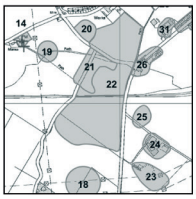
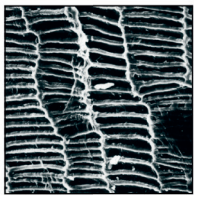
GWPS18










SMITHS LAWN, WINDSOR GREAT PARK, SURREY

GEOPHYSICAL SURVEY
PLANNING REF. 18/00196/FULL

commissioned by CgMs Heritage
on behalf of Guards Polo Club Holdings Ltd

May 2018

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

SMITHS LAWN, WINDSOR GREAT PARK, SURREY

GEOPHYSICAL SURVEY
PLANNING REF. 18/00196/FULL

commissioned by CgMs Heritage
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May 2018

This report adheres to the quality standard of ISO 9001:2008

PROJECT INFO:

HA Project Code **GWPS18** / NGR **SU 9704 7054** / Parish **Old Windsor** / Local Authority **Royal Borough of Windsor and Maidenhead** / OASIS Ref. **headland5-315633**

PROJECT TEAM:

Project Manager **Sam Harrison** / Author **David Harrison** / Fieldwork **Neil Paveley, Ross Bishop** / Graphics **David Harrison, Julia Bastek-Michalska**

Approved by **Sam Harrison** .....

Headland Archaeology North
Unit 16 | Hillside | Beeston Rd | Leeds LS11 8ND
t 0113 387 6430
e north@headlandarchaeology.com
w www.headlandarchaeology.com

