

# GEOPHYSICAL SURVEY

Headland Archaeology is one of the largest heritage consultants and contractors in the UK. Our Geophysics team has more than 40 years' experience of carrying out geophysical surveys in the United Kingdom and Ireland and interpreting the results.

Since May 2015 Headland has already carried out surveys covering in excess of 6,000 hectares for housing developments, road schemes, nuclear facilities, major infrastructure, wind and solar farm developments.

We believe the key to a successful project outcome is the speed at which the survey data is processed and interpreted and the need for any further archaeological work established. To ensure that this gap is minimised we process the data on a daily basis and will advise on any significant archaeology as it is identified. We think this is key to providing the client with an early assessment of the likely scope of any further works.

The range and length of experience of Headland's staff are critical. We can advise on the most effective techniques and methodologies to evaluate a site. Our experience is founded on comparing excavation results with survey data, something many survey companies fail to achieve.

Headland recognises that each site is unique and that soils, geology, topography and recent land use all impact on the quality and interpretability of the data. All these and other local factors are assessed to provide as accurate an interpretation of the data as possible.

## GEOPHYSICAL SURVEY METHODS

### » MAGNETOMETER SURVEY

This method is the most frequently used prospection technique. It is used to detect small magnetic variations caused by buried archaeological features. We have developed a hand carried multi-array magnetometer system (Headland Archaeology Multi Sensor Frame – HMSF). The HMSF affords easy access to sites and allows survey on terrain where cart-based surveys might struggle or even fail. It has significantly increased speed of survey compared to conventional dual sensor system allowing survey of up to 12 hectares in an 8 hour day.

### » EARTH RESISTANCE AREA SURVEY

This technique is predominantly used to define the extent of sub-surface buildings and/or masonry although it can also identify soil-filled features. It uses electrical currents that are inserted into the ground with the resistance to this current measured.

### » EARTH RESISTANCE IMAGING (ERI)

ERI is commonly used to gather data from greater depths than is possible using magnetometry or earth resistance. Multiple electrodes are set-out along a profile line and, by taking readings with differing separations, it is possible to record variations in resistance with depth allowing the identification of geological boundaries, water table depth, buried alluvial channels, mass burials and large buried archaeological features.

### » ELECTROMAGNETIC SURVEY (EM)

In EM surveys an electromagnetic field is induced that creates electrical current in the ground which can be measured as conductivity. Magnetic susceptibility is also recorded. Conductivity is comparable to an earth resistance area survey and the magnetic susceptibility is similar to magnetic survey. Standard EM equipment is able to record data at 3 different depths and can be used to identify buried alluvial channels, metallic features, areas of rubble, foundations and ditches.

### » GROUND PENETRATING RADAR (GPR)

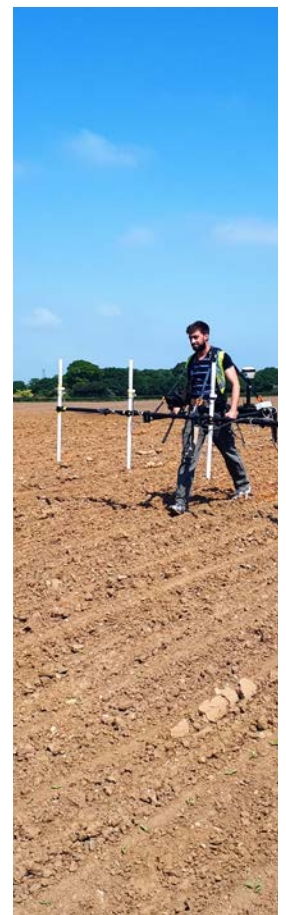
GPR measures reflections from buried features from transmitted electromagnetic waves. GPR survey can be carried out on a number of different ground surfaces, such as concrete, tarmac, soil and water. Certain types of instrument can record multiple frequencies enabling the survey to obtain data from different depths. This method can be used to identify services, building remains, graves and voids.

### » METAL DETECTOR SURVEY

A metal detector may be used where the objective of the survey is to locate metallic artefacts associated with a specific event on a site. A Global Positioning System (GPS) is used to record find spots and analysis of this spatial data in CAD or GIS can reveal patterns that can be used to define the extent of battlefields and settlement activity.

## CAPABILITY STATEMENT

We believe the key to a successful project outcome is the speed at which the survey data is processed and interpreted to allow early assessment of the likely scope of any further works.



