions underfoot were favourable with the hay crop having been freshly removed.

4.2 Survey Location and Summary

4.2.1 The assessment area was surveyed using a total of 60 grids (20m x 20m) laid out using a Topcon GTS 725 total station. The fences bounding the east and west of the site contained metallic elements, so a sufficient distance was maintained so as to not impact on the results of the survey data.

4.2.2 A metallic water trough and pipe were also avoided.

4.3 Results of the Survey

4.3.1 The results of the geophysical survey are of good clarity (Figs 3-6).

4.3.2 A large amount of features of archaeological interest are located within the survey area (Figs 3-5).

4.3.3 Figure 5 shows a traced interpretation of the features identified on the geophysical survey.

4.3.4 At the northern end of the plot a series of parallel lines are noted (blue on figure 5). These represent medieval or later plough furrows. They are also visible, albeit somewhat fainter, in the middle of the survey area (Figs 3-4).

4.3.5 The features marked in yellow on figure 5 represent the lines of removed field boundaries. These are visible as extant boundaries on the maps and aerial photographs contained within the desk based assessment (Smith, 2014) and have thus only been removed in the relatively recent past.

4.3.6 The remaining archaeological features are marked in red on figure 5. The most northerly feature is a rectilinear enclosure (A) with an apparently associated sub-oval feature set partly within it.

4.3.7 Feature B is a further rectilinear enclosure which appears to share a common alignment with feature A. This may be indicative of contemporaneity.

4.3.8 Within the southern third of the survey area a large amount of archaeological features are located (Group C). Features within group C appear to include several linear ditches and right angled features which may represent built structures.

4.3.9 Several isolated responses scattered within Group C, shown as solid red circles on fig 5, appear to represent pit features.

4.3.10 Two parallel curvilinear ditch features are located at the southern extremity of the survey area, within Group C.

5 Interpretation and Discussion

5.1 Overall interpretation

5.1.1 The geophysical survey has identified a large amount of archaeological features within the southern half of Area C.

5.1.2 The two rectilinear enclosures sharing a common alignment, as well as the large amount of overlaying features and pits within Group C, is likely to represent the Roman settlement alluded to in the desk based assessment (Smith, 2014).

5.2 Discussion

5.2.1 The relatively large amount of what appear to be overlaying features within the southern half of the survey area is likely indicative of settlement in the area. It is likely that this is the Roman settlement previously highlighted though as the features appear to overlap this may be representative of a more extended period of occupation. The twin curvilinear ditches appear prehistoric for example.

5.2.2 The two rectilinear enclosures (A & B) may represent agricultural enclosures on the outskirts of a small settlement.

5.3 Importance and Potential

5.3.1 The two enclosures of likely Roman date are of archaeological importance as their existence was previously unknown. As they are not visible on aerial photographs of the site it would appear that they have been sealed, and thus protected, beneath the later ridge and furrow ploughing. They are, therefore, potentially well preserved.

5.3.2 The group of features highlighted within the southern end of the geophysical survey area, Group C, are also of archaeological importance as they may represent a multiphase settlement. The curvilinear features are suggestive of prehistoric activity whilst the right angled features, possibly buildings, may represent later Roman settlement.

5.3.3 The depth of soil before natural rock is reached in the southern half of the survey area is, according to the farmer in information relayed during the site walkover, very shallow. Whilst this shallow soil will mean that waterlogged features, such as found elsewhere and described in the desk based assessment (Smith, 2014), will not be located in this area, the features which are located here are likely to be at a very shallow depth. Past truncation through agricultural works and larger industrial schemes such as the M5 are a possibility.

5.4 Mitigation

5.4.1 Given the apparent density of the features within the southern half of Area C, it is considered that the proposed infrastructure in these areas should be located above ground to avoid any below ground disturbance. The panels would be mounted on concrete sleepers that would be placed on the surface and any cabling from the panels, inverter and transformer stations to the on-site substation will be above ground. Such mitigation will be implemented over the areas shaded red (plus a 10m buffer) on figure 7.

5.4.2 However, due to specific requirements of the distribution network operator the proposed on-site substation needs to be below ground level. The substation will require foundations to a depth of 1500mm, as will the associated cabling from the substation to the point of connection. In this area, provisionally anticipated at being less than 20x20m, trenching will be carried out to achieve a fuller understanding of the below ground features.

