Scotland England Green Link 2

GEOPHYSICAL SURVEY INTERIM REPORT

1. INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by AECOM (the Consultant) on behalf of National Grid (NG - the Client) to undertake a geophysical (magnetometer) survey as part of the pre-submission environmental works for the Scotland England Green Link 2 (SEGL2) Project (see Illus 1).

The purpose of SEGL2 is to scale up the capability of the electricity network to deliver greener electricity generated in Scotland to the rest of the United Kingdom (UK) by creating a transmission link between Peterhead in Scotland and Drax in England. If approved, SEGL2 will carry enough green electricity to power 2 million homes across the United Kingdom.

The Project is made up of several parts, but the surveys reported herein cover the proposed English Onshore Scheme (EOS) boundary (the Scheme). The survey corridor (SC), comprises a 40m wide installation corridor, required for the construction of the underground DC cable, plus an additional 20m corridor, 10m either side of the 40m installation corridor, to allow for any minor deviation of the DC cable route. The Scheme extends for 65km from Fraisthorpe in East Yorkshire, where the cable makes landfall, to a new converter station adjacent to the existing NG sub-station at Drax Power Station in North Yorkshire. The design freeze survey area as referred to in the illustrations and the report relates to the Rev 8 design supplied by AECOM in January 2022, and it is acknowledged that there were changes to the alignment after this date.

The geophysical surveys were undertaken as part of a wider programme of non-intrusive investigations the results of all of which will be used to inform the emerging Scheme design and determine the requirement for further archaeological evaluation. The scope of the survey was approved by the Planning Archaeologist for East Riding of Yorkshire Council (ERYC – Richard Newman) and the Planning Archaeologist for North Yorkshire County Council (NYCC – Peter Rowe). Any further work will be determined in consultation with the appropriate stakeholders.

The final geophysical survey report will be submitted as part of an Environmental Statement that will be used to support a Town and Country Planning Act (TCPA) application. In particular, the surveys will help determine the impact of the proposed Scheme on the historic environment, including both known and currently unknown heritage assets.

The survey was undertaken in accordance with the with the requirements of a Written Scheme of Investigation (WSI – AECOM 2021a) as well as to standards laid down in the European Archaeological Council's guideline publication EAC Guidelines for the Use of Geophysics in Archaeology (Europae Archaeologia Consilium 2016) and by the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Archaeological Geophysical Survey (CIfA 2014). It was also undertaken in accordance with the requirements of the National Planning Policy Framework (MHCLG 2021).

Whilst recognising that magnetometry is unlikely to identify all archaeological features from all periods even under ideal circumstances it is generally considered to be the best method for evaluating large areas quickly and efficiently particularly when ground conditions are less than perfect. As such magnetometry was selected as the most effective technique when considering the time constraints

and wider project goals. This does not preclude the option of using other techniques, such as metal detecting, at selected locations once the magnetic survey has been concluded.

1.1. LOCATION, TOPOGRAPHY AND LAND-USE

The Scheme is aligned north-east/south-west from Fraisthorpe on the East Yorkshire coast to the proposed new converter station adjacent to the existing NG sub-station at Drax Power Station in North Yorkshire, 65km to the south-west. It crosses four geographically and geologically distinct regions. From the coast in East Yorkshire the Scheme extends across the low-lying landscape of the Holderness Plain before rising to cross the rolling Yorkshire Wolds (Illus 1). The Scheme then drops into the lower lying wetland landscape of the Vale of York and the hinterland of the River Ouse from where it runs to the south-western end of the corridor at Drax. The Scheme has been divided into four Sections (see Illus 1), from east to west, based on these regions. The sections comprise:

- Landfall to Bainton – Section 1,
- Bainton to Market Weighton – Section 2,
- Market Weighton to River Ouse – Section 3, and
- River Ouse to Drax Sub-station – Section 4.

At the commencement of the fieldwork the survey was estimated to cover approximately 426 hectares. However, some parcels were not accessible and ultimately 385 hectares has been surveyed, giving approximately 90% coverage of the currently proposed design freeze corridor.

The survey was carried out in two phases; from early October to mid-November 2021 and in January 2022, to accommodate different agricultural cropping regimes and land access agreements.

Ground cover comprised a mix of permanent pasture, grazed either by sheep or dairy cattle, and arable crops (mostly winter wheat) with a few fields of sugar beet, maize, and other fodder crops.

Ground conditions were variable being generally good on the areas of sheep grazed pasture, less so on the cattle pasture and poor on the recently sown arable fields where the soils were wet and heavy. Nevertheless, no areas were omitted due to unsuitable conditions underfoot.

1.2. GEOLOGY AND SOILS

The underlying bedrock geology along the Scheme comprises wholly sedimentary formations. Guidance (English Heritage 2008, Table 4) indicates that magnetometer survey can be recommended over any sedimentary geology as there are few significant distorting factors although a wide range of magnetic susceptibility in the parent rock results in a very variable background response to survey. Specifically, Chalk predominates to the east and over the Yorkshire Wolds, consisting mostly of Flamborough Chalk Formation over the majority, with Rowe Chalk Formation to the east and Welton Chalk Formation and Ferriby Chalk Formation to the west. As the landscape drops down into the Vale of York off the chalk escarpment near Market Weighton intermittent bands of Mudstone, Siltstone, Limestone and Sandstone are recorded. Further into the Vale of York more sedimentary Triassic bedrocks becomes more evident, with Mercia Mudstone and Sherwood Sandstone Group being recorded (NERC 2021).

