



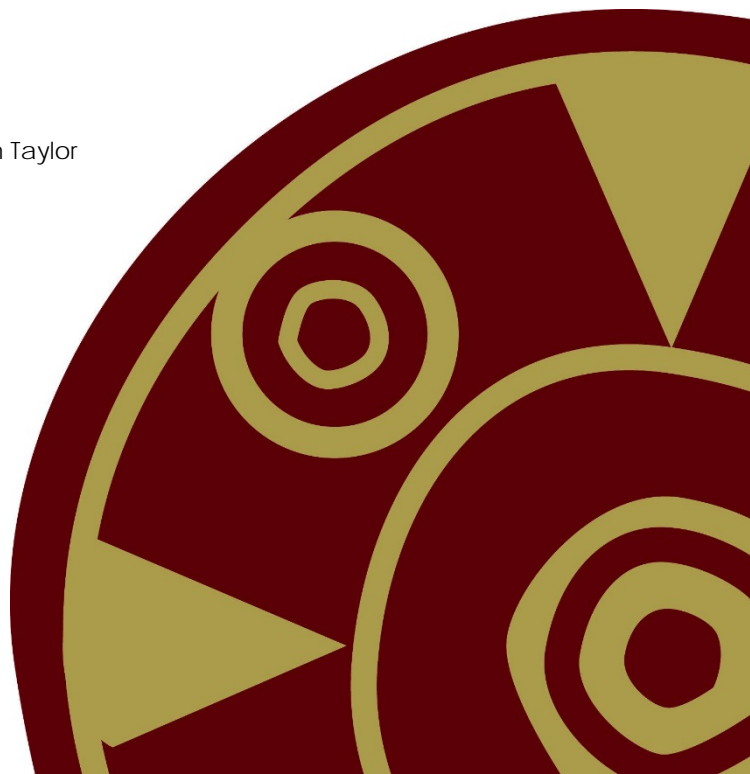
'World War 2 Treasure Hunters' TV Series
Denbies Vineyard & Dunley Hill Camp
Dorking and Effingham, Surrey

Client:



Date:
July 2018

Series 1, Episode 1
Magnetometer & Metal Detector Survey Report
SACIC Report No. 2017/114
Authors: Timothy Schofield, Mark Sommers & Stephen Taylor
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Denbies Vineyard, Dorking, Surrey
& Dunley Hill Camp, Effingham, Surrey
'World War 2 Treasure Hunters' Television Series
Series 1, Episode 1

Magnetometer & Metal Detector Survey Report

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Illustrator: Timothy Schofield, Mark Sommers

Editor: Stuart Boulter

Report Date: July 2018

HER Information

Site Name: Denbies Vineyard, Dorking, Surrey
& Dunley Hill Camp, Effingham, Surrey

Date of Fieldwork: 22nd to 23rd May 2017

Grid Reference: TQ 1583 5047 (Denbies Vineyard)
TQ 1071 5003 (Dunley Hill)

Oasis Reference: suffolka1-316995

Project Officers: Timothy Schofield, Mark Sommers

WW2 Finds Expert: Stephen Taylor


Client: Emporium Productions Ltd

Digital report submitted to Archaeological Data Service:
<http://ads.ahds.ac.uk/catalogue/library/greylit>

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Date: July 2018

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Date: July 2018

Signed:



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Summary

In May 2017, Suffolk Archaeology Community Interest Company undertook a detailed fluxgate gradiometer and metal detector survey within a vineyard on land at Denbies Wine Estate, Dorking, Surrey. The magnetometer survey was undertaken to confirm the location of a buried Second World War tank, one of a pair of Covenanter tanks, the first of which was excavated in 1977 and currently on display in the Bovington Tank Museum. A large ferrous response interpreted as the likely position of the tank remains was recorded, which, upon excavation, was found to be the second Covenanter tank. An area of magnetic enhancement was further prospected that may identify the location of the first tank excavation.

The metal detector survey encompassing the tanks location was undertaken by a team of metal detectorists. An area of c.9ha was surveyed and a number of items dating to the Second World War were recovered. These finds were primarily related to munitions, suggesting that this was a former training area. An additional metal detecting survey was carried out within the nearby Dunley Hill Camp, a site formerly occupied by troops during the war. The camp could be easily defined as many of the original structures are still extant. Artefacts recovered here, include munitions and domestic items, confirming the presence of an accommodation area.

1. Introduction

On the 22nd and 23rd May 2017 a detailed fluxgate gradiometer and metal detector survey was undertaken at Denbies Wine Estate in Dorking, Surrey. An additional metal detector survey was also carried out within the bounds of an abandoned World War 2 (hereafter WW2) camp, known as Dunley Hill Camp, located on Effingham Upper Common, approximately 4.8km to the west of Denbies Vineyard (see Fig.1).

The surveys were undertaken by Suffolk Archaeology Community Interest Company (hereafter SACIC) who were commissioned by Emporium Productions Ltd. as part of a television series investigating the history of a variety of military sites around the UK. Primarily, metal detecting surveys were undertaken, with targeted geophysical surveys carried out to help pin-point areas of interest. The series was broadcast in the UK during the autumn of 2017 on the History Channel. This report covers the first episode filmed, transmitted as episode three in the series.

The specific geophysical survey research questions were:

- Can the geophysical survey locate position of the buried Covenanter tank?
- Can the geophysical instrumentation prospect anomalies likely to be indicative of any other buried WW2 features or artefacts?
- Can the site of the original Covenanter tank be ascertained from remnant magnetic material located within the dataset?
- Can the extent of the buried earthwork/pit be defined within the survey area?

The aim of the metal detector survey was to identify WW2 artefacts that could help identify the types of activity that were taking place, in specific areas of both sites.

The national grid reference for the centre of the two survey areas is as follows:

Denbies Vineyard, Dorking; - SK 5640, 1592;

Dunley Hill Camp, Effingham; - SK 1071, 5003.

