SUNNICA ENERGY FARM

EN010106

Volume 6

Environmental Statement

6.2 Appendix 7G: Cable Route Geophysical Survey Report

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

18 November 2021
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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Sunnica Energy Farm

Environmental Statement
Appendix 7G: Cable Route Geophysical Survey Report

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Abstract

Magnitude surveys was commissioned to assess the subsurface archaeological potential of a c. 138.3ha area of land connecting the previously surveyed Sunnica Energy Farm to Burwell Substation, East Cambridgeshire. A fluxgate gradiometer survey was successfully completed across c. 101.4ha of the site. Probable and possible archaeological activity has been identified in at least four distinct areas covering in total approximately 8.4ha in the form of possible trackways, former field systems which appear to pre-date any recorded on available historical maps, and multiple linear ditch-like anomalies. Only in one area were distinct rectilinear anomalies identified allowing a tentative interpretation to the late prehistoric to Romano-British periods. Anomalies related to the historical agricultural use of the landscape have been detected, including anomalies relating to ridge and furrow ploughing regimes, more recent historical field boundaries corresponding with historical maps, and field drains. The modern use of the landscape has also impacted the data, with modern ploughing trends, extant field boundaries, and temporary fencing all present within the dataset. Significant ferrous and debris anomalies relate to underground services, areas of potential made ground, or possible areas of "green waste", and the former route of the Cambridge and Mildenhall Branch railway.

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1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by Sunnica Ltd to undertake a geophysical survey over a c. 138.3ha area of land, to connect the previously surveyed areas of Sunnica East and Sunnica West sites to Burwell Substation (Swinbank Et al, 2020). This survey covers the future cable route and extends from Lee Farm, Freckenham, West Suffolk (TL 66360 73368), between Zones A and B of the previous survey, to Burwell Substation, Burwell, East Cambridgeshire (TL 58103 67193), c. 5.8km west of Zone G of the previous survey (Overall Figure 2). Approximately 36.9ha remain to be surveyed along the cable route due to a mixture of access issues, overgrown vegetation, and tall crops.

1.2. The geophysical survey co[redacted]ounted and hand-carried GNSS-positioned fluxgate gradiome[redacted] the standard primary geophysical method for archaeological ap[redacted]bility to detect a range of different features. The technique is p[redacted]g fired or magnetically enhanced features, such as ditches, pit[redacted]ings (SFBs) and industrial activity (David *et al*., 2008).

1.3. The survey was conducted in [redacted]ce guidelines produced by Historic England (David *et al*., 2008), [redacted]chaeologists (CIfA, 2020) and the European Archaeological Cou[redacted]

1.4. It was conducted in line with [redacted] Sunnica East (2019 [1]), as well as in line with the Updated Br[redacted]ion produced by Cambridgeshire County Council (2019), and [redacted]/SI and approved by the county archaeologists of Suffolk and [redacted]

1.5. The first c. 12ha to be survey[redacted] surveyed in December 2019, and c. 1ha was surveyed in July 2[redacted] 138.3ha segment commenced in January 2021 with the final visit in May 2021.

2. Quality Assurance

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

2.2. The directors of MS are involved in cutting edge research and the development of guidance/policy. Specifically, Dr Chrys Harris has a PhD in archaeological geophysics from the University of Bradford, is a Member of CIfA and is the Vice-Chair of the International Society for Archaeological Prospection (ISAP); Finnegan Pope-Carter has an MSc in archaeological geophysics and is a Fellow of the London Geological Society, as well as a member of GeoSIG (CIfA Geophysics Special Int[redacted]ong has a PhD in archaeological geophysics from Bournemout[redacted]fA, the Editor of ISAP News, and is the UK Management Commit[redacted] Action SAGA; Dr Paul Johnson has a PhD in archaeology from [redacted]n, is a Fellow of the Society of Antiquaries of London, has b[redacted]nagement Committee since 2015, and is currently the nomin[redacted] EAA Archaeological Prospection Community to the board of th[redacted]ociation.

2.3. All MS managers, field and c[redacted]ations relevant to archaeology or geophysics and/or field exper[redacted]

3. Objectives

3.1. The objective of this geophys[redacted]ubsurface archaeological potential of the survey area.

3.2. To assess the presence/ abse[redacted]anomalies that might be present.

4. Geographic Background

4.1. The survey area extends around the north of Freckenham and southeast Chippenham, continues north of Snailwell and concludes to the west of Burwell (Overall Figure 2). The survey area was bounded by Lee Farm and Beck Road to the north, fields adjacent to the A11 to the east, Burwell to the south, and Burwell substation and further fields to the west (Figure H1). Gradiometer survey was undertaken across 48 fields under arable cultivation, 9 under pasture, and one a bare earth paddock. Approximately 36.9ha remain to be surveyed across the survey area due to a mixture of access issues, overgrown vegetation and tall crops.

4.2. Survey considerations:

Survey Area	Ground Conditions	
1	Arable field under [redacted] Slight topographic [redacted] the centre-north of [redacted] area. Soft and unev[redacted] conditions with pat[redacted] rough/ turned over	[redacted] newly planted trees to the [redacted] edgerow to the north and [redacted] field continued to the south and [redacted] ublic footpath crossed the centre [redacted] on a southwest to northeast
2	Arable field under [redacted] Gently sloping up t[redacted] southeast.	[redacted] ees and hedgerow to the north, [redacted] heast. The field continued to the [redacted] hwest.
3	Pasture field, gentl[redacted] towards southeast.	[redacted] re fencing to the north, east, and [redacted] field continued to the south and
4	Flat, pasture field.	[redacted] ely by hedgerow and trees. A [redacted] ted beyond the survey area to the [redacted] rhead powerlines extended south [redacted] ssing the western corner of the area. Tractor ruts crossed the northwest of the survey, north to south, indicating the route to access fields beyond the survey area.
5	Arable field under young crop, slightly sloping down from east to west. Wet ground conditions in the west prevented a small section of survey.	Bounded by hedgerow to the north, west, and south, and trees to the south. The field continued to the southwest.
6	Arable field under young crop, slightly sloping down from east to west. Wet ground conditions in the west, surface ground water prevented a small section of survey.	Bounded by hedgerow to the north, tree line and a dirt path to the east, treeline and a farm track to the west. The field continued to the southwest and was bounded by volunteer crop to the southeast.
7	Flat, arable field under crop stubble.	Bounded by a grass verge, a hedge, and a house to the north, and trees and a road to the west. The field continued to the east and south.
8	Arable field recently seeded, gently sloping down from east to west.	Bounded by tree lines to the north and east, a stream and bank to the west, and the field continued to the south.

9	Arable field recently seeded, gently sloping down from east to west. Wet ground conditions in the west, surface ground water prevented a small section of survey.	Bounded by hedgerow to the south, intermittent trees and a farm track to the east, a stream and bank to the west. The field continued to the north. A telegraph pole was present in the centre-west of the survey area with overhead cable running northeast to southwest.
10	Flat, arable field under crop stubble.	Bounded by a hedgerow to the south and a brick wall to the southwest, intermittent trees and a farm track to the west. The field continued to the north and east.
11	Pasture field, flat to the north, with a topographic depression running north to south through the southern half.	Bounded by tree line to the north and part of the western boundary, a hedgerow and metal fence in the south, and a metal fence in the northwest corner. The field continued to the east and west.
12	Flat, arable land left as fallow. Some long vegetation which did not prevent survey.	Bounded by hedgerow to the southwest and northeast, by a farm track to the east as well as metal fencing and a treeline. The field continued to the west and southeast corner.
13	Flat, recently seeded arable field.	Bounded to the southwest by hedgerow, to the southeast by a farm track and tree line. The field continued to the north.
14	Flat, pasture field.	Bounded by metal fencing to the north, east, and northwest. The field continued to the south and west.
15	Flat, arable field under young crop.	Bounded to the east, south, and southwest by trees and hedges. The field continued to the north.
16	Flat, arable field under young crop.	Bounded to the east and southeast by trees. The field continued to the west, and into Areas 15 and 17 to the southwest and north respectively.
17	Flat, arable field under young crop.	Bounded by metal fencing to the northwest, and by trees and hedges to the north, northeast, and south. The field continued to the west.
18	Arable field under a young crop, gently sloping down from southeast to northwest.	Bounded by tree lines to the west and south. The field continued to the north and east.
19	Not Surveyed	
20	Flat, arable field under young crop.	Bounded to the south by a ditch and tree line, to the west by a tree line, and the field continued to the north and east.
21	Flat, arable field under young crop.	Bounded to the east by a tree line, and to the west by a tree line and farm track, the field continued to the north and south. Overhead cables crossed the area northwest to southeast.
22	Flat, arable field under young crop.	Bounded to the east by a tree line, the field continued into Areas 21 and 25 to the north and south respectively. Overhead cables crossed the area from northwest to southeast to join a telegraph pole central to the eastern boundary.
23	Flat, arable ploughed field.	Bounded by trees to the north, and hedgerows to the east and west. The field continued to the