However, it is the Quaternary deposits overlying the solid geology that are a primary factor regarding the efficacy of magnetometry. These superficial deposits often show a high degree of local variation, and the magnetic response is usually dependent on the magnetic mineralogy of the parent solid geology.

Broadly speaking the superficial deposits match the four geographical Sections.

Across Holderness (Section 1) the bedrock is mostly overlain by till (Diamicton), a superficial deposit formed up to 3 million years ago in the Quaternary Period in a local environment previously dominated by Ice Age conditions. There are other superficial deposits in Section 1, including bands of alluvium (Clay, Silt, and Sand) adjacent to major watercourses and most notably, a wide band of river terrace deposits (Undifferentiated Sands and Gravels) south-east of Driffield.

Across the Wolds, east of Market Weighton (Section 2), there are no recorded superficial deposits.

West of Market Weighton, moving onto the Vale of York (Section 3 and Section 4) lacustrine deposits of Clay predominate. These superficial deposits were formed up to 3 million years ago in a local environment previously dominated by lakes and lagoons. Deposits of alluvium are recorded either side of the River Ouse.

Overall, it was considered that, whilst the results may well be variable depending on local conditions, a

magnetometer survey is an entirely appropriate technique to apply on the prevailing geology and soils throughout the Scheme.

2. ARCHAEOLOGICAL BACKGROUND

The historical and archaeological background of the Scheme will be set out in detail in a Cultural Heritage Baseline and Gazetteer (AECOM 2021b, forthcoming). This report will evaluate a study area of 500m either side of the cable corridor, and the same distance around the proposed location of the new converter station and existing sub-station sites, to identify non-designated heritage assets. It will contain comprehensive information on the known archaeological resource in and around the Scheme. However, a high-level overview of the initial research is presented as a summary below.

Evidence for human activity has been recorded throughout the Scheme from the Palaeolithic onwards. While Palaeolithic material is limited to sites at the eastern end of the Scheme in Holderness, Mesolithic material has been recorded at several locations including both in Holderness and the Vale of York. Previous work undertaken as part of the Humber Wetlands Project also identified peat deposits in both these regions.

More extensive evidence for Neolithic activity has been recorded throughout the Scheme, although this is largely limited to findspots of lithics with a limited number of burial mounds recorded in the wider landscape. While Bronze Age activity is more common, features dating to this period are once again largely limited to burials, with key concentrations in the study area including the High Wold Barrow Cemetery to the east of Market Weighton.

Extensive evidence for activity during the Iron Age and Roman periods has been recorded throughout the Scheme, with settlements, burials, and industrial processes identified through aerial photography, previous geophysical survey, and excavation. Major foci of activity include metal working near the River Foulness and the Tollingham pottery kilns south of Holme-on- Spalding-Moor, while settlements have been identified throughout the Scheme. These include a possible roadside settlement south of Market Weighton, an extensive ladder settlement at Springwell Field (again near Market Weighton), and roundhouses identified at Skiff Farm.

Most of the settlements which the Scheme avoids have their origins in the medieval period, and as a result most medieval assets will be avoided with remains being largely limited to agricultural remains such as ridge and furrow cultivation. However, possible fishponds linked to Drax Abbey have been recorded near the western end of the Scheme, while remains of the shrunken medieval settlement of Wansford might also be located close to the Scheme.

A similar situation is observed with post-medieval assets, with the majority of remains recorded within or immediately adjacent to the corridor being associated with agricultural practices due to the alignment avoiding the settlements and farmsteads that have been recorded in the wider area. At the western end of the Scheme, in the Vale of York area, warping (the controlled flooding of the landscape to increase soil quality) was a common process in the 19th century, and as a result it is possible that deposits associated with the process might act as a screening layer for earlier remains.

The majority of remains dating to the 20th century are associated with the First and Second World War and include defences such as pill boxes and anti-tank blocks on the coast, as well as other key strategic positions. Other military remains on the alignment include the site of the former RAF base at Holme-on-Spalding-Moor which continued in use into the post-war period.

In 2014 a geophysical (magnetometer) survey was carried out along the route of the proposed Yorkshire and Humber Carbon Capture Scheme (CCS) Cross Country Pipeline (ASWYAS 2014a, 2014b, 2014c, 2014d and 2014e). Although this scheme did not proceed at the time its proposed route was very similar to that surveyed for SEGL2 running from Barmston in East Yorkshire and terminating at Drax Power Station in North Yorkshire. The 2014 survey identified anomalies consistent with medieval settlements (at Wansford and Stone Hills), a multi-period settlement at Hamilton Hill, two Roman Roads, undated field systems and trackways, an Iron Age settlement west of Market Weighton, pottery kilns at Throlam Farm and the western extent of the former Second World War airfield at RAF Holme-on-Spalding-Moor.

