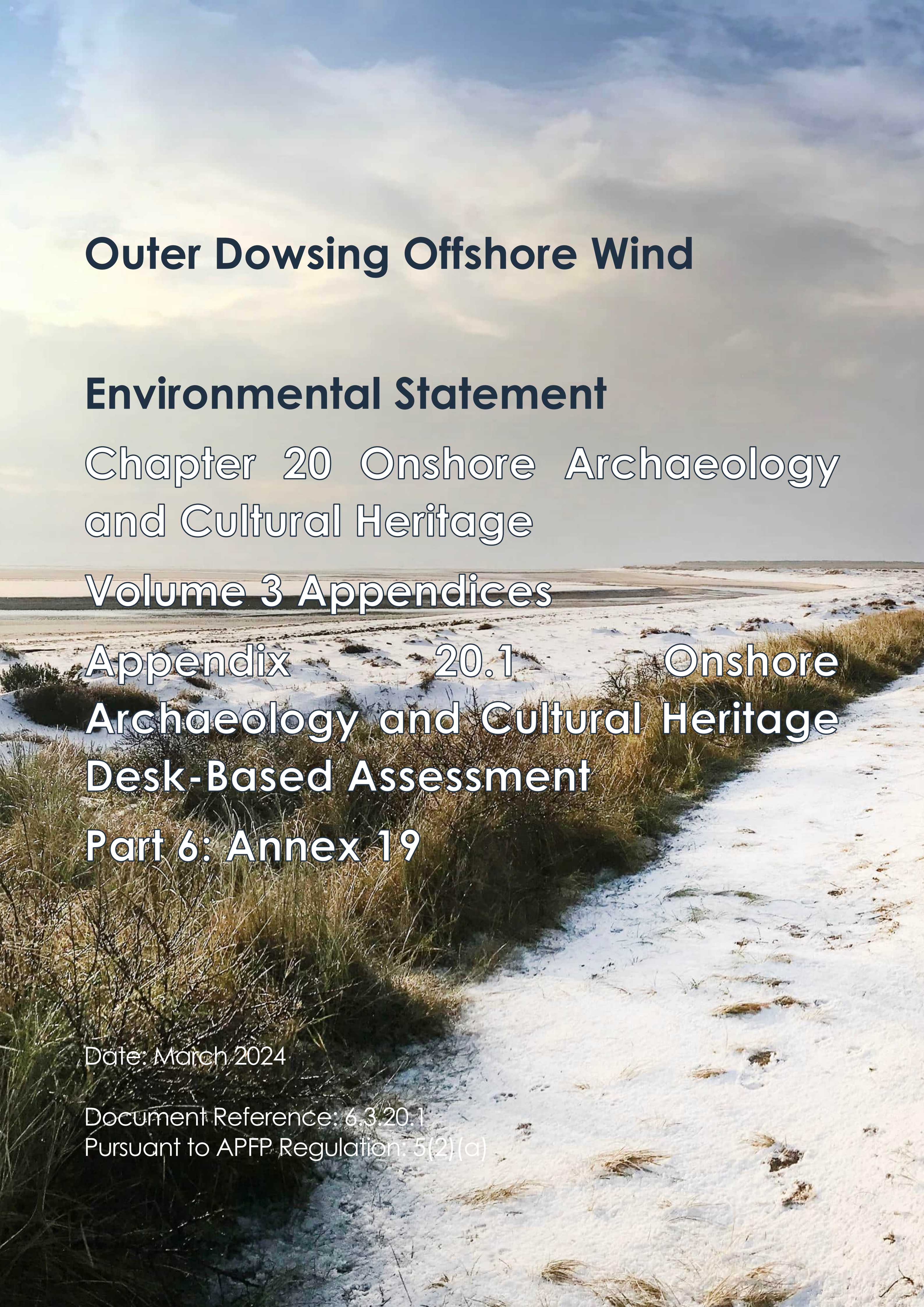

Outer Dowsing Offshore Wind

Environmental Statement

Chapter 20 Onshore Archaeology and Cultural Heritage

Volume 3 Appendices

Appendix 20.1 Onshore Archaeology and Cultural Heritage Desk-Based Assessment

Part 6: Annex 19

Date: March 2024

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Annex 19: Magnetometer and Electromagnetic Geophysical Survey

Geophysical Survey Report

For

Outer Dowsing Offshore Wind, Lincolnshire

For

GT R4 Limited

Magnitude Surveys Ref: MSTF1592

HER Event Number: TBC

OASIS Number: TBC

February 2024

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Issue Date:

05 March 2024

Abstract

Magnitude surveys was commissioned to assess the sub-surface archaeological potential along the route of the Outer Dowsing Offshore Wind Onshore Cable Connection through a standard magnetometer survey, and to map the paleoenvironmental features of the survey area through a low frequency electromagnetic (EM) survey. The EM survey allowed for characterisation of the sediments within the survey area to a depth of approximately 6m Below Ground Level. Both methods responded well to the survey environment. The survey was successfully completed over c. 513.8ha of the route, with c. 180ha remaining to be surveyed in a separate future deployment. A large number of archaeological anomalies have been identified, concentrated within twelve areas of particular archaeological interest. These include multi-phased settlements, enclosure systems, trackways, and areas of probable salt production. The magnetic and EM results provide complementary datasets, as most of the archaeological activities occur on, or near, low conductivity sand and gravel deposits. Magnetic disturbance, affecting both techniques, is present over services and along parts of the perimeter of the survey area. Within the magnetic and EM data, anomalies relating to the long-term agricultural use of the land have been identified as former mapped and unmapped field boundaries, and ridge and furrow cultivation. Several anomalies for which an archaeological origin cannot be excluded, have been classified as ‘Undetermined’ due to a lack of context or any clear morphology that would enable a confident interpretation.

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1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by GT R4 to undertake a geophysical survey along a c. 952ha corridor for the onshore cable connection of the proposed Outer Dowsing Offshore Wind Project. Of this, an area c.257.8ha in size was descoped with the remaining survey corridor totalling c. 694.2ha in size.

1.2. Out of the total survey corridor area, c. 513.8ha have been surveyed to date. The remaining c. 180.4ha have not been surveyed at the time of writing due to unsuitable ground conditions, weather events, and lack of suitable access. A second deployment to complete the survey of the remaining areas will be conducted in the spring of 2024.

1.3. The survey was undertaken over a c. 100m wide corridor (Figure 1). The survey incorporated larger areas where there was potential for particularly sensitive archaeology to be present, for example where the Historic Environment Record indicated the presence of deserted medieval villages, where LiDAR anomalies indicating the presence of archaeological features were present, and where Scheduled Ancient Monuments were located adjacent to the corridor.

1.4. The geophysical survey comprised hand-pulled/quad-towed, cart-mounted GNSS-positioned fluxgate gradiometer and electromagnetic (EM) survey. The survey incorporated areas of greater archaeological potential based primarily on historic geography, referencing coastlines and deposit modelling. Survey areas were expanded in reference to HER entries, the proximity of scheduled monuments and features identified through LiDAR assessment (see ES Submisssion Volume 3 Appendix 20.1). Magnetic survey is the standard primary geophysical method for archaeological applications in the UK for its ability to detect a range of different features. The technique is particularly suited to detecting fired or magnetically enhanced features, such as ditches, pits, kilns, sunken featured buildings (SFBs) and industrial activity (David et al., 2008). Electromagnetic survey is particularly suited for the detection of palaeolandscape features, such as palaeochannels and deeper conductive targets, and/or ridge and swale, former gravel islands etc.

1.5. The geophysical survey excluded the following areas: areas of made-ground, woodlands, and land parcels where only small areas fell within the proposed survey corridor and the opportunity for meaningful data collection would be limited or negligible.

1.6. The survey was conducted in line with a WSI approved by the Lincolnshire Historic Environment Officer.

1.7. Survey areas were primarily targeted based on Areas of Potential (AOP) identified through geoarchaeological deposit modelling. The geoarchaeological model has been considered alongside the results of a LiDAR assessment and review of HER data (SLR Consulting 2023), to enable survey areas to be focussed where they are likely to provide the greatest benefit.

1.8. The survey commenced on 10/07/2023, with the first mobilisation finishing by the end of November 2023, and with further works to be undertaken in Spring 2024.

2. Objectives

2.1 The objective of this geophysical survey was to further assess the subsurface archaeological potential of the survey area.

2.2 The techniques and methodologies proposed in this report were designed to provide the greatest chance of rapidly and non-intrusively clarifying the potential for, and nature of, any subsurface archaeological remains that may be present.

2.3 The results of the geophysical survey programme will be used to inform further intrusive evaluation and/or mitigation. The results will be incorporated into an Environmental Statement (ES) in support of a Development Consent Order (DCO).

3. Quality Assurance

3.1. Magnitude Surveys (MS) is one of the largest independent providers of near-surface geophysical survey for archaeological applications in the UK. Our Health and Safety, Quality, and Environmental Management, Systems are certified to ISO 45001, 9001, and 14001 standards. We are also UVDB Accredited through Achilles and hold a Constructionline Silver membership.

3.2. Magnitude Surveys is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA), the chartered UK body for archaeologists, a corporate member of ISAP (International Society for Archaeological Prospection), and a corporate member of FAME (the Federation of Archaeological Managers and Employers).

3.3. The survey was conducted in line with the current best practice guidelines produced by Historic England (David et al., 2008), the Chartered Institute for Archaeologists (CIfA, 2020) and the European Archaeological Council (Schmidt et al., 2015). Our reports are produced by staff throughout the company under processes that ensure compliance with all standard archaeological geophysics guidelines applied in the UK.

3.4. The flexibility of our bespoke, modular geophysical survey equipment allowed our survey teams to maintain productivity in the face of unforeseen constraints, while ensuring that any concerns held by landowners were addressed in a sensitive way. Our survey methodology incorporates the use of a secure live data-streaming protocol that allowed for data to be processed and checked in real-time while the team were still on site. This procedure ensured that any negative impact on the quality of data collected was immediately identified, meaning that any issues that occurred during restricted periods of land access, were addressed while the team were still on site.

3.5. All works were undertaken in accordance with the WSI as approved by the Local Authority Archaeological Officer/Senior Historic Environment Advisor and Historic England.

