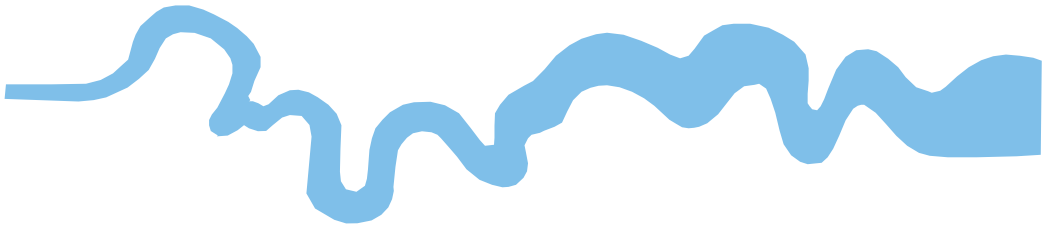
T V A S



SOUTH WEST

Land at Westford Park Farm, Chard Junction, Dorset Phase 2

Geophysical Survey (Magnetic)

by Nicholas Dawson

Site Code: WCJ18/65
(ST 3378 0392)

Land at Westford Park Farm, Chard Junction, Dorset

Geophysical Survey (Magnetic) Report

For Aggregate Industries UK Ltd

by Nicholas Dawson

Thames Valley Archaeological Services Ltd

Site Code WCJ 18/65

August 2018

Summary

Site name: Land at Westford Park Farm, Chard Junction, Dorset

Grid reference: ST 3378 0392

Site activity: Magnetometer survey

Date and duration of project: 21st to 22nd August 2018

Project manager: Agata Socha-Paszkiewicz

Site supervisor: Nicholas Dawson

Site code: WCJ 18/65

Area of site: 11.9ha

Summary of results: The survey identified a small number of magnetic anomalies across the site, with those of archaeological potential being two possible buried linear features located in the main field.

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

Report edited/checked by:	Steve Ford✓ 4.9.18
	Tim Dawson✓ 29.8.18

TVAS South West, Unit 21 Apple Business Centre, Frobisher Way, Taunton, TA2 6BB

Tel. (01823) 288 284; email: southwest@tvas.co.uk; website: www.tvas.co.uk/southwest

Land at Westford Park Farm, Chard Junction, Dorset
A Geophysical Survey (Magnetic)

by Nicholas Dawson

Report 18/65c

Introduction

This report documents the completion of a geophysical survey (magnetic) carried out at land at Westford Park Farm, Chard Junction, Dorset (NGR ST 3378 0392) (Fig. 1), in order to survey areas that were inaccessible during the initial survey carried out on the 10th and 11th of July 2018 (Dawson 2018). The work was commissioned by Ms Joanne Baker of Aggregate Industries UK Ltd, Frome Area Office, Edwin Sims House, Vallis Road, Frome, BA11 3EG.

Planning permission is to be sought from Dorset County Council to extend Chard Junction Quarry onto neighbouring Westford Park Farm for gravel extraction.

The fieldwork was undertaken by Nicholas Dawson and Piotr Wrobel, on the 21st to 22nd August 2018 and the site code is WCJ 18/65. 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 4.88km to the south east of Chard and 6.8km north east of Axminster. It comprises an area of 2.6ha of the sites original 11.9ha in a contiguous south to north row of fields on the lower west-facing slopes overlooking the floor of the Axe valley, the river's meanders coming within 60m of its west side. In addition, a proposed 530m-long haul road would link the east side of the site's north field to the existing quarry's grading facilities to the north-east (Fig. 2). The site lies at a height of 60-70m above Ordnance Datum (aOD). Current land use of the field is for the most part pastoral land with one field of now harvested wheat crop and one of corn.

Site history and archaeological background

The archaeological potential of the site has been highlighted in the desk-based assessment (Tabor 2018). In summary the site lies in an area of moderate archaeological potential with recent fieldwork having revealed a number of sites of Bronze Age, Roman and medieval date as well as finds of lower Palaeolithic date. The initial

phase of geophysical survey (Dawson 2018) identified a small number of magnetic anomalies across the site, with those of archaeological potential being concentrated in the north and mid south fields. In the north field two semi circular linear anomalies and in the mid south field a system of weak positive linear trends all possibly representing buried cut features of archaeological origin. There are no known heritage assets within the site itself. However, one known heritage asset (a listed building) lies on its periphery. By analogy with known nearby sites, the site would have been well-situated for past settlement and can be considered to have moderate archaeological potential for all post-glacial periods, probably increasing on account of the size of the site area.

Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating east to west zig-zag orientation across the survey area. The upper central field and the route of the haul road were not surveyed at this stage due to the presence of crops in the fields.

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^{-9} 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 Chartered Institute *for* Archaeologists (2002, 2011, 2014).

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 the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10 mounted at the rear of the cart. 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.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses 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 positioned using the MultiGrad601 logging software and processed using the TerraSurveyor 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	**Effect**
Clip from -1.80 to 2.20 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.

The raw data plot was processed and the resulting data then presented as three figures (Figs. 3, 4 and 5), followed by a second three plans to present the abstraction and interpretation of the magnetic anomalies (Figs. 6,

7 and 8). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.58.00, 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 TerraSurveyor in a georeferenced 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 combined with grid and site plans in QGIS 2.16.2 and exported again in .PNG format in order to present them in figure templates 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

Main field

A small number of magnetic anomalies were recorded across this field (Figs. 3 and 6). Running east to west across the centre of the field are two weak positive anomalies. The northern most linear [Fig 6: 2] runs for just over 100m. The second and more southerly linear [Fig 6: 3] is much shorter at approximately 20m and has a right angle bend off to the north at its western end. Both of these anomalies represent possible buried cut features of archaeological interest. The large area of magnetic disturbance in the south west corner of the field [Fig 6: 1] is likely cause but the metal gate at the field entrance as well as a number of metal debris found in the hedge including a fire extinguisher. A number of magnetic spikes are spread throughout the field, these most likely represents buried ferrous objects or agricultural debris.