		south. Wet ground conditions in the west and centre prevented a small section of survey.
24	Flat, arable field under young crop.	Bounded to the north and east by trees, and by a farm track and grass verge. The field continued to the west and into Area 21 in the south.
25	Flat, arable field under young crop. An area of volunteer crop on the southern boundary prevented a small section of survey.	Bounded by a bank and adjacent farm track to the west, a tree line to the south, a stream to the northeast, and the field continued to the north and east. A line of telegraph poles was present along the northeast boundary.
26	Flat, arable field under young crop. The eastern quadrant of the field could not be surveyed due to presence of a tree nursery.	Bounded by a metal fence to the northwest and east, a tree line, farm track, and stream to the northeast, and a farm track and stream to the southwest. The field continued to the south. Three metal posts were noted in the west of the survey area.
27	Not Surveyed	
28	Flat, arable field under crop stubble.	Bounded by a small access road to the east, and a farm track to the south. The field continued to the north (Area 42) and the west.
29	Flat, pasture field.	Bounded entirely by wooden fencing. A wooden stable was located in the northwest corner of the survey area. A metal gate was present central to the southern boundary.
30	Flat, arable field under young crop.	Bounded by a road to the west, a stream and tree line to the south. The field continued to the north and west.
31	Flat, arable field under young crop.	Bounded by ditches to the north, south and west, and by a road to the east. A metal gate accessed the field in the southeast corner and a telegraph pole was located in the southwest corner.
32	Flat, arable field under young crop.	Bounded by a ditch and tree line to the northeast, and a ditch and footpath to the south. The field continued to the east and west. Telegraph poles and overhead cables crossed the northern half of the survey area east to west.
33	Flat, recently seeded arable field.	Bounded to the north and south by ditches. The field continued to the east and west.
34	Flat, arable field under young crop.	Bounded to the north, south, and east by ditches and hedgerows. The field continued to the north. Two telegraph poles were present near the centre of the survey area carrying overhead cables parallel to the western boundary.
35	Flat, grassland surrounding a parking area and buildings. Dense vegetation along the south-eastern boundary prevented a strip of survey.	Bounded in the north by wooden fencing, and ditch drainage to the northwest, a treeline to the east, and car parking and buildings to the west. An embankment ran parallel with the eastern boundary separating the overgrown vegetation from the main survey area. A shed and tools were noted in the northeast of the survey area

		along with some concrete hardstanding south of this, a manhole cover in the northwest and a picnic area central to the eastern boundary. Lines of gravel were noted in the centre north of the survey area possibly indicating the presence of drains.
36	Flat, combination of recently seeded arable land and the grass bordering the field.	Bounded by trees to the south and west, the field continued to the north and east.
37	Arable field under a young crop, the field slopes slightly down from east to west.	Bounded by a tree line to the south, west, and east, and hedgerow in the northwest. The field continued to the north. Telegraph poles and overhead cables ran north to south through the centre of the survey area.
38	Flat, arable field under young crop.	Bounded by a small access road to the north, trees to the east, and a ditch to the west. The field continued to the south. A line of telegraph poles and overhead cables ran along the northern boundary.
39	Flat, arable field under young crop.	Bounded by small access roads to the north and southeast, and trees to the northwest. The field continued to the south. Telegraph poles and overhead cables ran along the northern boundary.
40	Flat, arable field under young crop.	Bounded by a small access road to the south, trees to the east, and a ditch to the northwest. The field continued to the north.
41	Flat, arable field under young crop. Wet ground conditions and a very muddy area prevented a small section of survey near the centre of the field.	Bounded by a stream to the northeast, a farm track to the south, a tree line to the west, and the field continued to the north.
42	Flat, arable field under crop stubble. The northern corner of the field was grassland.	Bounded by a farm track to the east and southeast, and trees to the north. The field continued to the north and southwest (Area 28).
43	Flat, arable field under young crop.	Bounded by a ditch to the north, a ditch and hedgerow to the east, and an embankment with footpath to the south with a river beyond. The field continued to the west. A line of telegraph poles and overhead cables ran the central length of the field parallel the eastern boundary.
44	Flat, arable field under crop stubble.	Bounded by metal fencing and hedgerow to the northwest corner, south, and west, and a wooden fence to the east. The field continued in the north. A pole indicating the presence of a gas pipeline was noted central to the western boundary.
45	Flat, grassland with waterlogged ground conditions throughout	Bounded to the south and west by wooden fencing, and to the northeast by trees. The field continued to the north.

	which prevented multiple small sections of survey.	
46	Flat, grassland with waterlogged ground conditions in the northeast and south which prevented sections of survey.	Bounded by wooden fencing to the south, east and west. The field continued to the north.
47	Flat, arable field under rolled plough. A group of young trees prevented a section of survey to the west.	Bounded by a small access road to the north and west, and a ditch boundary to the east. The field continued to the south.
48	Flat, arable field under young crop.	Bounded by farm tracks to the north and northeast, and a ditch boundary to the west. The field continued to the south.
49	Not Surveyed	
50	Flat, arable field under young crop.	Bounded to the south by a farm track, and a farm track and trees to the east. The field continued to the north and west. Metal farm equipment was noted in the southeast corner.
51	Flat, arable field under young crop.	Bounded to the north and west by hedgerow, and to the south by a drainage ditch. The field continued to the east.
52	Not Surveyed	
53	Flat, arable field under young crop. Wet ground conditions and a very muddy area prevented a small section of survey near the centre-east of the field.	Bounded to the north, south, and west by drainage ditches. The field continued to the east.
54	Flat, arable field under young crop.	Bounded by ditch drains to the northeast, east, south, and southwest, and hedges on the eastern and southern boundaries. The field continued to the north and northwest. A pylon was located in the northeast of the survey area with overhead cables running north to south. A telegraph pole was located in the east on the northern boundary with overhead cables running northeast to southwest.
55	Flat, grassland used for paddocks.	Bounded to the north by a drainage ditch, and hedgerow to the south and west. The field continued to the east. The northeast corner of the survey area extended into a separate paddock divided by a wooden fence.
56	Flat, arable field under young crop.	Bounded by a farm track to the north, trees to the west and east, with a stream beyond the eastern boundary. The field continued to the south. An outbuilding was present central to the western boundary.
57	Flat, arable field under young crop.	Bounded by a road to the north, and a small embankment to the south. The field continued to the east and west.