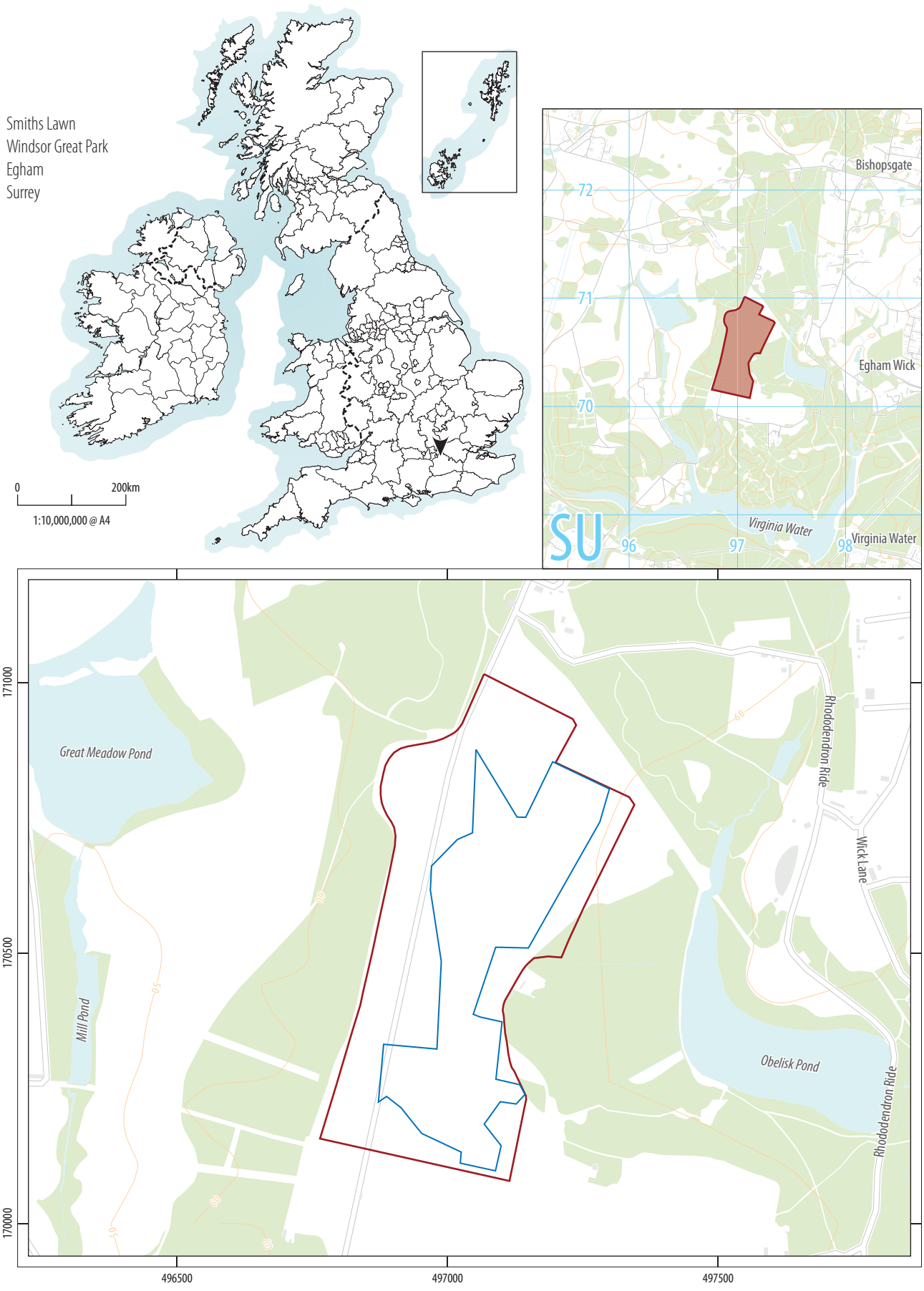
HEADLAND ARCHAEOLOGY

PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey, covering approximately 13 hectares, in support of a planning application (Ref 18/00196/FULL) for improvements to the polo pitches at Smiths Lawn, Windsor Great Park, Surrey. No anomalies of definite archaeological potential have been identified by the survey. Numerous ferrous anomalies have been identified which are consistent with the use of the lawn as an airfield during the Second World War and its subsequent recreational use as polo pitches. A broad band of ferrous anomalies aligned north north-east/south south-west in the centre of the lawn probably locates the buried remains of a runway, possibly used by Edward VIII in the 1920s, and subsequently used as a relief landing ground for de Havilland Tiger Moth trainers in the Second World War. A single rectilinear anomaly towards the north of the runway may be due to an earlier soil-filled ditch, and is ascribed moderate archaeological potential, although a modern origin is possible. No other anomalies of any archaeological potential have been identified and therefore, on the basis of the geophysical survey, the archaeological potential of the geophysical survey area is assessed is low.

CONTENTS

LIST OF ILLUSTRATIONS



HEADLAND ARCHAEOLOGY
Headland Archaeology North
Unit 16 | Hillside | Beeston Rd | Leeds LS11 8ND
t 0113 387 6430
e north@headlandarchaeology.com
w www.headlandarchaeology.com

ILLUS 1 Site location

SMITHS LAWN, WINDSOR GREAT PARK, SURREY

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by CgMs Heritage (the Consultant), on behalf of their client Guards Polo Club Holdings Ltd, to undertake a geophysical (magnetometer) survey at Smiths Lawn, Windsor Great Park, where improvements are proposed to the polo pitches including landscaping by means of cut and fill of varying depths. The survey has been requested by Roland Smith (Archaeology Officer at Berkshire Archaeology) in relation to planning application 18/00196/FULL.

The work was undertaken in accordance with a Written Scheme of Investigation for Geophysical Survey (Bishop 2018) and in line with current best practice (Chartered Institute for Archaeologists 2014, English Heritage 2008).

The survey was carried out on the 5th and 6th of April 2018.

1.1 SITE LOCATION, LAND-USE AND TOPOGRAPHY

The application boundary comprises 29 hectares of mainly turfed ground which is utilised as polo pitches on Smiths Lawn, within Windsor Great Park, centred at SU 9704 7054 (see Illus 1). It is bound to the west by Prince Consort Drive and by woodland on all other sides. The geophysical survey area (GSA) covered almost half of the application boundary (13 hectares) and targeted the area where grading and deeper truncation is proposed. It comprises an irregularly shaped block of land towards the east of the lawn (Illus 3). At the time of the survey the GSA was under short grass (Illus 2).