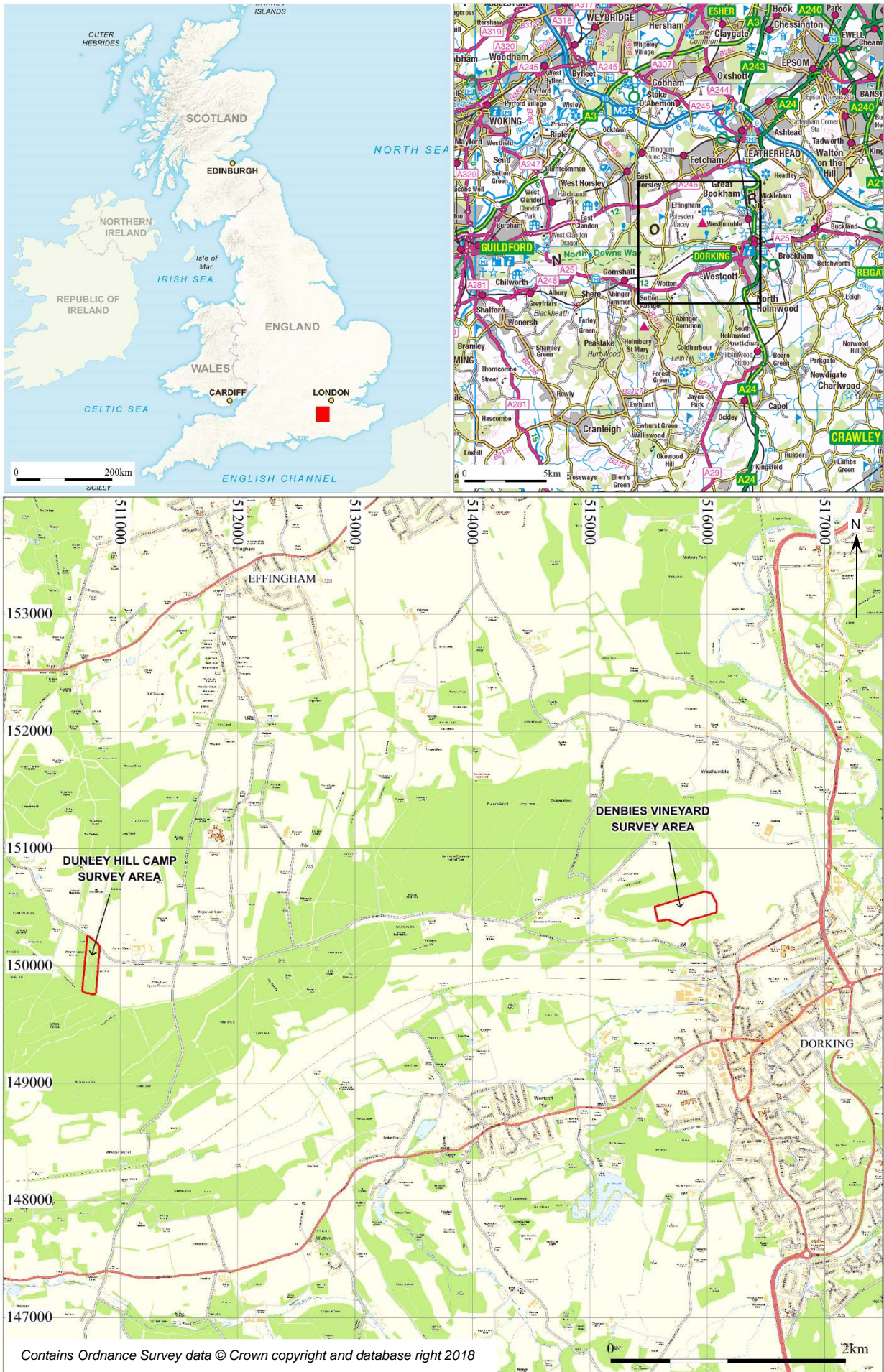


Figure 1. Site location

2. Geology and topography

The metal detecting survey area comprised of c.9 hectares of Denbies Vineyard. Located on the side of a steep, south facing slope, 850m to the southwest of the gift shop and restaurant at Denbies Wine Estate and 1.4km to the north of the town of Dorking. It was bounded to the south and east by vineyard trackways. The site slopes down from 91m in the north to 85m above Ordnance Datum (AOD) in the south. Within the site, a 0.4ha area was further subjected to a magnetometer survey, centred over the probable location of a buried Second World War tank.

Dunley Hill Camp, located c.4.8km to the west of the Denbies site, comprised a roughly rectangular area of established woodland, situated to the south of Crocknorth Road. Within the site were a number of derelict buildings, identified primarily as Nissen huts, and various unsurfaced trackways that together comprise the remains of the former army camp, that lay on the plateau of high ground at c.185m AOD, that runs roughly east-west through the county of Surrey.

The bedrock geology for Denbies Vineyard is described as Holywell Nodular Chalk Formation and New Pit Chalk Formation formed approximately 89 to 100 million years ago in the Cretaceous period in warm chalk seas. No superficial deposits for this location had been recorded. Bedrock geology at the Effingham site comprises the Lewes Nodular Chalk Formation, the Seaford Chalk Formation and the Newhaven Chalk Formation overlain by a superficial geology of clay, silt, sand and gravel (BGS 2018).

3. Archaeological background

Denbies is a large wine estate located to the northwest of Dorking in Surrey and is named after the original owner of the land, John Denby and his farmhouse, that formerly stood on the site. A modest mansion replaced the farmhouse in the early 18th century, this was in turn replaced by a significantly larger house in the mid-19th century.

In the 1940's the Home Guard requisitioned a section of the mansion as its headquarters and based a training school in the grounds, including an area located in the former gravel pits to the southeast of the property. The Canadian army also set-up

camp on the Denbies estate undertaking training exercises. Covenanter tanks were used as part of the training and were also possibly incorporated into the anti-tank defensive stop lines overlooking the Mole Valley defensive ditch. At least two Covenanter tanks were buried in a large pit in this area towards the end of WW2.

During WW2, Dunley Hill Camp was established on part of Effingham Upper Common, within the Denbies estate. Dunley Hill Camp, derequisitioned c.1950, housed around 300 men and was in use continuously from 1941 to 1945 by various units, mostly Canadian Artillery, prior to deployment in Europe. Units known to have been based at the camp include the 8th Canadian Light Anti-Aircraft Regiment (c.1941), 1st Canadian Survey Regiment (1941), 7th Medium Regiment (Nov 1941), The 5th Anti-Tank Regiment (1942) and 1st Medium Regiment (c.1943), all divisions of the Royal Canadian Artillery.

According to contemporary accounts, the base was muddy, isolated and uncomfortable. One regimental history recorded that "other than the NAAFI, the place had little amusement to offer" and days were filled with battle-drill, command-post and signal exercises, and seemingly interminable lectures on gunnery and gas". The thousands of Canadians stationed here and elsewhere on the Downs became a familiar sight in local towns and villages, although not always a welcome one. According to one source, some of the men would go down to Dorking High Street, get drunk on whisky and start fights until they were rounded up and sent back to base again. Others, no doubt, found more wholesome diversions such as competitive sports, cycling, trips to the pictures and community social events that would have offered welcome distractions from the stresses and banalities of army life. The Canadians proved popular with many locals, especially children (who were apparently captivated by their strange accents and stories of far-away lands), and young women (a number of marriages and children resulted, though not always in that order).