5.4.3 It is also worth noting that in those areas where non-penetrative ballasted systems are used for surface mounting of infrastructure, the works are completely reversible upon the completion of the solar farms active life.

5.4.4 Geophysical survey work was not undertaken across the northern half of Area C or Areas A&B owing to both the apparent depth of soil cover in these areas and lack of identified features, as highlighted by the desk based assessment (Smith, 2014). The likely depth of soil sediment masking archaeological features in these largely drained and reclaimed areas is likely to exceed the typical operating depth of the Bartington magnetometer.

6 Acknowledgements

6.1.1 Thanks are due to Rachel Gillen of Stratus Environmental Ltd and to Hywel Keen and Andy Shobbrook (AW) for undertaking the on-site survey.

7 Bibliography and References

Aspinall, A, Gaffney, C & Schmidt, A. 2011. *Magnetometry for Archaeologists*. Altamira, London

British Geological Survey. 2001, 4th Edition. Solid Geology Map, UK South Sheet.

Clark. A. 1997. *Seeing Beneath the Soil: Prospecting Methods in Archaeology*. Routledge, Stroud

Gathercole, C. 2003. An Archaeological Assessment of Down End: English Heritage Extensive Urban Survey

Institute for Archaeologists. 2008. Standards and Guidance for a Geophysical Survey

Smith, C, E. 2014. Puriton Landfill Solar Farm, Somerset. A desk based assessment and site visit. Archaeology Wales Ltd Report No. 1220

