

**T H A M E S      V A L L E Y**

**ARCHAEOLOGICAL**

**S E R V I C E S**

**S O U T H W E S T**

**Proposed Solar Farm, Church Farm,  
Chelwood, Somerset**

**Geophysical Survey (Magnetic)**

**by Aiji Castle and Andy Muddin**

**Site Code: CFC14/34**

**(ST 6413 6121)**

# **Proposed Solar Farm, Church Farm, Chelwood, Somerset**

## **Geophysical Survey (Magnetic) Report**

**For Mr Robert Maxwell**

by Aiji Castle and Andrew Munding

Thames Valley Archaeological Services Ltd

Site Code CFC 14/34

**August 2014**

## Summary

**Site name:** Proposed Solar Farm, Church Farm, Chelwood, Somerset

**Grid reference:** ST 6413 6121

**Site activity:** Magnetometer survey

**Date and duration of project:** 30th July to 8th August 2014

**Project manager:** Tim Dawson

**Site supervisor:** Aiji Castle

**Site code:** CFC 14/34

**Area of site:** 10.1ha

**Summary of results:** A number of anomalies were revealed most of which were linear in nature and correspond with field boundaries on historic maps of the late 18<sup>th</sup> and 19<sup>th</sup> centuries. One, or possibly two linear anomalies are likely also to be old field boundaries but have not been previously mapped. No anomalies were revealed that could be interpreted as indicating the presence of earlier deposits of archaeological interest.

**Location of archive:** The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

*This report may be copied for bona fide research or planning purposes without the explicit permission of the copyright holder. All TVAS unpublished fieldwork reports are available on our website:  
[www.tvas.co.uk/reports/reports.asp](http://www.tvas.co.uk/reports/reports.asp).*

Report edited/checked by: Steve Ford ✓ 22.08.14
---

# Proposed Solar Farm, Church Farm, Chelwood, Somerset A Geophysical Survey (Magnetic)

by Aiji Castle and Andrew Munding

Report 14/34b

## Introduction

This report documents the results of a geophysical survey (magnetic) carried out on a parcel of land to the south-east of Chelwood in Somerset (centred on NGR ST 6413 6121 (Fig. 1)). The work was commissioned by Mr. Kevin Ayton of Carter Jonas, Mayfield House, 256 Banbury Road, Summertown, Oxford, OX2 7DE on behalf of Mr. Robert Maxwell of Church Farm, Chelwood, Somerset, BS39 4NW.

An application for planning permission has been made to Bath and North East Somerset Council (14/01895/FUL) to develop the site as a solar farm. It has been requested by the council's archaeological advisor that a field evaluation consisting of a geophysical survey be undertaken in advance of its determination. This is in accordance with the Department for Communities and Local Government's *National Planning Policy Framework* (NPPF 2012), and the Council's policies on archaeology. The field investigation was carried out to a specification approved by Mr Richard Sermon, archaeological officer of Bath and North East Somerset Council. The fieldwork was undertaken by Aiji Castle, Anna Ginger, Natasha Bennett and Lizzie Lewins between 30<sup>th</sup> July and 8<sup>th</sup> August 2014 and the site code is CFC 14/34.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

## Location, topography and geology

The site is located at Church Farm on the eastern edge of Chelwood, a small village hamlet c. 11km south of Bristol and west of Bath, set in one of the many riverine valleys cutting the Mendip Hills, in north-eastern Somerset. (Fig. 1). The site itself consists of a single c. 10.1ha pasture field c. 800m south-east of the farm, though the Ordnance Survey mapping suggests it has recently been three separate fields (Fig.1). The ground rises gradually from c. 149m above Ordnance Datum (aOD) at its north-western access to c. 155m and at the west end the ground falls from c. 153m in the centre of the field to c. 149m in a dry valley which passes along much of its southern boundary. The field is surrounded by hedges with Daniel's Brake, a copse along the north side.

The underlying geology is late Triassic to early Jurassic Langport Member and Blue Lias Formation interbedded with sedimentary mudstone and limestone. (BGS 2013).

Conditions during the survey were fine with high temperatures resulting in firm, but not parched, ground. The recently cut hay was arranged in lines primarily on a north-south orientation across the area (Pls 1-2).