3. AIMS, METHODOLOGY AND PRESENTATION

3.1. AIMS & OBJECTIVES

The general aim of the geophysical survey was to provide enough information to corroborate, identify and characterise sub-surface anomalies that may have an archaeological origin, including defining the spatial limits of already known or suspected heritage assets, within the defined Scheme boundary. This information will form part of a much larger body of evidence from a variety of sources that, taken as a whole, will enable an assessment to be made of the impact of the proposed Scheme on any sub-surface archaeological remains, where present and therefore help determine an appropriate mitigation strategy.

The specific archaeological objectives of the geophysical survey were:

to gather enough information to inform the extent, condition, character, and date (as far as circumstances permit) of any archaeological features and deposits within the Scheme,

to obtain information that will contribute to an evaluation of the significance of the Scheme upon cultural heritage assets, and

to prepare a fully illustrated report on the results of the survey that is compliant with all relevant standards, guidance, and good practice.

3.2. METHODOLOGY

It is acknowledged that magnetometry has limitations and that certain types of sub-surface remains may, under certain circumstances, be more likely to be identified by other techniques such as resistivity, ground penetrating radar (GPR) or electro-magnetic methods. However, to achieve the immediate project aims magnetometry was selected as the best general-purpose methodology for assessing the survey areas given the variation in ground conditions along the corridor, the sub-surface remains most likely to be encountered and the project time constraints. This does not preclude the use of other remote-sensing techniques, specifically metal detecting, in the future at specific locations to answer specific archaeological questions, nor the use of other fieldwork methodologies such as test-pitting or trial trenching to provide further information which as a body of evidence will provide information to inform the appropriate mitigation strategy.

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

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

MLGrad601 and MultiGrad601 (Geomar Software Inc.) software was used to collect and export the data. Terrasurveyor V3.0.37.0 (DWConsulting) software was used to process and present the data.

3.3. DATA PRESENTATION& TECHNICAL DETAIL

An overall location plan of the Scheme is presented at a scale of 1:250,000 in Illus 1, showing the four geographical Sections. The processed greyscale data plots and accompanying interpretation plots are presented from east (landfall) to west (Drax Power Station) at a scale of 1;10,000 in twenty Overview graphics (Illus 2 to Illus 41). For presentation purposes the data is then broken down into 78 Sectors and presented at a scale of 1:2,500 in processed (greyscale), minimally processed (X-Y trace plot) and interpreted formats in Illus 42 to Illus 275 inclusive. Sixteen Areas of Archaeological Activity (AAA's) have also been identified and these areas are presented in the same three formats at the larger scale of 1:1,000 in Illus 276 to Illus 323 inclusive. Data from the 2014 Carbon Capture Scheme survey (ASWYAS 2014a/b/c/d/e) has been displayed on the greyscale data plots where the two corridors overlap or are in close alignment with each other.

Technical information on the equipment used, data processing and magnetometer survey methodology is given in Appendix 1. Details of the survey location information are in Appendix 2. A note on the format of the geophysical data archive is present in Appendix 3. Data processing details for the magnetometer survey are presented in Appendix 4. The OASIS Archive entry will be included as Appendix 5 in the final report.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (WSI – AECOM 2021a), guidelines outlined by Europae Archaeologia Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2014). All Illustrations from Ordnance Survey (OS) mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations in this report have been produced following analysis of the data in 'raw' (minimally processed) and processed formats (see above) and over a range of different display levels. All illustrations are presented to display and interpret the data from the Scheme to best effect based on the experience and knowledge of Headland management and reporting staff.

4. RESULTS

4.1. SITE CONDITIONS

Magnetometer survey is generally recommended over any sedimentary bedrock geology. However, it is noted that Mercia Group Mudstones generally provide poor or average responses to magnetometer survey though results can be variable (English Heritage 2008; Table 4) and that the presence of superficial deposits may also affect the results. Nevertheless, it was considered that magnetometry was the most appropriate methodology for evaluating the PDA given the prevailing geology and taking account of the limitations noted in Section 3.2 above.

Ground conditions were variable across the Scheme ranging from good, where the fields were either under permanent pasture or had not been cultivated following harvest and were still under stubble, to poor where the fields had been reseeded and conditions were soft underfoot. Data quality was good with only minimal post-processing required. No problems were encountered during the fieldwork.

The magnetic background was variable across the Scheme depending on the presence/absence or prevailing type of superficial deposits. In general, this manifested as smoother more homogenous magnetic background on the lower lying clays across the Vale of York with a much more variable heterogenous magnetic background where the glacial till (Diamicton) predominates.

Numerous anomalies, including those due to archaeological, agricultural, geological and modern activity have been identified against the variable magnetic backgrounds confirming that the soils and geology are suitable for magnetometry (although better in some locations than others) and therefore that, on balance across the Scheme, the results likely provide a good indication of the extent of sub-surface archaeological features within the Scheme, notwithstanding the limitations of magnetometer survey to identify certain types and sizes of archaeological feature.

The anomalies have been classified into categories and their possible causes discussed below by type and origin in Sections 4.2 to 4.5 inclusive. A summary of the results from each field is presented in Table 1; the field numbers follow the numbering system used in the AP and LiDAR mapping and interpretation report (Deegan 2021).

As mentioned above sixteen AAA's have been identified and the results from these areas are discussed in more detail in Section 4.6.