In these turbulent times, the Denbies estate became expensive to maintain and was gradually reduced in size. The mansion itself was abandoned after the war before being finally demolished in 1953.

In 1977 a team of enthusiasts unearthed the first tank buried on the site. It was then restored and from 1985 until the present day it is proudly on display at Bovington Tank

Museum. The second tank is believed to have been partially uncovered during the initial excavation and parts may have been removed to aid the rebuilding of the first Covenanter tank.

At the Dunley Hill Camp many of the buildings still stand. Of the actual men who briefly lived here and went off to fight, perhaps never to return, there is little trace immediately visible on the surface, although it is highly likely that significant evidence of camp life survives below ground.

4. Methodology

Geophysical Survey

Instrument type

A Bartington DualGRAD 601-2 fluxgate gradiometer was employed to undertake the detailed geophysical survey; the weather was dry and the geological conditions were known to be favourable for magnetometer survey. The site's topography was found to be challenging, with vines supported by wires strung along the traverses which affected the readings.

Instrument calibration and settings

One hour was allocated to allow the instrument's sensors to reach optimum operating temperature before the survey commenced; the weather was hot and sunny. Instrument sampling intervals were set to 0.125m along 1m traverses (eight readings per metre).

Survey grid layout

The detailed survey was undertaken within 20m grids (Fig. 2, blue grid), orientated approximately east to west and geolocated employing a Leica Viva GS08+ Smart Rover RTK GLONASS/GPS, allowing an accuracy of +/- 0.03m. Data were converted to National Grid Transformation OSTN15.

Data capture

Detailed fluxgate gradiometer survey data points were recorded on an internal data logger that were downloaded and checked for quality at midday and in the evening, allowing grids to be re-surveyed if necessary. A *pro-forma* survey sheet was completed to allow data composites to be created. Data were filed in unique project folders and backed-up onto an external storage device and then a remote server in the evening.

Data software, processing and presentation

Datasets were composited and processed using DW Consulting's Terrasurveyor v.3.0.33.6; the raw grid files, composite and raster graphic plots will be stored and archived in this format. The processing algorithms undertaken on the raw (Fig. 3) and processed datasets (Figs. 4 and 5); schedules are presented in Appendix 1.

Data composites were exported as raster images into AutoCAD. An interpretation plan based on the combined results of the raw, processed and xy trace plots (Figs. 3, 4 and 5) has been produced (Fig. 6).

Survey grid restoration

In order to accurately relocate the grid, three virtual survey stations were placed on survey grid nodes located along the baselines (Fig. 2).

Metal Detector Survey

The metal detecting survey was undertaken by a group of five detectorists, all of whom have a specific interest in WW2 sites. Each used their own detecting equipment.

The metal detecting survey was undertaken along roughly paced transects, to ensure a total and even coverage of the survey areas. It should be noted that the Denbies site was a working vineyard crossed by regularly spaced lines of vines held on wires, these were used as guides during the detecting survey, although the metal wires themselves may have hampered the detecting equipment. Findspots were marked with a flag with the find bagged and left *in-situ*. Multiple finds in close proximity (up to 0.5m separation) were bagged together and the centre of the findspot area flagged. If applicable, small

find numbers were later allocated to each individual find, during post-excavation processing. All finds were recovered from the topsoil in all four of the survey areas. At no point did any excavation into the underlying subsoil occur.

A dedicated recording team followed behind the detectorists to retrieve and record the detected finds. Each bag was issued with a findspot number (prefixed with the site code 'DNB') and the findspot was then geolocated employing a Leica Viva GS08+ Smart Rover RTK GLONASS/GPS, allowing an accuracy of +/- 0.03m. The resultant data was converted to National Grid Transformation OSTN15.

A list of findspot numbers with very rapid identifying description of the associated artefacts was produced, using pre-printed *pro-forma* sheets. These descriptions were written 'on the fly' and contained occasional errors in identification; such errors, where present, have subsequently been corrected in the published lists (Appendices 3 and 4).

At the Dunley Hill camp site the survey was carried out in a very random fashion due to the presence of trees and other obstacles. No detecting was carried out within, or in the immediate vicinity of, the extant structures due to their unstable nature. The GPS equipment was not used at this site and areas of interest were simply recorded by hand on a map of the site.

5. Results and discussion

Geophysical Survey

Due to the high degree of background magnetic noise caused by the ferrous vine cables, only three anomaly types could be extrapolated from the data (Figs. 3 – 6). Bipolar linear trends (magenta lines) orientated north-northwest to south-southeast delineate the location of the vine cables.

A discrete area of magnetic enhancement (dark blue hatching) located on the northern edge of the data records the presence of moderately magnetic debris backfilled within the large tank pit. It is possible that this anomaly could be remnants of tank material left behind after the first Covenantor was excavated in 1977.

The highly magnetic bipolar response (magenta hatching) reaches a peak that is beyond the range (1000nt+) of the instrument, it is therefore likely to correspond with the location of the buried tank. This anomaly measures 3.50 x 8.00m which is only slightly larger than the size of a Covenantor tank (2.62m x 5.80m), the local magnetic field generated by the anomaly is so large that it has been sensed by the gradiometer outside its physical footprint. The anomaly is orientated on an almost north-south orientation, running roughly in line with the slope of the hill. No further large magnetic responses indicative of buried machinery was detected in the survey area.

No further discrete anomalies could be identified within the dataset due to the masking nature of the local magnetic field generated by the vine cables. The pit fill is likely to have had low magnetic susceptibility and only removal of the vines would have allowed the edges of the earthwork to have been defined with the gradiometer. Due to time and financial constraints, it was not possible to undertake a complementary geophysical survey using a different instrument, before excavation of the anomaly commenced. Ground penetrating radar and/or earth resistance meter surveys may have helped further define the extent of the pit and provided extra detail of the anomaly located within it.

Metal Detector Survey

At Denbies, an area of c.9ha was detected, with the Dunley Hill Camp area being c.5ha, they were detected over two days. The results of these surveys are presented as scaled plans. Figure 7 depicts the findspots and the findspot numbers across the Denbies survey area, whilst Figure 8 shows the approximate area where the majority of finds were recovered at the Dunley Hill Camp. Lists of the individual findspot numbers, including brief descriptions of the recovered artefacts, can be found in Appendices 3 and 4 of this report.