South west section of haul road

No magnetic anomalies of archaeological potential were identified within this part of the survey (Figs. 4 and 7), only a scatter of magnetic spikes indicating buried ferrous objects or agricultural debris and magnetic disturbance towards the field boundaries caused by the post for an electric fence.

South east section of haul road

No magnetic anomalies of interest were identified within this field (Figs. 4 and 7), only the usually scatter of magnetic spikes indicating buried ferrous objects or agricultural debris and magnetic disturbance caused by debris in the boundary ditch or hedge.

North section of haul road

Nothing of archaeological potential were identified in the magnetic anomalies recorded within this field (Figs. 5 and 8), only a single magnetic spike indicating buried ferrous objects or agricultural debris and magnetic disturbance near the field boundary and along the north west edge caused by the track running along that field edge. A small gap had to be left between the first and second traverses due to the presence of a low but sleep incline that the cart could not traverse safely.

Conclusion

The survey was successfully completed across the full field missed due to crop presence in the initial survey. The southern section of the haul road running east west across two fields and the most northerly section adjacent to the existing quarry were also surveyed successfully. The largest of the fields that the haul road passes through in a north east to south west direction was not surveyed due to the presence of crop. Of the areas surveyed the main field was the only one to produced anomalies with archaeological potential. In this field two linear anomalies [2] and [3] possibly representing cut features that may have archaeological origins.

References

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NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

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Appendix 1. **Survey and data information**

Programme:
Name: TerraSurveyor
Version: 3.0.34.4

Raw data
Main Field

Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 333665.947058055, 103893.640159779 m
Southeast corner: 333844.567058055, 103778.590159779 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 56559

Dimensions
Composite Size (readings): 1374 x 885
Survey Size (meters): 179 m x 115 m
Grid Size: 179 m x 115 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 104.15
Min: -109.71
Std Dev: 4.40
Mean: 0.92
Median: 0.71
Composite Area: 2.055 ha
Surveyed Area: 1.5503 ha

Processed data
Main Field
Stats
Max: 2.41
Min: -2.00
Std Dev: 0.54
Mean: 0.03
Median: 0.00

GPS based Proce7
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip at 3.00 SD
6 Clip from -1.80 to 2.20
7 DeStagger by: 100.00cm, Shift Positions

South west section of haul road

Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 333864.757531551, 103947.186893276 m
Southeast corner: 333982.797531551, 103905.586893276 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 5343

Dimensions
Composite Size (readings): 908 x 320
Survey Size (meters): 118 m x 41.6 m
Grid Size: 118 m x 41.6 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 107.13
Min: -109.22
Std Dev: 6.87
Mean: 0.90
Median: 1.53
Composite Area: 0.49105 ha
Surveyed Area: 0.195 ha

Southwest section of haul road
Stats
Max: 2.41
Min: -2.00
Std Dev: 0.51
Mean: -0.06
Median: 0.01

GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip at 2.00 SD
6 Clip from -1.80 to 2.20

South east section of haul road
Survey corner coordinates (X/Y):
Northwest corner: 333990.514555624, 103915.173827261 m
Southeast corner: 334018.334555624, 103887.873827261 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 1279

Dimensions
Composite Size (readings): 214 x 210
Survey Size (meters): 27.8 m x 27.3 m
Grid Size: 27.8 m x 27.3 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 23.97
Min: -45.44
Std Dev: 4.64
Mean: 1.21
Median: 1.60
Composite Area: 0.075949 ha
Surveyed Area: 0.041255 ha

South east section of haul road
Stats
Max: 2.41
Min: -2.00
Std Dev: 0.52
Mean: -0.01
Median: 0.01

GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip at 3.00 SD
6 Clip from -1.80 to 2.20

North section of haul road
Survey corner coordinates (X/Y):
Northwest corner: 334211.425858823, 104274.028466333 m
Southeast corner: 334269.795858823, 104227.488466333 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 4279