Archaeology Wales

APPENDIX I:
Figures

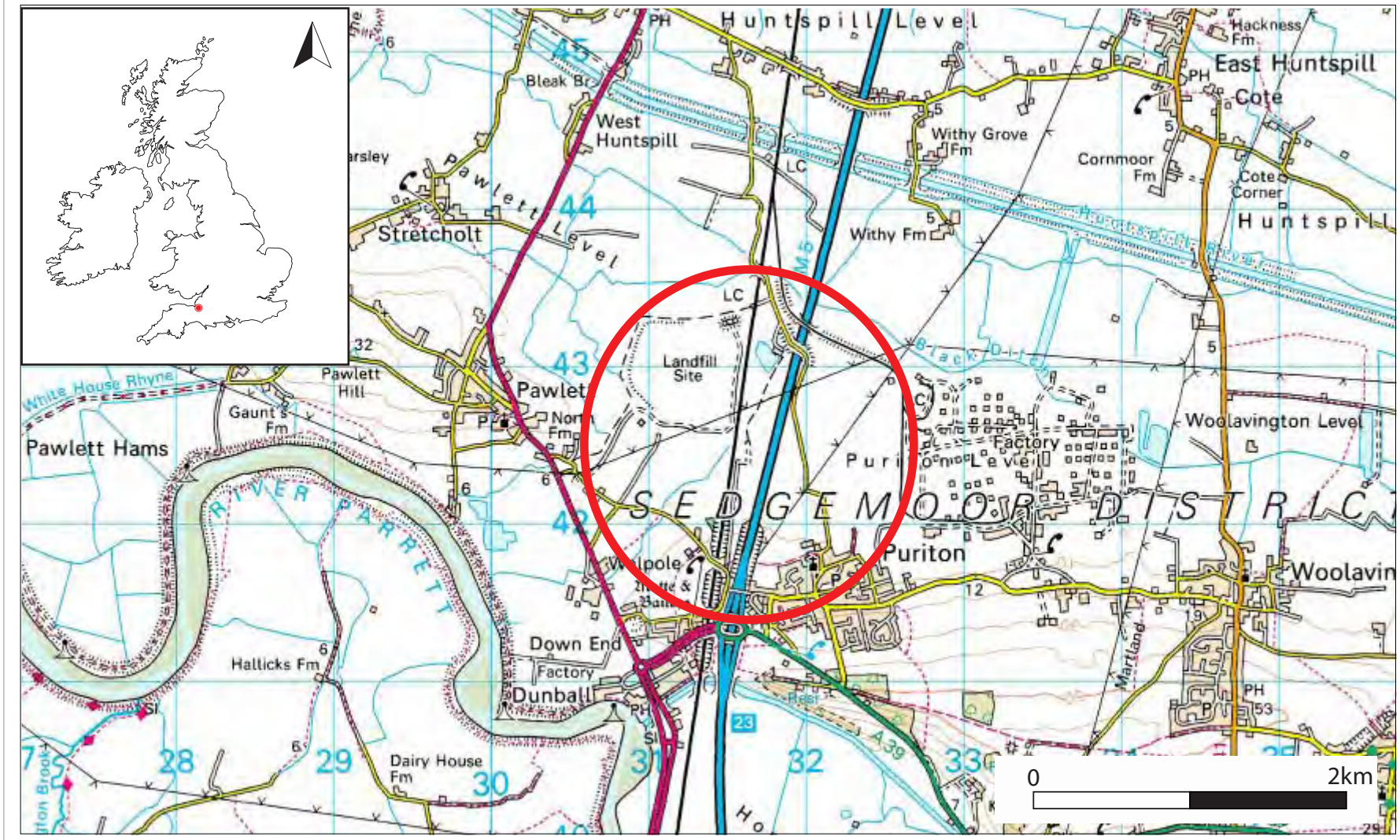


Fig 1: Figure showing