A fuller description, interpretation and discussion of the more significant and diagnostic artefacts recovered during the survey are outlined in the following section.

The finds – description and discussion

Stephen Taylor

The artefacts recovered during the metal detecting survey of the Denbies estate were of a volume that was less than expected, given the predicted use of the site as a training area for small/medium calibre firearms practice. Such areas are normally very productive with regards to finds, with cartridge cases and fragments of No 36M grenades (Mills Bomb) being the most common finds, as training areas like this normally saw extensive use of such items. However, some cartridge cases were recovered, (DNB 1, DNB 13), along with fragments of both British 2 inch mortars, (DNB 9, DNB 10, DNB 11, DNB 12), and No 36M grenades, (DNB 13), which all supported the view that the area was used as a live firing training area during WW2. The majority of artefacts were dated, giving a verifiable time line and high likelihood of use during the WW2 period. Of note was the recovery of a practice concrete German mine from the tank pit, indicating the use of the site to train persons on how to identify and deal with German mines.

The finds from Dunley Hill Camp confirmed its use by the military, although no direct evidence of it being occupied by the Canadian army was found. However, a large number of 303 cartridge cases were recovered, along with pieces of webbing and a safety cap from a 2 inch mortar. One of the cartridge cases recovered was noted to have been manufactured in Canada, (headstamp 'DC'; Dominion Cartridge Company,

Quebec, Canada), but this could have been used by the British army, as this company supplied .303 ammunition to all Allied forces.

6. Conclusion

The geophysical survey was successful in accurately locating the position of an anomaly indicative of a buried tank, a single area of magnetic enhancement was further prospected that may delimit the site of the first Covenantor tank excavated or another anomaly worthy of further archaeological investigation. It would be prudent to undertake further geophysical surveys, using ground penetrating radar and earth resistance meter instruments, to define the limits of the tank pit.

At this stage few conclusions can be drawn from the results of the metal detecting survey. Artefacts recovered confirmed WW2 activity at both the Denbies site and at the Dunley Hill Camp. Those from Denbies were primarily related to munitions, suggesting that this was a training area for soldiers in the use of small to medium calibre firearms, (e.g. Lee-Enfield rifles, Bren guns, Browning M2 .50cal machine guns) along with 2 inch mortars and No. 36M grenades. Those items recovered from Dunley Hill Camp also include munitions, with a number of domestic finds, that would be expected in the vicinity of military living quarters.

7. Archive deposition

The paper and digital archive will be kept at the SACIC office in Needham Market, before deposition in a location yet to be agreed.

8. Acknowledgements

The geophysical survey fieldwork was carried out and directed by Tim Schofield, the metal detector surveys and recording was directed by Mark Sommers and undertaken by a team of detectorists led by Stephen Taylor that comprised Richard Jordan, Adrian Jones, Martin Dewick and Matthew Sabourn. Project management was undertaken by Rhodri Gardner. The excavation of the tank at the Denbies was lead and undertaken by Rick Wedlock, who will also be undertaking its restoration, with a team of tank enthusiasts.