3.6. Due to the duration and complexity of this project, the works were overseen by a Manager, with the management of day-to-day activities and planning being undertaken by two dedicated Project Officers.

3.7. The project management team in charge of quality assurance and programme are as follows:

Name	Position
Dr Paul S. Johnson FSA MCIfA	Director
Krasimir Dyulgerski BA MRes	Geophysical Services Manager
Matthew Stead BA (Hons) MA	Project Officer
Joseph Howarth MSc	Junior Project Officer

3.8. All MS managers, field and office staff have degree qualifications relevant to archaeology or geophysics and/or field experience.

4. Geographic Background

4.1. The survey area comprised a c. 100m corridor around a centre-line starting from Anderby in the north and running southward parallel to the Lincolnshire coast down to Spalding. The area surveyed also comprised wider areas at select locations (Figure 1). Survey was undertaken across 363 fields under arable cultivation and pasture. The survey area initially comprised c. 952ha, of which c. 257.9ha was descoped, c. 513.8ha have been surveyed to-date, and c. 180.4ha are to be surveyed at a later date (Figures 2–3).

4.2. The survey area included three potential substation locations, associated potential cable routes and compounds. For ease of reference and in co-ordination with desk-based reporting prepared by SLR Consulting (2023) the Project is split into the following segments:

- ECC1 - Landfall to A52 – Hogsthorpe;
- ECC2 - A52 – Hogsthorpe to Marsh Lane;
- ECC3 - Marsh Lane to A158 - Skegness Road;
- ECC4 - A158 Skegness Road – Low Road;
- ECC5 – Low Road to Steeping River;
- ECC6 – Steeping River to Fodder Dike Bank/Fen Bank;
- ECC7 – Fodder Dyke Bank to Broadgate;
- ECC8 - Broadgate to Ings Drove;
- ECC9 – Ings Drove to Church End Lane
- ECC10 - Church End Lane to The Haven;
- ECC11 - The Haven to Marsh Road;

- ECC12 - Marsh Road to Fosdyke Bridge;
- ECC13 - Fosdyke Bridge to Surfleet Marsh OnSS / Marsh DroveOnSS; and
- ECC14 - Surfleet Marsh OnSS / Marsh Drove to the Connection Area

4.3. The underlying geology of the survey corridor comprises sequential bands of chalks to the north, in sections ECC1, ECC2, and the north of ECC3. In the centre of the corridor, mudstone is present in sections ECC3 and ECC5-6. Mudstone with limestone is present in the south of ECC6, and ECC7–9. Mudstone and siltstone is present in ECC10–11. In the south of the corridor the bedrock consists of sandstone in ECC12–14 (Figures 4 – 7), (British Geological Survey, 2023).

4.4. Prior to drainage and land management from the late medieval period onwards, the area was characterised by tidal creeks across mudflats and saltmarshes, if not open water, with dry areas limited to localised areas of higher ground where near-surface deposits of till and glaciofluvial deposits were not covered by the later mudflats. These better-draining geologies are generally restricted to the northern part of the survey area. Notable areas of near-surface till are recorded in ECC8 and across ECC12 and ECC14. Smaller areas of till are also recorded at the southern end of ECC1 and in the northern part of ECC2. Away from the near-surface deposits of till and glaciofluvial deposits, the superficial geology across the rest of the PEIR boundary is characterised by mudflats deposited during various phases of marine transgression/regression. (Figures 6-7) (British Geological Survey, 2023) (SLR Consulting 2023).

4.5. The soils of the survey area mainly comprise loamy and clayey soils of coastal flats with naturally high groundwater across most of the survey area. Loamy and sandy soils with naturally high groundwater and a peaty surface in the north of ECC7 and small areas of saltmarsh soils in ECC12 ECC 14. (Soilscapes, 2023).

5. Archaeological Background

5.1. The following is a summary of a DBA produced and provided by SLR Consulting (2023).

5.2. Episodes of sea flooding since the end of the Mesolithic into the medieval period have deposited substantial deposits of mud flats across the entirety of the Order Limits. The first period of mudflat deposition occurred during the prehistoric period when the high-water mark became established 5-10km west of the current coastline. This coastline subsequently moved in and out with further episodes of sea transgression and regression which are anticipated to have affected all of the Order Limits at some point, with the southern part of the Order Limits under water or tidal from the late Mesolithic onwards. These sequences of dramatic depositional events have buried earlier archaeology at some significant depth across much of the Order Limits footprint.

5.3. A notable period of regression occurred in the Iron Age/Roman period when the high-water mark is known to have moved eastwards. This placed some of the Order Limits, which had been marshland or tidal since the Neolithic period, into dry land once more. Iron Age occupation/agricultural activity may therefore be present in the northern half of the Order Limits and Roman occupation and agricultural activity may have extended into segments ECC1-

ECC10. Any areas of activity are sealed by a post Roman mudflat. Evidence for Iron Age/Roman salterns may also be present; a potential which may also extend further south although the southern end of the Order Limits remained tidal or under water for the Iron Age/Roman period.

5.4. The sea flooding into the Anglo Saxon and medieval periods caused the high-water mark to move west again. During the Anglo-Saxon period the majority of the Order Limits were marginal with settlement favouring slightly elevated land which does not appear to have extended into the Order Limits. Some potential for agricultural/pastoral activity may extend into the Order Limits, in the hinterland of settlements on saltmarsh islands in segments ECC2, 7, 8 & 9. Salterns may be present in segments ECC1-14.

5.5. Medieval activity was made possible through the construction of sea walls with extant earthworks or below ground potential for seawalls identified in segments ECC1 & ECC11-13. These would have contributed to bringing the whole of the Order Limits into possible agricultural or pastoral activity apart from the southern extremity which was likely within the footprint of the Bicker Haven – ECC13/14. Settlement is known to have become established at extant historic villages within the vicinity of the Order Limits at this time and evidence for some deserted settlement extending within the Order Limits is known at ECCC2, ECC3 and ECC6. Evidence for significant moated sites is provided by two scheduled examples comprising Abbey Hills moated site (NHLE 1016044) adjacent to ECC7 and Multon Halll moated site (NHLE 1018584) located 100m west of ECC11.

5.6. Post medieval activity references land reclamation and agricultural activity across the entirety of the Order Limits. This includes some potential for remains of demolished farmsteads and other agricultural buildings. This period likely saw the first occupation of the southern parts of the route, specifically ECC13/14.

6. Methodology

6.1. Data Collection

6.1.1. Geophysical survey comprised the magnetic and electromagnetic methods as described in the following table. Magnetic survey measured subtle changes in the earth's magnetic field caused by subsurface features. Magnetometer surveys are generally the most cost effective and suitable geophysical technique for the detection of archaeology in England. Electromagnetic (EM) surveys measure both electrical conductivity and magnetic susceptibility and allow the identification of broad paleo-landscape formations and is therefore a complementary technique to the magnetometer.

6.1.2. Table of survey strategies:

Method	Instrument	Traverse Interval	Sample Interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer	1m	200Hz reprojected to 0.125m
Electromagnetic Induction – Conductivity and Magnetic Susceptibility	GF Instruments CMD Explorer in HCP orientation	4m	5Hz reprojected to 0.25m

6.1.3. Magnetometer and EM data was collected using Magnitude Surveys' bespoke modular cart system. For combined magnetometer and EM survey, data must be collected in a hand-pulled or ATV-towed cart configuration. With extensive testing and feedback from tenant farmers and landowners, Magnitude Surveys' equipment systems have been designed to have minimal impact on site conditions and crop cover.

6.1.4. Magnetometer data was collected using the latest Bartington Instruments Grad 13 Digital Three-Axis Fluxgate Gradiometers. The sensors, which are located 30cm above the ground, collect both magnetic gradient and magnetic total field data. The total field output of the Grad 13 system is comparable with data produced by caesium vapour systems for the majority of archaeological applications in the UK. Combined, both datasets enable the enhanced resolution of weak or more deeply situated features, compared with competing gradient only systems. The magnetometers were mounted vertically on the cart system, spaced 1m apart. The magnetometers have a sampling rate of 200Hz, but for the purposes of data visualisation, this will be reprojected to 0.125m.

6.1.5. EM data was collected using the GF Instruments CMD Explorer in HCP orientation to facilitate the collection of three bulk soil volumes, c. 1.48m, 2.8m, and 4.5m deep for the quadrature phase (electromagnetic conductivity). The EM instrument was mounted horizontally on the cart system, resulting in a traverse interval of 4m. The instrument had a sampling rate of 5Hz, but for the purposes of data visualisation will be reprojected to 0.25m. The instrument is calibrated at the beginning of every survey day.

6.1.6. Positional referencing was undertaken through the use of a multi-channel, multi-constellation GNSS Smart Antenna RTK GPS outputting in NMEA mode, to ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

6.1.7. Magnetic and EM data was stored on an SD card within MS' bespoke datalogger. The datalogger is continuously synced, via an in-field Wi-Fi unit, to servers at the offices of Magnitude Surveys. This allows for data collection, processing, and visualisation to be monitored in real-time as fieldwork is ongoing.

6.1.8. A navigation system is integrated with the RTK GPS, and used to guide the surveyors. Data was collected by traversing the survey area along lines designed to intersect known/expected features at an angle of approximately 30°, ensuring a balance between maximising the possibility of resolving features, and efficient collection and processing.

6.2. Data Processing

6.2.1. Magnetic data

6.2.1.1. Magnetic data were processed in bespoke in-house software produced by MS. Processing steps conform to the EAC and Historic England guidelines for 'minimally enhanced data' (see Section 3.8 in Schmidt *et al.*, 2015: 33 and Section IV.2 in David *et al.,* 2008: 11).