4.2. FERROUS AND MODERN ANOMALIES

Ferrous anomalies, characterised as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris is common on most sites, often being introduced into the topsoil during manuring or tipping/infilling. There is no obvious clustering to the ferrous anomalies within any of the fields that would suggest an archaeological origin was likely. Far more probable is that the 'spike' responses are caused by the random distribution of ferrous debris in the upper soil horizons.

High magnitude dipolar, linear anomalies are recorded in several fields; these are caused by sub-surface pipes.

Areas of more widespread magnetic disturbance are also common and may be due to tipping or spreading of magnetic debris from nearby farms or occasionally to the infilling of former ponds or small-scale extraction pits.

Linear bands of magnetic disturbance located along field edges or adjacent to tracks or roads may be due to the accumulation of ferrous debris along the boundaries, to the presence of barbed wire or wire mesh in the boundary itself or to the proximity of buildings or other infrastructure; pipes are also commonly laid along boundaries. No areas of magnetic disturbance are interpreted as of any archaeological interest.

In F135b (Illus 22-23, Illus 177-179 and Illus 315-317) the magnetic background is elevated and highly variable throughout the field, relative to the fields lying to the east and west. The fact that this area of 'disturbance' is constrained within this single field is a strong indication that 'green' waste has been spread as a soil conditioner. The exact cause of the elevated readings is not fully understood but is thought to be generated by a combination of the presence of magnetic compounds in the soil created during the decomposition processes and the presence of frequent ferrous contaminants within the waste material itself. It remains plausible that the strength and extent of responses from this material can mask ephemeral or weaker magnetic responses from underlying archaeological features if present. This might be the case in F135b as archaeological features are clearly recorded in F135c, immediately to the east. The level of detail recorded from these strongly magnetic archaeological features in this area means that the possible extent of the archaeological remains may still be interpreted albeit with a lack of detail and resolution of smaller and lower magnitude anomalies.

4.3. AGRICULTURAL ANOMALIES

Analysis of the first edition Ordnance Survey (OS) County series mapping from the late 19th century and more recent OS mapping shows that there has been a rationalisation of boundaries over the past 130 years to create larger fields and numerous former boundaries are recorded in the data as linear anomalies.

Elongated, sinuous and parallel, low magnitude anomalies, aligned parallel or orthogonal to the extant surrounding field boundaries, are typical effects of ridge and furrow cultivation whilst straighter more closely spaced linear trends in the data reflect the direction of recent ploughing/cultivation. This type of anomaly is ubiquitous across the Scheme.

Other clusters of parallel linear anomalies, some forming regular patterns, others not, are due to land drains. These anomalies are particularly prevalent on the clay soils in Section 3 and Section 4 across the Vale of York and on the floodplain of the River Ouse but are also recorded in most of the fields within the Scheme.

4.4. GEOLOGICAL OR PEDOLOGICAL ANOMALIES

The origin of anomalies in this category broadly correlates with the four Sections/geographical areas.

Broad, mostly low magnitude anomalies, or trends in the data are recorded either side of drains and watercourses across most of the low-lying land of the Holderness Plain in Section 1. These anomalies are due to the deposition of alluvial material following flooding and the extent of these anomalies either side of a ditch or watercourse may typically define the maximum extent of flooding episodes. Also in Section 1 are discrete clusters of anomalies. This type of anomaly is more likely to reflect variations in the composition of the superficial deposits, whether in the river terrace deposits south-east of Driffield or the unsorted glacial till deposits which cover the remainder of this section.

In Section 2, east of Market Weighton, where there are no superficial deposits, some of the discrete anomalies may be due to small naturally occurring water worn depressions or pits eroded by water in the chalky bedrock.

Across the Vale of York and in the hinterland of the River Ouse the geological anomalies again are due to the deposition of flood material adjacent to the major rivers and streams in Section 3 and Section 4.

Field No.	Archaeological Anomalies	Survey Interpretation
F2	?	No access.
F3	Y	Linear and curvilinear anomalies of possible archaeological origin although with no obvious pattern. These probably correlate with numerous HER records. Field drains and ploughing trends are also recorded.
F4	Y?	Cluster of anomalies in the west of the field. Also ridge and furrow and later ploughing trends.
F6	Y	Possible enclosure (AAA1) as well as alot of agricultural trends.
F7	Y	Several linear anomalies, possibly forming an enclosure complex. Two conjoined enclosures in west of field and possible associated linear ditch type features (AAA2). Also ridge and furrow and later cultivation trends.
F8	Y?	Ridge and furrow throughout on two differing alignments. Some geological variation.
F10	N	Field drains and geological anomalies.
F11a/b	N	Ridge and furrow and modern cultivation trends.
F13	N	Modern cultivation trends and field drains.
F16	N	Drains and agricultural trends.
F15	N	Geological variation.
F18	Y?	Several possible linear ditch type anomalies but no obvious pattern.
F19.	N	Geological variation only.
F20	Y	Probable enclosure and other linear anomalies which correspond with cropmarks recorded as MHU9974 (AAA3). Also, numerous discrete anomalies interpreted as of possible archaeological origin as well as some modern ploughing trends and drains.
F21	N	Geological variation.
F22	N	Agricultural trends and geology. Ploughing trends and drains
F23	N	Agricultural trends and drains.
F25	?	No access.
F225	N	Ridge and furrow trends.
F227	?	No access.
F229	N	Ridge and furrow trends.
F230	N	Agricultural trends and geological variation.
F234	Y?	Cluster of very faint linear anomalies and discrete anomalies. No clear pattern but of possible archaeological origin although no nearby cropmarks.
F30	N	Ploughing trends.
F238	Y	Numerous discrete anomalies with no clear pattern although they clearly record features forming part of the roadside settlement recorded on the HER as MHU8066 (AAA4).
F240	N	Linear trends and probable former field boundaries.
F242	N	Geological variation.
F243	Y?	Single possible ditch – may be associated with enclosure complex in F35 (see below) although it is orthogonal to current field boundary and may be a drain or unmapped boundary.
F35	Y	Part of settlement complex which extends to north and is partially visible as cropmarks recorded as MHU15523 and described as AAA5.
F38	Y	Part of large enclosure recorded on HER as MHU4084.

