OUTLINE WRITTEN SCHEME OF INVESTIGATION

Berden Hall Solar Farm, Pelham

JAC27783
Berden Hall Solar Farm,
Pelham
1
05 October 2022

Quality Management

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Contents

Figures

Appendices

1 INTRODUCTION AND SCOPE OF STUDY

1.1 This below-ground archaeological Outline Written Scheme of Investigation (WSI) has been prepared by Susana Parker of RPS Consulting Services Ltd on behalf of Statera Energy Ltd (hereafter referred to as the 'Applicant').

1.2 An Outline Written Scheme of Investigation has been prepared setting out a programme of archaeological evaluation in areas of archaeological potential as identified in a Heritage Statement prepared for the site (RPS, 2022). This evaluation will be undertaken ahead any development associated with the proposals.

1.3 Should areas of significant archaeological remains be identified as a result of this evaluation, options to avoid or reduce any impact on such remains could include the use of concrete bases as a means of fixing the panels to the ground rather than a more intrusive foundation design. This approach would be in line with the guidance provided by Historic England (HE, 2021, paragraph 68).

1.4 Alternatively, a mitigation strategy which takes account of the results of this evaluation will be agreed with the LPA advisors.

The Site

1.5 The proposal site comprises 65.84 hectares (ha) of agricultural land, currently utilised for arable crop. The site is located 150 m east of the village of Berden, and 8.5 km south of Bishop Stortford, in the county of Essex and it is bound by Ginns Road to the north, hedgerows to the south and east, with an access lane to the west, and a substation in the south-west corner (**Figure 1**).

Geology[1]

1.6 The underlying basal geology comprises Mudstone, Siltstone, and Sandstone of the Lowestoft Formation, with overlying superficial geological deposits of Diamicton (**Figure 2**).

Topography

1.7 The site slopes from 115 m above Ordnance Datum (aOD) at the north-eastern corner to 127 aOD at the south-western corner.

Archaeological Background

1.8 The archaeological background is set out in in a Heritage Statement and Addendum prepared for the Site (RPS, 2022), illustrated in **Figure 3** and replicated below.

1.9 Activity dating to the **Palaeolithic** period is often ephemeral, and in situ deposits tend to be associated with specific geological deposits such as river terrace gravels. Evidence dating to the Mesolithic period is similarly ephemeral, and generally associated with hunter-gatherer patterns of land use. The Neolithic and Bronze Age periods are associated with the establishment of farming and more permanent settlement, with large scale woodland clearances occurring in the Bronze Age.

1.10 There are few finds dating from the earlier Prehistoric periods confirmed in the designated search area. A water-worn Palaeolithic ovate handaxe was found between the Rivers Ash and Stort at

[1] British Geological Survey – [redacted] [Accessed: 22.10.05]

Stocking Pelham by W H Penning of the Geological Survey in 1872, depicted in the HER (1760) c. 200 m to the west of the site, and a **Bronze Age** beaker burial was found in 1907 under the main entrance of the Berden Wesleyan Chapel by workmen in digging foundations (3863), c. 410 m to the north-east of the site.

1.11 By the **Iron Age**, the landscape had been mostly cleared of its woodland cover and was being farmed and settled. Cropmarks of three distinct enclosures, a ring-ditch and field boundaries are recorded at Crabb's Green in the HER (46423), partly overlapping with Archaeologically Alert Area EH_39 (to the south-west of the site - see below). The cropmark of a possible enclosure (46420) is recorded at Arnold's Spring, adjacent to Archaeologically Alert Area EH_25 (to the north-west of the site - see below). These may date from the late Prehistoric period onwards.

1.12 There are three finds recorded by the Portable Antiquities Scheme (PAS) within the search area dating to the Iron-Age to **Romano-British** period (51504, 55311, and 55317), and an area of cropmarks of a multi-ditched rectilinear enclosure of possible later Prehistoric date is recorded at Parsonage Lane (47949).

1.13 Within the site itself, the PAS records the find of a fourth century AD Roman coin within the north-east (55307), and a Medieval coin of late thirteenth to early fourteenth century date roughly centrally in the site (52153); however, the PAS locations depicted in the HER cannot be confirmed as accurate.

1.14 Further archaeological investigations have been undertaken **within the site boundary** in order to inform this assessment of archaeological potential. These consist of an assessment of historic aerial photography (March 2022, **Appendix 1**) and a geophysical survey of the site (May 2022, **Appendix 2**), noting that those surveys included the field of "The Rookery" ringfort, which is now excluded from the site boundary.

1.15 The aerial photography assessment of the site identified evidence for:

- a likely **Prehistoric to Roman ditched enclosure**, eroded and visible only as a crop mark 99 m by 60 m with no internal features or visible entrances recorded in the HER within the north-west of the site (47982);
- **post-Medieval field systems**, some of which may possibly derive from pre-Medieval land use. Linear features also identified through geophysical survey (see below) in the southern portion of the site have been interpreted as a field system, although it was difficult to attribute a date. This field system is also recorded in the HER (19562), and identified as a possible moated site; and
- a **ringwork motte**, to the east of the site (excluded from original site boundary further to consultation with statutory advisors). This feature is very superficial (EEX52369, EEX13884, and EEX13885), but archaeological deposits are likely present in the top and subsoils, as evidenced by their appearance as marks in soil there the buried features are brought to the surface by the plough.

1.16 The detailed gradiometer survey of the site identified additional features to those above; specifically, an area of settlement activity in the north of the site. The settlement activity appears to present as multi-phased occupancy. There is an area which may be enclosed by a ditch system, similar to a banjo enclosure in character, and has a distinct entrance-way to the south-east. This leads towards an inner, focal area of increased activity. The characteristics of the features imply an Iron Age or Romano-British date, making it possibly contemporary with the cropmarks in the north-east of the site.

1.17 There are additional regular linear features in the centre and south of the site (see above) which suggest a separate phase of occupation, most likely later, possibly Anglo-Saxon through to Medieval, and perhaps associated with the ringfort fortifications to the east and south-east of the site.

1.18 "The Crump" (Scheduled Monument) ringwork is dated to the twelfth century through finds from an excavation conducted by the owner in the 1950's (122). Its bank and outer ditch enclose a saucer-shaped area, measuring c. 53 m overall in diameter. The ditch is 1.5 m deep, waterfilled on the west. The east arm is dry but originally was wet. The bank is 2.9 m above the base of the ditch. Within, from the base of the `saucer' to the top of the bank, measures c. 1 m. The bank and ditch are massive enough for defence, the bank being the more important feature. The only break in the bank is in the south side but there appears to be no contemporary causeway across the ditch. The ringwork appears to be isolated from centres of population (past or present). Ringworks and mottes were usually built in an existing settlement or else form the nucleus of one.

1.19 A strong circular feature is apparent from the results of geophysical survey to the east of the site (EEX13885). This is noted on historical maps from the eighteenth to the mid-twentieth century as a ring pond with trees in the centre (**Figures 4** to **14**). However, it would appear this may be a moated enclosure of similar construction dimensions to the Scheduled 'Ringwork'. The ringwork partly within the east of the site is also identified in the HER (3854) and named as "The Rookery" in a field historically known as "Cumber Hills".

1.20 This monument was partly excavated by G M Knocker in 1954 (EEX13884, EEX52369), who recorded a "motte" surrounded by a U-shaped ditch with an overall diameter c. 55 m, and a central area 22 m across. The ditch was 1.5 to 1.8 m deep, filled with c. 0.6 m of wet silt. Finds included a twelfth century pot in the make-up of the bank, and a thirteenth century pot in the central hearth. This earthwork had been ploughed out by 1966, although as mentioned above, cropmarks indicate that subsurface deposits survive.