location of assessment area

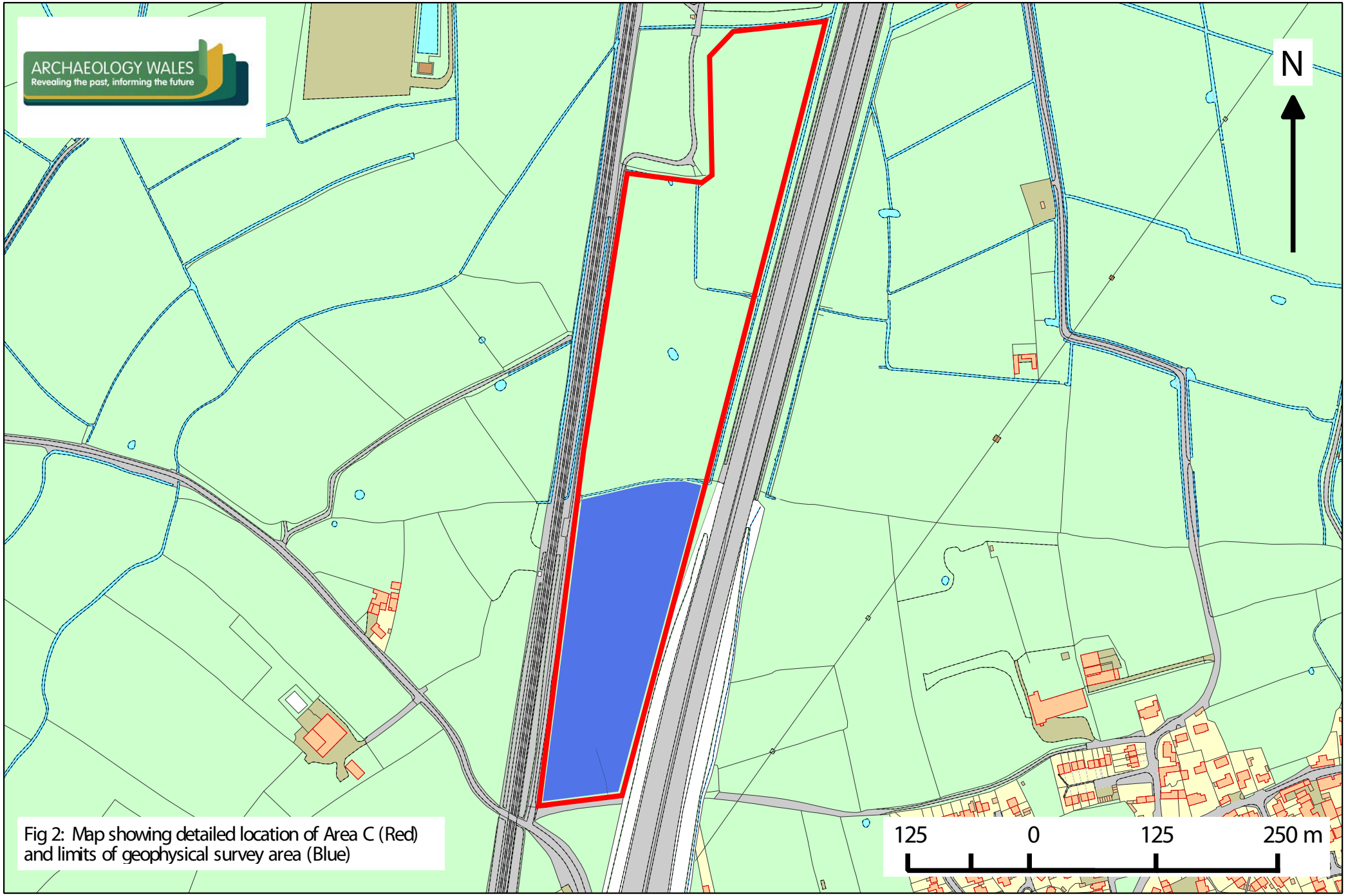
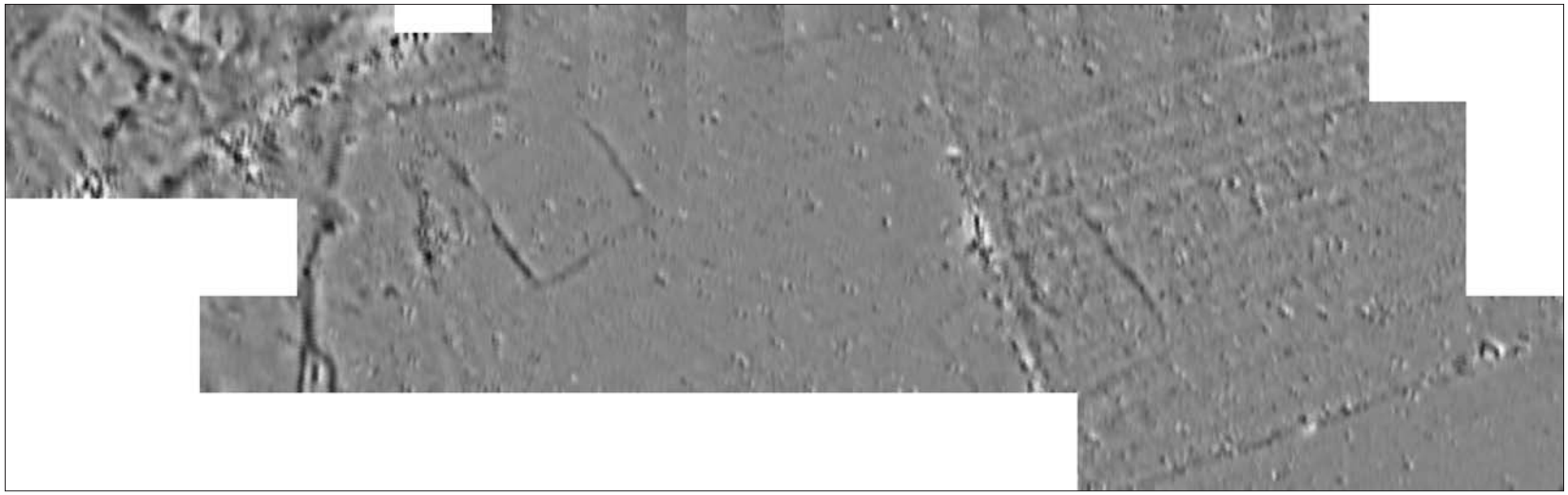