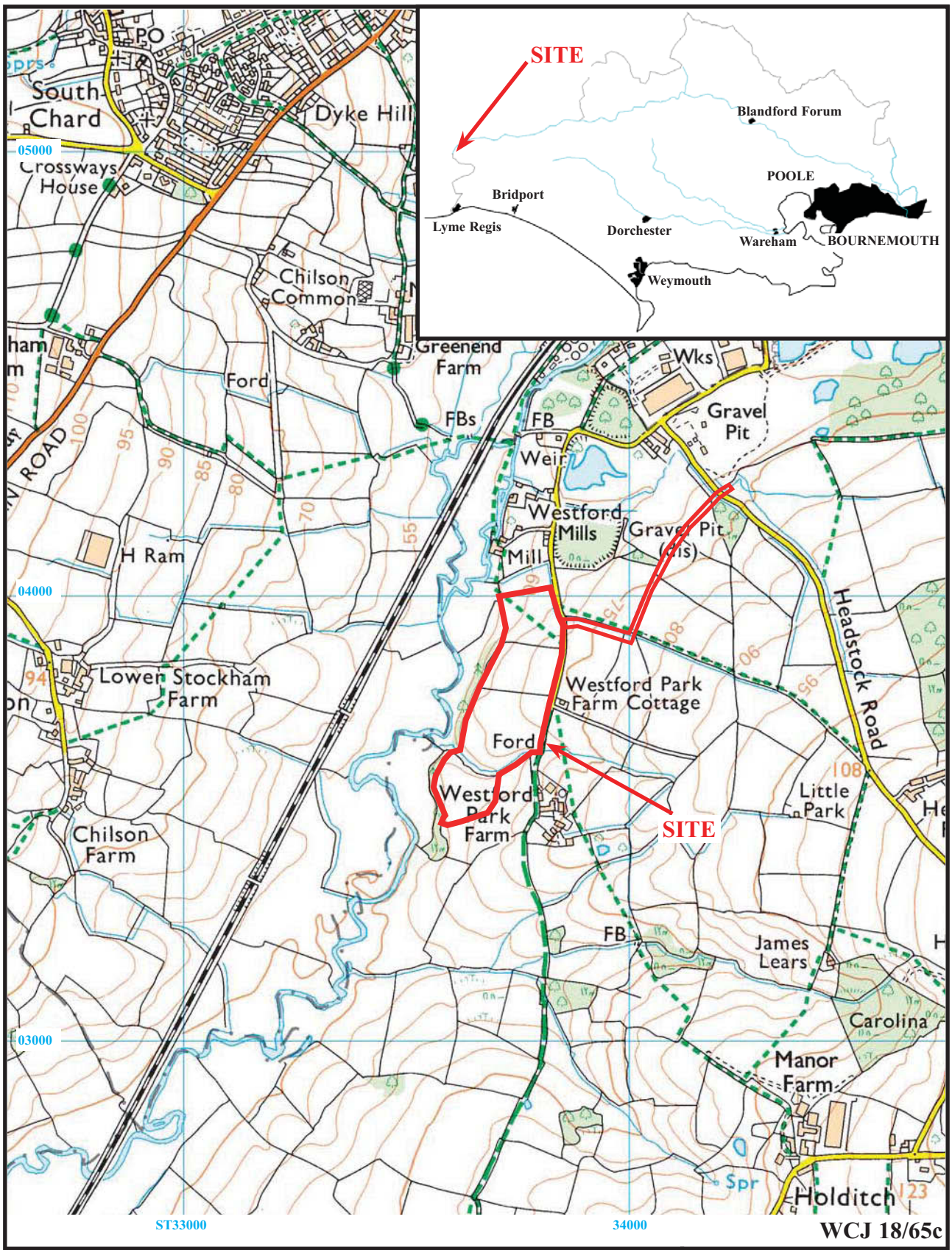
Dimensions
Composite Size (readings): 449 x 358
Survey Size (meters): 58.4 m x 46.5 m
Grid Size: 58.4 m x 46.5 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats
Max: 106.33
Min: -108.73
Std Dev: 15.69
Mean: -0.13
Median: 1.06
Composite Area: 0.27165 ha
Surveyed Area: 0.11053 ha

North Section of haul road
Processed:

Stats
Max: 2.41
Min: -2.00
Std Dev: 1.02
Mean: -0.03
Median: 0.01

GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Despike Threshold: 1 Window dia: 3
5 Clip at 2.00 SD
6 Clip from -1.80 to 2.20