Smiths Lawn is located on a plateau that rises from approximately 58m Above Ordnance Datum (AOD) in the east to 68m AOD in the west.

1.2 GEOLOGY AND SOILS

The bedrock geology comprises sand of the Bagshot Formation, overlain by superficial river terrace deposits of sand and gravel (NERC 2018).

The soils are classified in the Soilscape 14 association, characterised as freely draining, very acid sands and loams (Cranfield University 2018).

2 ARCHAEOLOGICAL BACKGROUND

An archaeological desk-based assessment (CgMs 2018) which considered the known archaeological resource of the application boundary and wider study area concluded that 'the study site can be considered to have a low to moderate potential for below ground archaeological deposits for all periods'.

The lawn was used as a base depot for the Canadian Forestry Corps during the Second World War and, from the 1920s, the area was used as an airfield by the Prince of Wales (later King Edward VIII). In the Second World War the lawn as used as an airfield (RAF Smiths Lawn) and relief landing ground for de Havilland Tiger Moth trainers, with an assembly plant for Vickers-Armstrongs Wellington bombers constructed from 1940. The plant was built in response to damage to the main company factory at Brooklands following a Luftwaffe raid. At the conclusion of the war, all military and construction facilities were removed and the lawn returned to recreational use.

A ground penetrating radar (GPR) was undertaken in 2013 to identify any sub surface structural remains, particularly in association with the WWII airfield. No remains were identified.

ILLUS 2 Smiths Lawn (south), looking south

3 AIMS, METHODOLOGY AND PRESENTATION

The general aim of the geophysical survey was to provide sufficient information to establish the presence/absence, character and extent of any archaeological remains within the survey area. This will therefore enable an assessment to be made of the impact of the proposed development on any sub-surface archaeological remains, if present.

The specific archaeological objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore model the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

3.1 MAGNETOMETER SURVEY

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. A feature such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses (swaths) 4m apart. These readings were stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system was linked to a Trimble R8s Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy for each data point.

MLGrad601 and MultiGrad601 (Geomar Software Inc.) software was used to collect and export the data. Terrasurveyor V3.0.32.4 (DWConsulting) software was used to process and present the data.

3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:10,000. Illus 2 is a site condition photograph. Illus 3 is a 1:2,500 survey location plan showing the GPS swaths overlying areas of proposed cut and fill. Large-scale fully processed (greyscale) data, minimally processed data (XY traceplot) and an accompanying interpretative plot are presented at a scale of 1:2,500 in inclusive.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. Data processing details are presented in Appendix 4. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 5.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Bishop 2018), guidelines outlined by Historic England (English Heritage 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All illustrations from Ordnance Survey mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All illustrations are presented to most suitably display and interpret the data from this site based on the experience and knowledge of management and reporting staff.

4 RESULTS AND DISCUSSION

The ground conditions were very good (Illus 2) and contributed to a high standard of data quality throughout.

Generally, with the exception of the southern part of the GSA, the survey has detected a variable magnetic background manifesting in the data as a plethora of discrete areas of low magnitude magnetic enhancement (anomalies). These anomalies are caused by variation in the composition of the soils and the river terrace deposits from which they derive.

Four high magnitude dipolar linear anomalies (SP1–4; Illus 6) are identified on varying orientations in the north-east and south of the GSA. These anomalies locate buried pipes, possibly drains. The series of parallel linear anomalies, aligned north-east/south-west, north-east of SP1 are characteristic of land drains.

The southern part of the GSA is dominated by ferrous anomalies throughout. No clear pattern is discernible against this background although vague and fragmentary linear anomalies, appearing on varying alignments, may locate drains. Against this variable magnetic background, it is difficult to provide a confident interpretation of all but the highest magnitude ferrous spikes and pipes. The increased background is probably due to landscaping and/or the spreading of demolition material (brick, concrete, iron etc) within the topsoil, probably following the closure of RAF Smiths Lawn after the Second World War.