1.21 In the **wider search area**, four **Archaeologically Alert Areas** are identified in the Hertfordshire HER, primarily relating to clusters of Medieval settlement to the west of the site:

- EH_25 - Cropmarks of an extensive area of rectilinear ditches and enclosures approximately 5.5 ha in size to the north-west of the site at Brent Pelham, probably represent field systems and associated enclosures (7648). The ditches and enclosures are aligned both with the parish boundary immediately to the south and the county boundary immediately to the east, and with Historic Landscape Character defined as pre-eighteenth century irregular enclosure.
- EH_39 – An area of scattered building material and pottery, and a watercourse which appears to be the remains of a Medieval moat (4535) to the south-west of the site at Furneux Pelham, and a wider area of cropmarks, largely those of historic field boundaries, but also some fainter features which may be of ditched enclosures, of unknown date (31148).
- EH_64 – Medieval moat to the west of the site (1971) of trapezoidal form, now the site of the Old Rectory in Stocking Pelham, drained and partly infilled in the mid-nineteenth century and largely restored in the twentieth century.
- EH_68 – A further Medieval moated site at Stocking Pelham Hall (4520), close to the Medieval Church of St Mary (4348) and a variety of shallow earthworks in pasture east of the moat (1639).

1.22 A further possible Medieval moated site is recorded in the Hertfordshire HER at Crabbs Green Farm in Stocking Pelham (11865), and another moated site is recorded in the Essex HER at Battles' Wood (3875).

1.23 Medieval settlement is also evidenced in ecclesiastical buildings in the search area, including the Church of St Nicholas in Berden, c. 200 m to the east of the site, with a nave of twelfth century date (however, noting that the west angle has Saxon long and short work on the quoins, indicating a possible earlier date) (35477), and Berden Priory (3906), located on the site of the twelfth century hospital or priory of St John the Evangelist, of the Augustinian canons (3905). A series of Medieval fishponds near Dewes Green Farm set into a gently sloping clay soil adjacent to a stream (now dry), were probably connected with Berden Priory (3930).

1.24 Several anomalies have been identified in the geophysical survey results that relate to the recent agricultural past of the site. These include an area of probably post-Medieval ridge and furrow, a former field boundary, and a backfilled pond. A series of positive linear features identified across the central and southern portion of the site appear to be drainage associated with the former pond.

1.25 A programme of Historic Landscape Characterisation (HLC) has been undertaken for this area (**Figure 15**). HLC is an aspect of more general landscape characterisation that seeks to provide an additional element of 'time-depth', allowing the historic evolution of the landscape to be perceived and understood.

1.26 The broad HLC Type for most of the site has been recorded as 'Piecemeal Style Parliamentary Enclosure' (HEX14161 - eighteenth century or later) of the former open fields, extending eastwards to Berden in the north-east and the Scheduled Ringfort to the south-east. To the east of the site, the field within which the "The Rookery" ringwork is located is identified as 'Post 1950 Boundary Loss' (HEX14159), which represents the removal in the latter part of the twentieth century of field boundaries dating back to the enclosure in order to establish larger fields.

1.27 This HLC description is consistent with the development of the site as depicted in historic maps, which depicts the relict boundaries in the 1800 OS (**Figure 6**), although the slightly earlier 1783 parish map (**Figure 5**) depicts the removal of a number of internal boundaries. That parish map also depicts a large, wooded area occupying part of the south-west and south of the site until the 1877 OS (**Figure 8**). From 1877 a footpath is also depicted entering the site from the east, and turning south roughly in the centre, which by the time of the 1896-98 survey (**Figure 9**) had been extended to cross the site north to south. As mentioned above, the ringwork feature in the east of the site had been ploughed out in the 1960s and is no longer depicted from the 1981 OS (**Figure 13**) onwards.

1.28 Satellite imagery (**Figure 16**) shows that the west and north of the site have been sub-divided, and that it has been in agricultural (arable) use throughout the twenty-first century. Satellite imagery also illustrates some of the cropmark areas identified in historic aerial photography, LiDAR and geophysical survey, including the ringwork at the east of the site.

Proposals

1.29 The Block Plan and Planting Plan for the proposed development are presented in **Appendix 3**. They depict the areas proposed for solar PV panels along with associated infrastructure, and landscape mitigation.

1.30 The proposals consist of:

- Installation of photovoltaic solar panels mounted on tables which will have a front edge at around 0.9m above ground and the rear edge 2.5m (a twenty-degree slope). Rows will run west to east, following the existing contours of the ground with the panels facing south. Spacing between rows will vary between 7.9m and 9.8m, depending on topography.
- Ten inverter units distributed among the panels and accessed via a combination of existing and proposed farm tracks (formed from crushed stone). Inverter units are typically the size of standard shipping containers.
- A small substation protected with a palisade fence will be built in the southwest corner, adjacent to the battery storage facility. It will be accessed via the internal track network from the main access to the solar farm on the Pelham Road.
- Deer fencing around each field to exclude large mammals and humans from the facility. Gates to allow the passage of small mammals such as badgers and foxes will be provided at intervals along the fence.
- Existing footpaths will be retained along their same routes, typically within corridors 10 – 15 m wide between existing hedge lines and the proposed deer fence. A hedge will be planted in

front of the deer fence to reduce the visual impact of the solar farm from view, reducing the corridor by 3 m (allowing for growth of the hedge).

- A permissive path will be established just inside the landholding on the south side of the Stocking Pelham Road. This path will establish a pedestrian link between Stocking Pelham and Berden (currently there is no footway along the highway).
- One hectare of community woodland will be created in the northeast corner of the site. As well as providing recreational and wildlife benefits it will also screen the solar farm from a residential area of Berden which lies immediately to the north. The permissive path will pass through the woodland. The remaining area of arable field (2.7 hectares) will be sown as a wildflower meadow.
- 1.7 hectares of woodland will be planted elsewhere, providing screening, landscape and wildlife benefits.

1.31 No trees or hedges will need to be removed to build of the solar farm.

1.32 When decommissioning, at the end of its operational life or as set by a planning condition, the solar farm will be removed including all fencing, piles and underground cabling and the access tracks (apart from those that will assist in the ongoing agricultural management of the land). The substation and inverters will be removed, and the land returned to agriculture. The trees, hedges and woodland planted as part of the development will be retained, forming a beneficial long-term legacy, enhancing landscape character, sequestering carbon and increasing ecological biodiversity.

Scope of Archaeological Work

1.33 The scope of archaeological mitigation for the consented proposals for the site is primarily aimed at addressing a likely planning condition, and consists of a **4% sample of the areas proposed for development** within the site boundary, amounting up to approximately 26,336 m^2 of trial trenching, or the equivalent of 293 trenches, each 50 x 1.8 m. The trench locations will target the results from previous aerial photography, LiDAR and geophysical survey, testing both positive and negative results. The final quantum and layout of trenches will be agreed in consultation with the LPA advisor, and a contractor specific Method Statement will be produced by the appointed archaeological unit.

1.34 RPS are a registered organisation with the Chartered Institute for Archaeologists (CIfA), and abides by both its *Code of Conduct* and its published standards and guidance. This includes *the Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*[2], which states under its procedures that advisors should:

"where possible, promote community engagement with the historic environment, seeking to ensure that archaeological investigation is directed toward providing benefit to the public, whether directly through participation and engagement in the process, where it is appropriate to do so, or indirectly through the increase in knowledge that the results of investigation provide to the local and wider community. Such engagement should be proportionate to the scale, nature and circumstances of the work."

1.35 As such, where possible, opportunities for community engagement will also be identified in this document.

[2] Chartered Institute for Archaeologists, 2014. *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*

1.36 Specific reference to other applicable standards and guidance is made below in the Methodology section.

General Aims

1.37 In general, the aims of the archaeological fieldwork are:

1. To record the nature of the main stratigraphic units encountered in terms of their physical composition (stone, sand, gravel, organic materials, etc.) and their archaeological formation (primary deposits, secondary deposits, etc.);
2. To assess the overall presence and survival of archaeological remains relating to the main periods of occupation revealed and the potential for the recovery of additional structural information given the nature of the deposits encountered (e.g. extent of later disturbance, etc.);
3. To assess the overall presence and survival of the main kinds of artefactual evidence (including pottery, brick, tile, stone, glass, metal, bone, small finds, industrial residues, etc.), its condition, given the nature of the deposits encountered; and
4. To assess the overall presence and survival of the main kinds of ecofactual and environmental evidence (including animal bone, human bone, plant remains, pollen, charcoal, molluscs, soils, etc.), its condition and potential, given the nature of the deposits encountered.