## **Site history and archaeological background**

The archaeological potential of the site has been highlighted in a desk-based assessment (Tabor 2014). In summary the site lies in an area with few sites and finds recorded in the county Historic Environment Record. The most prominent of these was the presence of a 18th or 19th century lime kiln within the site and a series of undated earthworks immediately to the north. Chelwood village has late Saxon origins and is mentioned in Domesday Book (Williams and Martin 2002). The parish church of St Leonard is considered to have Norman origins and to retain 13th- or 14th-century fabric but was rebuilt in the 19<sup>th</sup> century. A few prehistoric flints and Roman finds and features are recorded for wider environs of the site.

## **Methodology**

### Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. A grid plan was drawn up to cover the entire proposal site area but the thickness of the hedgerows, particularly the one dividing the two fields, dramatically reduced the area available to survey resulting in the small southern corner of the site being left unsurveyed. The south-eastern survey area was extended beyond the site boundary in order to reduce the number of partial survey grids and thereby increase the survey rate.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10<sup>-9</sup> Tesla, the SI unit of magnetic flux density.

## Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both English Heritage (2008) and the Institute for Archaeologists (2002, 2011).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for fast yet detailed survey of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble GeoXH 6000 handheld GPS system with sub-decimetre accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyorLite software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

### **Process**

Clip from -3.00 to 3.00 nT

De-stripe: median, all sensors

De-spike: threshold 1, window size 3×3

### **Effect**

Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.

Compresses outlying magnetic points caused by interference of metal objects within the survey area.

Once processed, the results are presented as a greyscale plot shown in relation to the site (Fig. 3), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.22.01, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyorLite in portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is rotated to orientate it to north and combined with grid and site plans in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

## Results

A number of magnetic anomalies were recorded across the survey area. Three distinct phases of field boundary can be identified from the survey (Figs 3 and 4).

A linear anomaly enters the area from the south east, from a junction of fields on the site boundary to the south of Whidcombe Brake. This turns northwards 90° before turning again to continue its roughly E-W orientation before being lost in the area of the modern pipe [1]. Though associated as it is with an existing boundary, it seems to be associated with a track that runs into the field at this location. It is not obviously present on any historic maps (Tabor 2014).

Another, though faint anomaly lies in the northern part of the site [2]. This lies perpendicular to the faint trace of the relatively recent sub-division of these fields, which consists of several faint linear anomalies [4a-d]. These latter anomalies are field boundaries present on the Tithe map of 1837 with several surviving up until the 1960's (Tabor 2014, figs 8-11). This shorter, possibly archaeological derived linear feature [2] leads from the north part of anomaly [4d] and which may thus be related.

There is also a relatively strong negative anomaly [3], which forms a field boundary underlying(?) the later subdivision [4d]. This old boundary is possibly indicated on the 1882 Ordnance Survey map as a line of trees and a barn(?) though the latter is perhaps only indicated by a small cluster of ferrous anomalies. It is probably a boundary as shown on the manor map of 1776 (Tabor 2014, figs 7 and 9).

Agricultural anomalies, in the form of subsoil striping were present in the smaller of the recent subdivided fields, covering the north and central parts of the site [6].

The strongest magnetic response was gained from the buried pipe that ran SW-NE across the site [5]. An approximately 8m spread either side of the pipes location, disrupted the response gained from the equipment, masking any potential discrete features near by. A similarly disruptive response to the reading was gained from the surveys proximity to a fence on the southern boundary. Other disruption to the subsoil seems to have occurred on the lines of these field sub divisions, which sees a ferromagnetic debris spread butting up against a ditch-like anomalies [7]. Ferrous spikes seem to be generally distributed across the central area of the site with a particular concentration to the south of the small field sub division [4a and 4b].

## Conclusion

Though a small selection of anomalies were encountered from the survey, only one or two are not obviously of modern date, interpretable as being old but fairly recent (19<sup>th</sup> century) field boundaries, or of agricultural origin. One field boundary may relate to an 18<sup>th</sup> century configuration of the fields. One boundary is not depicted on any maps despite seemingly terminating at a the junction of mapped fields.

The other anomalies are the result of magnetic debris within the subsoil or near-by metallic objects such as fencing, a buried service pipe and previous agricultural activity. Any of these may have a masking affect on weaker underlying anomalies of archaeological origin. The survey was successful in as much that all of the surveyable area of the field was scanned, with minimal restriction other than from overgrowth at edge of the field boundaries.