A clear linear band of ferrous anomalies (RW1; Illus 6) is identified aligned north north-east/south south-west within the centre of the lawn and extending for 675m. Rows of regularly-spaced ferrous spikes, 25m in width, are clearly visible across the band. The location and alignment of the band corresponds closely to a trackway which is shown on the 1811 Ordnance Survey map and the anomalies may locate the surface of the track. However, given the width of the band of ferrous anomalies and the known 20th century military activity on the lawn, it is thought likely that the anomalies locate a runway, the rows of ferrous spikes being due to ferrous fixings in the former runway surface. No runways are shown here on historical cartographic sources.

A single rectilinear anomaly (D1; Illus 6) has been identified which does not obviously conform to a modern or geological interpretation. The anomaly is thought to be due to a soil-filled ditch and may be archaeological in origin, perhaps locating a small enclosure – the western extent being masked by the ferrous anomalies within RW1. Alternatively, the ditch may be associated with the 20th century military use of the site, perhaps locating a small building or electrical service trench.

5 CONCLUSION

The survey has successfully evaluated the GSA and has not identified any anomalies of definite archaeological potential. Broad areas of magnetic disturbance and numerous ferrous anomalies have been identified which are consistent with the use of the lawn as an airfield during the Second World War and its subsequent recreational use as polo pitches. A broad band of ferrous anomalies aligned north north-east/south south-west in the centre of the lawn probably locates the buried remains of a runway, possibly used by Edward VIII in the 1920s, and subsequently used as a relief landing ground for de Havilland Tiger Moth trainers in the Second World War. A single rectilinear anomaly towards the north of the runway may be due to an earlier soil-filled ditch, and is ascribed moderate archaeological potential, although a modern origin is possible. No other anomalies of any archaeological potential have been identified and therefore, on the basis of the geophysical survey, the archaeological potential of the geophysical survey area is assessed is low.

6 REFERENCES

Bishop R 2018 ***Smiths Lawn, Windsor Great Park, Egham, Surrey; Written Scheme of Investigation for Geophysical Survey*** [unpublished client document] Headland Archaeology Ref GWPS18

CgMs 2018 ***Archaeological Desk-Based Assessment; Smiths Lawn, Windsor Great Park, Egham, Surrey TW20 0HP*** [unpublished client report] CgMs Heritage Ref AR/RM/24013