Specific Aims

1.38 Following consideration of the archaeological potential of the site and the East of England Regional Research Framework (Medlycott 2011), the site-specific objectives of the evaluation are:

- To examine potential for Prehistoric, Roman, Saxon, Medieval and post-Medieval activity, particularly as identified through previous investigations within the site boundary (see above);
- To investigate the undated archaeology identified in previous investigations within the site boundary (see above);
- To investigate the potential for archaeological remains in areas of devoid of geophysical and other non-intrusive survey results within the site boundary; and
- If archaeological remains are present within those blank areas, what is their date, character, extent, form, function, state of preservation and significance.

2 METHODOLOGY

Trial Trench Evaluation

2.1 In areas with identifiable archaeological potential, or where not enough information is available to determine the archaeological potential, a trial trench evaluation will be considered in advance of proposed ground intrusive works. Consideration will be given to undertaking a trial area to assess the success of the proposed methodology.

2.2 The excavation under the supervision of a competent archaeologist, and the project design will consider community engagement, seeking to ensure that archaeological investigation is directed toward providing benefit to the public, directly through participation and engagement in the process.

2.3 The work will be undertaken in accordance with the guidelines contained within the CIfA's current *Standard and guidance for archaeological field evaluation* (2014).

2.4 The excavation is to be taken down to the top of natural geology, or the top of any significant archaeological level, whichever is highest. All machine work must be completed under archaeological supervision and should cease immediately if archaeological assets are revealed. Care should be taken not to damage archaeological deposits through excessive use of mechanical excavation; machines will be fitted with ditching or toothless buckets.

2.5 Whilst the surface of the exposed archaeological horizon should be cleaned to clarify the remains, archaeological features should generally only be sampled sufficiently to characterise and date them. Full excavation of features should not be undertaken at this stage.

2.6 The machine used should be powerful enough for a clean job of work and able to mound spoil neatly at a safe distance from excavation edges. All spoil should be scanned visually and metal detected for any archaeological finds.

2.7 No staff will enter a trench deeper than 1.2 m (although with unstable soils and in adverse weather conditions, this threshold can be lower) without prior agreement of their supervisor following an acceptable risk assessment and implementation of any identified safety measures. If necessary, trenches shall be stepped out appropriately to make excavations safe, or if this is not practicable then shoring shall be utilised to make trench sides safe prior to anyone undertaking further excavation.

2.8 A sufficient sample will be made of archaeological features and deposits at a sufficient level to characterise them. Features such as hearths, burials, surfaces and the key relationships will be investigated in such a way as to minimised unnecessary destruction.

2.9 Any human remains that are encountered will initially be left *in situ* and reported to the appropriate authorities. Subsequent removal will comply with the relevant Ministry of Justice regulations and current archaeological best-practice.

2.10 All finds of gold and silver, or hoards of prehistoric metals, will be moved to a safe place and reported to the Coroner's office according to the procedures relating to the Treasure Act 1996. Where removal cannot be completed on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage. Please note that this is a public park open 24/7.

2.11 Provision should be made for taking environmental/organic samples. Decisions regarding which contexts are suitable for environmental sampling shall be made through consultation with the Planning Archaeologist.

2.12 Sampling levels will be proportionate to the nature and significance of finds, and will be the subject of regular monitoring in consultation with the Planning Archaeologist.

2.13 All excavated features and deposits will be fully recorded and assigned context numbers in accordance with Historic England's and CIfA's standards and guidance.

2.14 All artefactual and ecofactual remains, whether stratified or not (including material from spoil tips), shall be collected, bagged and labelled. Artefacts shall be subject to preliminary study on-site to help date excavation contexts.

2.15 Photographic recording of excavated features shall comprise 35 mm monochrome exposures or alternatively, digital images using cameras with a minimum resolution of ten megapixels, in JPEG, RAW and DNG formats. The contractor shall include metadata embedded in the DNG file. The metadata shall include the following:

1. the commonly used name for the site being photographed;
2. the relevant centred OS grid coordinates for the site to at least six figures;
3. the date of photograph;
4. the subject of the photograph;
5. the direction of shot; and
6. the name of the organisation taking the photograph.

2.16 The trial trenches will not normally be backfilled before the Planning Archaeologist has inspected them, or that agreement has otherwise been obtained.

2.17 The backfilling will comprise all excavated materials (excluding archaeological artefacts and environmental samples) being returned into the trial trenches in layers and compressed by the back of the mechanical excavator's bucket as each layer is placed back into the trench to prevent the creation of soft softs. The back-filled materials in the trial trench should be left slightly proud of the surrounding surface to allow for settlement.

2.18 Should significant archaeological deposits be revealed during the archaeological trial trenching, the deposits will be archaeologically sampled and recorded in accordance with the methodology for recording as set out in the CIfA's *Standards and guidance for archaeological excavation* (2014). A 20% contingency will be applied in accordance with consultation and agreement by the Planning Archaeologist in the first instance.

Recording Systems

2.19 The recording system shall be compatible with Historic England's and the CIfA's standards and guidance. The recording system will also be compliant with other systems used in the region. The recording system will be based on single context planning, such as informed by the Museum of London 'red book'. Pro-forma context sheets shall include all relevant stratigraphic relationships and for complex stratigraphy a separate matrix diagram shall be employed. The following plans and sections are required:

1. an overall site plan shall be prepared detailing archaeological deposits as well as the extent of the area relative to the National Grid on a 1:2,500 plan;
5. a detailed site plan may be required at 1:100 scale, depending on the findings;
6. sections containing significant deposits, including half-sections, shall be drawn as appropriate. Section drawing should include heights Ordnance Datum (OD);
7. all archaeological plans and sections shall be on drawing film and at a scale of 1:10 or 1:20 and shall include context numbers and OD spot heights for all principal strata and features; and
8. an adequate photographic record of any significant archaeological remains shall be made, in both plan and section.

Finds and samples

2.20 A high priority shall be given to dating any remains, so all artefacts and finds shall be retained. Consideration shall also be given to the recovery of specialist samples for scientific analysis, particularly samples for absolute dating, structural materials and cultural / environmental evidence. Environmental samples shall be taken from suitable deposits and examined for carbonised remains, macroscopic plant remains, pollen, seeds, insect, molluscs, etc.

2.21 All finds and samples shall be treated in a proper manner to prevent deterioration. This shall involve cleaning and conservation where necessary and labelling, cataloguing and secure storage in appropriate containers.

2.22 The archaeological contractor shall submit, as part of the detailed method statement, a strategy for palaeo-environmental sampling and for processing and analysis of samples. This work shall accord with the minimum standard guidance provided by the CIfA. The archaeological contractor shall carry out an assessment of the palaeo-environmental potential and shall submit this assessment in concise form in writing within the full post-excavation assessment report. The archaeological contractor is expected to seek the advice of a palaeo-environmental specialist, and to consult with Historic England's Regional Science Advisor in this regard.

2.23 The archaeological contractor shall need to demonstrate that arrangements are in hand to cover all necessary processing, conservation and specialist analysis of finds and samples, including if necessary, the conservation or organic and composite materials and dendro-chronological and environmental analysis of samples.

2.24 Every effort shall be made to ensure that finds analysis is consistent with existing local systems.

Monitoring and Access

2.25 The Planning Archaeologist, the client Project Manager and the archaeological consultant shall be allowed access to inspect the archaeological works to ensure that they are being conducted to the proper professional standards and in accordance with the agreed method statement.

2.26 To facilitate this, a projected timetable for Site work shall be agreed between the consultant, the Planning Archaeologist, the Principal Contractor, the Client, and the contracting archaeological organisation.

2.27 Safe access to the Site shall be granted to the archaeological contractor, the Planning Archaeologist, the client Project Manager and the archaeological consultant.