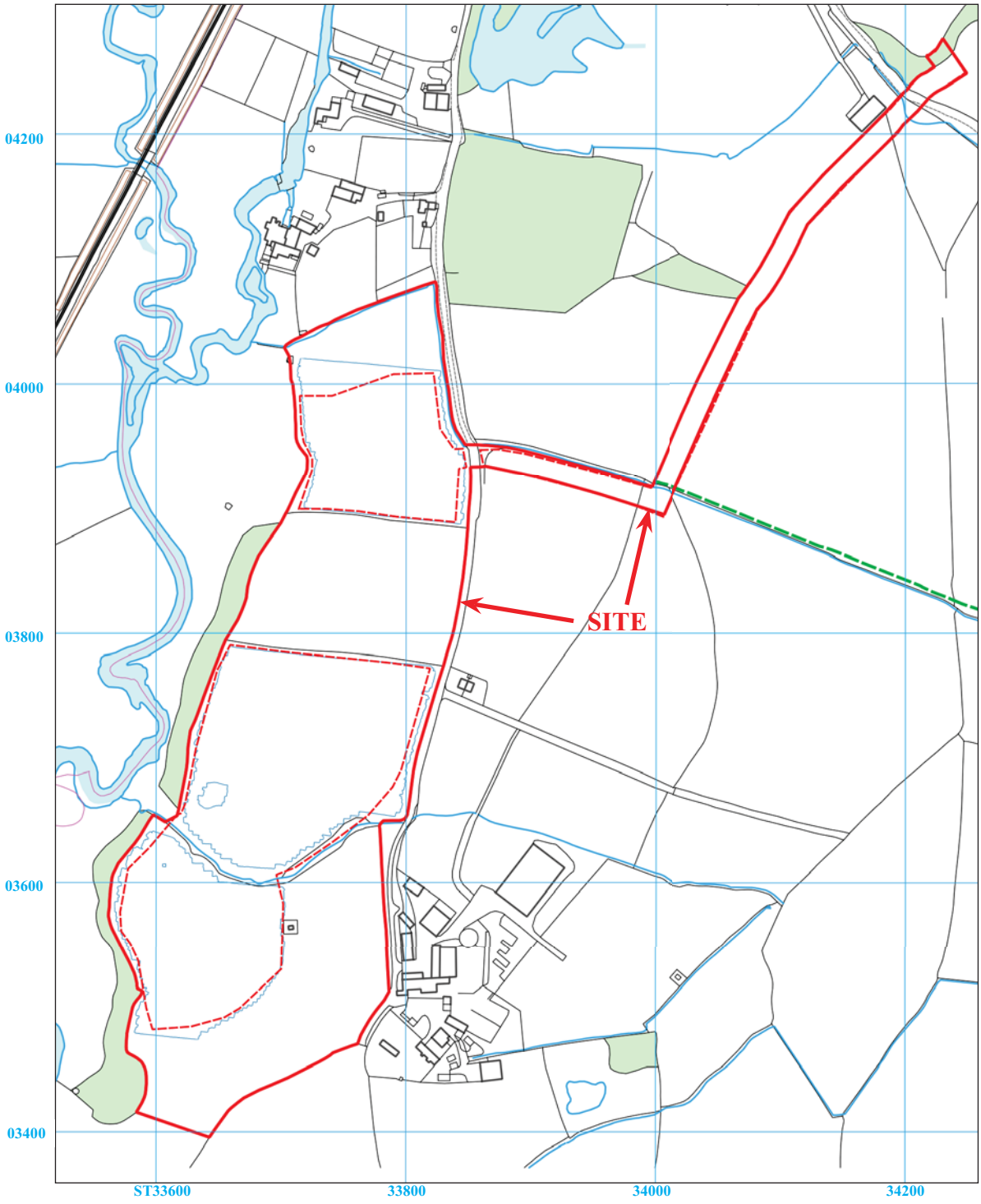


WCJ 18/65c

Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)

Figure 1. Location of site in relation to Chard Junction and within Dorset.