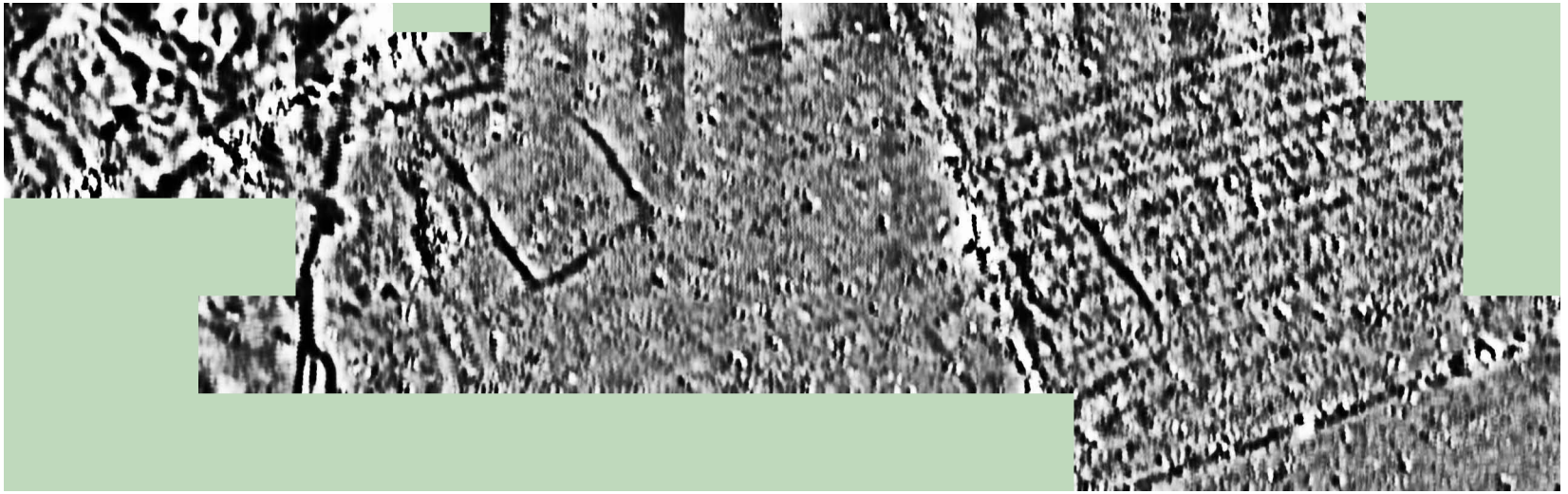
Fig 2: Map showing detailed location of Area C (Red) and limits of geophysical survey area (Blue)



0 200m

Job Title:	Puriton Landfill
Drawing Title:	Survey results
Date:	22/07/2014
Drawn By:	CES
Scale:	See bar
Figure 3:	

