GFSF22

Tydd Solar Farm, Land East of Guanockgate Rd, Gorefield: Fenland District Council, Cambridgeshire and South Holland District Council, Lincolnshire

Written Scheme of Investigation for Geophysical Survey

Cambridgeshire Event Code: ECB7006

Client: Pathfinder Clean Energy (PACE) Ltd.

v.02

Headland Archaeology (UK) Ltd
Units 23-25
Acorn Business Centre
Balme Road
Cleckheaton
BD19 4EZ

HEADLAND ARCHAEOLOGY

1 INTRODUCTION

1.1 This Written Scheme of Investigation (WSI) has been prepared by Headland Archaeology in advance of a geophysical (magnetometer) survey at Tydd Solar Farm, Gorefield, Fenland District Council, Cambridgeshire and South Holland District Council, Lincolnshire at the request of Abrams Archaeology on behalf of the Client, Pathfinder Clean Energy (PACE) Ltd, to inform a planning application for a proposed Solar Photovoltaic (PV) array and associated infrastructure at the site.

1.2 The results of the geophysical survey will be submitted in support of the planning application for the future development of the land and may also inform future archaeological strategy at the site, if required. A Brief for Archaeological Evaluation (Cambridgeshire Historic Environment Team – CHET 2022) for the proposed new Solar Photovoltaic (PV) array and detailed requirements for the preparation of the Written Scheme of Investigation (WSI) and for the undertaking of the prescribed works by the archaeological geophysical survey contractor (Headland Archaeology Ltd) has been used to guide the preparation of this WSI. In addition, this WSI has been prepared and the survey will be undertaken in accordance with the guidance set out by the Lincolnshire County Council Archaeology Handbook (2019).

1.3 The WSI is produced to comply with the requirements of both the archaeological brief and the scoping document as well as to standards laid down in the European Archaeological Council's guideline publication EAC Guidelines for the Use of Geophysics in Archaeology (Europae Archaeologia Consilium 2016), the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2014). The survey is being undertaken in accordance with the requirements of the National Planning Policy Framework (MHCLG 2022).

2 DESCRIPTION OF THE SITE

2.1 The GSA (Illus 1) comprises the area within the PDA covered by 2 roddons. This consists of 3 distinct irregularly shaped parcels of land measuring approximately 37.2ha in area, centred at NGR TF 38297 12877.

2.2 The underlying bedrock geology comprises Mudstone of the West Walton and Ampthill Clay Formations, sedimentary bedrock formed between 165.5 and 157.3 million years ago during the Jurassic period. The superficial geology consists of Tidal Flat Deposits – clay and silt. Sedimentary superficial deposts formed between 2.588 million years ago and the present during the Quaternary period.

2.3 The soils are classified in the Soilscape 21 Association being described as loamy and clayey soils of coastal flats with naturally high groundwater (Cranfield University 2022).

3 ARCHAEOLOGICAL BACKGROUND

3.1 The following archaeological background is based on an initial review of Lincolnshire Historic Environment Record (HER) and Cambridgeshire Historic Environment Record (HER) data within a 1km radius of the PDA.

3.2 The geophysical survey targets roddon crests, examples of which in the wider area are known to contain archaeological remains. Roddons are considered to have a higher chance of being foci of archaeological activity due to being silt, sand and clay filled channels representing areas of higher ground within the fen landscape.

3.3 No evidence of prehistoric activity is recorded in the vicinity of the PDA. However, Roman activity is known within close proximity. This includes two possible Romano-British settlements, one on the southern boundary (MLI22330) of the PDA

and another approximately 160m south-west of the south-western corner of the PDA (MLI22307). Other evidence of Romano-British activity includes pottery found to the immediate west (MLI22309) of the PDA and approximately 730m west (MLI22304) of the PDA.

3.4 Evidence for Medieval and Early Medieval activity includes the settlement of Sutton St Edmund (MLI20513), approximately 900m west of the PDA. Running through the PDA from north to south is Lady Nunn's Old Eau (20854), a drainage channel dating from the 13th Century and improved in 1596. There is substantial evidence of post-medieval activity including numerous farms, buildings and farmsteads surrounding the PDA dating from the post-Medieval period to the present. Within the PDA is a decoy pond (08422) dating from this period.