Sensor Calibration – The sensors were calibrated using a bespoke in-house algorithm, which conforms to Olsen *et al*. (2003).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

6.2.2. Electromagnetic data

6.2.2.1. Electromagnetic data was processed in bespoke in-house software produced by MS. Processing steps conform to the EAC and Historic England guidelines for 'minimally enhanced data' (see Section 3.8 in Schmidt *et al.,* 2015: 33 and Section IV.2 in David *et al.,* 2008: 11).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

Background Balancing – The CMD Explorer has its own built auto calibration routine that is performed at the start of a data collection interval. Due to minor drift in the instrument's electronics and variability in background zero depending on external conditions, the data requires a background balancing step to display all traverses and fields at the same background level. The algorithm iterates through data points in each traverse and searches for neighbouring points within 15m. Each point discovered within this search radius is assigned a weighting based on its distance from the point on the traverse. The accumulated value for each individual dataset is then divided by the accumulated weighting to produce an average value that is then applied to the point on the traverse. Each dataset is iterated through five teams, repeating the workflow described, to bring the relative background within range of the neighbouring traverses.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

6.3. Data Visualisation and Interpretation

6.3.1. All vector and raster data were projected into OSGB36 (ESPG27700) and can be provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) formats respectively. Figures have been produced with raster and vector data projected against OS Open Data.

6.3.2. Magnetometer results have been interpreted using raster images and XY traces in a layered GIS environment.

6.3.3. Multiple raster images of the magnetic gradient and total field data at different plotting ranges have been consulted for data interpretation. The gradient of the Grad-13 sensors minimises external magnetic interferences and reduces the blown-out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features are clearer in the respective gradient or total field datasets. XY trace plots were used to visualise the magnitude and form of the geophysical response, aiding anomaly characterisation.

6.3.4. The quadrature-phase results of the electromagnetic survey are presented as colour plot images. The EM interpretation was derived from the quadrature phase, which relates to the soil's apparent electrical conductivity. These datasets roughly correspond with a bulk soil volume equated to c. 1.48m, 2.8m, and 4.5m deep, respectively. However, as the EM is measuring a bulk soil volume, it is sensitive to features above and below these theoretical exploration depths. The different receiving coil responses are referred to as C1, C2, and C3 configurations. These relative depths are described and presented as comparatively “shallow”, “middle”, and “deep” soil volumes, respectively. From this point onward, the quadrature-phase dataset will be referred to as EM conductivity.

6.3.5. The EM response also has an in-phase component, which relates to the magnetic susceptibility of the soil, and which roughly corresponds with a bulk soil volume of half that of the EM conductivity. However, for the purposes of this report the in-phase dataset has not been considered as conductivity is preferred as a means of assessing natural variations in the subsurface.

6.3.6. The geophysical results have been interpreted in a layered environment, overlaid against open street mapping, satellite imagery, historical maps, LiDAR data, and soil and geology mapping. Google Earth (2023) will also be consulted, to compare the results with recent land use.

7. Results

7.1. Qualification

7.1.1. Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources. Where possible, an anomaly source will be identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports. MS actively seek feedback on their reports, as well as reports from further work, in order to constantly improve our knowledge and service.

7.2. Discussion

7.2.1. The geophysical results are presented in combination with satellite imagery and historical maps (Figures 15, 22, 29, 36, 43, 50, 57, 64, 71, 78, 85, 92, 99, 106, 113, 120, 127, 134, 141, 148, 155, 162, 169, 176, 183, 190, 197, 204, 211, 218, 225, 232, 239, 246, 253, 260, 267, 274, 281, 288, 295, 302, 309, 316, 323, 330 and 337).

7.2.2. The respective magnetic and electromagnetic (EM) surveys have generally responded well to the environment of the survey area. The EM survey has been effective for understanding the broader geological context of the site. The EM data reveals anomalies that correlate with mapped deposits identified in the geoarchaeological model (Section 4), and with recorded superficial deposits, alongside further responses that could represent more deeply-buried channels, and the results of processes characteristic of an intertidal (high conductivity anomalies) environment. Indicative palaeochannels, mudflats and bars present in the EM data correlate well with anomalies detected in the magnetic results. The total field data has also proven useful for identifying anomalies of natural origins.

7.2.3. A fluxgate gradiometer and electromagnetic induction survey was successfully undertaken over c. 513.8ha of the corridor, with c. 180.4ha remaining to be surveyed in 2024. Due to the large number of areas remaining to be surveyed this report should be considered as an interim draft report. The interpretation presented below may be subject to change once the geophysical context has been expanded. Nevertheless, anomalies of probable and possible archaeological origin have been detected at points along the survey corridor, along with anomalies of natural, agricultural, modern, and undetermined origins. Modern magnetic disturbance has been mostly identified along extant field boundaries and where buried services cross the survey area. The effect on the data caused by this interference is limited but locally significant.

7.2.4. The conductivity results offer a spatially extensive indication of the probable distribution of superficial deposits. The data are characterised by clear contrasts, considered most likely to reflect the differences in mineralogy and hydrological conductivity that result in the higher and lower EM conductive properties of clays and sands/gravels respectively. It should, however, be noted that the correlation between relative conductivity and substrate is never clear cut. As a bulk volume measurement, results will be affected by a complex range of influences, including background levels of ground saturation, agricultural practices such as draining, and the presence of lenses of contrasting or poorly sorted material such as the Glacial Till and mudflat deposits identified along the route of the corridor. While associations between past human activity and watercourses/wetlands have been recorded, it should be borne in mind that the geophysical data cannot provide conclusive absolute, or relative, dating information without further investigation. The complex superficial geology of the area and the geoarchaeological modelling suggests a mosaic of habitats that changed depending on the coastline's location.

7.2.5. The magnetometry survey results appear to support a picture of land use change over time, starting with the Iron Age/Roman period. The survey has expanded upon the available HER evidence, and twelve Areas of Archaeological Interest have been identified (Figures 9–11, 341–394). Additionally, several isolated anomalies of possible archaeological origin have been identified throughout the survey area. Within these foci the anomalies generally consist of weak and strong magnetic enhancement, with defined edges emblematic of cut features such as ditches. While there are variations in signal strength and morphology among these anomalies, they are identifiable as probable and possible archaeological features. Despite the presence of an enhanced geological background across the site combined with ridge and furrow cultivation in some parts, the results were able to identify the extent and morphology of the archaeological anomalies. All these anomalies together represent an extensive, multi period archaeological landscape, with multi-phased settlements, historical field enclosures and evidence of salt production and past industrial activity. The majority of the archaeological anomalies are located in the northern part of the survey area (ECC1 to ECC5) which supports the projected coastline regression model of the geoarchaeological report. It is also worth noting that all of the identified settlements and enclosures appear to be located in areas of low conductivity which indicate probable pockets of drier land in antiquity.

7.2.6. The morphology of the anomalies forming some of these AAIs were distinctive enough to allow them to be tentatively dated. A general Iron Age/Romano-British date is suggested for AAI 1, AAI 6 and AAI 7 based on morphology and association with dated features known in the vicinity of the site (Figures 341-343 and 359-370). These anomalies, which are in close proximity to the projected Romano-British coastline seem to be located in areas of low conductivity that likely consist of well-draining subsurface sand and gravel banks. The presence of possible salterns near these settlements potentially provides evidence of small-scale exploitation of the natural resources present in this coastal landscape.

7.2.7. Some of the foci of archaeological activity (AAI 1, AAI 3, AAI 4, AAI 10 and AAI 11) are thought to represent medieval activity, due to their proximity to the medieval sea wall (the Roman Bank), a Deserted medieval village, and a former priory in addition to the presence of extant ridge and furrow surrounding the anomalies (Figures 341-343, 350-356 and 386-391).

7.2.8. Former field boundaries have been detected throughout the survey area. These are identified as both strong and weak, linear anomalies some of which align with features marked on 2nd Edition OS mapping. Those that do not correspond with known former boundaries present a similar magnetic signal or follow similar alignments to the mapped boundaries, and are therefore thought likely to be unmapped former field boundaries. Small spreads of material displaying a strong magnetic enhancement have been detected throughout the survey area. These anomalies roughly correlate with former farm buildings visible on historical OS mapping, and have been given an agricultural categorisation.

7.2.9. Groups of parallel linear and curvilinear anomalies occur across the survey area and are typical of ridge and furrow cultivation. These have multiple different orientations, and differences in spacing and morphology which suggest they are from different periods of agricultural use. Some of these appear to cross probable archaeological anomalies and may obscure smaller or weaker anthropogenic evidence (Figures 12 to 340). A large number of these ridge and furrow regimes are also located in close proximity to deserted and shrunken medieval villages or former priory's which might suggest a possible connection to the agricultural hinterland of these settlements.

7.2.10. Throughout most of the survey area, anomalies that have been classified as 'Undetermined' have been identified. All of these anomalies have limited context or lack any clear pattern or morphology that would enable a confident interpretation, although an archaeological origin cannot be entirely excluded. Numerous discrete, strong, dipolar anomalies have been detected and also identified as undetermined.

7.3. Interpretation

7.3.1. General Statements

7.3.1.1. Geophysical anomalies will be discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual will be discussed individually.

7.3.1.2. **Data Artefact** – Data artefacts in magnetic data usually occur in conjunction with anomalies with strong magnetic signals due to the way in which the sensors respond to very strong point sources. They are usually visible as minor 'streaking' following the line of data collection. While these artefacts can be reduced in post-processing through data filtering, this would risk removing 'real' anomalies. These artefacts are therefore indicated as necessary in order to preserve the data as 'minimally processed'.

7.3.1.3. **Ferrous (Spike)** – Discrete dipolar anomalies are likely to be the result of isolated pieces of modern ferrous debris on or near the ground surface.

7.3.1.4. **Ferrous/Debris (Spread)** – A ferrous/debris spread refers to a concentration of multiple discrete, dipolar anomalies usually resulting from highly magnetic material such as rubble containing ceramic building materials and ferrous rubbish.

7.3.1.5. **Magnetic Disturbance** – The strong anomalies produced by extant metallic structures, typically including fencing, pylons, vehicles and service pipes, have been classified as 'Magnetic Disturbance'. These magnetic 'haloes' will obscure weaker anomalies relating to nearby features, should they be present, often over a greater footprint than the structure causing them.

7.3.1.6. **Overhead Cables –** Across the survey area a change in the magnetic background has been detected most visible in the Total Field Plots. This type of specked dipolar background correlates with the presence of overhead electric cables crossing over the survey area. This type of magnetic interference may mask more ephemeral anomalies of anthropogenic origin, if present.

7.3.1.7. **Undetermined** – Anomalies are classified as Undetermined when the origin of the geophysical anomaly is ambiguous and there is no supporting contextual evidence to justify a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally distinct from those caused by ferrous sources.