58	Flat, arable field under rolled plough.	Bounded by drainage ditches to the northwest, south and west. The field continued to the east and northeast.
59	Flat, paddock area muddy underfoot. A small area in the northeast could not be surveyed due to sticky muddy conditions.	Bounded entirely by wooden fencing and trees in the northeast and east. A metal barrel was noted in the northeast corner of the survey area. A metal gate was present in the southwest corner.
60	Flat, arable field under rolled plough.	Bounded by a farm track to the north, and drainage ditches to the south and east. The field continued to the west. Three lines of overhead cables crossed the area running north to south, [redacted]st, and one in the centre of the
61	Flat, arable field un[redacted] crop.	rainage ditches to the north and rm track to the south. The field the east. A telegraph pole was outhwest corner.
62	Flat, arable field un[redacted] crop.	rainage ditches to the north and d continued to the east and west.

4.3. The majority of survey areas i[redacted]route (west of the A142 to Burwell substation) have chalk under[redacted]bury Marly Chalk Formation. The only exceptions are the centra[redacted]uth of Area 25, both of which have Tottenhoe Stone Member ch[redacted]g Formation chalk. Directly east of the A142 Areas 35, 36, 44-46 [redacted]g Zag Formation chalk, as do Areas 5-10 in the north of the cable [redacted]oute (near Chippenham Road, and La Hogue Cottages) Areas 1-3[redacted]logy of Holywell Nodular and New Pit Chalk formations undiffe[redacted]ral inclusion of Tottenhoe Stone Member chalk, and Zig Zag Fo[redacted]al Survey, 2021) (Overall Figure 3).

4.4. Superficial deposits are largely unrecorded in the western half of the cable route (west of the A142 to Burwell substation), with exceptions in Areas 29-34, 58 and 62 which show intermittent peat deposits. Area 28 contains sand and gravel river terrace deposits, as does the east of Area 44 (immediately east of the A142). East of Area 44 a band of clay, silt, sand and gravel alluvium is recorded covering Areas 35, 45, 46 and 59. The north of the cable has superficial deposits of Head clay, silt, sand and gravel (Areas 5-10). The east of the cable route has deposits of sand and gravel river terrace deposits across Areas 11-17, with some Lowestoft Formation diamicton in the north of Area 14 (British Geological Survey, 2021) (Overall Figure 4).

4.5. Soils in the western half of the cable route (west of the A142 to Burwell substation) consist of shallow lime-rich soils over chalk or limestone, which are also present in Areas 35, 36, 45, 46, 59, the central section of Area 1 and the west of Area 8. The majority of the remaining areas have soils consisting of freely draining slightly acid but base-rich soils: along the route of the A142 (Areas 37 and 44), in the east of the cable route (Areas 1-3, 12-17, the north of Area 11), and in the north (Areas 7-10, and the eastern edges of Area 5-6). Also in the north, across the majority of Areas 5-6 are freely draining sandy Breckland soils, and freely draining lime-rich loamy soils in the west of Area 9. The majority of Area 11 is covered by freely draining slightly acid sandy soils (Soilscapes, 2021) (Overall Figure 5).

5. Archaeological Background

5.1. The following archaeological background takes into account information taken from a desk-based assessment (DBA) of the site at the Sunnica Energy Farm. Information has been collated from a Heritage gateway search and a previous DBAs produced by AECOM for the Sunnica Energy Farm east (AECOM, 2019 [2]), west (AECOM 2019 [3]) and national grid connection sites (AECOM 2019 [4]). These AECOM DBAs looked to assess the archaeological potential for the survey area(s) and a wider 1km study area surrounding both the Sunnica west and east sites (See 1.1).

5.2. A flint axe, pottery sherds and bone fragments, possibly dating to the Neolithic have been recovered from the Sunnica e[redacted]date to the same time-period have been identified in the immed[redacted]lose to Swales Tumuli.

5.3. Evidence of prehistoric settler[redacted]th of the study area. An excavation at Foxburrow Plantation ident[redacted]ddocks, buildings, hut circles, a ring ditch, ditches and pit feature[redacted]he northern boundary of the A14, inside Zone F of the solar PV s[redacted]ducted prior to the construction of the bypass identified an earl[redacted]ttery with evidence of Bronze Age cremations. Several minor p[redacted]n identified c. 360m outside the survey area at Bay Farm– offe[redacted]t to the Sunnica Energy Farm site. A hoard of Iceni staters and a [redacted]so been recovered in Freckenham.

5.4. Two scheduled monuments v[redacted] identified: Chalk Hill bowl barrow and Lumber Hill bowl barrow[redacted] were also identified in the form of worked flints and bronze a[redacted]acent to the Sunnica west site, immediately north of the A1[redacted]d monuments comprised of four bowl barrows, forming part o[redacted]etery; Hilly Plantation bowl barrow and The Rockery bowl barrow. West of the A11, an excavation at Dane Hill Farm uncovered several prehistoric sites of uncertain dates, including a Bronze Age Barrow and evidence of a Medieval moated manor.

5.5. Numerous different surface scatters have been recovered from c. 1100m south of the Sunnica east site with a number of brooch type finds relating to the Roman era among these. Further examples include a scatter of fragments south of Freckenham indicative of hypocaust tile, and a hoard of 600 bronze coins has been recovered in the north western portion of the Sunnica east site.

5.6. Medieval activity within the site and wider search area is confined to a number of find spots and stray finds. A Saxon pin and Saxon bronze book fitting were both identified within the eastern portion of the Sunnica site. A Saxon brooch, pin and pottery scatter have been recovered along with metal working related finds and Anglo-Saxon coins within the immediate vicinity of the site. Later medieval activity includes a scatter of silver coins and pottery scatter within the eastern portion of the Sunnica Energy Farm.

6. Methodology

6.1.Data Collection

6.1.1. Magnetometer surveys are generally the most cost effective and suitable geophysical technique for the detection of archaeology in England. Therefore, a magnetometer survey should be the preferred geophysical technique unless its use is precluded by any specific survey objectives or the site environment. For this site, no factors precluded the recommendation of a standard magnetometer survey. Geophysical survey therefore comprised the magnetic method as described in the following section.

6.1.2. Geophysical prospection comprised the magnetic method as described in the following table.

6.1.3. Table of survey strate

Method		e Interval	Sample Interval
Magnetic	Instrum Three	m	200Hz reprojected to 0.125m

6.1.4. The magnetic data w oke hand-pulled/quad-towed cart system and hand-carr

6.1.4.1. MS' cart and h prised of Bartington Instruments Grad 13 Digita itional referencing was through a multi-channel, t Antenna RTK GPS outputting in NMEA mode to y of collected measurements. The RTK GPS is accu horizontal and 0.015m + 1ppm in the vertical.

6.1.4.2. Magnetic and GPS data were stored on an SD card within MS' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.

6.1.4.3. A navigation system was integrated with the RTK GPS, which was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

6.2.Data Processing

6.2.1. 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 electron

Projection to a Regular Grid positioning requires a uniform grid projection to visualise data. orthogonal grid projection and are resampled onto the grid usi g algorithm.

Interpolation to Square Pixe a bicubic algorithm to increase the pixel density between sens ges with square pixels for ease of visualisation.

6.3.Data Visualisation and Interpretation

6.3.1. This report presents t l field data as greyscale images, as well as the total field d e gradient of the sensors minimises external interference esponses from ferrous and other high contrast materia k or ephemeral anomalies can be reduced through the ent. Consequently, some features can be clearer in the field datasets. Multiple greyscale images of the gradien lotting ranges have been used for data interpretation. ewed alongside the XY trace plot (found in the relevant map book). XY trace plots visualise the magnitude and form of the geophysical response, aiding anomaly interpretation.

6.3.2. Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historical maps, LiDAR data, and soil and geology maps. Google Earth (2021) was also consulted, to compare the results with recent land use.

6.3.3. Geodetic position of results – All vector and raster data have been projected into OSGB36 (ESPG27700) and can be provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) respectively. Figures are provided with raster and vector data projected against OS Open Data.