2.28 The Applicant shall notify the Planning Archaeologist of the start of the works.

Post Fieldwork Assessment and Analysis

2.29 The archive shall be prepared, and a post-excavation assessment undertaken immediately after the Site works have been completed, and shall be completed within 12 months of completion of site works. This shall be prepared in accordance with the specification given in Management of Research Projects in the Historic Environment and MoRPHE (applicable Technical Guides and Project Planning Notes).

2.30 Each category of finds shall be assessed by specialist staff and recommendations prepared for a further study should this be required by the Planning Archaeologist. All artefacts and ecofacts shall be processed in accordance with standard practice. No artefacts, ecofacts or environmental samples shall be discarded without written permission from the Planning Archaeologist.

2.31 The draft Post-Excavation Assessment shall be submitted by the archaeological contractor to the consultant for verification and approval. It shall be the property of the Applicant and shall represent a confidential document. The consultant shall be responsible for submitting the draft report to the Planning Archaeologist for comment prior to final approval.

Reporting

2.32 Once the Post-Excavation Assessment is finalised, a hard copy of the Final Report shall be submitted by the archaeological contractor to a suitable archive. An e-copy, as a pdf, shall be submitted to the Planning Archaeologist for inclusion in the HER. GIS (shape) files of the final phased excavated site plan should be provided to the Planning Archaeologist. In addition, the photographic record of the works shall be made available to the Historic England Archive (HEA) prior to archiving to enable selection of suitable materials for copying for inclusion into the HER. Once submitted, the Final Report shall become a public document.

2.33 The report should include, as appropriate:

1. a review of the aims and methods used in the evaluation / excavation areas;
2. a table summarising the descriptive text showing the features, classes and numbers of artefacts and their interpretation;
3. artefact analysis to include the production of a descriptive catalogue with finds critical for dating and interpretation illustrated;
4. illustrations including Site and excavation area plans at suitable scales and general and detailed photographs;
5. the nature, extent, date, condition and significance of the archaeological and environmental material uncovered with specialist opinions and parallels from other sites in the area;
6. an interpretation of the results should be produced, and attention should be given to the significance of the remains in local, regional and national terms, if appropriate; and
7. a reconsideration of the methodology used, including a confidence rating of the strategy and the results.

2.34 The archaeological contractor shall also input details of the project to the online database maintained by the Online Access to the Index of Archaeological Investigations (OASIS) Project at the following internet site: [redacted]

Publication and Dissemination

2.35 Provision shall be made for an appropriate level of publication of the results of the evaluation. A summary report shall be prepared by the archaeological contractor and submitted for publication in the relevant local journal.

2.36 Additional publication requirements shall be agreed with the Planning Archaeologist in the first instance.

2.37 Where possible, the contractor will advise on opportunities to promote community engagement with the historic environment through publication, in accordance with the CIfA's *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment* (2014). This will be aimed at:

"where appropriate to the nature and significance of the results, promote in addition to formal publication the use of innovative forms of dissemination which produce wider public benefit than conventional methods of publication. These might include the use of different forms of media, exhibitions or events."

Copyright and Confidentiality

2.38 The consultant and the archaeological contractor shall retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents

Act 1988 with all rights reserved; excepting that it will provide an exclusive licence to the Client in all matters directly relating to the project as described in this WSI.

2.39 The consultant and the archaeological contractor shall assign copyright to the Client upon written request but retain the right to be identified as an author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV. S.79).

2.40 The consultant shall advise the Client of any such materials supplied in the course of projects that are not the consultant's or the archaeological contractor's copyright.

2.41 The consultant undertakes to respect all requirements for confidentiality about the Client's proposals provided that these are clearly stated. It is expected that such conditions shall not unreasonably impede the satisfactory performance of the services required. The consultant further undertakes to keep confidential any conclusions about the likely implications of such proposals for the historic environment. It is expected that clients respect the consultant's general ethical obligations not to suppress significant archaeological data for an unreasonable period.

Archiving

2.42 The site archive, which comprises records of the watching brief and excavation areas, and any materials recovered, including written elements, plans and drawings, photographic prints and transparencies (where appropriate) and other primary data recovered during the investigation, shall be quantified, ordered, indexed and made internally consistent. It shall also contain, as a minimum requirement, a site matrix, site summary (a short report giving a preliminary account of the discoveries) and brief written observations on the artefactual and environmental data.

2.43 The site archive will also include a summary of all archaeological investigations and mitigation for the site, incorporating the results of all final assessment and analysis reports, and thereby providing an integrated record.

2.44 Work on the site archive shall be completed by the archaeological contractor within twelve calendar months of completion of the archaeological field investigation. Upon completion of the site archive the archaeological contractor shall arrange a meeting with the Planning Archaeologist to present the archive for inspection prior to its deposition in an appropriate museum.

2.45 All artefacts (e.g. pottery, metalwork, objects in worked flint and stone, wood, bone, horn and leather, slag) and ecofacts (organic finds such as bones, preserved ancient plant remains, seeds, pollen and charcoal, soil samples) recovered during the archaeological investigation shall be made available to the archaeological contractor pending completion of the excavation report, to be stored during the course of the archaeological investigation at the archaeological contractor's secure offices or usual place of secure storage of archaeological finds.

2.46 All artefacts recovered during the archaeological investigation shall be suitably washed (where the condition of the artefacts allows) and marked by the archaeological contractor and all artefacts and ecofacts bagged and boxed by the archaeological contractor, in accordance with current United Kingdom Institute for Conservation (UKIC) / RESCUE publication First Aid for Finds (3rd. ed. 1998). All 'small finds' shall be boxed together, separate from bulk finds.

2.47 In preparing cost estimates for the archaeological investigation, the archaeological contractor shall include provision for at least a basic minimum level of conservation of finds liable to deterioration after excavation.

2.48 Subject to the legislation of the Treasure Act 1996, all artefacts and ecofacts unearthed from the investigation and all other elements of the site archive (as defined in MoRPHE[3]) should be

[3] Historic England, April 2015. *Management of Research Projects in the Historic Environment - The MoRPHE Project Managers' Guide*

deposited by the archaeological contractor in an appropriate public museum registered or provisionally registered by the Museums and Galleries Commission and acceptable to the Planning Archaeologist. No artefacts or ecofacts from the site shall be deposited in the relevant depository without the prior written consent of the land owner. Should the land owner be unwilling to deposit the archive with the chosen archive, a full photographic and drawn survey shall be made of all artefacts and elements being withheld.

2.49 In the absence of an appropriate archive, provision shall be made by the archaeological contractor for retaining the project archive, until a suitable depository is available, and arrangements have been made for the transfer of the archive.

2.50 The archaeological contractor shall ensure that the Collections Manager is notified and liaised with at an early stage. It is the responsibility of the archaeological contractor to meet the local museum's reasonable requirements with regard to the preparation of archives for deposition.

2.51 Provision shall be made for the payment of a 'deposit grant' at the time of archive transfer towards the costs of archive curation in perpetuity. The rates and requirements currently employed by archive stores elsewhere in the country and by the chosen museum for its archive store shall be used for guidance.

2.52 Prior to the deposition of finds in the recipient museum, the archaeological contractor shall agree with that museum the sample or quantity of bulk finds (pottery, animal and (if appropriate) human bone, other ecofactual material, building material, burnt flint, worked flint and stone) to be deposited.

2.53 All excavated artefacts and ecofacts and all other elements of the site archive should be delivered by the archaeological contractor to the recipient museum as one deposit, and written confirmation of this shall be provided to the Planning Archaeologist. Where this arrangement is not practicable, lists shall be submitted by the archaeological contractor to the recipient museum of objects not deposited, together with information as to the quantity involved and their current location, reasons why items have not been deposited and a timetable for their ultimate deposition.

2.54 The archaeological contractor shall contact the recipient museum prior to preparing cost estimates for the work, in order to discuss any special requirements for the deposition of finds.

2.55 Subject to the resources available and to discussion with the recipient museum, all articles needing conservation shall be properly stabilised by the archaeological contractor prior to their deposition at the recipient museum and records of their treatment lodged with the museum. Those items for which available resources do not permit stabilisation shall be separately packed and listed by the archaeological contractor.