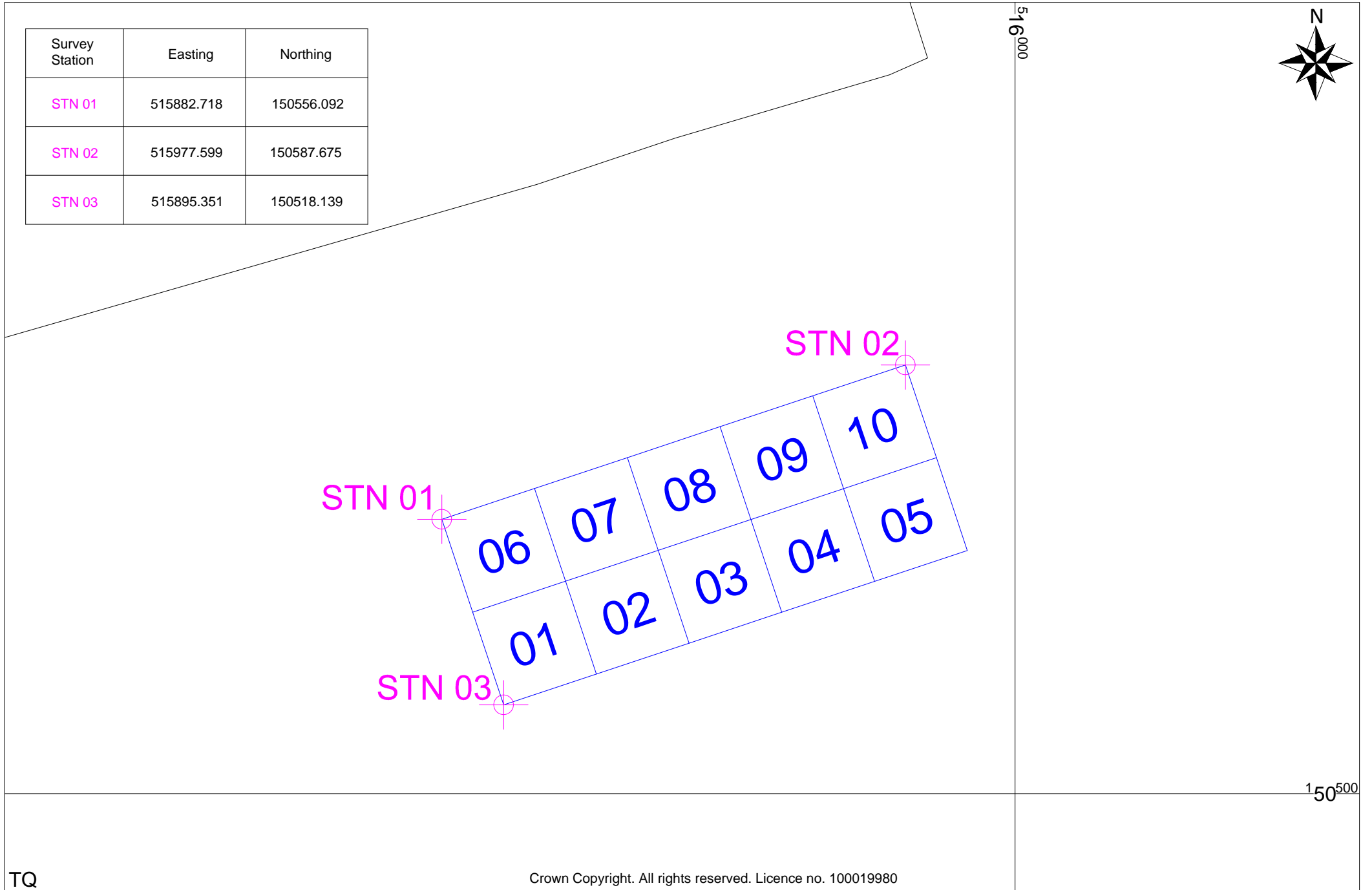
9. Bibliography

- Ayala, G., et al., 2004, *Geoarchaeology; Using Earth Sciences to Understand the Archaeological Record*. English Heritage.
- Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Archaeological Geophysical Survey*.
- Clark, A. J., 1996, *Seeing Beneath the Soil, Prospecting Methods in Archaeology*. BT Batsford Ltd. London.
- David, A., et al., 2014, *Geophysical Survey in Archaeological Field Evaluation*. Historic England.
- Gaffney, C., Gater. J., and Ovenden, S., 2002, *The Use of Geophysical Techniques in Archaeological Evaluations*. IFA Technical Paper No.6.
- Gaffney, C., and Gater. J., 2003, *Revealing the Buried Past, Geophysics for Archaeologists*. Tempus Publishing Ltd.
- Historic England, 2015, *Management of Research in the Historic Environment (MoRPHE)*.
- Schmidt, A., 2001, *Geophysical Data in Archaeology: A Guide to good Practice*. Archaeology Data Service. Oxbow books.
- Schmidt, A., et al., 2015, *EAC Guidelines for the use of Geophysics in Archaeology; Questions to ask and Points to Consider*. EAC Guidelines 2.
- Witten, A. J., 2006, *Handbook of Geophysics and Archaeology*. Equinox Publishing Ltd. London.

Websites

- British Geological Survey, 2018, <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Survey Station	Easting	Northing
STN 01	515882.718	150556.092
STN 02	515977.599	150587.675
STN 03	515895.351	150518.139



TQ

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Figure 2. Survey grid and georeferencing information



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Figure 3. Raw magnetometer greyscale plot