TVAS SOUTH WEST



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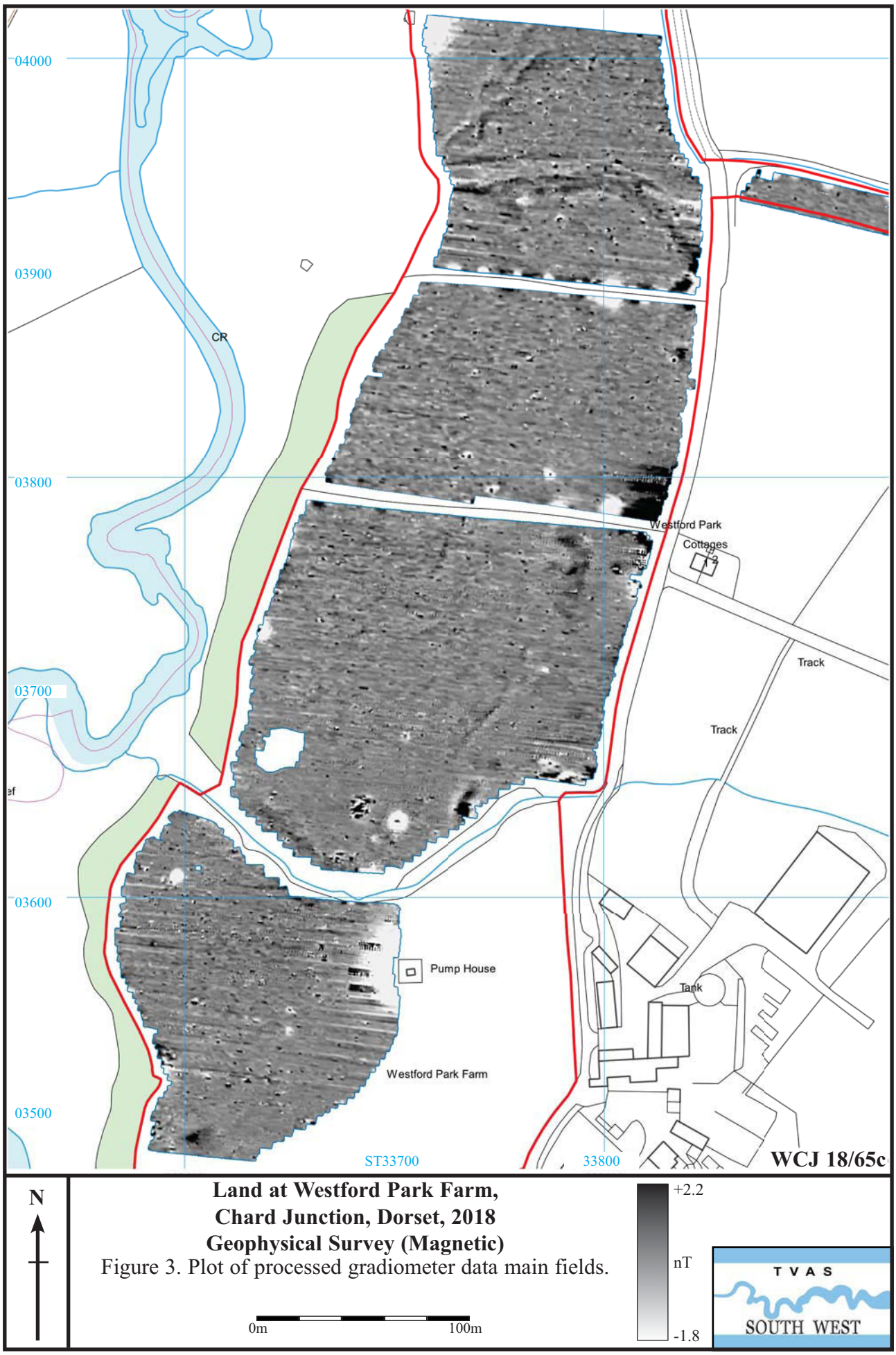
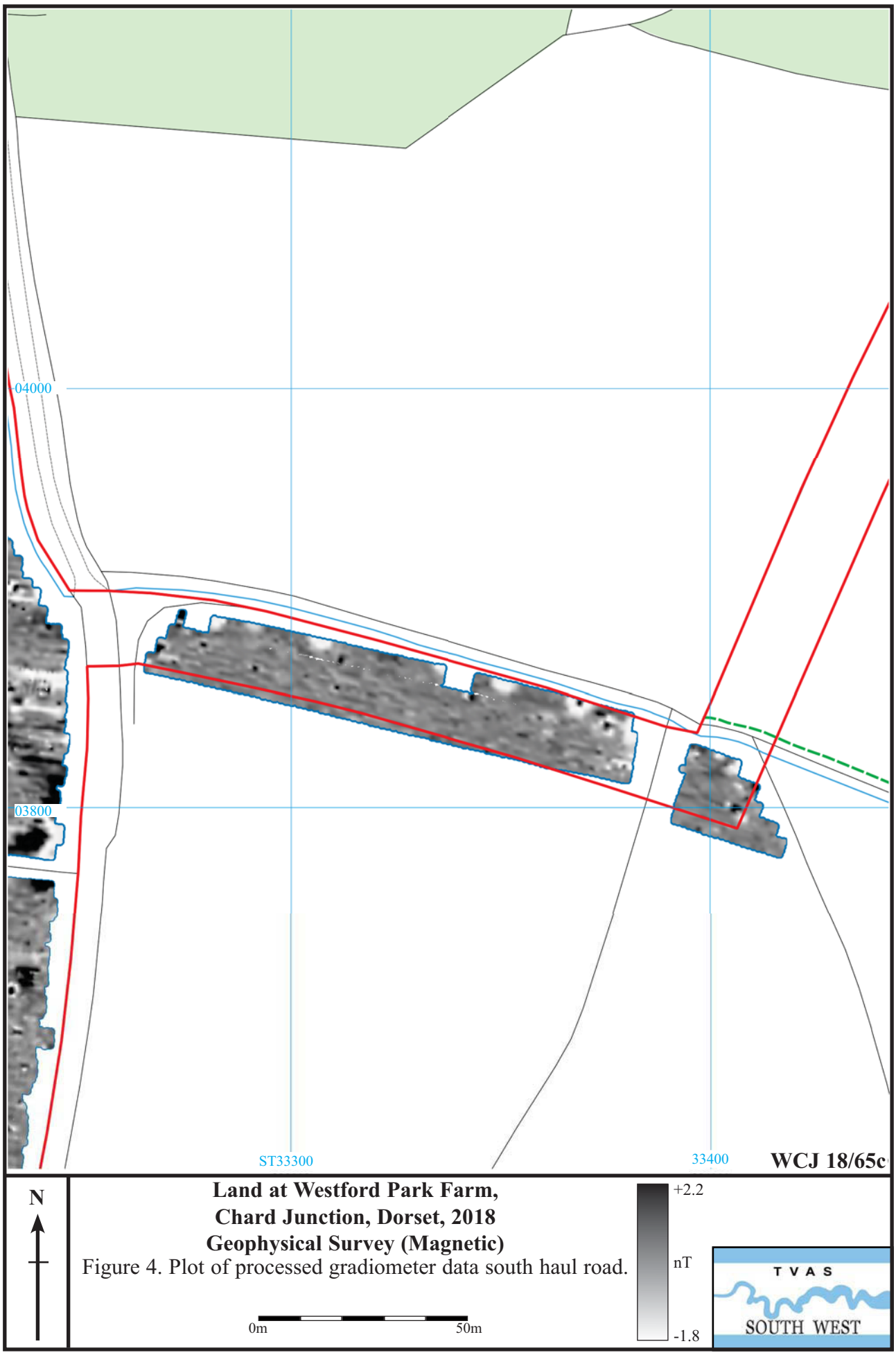
Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)
Figure 2. Detailed location of site.