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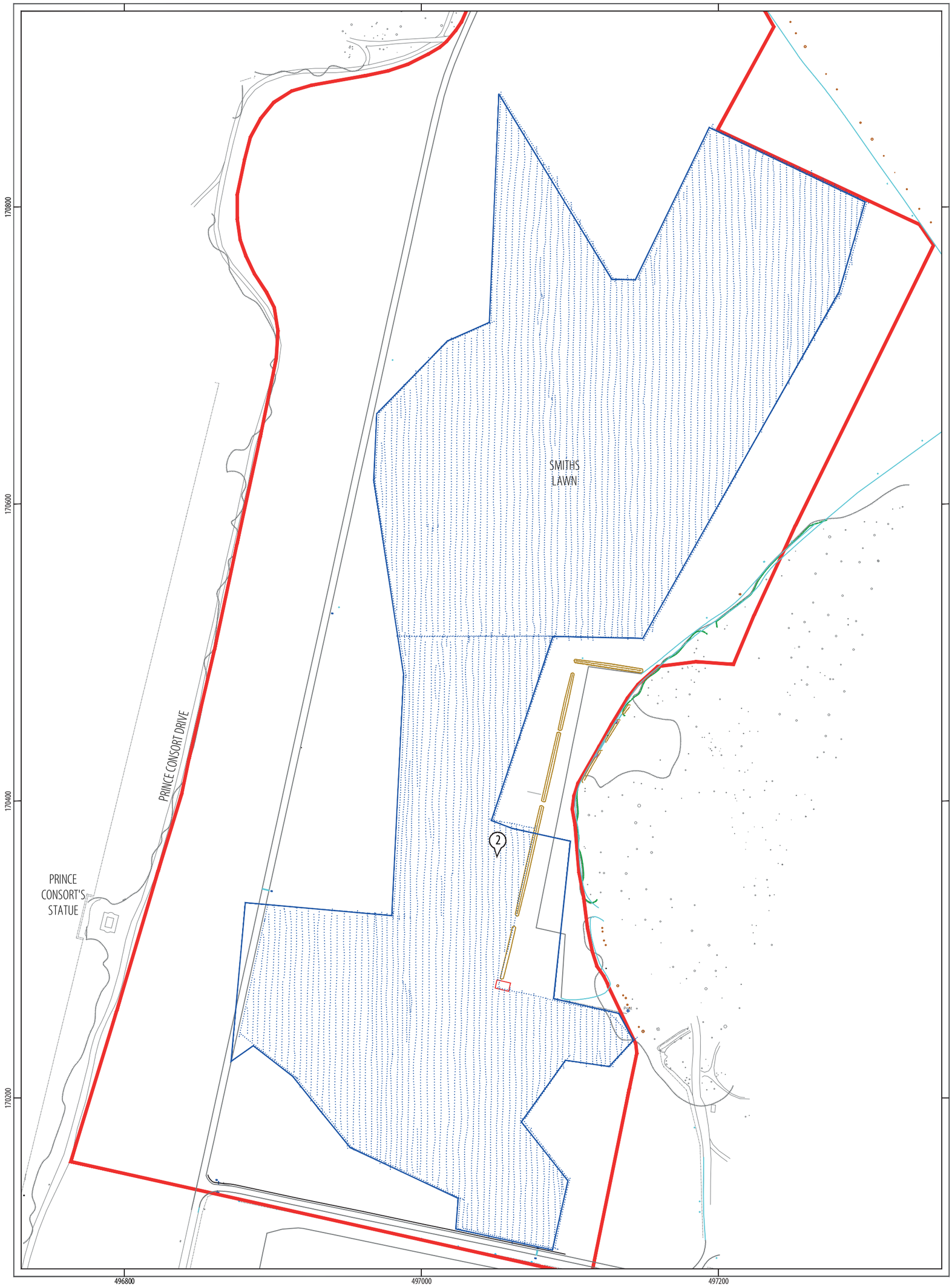


application boundary
geophysical survey area
GPS swaths
location and direction of ILLUS 2

0 50m
1:2,500 @ A3

PROJECT GWPS18
Smiths Lawn
Windsor Great Park
Surrey
CLIENT CgMs Heritage

HEADLAND ARCHAEOLOGY
NORTH Unit 16, Hillside, Beeston Road
Leeds LS11 8ND
0113 387 6430
www.headlandarchaeology.com