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 anomal[redacted]along with the certainty of the interpretation. The c[redacted]pretation of results is through a process of comparing[redacted]physical reports. MS actively seek feedback on their rep[redacted]rther work, in order to constantly improve our knowled[redacted]

7.2.Summary

7.2.1. The western half of Z[redacted]et magnetic background, probably due to past waterlogg[redacted]ancement of the soils. Historically, much of the land sout[redacted]ded as fenland (From Snailwell fen, West fen, Little fen[redacted]n fenland areas was limited by waterlogging without[redacted]ainage, suggesting the majority of the extent was unsui[redacted]cultivation in periods of the past. Furthermore, the wet[redacted]mation of magnetic enhancement related to human acti[redacted]exploited in some way (or settled, during drier periods)[redacted]ssociated with this activity would achieve detectable m[redacted]rounding soils and sediments. The survey results have identified a greater density of drains in this western half of the zone which suggests waterlogging of this area has been managed in recent centuries to allow for agricultural utilisation, which can be seen in the recorded former field boundaries and agricultural ploughing trends in these areas (Figures H25, H29, H36, H41).

7.2.2. On slight rises above this low laying ground, some linear anomalies of potential archaeological origin have been detected. Most of these anomalies appear to extend beyond the bounds of the survey corridor which has prevented confident classifications. However, some parallel linear anomaly pairs (Areas 38 & 57 (Figures H24 & H32)) have been interpreted as potential trackways. A more complex series of overlapping rectilinear anomalies were identified within Area 40 (Figure H32), these comprise truncated anomalies in multiple orientations, likely indicating multiphase activity. None of the anomalies classified as “Probable” or “Possible” archaeology correspond with any former field boundaries recorded on available historic maps, which suggests the field systems identified predate these maps.

7.2.3. At the highest point in Zone H in Areas 1-3, groups of linear positive anomalies have been identified, in some cases with associated discrete positive anomalies (Figures H20, H21) and interpreted as ditches and pits respectively. The linear ditches follow different

orientations and partly intersect each other. No corresponding features have been recorded on historic maps; for this reason, they have been interpreted as having a possible archaeological origin. The limits of the survey area, being long and narrow, preclude a clear and more confident identification of these anomalies. The westernmost of these linear anomalies is also visible on satellite imagery (Google Satellite, 2018), where it appears to be part of a much larger cropmark possibly suggestive of a sub-rectangular enclosure.

7.2.4. Three sets of ridge and furrow trends have been recorded on this higher ground, with an evident variation in signal strength between the two sets in Area 1 and the set in Area 2 (Figure H19-H20). The sets in the north follow two opposite directions and are extremely faint in magnetic signal whereas the trends in the centre have a stronger signal.

7.2.5. In the north of Zone H weakly enhanced curvilinear anomalies have been detected (Figure H4) following a similar alignment to a large trackway detected within Zone A of the solar PV survey areas (Swinbank Et al, 2020), this is visible within the Overall Figure 6. However, these anomalies are separated by c. 300m, and may be unrelated. In any case, the curvilinear anomalies within Zone H appear to open from a relatively narrow trackway into a wider space, potentially an enclosure or occupation area, the full extent of which is cut off by the narrow confines of the survey corridor. Though it should be noted that within the adjacent Zone B solar PV areas, no continuation of this potential enclosure was identified (Swinbank Et al, 2020).

7.2.6. In the north and centre of Zone H (Areas 5, 24, 42), sections of the former Cambridge and Mildenhall Branch railway has been detected (Figure H9 & H25). The varying strength and type of magnetic signal along the length of the former railway indicates that removal was more complete in the northeast, where only debris material remains, than to the northwest and centre, where broad ferrous anomalies have been detected.

7.2.7. Recent agricultural activity is evident in the form of ploughing trends and tractor tracks present throughout the zone. Several large, buried services have been detected in the east and the west of the zone. These have produced broad magnetic haloes that may obscure weaker underlying signals, if any are present. Magnetic disturbance is also present at the perimeter of the fields due to fencing. Areas covered in high concentrations of small ferrous anomalies with strong magnetic signals could indicate made ground such as Areas 48 & 35 (Figures H24 & 28). While less densely packed ferrous debris could indicate the spread of green waste for agricultural purposes such as Area 43 (Figure H40).

7.3.Interpretation

7.3.1. General Statements

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

7.3.3. **Magnetic Disturbance** – The strong anomalies produced by extant metallic structures along the edges of the field have been classified as 'Magnetic Disturbance'. These magnetic 'haloes' will obscure the response of any weaker underlying features, should they be present, often over a greater footprint than the structure they are being caused by.

7.3.4. **Ferrous (Spike)** – Dis[redacted]nalies are likely to be the result of isolated modern meta[redacted]d surface.

7.3.5. **Ferrous/Debris (Spre[redacted]efers to a concentrated deposition of discrete, dipolar fe[redacted]ly magnetic material.

7.3.6. **Natural – Various cla[redacted]n the natural soils and sediments across the survey are[redacted]cape formation processes and are a complex product c[redacted]geology and local soil formation. Though almost the w[redacted]y various chalk types, the resulting background data text[redacted]perficial overburden, topography and morphology all [redacted]dscape. These specific landscape features influence t[redacted]n of natural anomalies through transportation, depos[redacted]. Two different main background patterns have been [redacted]ey appear to relate to the local landforms and resulti[redacted]es across and through the surface. In the interpretatio[redacted]anomaly have been used. The characteristics of each are as follows:

7.3.6.1. **Natural (General)** – This class has been used to described anomalies that typically appear as bands of relatively enhanced response and are usually more visible in the total field data than the gradient. In this landscape, they are interpreted as largely relating to variations in the superficial geology (sands, gravels etc) created at the time of their deposition. The sorting and fining of sediments under fluvial influence creates bands and pockets of sediments that are relatively magnetically enhanced compared to their immediate surroundings. These bands also have different resistances to erosion, and so commonly influence the local topography as well. Finally, they may appear in conjunction with the two other predominant background patterns where there are bands of superficial material present in areas where the processes that produce the other two patterns are active. There may also be locations where these bands are a result of colluvial hill washing of sediments from further uphill and deposition in the lower parts of the site, and accumulation of the finer textured material in the deeper parts of the soils and sub-soils.

7.3.6.2. **Natural (Dissolution)** – This class has been used to describe a background pattern to the data characterised by broad curving and circular changes in magnetic strength.

These patterns vary in scale across the site from tens to hundreds of meters, but they are uniformly broad and gentle, with a diffuse macular appearance, with only occasional abrupt changes in intensity. As suggested by the name of the class, these anomalies are interpreted as being produced by dissolution processes affecting the chalk. These anomalies and the subsurface variations causing them are the product of slow-moving water within the subsurface, with a low or non-existent flow rate. This means lower lying areas of flat ground may be subject to percolation and stagnation of nutrient/ acid rich precipitates creating large scale dissolution formations such as 'dissolution sinkholes' in the surface of the bedrock. These processes are more likely to occur in areas without superficial geology, and where the soils are thinner and are well drained.

7.3.6.3. **Natural (Infill)** – This class has been used to describe a background pattern to the data characterised by strong linear positive anomalies, frequently running with the local slope. In some areas, they can appear to have a striped effect difficult to distinguish from ridge and furrow, whereas in other the effect can look like braided formations, or a geometric pattern. As implied by the class name, these anomalies are interpreted as being the product of finer grained material that is more magnetically enhanced, accumulating in cracks and fissures. These fissures may be within the immediate subsurface or at the surface, such as rills, or they may be at the surface of the bedrock and relate more to faulting patterns within the chalk, or, for example, periglacial cracking (ice wedges). Generally speaking, the straighter and less braided areas correspond with steeper slopes, and so are interpreted as being related to higher flow velocities, whereas the more braided and geometric areas associate with more gentle slopes and are related to lower velocities. Where the velocities slow sufficiently, the pattern shifts to the 'Natural (Dissolution)' pattern described above. Where this pattern has been difficult to distinguish from ridge and furrow, the classification has been made on the overall appearance of the pattern and whether or not it ends at a boundary anomaly (or the projected line of one), or where the pattern transitions into another natural type. In the case of the former, ridge and furrow is more likely, and in the case of the latter, then a natural explanation of the anomalies is more likely.