4 OBJECTIVES

4.1 The principal objectives of the programme of geophysical survey are to gather information to establish the presence/absence, character, and extent of any archaeological remains within the GSA, and to inform the DCO application and any further investigation strategies.

4.2 The aims of the survey are:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified,
- to therefore determine the likely presence/absence and extent of any buried archaeological features, and
- to produce a comprehensive site archive and report.

5 PROJECT TEAM

5.1 The project will be managed for Headland Archaeology by Christian Adams (Project Manager). The field team will comprise of at least one Supervisor.

5.2 The project team will familiarise themselves with the background to the site and will be aware of the project's aims and methodologies.

5.3 Headland Archaeology (UK) Ltd is a Registered Archaeological Organisation and abides by the Codes of Conduct and Approved Practice and Standards of the Chartered Institute for Archaeologists. The company has all the necessary technical and personnel resources for the satisfactory completion of the survey.

6 INSURANCE & COPYRIGHT

6.1 Headland Archaeology (UK) Ltd is fully indemnified and all necessary insurances can be presented on request.

6.2 Copyright will be retained by Headland Archaeology (UK) Ltd. Headland will licence the client and other bodies as necessary for use in matters relating to the project and for use of the project archive by the relevant museum. This licence will also extend to non-commercial use.

7 HEALTH & SAFETY

7.1 All of Headland's work is undertaken in accordance with current H&S legislation. A risk assessment and method statement will be prepared prior to the commencement of fieldwork. All staff will wear appropriate PPE.

8 METHOD

8.1 A geophysical (magnetometer - gradiometer) survey will be carried out across all parts of the survey area, excluding any which are unsuitable for magnetometer survey, an area of up to approximately 37.2ha.

8.2 The survey will be undertaken using four Bartington Grad601 sensors mounted at 1m intervals (allowing for a 1m traverse interval) onto a rigid carrying frame. The system will be programmed to take readings at a frequency of 10Hz (allowing for a 10-15cm sample interval) on roaming traverses spaced 4m apart. These readings will be stored on an external weatherproof laptop and later downloaded for processing and interpretation. MLGrad601 and MultiGrad601 (Geomar Software Inc.) software will be used to collect and export the data. Terrasurveyor V3.0.37.0 (DWConsulting) software will be used to process and present the data.

8.3 The magnetometer system will be linked to a Trimble R8s and R2 Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy of each data point.

8.4 A series of temporary sight markers will be established within each survey area using a Trimble dGPS system. The markers will guide the operator and ensure full coverage with the magnetometer system.

8.5 At the start of each day the magnetometer will be left idle whilst switched on for approximately 30 minutes to allow the instrument to acclimatise to the site conditions. The instrument will thereafter be balanced when necessary and at least twice during the day.

8.6 The survey is expected to commence on TBC and is likely to take up to 4 days with a single team of surveyors. A draft report will be issued to the Client within 3-4 weeks of completion on site.

8.7 A photographic record of the site will be undertaken during the geophysical survey. It shall be accompanied by a photographic register detailing as a minimum location, and direction of shot. Digital photographs intended for archive purposes will comply with the latest best practice – i.e. high quality non-proprietary raw files (DNG) or TIFF images. Working shots illustrating ground conditions and areas unsuitable for survey will be included within the report but will not form part of the archive.

9 REPORTING AND ARCHIVE

9.1 On completion of the survey, a report will be produced containing all relevant information including (but not necessarily limited to):

- site code/project number; Cambridge Event Ref. No; dates for fieldwork visits; grid references; location plan, and a plan showing the limits of the survey area,

- a non-technical summary of the reason for, aims and main results of the survey,
- an introduction to outline the circumstances leading to the commission of the project and any restrictions encountered,
- the aims and objectives of the survey,
- the methodology used,
- a summary and synthesis of the archaeological results in relation to the methods used together with a confidence rating and the perceived importance in local, regional, or national context. This shall be supported by a survey location plans and plots of minimally processed (X-Y traceplot) and 'raw' fully processed (greyscale) data at a minimum scale of 1:2500 with larger scale (1:1000) plots of all areas of clear archaeological potential. Each plan/plot will have a bar scale and accurately orientated north arrow; Survey locations, all greyscale plots of the processed data and interpretative plots will be georeferenced and supplied in .dwg or .shp formats along with the submission of the survey report so that these can be added to the HER digital material together,
- OASIS Reference Number and fieldwork summary, and
- references to all primary and secondary sources consulted.
- acknowledgement of CCC's HET advisory and planning role.