2.56 Prior to commencement of the archaeological investigations the archaeological contractor shall obtain from the recipient museum an accession number(s) for excavated artefacts and ecofacts from the project and any guidelines regarding deposition of such artefacts and ecofacts specific to the recipient museum.

2.57 All finds, save those specifically excluded by the recipient museum or excluded on grounds of size/material, shall be marked by the archaeological contractor with the recipient museum's accession number.

2.58 Artefacts and ecofacts deposited by the archaeological contractor in the recipient museum shall be accompanied by the remainder of the original Site archive or by a complete duplicate record thereof. A microfiched security copy of the site archive should also be supplied by the archaeological contractor to the recipient museum.

2.59 Subject to the agreement of the landowner, all artefacts and ecofacts recovered from the archaeological excavations shall be deposited by the archaeological contractor within the recipient museum within five years from the date of completion of the investigation.

2.60 Copyright of the written, drawn and photographic elements of the site archive shall be vested jointly with the archaeological contractor and the recipient museum.

2.61 The following documents should be adhered to:

1. Standards in the Museum Care of Archaeological Collections[4];
2. Management of Research Projects in the Historic Environment[5]; and
3. MoRPHE (applicable Technical Guides and Project Planning Notes)[6].

[4] Museum and Galleries Commission, 1992. *Standards in the Museum Care of Archaeological Collections*

[5] Historic England, April 2015. *Management of Research Projects in the Historic Environment - The MoRPHE Project Managers' Guide*

[6] Available from [redacted]

3 HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION

3.1 The archaeological contractor shall comply with the requirements of the Health & Safety at Work etc. Act, 1974. The archaeological contractor shall prepare a Risk Assessment for the site in accordance with the organisation's health and safety policy. Health and safety shall take priority over archaeological matters.

3.2 All archaeologists undertaking fieldwork shall comply with all relevant Health and Safety Legislation. Machinery shall be kept away from unsupported trench / excavation edges and public access should be restricted. Barriers, hoardings and warning notices shall be installed as appropriate. Safety helmets and other applicable Personal Protective Equipment (PPE) shall be used by all personnel as necessary and identified in the Risk Assessment.

3.3 Available reports and drawings pertaining to ground conditions and services shall be provided to the archaeological contractor, however, any further information deemed necessary shall be obtained by the archaeological contractor prior to intrusive works commencing.

3.4 In addition to written records excavation areas shall be checked and cleared for services using a CAT scanner. The Principal Contractor shall be responsible for any damage and repairs to site services and any associated business interruption.

3.5 Where working on sites with overhead cables present, the exclusion zone in relation to the cables shall be fenced off with a physical marker, such as barrier fencing or Heras prior to any machine work being undertaken.

3.6 Spoil shall be kept at a safe distance from any excavation edges. The location of the spoil heap/s may be within the site or spoil may be removed off-site immediately.

3.7 No existing rights of way or accesses shall be blocked during the course of site work. Adjacent public roads shall be kept free of mud and spoil.

3.8 An ecological constraints plan is provided in Appendix C. To ensure wildlife legislation is adhered to, this WSI shall be read in conjunction with the method statement(s) for ecological mitigation, where they exist, and any areas of overlap shall need to be considered in terms of both ecological and archaeological works proposed, with a view of establishing a programme of works which complies with both methodologies. Should a protected species be identified, works shall stop and an ecologist consulted for advice.

3.9 Where works are undertaken in the vicinity of any trees, trees shall be adequately protected as detailed in BS 5837-2012: Trees in relation to design, demolition and construction. Should any conflict arise, works shall stop and an arboriculture specialist shall be consulted for advice.

3.10 There may be potential for intrusive works to expose unforeseen contamination at the site, such as asbestos containing materials (ACMs). The Principal Contractor shall detail adequate control measures within their method statements should contamination be encountered.

3.11 The Principal Contractor shall control all aspects of the Safe System of Work. A Risk Assessment, which covers all risks associated with the archaeological contractor's activities on site, shall be provided by the appointed archaeological contractor for this phase of work. The archaeological contractor's Risk Assessment shall also consider hazards posed by the activities of other contractors on site, where those hazards might pose a risk to employees of the archaeological contractor.

3.12 All work shall be carried out in compliance with the Health and Safety requirements of the Principal Contractor.

4 CONTRACTOR SPECIFIC REQUIREMENTS

General

4.1 The appointed archaeological contractor will provide the consultant with a detailed method statement for undertaking the archaeological investigations, which shall require approval from the Planning Archaeologist, as required. This shall include all fieldwork and post-excavation work including archiving.

4.2 The archaeological contractor shall provide a brief career profile of the site supervisor which demonstrates their suitability for undertaking the work. A full cost estimate for the fieldwork, post-excavation and archiving shall be provided to the consultant.

4.3 The requirements of this WSI shall be met in full where reasonably practicable. Any variations to this WSI shall be agreed with the Planning Archaeologist in advance.

4.4 The scope of work detailed in the main part of the specification is aimed at meeting the aims of the project in a cost-effective manner. The consultant attempts to foresee possible site-specific problems and resource these. However, there may be unusual circumstances which have not been included in the costing and programme, such as:

1. unavoidable delays due to extreme bad weather;
2. vandalism; and
3. complex structures or objects, including those in waterlogged conditions, requiring specialist removal.

Insurance

4.5 The archaeological contractor shall hold Employers Liability Insurance, Public Liability Insurance and Professional Indemnity Insurance. Details will be supplied on request.

4.6 The consultant and the archaeological contractor shall not be liable to indemnify the Client against any compensation or damages for or with respect to:

1. damage to crops being on the Area or Areas of Work (save in so far as possession has not been given to the archaeological contractor);
2. the use or occupation of land (which has been provided by the Client) by the Project or for the purposes of completing the Project;
3. interference whether temporary or permanent with any right of way, light, air or water or other easement or quasi easement which are unavoidable result of the Project in accordance with the Agreement;
4. any other damage which is the unavoidable result of the Project in accordance with the Agreement; and
5. injuries or damage to persons or property resulting from any act or neglect or breach of statutory duty done or committed by the Client or his agents, servants or their contractors (not being employed by the consultant) or for or in respect of any claims demands proceedings damages costs charges and expenses in respect thereof or in relation thereto.

Standards and Procedures

4.7 The consultant and the archaeological contractor shall conform to the standards of professional conduct outlined in the CIfA Code of Conduct, and the relevant CIfA Standards and Guidance.

4.8 Project Supervisors shall be recognised in an appropriate Area of Competence by the CIfA.

5 SOURCES CONSULTED

General

Essex Historic Environment Record

Hertfordshire Historic Environment Record

Internet

British Geological Survey – [redacted]

British History Online – [redacted]

Domesday Online – [redacted]

Historic England: The National Heritage List for England [redacted]

National Planning Policy Framework – [redacted]

Portable Antiquities Scheme – [redacted]

Bibliographic

Chartered Institute for Archaeologists, 2021, Code of conduct: professional ethics in archaeology

Chartered Institute for Archaeologists *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*, 2014

Chartered Institute for Archaeologists *Standard and guidance for archaeological field evaluation*, 2014

Department for Digital, Culture, Media & Sport, 2013, *Scheduled Monuments & nationally important but non-scheduled monuments*

HE, 2021, Historic England Advice Note 15*: Commercial Renewable Energy and the Historic Environment, February 2021*

Ministry of Housing, Communities & Local Government, 2021, National Planning Policy Framework

Ministry of Housing, Communities & Local Government Planning practice guidance, 2019, Historic environment