ARCHAEOLOGY WALES
Revealing the past, informing the future

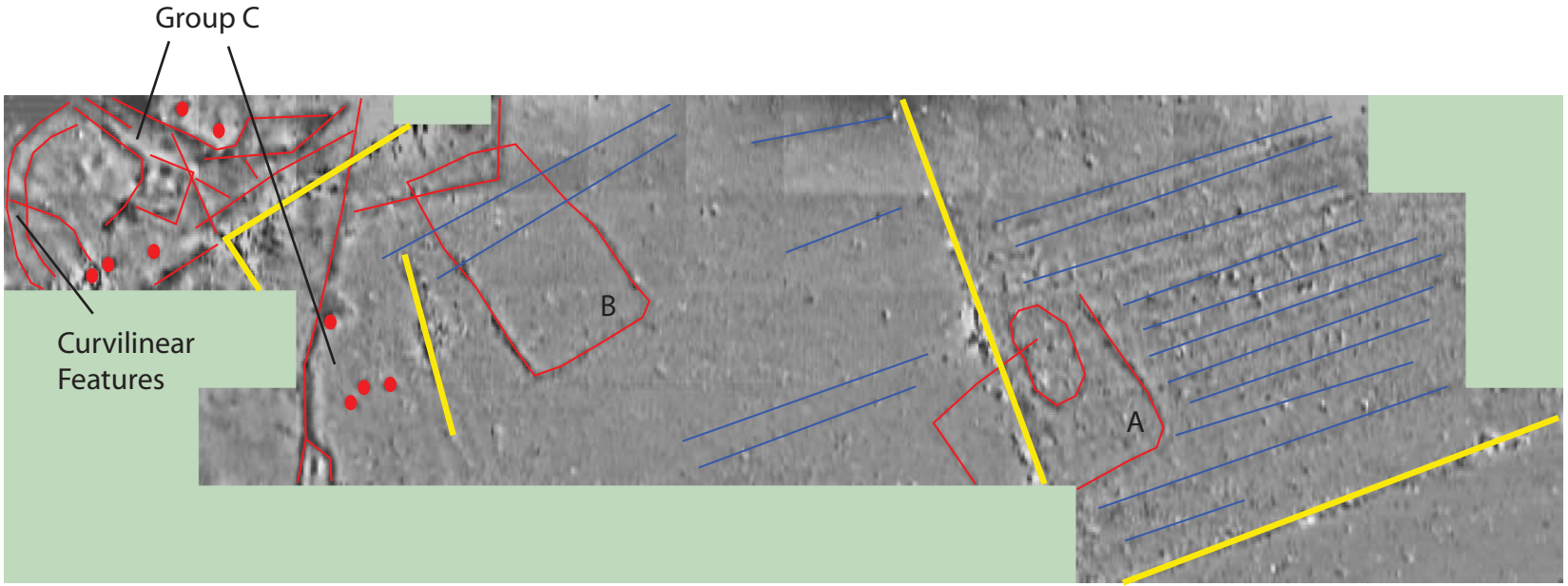


0 200m

NB - Alternate filter on results

Job Title:	Puriton Landfill
Drawing Title:	Survey results
Date:	22/07/2014
Drawn By:	CES
Scale:	See bar
Figure 4:	

ARCHAEOLOGY WALES
Revealing the past, informing the future



0 200m

Archaeological Features

Medieval or later cultivation

Recently removed field boundaries

Job Title:	Puriton Landfill
Drawing Title:	Interpretation
Date:	22/07/2014
Drawn By:	CES
Scale:	See Bar
Figure 5:	