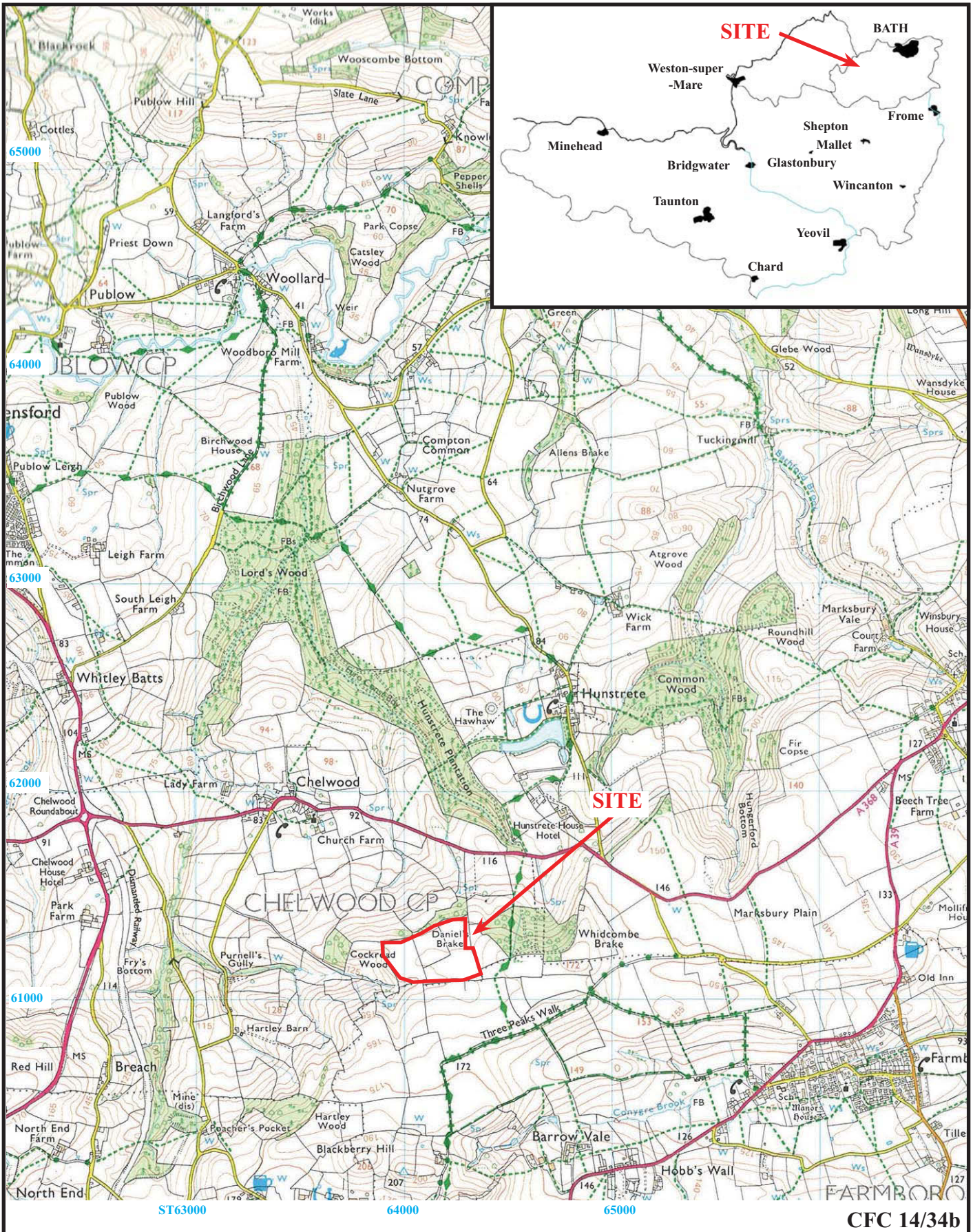
## References

- BGS, 2013, *British Geological Survey*, 1:50,000. <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (accessed: 27th February 2014)
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)
- IFA, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading
- IFA, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading
- NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London
- Tabor, R, 2014, Proposed Solar Farm, Church Farm, Chelwood, Somerset, an archaeological desk-based assessment, Thames Valley Archaeological Services report 14/34, Reading
- Williams, A and Martin, G, 1992, *Domesday Book, A complete Translation*, London