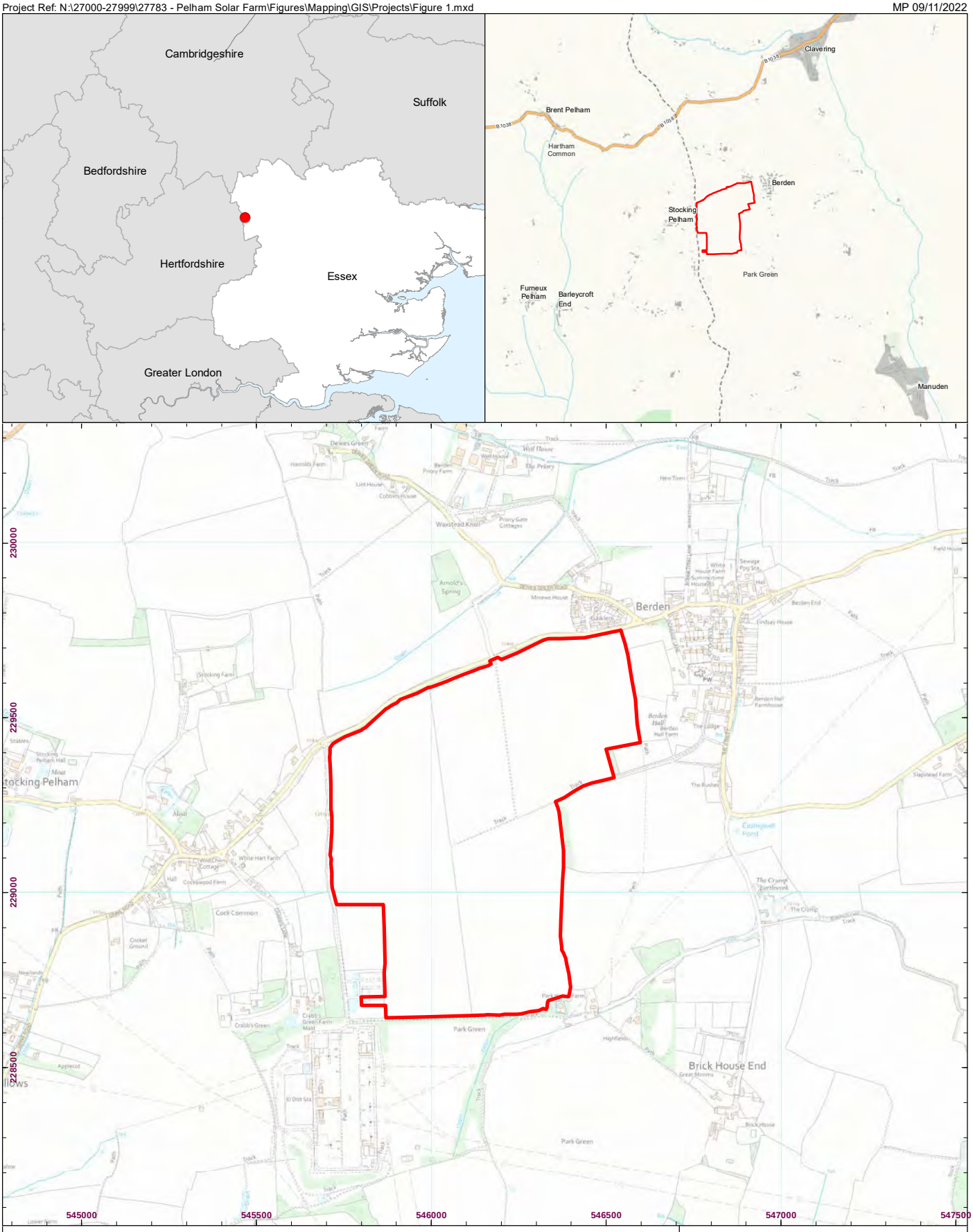
Historic England, April 2015. *Management of Research Projects in the Historic Environment - The MoRPHE Project Managers' Guide*

Maria Medlycott (ed.) 2011. *Research and Archaeology Revisited: A Revised Framework for the East of England*. East Anglian Archaeology Occasional Papers 24

Museum and Galleries Commission, 1992. *Standards in the Museum Care of Archaeological Collections*

RPS Consulting Services Ltd, 2022. Heritage Statement: Pelham Solar Farm

FIGURES



Site Boundary

N

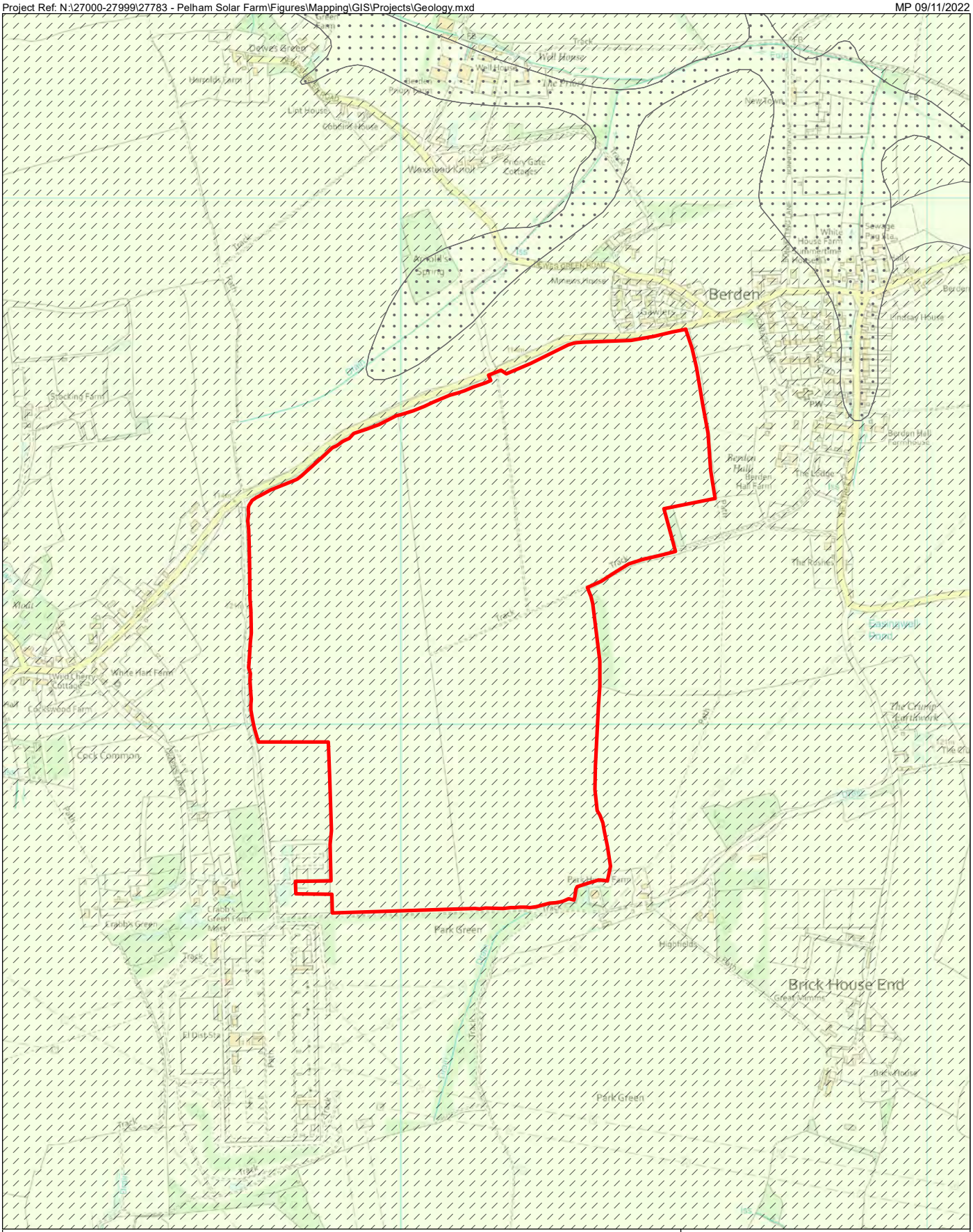
0 200 400m

Scale at A4: 1:15,000

MAKING COMPLEX EASY

Figure 1

Site Location



MAKING COMPLEX EASY

Figure 2

Geology

MP 09/11/2022

Legend

- Site Boundary
- Search Radius 1km

Non-designated Heritage Assets:

- Area of Archaeological Significance (Herts)
- HER Feature (Point)
- HER Feature (Polygon)