7.3.2. Specific Anomalies (Magnetic)

7.3.2.1. **Area of Archaeological Activity 1 (ECC1)**

7.3.2.2. **Possible Archaeology (Strong/Weak)** – Within Area 408.1, the survey has identified an alignment of weak positive rectilinear anomalies running in a southwest-northeast direction (Figures 341 and 342). These anomalies, which are located directly to the south of a probable paleochannel appear to terminate at the 'Roman Bank', a sea wall constructed in the medieval period (Figures 341 and 342). This anomaly, which is located within a low conductivity area appears to flank the palaeochannel to the north, and has been interpreted as a possible embankment or an addition to the 'Roman bank'. However, due to the lack of records in the OS mapping a possible rather than probable archaeological classification is given.

7.3.2.3. **Possible Archaeology (Strong)** – Sixty metres to the north of the Order Limits is a partial rectilinear anomaly (Figures 13 and 14). The anomaly exhibits a stronger magnetic signal than the overall geological background. Its morphology is also suggestive of a cut feature with magnetically enhanced fill. The anomaly has been interpreted as a partial enclosure, however due to its isolated position and its location within an area of enhanced natural background it has been given a possible rather than probable archaeological classification.

7.3.2.4. **Area of Archaeological Activity 2 (ECC2)**

7.3.2.5. **Probable Archaeology (Strong/Weak) (Settlement Complex) –** Located in Area 294.1 and 294.6 a large group of linear, rectilinear and curvilinear anomalies forming a series of abutting enclosures of both strong and weak positive magnetic enhancement have been identified (Figures 347 and 348). Within this group of anomalies, the largest rectilinear enclosure [**ECC2a**] encapsulates an area of c. 1ha. This enclosure, which is aligned in a north-south direction appears to be surrounded by parallel linear anomalies, and within it several subdivisions form a series of abutting rectilinear enclosures. The magnetic signal of the enclosure is typical of a 'habitation effect'. This type of effect is characterised by a strong magnetic signal in the centre of an area of archaeological activity that becomes weaker along the edges. This is usually caused by the prolonged enhancement of the ground through anthropogenic processes. It is likely that these anomalies represent a settlement comprising multiple phases of occupancy. This interpretation is supported by the presence of a strong penannular anomaly in the centre of **[ECC2a]**, that appears to be truncated by the rectilinear internal enclosures. In the southern part of the enclosure complex a rectilinear enclosure exhibiting a negative magnetic signal has also been identified that might suggest the presence of stone building foundations. In In the eastern part of Area 294.6 a continuation of linear and rectilinear anomalies [**ECC2b**] following a similar north-south alignment have been identified (Figures 347 & 348). The anomalies have a weaker magnetic signal and within the extent of the survey corridor appear to be less complete. Along their western extent two parallel curvilinear anomalies run towards **[ECC2a].** These anomalies have been interpreted as a probable trackway. To the west of [**ECC2b]** further anomalies with magnetically enhanced signals indicating rectilinear enclosures have been identified. These anomalies might form a second enclosure complex with internal divisions and pits, however due to the limited size of the survey area its full extent cannot be established.

7.3.2.6. **Probable Archaeology (Strong/Weak/Spread) (Industrial Activity) –** In the northern part of 294.1, the survey has identified further strong linear, curvilinear and discrete anomalies that appear to form partial rectilinear and annular enclosures connected by probably trackways (Figures 347 & 348). These anomalies, which do not appear to share similar orientation to the settlement complex **[ECC2a]** to the south are aligned alongside a large, diffuse anomaly forming a possible paleochannel **[ECC2c]**. This interpretation of this possible channel is supported by the strong high conductivity measurements identified in the EM data sets, suggesting the presence of deposits of clay within the channel (Figures 51-53). Along this feature a number of strong positive amorphous anomalies that appear to mask some of the extent of identified enclosures have been detected. The strong magnetic signal and the lack of coherent shape suggests that these anomalies have been formed by the deposition of highly enhanced material such as industrial debris or briquetage from salt production likely related to the settlement in the south.

7.3.2.7. **Probable Archaeology (Strong/Weak) (Historical Field Systems) –** A series of strong and weak linear and curvilinear anomalies have been identified in Areas 11.2, 434.3 and 209.3 (Figures 344 & 345). The anomalies, which are curtailed by modern field drains and Listoft Lane, form rectilinear enclosures on a north-south alignment. The strength and morphology of these anomalies are typical of ditch-like features with magnetically enhanced fill. Due to their size, they have been interpreted as historical field systems. Although the anomalies share a similar alignment with **[ECC2a]** to the south, the limited extent and lack of archaeological context preclude any connection between these anomalies.

7.3.2.8. **Area of Archaeological Activity 3 (ECC2)**

7.3.2.9. **Probable and Possible Archaeology (Strong/Weak) (Deserted Medieval Village) –** In Areas 73.2 to 73.15 linear curvilinear and discrete anomalies of variable magnetic signal on a roughly north to south alignment have been detected (Figures 54-56, 350 & 351). These anomalies are located within the recorded Deserted Medieval Village of Slackholme (Section ECC2, MLI99418) and some of the identified anomalies correspond to cropmarks recorded on the LiDAR and aerial photographic assessment (ES Volume 3 Appendix 20.2) (Figure 57). The morphology of some of the identified anomalies is difficult to distinguish, as they are obscured by extant ridge and furrow and truncated by modern drains and ploughing. The focal point of the settlement [**ECC2d**] seems to be located in in the northwest corner near the modern farm buildings, where strong abutting rectilinear enclosures have been identified. A number of linear anomalies appear to emanate from [**ECC2d**] forming a series of historical field systems of potential medieval origin.

7.3.2.10. **Possible Archaeology (Strong/Weak) –** Outside of the Order Limits to the west, a spread of strongly enhanced dipolar anomalies have been identified (Figures 350 and 351). These anomalies are likely associated with the village of Slackholme, however, due to their strong magnetic signal and the presence of modern farm buildings directly to the north a modern origin cannot be discounted. Due to this, a possible rather than probable archaeological origin has been assigned.

7.3.2.11. **Area of Archaeological Activity 4 (ECC2)**

7.3.2.12. **Probable Archaeology (Strong/Weak) (Possible Medieval Settlement) –** In the northern part of Area 123.1, the survey has identified a series of linear, curvilinear and discrete anomalies. The anomalies have a variable magnetic strength, and morphological characteristics consistent with ditches filled with anthropogenically enhanced material (Figures 61-63, 353 & 354). The anomalies appear to form multi-cellular enclosures with internal divisions, and pit features. Some of the linear anomalies oriented in an east-west direction have also been truncated into multiple smaller segments. This is likely due to the modern ploughing regimes evident on the satellite imagery (Figure 64). These anomalies correspond with a cluster of artefacts recorded by the Portable Antiquities Scheme

(PAS). This cluster consists of buckles, vessels, harness pendants, a token, and 5 coins dated between A.D. 1154 and 1489 (ES Volume 3 Appendix 20.2). Due to the close proximity of these artefacts, this series of enclosures have been interpreted as a probable medieval settlement/farmstead. These anomalies are located within a HER entry for a medieval enclosure (MLI98636).

7.3.2.13. **Possible Archaeology (Weak) (Former Trackway)–** A parallel curvilinear anomaly running in a southwest to northeast direction has been identified in the south of Area 123.1 (Figure 63). The anomalies, which are located in an area of strong geological enhancement have the signature of cut features with magnetically enhanced fill. In the EM data this low-conductivity anomaly appears to have properties characteristic of a well-draining gravel or sand bank (Figures 66 & 67). This anomaly has therefore been attributed a possible archaeological origin and interpreted as a former trackway.

7.3.2.14. **Possible Archaeology (Strong) (Possible Roman Saltern Sites)–** In Areas 123.1, 148.1, 73.14, 339.1 and 339.2 a number of amorphous anomalies have been identified scattered throughout the survey area (Figure 63). The strong positive and dipolar signal of these anomalies, suggest the presence of localised burning and deposition of enhanced magnetic material. This interpretation is supported by HER records of Roman Saltern sites within and around the survey area, most of which consist of handbricks, ceramic pan fragments, and greyware pottery (Section ECC3). The strong magnetic signature of these anomalies corroborates the HER records and expands upon the previously recorded features. The anomalies do not appear to be present within the EM dataset which suggests that they represent a fairly thin section of the overall stratigraphy that did not influence the bulk soil measurements within the upper horizons.

7.3.2.15. **Area of Archaeological Activity 5 (ECC3)**

7.3.2.16. **Possible Archaeology (Strong/Weak) –** Along the western edge of Area 338.2 a group of weak linear and curvilinear, and strong discrete magnetically enhanced anomalies have been detected (Figures 356 & 357). Some of the anomalies appear to form partial enclosures however, due to their weak magnetic signal and the enhanced geological background these anomalies have been given a possible rather than probable archaeological classification. These anomalies are located with a probable medieval settlement (MLI88895).

7.3.2.17. **Area of Archaeological Activity 6 (ECC5)**

7.3.2.18. **Probable Archaeology (Strong/Weak) (Possible Roman Settlements and Salterns) –** In Areas 4.8, 4.7, 26.5, 462.1 and 485.1 localised foci of probable archaeological activity have been identified (Figures 359-370). The most prominent area **[ECC5a]**, located c.200m east of the Order Limits, consists of several strong positive linear, curvilinear, and discrete anomalies forming overlapping enclosures, likely part of a multiphase settlement. The archaeological classification is supported by the presence of an HER Record of Romano-British finds (MLI41716). Directly to the west and southwest, located c.60-70m east of the

Order Limits, two more probable enclosure complexes have been identified exhibiting similar magnetic signal and morphology. A potential reason for the spacing of these complexes is their location in the landscape. According to the Geoarchaeological model (Volume 3 Appendix 20.2), the coastline during the Romano-British period was located c. 250m to the south of **[ECC5a**] which might have exposed the area around these settlements to seasonal flooding and tidal variations. According to the EM dataset, these anomalies sit within areas of low conductivity, representing freely draining sand and gravel deposits that would be less susceptible to water level changes. More potential evidence of possible water management can be identified in Area 4.8 (Figures 362 & 363). The survey has recorded a curvilinear channel **[ECC5b],** located c. 500m east of the Order Limits, measuring c. 11m in width, running in a southwest-northeast alignment. This anomaly which consists of two parallel positive anomalies, appears to cut across the recorded paleochannels running in a north-south direction towards the former coastline. Within the EM data, the anomaly exhibits a higher conductivity than the larger paleochannels recorded within the survey area, supporting its interpretation as a possible water channel (Figure 103-107). To the north of **[ECC5b]** the survey has identified a number of linear positive anomalies exhibiting the characteristic signal of a cut feature with magnetically enhanced fill. These anomalies, which do not correspond to any features recorded on the historical OS mapping, have been interpreted as probable drainage ditches from a historical field system.