F39	Y	Several linear and curvilinear anomalies. Partial correlation with cropmarks but clearly correspond to MHU4112 and MHU9658 on HER.
F41	Y	Part of cropmark enclosure with internal features recorded as MHU4112 and described as (AAA6).
F42	N	Agricultural trends only.
F43	N	Agricultural trends and geology.
F45	N	Geology and agricultural trends.
F46	N	Agricultural trends.
F47	N	Agricultural trends and drains only.
F49	?	No access.
F50	N	Field drains only
F52	?	No access.
F54	N	Ridge and furrow and modern cultivation trends and geology.
F56	N	Agricultural trends.
F57a/F57b	N	Alluvial and fluvial deposits.
F59	N	Ridge and furrow ploughing trends.
F60	Y?	Possible linear ditch type anomalies. Ridge and furrow ploughing.
F62a	N	Ridge and furrow ploughing.
F62b	?	No access
F64	?	Unsuitable for survey – construction site.
F65	N	Agricultural trends and geological variation.
F66b	?	No access.
F66c	N	Drains and agricultural trends.
F68	N	Agricultural trends.
F70	?	No access.
F72	?	No access.
F73	N	Ridge and furrow ploughing.
F74	N	Ridge and furrow ploughing.
F75	N	Ridge and furrow and agricultural trends.
F76	N	Ridge and furrow ploughing.
F77	N	Ridge and furrow ploughing and drains.
F78	N	Ridge and furrow ploughing.
F81	N	Ridge and furrow ploughing.
F82	N	Agricultural trends.
F83	N	Ridge and furrow ploughing.
F84	N	Ridge and furrow ploughing.
F87	?	No access.
F88	N	Ridge and furrow ploughing and agricultural trends.
F89	N	Ridge and furrow ploughing.
F91	Y?	Three linear anomalies. Ridge and furrow ploughing.
F92	N	Ridge and furrow ploughing.
F95	?	No access.
F97	Y?	One possible linear ditch type anomaly oblique to current field boundaries. Ridge and furrow ploughing and pronounced geological variation.
F98	Y	Probable trackway with appended enclosure (AAA7). Also, two ditch type anomalies and discrete anomalies within and close to the enclosure which may also be archaeological in origin. Also ridge and furrow cultivation and geological anomalies.
F99a	N	Modern cultivation and ridge and furrow ploughing only
F99b	N	Ridge and furrow.
F100	Y	Cluster of at least three conjoining enclosures (AAA8) with associated discrete anomalies some of which may be indicative of burning.

F101	?	No access
F102	Y	Three large enclosures described as (AAA9). Northernmost enclosure correlates with cropmark recorded as MHU22106. Discrete anomalies may also be of archaeological potential. Also ridge and furrow ploughing.
F104	N	Ridge and furrow ploughing and agricultural trends.
F105	N	Ridge and furrow ploughing, modern cultivation trends and geological variation
F106	Y?	Single ditch type anomaly may be archaeological but orthogonal to current field boundary. Ridge and furrow ploughing and geological variation.
F107	N	Agricultural trends and geological variation. Four large discrete anomalies that are probably geological.
F108	?	No access.
F109	N	No access but anomalies from CCS corridor.
F110a/b/c/d/e	?	No access but anomalies in F110e. F110c and F110d overlap with CCS corridor.
F110c	?	No access but surveyed for CCS. No archaeological anomalies.
F110a	?	No access
F110b	N?	Settlement MHU3076 in CCS survey but no anomalies within current design freeze corridor.
F111	Y?	Possible enclosure, possibly associated with settlement site in adjacent field F113.
F113c	Y	Multiple conjoined enclosures and discrete anomalies indicative of settlement activity. Correlates with cropmarks recorded as MHU22143 and described as AAA10. Also ridge and furrow cultivation and geological anomalies.
F113b	Y	Various ditch like anomalies oblique to current boundaries and ridge and furrow cultivation likely to be associated with the settlement in F113c to the east.
F113a	Y?	Several short, discontinuous anomalies oblique to ridge and furrow ploughing. Again, possibly associated with the adjoining settlement MHU22143.
F114	Y	Possible small barrow and single ditch type anomaly. Modern cultivation trends and geological variation.
F115	N	Modern cultivation trends and geological variation.
F116	N	Modern cultivation trends and geological variation.
F117	N	Modern cultivation trends and geological variation.
F119	N	Modern cultivation and drains. Three possible areas of small-scale extraction or geological variation.
F120	N	No anomalies.
F122b	?	No access
F112a	?	No access
F121b	Y?	Geological trends and modern cultivation. Single possible ditch type anomaly oblique to boundaries and ploughing.
F123	N	Modern cultivation and geological trends.
F125	N	Modern cultivation and geological trends.
F127b/d	N	Modern disturbance.
F128	Y?	Single curvilinear anomaly. Agricultural trends and geological variation.
F129c	N	Agricultural and geological trends. Disturbance possibly relates to MHU10895.
129b	Y?	Single possible ditch. Agricultural trends.