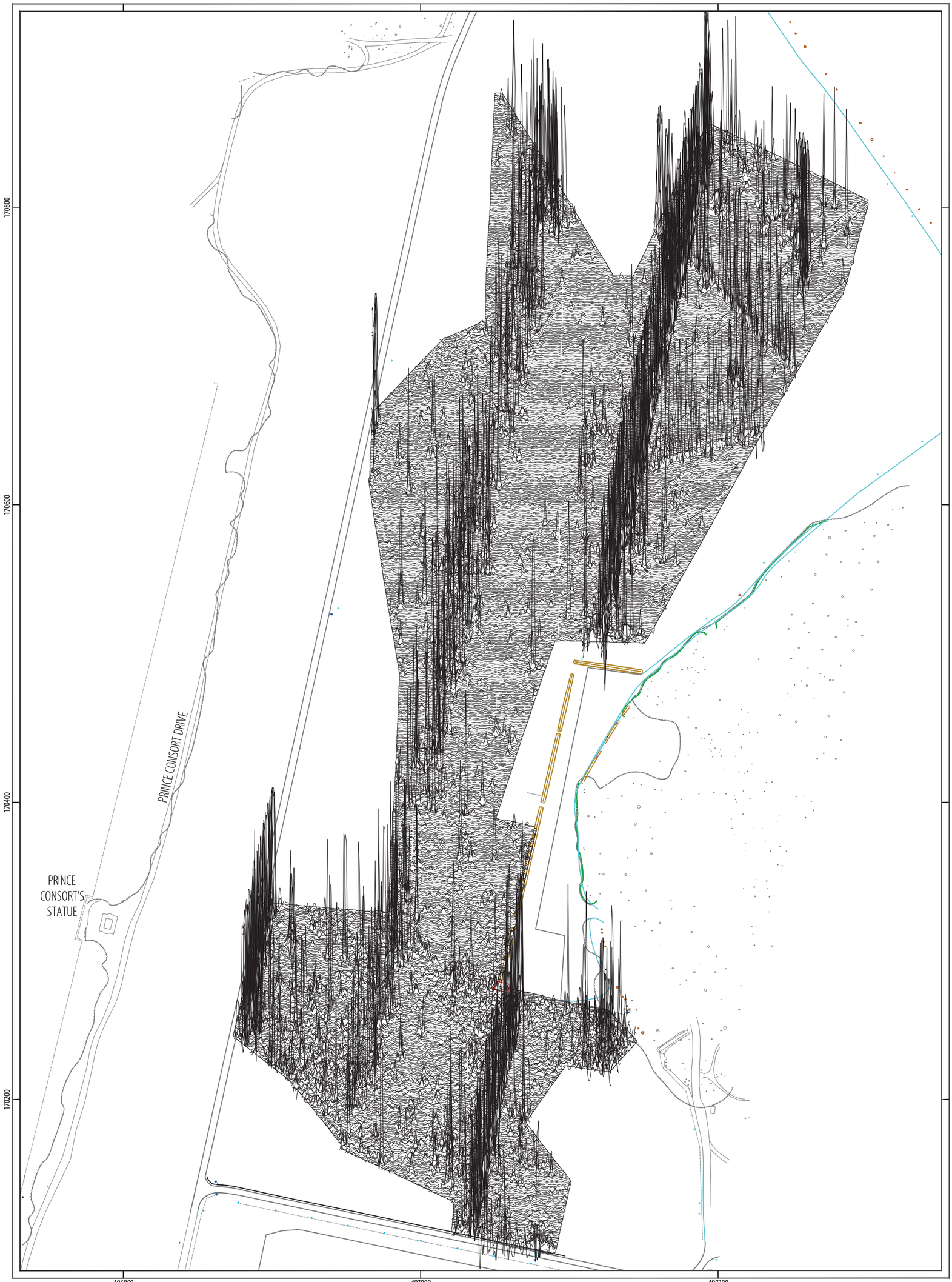
ILLUS 3 Survey location showing GPS swaths (1:2,500)

PROJECT GWPS18
Smiths Lawn
Windsor Great Park
Surrey

CLIENT CgMs Heritage

HEADLAND ARCHAEOLOGY
NORTH Unit 16, Hillside, Beeston Road
Leeds LS11 8ND
0113 387 6430
www.headlandarchaeology.com

ILLUS 4 Processed greyscale magnetometer data (1:2,500)