7.3.7. **Undetermined** – Anomalies are classified as Undetermined when the anomaly origin is ambiguous through the geophysical results and there is no supporting or correlative evidence to warrant 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 not ferrous in nature.

7.3.8. **Ridge and Furrow** – Ridge and furrow cultivation has a characteristic appearance in magnetic results as alternating bands of enhanced and less enhanced material at regular spacings of 2m up to 20m, though more usually within a 3m to 7m range. The enhanced bands, generally associated with the furrows, of these are all drawn as this can help in the analysis of field patterns and sometimes help to ascribe a relative date to the system.

7.3.9. **Agricultural (Trend)** – Modern ploughing is more typically seen as weaker more narrowly spaced linear trends in the texture of the data, though this varies depending on the local soil properties and type of agriculture engaged in. In many cases, a sample of the modern ploughing trend will be drawn, rather than all of the lines, as this allows other anomalies of greater interest that underlie the ploughing to be clearly seen. At other locations, more of the modern ploughing might be drawn, where this is helpful to the interpretation of the landscape, rather than hindering it. Linear anomalies that follow the shape of the modern field edge are indicative of repeated tractor movement in these locations and are often evident as narrow negative anomalies.

7.3.10. **Agricultural (Strong/ Weak)** – Generally agricultural activity has unique signatures both in terms of anomaly types and patterns of occurrence that makes it straightforward to classify. Field boundaries are a type of historical agricultural feature and are identifiable in the results where old field divisions have been removed to amalgamate fields, but left behind filled ditches and other subsurface remains, such as ferrous/debris material, drains or services. Where anomalies collocate with field boundaries shown on historic maps, these have been classified as 'Agricultural', unless there is a strong reason to suggest otherwise which is discussed in the relevant results section. Other anomalies of similar character that align with mapped boundaries or continue them but where no boundary is shown on the earliest maps are usually also classified as 'Agricultural', unless there is a strong reason to suggest otherwise which is discussed in the relevant results section.

7.3.11. Magnetic Results - Specific Anomalies

North (Figures 42-53)

7.3.11.1. **Possible Archaeology** – Across Area 10 a number of linear and curvilinear anomalies have been detected (Figures H42-45); these anomalies have weak magnetic signals typical of ditch-features with only slightly enhanced backfills. At [**10a**] two of these curvilinear anomalies appear to come together to suggest two parallel ditches, the full extent of which are obscured by magnetic disturbance along the western boundary of the survey area. Anomaly [**10a**] could mark the beginning of a of a trackway; a possible trackway with similar width and alignment was identified c. 300m west within Zone A of the Sunnica Solar Panel areas (Swinbank et al, 2020: 7.2.2.6) and is visible on the Overall Figure 6. However, there is no physical connection between [**10a**] and the curved trackway noted within Zone A.

7.3.11.2. **Magnetic Disturbance and Ferrous/Debris (Spread)** – Crossing through the north of Area 5 is a broad ferrous anomaly [**5a**] running on a northwest to southeast alignment (Figures H46-49). This is characterised by ferrous-type anomalies of varying strengths and signal types, all of which fall within a consistent band crossing the survey area. The band of anomalies comprises a high concentration of small ferrous anomalies indicating the presence of debris. This linear band is strongly dipolar in the northeast of Area 5, but the magnetic enhancement decreases in the southwest suggesting a reduction in the ferrous content. This anomaly corresponds with the former Cambridge and Mildenhall Branch railway recorded on historic maps (Figure H9). The variety of the magnetic signal within the band of anomalies likely reflects the differences in how thoroughly the railway was dismantled along its extent. A continuation of the line of the former Cambridge and Mildenhall Branch railway is visible to a lesser extent along field edges to the southwest (Areas 24 & 42 (Figure H25 & H29)).

7.3.11.3. **Extraction** – In the centre of Area 6, a broad anomaly showing as a distinctly different texture has been identified [**6a**] and interpreted as possible extraction (Figure H50-H53). Due to this anomaly showing defined edges and being located on a band of clay, silt, sand and gravel, [**6a**] could indicate a sand pit or similar removal of the natural material. No evidence for extraction is visible on the 2nd Edition OS Maps within Area 6, but a gravel pit is recorded a short distance to the east (Figure H9) indicating [**6a**] is likely related to unmapped extraction activity.

East (Figures 54-65)

7.3.11.4. **Ferrous/Debris (Spread)** – In the northern half of Area 14, a concentration of strongly dipolar anomalies was detected in the location of a former pond [**14a**], identified on 2nd Edition OS maps (Figures H17). The dipolar anomalies indicate that the former pond has been backfilled with a mixed material with either a high ferrous content, or perhaps using building materials given its location next to La Hogue Farm (Figures H58-H61).

Centre-East (Figures 66-73)

7.3.11.5. **Possible Archaeology (Strong/Weak)** – In the south of Area 2 and in the north of Area 3, a set of intersecting linear and discrete anomalies [**2a**], [**2b**] and [**3a**] has been identified (Figures H66-H69). The positive linear anomalies, interpreted as possible enclosure ditches, are variably strong and weak in magnetic signal and run on different orientations. They are concentrated in the southern end of Area 2, with one of them extending southwards into Area 3. The linear anomalies appear as though they may extend beyond the survey boundaries. One of these linear anomalies is also visible as a cropmark on 2018 satellite imagery (Google Satellite, 2021), where it appears to be part of a larger cropmark possibly suggestive of a sub-rectangular enclosure. Several strong discrete anomalies have been interpreted as possible pits [**2b**]. In the north of Area 2, further weakly positive linear anomalies have been detected [**2c**], running parallel to each other and on a north-south alignment (Figures H66-H69). These could be interpreted as trackways, however, the limited context which this survey area provides has prevented a confident interpretation. This group of anomalies lies within a rich archaeological landscape as visible in Solar Panel Zones G and F (Swinbank et al, 2020), respectively to the west and east of Areas 2 and 3.

7.3.11.6. **Agriculture (Strong/Weak)** – In the centre of Area 1, weak positive linear anomalies and an alignment of discrete anomalies [**1a**] have been identified (Figures H70-H73). These are parallel to each other and run on a northeast to southwest orientation. They correspond with an extant trackway which has been used over a long period of time, also visible on 2nd Edition OS mapping (Figure H21).

Centre (Figures 74-101)

7.3.11.7. **Possible Archaeology (Weak)** – Within the centre of Area 37 two weakly positive linear anomalies running parallel to each other have been identified [**37a**] (Figures H78-H81). These anomalies are located within an area of geological variation which is characterised by weakly enhanced braided formations (see section 7.3.6.3). However, [**37a**] appears to cut across the less well-defined natural formations and has a straighter linear form indicating an anthropogenic origin. [**37a**] could be interpreted as a small trackway, however, the limited context which this survey area provides has prevented a confident interpretation.

7.3.11.8. **Possible Archaeology (Weak) –** Further west, in Area 41, three linear anomalies have been identified on a sub north-south alignment, [**41a**] (Figure H94-97). The western-most linear anomaly appears to extend south into the northern edge of Area 56, but the magnetic signal is much more ephemeral. A short linear anomaly aligned northeast to southwest within Area 56, [**56a**], has similar geophysical characteristics. Given the limited context provided by the cable route survey corridor is it not possible to determine whether these anomalies are part of a larger archaeological complex; or, more likely, were land divisions of indeterminate date. Both [**56a**] and [**41a**] run on similar alignments to the extant and recorded post medieval field systems (Figure 279).