ARCHAEOLOGY WALES
Revealing the past, informing the future

Fig 6: Geophysical survey results overlaid on site map

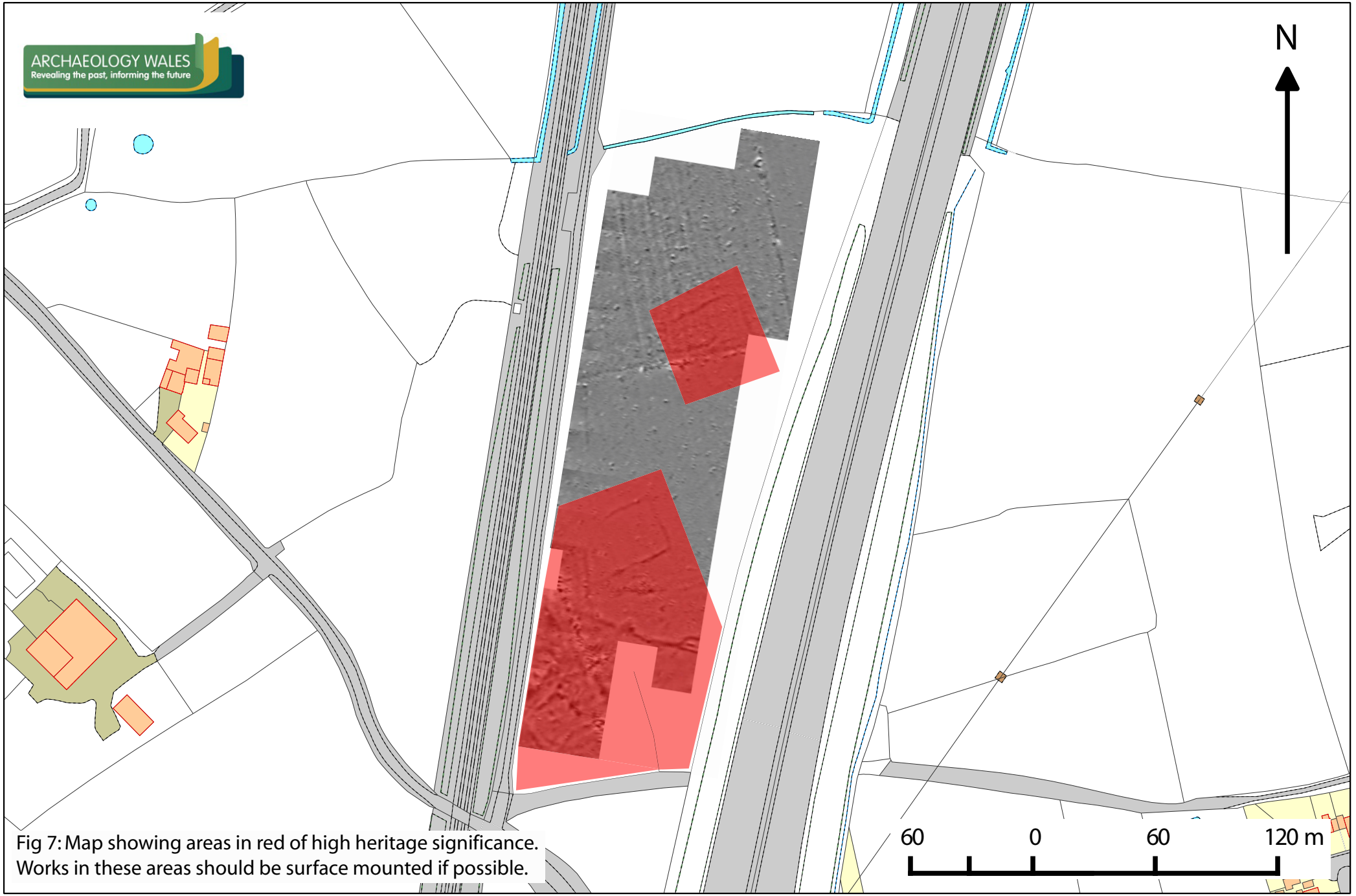


Fig 7: Map showing areas in red of high heritage significance.
Works in these areas should be surface mounted if possible.

Archaeology Wales

APPENDIX II:

AW Specification

ARCHAEOLOGY WALES LIMITED:

Specification

for a geophysical survey

at

Puriton Landfill Solar Farm, Puriton
Somerset

Prepared for:
Stratus Environmental Ltd

July 2014

Archaeology Wales Limited
Rhos Helyg, CwmBelan, Llanidloes, Powys, SY18 6QF
Tel: +44 (0) 1686 440371

Email: admin@arch-wales.co.uk

NON TECHNICAL SUMMARY

This Written Scheme of Investigations details a proposal for a magnetic survey on land adjacent to the M5 motorway to the immediate north west of the village of Puriton, Somerset, prior to a proposed application to construct a solar farm, in the area.

1. Introduction

The proposed development is on land adjacent to the M5 motorway to the immediate north west of the village of Puriton (Henceforth – the site – Fig 1). The development proposal for a solar farm on the site has been developed by Stratus Environmental Ltd. The local planning authority is Sedgemoor District Council (SCC).

This specification has been prepared by Chris E Smith (MIfA), Project Manager, Archaeology Wales Ltd (Henceforth - AW) at the request of Stratus Environmental. It provides information on the methodology which will be employed by AW during the geophysical survey. Chris will manage all aspects of the proposed work.

The geophysical survey, along with a previously undertaken desk based assessment, is being carried out pre-planning application following advice supplied to Stratus Environmental Ltd by Steve Membery, the Somerset County Archaeologist.

AW is a Registered Organisation with the Institute for Archaeologists (IfA). All work will be undertaken by suitably qualified staff and in accordance with the standards and guidelines of the IfA.

2 Archaeological Background

A desk based assessment for the three proposed areas to be included within the solar farm was undertaken by AW in April 2014. The assessment revealed a wide range of heritage assets within the study area though of most interest was a possible area of Roman settlement within the southern half of Area C – adjacent to the M5.

The area of Roman settlement had been previously noted in an extensive urban survey undertaken by English Heritage in 2003.

3 Objectives

The primary objectives will be to locate and describe, by means of geophysical survey, all sub-surface archaeological features which may be present within the development area.

4 Method statement for geophysical survey (Stage 1)

The area to be surveyed includes all of the southern half of Area C as defined on Fig 1.

A 20m grid will be laid out across the survey area along a common alignment. All grid points will be located with a total station and plotted onto an O.S. base map.

The on-site survey will be undertaken in a single phase lasting approximately 5 days. This will be followed by report production.

The survey will be carried out using a Bartington Grad601 Fluxgate Gradiometer.

Within each grid, parallel traverses 2m apart will be walked along the same orientation. Instrument readings will be logged at 0.25m intervals. Incomplete survey lines resulting from irregular area boundaries or obstacles will be completed using the dummy key.

Further survey information will be completed on the relevant pro-forma sheet. All data will be downloaded in the field into a laptop computer. The location of the grid corners will be recorded using a total station so that results can be accurately placed onto an OS map.