50.0nT/cm

0 50m

1:2,500 @ A3

PROJECT GWPS18
Smiths Lawn
Windsor Great Park
Surrey

CLIENT CgMs Heritage

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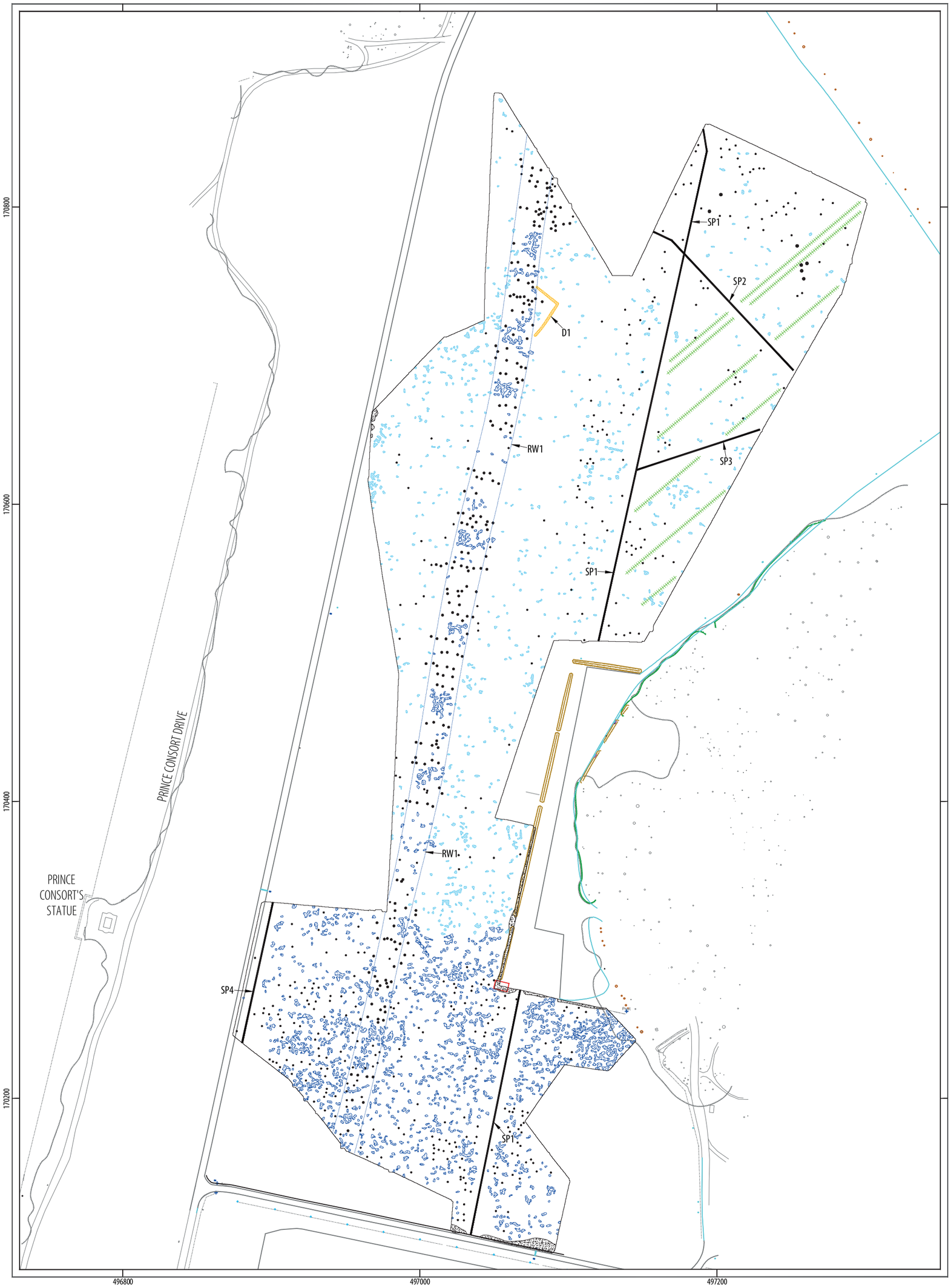
ILLUS 5 XY trace plot of minimally processed magnetometer data (1:2,500)



TYPE OF ANOMALY	INTERPRETATION
dipolar isolated	ferrous material
magnetic disturbance	ferrous material
dipolar linear	service pipe
magnetic disturbance	modern
linear trend	field drain
magnetic enhancement	geology

TYPE OF ANOMALY	INTERPRETATION
magnetic enhancement	archaeology?

ABBREVIATIONS	
D	ditch
SP	service pipe
RW	runway

0 50m
1:2,500 @ A3

PROJECT GWPS18
Smiths Lawn
Windsor Great Park
Surrey

CLIENT CgMs Heritage

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0113 387 6430
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ILLUS 6 Interpretation of magnetometer data (1:2,500)

7 APPENDICES

APPENDIX 1 MAGNETOMETER SURVEY

Magnetic susceptibility and soil magnetism

Iron makes up about 6% of the earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

Types of magnetic anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes) These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

APPENDIX 2 SURVEY LOCATION INFORMATION

An initial survey base station was established using a Trimble VRS differential Global Positioning System (dGPS). The magnetometer data was georeferenced using a Trimble RTK differential Global Positioning System (Trimble R8s model).