7.3.2.19. Further evidence of the wider use of the coastal landscape can be found in the north of Area 4.7 and Area 485.1 (Figures 98, 112, 119, 359-60 and 365-366). Four anomalies consisting of rectilinear ditches surrounding amorphous areas of strongly enhanced signal have been identified in close proximity to identified paleochannels. Their location and their morphology suggest a possible interpretation as airdrying salterns likely associated with the settlements to the south.

7.3.2.20. **Probable and Possible Archaeology (Strong/Weak) –** Magnetically enhanced anomalies have been identified to the southwest (Figures 368 & 369). In Area 445.4, a cluster of strongly enhanced linear, curvilinear and discrete anomalies have been identified within an area of low conductivity. These anomalies share a similar magnetic signal and morphology to the enclosures identified at **[ECC5a]** which might suggest a similar function and date. In Area 445.6, the survey has identified isolated discrete and linear anomalies exhibiting the characteristics of cut features with magnetically enhanced fill (Figure 368). These anomalies have been interpreted as pits and enclosures, however since their southwest-northeast alignment corresponds with the direction of the historical and modern field boundaries, they have been given a possible rather than probable archaeological classification.

7.3.2.21. **Area of Archaeological Activity 7 (ECC5)**

7.3.2.22. **Possible Archaeology (Strong/Weak) (Possible Salterns) –** In Areas 4.13 169.2, 168.2, 168.3, 258.1 a number of strong dipolar amorphous anomalies have been identified running on an east-west alignment and spaced between c. 100-150m apart (Figures 371 & 372). These anomalies have a comparable morphology to the previously identified salterns to the north in Areas 123.1, 148.1 and 339.2 (Section 7.3.2.14). Similarly, the anomalies do not correspond to any anomalies identified in the EM dataset (Figure 121 & 128), which suggests that these anomalies might be related to salt production. Their alignment also appears to align with the extent of the coastline during the Romano-British period which was located c.320m to the south, parallel to the outline of the survey area. More possible salterns have been identified further to the south in Areas 4.1, 125.1.

7.3.2.23. **Area of Archaeological Activity 8 (ECC6)**

7.3.2.24. **Probable and Possible Archaeology (Strong/Weak) –** Located in Areas 4.15 and 376.4 a number of linear, curvilinear and rectilinear anomalies exhibiting a positive magnetic signal have been identified (Figures 133-40, 374 & 375). These anomalies which appear to form a series of rectilinear enclosures have been truncated by former field boundaries and the modern course of the Steeping River. The most prominent enclosure is located near the southern boundary of Area 4.15 (Figure 374). This anomaly exhibits a strong magnetic signal characteristic of a ditch-like feature with magnetically enhanced fill. A linear anomaly appears to emanate from its western side that is likely part of a former field system. However, the full extent of these anomalies cannot be established due to the presence of buried services, and ferrous spreads directly to the west, north, and east of the anomalies. To the south a number of anomalies aligned on a southwest to northeast direction have been identified (Figures 377-382). These anomalies have diffuse edges similar to the geological anomalies identified within the survey area. However, their rectilinear morphology suggests an anthropological origin. Although these anomalies appear to be in a different alignment to the established historical field patterns, these anomalies have been interpreted as a possible historical field system of unspecified date.

7.3.2.25. **Area of Archaeological Activity 9 (ECC7) (Possible Moat)**

7.3.2.26. **Possible Archaeology (Weak) –** In the centre of Area 139.1 the survey identified a series of diffuse strong and weak signalled linear anomalies that offer a distinct signal from those in their immediate vicinity (Figures 383-384). These anomalies display a strong negative enhancement bordered by strong and weak signals on their edges. It is likely that these are indicative of cut features that have been filled with enhanced material. The anomaly lies north of a moat associated with a former Abbey, this has been identified on historical mapping (Figures 169, 175 & 176). It is possible that the anomaly represents a continuation of the moat complex beyond that which had previously been identified or is representative of other features associated with the abbey complex. The survey in this area extended beyond the Order limits and the enclosure is located primarily to the east and north of the Order Limits.

7.3.2.27. **Area of Archaeological Activity 10 (ECC6) (Enclosure Complex)**

7.3.2.28. **Probable Archaeology (Strong/Weak) –** On the western side of Area 4.16 the survey has identified a series of linear, rectilinear and discrete anomalies within a zone of low conductivity (Figures 147, 426 & 427). These anomalies display both strong and weak magnetic enhancement, with enhanced edges suggestive of cut features such as ditches. These anomalies consist of a large rectilinear enclosure abutted by several partial enclosures on its southern and northern sides. The variable enhancement and the distribution of anomalies suggest the presence of a small-scale enclosure complex. The full extent of this enclosure is difficult to establish due to the presence of strongly enhanced geological variation to the north. Multiple strong discrete anomalies have been detected within this possible enclosure complex, possibly representing pits, hearths, and internal divisions indicative of occupation activity. These anomalies are located within the boundary of a HER record for a medieval settlement (MLI90648).

7.3.2.29. **Area of Archaeological Activity 11 (ECC6) (ECC9 and 10)**

7.3.2.30. **Possible Archaeology (Weak) –** Within Areas 319.14 and 252.2 groups of anomalies of linear and rectilinear morphology have been detected (Figures 259, 386 & 387). The anomalies exhibit a positive signal that indicate ditch-like features with magnetically enhanced fill. The anomalies appear to form a number of abutting enclosures. Both groups of anomalies are located in close proximity to ridge and furrow cultivation regimes and are located c.750m away from the site of St James Priory (Figures 386 & 387). As a result of this it is possible that these anomalies form part of the agricultural hinterland of the priory.

7.3.2.31. **Possible Archaeology (Strong/Weak) –** In Area 252.11 a series of weak linear and curvilinear anomalies have been identified aligned along the route of Church End Road (Figures 266, 389 & 390). These anomalies which are not recorded on historical OS mapping, appear to form a series of honeycombed enclosures. However, their full extent cannot be identified due to the presence of ferrous noise caused by the presence of a former farm building and a pond. Within and outside these enclosures, several strong, positive, discrete anomalies have been identified. The strong magnetic enhancement of these anomalies could have been caused by in-situ burning or possible kilns associated with this enclosure complex. Its proximity to St James; Priory and its alignment along the historical Church End Road, might suggest a medieval origin.

7.3.2.32. **Area of Archaeological Activity 12 (ECC8)**

7.3.2.33. **Possible Archaeology (Weak) –** Within Area 118.2 a series of weak linear, curvilinear and rectilinear anomalies [**ECC12a**] have been identified close to the field boundary along the route of Southfields (Figures 217, 244 & 393). These anomalies correspond to structures visible on historical OS mapping as a series of rectilinear structures. This are identified in HER entries as belonging to a farmstead called Old Leake (MLI124524). It is possible that these anomalies are evidence of the former farmstead structures. However, an earlier archaeological origin cannot be discounted.

7.3.3. Other Anomalies

7.3.3.1. **Possible Archaeology (Strong/Weak)** - Across the survey area a number of isolated positive, weak, linear, curvilinear, rectilinear, penannular, and strong, discrete anomalies that are isolated from the main foci of archaeological activity have been identified (Figures 12-340). Most of these anomalies have the potential to be anthropogenic in origin, and therefore a possible archaeological categorisation has been given. These anomalies could form part of former field systems, or parts of enclosures, but lack clear characteristics or context that would allow for a confident interpretation.

7.3.3.2. **Agricultural (Strong/Weak) –** Across the survey area a multitude of strong and weak linear anomalies have been identified. The majority of these roughly correspond with field boundaries recorded on 2nd Edition Ordnance Survey (OS) mapping, or with footpaths visible on satellite images. Others have been interpreted as being unmapped field boundaries due to their similarities in magnetic signal and alignment to the mapped field boundaries.

7.3.3.3. **Agricultural (Spread) –** In the centre of Area 338.2 a spread of dipolar discrete anomalies has been identified (Figure 70). This spread is located to the east of the Order Limits. These anomalies correspond with the former location of Marsh Farm, recorded on the historical OS mapping (Figure 78). The strong dipolar signal is likely caused by the presence of ferrous and ceramic debris left over from the demolition of the building. This has the potential to obscure any ephemeral anthropogenic features, if they were present. Similar strong dipolar magnetic spreads correspond to demolished former farm building have also been identified in Areas 376.4 and 125.1 (Figures 138-144).

7.3.3.4. **Ridge and Furrow (Trend) –** Arrangements of regularly-spaced weak linear and curvilinear anomalies have been identified across the survey area (Figures 12-340). these anomalies are indicative of ridge and furrow cultivation that for the most part do not align with modern field boundaries and crop directions. These anomalies are emblematic of medieval field systems and in Areas 66.1, 73.2, 73.4, 73.6, 252.2, 319.6, these anomalies are located in close proximity to the DMV of Slackholme and the Priory site of St James (Figures 40-60 & 257- 263).

7.3.3.5. **Agricultural (Trend) –** Weak linear parallel trends have been identified throughout the survey area. These anomalies, which are tightly spaced, correspond with modern ploughing visible on the satellite imagery. Only a representative sample have been drawn to represent the general alignment of these anomalies.

7.3.3.6. **Drainage Features (Trend) –** Linear anomalies on multiple alignments throughout the survey area have been detected. Three types of magnetic responses have been recorded. The first type of response consists of strong, positive, linear signals. The second kind of anomaly consists of weak positive linear signals. The third type of anomaly has a weak, dipolar signal indicative of ceramic drains (Figures 12 to 340). The drainage features are arranged on a variety of alignments, and range from the typical closely-spaced herringbone pattern to wide rectilinear layouts terminating at field edges.