9.2 All figures will be reproduced from Ordnance Survey mapping with the permission of the controller of His Majesty's Stationery Office (© Crown copyright).

9.3 A digital copy of the report, clearly marked DRAFT, will be made available to the CHER within 4 weeks of the completion of site works unless there are reasonable grounds for more time. This report will conform to the format contained within CIfA Standard and guidance for archaeological geophysical survey (2014) Annex 2.

9.4 The CHER will be supplied with shape files georeferenced greyscale plots of the processed data and interpretation layers for inclusion into the HERs' GIS mapping modules.

9.5 Following approval a digital copy will be supplied to CHER via OASIS.

9.6 A digital copy, in PDF format, will be supplied to the Lincolnshire Council Historic Environment Record (LCHER).

9.7 In addition, Headland Archaeology will make their work accessible to the wider research community by submitting digital data and copies of the report online to OASIS (see above).

9.8 The project will be ultimately archived with the ADS (see attached Data Management Plan) and in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3) and the Data Management Plan prior to the submission of the approved report.

10 MONITORING

10.1 A standard working day will involve driving to site, condition surveys of the survey area, survey area setting out and detailed geophysical survey. Data will be sent back to the office on a regular basis and progress reports provided to the client.

Key Contacts

Christian Adams, Project Manager	07392 870524
Alistair Webb, Project Manager	01274 938019
Steve Nicholson, Health and Safety Coordinator	07388 943978

11 BIBLIOGRAPHY

Chartered Institute for Archaeologists (CIfA) 2014 Standard and guidance for archaeological geophysical survey (Reading) http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_3.pdf accessed 24 October 2022

Cranfield University 2021 Cranfield Soil and Agrifood Institute Soilscapes www.landis.org.uk/soilscapes/ accessed 24 October 2022

Ministry of Housing, Communities and Local Government (MHCLG) 2021 National Planning Policy Framework 2021 National Planning Policy Framework https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf accessed 24 October 2022

Europae Archaeologia Consilium (EAC) 2016 AC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider (Namur, Belgium) https://historicengland.org.uk/images-books/publications/eac-guidelines-for-use-of-geophysics-in-archaeology/ accessed 24 October 2022

Natural Environment Research Council (NERC) 2021 British Geological Survey http://www.bgs.ac.uk/ accessed 24 October 2022

Cambridge Historic Environment Team (CHET) 2022 Brief for Archaeological Evaluation: Land at Treading Field, Treading Drain, Tydd St Giles, Cambridgeshire

Lincolnshire County Council 2019 Archaeology Handbook https://www.lincolnshire.gov.uk/downloads/file/2204/archaeology-handbook-pdfa accessed 24 October 2022

12 DATA MANAGEMENT PLAN

Section 1: Project Administration

Project ID / OASIS ID
OASIS ID = Headland5–xxx Site Code = GFSF22
Project Name
Tydd Solar Farm, Land East of Guanockgate Rd, Gorefield: Fenland District Council, Cambridgeshire and South Holland District Council, Lincolnshire
Project Description
Geophysical (magnetometer) Survey – 37.2 hectares of agricultural land. Aim is to inform a planning application

Project Funder / Grant reference
Client Funded – Pathfinder Clean Energy (Pace) Ltd
Project Manager
Christian Adams – Project Manager, Headland Archaeology
Principal Investigator / Researcher
TBC – Project Officer Headland Archaeology
Data Contact Person
Sam Harrison – Senior Manager responsible for IT
Date DMP created
21-10-2022
Date DMP last updated
-
Version
1.0
Related data management policies
http://guides.archaeologydataservice.ac.uk/g2gp/Contents EAC Guidelines for the use of geophysics in archaeology 2016

Section 2: Data Collection

What data will you collect or create?

Fluxgate Gradiometer data is collected in the field in proprietary format and converted to XYZ format ready for import to processing software and archiving purposes. Vector data will be stored in DWG format, this will include the minimally processed XY trace plots and interpretation. Raster images will be stored as Tiff and TFW files. The report will be uploaded to OASIS as PDF/A format.