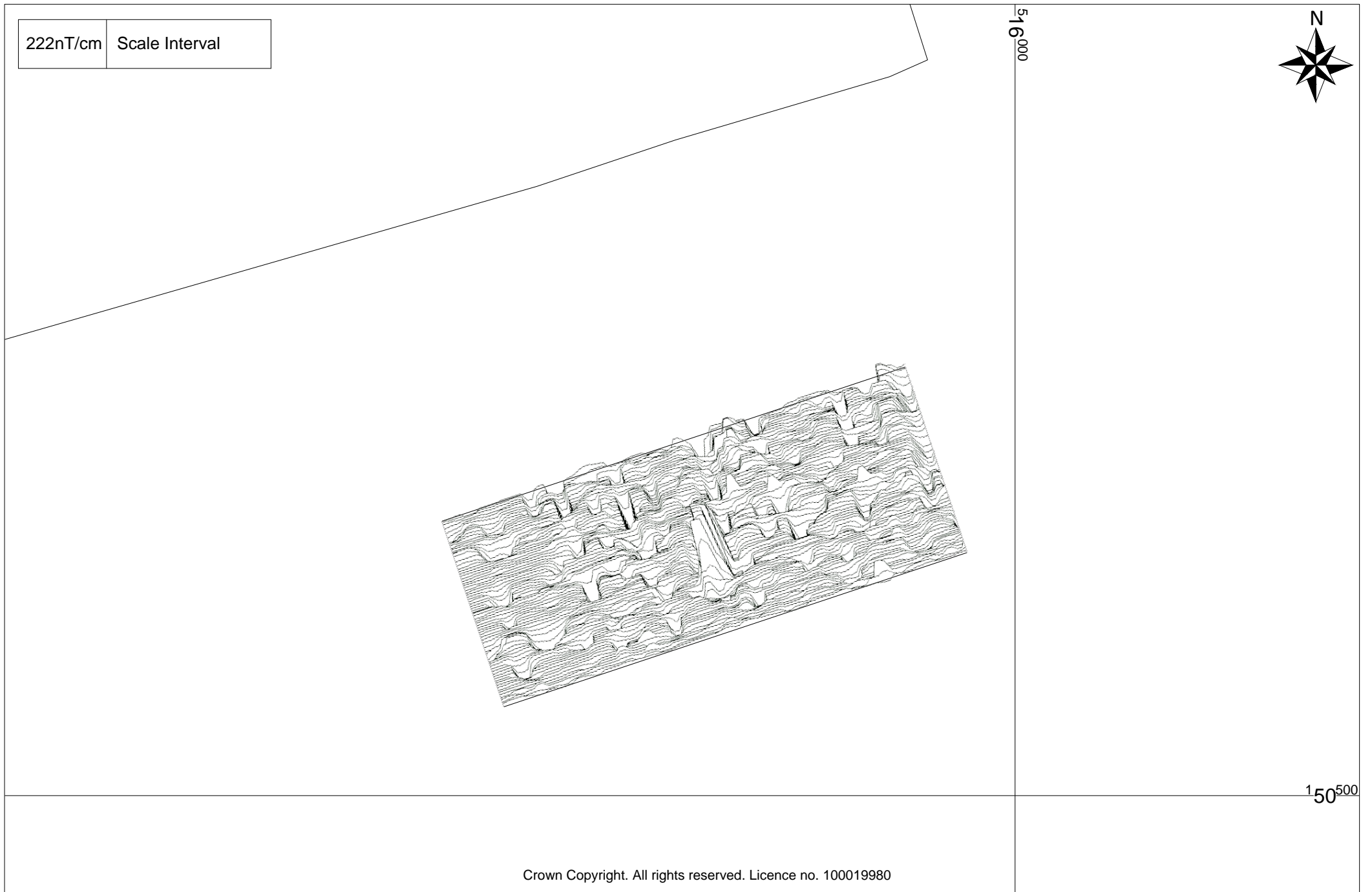


Figure 4. Processed magnetometer xy trace plot

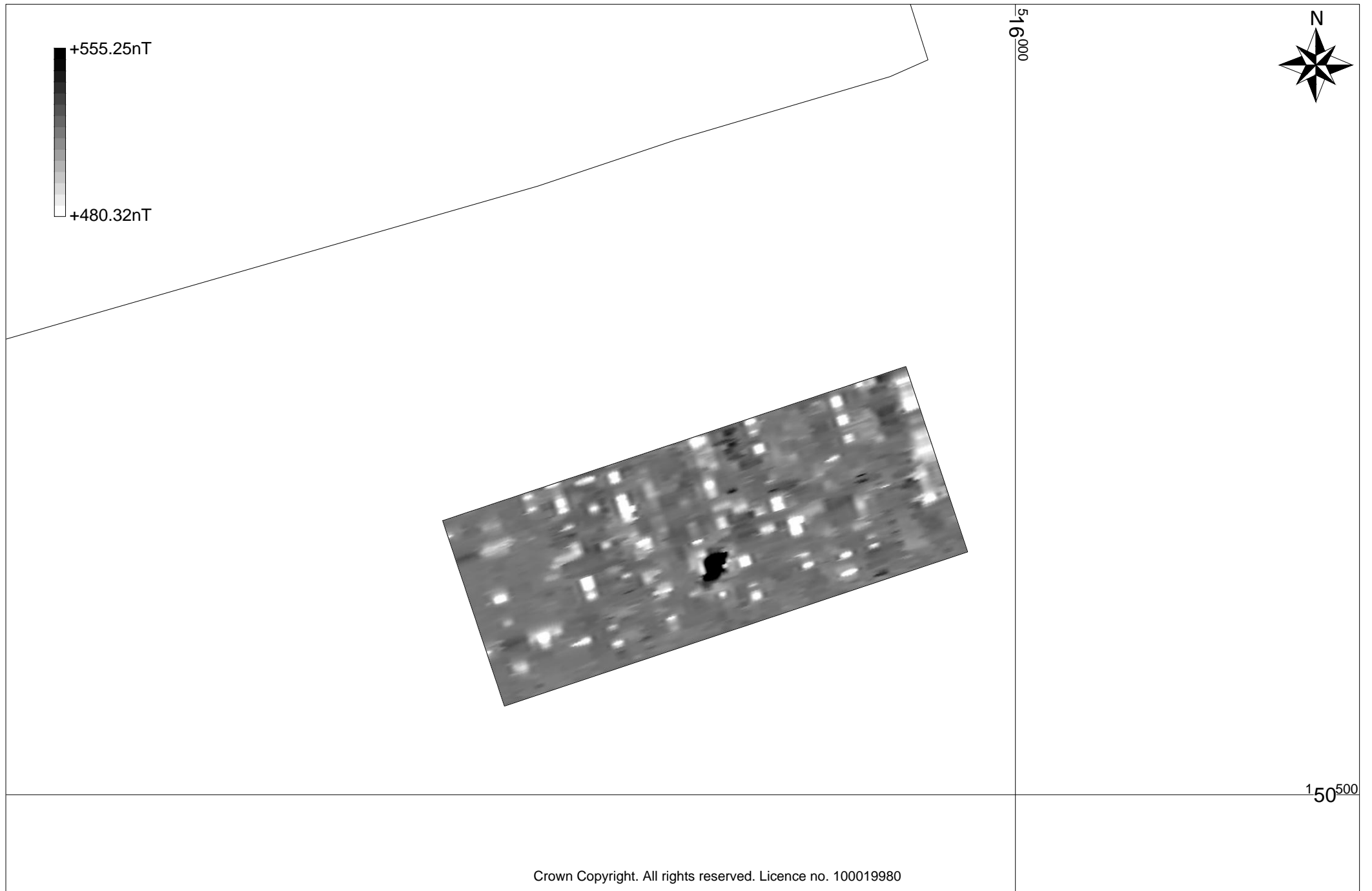


Figure 5. Processed magnetometer greyscale plot



Figure 6. Interpretation plot of magnetometer anomalies



Figure 7. Denbies Vineyard - Metal detector findspots



Figure 8. Dunley Hill Camp - Metal detector finds area

Appendix 1. Metadata sheets

Source Grids

Source Grids: 10	
1	Col:0 Row:0 grids\01.xgd
2	Col:0 Row:1 grids\02.xgd
3	Col:0 Row:2 grids\03.xgd
4	Col:0 Row:3 grids\04.xgd
5	Col:0 Row:4 grids\05.xgd
6	Col:1 Row:0 grids\06.xgd
7	Col:1 Row:1 grids\07.xgd
8	Col:1 Row:2 grids\08.xgd
9	Col:1 Row:3 grids\09.xgd
10	Col:1 Row:4 grids\10.xgd

Raw Data

Filename	Denbies 1 Raw.xcp
Description	
Instrument Type	Grad 601 (Magnetometer)
Units	nT
Direction of 1st Traverse	315 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	320 x 100
Survey Size (meters)	40 m x 100 m
Grid Size	20 m x 20 m
X Interval	0.125 m
Y Interval	1 m
Stats	
Max	1000.00
Min	-1000.00
Std Dev	289.48
Mean	-165.04
Median	-79.40
Composite Area	0.4 ha
Surveyed Area	0.4 ha
Program	
Name	TerraSurveyor
Version	3.0.32.4

Raw data schedule

Clip from -1000 to 1000 nT.

Processed Data

Filename	Denbies 1 Pro.xcp
Description	
Instrument Type	Grad 601 (Magnetometer)
Units	nT
Direction of 1st Traverse	315 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	320 x 100
Survey Size (meters)	40 m x 100 m
Grid Size	20 m x 20 m
X Interval	0.125 m
Y Interval	1 m
Stats	
Max	1265.40
Min	-987.80
Std Dev	172.60
Mean	-37.47
Median	0.35
Composite Area	0.4 ha
Surveyed Area	0.4 ha
Program	
Name	TerraSurveyor
Version	3.0.32.4

Processed data schedule

Despike Threshold: 1 Window size: 3x3

DeStripe Median Sensors: All

High pass Uniform (median) filter: Window: 21 x 21

Low pass Uniform (median) filter: Window: 3 x 3

Graduated Shade

Display Clip -500 +500nT

Appendix 2. Technical data

Detailed magnetometer survey

Detailed magnetometer survey is the most commonly employed archaeological geophysical prospection method in Britain; sensitive sensors can cost-effectively cover large areas of ground, rapidly recording anomalies that are indicative of cultural settlement activity. These anomalies can then be further investigated by field archaeologists to quantify a form and function. The magnetometer is a passive instrument that detects both permanent thermoremanent and temporary magnetic responses.

Thermoremanent Magnetism

When a material containing iron oxides, for example clay, is heated above the Curie point, weakly magnetic compounds transform into highly magnetic oxides that can be detected by the sensors of a magnetometer (Clark, 1996). For instance, the iron oxide haematite has a Curie temperature of 675 Celsius and magnetite 565 Celsius. Once these temperatures are reached, the oxides become demagnetised, on cooling their magnetic properties become permanently re-magnetised and align in the direction of the Earth's magnetic field (Gaffney and Gater, 2003). Over time the direction of the Earth's magnetic field changes allowing these directional differences to be detected by the magnetometer.