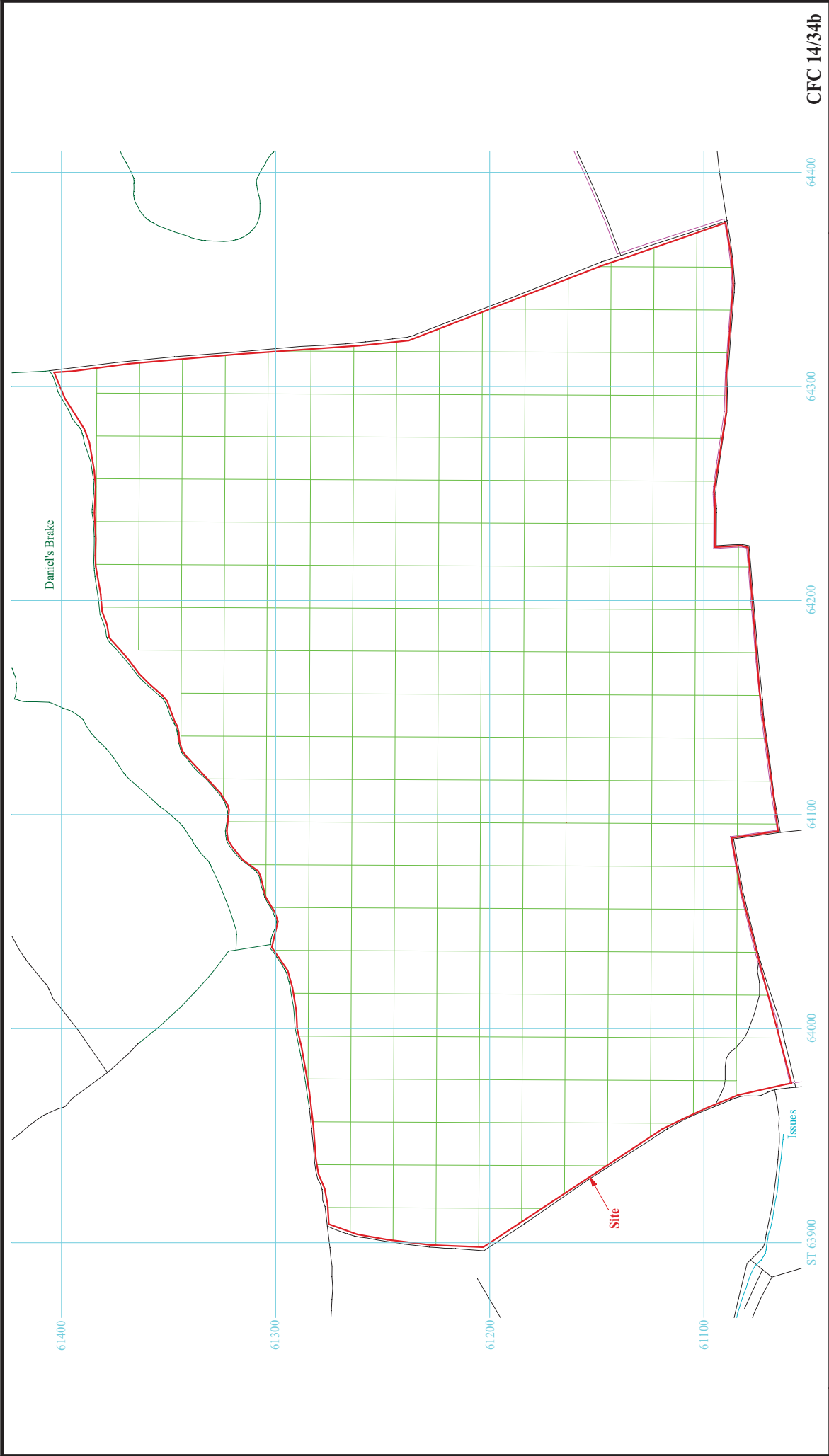






**Proposed Solar Farm, Church Farm, Chelwood  
Bath and North East Somerset, 2014  
Geophysical Survey (Magnetic)**  
Figure 1. Location of site within Chelwood and  
Bath and North East Somerset.  
Reproduced from Ordnance Survey Explorer 171 at 1:12500  
Ordnance Survey Licence 100025880