7.3.11.9. **Undetermined (Weak) –** An ephemeral linear anomaly within Area 41 has been highlighted as being of undetermined origin (Figures 94-97). This curvilinear anomaly has been partially obscured by a data artefact caused by poor ground conditions at the time of survey preventing a section of data collection. It is therefore unclear whether this anomaly is part of the natural background variation of the area, or a feature similar to those of [**41a**].

Centre-West (Figures 102-109)

7.3.11.10. **Probable Archaeology (Complex)** – Within Areas 39 and 40, a series of rectilinear anomalies, [**40a**] and [**39a**], together form an archaeological complex (Figures H102-H105) measuring at least 0.5ha. However, it is likely the complex extends further north, beyond the scope of the survey. The anomalies exhibit a range of strong and weak positive magnetic signals, indicative of ditches infilled with an enhanced backfill, likely caused by occupation activity. Given the narrow survey corridor it is difficult to give a full interpretation of the anomalies due to their limited context. However, the anomalies do appear to overlap each other suggesting multiphase activity in this location, and their rectilinear forms indicate a late prehistoric to Romano-British origin.

7.3.11.11. **Probably Archaeology (Strong/ Weak)** – To the southeast of the complex within Area 40, two parallel weakly positive linear anomalies have been identified, [**40b**] (Figures H102-H105). The magnetic signal is indicative of two ditches lining a narrow trackway, which likely extends north of the survey area. These anomalies have similar magnetic signals to those within the archaeology complex; however, the varied alignment makes it uncertain whether [**40a**] and [**40b**] were contemporaneous. Further weakly-enhanced linear anomalies [**39b**] and [**40c**] share a much closer alignment to [**40b**], and it is possible that together these anomalies form part of a wider former field system not visible due to the narrow survey corridor.

7.3.11.12. **Possible Archaeology (Strong) –** Within Area 39 a number of strongly-positively-enhanced anomalies have been highlighted which could be indicative of cut features with anthropogenically enhanced backfills, such as pits and ditches. However, their locations either within the magnetic disturbance of a service line, or right on the edge of the survey area have prevented a more confident classification. Several small, discrete anomalies that appear to be arranged in a circular pattern adjacent to [**39b**], have been highlighted as possibly archaeological in origin. However, it should be noted these are not dissimilar in size or magnetic characteristics to incidental background variation and the circular arrangement could itself be coincidental.

7.3.11.13. **Probably Archaeology (Strong/ Weak) -** Approximately 550m west of the possible former field system highlighted at [**40c**] two further parallel linear anomalies have been detected within Area 57, [**57a**] (Figures H106-H109). Unlike those within Area 40, [**57a**] is relatively isolated, but appears to extend north beyond the survey boundary. Again, the magnetic signal is indicative of two ditches lining a trackway, but at c. 14m, this is substantially wider that that within Area 40.

Undetermined (Strong) – Many discrete anomalies classified as 'Undetermined' are scattered throughout Zone H (Area 44, Figure 74-77), however, several appear to cluster around [**57a**] (Figures H106-H109). Discrete anomalies have been identified that return a positive magnetic signal, but with a negative response in the centre. This type of magnetic signal, with dipolar characteristics, usually suggests a ferrous origin. However, the signal is a-typical, being inverted when compared to a characteristic ferrous anomaly. Another possible origin of dipolar signals is an anomaly comprising burnt or fired material. Due to the unusual response of these anomalies, and the fact that they do appear to cluster to a degree, they have been categorised as "Undetermined" because they could represent anthro

8. Conclusions

8.1. A fluxgate gradiometer survey cross the majority of the site, with c. 101.4ha surveyed out of t ombination of access restrictions, overgrown vegetation and cr final c. 36.9ha of land. The survey methodology has generally re ent and reveals phases of possible archaeological activity in sev cable route. Due to the dispersed nature of the cable route are n the archaeology detected within different sections of the site.

8.2. The limits of the survey area clude a clear and more confident identification for many of th ibly or probably archaeological in origin. Those within the nor cated within 600m of substantial archaeological complexes ide s in Zones A and B (Swinbank et al, 2020), however the magnetic Zone H are weaker and relatively isolated from the foci of the p s. Anomalies on the higher ground central to the cable route corridor have been interpreted as ditches and pits respectively. The linear ditches follow different orientations and partly intersect each other, suggesting multiple phases of activity. Similar anomalies have been identified further west, within some slight raises in the former fenland. Rectilinear anomalies identified have only partially been revealed due to the narrow limits of the survey area but could tentatively be suggested to be of late prehistoric to Romano-British in date. Further linear anomalies in the central and western sections of the survey area have been suggested to be related to land division or possible trackways, which are not recorded on available historical maps.

8.3. The historical and modern agricultural utilisation of the landscape is evident across the Sunnica cable route. With ridge and furrow ploughing regimes detected on the highest topographic point in the centre-west of the route. Modern ploughing is prevalent across the site, as are anomalies associated with tractor movement along field edges. Field drains have been identified across the western half of the site, accompanying the lowest area in the landscape, and associated with wetter local environments such as former fenland. In addition, evidence of former field boundaries from recent centuries, recorded on historical OS maps, has been detected across the western half of the site.

8.4. In general, the survey areas have been only minimally impacted by the presence of modern activity, this being mostly restricted to broad ferrous anomalies at the perimeters of fields, related to field boundaries, or where temporary fencing had been in place. However, underground services have been detected, producing broad ferrous anomalies in some areas. Two fields in the centre of the cable route are covered in high concentrations of small ferrous anomalies possibly indicative of made ground; and one field in the west is covered in less densely packed ferrous anomalies likely caused by the spread of “green waste” for agricultural purposes. Other significant ferrous and debris anomalies identified include sections of the former Cambridge and Mildenhall Branch railway in the north, and centre, of the cable route.

9. Archiving

9.1. MS maintains an in-house d[redacted]n Schmidt and Ernenwein (2013). This stores the collected m[redacted]ssed data, georeferenced and un-georeferenced images, XY t[redacted]ort.

9.2. MS contributes reports to t[redacted] upon permission from the client, subject to any dictated time[redacted]

10. Copyright

10.1. Copyright and intellectual p[redacted], figures and datasets produced by Magnitude Services Ltd is re[redacted]n full licence to use such material for their own purposes. Pe[redacted]ny third party wishing to use or reproduce any IP owned by [redacted]

11. References

AECOM., 2019 [1]. Sunnica Energy Farm (East), Written Scheme of Investigation. AECOM.

AECOM., 2019 [2]. Sunnica Energy Farm, Heritage Desk Based Assessment, Sunnica East Site. Sunnica Ltd.

AECOM., 2019 [3]. Sunnica Energy Farm, Heritage Desk Based Assessment, Sunnica West Site. Sunnica Ltd.

AECOM., 2019 [4]. Sunnica Energy Farm, Heritage Desk Based Assessment, National Grid Connection. Sunnica Ltd.

British Geological Survey, 2021. Geology of Britain. [Newmarket, Suffolk]. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. [Accessed 07/05/2021].

Cambridgeshire County Council, 2019. Updated Brief for Archaeological Evaluation, Cambridgeshire Historic Environment Team. Cambridgeshire County Council.

Chartered Institute for Archaeologists, 2014. Standards and guidance for archaeological geophysical survey. CIfA.

David, A., Linford, N., Linford, P. and Martin, L., 2008. Geophysical survey in archaeological field evaluation: research and professional services guidelines (2nd edition). Historic England.

Google Earth, 2021. Google Earth Pro V 7.1.7.2606.

Magnitude Surveys, 2019. Written Scheme of Investigation for a Geophysical Survey of Sunnica Energy Farm, Mildenhall, Suffolk. Unpublished.