7.3.3.7. **Palaeochannel** – Multiple sinuous anomalies varying in length and width have been identified (Figures 12-340). These anomalies are characterised by a weak positive slightly diffuse signal, which is most evident on the Total Field plots. The anomalies also exhibit a highly conductive signal in the EM data, which suggests the presence of clay and silt deposits within the bed of these channels. These anomalies have been identified across the entire survey area, however a higher concentration of channels have been located in areas associated with mud flat deposits in the south, suggesting that these anomalies represented rivulets that drained within the tidal landscape. In Areas 168.3 and 258.1, several paleochannels exhibit a more-rectilinear morphology (Figures 124-130). Even though this alone will not discount a natural origin, the presence of possible salterns in these areas might suggest that these channels might have undergone past anthropological modifications.

7.3.3.8. **Natural (Strong/Weak/Spread) –** Across the survey area, numerous sinuous, curvilinear and amorphous anomalies have been identified exhibiting a wide range of magnetic signals (Figures 12-340). The most wide-ranging typology consists of large zones of strongly enhanced curvilinear, linear and discrete anomalies. These zones, which in most cases are bound by paleochannels, are likely the remnants of past coastal inundation. According to the geoarchaeological model the survey area experienced a period of marine transgression and ingression from 3,900BC onwards. This continuous change in sea level has led to the deposition of mudflat deposits of various depths across the survey area. The highly enhanced zones that have been identified are likely caused by the accumulation of clays and organic material within the lower points of the coastal marshlands. The strong magnetic enhancement might be obscuring any anomalies of anthropogenic origin that are present. However despite this, the survey has identified a number of possible archaeological enclosures and salterns within these zones.

7.3.3.9. **Undetermined (Strong/Weak) -** Multiple linear, curvilinear, and discrete anomalies have been identified across the survey area (Figures 12 to 340). These anomalies do not have any supporting contextual evidence and may be partially obscured by the spreads of anomalies resulting from geological variation across the area. These anomalies are themselves likely to be the result of geological or agricultural processes, but in these cases an archaeological origin cannot be entirely ruled out.

7.3.3.10. **Industrial/Modern (Spread) –** Located throughout the survey area are multiple spreads of strongly enhanced ferrous material. These spreads roughly correlate with former ponds recorded on the historical OS mapping. The strong magnetic signal is likely caused by the enhancement of the material used to infill these former ponds. The most prominent of these anomalies is identified in Area 14.1 where a strong dipolar spread in a triangular configuration covers a part of a former pond (Figures 320-326). The deliberate placement of this anomaly might suggest the deposition of magnetically enhanced dredging material from the Fosse Dyke canal located directly to the north of Area 14.1. This interpretation is confirmed by the EM data which recorded strong conductivity associated with this anomaly.

7.3.3.11. **Service (Trend) –** Buried services have been detected throughout the survey area. These linear anomalies, comprising repeating strong dipolar anomalies, are characteristic of buried services; their strength and spread has contributed to the obscuring of probable archaeological anomalies in places and obscuring weaker anomalies if present.

7.3.4. Specific Anomalies (Electromagnetic)

7.3.4.1. **High conductivity (Strong and Weak**) – Large sinuous linear and curvilinear anomalies of high conductivity have been identified across the survey area and within all depths (Figures 17, 24, 31, 38, 45, 52, 59, 66, 73, 80, 87, 94, 101, 108, 115, 122, 129, 136, 143, 156, 163, 170 ,177 ,184, 191 ,198, 205, 212, 219 226, 233 240 ,247, 254, 261, 268, 275, 282, 289, 296, 303, 310, 317, 324, 331, & 338). These types of signals have been interpreted as zones of clay, or a laminated mixture of clays, silts and sands. These anomalies correspond well with the paleochannels identified in the magnetic data, and in some cases indicate further meandering anomalies that might have been masked by the enhanced mudflat deposits. This natural canalisation of the landscape is likely caused by the intertidal environment that was present on site until the coastline was drained and developed for agriculture during the post-medieval period.

7.3.4.2. **High conductivity (Strong and Weak)** – Various other highly conductive amorphous anomalies have been identified across the survey area, these anomalies appear to not exhibit a significant difference between the shallower and deeper coil readings. This is likely reflective of the superficial deposits identified on the geological mapping and the geoarchaeological analysis. The majority of the survey area has been overlain by glacial till deposits ranging in depth between c. 5 to 25m with the thickest part recorded in the north of the survey area. The till consists of poorly sorted material such as enhanced clays, gravels, sand and larger rock particles. The presence of these undifferentiated deposits explains the lack of any morphological features apart from the identified paleochannel. However, the identified high conductivity anomalies may have the potential to preserve any organic material present.

7.3.4.3. **Low conductivity (Strong and Weak**) – The survey has detected large, amorphous low-conductivity anomalies across the survey area. These types of responses are likely the result of more open and easily drained sediments such as sands and gravels. These types of anomalies which are located across all depths can be separated into two typologies. The broad amorphous anomalies located in the deeper coil measurements likely correspond to undifferentiated sand and gravel deposits within the glacial till. The more sinuous curvilinear anomalies abutting the paleochannels recorded in the EM and magnetic results are likely caused by the accumulation of sand and gravel banks along the drainage channels and rivulets. Regardless of their origin, the well-draining characteristics of these areas have been exploited by past human populations for settlement and industry.

7.3.4.4. **Area of Archaeological Potential –** In Areas 4.7, 4.8, 26.5, 139.1, 376.4 & 485.1. The survey has identified a number of amorphous anomalies of low and high conductivity in close proximity to the areas of archaeological activity (Figures 93, 100, 107, 114, 135, 142, 170 & 177). Some of these anomalies do not have any recorded magnetic anomalies within them. However, they might contain anthropological features that have been either masked by strongly enhanced magnetic background or overlain by deep superficial deposits.

7.3.4.5. **Agricultural –** In the dataset, the drying influence of recent and current agricultural activity can be seen in the conductivity data, with the lines of former field boundaries, tracks, and drainage systems visible as linear high conductivity anomalies. These anomalies are most analogous the cut features interpreted from the magnetic survey (drains, boundaries, and ridge and furrow cultivation). The former field boundaries in particular can be identified within all of the EM depths. This is likely caused by the deep channelling that was required in the draining of the land during the post-medieval period.

7.3.4.6. **Modern Boundary Effect –** Along some of the borders of the survey area, electromagnetic disturbance presenting as a series of low and high conductivity anomalies have been identified, these anomalies are caused by the presence of ferrous objects in close proximity to the EM meter at the time of collection.

8. Conclusions

8.1. A combined fluxgate gradiometer and electromagnetic survey was conducted along the proposed onshore cable route for the Outer Dowsing Offshore Wind Project. The aims of the survey were to assess the archaeological potential of the subsurface, with a particular focus on informing further intrusive evaluation and/or mitigation. The survey was successfully completed over c. 513.8ha with c. 180.4ha remaining to be surveyed in a separate deployment at a later date. Both survey techniques responded well to the environment of the survey corridor and resulted in the detection of a range of anomalies of anthropogenic and natural origins. The interpretation of the results correlates well with other available data sources for the sediments within the survey area, resulting in a high degree of confidence in the interpretation of the data.

8.2. The geological variations within the survey area are evident in both magnetic and EM survey results. The EM is more effective at delineating the paths of former paleochannels, and the locations of clay, sand and gravel deposits within the superficial Till and mudflat deposits. The mosaic environment presented by such features would have been resource rich, and frequently exploited by past human populations.

8.3. The survey has identified twelve main Areas of Archaeological Interest primarily located in the northern part of the survey corridor. Other more-isolated anomalies can also be interpreted as possibly/probably archaeological in origin. All together these anomalies represent an extensive, multi-period archaeological landscape, with settlements likely existing through multiple phases of occupation. Smaller enclosure complexes, field systems and evidence of salt production have also been identified. These archaeological areas appear to be connected to the sand and gravel deposits identified within the EM data which are indicative of drier areas in the past.

8.4. Long term agricultural use of the land within the survey area has been detected in the form of extensive ridge and furrow cultivation, former mapped and unmapped historic field boundaries, drainage features and ploughing trends identified in the magnetic and EM data sets.

8.5. Several anomalies have been classified as 'Undetermined' due to lack of context, or any clear pattern or morphology which would enable a confident interpretation. Nevertheless, an archaeological origin for these cannot be excluded.

9. Archiving

9.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.

9.2. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to any dictated time embargoes.

10. Copyright

10.1. Copyright and intellectual property pertaining to all reports, figures and datasets produced by Magnitude Services Ltd is retained by MS. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by MS.

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12. Project Metadata

MS Job Code	MSTF1592
Project Name	Outer Dowsing Offshore Windfarm, Lincolnshire
Client	GT R4
Grid Reference	TF 49399 58626
Survey Techniques	Magnetometry, Electromagnetic Induction – Conductivity and Magnetic Susceptibility
Survey Size (ha)	952.08ha (Magnetometry and EM) reduced to 694.23ha
Survey Dates	2023-07-10 to 2023 - ongoing
Project Lead	Dr Paul S. Johnson FSA MCIfA
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13. Document History

Version	Comments	Author	Checked By	Date
0.1	Initial draft for Project Lead to Review	IT, KD	PJ	21 December 2023
0.2	Changes following PL review	MS, JH	PH	5 January 2024
0.3	Client Corrections	MS	KD	29 February 2024

APPENDIX A: Survey Considerations

ECC 1:

Survey Area	Ground Conditions	Further Notes
11.1	The survey area was a flat crop field	All sides were defined by drainage ditches apart from the western side which had no physical boundary.
18.1	The survey area was a flat crop field	The northern and southern sides of the survey area were defined by ditches, whilst the eastern and western perimeters had open boundaries.
21.1	The survey area consisted of a flat arable field	The northern and southern boundaries were defined by ditches, and the eastern and western boundaries were open with no physical boundary.
22.1	The survey area was a flat arable field	The northern boundary of the survey area was open whilst the south, east and west were defined by drainage ditches.
28.1	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries to the east or west.
29.2	The survey area consisted of a flat pasture field	The northern, eastern and southern most boundaries of the survey area were defined by a drainage ditch whilst the western most side was defined by a line of trees secluding a small settlement
133.1	The survey area comprised arable land.	There was no physical boundary to the north or south. The east and west of the survey area were bounded by ditches.
133.2	The survey area comprised flat arable land.	There was no physical boundary to the north or south. The survey area was bordered by ditches to the east and west.
135.3	The survey area consisted of grass pasture. A water tank was present in the southern corner of the site.	The survey area had no physical boundary to the southeast or northwest. To the northeast and southwest the area was bordered by a hedge and ditch lined with a wire fence. A metal gate was present in the west corner of the site.
135.4	The survey area was a flat crop field	The survey area was defined by ditches in the north, south and west. The eastern side was open with no physical boundary.
135.5	The survey area comprised grass pasture. An animal water tank was located c. 10m south of the field.	The survey area had no boundary to the south and was bordered by hedge lined with an electric fence to the north and west. The ground had an undulating surface. A metal gate was present in the southwest corner of the area. A small depression along the north border of the survey area slightly reduced the surveyable area.
306.2	The survey area consisted of a flat and rolled field.	The survey area was bounded by an irrigation ditch and a road to the north, and by a hedgerow

		to the south. There was no physical boundary to the east or west.
391.3	The survey Area consisted of a flat crop field	The survey area was defined by ditches on all sides except from the northern extent, which was open, with no physical boundary.
402.1	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries to the east or west. The field contained hay bales.
403.4	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries to the east or west. The field contained hay bales.
403.5	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries to the east or west. The field contained hay bales.
403.6	The survey area consisted of a flat arable field	The northern most and southern most extents of the survey area were defined by drainage ditches. The eastern and western sides were open, with no physical boundary.
406.1	The survey area was flat, and contained cut crop.	The survey area was bounded by an irrigation ditch to the south, and a trackway to the east. There were no physical boundaries to the southeast or northwest. There were small unsurveyable areas to the east of the survey area due to deep ruts in the ground.
408.1	The survey area was flat, and contained crop stubble.	The survey area was bounded by an irrigation ditch on all sides. A series of telegraph poles supporting overhead electrical cables, aligned north to south, ran through the eastern end of the survey area.
504.6	The survey area comprised harvested crop stubble and mud.	The survey area was bounded by hedgerow to the east and south, adjacent to a road along the south. There was no physical border along the north or west boundary.

ECC 2:

Survey Area	Ground Conditions	Further Notes
11.2	The survey area was a flat crop field	The northern and southern perimeters were defined by drainage ditches whilst the eastern and western were open with no physical boundary.
66.1	The survey area was a flat crop field	The northern and southern perimeters were defined by drainage ditches whilst the eastern and western were open with no physical boundary.
73.2	The survey area consisted of bumpy pasture.	The survey area was bounded by hedgerow on the north, south and east, with two metal gates

		along the southern boundary. The survey area was bounded by an electric fence behind a wooden fence to the west.
73.3	The survey area consisted of bumpy pasture	The survey area was bordered by a ditch to the north and electric fencing to the southeast. There was no physical boundary on the western edge of the survey area.
73.4	The survey area consisted of a flat, pasture field	The western edge of the survey area had no physical boundary. All other sides featured electric fencing, hedges, and ditches.
73.5	The survey area consisted of a flat, pasture field.	The survey area was bounded by a hedge and an electric fence along the north, east and west. There was no physical boundary to the northwest. An electric fence bounded the south of the survey area.
73.6	The survey area consisted of a pasture field with earthwork features present.	The survey area was bordered on all sides by electric fencing. The north, east and western edges of the survey area featured hedges and ditches, whilst the south only featured hedges. There were metal gates in the north and northwest borders.
73.8	The survey area was flat, and contained bumpy crop stubble.	The survey area was bounded by an irrigation ditch to the north and east. There were no physical boundaries to the west or south.
73.9	The survey area was a flat crop field	The survey area was bordered to the north, east and south by an irrigation ditch with a hedgerow to the west.
73.12	The survey area was flat, and had been drilled.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries to the east or west.
73.15	The survey area comprised flat harvested crop stubble.	There was no physical boundary to the east or west. To the north and south the survey area was bounded by hedge rows and ditches.
73.17	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by an irrigation ditch along the south. There were no physical boundaries to the west, north and east.
123.1	The survey area was a flat crop field	The survey area was bordered by drainage ditches on all sides apart from the eastern perimeter which was empty and had no physical boundary.
209.2	The survey area was a flat crop field	The northern, eastern and western boundaries were defined by drainage ditches whilst the southernmost boundary was open and had no physical boundary.
209.3	The survey area was a flat crop field	The survey area was defined by drainage ditches to the south and west whilst the eastern perimeter was open with no physical boundary.
294.1	The survey area consisted of a flat crop field	The northern and southern edges of the survey area were defined by a drainage ditch with the eastern and western edges being open with no physical boundary.

294.6	The survey area was a flat crop field	The northern and southern boundaries were articulated by ditches, whilst the eastern and western boundaries were open with no physical boundaries.
434.2	The survey area consisted of a flat crop field	All perimeters of the survey area were defined by drainage ditches.
434.3	The survey area consisted of a flat crop field	The survey area was defined by ditches to the north and south but open with no physical boundary in the west.

ECC 3:

Survey Area	Ground Conditions	Further Notes
34.2	The survey area comprised harvested crop stubble.	There was no physical boundary to the east or west. The north and southeast of the survey area were bound by ditches. The south of the survey area bounded a line of trees separating the field from the A158,
40.1	The survey area was a flat arable field	The northern and southern sides were defined by drainage ditches but open, with no physical boundaries, on the eastern and western sides.
73.14	The survey area comprised harvested crop stubble.	No physical boundaries were present to the east or west of the survey area. The south of the survey area was a large drainage ditch. Telephone cables ran along the north edge of the survey area.
148.1	The survey area consisted of flat arable land.	No physical boundary was present to the east of west of the survey area. The north of the survey area was lined by a country road lined with overgrown vegetation. The south of the survey area was bordered by a ditch along which. A telephone line ran along the ditch
290.3	The survey area consisted of a flat arable field	The northern and southern perimeters were articulated by ditches whilst the eastern and western edges were open with no physical boundary.
290.4	The survey area consisted of a flat, ploughed field.	The survey area was bounded by irrigation ditches on the north and south. There were no physical boundaries along the east and west.
298.1	The survey area consisted of a flat pasture field.	The survey area was bounded by hedgerow on all sides. There were small unsurveyable areas in the northern portion of the survey area due to ground works, as well as a large water pond. Thick vegetation also made a small section in the southern half of the field unsurveyable.
338.2	The survey area was flat, and contained harvested crop stubble.	The survey area was bounded by irrigation ditches to the north and south. There were no physical boundaries along the east and west. A small area to the southeast was unsurveyable due to brick ruins.

339.1	The survey area was a flat crop field	The northern and southern sides were defined by drainage ditches while the eastern and western sides were open with no physical boundaries
339.2	The survey area was flat and had been ploughed.	The survey area was bounded by hedgerow and a road to the south, and an irrigation ditch to the east. There was no physical boundary to the northwest.
339.4	The survey area consisted of a flat, cultivated field.	The survey area was bounded by irrigation ditches to the north and south. There were no survey boundaries along the east or west.
449.1	The survey area comprised newly planted young crop	A farm access track ran along the north border of the survey area. No boundary was present to the east and west or the survey area. The south of the survey area was bounded by a tree lined ditch. Telephone poles supporting overhead electric cables running north to south were present just beyond c. 10m east of the survey area.

ECC 4:

Survey Area	Ground Conditions	Further Notes
222.1	The survey area was a flat crop field	The northern and southern boarders were defined by drainage ditches whilst the eastern and western borders were open with no physical boundaries.
222.2	The survey area comprised of flat arable land	The western border was open with no physical boundaries, but all other borders were defined by drainage ditches.
222.3	The survey area consisted of a flat crop field	The northern and southern sides were articulated by ditches and the eastern and western were open with no physical boundary.
236.1	The survey area consisted of a flat, arable field.	The survey area was bounded by an irrigation ditch to the south, and hedgerow to the north and east. There was no physical boundary to the west.
462.1	The survey area was comprised of flat arable land	The northern boundary was articulated by a drainage ditch and the southern boundary by a road. The eastern and western boundaries were open and had no physical boundary.
463.1	The survey area comprised flat arable land in a fallow state.	The survey area was bounded by ditches to the west and south. There was no physical boundary to the east. There was an access point in the southwest corner of the field
495.1	The survey area was a flat arable field	The northern and southern borders were defined by drainage ditches whilst the eastern and western borders were open with no physical boundary.

500.2	The survey area was a flat arable field	The northern and southern borders were defined by drainage ditches whilst the eastern and western borders were open with no physical boundary.

ECC to Weston Marsh (TF 52598 67835):

Survey Area	Ground Conditions	Further Notes
4.1	The survey area was comprised of flat arable land	The field was bordered on all sides by drainage ditches.
4.6	The survey area was comprised of flat arable land	The northern and southern boundaries were defined by drainage ditches whilst the eastern boundary was open. The western boundary was mostly open except from a small section at the north and south of the boundary which was defined by a ditch.
4.7	The survey area was flat and contained young crops.	The northern and south-eastern extents of the survey area were bordered by hedges. The southern border featured a ditch, and all other sides had no physical boundary. Overhead cables ran across the centre of the survey area.
4.8	The survey area consisted of flat arable land	All borders were defined by a drainage ditch. Telephone wires also ran across the southern boundary of the survey area.
4.12	The survey area consisted of a flat arable field with young crop present.	The survey area was bordered by drainage ditches to the north, a hedgerow and train tracks to the south and had no physical boundary in all other directions.
4.13	The survey area comprised of flat arable land	The western most boundary was defined by a track whist the northern and southern boundaries were defined by ditches. All other sides were open with no physical boundaries.
4.14	The survey area comprised of flat arable land	The survey area was bordered to the north by a drainage ditch, the eastern boundary was open to the field, the south boundary was defined by a hedgerow and trees formed the western boundary.
4.15	The survey area consisted of a flat, arable field.	The survey area was bounded by hedgerow to the north and south. There were no physical boundaries to the east or west.
26.1	The survey area was a flat arable field	The northern boundary was defined by a ditch whilst the southern boundary was articulated by a hedge and a road. The eastern and western boundaries were open with no physical boundary.