## EXPERIENCE

- › **Vattenfall** Norfolk Vanguard Onshore Cable Corridor GEOPHYSICAL SURVEY
- › **RES Ltd** Brown's Holt Windfarm, Lincolnshire ES, GEOPHYSICAL SURVEY, FIELDWALKING
- › **Banks Group** Dewley Hill Surface Mine, Tyne and Wear DBA, GEOPHYSICAL SURVEY, FIELDWALKING
- › **Barratt Homes** Station Road Mickletown West Yorkshire EVALUATION
- › **Highways England** Trans-Pennine Upgrade GEOPHYSICAL SURVEY
- › **GasCorp Ltd** Ridge Farm, Leeds GEOPHYSICAL SURVEY, EXCAVATION
- › **Drax Group Ouse Renewable Energy Plant** Yorkshire and Immingham Renewable Energy Plant, North Lincolnshire ES, GEOPHYSICAL SURVEY, EVALUATION TRENCHING
- › **Scotch Corner Richmond LLP** Land west of A6108 Scotch Corner EVALUATION TRENCHING
- › **Newthorpe Aggregates Ltd** Newthorpe Quarry GEOPHYSICAL SURVEY, EVALUATION TRENCHING
- › **Thornhill Estates** Kirklees Knowl Farsley PUBLIC ENQUIRY

## KEY STAFF

### ALISTAIR WEBB (REGIONAL MANAGER)

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Alistair is the Senior Manager responsible for overall management of the geophysical survey teams, as well as other developer funded archaeological field projects. He was employed by Archaeological Services WYAS for more than 25 years working at all levels within the organisation from Site Assistant to Senior Manager, being involved in geophysical surveys almost exclusively for 15 years, as well as managing other large fieldwork projects. During his career at ASWYAS he wrote in excess of 350 grey literature reports, the majority being on geophysical surveys, for clients in all sectors of the heritage industry including national bodies such as English Heritage and Historic Scotland, as well as for other archaeological contracting companies, heritage consultants and commercial companies.

Alistair joined Headland in April 2015 as Regional Manager to set up and run the Headland North office in Cleckheaton which specialises in archaeological geophysical surveys throughout the United Kingdom.

Alistair gained his BA in Environmental Studies in 1984 and in 1995 successfully completed modules on Magnetic and Electromagnetic Methods of Survey, part of the MSc in Archaeological Prospection run by Bradford University. Alistair is a Member of the Chartered Institute for Archaeologists (MCIfA), a member of the CfA geophysics Special Interest Group (GeoSIG) and the International Society for Archaeological Prospection (ISAP). He has successfully completed IOSH Managing Safely training.

### SAM HARRISON (PROJECT MANAGER)

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Sam joined Headland in May 2015 following 11 years with Archaeological Services WYAS where he managed over 200 geophysical survey projects from small scale Heritage Lottery funded community schemes to large-scale linear infrastructure projects up to 700 hectares in size. He has substantial experience in managing, organising and undertaking shallow

sub-surface archaeological prospection techniques including magnetometry, earth resistance, ground penetrating radar, ERT and electro-magnetic methods. Sam is highly experienced in specialist geophysics software programs, such as Geoplot and Terrasurveyor, as well as AutoCAD Map, Illustrator, MapInfo and ArcGIS.

Sam graduated in 2002 from Bradford University with an Honours degree in Archaeological Sciences. He subsequently refined his interest in remote sensing techniques gaining an MSc in Archaeological Prospection in 2005. He is a Member of the Chartered Institute for Archaeologists (MCIfA) and has completed the ILM Leadership and Management Course (Level 3). He is also CSCS certified.

### DAVID HARRISON (PROJECT MANAGER)

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David has more than 12 years' experience of organising, undertaking and reporting on commercial geophysical surveys across the UK and Ireland. In his current position, David is responsible for managing small to medium sized projects, managing large amounts of geophysical data on a daily basis, quality control and reporting. In recent years, he has specialised in large-scale multi-sensor magnetometer surveys using both Sensys and Bartington systems. Since joining Headland in 2015 David has been integral in the development and design of Headlands own unique hand-carried multi sensor magnetometer, complete with on board GPS and wireless technology.

David has a BA (Hons) in Archaeology awarded in by 1999 by King Alfred's College, Winchester and an MSc in Archaeology awarded by the University of Liverpool in 2002. David is CSCS certified and First Aid at Work trained. He is a Member of the Chartered Institute for Archaeologists (MCIfA) and has successfully completed IOSH Managing Safely training.



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