Strongly heated features such as hearths, kilns or furnaces frequently reach the Curie temperature and become permanently magnetised. These permanent magnetic responses are some of the strongest cultural features that can be recorded.

Temporary Magnetism

Magnetic susceptibility is the ease with which a magnetic field can pass through a material, therefore the higher the material's magnetic susceptibility, the stronger the induced magnetic field will be. Temporary magnetisation occurs within material that is magnetically susceptible, this material acquires its own local magnetic field that combines with the Earth's magnetic field causing an anomaly to stand out from the background noise (Clark, 1996). These anomalies are subtler in nature, being derived from material that has been magnetically enhanced by cultural activity which has become concentrated into features over time. Anomalies that have temporary

magnetisation include backfilled pits, ditches, field systems, occupation areas, land drains, remnant and existing field boundaries (David *et al*, 2014).

The key to a successful survey is having good contrast between the magnetic susceptibility of an archaeological feature with the surrounding superficial deposits. If there is no discernible difference between the two mediums it may be unlikely that the magnetometer will successfully prospect the feature. Archaeological features can also be masked by high magnetically susceptible topsoil, or deep overlying subsoil and colluvial deposits.

Ferrous anomalies

Ferrous objects are a common source of permanent magnetism, usually isolated with a strong dipolar signature. Some of these responses may have an archaeological derivation, however they are probably more indicative of modern iron objects introduced through manuring or lost within the topsoil.

Bartington DualGRAD 601-2 Fluxgate Gradiometers

Fluxgate gradiometers are the most commonly employed class of instrument in the UK. Two 1m sensitive sensors are affixed to a frame mounted 1m apart in a vertical plane and harnessed to the trunk of a geophysical surveyor or attached to a cart. Each sensor contains two fluxgate magnetometers with a 1m vertical separation. The sensor above records the Earth's magnetic field (magnetic background) while the sensor below records the local magnetic field. The two sensors need aligning before recording can begin and a zero station is located in an area with low magnetic variation for this purpose. After the sensors have been aligned, the survey can begin. When differences in the magnetic field strength occur between the two vertical magnetometers within each sensor, a positive or negative reading is recorded that is relative to the magnetic background of the zero station. Positive anomalies include pits, ditches and agricultural furrows. Negative anomalies commonly prospected include earthwork embankments, land drains and geological features.

Sensors are normally mounted to a height of 0.30m above the surface, and can detect to a depth of between one and two metres below the ground. The first survey traverse is commonly undertaken in an east to west direction.

Magnetic Anomalies

Isolated dipolar responses

Isolated dipolar responses are commonly recorded throughout a dataset and are usually indicative of modern ferrous material deposited within the topsoil horizon. In some instances, the anomalies may be of an archaeological derivation. They are isolated, strong and dipolar in character.

Areas of magnetic disturbance

These anomalies are usually caused by building demolition rubble, ferrous boundaries, slag waste dumps, modern buried rubbish, pylons and services. Strong and dipolar in character, they are commonly recorded over a wide area.

Linear trends

Linear trends can be either positive or negative magnetic responses depending on the nature of the material present within the feature. If the anomaly is broad and weak, it is more likely to be of geological origin. Stronger positive linear trends are more likely to be of archaeological derivation, caused by settlement activity washing rich humic, charcoal and fired deposits into a feature. Negative linear trends are more commonly associated with bank deposits or land drains, with the less magnetically susceptible superficial deposits deposited at the top of the feature. Curvilinear trends are usually of archaeological origin, commonly interpreted as ring ditches or drip-gullies.

Discrete anomalies

Discrete anomalies can either be positive or negative in nature recorded within a localised area. Those that are positive are more likely to be of an archaeological origin, with negative discrete anomalies more commonly interpreted as natural geological variations.

Thermoremanent responses

These responses are caused by the heating of material containing iron to above the Curie temperature, they are strong and discrete in nature. In Britain high positive readings are recorded to the south of the anomaly with high negative readings recorded to the north.

Appendix 3. Metal detecting finds from the Denbies Site

Site Name	Denbies Vineyard, Dorking, Surrey				
Small finds No.	Material	Find Spot No.	Find Spot Description	NGR	Comments
1	Brass	Tank Pit	Complete .303 blank cartridge. Head stamp 'R↑L 26 VII'		
2	Composite	DNB 7	Rectangular object – modern TV part	515914, 150576	
3	Aluminium	DNB 2	Small Alloy fragment	515933, 150535	
4	Composite	DNB 3	Circular coin, both faces corroded. Illegible, possibly £1	515930, 150550	
5	Aluminium	DNB 5	Thin Alloy strip, irregularly folded	515928, 150556	
6	Lead alloy	DNB 6	Bullet, without cartridge case	515926, 150562	
7	Composite	DNB 8	Bullet, without cartridge case, Pre circa 1900	515913, 150586	
8	Brass	DNB 1	.303 Cartridge case. Head stamp '1943 K2 GL'.	515917, 150573	Indent on percussion cap shows it to have been fired by a Bren gun.
9	Zinc alloy	DNB 9	Fins from 2 inch smoke mortar	515823, 150517	
10	Composite	DNB 4	Small circular piece of metal with raised circular moulding offset at one end. Possible mine firing pin?	515929, 150554	
11	Zinc alloy	DNB 12	2 inch HE mortar fins. (42) stamped on base	515636, 150416	
12	Steel	DNB 10	2 inch parachute illumination mortar shell case	515811, 150475	
13	Steel	DNB 11	2 inch parachute illumination mortar shell case	515833, 150500	

14	Iron	DNB 13	Boot heel metal insert fragment	515786, 150365	
15	Tin	DNB 13	'Sunny Spread' jar lid, damaged but legible. Red and white	515786, 150365	
16	Zinc alloy	DNB 13	Base portion of central fuze column from a No. 36M grenade	515786, 150365	Damaged when grenade exploded
17	Brass	DNB 13	.303 Cartridge case. 'Head stamp R↑L 39 VII'	515786, 150365	
18	Composite	DNB 13	Conical (but spit open) fragment of 50 Cal. Bullet jacket	515786, 150365	
19	Composite	DNB 13	.303 bullet	515786, 150365	
20	Composite	DNB 13	.303 bullet. Deformed.	515786, 150365	
21	Composite	DNB 13	Metallic ring: Possible sealing washer or curtain ring	515786, 150365	
22	Composite	DNB 13	Coin. Penny of George V (1910-1936). Dated 1917, seated Britannia on Reverse	515786, 150365	
23	Steel	Tank Pit	Fragments of barbed wire		
24	Steel	Tank Pit	2 fragments: Possible broken pen and knife blade		
25	Steel	Tank Pit	Corroded thin steel fragments		
26	Steel	Tank Pit	Rectangular steel plate		
27	Steel	Tank Pit	Steel fragments. From helmet or vehicle?		
28	Alloy	Tank Pit	Alloy fragment		
29	Composite	Tank Pit	Ovoid metal fitting. Damaged, possible Eye: Tent or vehicle cover		
30	Composite	Tank Pit	General service button (standard military issue). Reverse: 'Firmin & Son LTD London'		
31	Composite	Tank Pit	Coin. Decimal penny of Elizabeth II. Post 1970		
32	Concrete/Steel	Tank Pit	½ circular (damaged) practice German landmine (Tellerminen 42)		