129a	Y	Several enclosure, ditches and discrete features forming the north-western part of MHU10895, described as AAA11. These features are the continuation of anomalies/features recorded in the CCS survey which form part of a large ladder settlement. Possible small square barrow recorded just to the west of the boundary of AAA11.
F130	Y	Part of a round barrow described as AAA12. Modern ploughing trends and geological trends. Also, single very small enclosure and ditch (AAA13). Geological and agricultural trends.
F131a/b/c	N	Agricultural and geological trends.
F132	N	Agricultural trends.
F133	Y?	Two parallel possible ditch type anomalies that correspond to cropmarks. Modern agricultural trends.
F134a		No access.
F134b	Y?	Single possible linear ditch also recorded in CCS corridor. Agricultural and geological trends.
F135c	Y	Several conjoining enclosures, ditches, and discrete features (AAA14). Continuation of features recorded during CCS survey.
F135b	Y?	Linear anomalies possibly associated with AAA11. Probable masking effect of 'green' waste.
F136	Y	Possible enclosure with possible internal features adjacent to road on eastern field boundary. Data overlaps with CCS corridor. Also, geological variation and modern cultivation trends.
F137b	Y?	Possible ditch type anomaly close to southern edge of design freeze corridor but doesn't appear to continue in CCS corridor data which partially overlaps here.
F138	N	Only land drains as also recorded during the CCS survey.
F137a	N	Ridge and furrow ploughing, and field drains recorded during CCS survey route.
F140	N	Field drains.
F142d	N	Most of the design freeze route was also surveyed for CCS survey. Only drains recorded.
F142c/b/a	N	Green waste spread across these three fields. No anomalies recorded during CCS survey which was carried out before the green waste was spread.
F143	N	Modern ploughing trends only
F144e/d/c/b	N	No access during current works. Previously surveyed for CCS route. No significant anomalies were recorded.
F144a	N?	No access during current works. Previously surveyed for CCS route but 'green' waste precludes identification of any other anomalies.
F145b	N	No access during current survey. Previously surveyed for CCS route. No significant anomalies previously recorded.
F145a	N?	No access during current survey. Previously surveyed for CCS route. No significant anomalies previously recorded although cropmarks are recorded within the design freeze corridor (MHU7347).
F146c	N	No access during current survey. Previously surveyed for CCS route. Only geological anomalies recorded.
F146b	N	Field drains and geological trends only
F146a	N	No access during current survey. Previously surveyed for CCS route. Only geological anomalies recorded.
F149	N	Only geological anomalies recorded corroborating wider route surveyed for CCS survey.

F150c	Y?	Two linear anomalies possibly forming corner of an enclosure/field although 'green' waste in this field precludes further interpretation. Also, field drains.
F150b	N?	'Green' waste also spread in this field. Filed drains and geological variation also.
150a	N	Agricultural trends only.
F151c	N	Geological anomalies only.
F151b	N	Agricultural trends and geological variation.
F151a	Y?	Single possible ditch type anomaly although doesn't extend into the CCS survey area which overlaps at this point. Only other anomalies are geological and agricultural trends.
F152c	N	Field drains and geological variation.
F152b	N	Geological anomalies only
F153	Y?	No access during current survey. Likely to be archaeological remains within the design freeze corridor based on data from adjoining CCS survey data and cropmarks MHU10836.
F154	N	Geological variation.
F155	Y?	Single north/south linear anomaly also visible as a cropmark. Probably former unmapped boundary but could be archaeological. Only other anomalies are field drains and modern ploughing trends.
F156	N	Agricultural trends. No evidence of enclosure recorded on the HER as MHU22633.
F157	N	Only geological anomalies and a pipe.
F158	N	Modern cultivation trends and field drains only.
F159	Y?	Several possible linear anomalies associated with adjacent enclosure complex, MHU1161. Not all the cropmarks are recorded by the current survey. Also, cultivation trends, field drains and geological variation.
F161	Y	Only a very narrow strip was surveyable on the western boundary of the survey corridor but enough to confirm the presence of enclosure ditches that correlate with the cropmarks for MHU1161.
F162	N	Agricultural trends and field drains.
F164c	N	Field drains.
F164b	N	Field drains.
F164a	Y?	Three possible linear features. Agricultural trends and drains
F165	?	No access.
F166	N	Agricultural trends and drains.
F167	N	Two former field boundaries and geological (alluvial) variation adjacent to a water course.
F169a	N	Agricultural trends and drains.
F169b	N	Modern cultivation trends
F169c	Y?	Single ditch type anomaly but orthogonal to current field layout.
F169d		Unsuitable for survey.
F169e	Y?	Possible corner of enclosure but no cropmarks. Field drains and modern cultivation.
F170b	N	Field drains and modern cultivation.
F170a	?	'Green' waste spread over this section of the survey corridor. No anomalies visible against this elevated magnetic background.
F172b	?	No access.
F172a	N	Field drains only.
F173	N	Field drains and modern cultivation trends.
F174	N	Field drains and modern cultivation trends.
F175a/b/c	N	Field drains and modern cultivation trends.
F176c/b/a	?	No access.