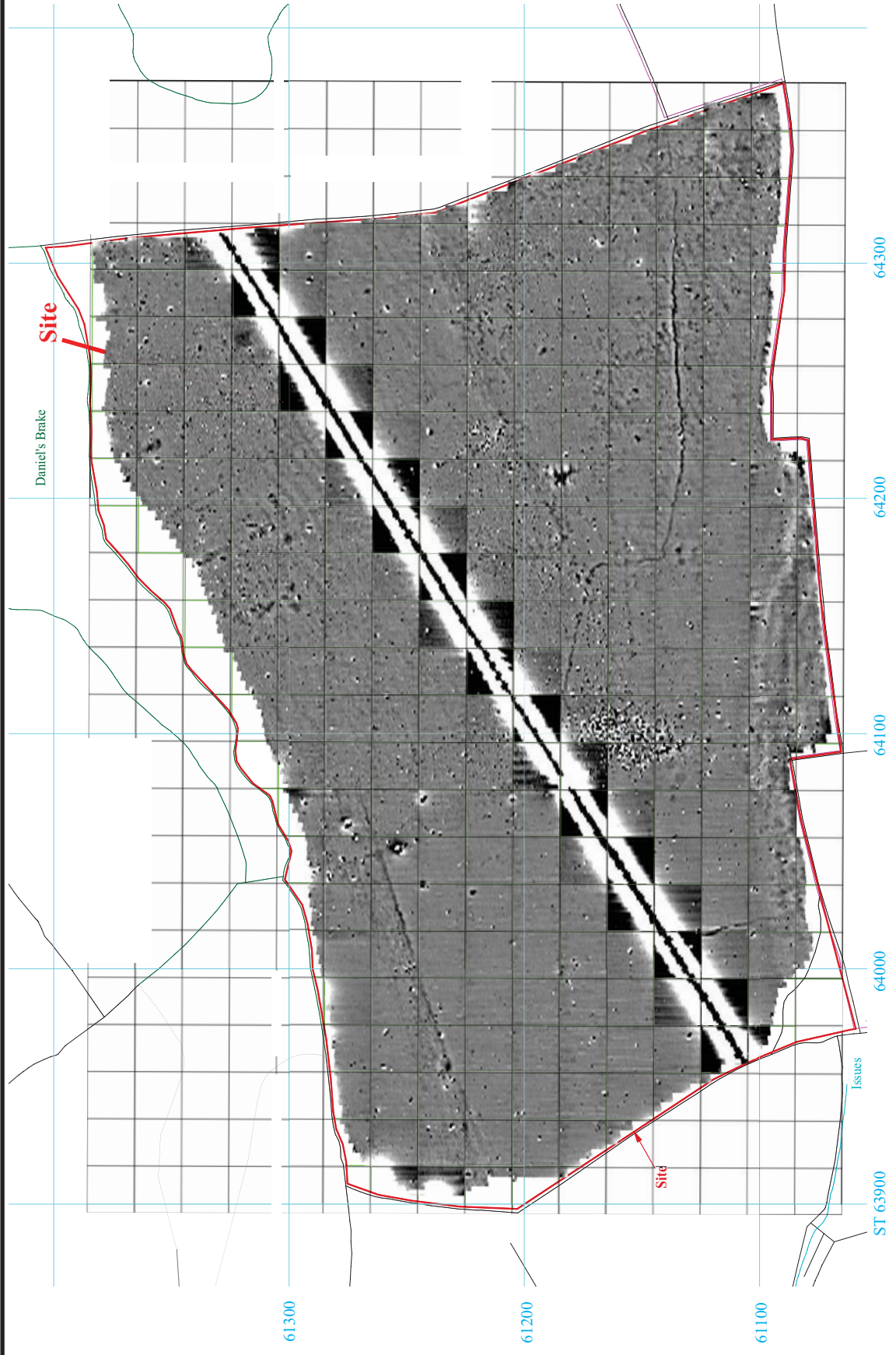


CFC 14/34b

**Proposed Solar Farm, Church Farm, Chelwood,  
Bath and North East Somerset, 2014  
Geophysical Survey (Magnetic)**

Figure 2. Survey grid layout.





**Proposed Solar Farm, Church Farm, Chelwood,  
 Bath and North East Somerset, 2014**  
**Geophysical Survey (Magnetic)**

Figure 3. Plot of minimally processed gradiometer data.