TVAS SOUTH WEST



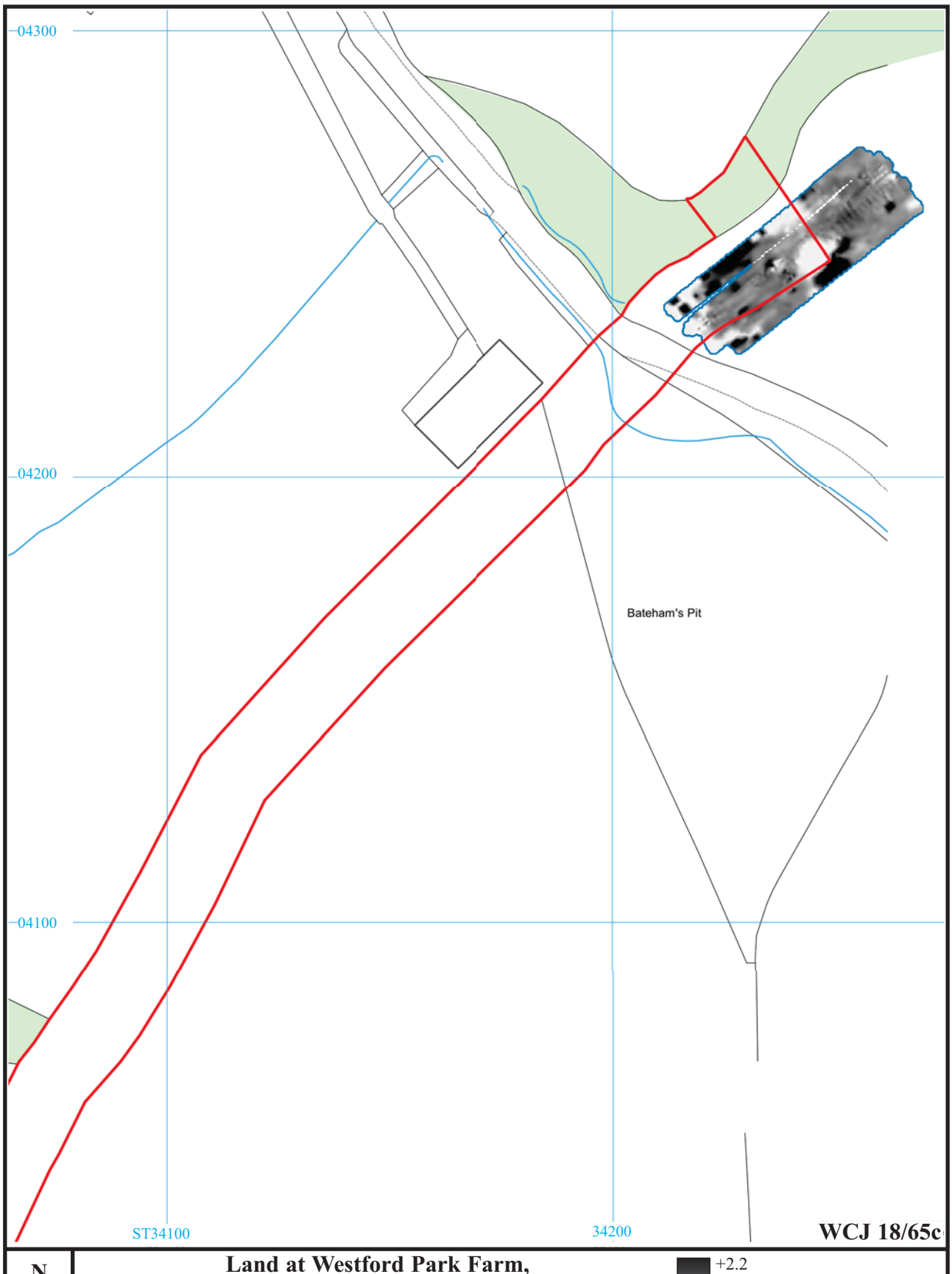
Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)

Figure 3. Plot of processed gradiometer data main fields.



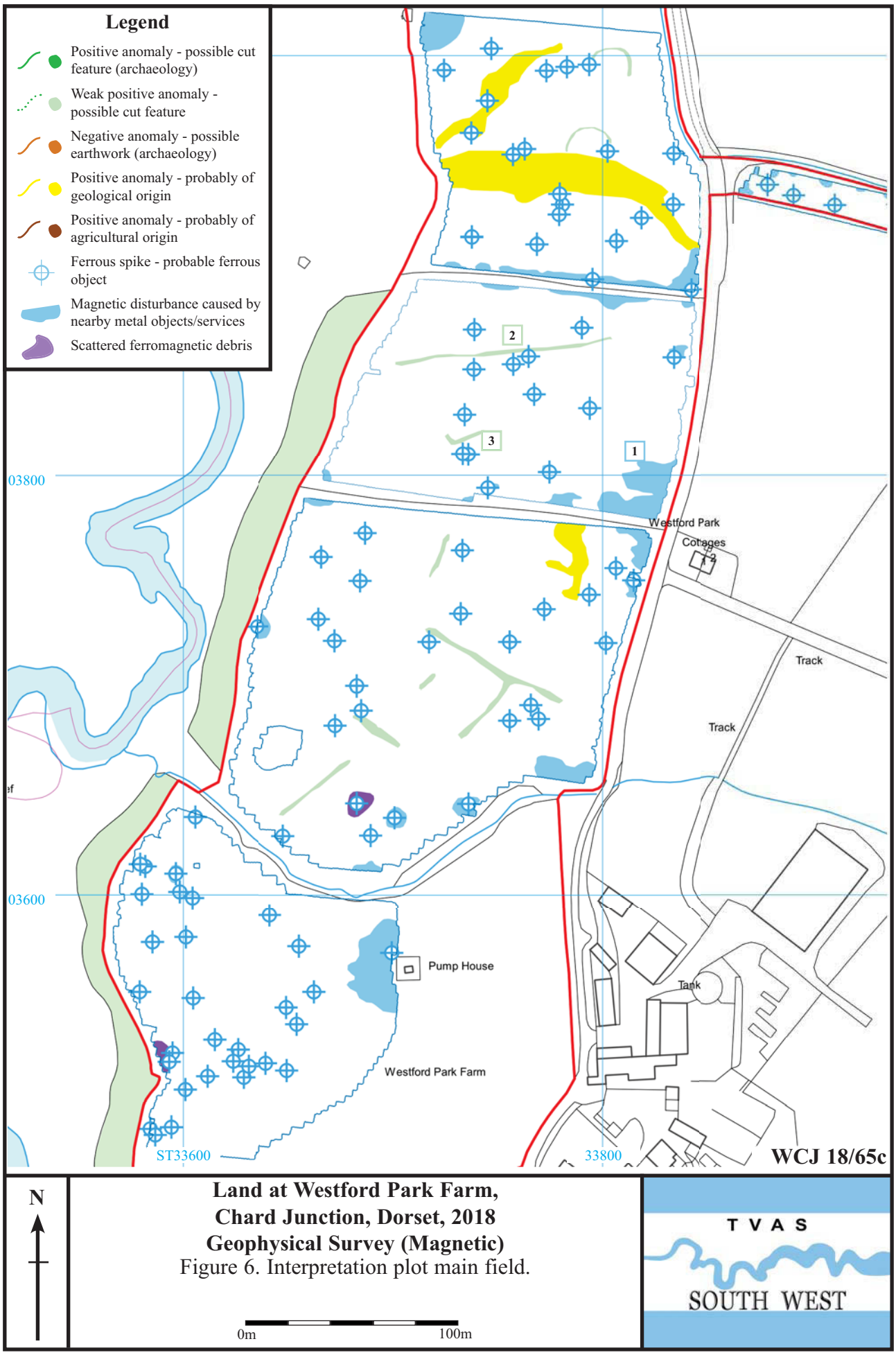
Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)