Temporary sight markers were laid out using a Trimble VRS differential Global Positioning System (Trimble R8s model) to guide the operator and ensure full coverage. The accuracy of this dGPS equipment is better than 0.01m.

The survey data were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report.

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

Data collected using RTK GPS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features) in order to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.

APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-315633

Project details	
Project name	Smiths Lawn, Windsor Great Park
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey, covering approximately 13 hectares, in support of a planning application (Ref 18/00196/FULL) for improvements to the polo pitches at Smiths Lawn, Windsor Great Park, Surrey. No anomalies of definite archaeological potential have been identified by the survey. Numerous ferrous anomalies have been identified which are consistent with the use of the lawn as an airfield during the Second World War and its subsequent recreational use as polo pitches. A broad band of ferrous anomalies aligned north north-east/south south-west in the centre of the lawn probably locates the buried remains of a runway, possibly used by Edward VIII in the 1920's, and subsequently used as a relief landing ground for de Havilland Tiger Moth trainers in the Second World War. A single rectilinear anomaly towards the north of the runway may be due to an earlier soil-filled ditch, and is ascribed moderate archaeological potential, although a modern origin is possible. No other anomalies of any archaeological potential have been identified and therefore, on the basis of the geophysical survey, the archaeological potential of the geophysical survey area is assessed is low.
Project dates	start: 05–04–2018 end: 06–04–2018
Previous/future work	No / Not known
Any associated project reference codes	GWPS18 - Contracting Unit No.
Any associated project reference codes	18/00196/FULL - Planning Application No.
Type of project	Field evaluation
Site status	English Heritage List of Parks and Gardens of Special Historic Interest
Current Land use	Other 14 - Recreational usage
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	'Geophysical Survey'
Development type	Amenity area (e.g. public open space)
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Between deposition of an application and determination
Solid geology (other)	Bagshot Formation
Drift geology	River Terrace Deposits
Techniques	Magnetometry
Project location	
Country	England
Site location	Berkshire Windsor and Maidenhead Windsor Smiths Lawn, Windsor Great Park
Postcode	TW20 0UU
Study area	13 Hectares
Site coordinates	SU 9704 7054 51.425053765014 -0.604108868205 51 25 30 N 000 36 14 W Point
Project creators	
Name of Organisation	Headland Archaeology
Project brief originator	CgMs
Project design originator	Headland Archaeology
Project director/manager	Harrison, S
Project supervisor	Bishop, R

Type of sponsor/funding body	Developer
Project archives	
Physical Archive Exists?	No
Digital Archive recipient	In house
Digital Contents	'Survey'
Digital Media available	'Geophysics'
Paper Archive Exists?	No
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Smiths Lawn, Windsor Great Park, Surrey
Author(s)/Editor(s)	Harrison, D
Date	2018
Issuer or publisher	Headland Archaeology
Place of issue or publication	Leeds
Description	A4 comb bound report / PDF/A
Entered by	David Harrison (david.harrison@headlandarchaeology.com)
Entered on	27 April 2018

Headland Archaeology South & East
Building 68C | Wrest Park | Silsoe | Bedfordshire MK45 4HS
t 01525 861 578
e southandeast@headlandarchaeology.com

Headland Archaeology Midlands & West
Unit 1 | Clearview Court | Twyford Rd | Hereford HR2 6JR
t 01432 364 901
e midlandsandwest@headlandarchaeology.com

Headland Archaeology North
Unit 16 | Hillside | Beeston Rd | Leeds LS11 8ND
t 0113 387 6430
e north@headlandarchaeology.com

Headland Archaeology Scotland
13 Jane Street | Edinburgh EH6 5HE
t 0131 467 7705
e scotland@headlandarchaeology.com

www.headlandarchaeology.com