**Proposed Solar Farm, Church Farm, Chelwood,  
Bath and North East Somerset, 2014  
Geophysical Survey (Magnetic)**

Figure 4. Interpretation plot.



CFC 14/34b

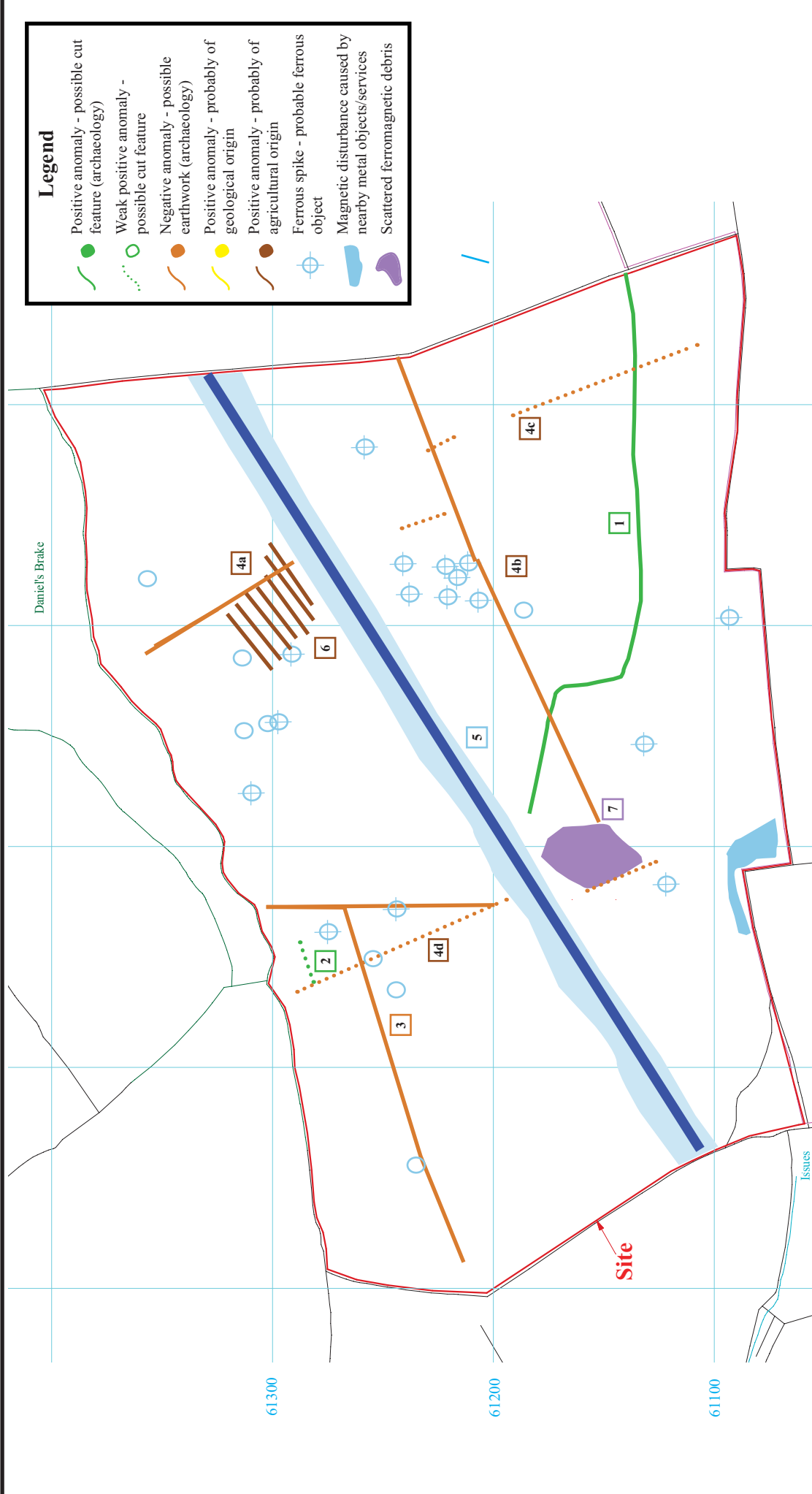






Plate 1. North eastern corner of the field, looking south south east.



Plate 2. Southern slope of the site and track, looking east.