Figure 4. Plot of processed gradiometer data south haul road.



Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)

Figure 4. Plot of processed gradiometer data north end of haul road.



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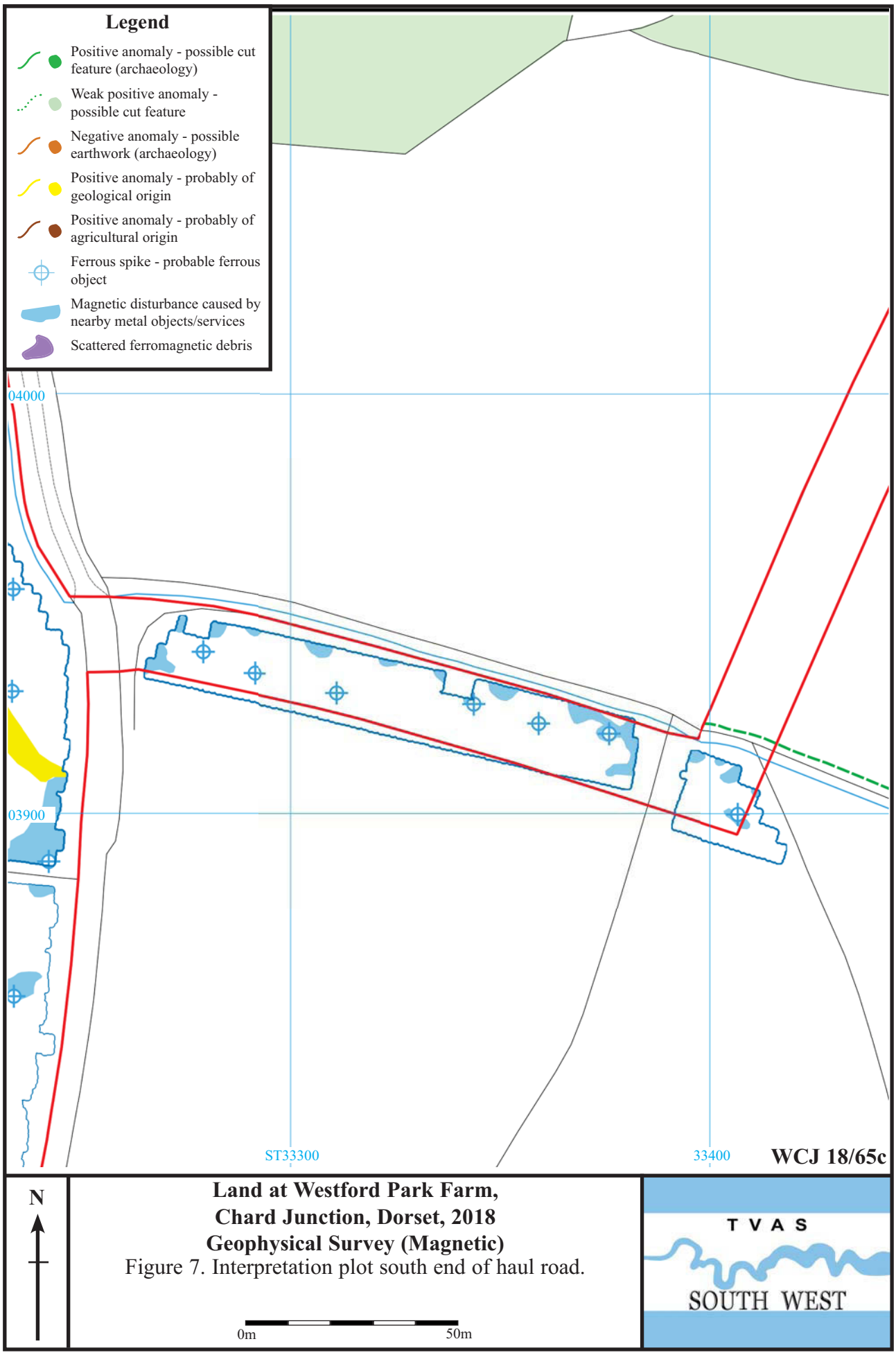
Land at Westford Park Farm, Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)
Figure 6. Interpretation plot main field.