F177	N	Field drains.
F178	Y?	Two very faint parallel curvilinear anomalies oblique to ploughing trends and modern field layout. Also, agricultural trends, drains and ridge and furrow.
F179	Y	Multiple linear, curvilinear, and discrete anomalies that correlate with cropmarks and are recorded as MHU3198 on the HER. Further described as AAA15. Also, ridge and furrow cultivation and modern ploughing trends.
F180e	N	Modern cultivation trends.
F180d/c/b	?	No access.
F180a	N	Land drains.
F181	N	Ploughing trends and magnetic disturbance.
F182	?	No access.
F183	N	Former field boundary and agricultural trends.
F184	N	Former field boundary, field drains and ridge and furrow cultivation.
F185	?	No access.
F186b	N	Field drains.
F186a	N	Modern cultivation trends.
F187	N	Modern and ridge and furrow cultivation and field drains.
F188	?	No access.
F189	?	No access.
F191	?	No access.
F192a/b	?	No access. No obvious anomalies in the CCS corridor immediately to the south.
F193	N	Geological variation or more likely ground disturbance associated with the installation of the pipe which crosses the survey corridor here.
F194	N	Geological variation.
F196	N	Agricultural trends and field drains.
F199b	N	Pipe and land drains.
F199a	N	Pipe and land drains
F201	N	Agricultural trends.
F203	N	Drains and geological variation.
F204	Y?	Two parallel ditch type linear anomalies, orthogonal to modern field layout.
F205	N/?	Southern section was surveyed, northern section under beet crop. Former field boundary, field drains and ridge and furrow cultivation trends.
F206b	N	Ridge and furrow ploughing and geological variation.
F206a	N	Ridge and furrow ploughing and geological variation.
F207	N	Field drains, geological variation, and pipe.
F208b	N	Pipe, field drains and geological variation.
F208a	N	Field drains.
F209	N	Modern ploughing trends and geological variation.
F211b	N	Drains and geological variation.
F211a	N	Geological variation.
F212c	N	Geological variation and ploughing trends.
F212b	N	Geological variation.
F212a	N	Geological variation and probable spreading of 'green' waste.
F214	Y?	Large 'enclosure' with at least four sides which seems to respect the road to the north. May be archaeological, possibly moated site. Several large discrete anomalies within the 'enclosure' may also be archaeological. Former field boundary modern ploughing and geological trends.
F215	N	Modern ploughing trends and geological variation.
F216	?	No access

F218d/c/b	?	No access.
F218a	N	Modern ploughing trends.
F219	N	Field drains, ploughing trends and some modern disturbance.
F220	Y	Probable enclosures and associated features (AAA16). Ridge and furrow ploughing and field drains.

4.5. POSSIBLE ARCHAEOLOGICAL ANOMALIES

Numerous linear anomalies across the Scheme have been interpreted as of possible archaeological origin. This is on the basis that they cannot be confidently interpreted as of non-archaeological (i.e agricultural) origin, usually because they are oblique to the alignment of current or former boundaries, and therefore an archaeological cause cannot be discounted. However, given the generally good correlation between cropmarks and the interpreted anomalies of probable archaeological provenance along the Scheme most of these 'uncertain' anomalies are probably more likely to not be of any archaeological potential.

4.6. AREAS OF ARCHAEOLOGICAL ACTIVITY (AAA)

Sixteen areas of archaeological activity have been identified across the Scheme. Unless specified otherwise all the linear anomalies described in this section are likely to be due to soil filled cut features, such as ditches, mostly forming clear patterns of enclosure and land division.

With the variable magnetic background, particularly in some areas it is difficult to confidently discriminate between discrete features, such as pits, which may be indicative of occupational activity, and those that may be due to localised geological variation. For this reason, most of the discrete anomalies within enclosures have been ascribed a possible archaeological origin with those outside, except where the responses are particularly broad or high in magnitude, interpreted as of non-archaeological origin. However, it is acknowledged that this is a subjective distinction and that on balance many of these discrete anomalies may not be archaeological in origin but due to natural variations within the superficial deposits.

AAA1 (Illus 276 to 278)

Against a cluttered background of ploughing trends across the whole of F6 a D-shaped enclosure is recorded bordering the southern extent of the survey area, centred at NGR 515800, 463400, and immediately east of a former boundary. In the centre of the 'enclosure' is a clear response which could be indicative of burning. In the east of the same field vague curvilinear parallel anomalies (NGR 515950, 463450) may also be of archaeological origin although a non-archaeological cause is also considered plausible. These anomalies are clearly part of an extensive cropmark complex of field systems, enclosures, and ring ditches, identified as MHU340, which has been interpreted as of indicative of Iron Age or Roman date and which probably also extends westwards into F7.