CFC 14/34b

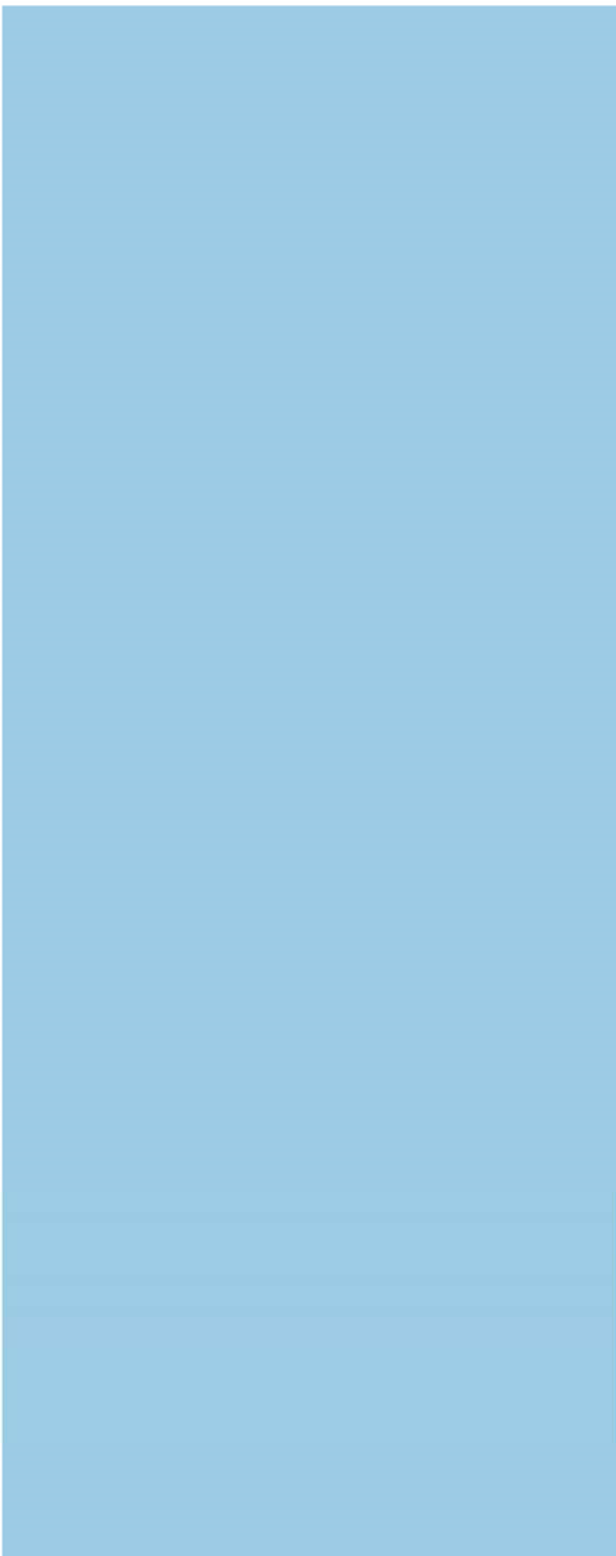
**Proposed Solar Farm, Church Farm, Chelwood, Bath and  
North East Somerset, 2014  
Geophysical Survey (Magnetic)  
Plates 1 - 2.**

THAMES VALLEY  
ARCHAEOLOGICAL  
SERVICES  
SOUTH WEST

## TIME CHART

	<b>Calendar Years</b>
Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43
Iron Age _____	BC/AD 750 BC
Bronze Age: Late -----	1300 BC
Bronze Age: Middle -----	1700 BC
Bronze Age: Early -----	2100 BC
Neolithic: Late .....	3300 BC
Neolithic: Early .....	4300 BC
Mesolithic: Late .....	6000 BC
Mesolithic: Early .....	10000 BC
Palaeolithic: Upper .....	30000 BC
Palaeolithic: Middle .....	70000 BC
Palaeolithic: Lower .....	2,000,000 BC





**TVAS (South West),  
Unit 21 Apple Business Centre,  
Frobisher Way, Taunton,  
Somerset, TA2 6BB**

**Tel: 01823 288 284  
Fax: 01823 272 462  
Email: [southwest@tvas.co.uk](mailto:southwest@tvas.co.uk)  
Web: [www.tvas.co.uk](http://www.tvas.co.uk)**