Type	Format	Estimated Volume
Text/Documents	PDF/A	1 x PDF
Vector Graphics	DWG	2 x DWG
GIS	TIFF+TFW	<10 files

How will the data be collected or created?

Data Standards / Methods

Data collected to the following guidance: European Archaeological Council's guideline publication EAC Guidelines for the Use of Geophysics in Archaeology (*Europae Archaeologia Consilium* 2016), the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2014). Data is collected utilising Bartington Sensors and Data Loggers using MulitGrad software from Geomar.

Data Storage

The working project archive will be stored in a project specific folder or data specific folder on the internal organisational server. The internal organisation server is backed up twice daily to maintain an up to date security copy of the organisation wide data. • Project folders are named following established organisational procedures. • Data collected will be downloaded and raw data will be stored in the appropriate folder. File naming conventions following established organisational procedures, based on ADS file naming guidance, and include version control management. All files included as part of this project archive will include an organisational identifier (PA), the Site Code (CWTP), the file descriptor (eg ProjectDesign) and Version number (eg v2).

File naming conventions following established organisational procedures, based on ADS file naming guidance, and include version control management.

Quality Assurance

Instruments used in the collection of data are calibrated prior to use and checked to ensure they are in full working order.

All site records and data collected will be reviewed during project delivery to ensure data is accurate and secure.

Data collection and management are reviewed regularly as part of the organisational Quality Policy (SHEQ-Q-C03 Quality ManualV3.2). This includes a review of internal project folders to ensure our organisational data management standards are being met.

Section 3: Documentation and metadata

What documentation and metadata will accompany the data?
Data collected will include standard formats which maximise opportunities for use and reuse in the future. A Collection Level Metadata Summary is included in all standard archaeological projects and will be completed as the project is delivered. A working copy will be kept on the organisational server in the Project Folder. The Collection Level Metadata Summary brings together the overarching project details and includes a register of data types and number of objects included in the archive, along with all other archive components. Metadata tables for each data type will be populated as the project progresses and will use the standard format for each data type as recommended by ADS, who are the intended repository for the digital data archive. Full metadata as required by the ADS when depositing will be created.

Section 4: Ethics and legal compliance

How will you manage any ethical, copyright and Intellectual Property Rights (IPR) issues?
Copyright will be retained by Headland Archaeology (UK) Ltd. Headland will licence the client and other bodies as necessary for use in matters relating to the project and for use of the project archive by the relevant museum. This licence will also extend to non-commercial use.

Section 5: Data Security: Storage and Backup

How will the data be stored, accessed and backed up during the research?
Headland Archaeology IT is managed by an external data management provider, who is also responsible for the management and verification of our daily back-ups and who supports access to security copies as needed. Data is backed up to Cloud based services daily.

Section 6: Selection and Preservation

Which data should be retained, shared, and/or preserved?
Data that is required to be archived will be retained when the project is complete. The data archive will be ordered, with files named and structured in a logical manner, and accompanied by relevant documentation and metadata
What is the long-term preservation plan for the dataset?
The digital archive will be deposited with the Archaeology Data Service, which is a certified repository with Core Trust Seal. The cost of which is unknown until the final archive is created.
Have you contacted the data repository?
No - quantity of data currently unknown Headland Archaeology regularly archive geophysical surveys with the ADS, following the standard procedures.
Have the costs of archiving been fully considered?
Yes – but quantity of data currently unknown