AAA2 (Illus 279 to 281)

In F9 two conjoined rectangular enclosures are recorded, centred at NGR 515250, 463150. Discrete anomalies within the enclosures are also considered to be of possible archaeological potential as are linear ditch type anomalies north and east of the enclosures. The anomalies are aligned oblique to the extant boundaries and direction of previous cultivation and are not recorded as cropmarks.

AAA3 (Illus 282 to 284)

Several parallel linear ditch type anomalies aligned north-west/south-east are recorded, centred at NGR 513650 460550, all of which correspond with cropmark ditches and ditch fragments, and which are grouped together and identified on the HER as MHU9974. Two small circular anomalies are also recorded and interpreted as of probable archaeological origin as well as numerous discrete anomalies interpreted as of possible archaeological origin. Not all the cropmarks are recorded as magnetic anomalies most notably a possible square barrow centred at NGR513540 460525.

AAA4 (Illus 285 to 287)

The data from F238 is characterised by a series of relatively high magnitude anomalies (at variance

with the background level in adjacent fields) with a degree of linearity which suggests an archaeological origin. These anomalies are centred at NGR 510100, 458850 and correlate with the Great Kelk medieval and post-medieval settlement (MHU8066) which comprises earthworks indicative of building platforms, enclosures, crofts and ridge and furrow, although no obvious pattern can be discerned in the magnetic data within the relatively narrow survey 'window'. Cropmark and LiDAR data is likely to provide better resolution in this instance.

AAA5 (Illus 288 to 290)

A cluster of linear and curvilinear anomalies, centred at NGR 508450, 458750 in F35, is clearly indicative of an extensive complex of enclosures and ditched boundaries visible as cropmarks and recorded as MHU15523. These features have been interpreted as of likely Iron Age or Roman date. Numerous discrete anomalies within and adjacent to the enclosures are also likely to be archaeological in origin. The magnetic data has provided much greater feature resolution than the cropmark data in this instance.

AAA6 (Illus 291 to 293)

A high magnitude curvilinear anomaly (also recorded as a cropmark) 'enclosing' several discrete anomalies of similar magnitude, centred at NGR 507650, 458250, stand out against a relatively low magnetic background in F41. The curvilinear anomaly is previously recorded on the HER (identified as part of MHU4112) and is interpreted as forming part of the partially identified remains of Iron Age or Roman enclosures.

AAA7 (Illus 294 to 296)

Parallel linear ditch type anomalies, aligned north/south and centred at NGR 498150, 451950, are on the same alignment as ridge and furrow anomalies recorded to the east and west although much higher in magnitude and may be interpreted as a possible trackway. An enclosure is appended to the easternmost ditch. These features may be contemporary with the ridge and furrow ploughing. Several discrete anomalies are recorded within the 'enclosure' and a cluster of similar anomalies is also recorded approximately 40m to the west close to another short, high magnitude linear anomaly which is also interpreted as of possible archaeological origin. Another possible ditch is recorded 40m north-east of the enclosure. These features are not previously recorded.

AAA8 (Illus 297 to 299)

Anomalies identifying parts of at least four enclosures, centred at NGR 497350, 451500, comprise AAA8 in F100. Discrete anomalies are recorded most notably within the northernmost enclosure, where two large pit type responses are also recorded. A cluster of pit type responses is also recorded 25m west of the most southerly enclosure. These enclosures, identified as MHU22106, are only partially recorded as cropmarks, the magnetic data in this instance providing greater resolution. Again, these features have been interpreted as of likely Iron Age or Roman origin.

AAA9 (Illus 300 to 302)

AAA9 in F129a, centred at NGR 497150, 451100, comprises parts of at least four enclosures aligned on a broad north/south alignment. Two of the enclosures (at the northern and southern ends of the survey corridor) are previously recorded as cropmarks and are also features recorded as forming part of MHU22106 (see AAA8) and interpreted as of likely Iron Age or Roman origin.

AAA10 (Illus 303 to 305)

Several linear ditch-like anomalies forming part of several conjoined enclosures appended to a trackway aligned broadly along a south-west/north-east axis and centred at NGR 495200, 447800 are recorded in F113c. Numerous discrete anomalies suggest settlement activity. The anomalies at the western end of AAA10 are previously recorded as cropmarks (recorded on the HER as MHU22143) but those to the east are not previously known. The features are likely of Iron Age or Roman date.

AAA11 (Illus 306 to 308)

Parts of at least four enclosures (also visible as cropmarks) are recorded on the north side of a trackway, centred at NGR 491750, 443050. These enclosures are interpreted as forming part of an Iron Age or Roman settlement (MHU10895). Additional parts of the settlement were previously recorded in the CCS survey which form part of a large ladder settlement. A probable boundary ditch runs east/west about 130m south-east of the settlement. A probable Iron Age square barrow is also recorded just to the west of the boundary of AAA11.

AAA12 (Illus 309 to 311)

AAA12 comprises part of a single ring ditch anomaly (ploughed down round barrow) which is recorded on the northern edge of the survey corridor in F130, centred at NGR 491380, 442830. A low magnitude