Following the completion of the on-site survey, processing and analysis of the survey data will be undertaken. The most typical method of visualising the data is as a greyscale image. In a greyscale, each data point is represented as a shade of grey, from black to white at either extreme of the data range. A number of standard operations will be carried out to process the data.

The data will be analysed using a variety of parameters and styles and the most useful of these will be saved as *JPEG images and displayed using Adobe Illustrator software.

The results of the survey will then be overlaid onto a digital map of the study area. This will then be used to produce interpretation figures.

5 Monitoring

SDC will be contacted at least one week prior to the commencement of site works, and subsequently once the work is underway.

Any changes to this specification that AW may wish to make after approval will be communicated to SDC for approval on behalf of Planning Authority.

6 Stage 2 - Archiving and Reporting

Site archive

An ordered and integrated site archive will be prepared in accordance with: Management of Research Projects in the Historic Environment (MoRPHE) English Heritage 2006 upon completion of the work on site. It will include:

- All site records (fully cross-checked and catalogued)
- All digital survey data
- Digitised copies of all site plans
- An interim or summary report on the above.

A copy of the site archive will be supplied to Stratus Environmental Ltd and SDC. The requirements for archive storage will be agreed with the appropriate organisation.

Final reporting

A draft report will be submitted to Stratus Environmental and to SDC for comments within 4 weeks of the survey being completed.

A full client report of the results of the archaeological work will be prepared within 6 months of the end of the project. Copies of the report will be sent to Stratus Environmental, SDC and for inclusion in the regional HER. Digital copies will also be provided in pdf format.

Terminology will be consistent with the English Heritage Thesaurus.

The client report will contain, as a minimum, the following elements:

- Concise English and Welsh non-technical summary of the results
- Detailed plans of the site
- Survey results, related to Ordnance Datum
- Written description
- Interpretations
- Conclusions as appropriate
- Bibliography
- A copy of the AW Written Scheme of Investigations

A summary of the work will be published in a national journal no later than a year after its completion.

Final archive

Although there may be a period during which client confidentiality will be maintained, the report and the final (project) archive will be deposited in the appropriate repository not later than six months after completion of the work. The contents and location of the archive will be agreed with SDC beforehand.

7 Resources and timetable

Standards

The fieldwork will be undertaken by AW staff using current best practice.

Staff

The project will be undertaken by suitably qualified AW staff. Overall management of will be undertaken by Chris E Smith MIfA.

Equipment

The project will use Archaeology Wales equipment.

Timetable of archaeological works

A provisional start date for the survey of Monday 7th July has been agreed between AW and the client (Stratus Environmental Ltd).

Insurance

Archaeology Wales Limited (AW) is an affiliated member of the CBA, and holds

Insurance through the CBA insurance service.

Health and safety

All members of staff will adhere to the requirements of the *Health & Safety at Work Act*, 1974, and the AW Health and Safety Policy.
AW will produce a detailed Risk Assessment for approval by the client before any work is undertaken.

Archaeology Wales

APPENDIX III:

Archive Cover Sheet

ARCHIVE COVER SHEET

Puriton Landfill Solar Farm, Puriton, Somerset

Site Name:	Puriton
Site Code:	PLF/14/GEO
PRN:	-
NPRN:	-
SAM:	-
Other Ref No:	-
NGR:	NGR ST 31584 42131
Site Type:	Green Field
Project Type:	Geophysical Survey
Project Manager:	Chris E Smith
Project Dates:	July 2014
Categories Present:	Prehistoric, Roman, Medieval, Modern
Location of Original Archive:	AW
Location of duplicate Archives:	NA
Number of Finds Boxes:	NA
Location of Finds:	NA
Museum Reference:	NA
Copyright:	AW
Restrictions to access:	None

Archaeology Wales

Archaeology Wales Limited
Rhos Helyg, Cwm Belan, Llanidloes, Powys SY18 6QF
Tel: +44 (0) 1686 440371
Email: admin@arch-wales.co.uk

Company Directors: Mark Houliston MIFA & Jill Houliston
Company Registered No. 7440770 (England & Wales).
Registered off ce: Morgan Gri ths LLP, Cross Chambers,
9 High Street, Newtown, Powys, SY16 2NY