Previous Archaeological Work:

- HER Event (Point)

N

0 100 200m

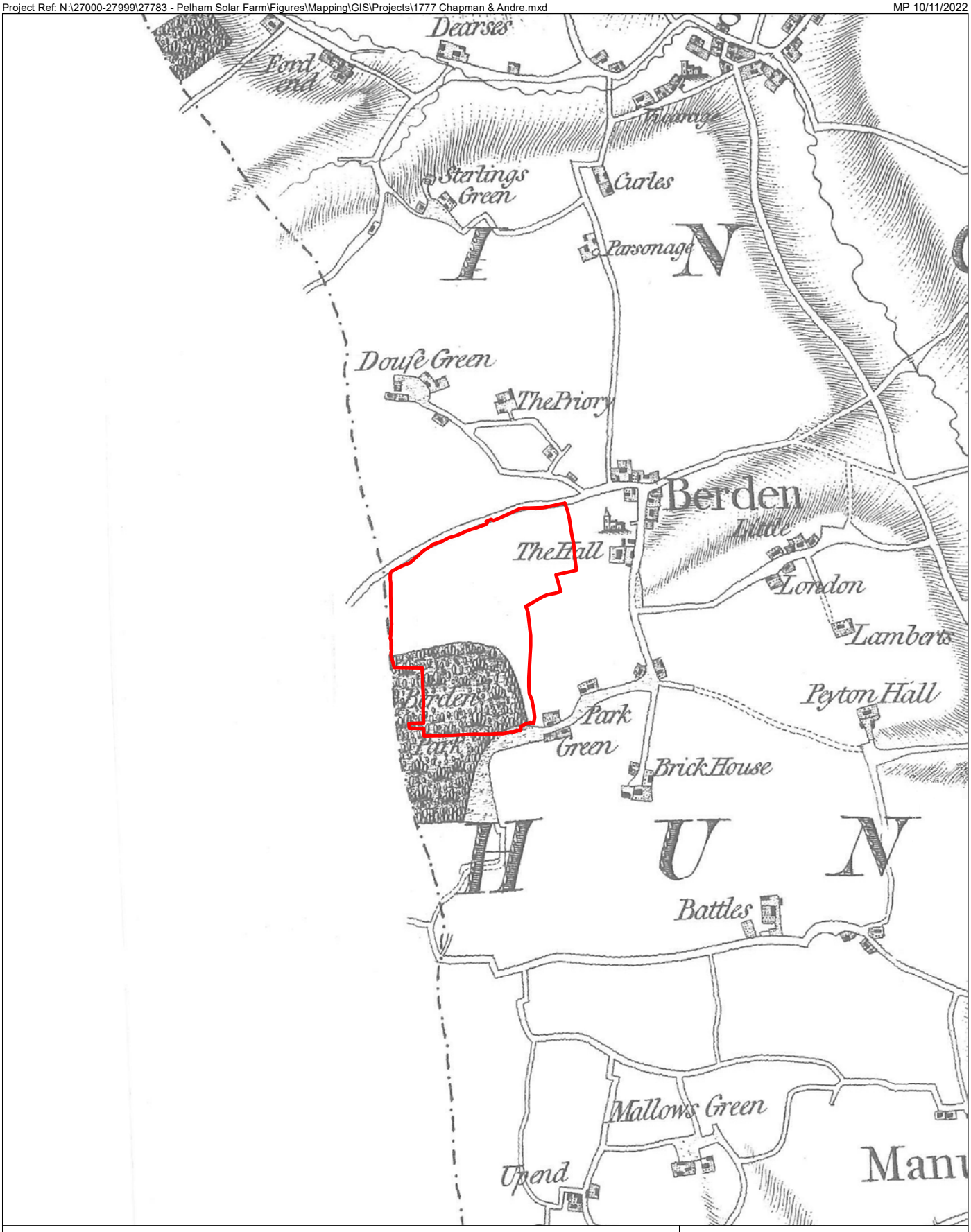
Scale at A3: 1:12,500

MAKING COMPLEX EASY

Figure 3

HER Plot

Project Ref: N:\27000-27999\27783 - Pelham Solar Farm\Figures\Mapping\GIS\Projects\HER.mxd



Approximate Site Location

N

0 250 500 750m

Scale at A4: 1:25,000 approx.