26.3	The survey area consisted of a flat arable field with young crop present.	The survey area was bordered by drainage ditched so the south, and had no physical boundary in all other directions.
26.5	The survey area was flat a flat crop field	The northern and western borders were defined by a drainage ditch and the southern border open with no physical boundary.

ECC 6:

ECC to Weston Marsh (Alternative Route) (TF 46068 55644):

Survey Area	Ground Conditions	Further Notes
682.4	The survey area consisted of a slightly undulating arable field.	The survey area was bordered by a drainage ditch to the east and west and had no physical boundary in all other directions.
139.1	The survey area consisted of a flat arable field. A vehicle was present parked in the southwestern corner.	The survey area had no physical boundary to the northwestern corner and was bordered by a drainage ditch to the north and west, by a track to the southeast, and a hedge in all other directions. Overhead cables and telegraph poles were oriented west to east in the south of the survey area and extended along the southeastern boundary.

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Survey Area	Ground Conditions	Further Notes
68.1	The survey area consisted of flat grass pasture.	No physical boundary was present to the northeast or northwest of the site, the southern half of the site was subdivided by electric fences. The north of the site was bordered by a ditch.
486.1	The survey area comprised cereal stubble.	The survey area was bordered by ditches to the north, west, and south. There is no physical boundary to the north or south along the length of the corridor. Telephone poles and overhead electric cables were present running northwest to southeast across the centre of the area.
418.5	The survey area comprised harvested arable stubble.	There was no physical boundary to the north of the survey area, the survey area was otherwise bordered by ditches.

281.2	The survey area comprised flat arable land.	There was no physical boundary to the north or south. The survey area was bordered by ditches to the east and west. A forested area lay to the east of the site.
267.8	The survey area was flat and planted with young crop.	The survey area was bordered to the southeast and southwest by a ditch. A small trace was present to the northeast and northwest.
1723	The survey area was flat and planted with young crop.	There was no physical boundary to the east, south, or west. To the north and the survey area was bounded by a large ditch.
1011	The survey area consisted of ploughed bare earth except the southeast corner of the survey area which comprised game cover.	There was no physical boundary to the north or south of the survey are. The east and west of the survey area was bounded by ditches. A road ran along the west edge of the survey area.
418.3	The survey area comprised flat arable land.	There was no physical boundary to the north or south. To the northeast a farm track bordered the edge of the survey area. To the was a deep drainage ditch was present. Tall cover crop was present to the south and blocked some of the survey area.
167.5	The survey area consisted of harvested crop stubble.	The survey area was lined by ditches to the north and south. There were no physical boundaries to the east and west. A telephone pole supporting overhead cables was present in the southeast corner of the survey area.
91.2	The survey area comprised agricultural land left to fallow.	The survey area was lined by ditches to the north and south. There were no physical boundaries to the east and west. A road ran along the southern edge of the site on the opposite side of the ditch. A telephone pole supporting overhead cables running from the centre of the western edge to the northeast corner of the survey area was present.
329.1	The survey area consisted of a flat arable field.	The survey area was bordered by an earth bank and Steeping River to the north, by a track to the southwest and had no physical boundary in all other directions.
1423	The survey area comprised harvested crop stubble.	There was no physical boundary to the east or west of the survey area. The north and south of the area was bordered by a ditch. The edge of the survey area along this ditch was overgrown and unable to be surveyed
2981	The survey area consisted of flat grass pasture. A large pool of water was present in the centre of the survey area.	The centre of the survey area was occupied by a large pool of water. The east and west of the survey area were unbounded. A farm track ran along the south of the survey area, separated from the field by a metal fence and hedge. A area of tall shrubbery was present in the centre of the field.

1682	The survey area comprised muddy harvested crop stubble.	No boundary was present to the north or south of the survey area. The east and west of the survey area were bordered by ditches
5046	The survey area comprised flat grass pasture.	The south and west of the survey area was unbounded. The north and east of the survey area were bounded by a hedge and ditch.
4871	The survey area comprised flat pasture grassland.	The long and narrow survey area was mostly bordered by ditches with the exception of the southwest border which was unbounded.
1182	The survey area comprised flat harvested maize spikes.	Paved roads bordered the east and west of the survey area. The north and south of the survey area were lined with ditches. Small pylons supporting over head electrical cables running southwest to northeast were present in the east of the survey area.
288.1	The survey area comprised flat harvested maize spikes.	The survey area was bordered but ditches to the north and west. There was no physical border to the south or east
252.12	The survey area consisted of a flat pasture field.	The survey area was bordered by a road to the east. There were no other physical borders of the survey area.
474.1	The survey area comprised harvested crop stubble and mud	The survey area was bounded to the east and west by ditches, there was nor physical boundary to the north and south
486.2	The survey area was flat, and had been drilled.	The survey area was bounded to the north and south by irrigation ditches and roads. There were no physical boundaries to the east and west of the survey area.
168.3	The survey area consisted of a flat and rolled field.	The survey area was bordered by a road to the north, and was bordered by an irrigation ditch on all sides except for a small section in the southeast of the field, where there was no physical border. A telegraph pole supporting overhead electrical cables running northwest to southeast were present in the western end of the survey area.
282.2	The survey area consisted of a flat arable field.	The survey area was bounded by an irrigation ditch on the west and south sides, a grass verge along the northern edge and had no physical boundary along the eastern side.
496.22	The survey area consisted of a flat, ploughed field.	The survey area was bounded by an irrigation ditch to the north and south, with the western half of the southern border bounded by hedgerow. There was no physical boundary along the east or west.
450.2	The survey area consisted of a flat, somewhat bumpy, ploughed field.	The survey area was bounded by an irrigation ditch and a hedgerow on the north, west and south. There was no physical boundary to the east.
249.2	The survey area was flat, and contained harvested maize	The survey area was bounded by an irrigation ditch on all sides.

	spikes. The ground was notably wet.	
251.1	The survey area consisted of a flat, ploughed field.	The survey area was bounded by an irrigation ditch along the north, east and south, as well as a main road along the eastern boundary. There was no boundary to the west.
496.22	The survey area consisted of a flat, pasture field.	The survey area was bounded by an irrigation ditch to the north and a hedgerow to the south. There were no physical boundaries to the east or west.
125.1	The survey area consisted of a flat, arable field.	The survey area was bounded by a hedgerow to the northeast. There were no physical boundaries to the south, west or east.
4.17	The survey area consisted of a flat, arable field.	The survey area was bounded by an irrigation ditch to the north, south and east. There was no physical boundary to the west. There were telegraph poles supporting overhead electrical cables running northeast to southwest through the centre of the field.
1623.01	The survey area was flat, and contained young crops.	The survey area was bounded by an irrigation ditch to the east, and hedgerow to the south. There was no physical boundary along the northwest.
1623	The survey area was flat and contained young crops.	The survey area was bounded by an irrigation ditch to the west, a track road to the north and a standard field boundary to the south and east. There was no physical boundary to the northwest.
2776	The survey area was flat and contained young crops.	The survey area was bounded by an irrigation ditch to the west and south. There was no physical boundary to the north.
2775.01	The survey area was flat and harvested.	The survey area was bounded by an irrigation ditch on all sides.
329.1	The survey area was flat and contained crops.	There was no physical boundary to the east and west of the survey area. The northern extent was bordered by a stream and raised ground on the stream’s banks. The south-western edge was bordered by a trackway. The centre of the survey area marked a change in crops between the northern and southern areas. Overhead cables were present c. 15m from the south-eastern extent of the survey area.
142.6	The survey area consisted of a flat pasture field.	In the northeast and southwest the survey area was bordered by electric wire fencing and hedges. No clear boundary was present on all other sides.

555.2	The survey area was flat and contained harvested crop stubble.	The north, east and south edges of the survey area were bordered by ditches. The west and northeast borders contained no physical boundary.
445.4	The survey area was a flat crop field	The survey area had no physical boundary to the north and was bordered by wooden fencing on all other sides.
258.1	The survey area was a flat crop field	The survey area was bordered by ditches to the east and west. The northern and southern borders had no physical boundary.
148.1	The survey area was a flat crop field	The northern and southern perimeters were defined by defined by ditches, all other sides were open and had no physical boundaries.
449.1	The survey area consisted of a flat crop field	The northern extent of the survey area was defined by a drainage ditch. The eastern and western sides were open, and the southern perimeter was articulated by an amalgamation of open boundary and trees.
463.1	The survey area comprised of flat arable land	The eastern edge of the survey area was open with no physical boundary whilst all other edges were defined by drainage ditches.
276.1	The survey area was a flat arable field	The northern border was defined by a road, the southern border by a drainage ditch, the western border by an amalgamation of treeline and ditch and the eastern border was open with no physical boundary.
485.1	The survey consisted of flat arable land.	All borders were defined by drainage ditches. Overhead telephone wires crossed from west to east through the middle of the field.
208.1	The survey area consisted of a flat arable field	Drainage ditches defined the boundaries of all sides apart from the northern side which is open with no physical boundary.
324.2	The survey area consisted of a flat crop field	Drainage ditches defined the boundaries of all sides apart from the northern side which is open with no physical boundary
445.6	The survey area was a flat crop field	The northern most boundaries were defined by drainage ditches as well as the western boundary. All other sides were one with no physical boundary.
169.1	The survey area was a flat arable field	The northern boundary was defined by a drainage ditch and the southern boundary was open. The eastern boundary was defined by a fence and road. The western boundary was defined by a grassy strip that separated 169.1 from 169.2.
169.2	The survey area comprised of flat arable land	The northern and western borders were defined by ditches. The southern border was open with no physical boundary. The eastern border was defined by a grassy strip that separated 169.2 from 169.1.

168.2	The survey area consisted of a flat arable field	The northern and southern borders were open with no physical boundaries whilst the eastern and western borders were articulated by drainage ditches.
168.3	The survey area was a flat arable field	All boundaries were articulated by drainage ditches apart from the southeast side which was left open
422.2	The survey area was a flat crop field	All sides were defined by drainage ditches apart from the eastern side which was open with no physical boundary.
422.3	The survey area was a flat crop field	All sides were defined by drainage ditches apart from the eastern side which was open with no physical boundary.