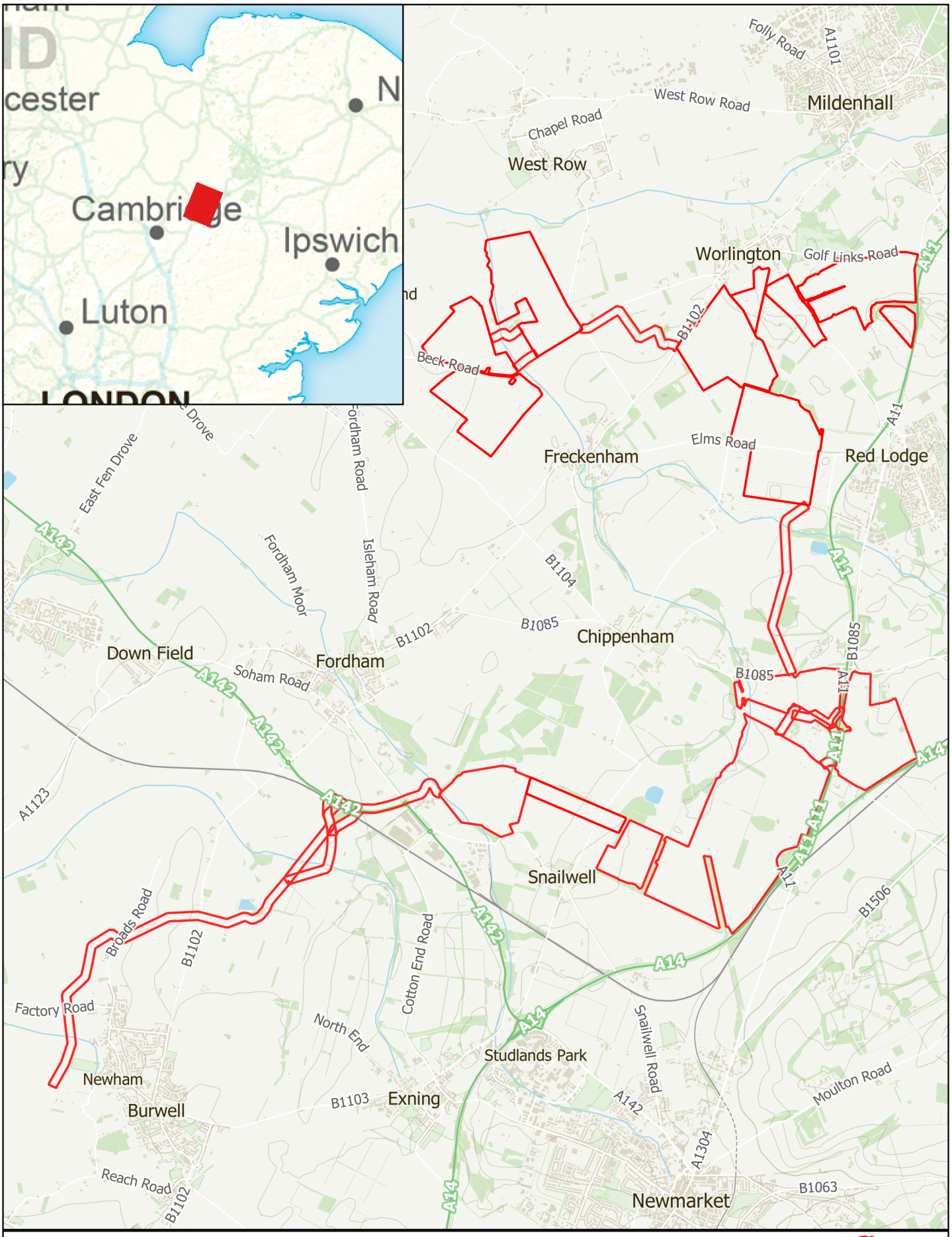
Olsen, N., Toffner-Clausen, L., Sabaka, T.J., Brauer, P., Merayo, J.M.G., Jorgensen, J.L., Leger, J.M., Nielsen, O.V., Primdahl, F., and Risbo, T., 2003. Calibration of the Orsted vector magnetometer. *Earth Planets Space* 55: 11-18.

Schmidt, A. and Ernenwein, E., 2013. Guide to good practice: geophysical data in archaeology. 2nd ed., Oxbow Books, Oxford.

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J., 2015. Guidelines for the use of geophysics in archaeology: questions to ask and points to consider. EAC Guidelines 2. European Archaeological Council: Belgium.

Soilscapes, 2021. [Newmarket, Suffolk]. Cranfield University, National Soil Resources Institute [http://landis.org.uk]. [Accessed 07/05/2021].

Swinbank, L., Harris, C., Beck, L., Carli, I., Salmon, F., Langston, A., 2020. Geophysical Survey Report of Sunnica Energy Farm, Mildenhall, Suffolk. Magnitude Surveys. ref: MSTL551.



MSTL551 - Sunnica Energy Farm
Figure 1 - Site Location
1:60,000 @ A4

Site Boundary

N

0 1 2 km

magnitude surveys

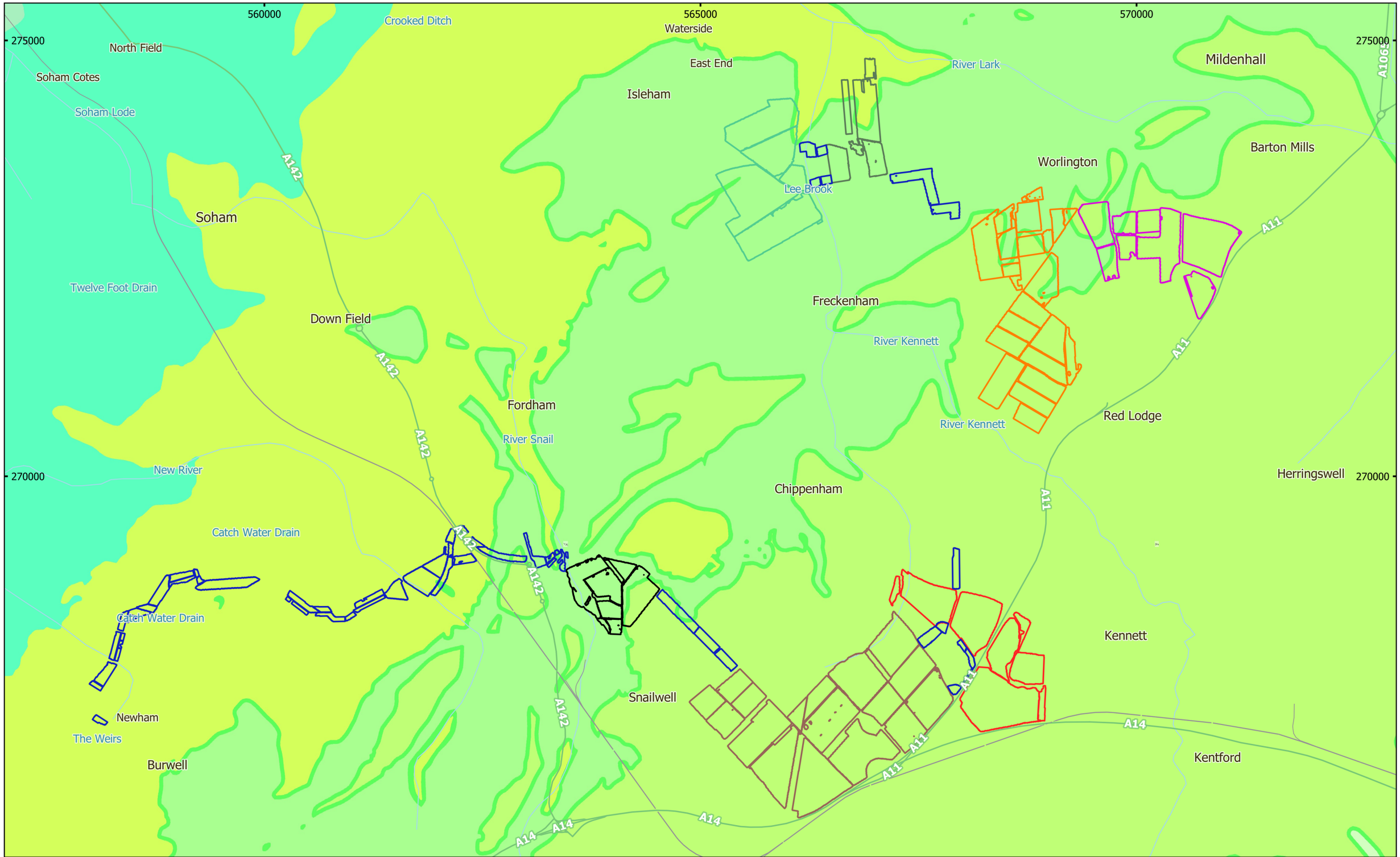
MSTL551 - Sunnica Energy Farm
Figure 2 - Location of Survey Areas (Survey Extent)
1:40,000 @ A3