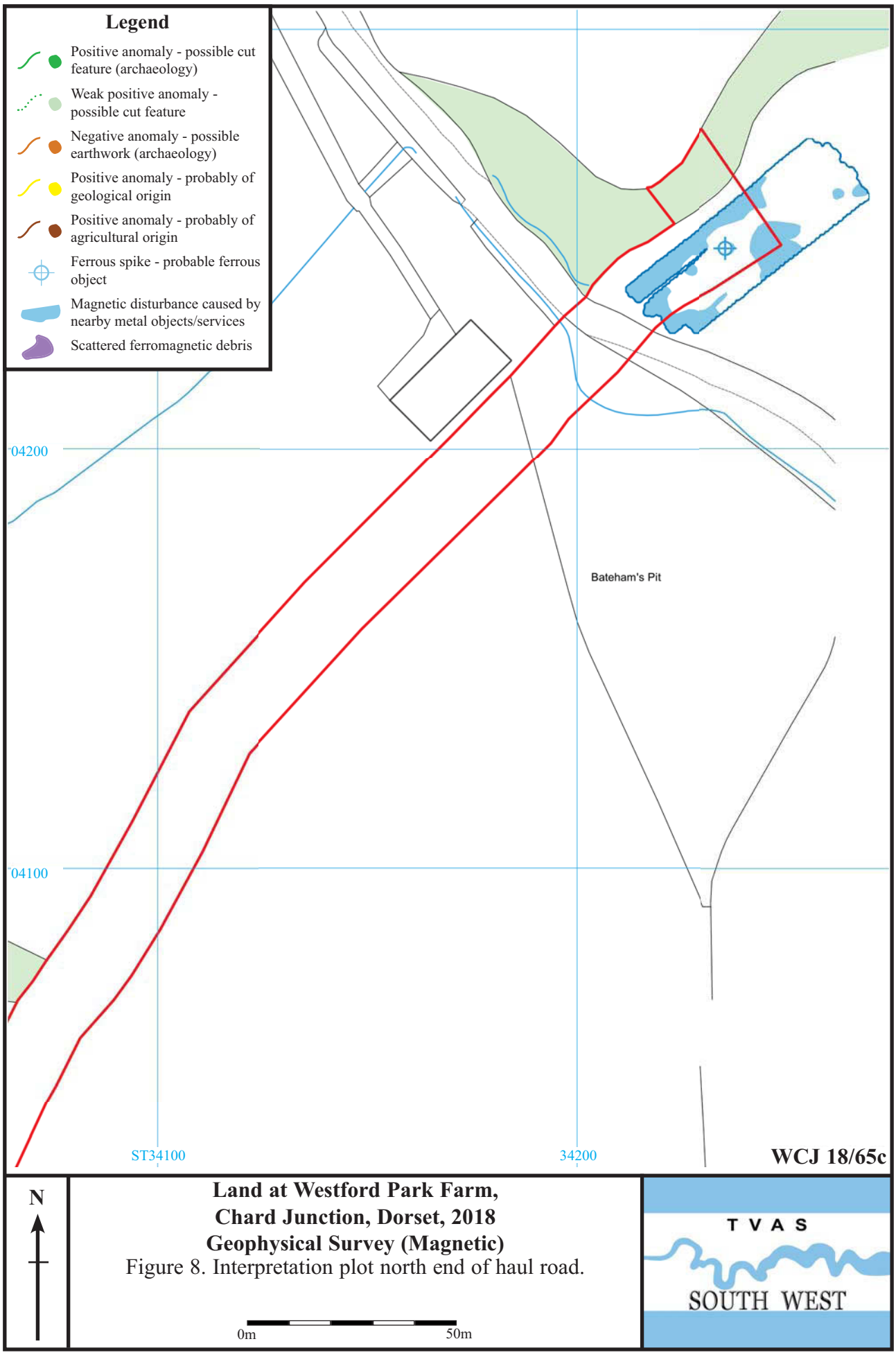
0m 100m

TVAS SOUTH WEST



Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)

Figure 7. Interpretation plot south end of haul road.



Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)
Figure 8. Interpretation plot north end of haul road.

Plate 1. Mid north field, looking north west from south east entrance.

Plate 2. South west haul road field, looking north from centre of field.

Plate 3. North field of haul road, looking south from north west edge of field.

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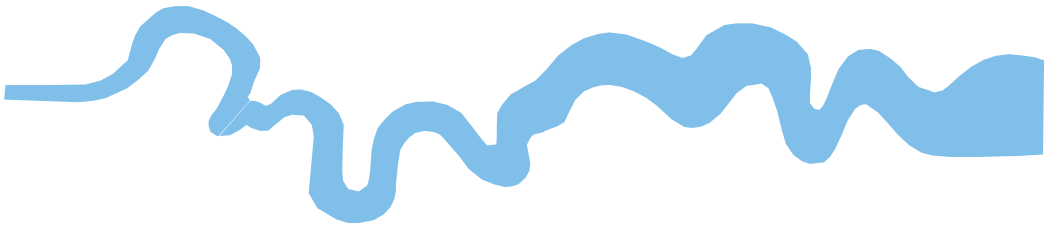
Land at Westford Park Farm,
Chard Junction, Dorset, 2018
Geophysical Survey (Magnetic)
Plates 1 to 3.

TVAS SOUTH WEST

TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
	AD 0 BC
Iron Age	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 TA2 6BB
Tel: 01823 288284
Email: southwest@tvas.co.uk
Web: www.tvas.co.uk/southwest

Offices in:
Reading, Brighton, Stoke-on-Trent and Ennis (Ireland)