Appendix 4. Metal detecting finds from Dunley Hill Camp

Site Name	Dunley Hill Camp				
Small finds No.	Material	Find Spot No.	Find Spot Description	NGR	Comments
1	Composite	Dunley Hill Camp	Bulb reflector for light		Photographed
2	Composite	Dunley Hill Camp	Shaving brush		Photographed
3	Lead alloy	Dunley Hill Camp	Lead tubing fragment, possibly electrical insulation		Photographed
4	Copper alloy/steel	Dunley Hill Camp	2 Circular brass door handle knobs, steel shaft still attached to one		Photographed
5	Steel	Dunley Hill Camp	2 toothed steel wheels with connecting shaft and part of rectangular support on one side		Photographed
6	Composite	Dunley Hill Camp	No 151 fuze safety cap, (used in 2 inch high explosive mortars), 'Remove Before Firing' on the top.		Photographed
7	Composite	Dunley Hill Camp	2 Spark plugs heavily corroded 1:14mm 'Champion' J-12 1:18mm 'Lodge'		Photographed
8	Steel/Iron	Dunley Hill Camp	Circular perforated metal stove part? With remains of handle		Photographed
9	Composite	Dunley Hill Camp	Bottle top threaded with metal handle. ?Water bottle		Photographed
10	Composite	Dunley Hill Camp	'Lift the dot' type fastener , from standard British/Canadian webbing and attachments		Photographed
11	Composite	Dunley Hill Camp	2 buckles from 1937 patternwebbing.		Photographed
12	Alloy	Dunley Hill Camp	Alloy round fitting, flat		Photographed
13	Lead Alloy/ Composite	Dunley Hill Camp	Possible lead shell fragment		Photographed

14	Composite	Dunley Hill Camp	Tube for ?paint, ?ointment, ?toothpaste. Squeezable		Photographed
15	Composite	Dunley Hill Camp	Metal tube marked 'Balloon Gauge'		Photographed
16	Composite	Dunley Hill Camp	Rounded end cap		Photographed
17	Brass	Dunley Hill Camp	.303 cartridge case. Head stamp worn and illegible		Photographed
18	Brass	Dunley Hill Camp	.303 Cartridge case head stamp worn and illegible. Unfired		Photographed
19	Brass	Dunley Hill Camp	.303 Cartridge case. Head stamp 'DC 41 303 VII Z'		Photographed
20	Brass	Dunley Hill Camp	.303 Cartridge case. Head stamp '1941 VII' Unfired		Photographed
21	Brass	Dunley Hill Camp	.303 Cartridge case. Head stamp very worn '1942 VII'		Photographed
22	Brass	Dunley Hill Camp	.303 Cartridge case. Head stamp '↑↑ 1941 VIII Z' Unfired. As a Mk VIII, the use of this cartridge was restricted to Vickers Machine guns.		Photographed
23	Brass	Dunley Hill Camp	.303 Cartridge case. Head stamp '↑ 1941 VII' Unfired		Photographed
24	Brass	Dunley Hill Camp	.303 Cartridge case. No head stamp. Percussion cap missing		Photographed

Appendix 5. OASIS form

OASIS DATA COLLECTION FORM: England

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OASIS ID: suffolka1-316995

Project details

Project name	Denbies Vineyard, Dorking, and Dunley Hill Camp, Effingham
Short description of the project	metal detector survey of two areas occupied by troops during World War 2 were detected. A number of munitions and domestic items relating to the military occupation were recovered. Magnetometer survey also undertaken to confirm the location of WW2 tank (a Covenanter) buried within one camp (now the site of Denbies Vineyard). The tank was then excavated and recovered with the aim of restoration.
Project dates	Start: 22-05-2017 End: 11-05-2018
Previous/future work	No / No
Type of project	Research project
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	NONE None
Significant Finds	LAND VEHICLE Modern
Significant Finds	EXPLOSIVE WEAPON Modern
Significant Finds	CARTRIDGE Modern
Investigation type	"Salvage Excavation", "Systematic Metal Detector Survey"
Prompt	Research
Solid geology (other)	Holywell Nodular Chalk Formation and New Pit Chalk Formation
Drift geology (other)	none recorded
Techniques	Magnetometry

Project location

Country	England
Site location	SURREY MOLE VALLEY DORKING Denbies Vineyard and Dunley Hill Camp, Effingham
Study area	14.5 Hectares
Site coordinates	TQ 1583 5047 51.241111228751 -0.340460431938 51 14 28 N 000 20 25 W Point
Site coordinates	TQ 1071 5003 51.238174202628 -0.413921819111 51 14 17 N 000 24 50 W Point

Project creators

Name of Organisation	Suffolk Archaeology CIC
Project brief originator	Not applicable - not under planning jurisdiction

Project design originator	Suffolk Archaeology CIC
Project director/manager	Stephen Taylor
Project supervisor	Tim Schofield
Project supervisor	Mark Sommers
Type of sponsor/funding body	Client

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Surrey HER
Digital Contents	"Survey"
Digital Media available	"Text"
Paper Archive Exists?	No

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Magnetometer and Metal Detector Survey Report: Denbies Vineyard and and Dunley Hill Camp, Dorking and Effingham, Surrey. World War 2 Treasure Hunters (Series 1, Episode 6)
Author(s)/Editor(s)	Taylor, S.
Author(s)/Editor(s)	Schofield, T.
Author(s)/Editor(s)	Sommers, M.
Other bibliographic details	SACIC Report No. 2017/114
Date	2018
Issuer or publisher	SACIC
Place of issue or publication	Needham Market
Description	printed sheets of A4 paper with card covers and wire binding
Entered by	Tim Schofield (tim.schofield@suffolkarchaeology.co.uk)
Entered on	16 July 2018

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