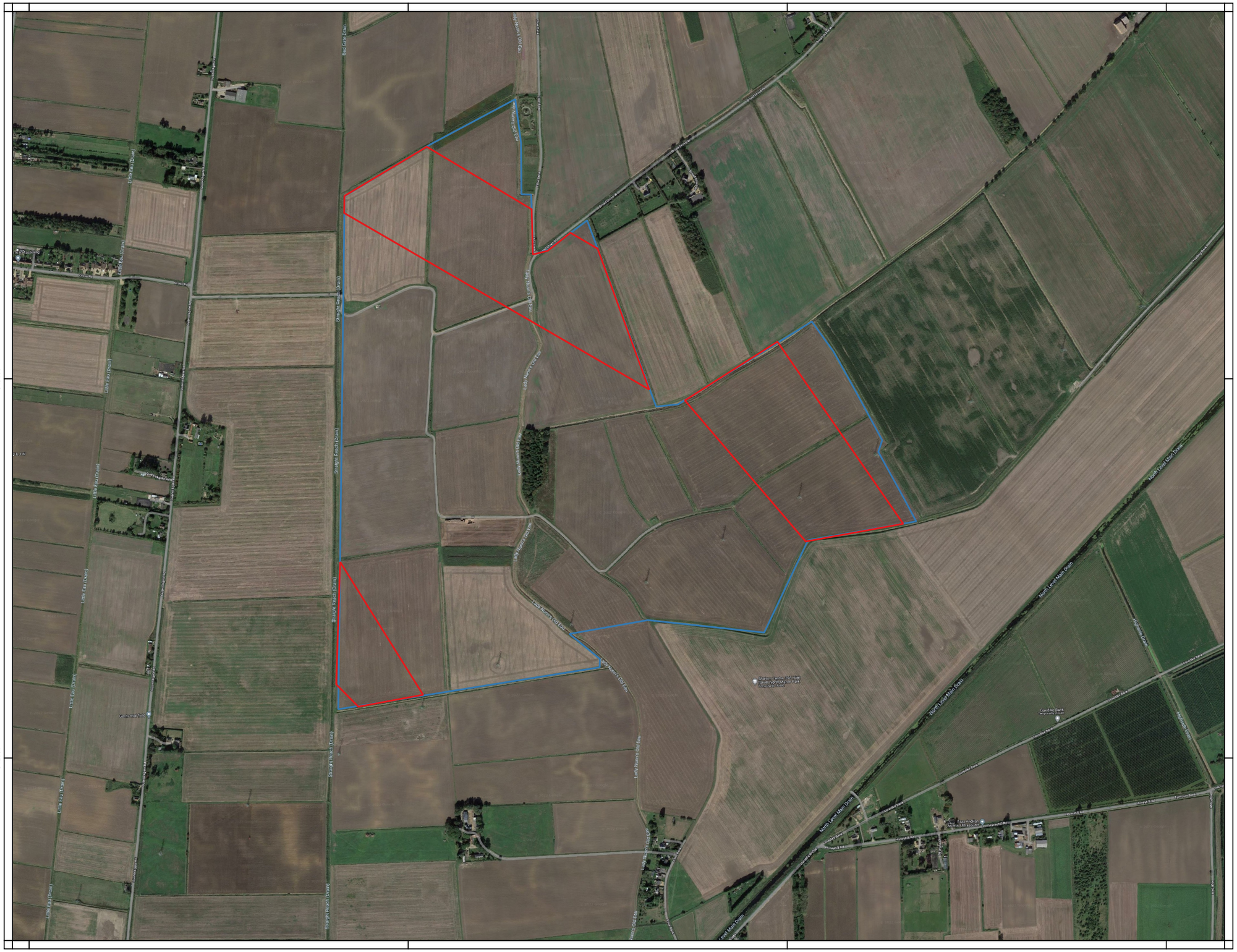
Section 7: Data Sharing

How will you share the data and make it accessible?

A summary of the project will be included on the OASIS Index of Archaeological Investigation and the digital archive repository and will be updated when the project has finished. The final report is expected to be completed within 12 months of the completion of fieldwork. The location (s) of the final Archaeological Archive will be added to OASIS when appropriate. The ADS will disseminate the digital elements of the Archaeological Archive online under a creative commons licence and the dataset will receive a unique identifier (DOI).
Are any restrictions on data sharing required?
A temporary embargo may be required on the sharing of the project results to the wider public. Once the project is in the public domain the embargo will be removed.

Section 8: Responsibilities

Who will be responsible for implementing the data management plan?
The Project Manager will be responsible for implementing the DMP. Data capture, metadata production and data quality is the responsibility of the Project Team, assured by the Project Manager. Storage and backup of data in the field is the responsibility of the field team. Once data is incorporated into the project server, storage and backup is managed by an external company. Data archiving is undertaken by the project team



HEADLAND ARCHAEOLOGY
Headland Archaeology Yorkshire & North
Units 23-25 | Acorn Business Centre | Balme Road
Cleckheaton | BD19 4EZ
t 0113 387 6430
e yorkshire&north@headlandarchaeology.com
w www.headlandarchaeology.com