Zone A
Zone B
Zone C
Zone D
Zone E
Zone F
Zone G
Zone H

N

0 1 2 km

magnitude surveys



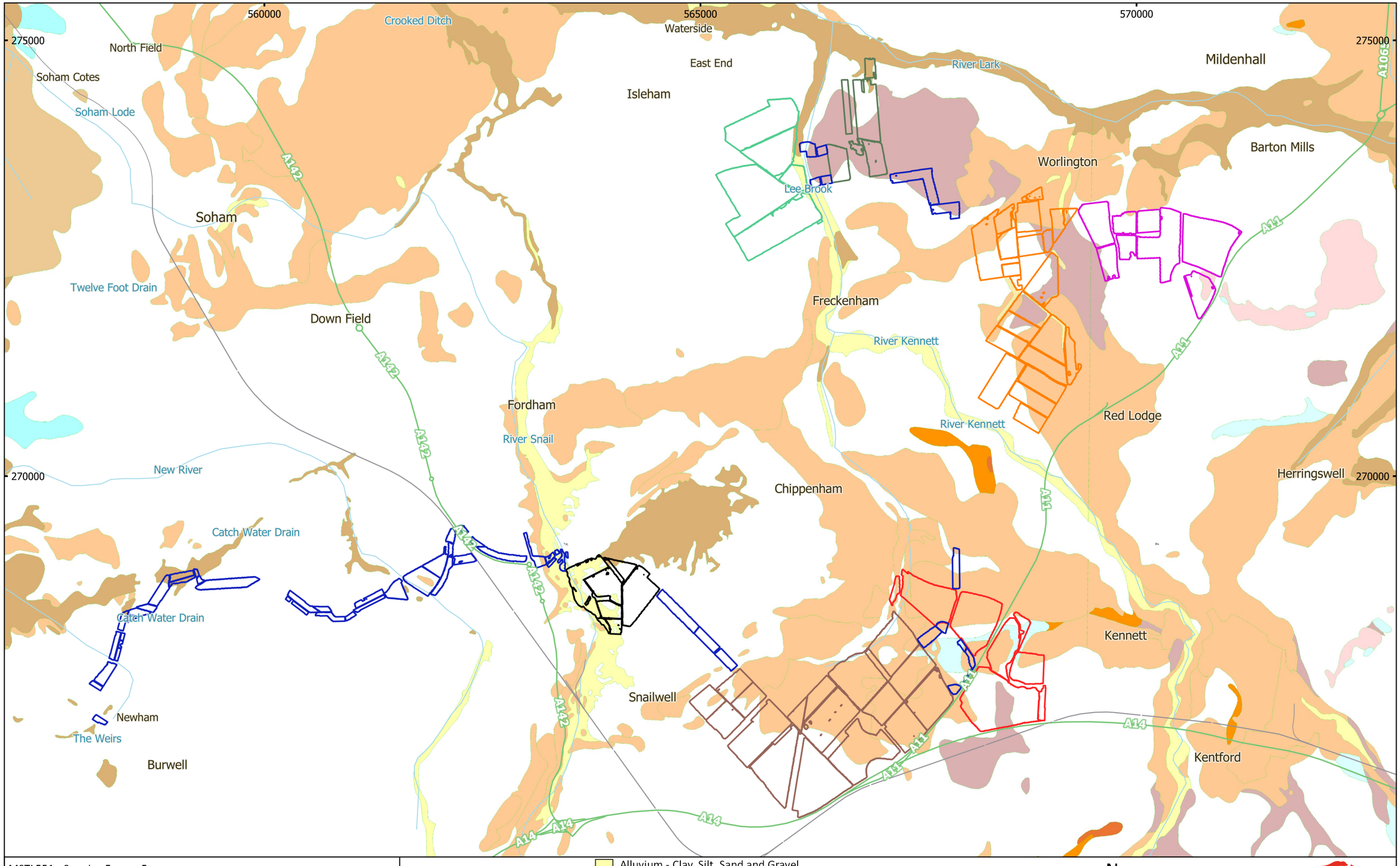
MSTL551 - Sunnica Energy Farm
Figure 3 - Geological Map of Site (Bedrock)
1:40,000 @ A3

- Zone A
- Zone B
- Zone C
- Zone D
- Zone E
- Zone F
- Zone G
- Zone H
- Gault Formation - Mudstone
- Holywell Nodular Chalk Formation & New Pit Chalk Formation - Chalk
- Lewes Nodular, Seaford, Newhaven & Culver Chalk Formations (Undifferentiated) - Chalk
- West Melbury Marly Chalk Formation - Chalk
- Zig Zag Chalk Formation - Chalk

N

0 1 2 km

magnitude surveys



MSTL551 - Sunnica Energy Farm
Figure 4 - Geological Map of Site (Superficials)
1:40,000 @ A3

- Zone A
- Zone B
- Zone C
- Zone D
- Zone E
- Zone F
- Zone G
- Zone H

- Alluvium - Clay, Silt, Sand and Gravel
- Croxton Sand and Gravel Member - Sand and Gravel
- Head - Clay, Silt, Sand and Gravel
- Lowestoft Formation - Clay and Silt
- Lowestoft Formation - Diamicton
- Peat - Peat
- River Terrace Deposits - Sand and Gravel
- None recorded

N

0 1 2 km

magnitude surveys

560000
565000
570000
275000
270000
Crooked Ditch
Waterside
North Field
Soham Cotes
Soham Lode
East End
Isleham
River Lark
Mildenhall
A1065
Barton Mills
Worlington
Lee Brook
A142
Soham
A11
Twelve Foot Drain
Freckenham
Down Field
River Kennett
Fordham
River Snail
Red Lodge
New River
Herringswell
Chippenham
Catch Water Drain
Kennett
Snailwell
Newham
The Weirs
Burwell
Kentford
A14

MSTL551 - Sunnica Energy Farm
Figure 5 - Geological Map of Site (Soils)
1:40,000 @ A3

Zone A
Zone B
Zone C
Zone D
Zone E
Zone F
Zone G
Zone H

Fen peat soils
Freely draining lime-rich loamy soils
Freely draining sandy Breckland soils
Freely draining slightly acid but base-rich soils
Freely draining slightly acid sandy soils
Loamy and sandy soils with naturally high groundwater and a peaty surface
Shallow lime-rich soils over chalk or limestone

N
0
1
2 km

magnitude surveys

560000
564000
568000
572000
272000
268000

MSTL551 - Sunnica Energy Farm
Figure 6 - Overview of Detected Archaeology
1:17,500 @ A1

Archaeology Probable (Strong)
Archaeology Probable (Weak)
Archaeology Possible (Strong)
Archaeology Possible (Weak)
Waterways
Contours

N
0 0.5 1 1.5 km

magnitude surveys