MAKING COMPLEX EASY

Figure 4

1777 Chapman & Andre

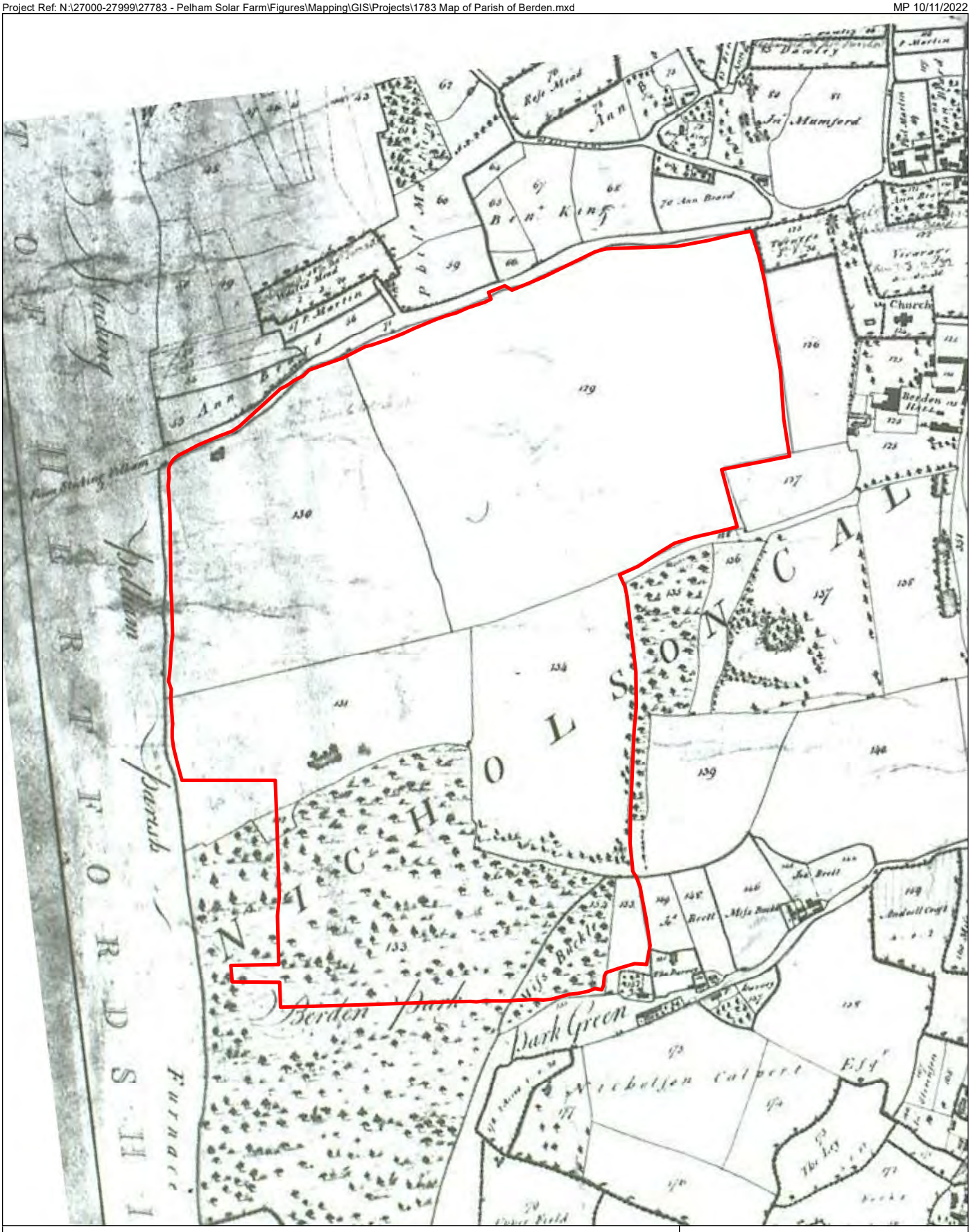
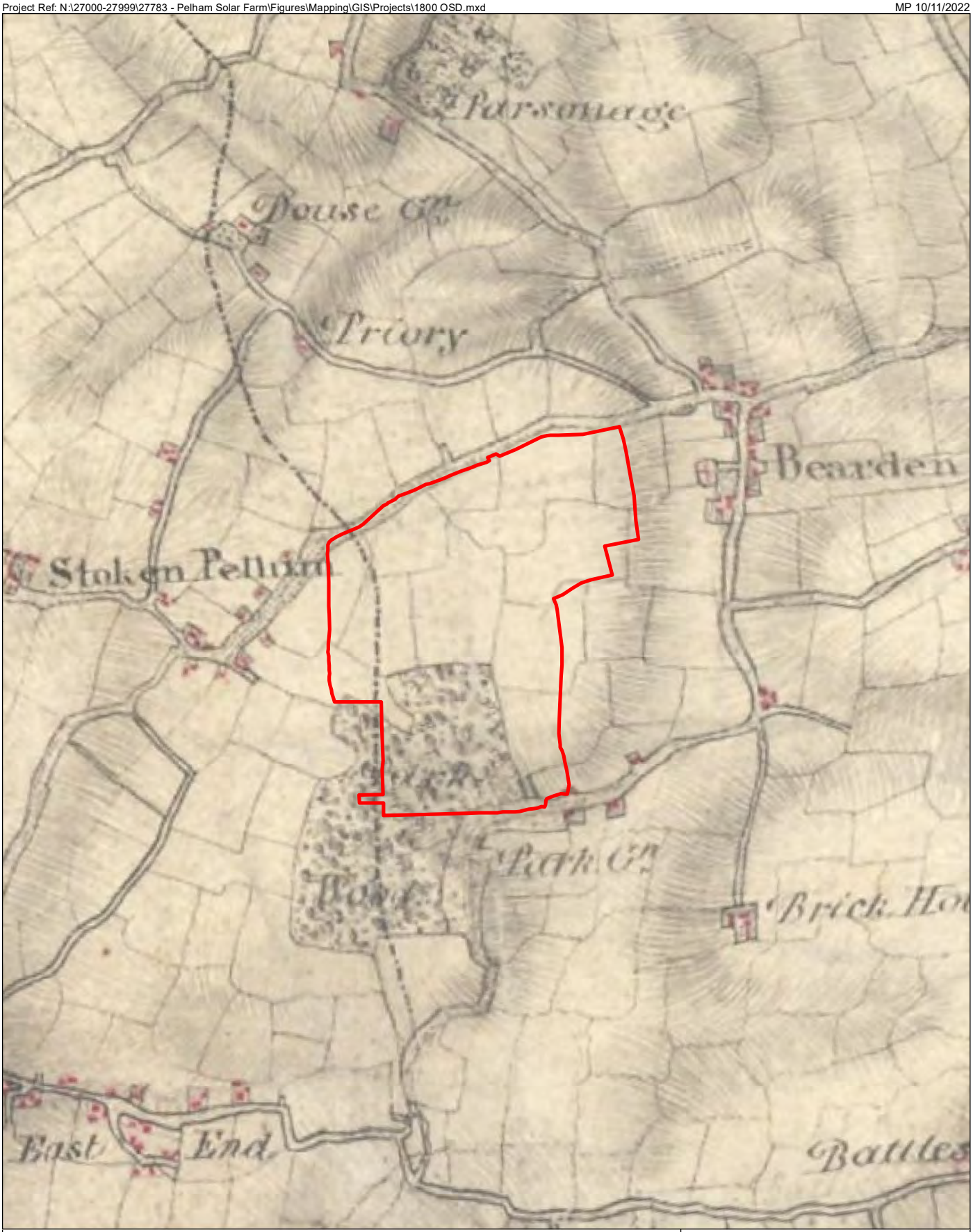


Figure 5

1783 Map of the Parish of Berden



Approximate Site Location

N

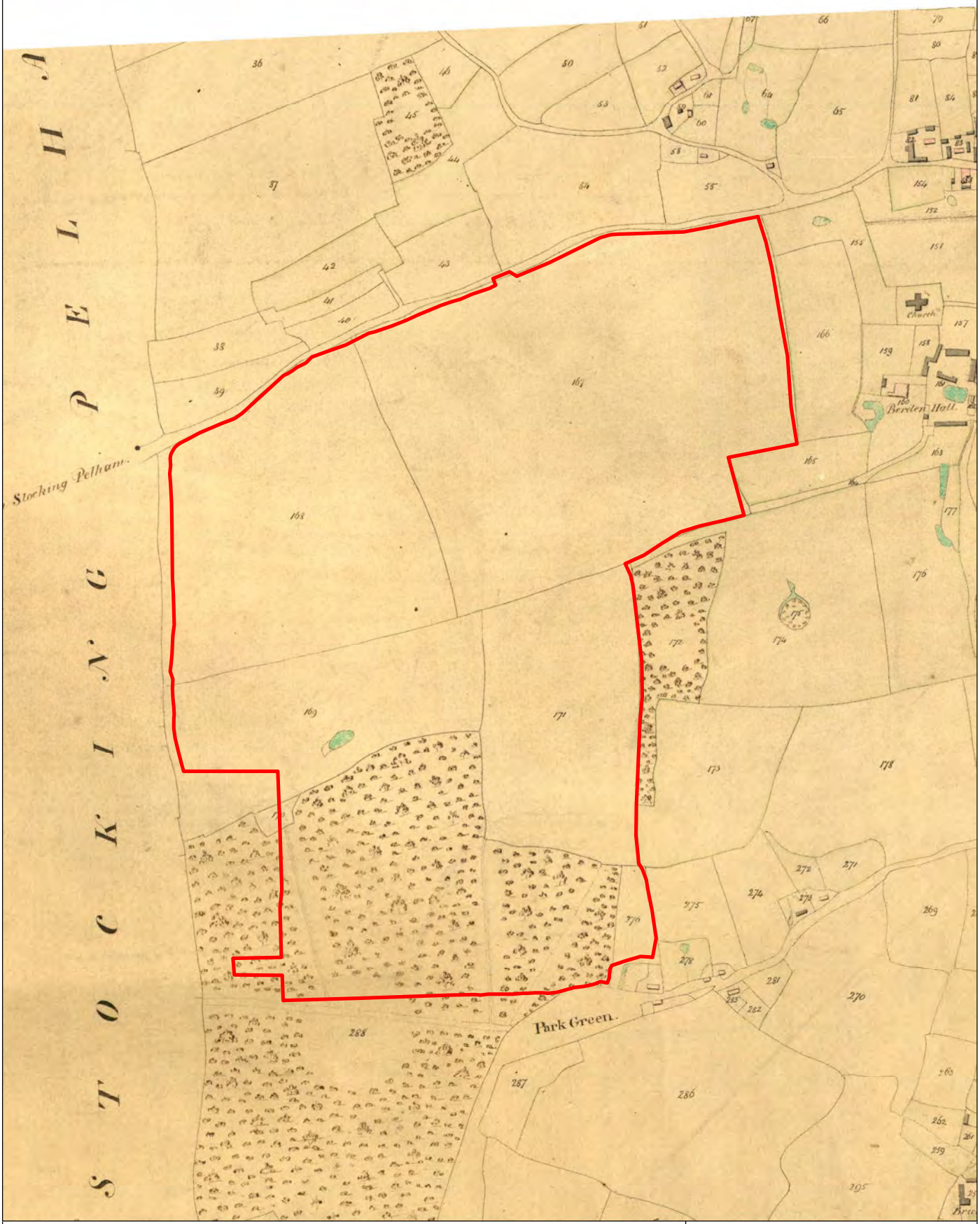
0 150 300 450m

Scale at A4: 1:15,000 approx.

MAKING COMPLEX EASY

Figure 6

1800 OSD



Site Boundary

N

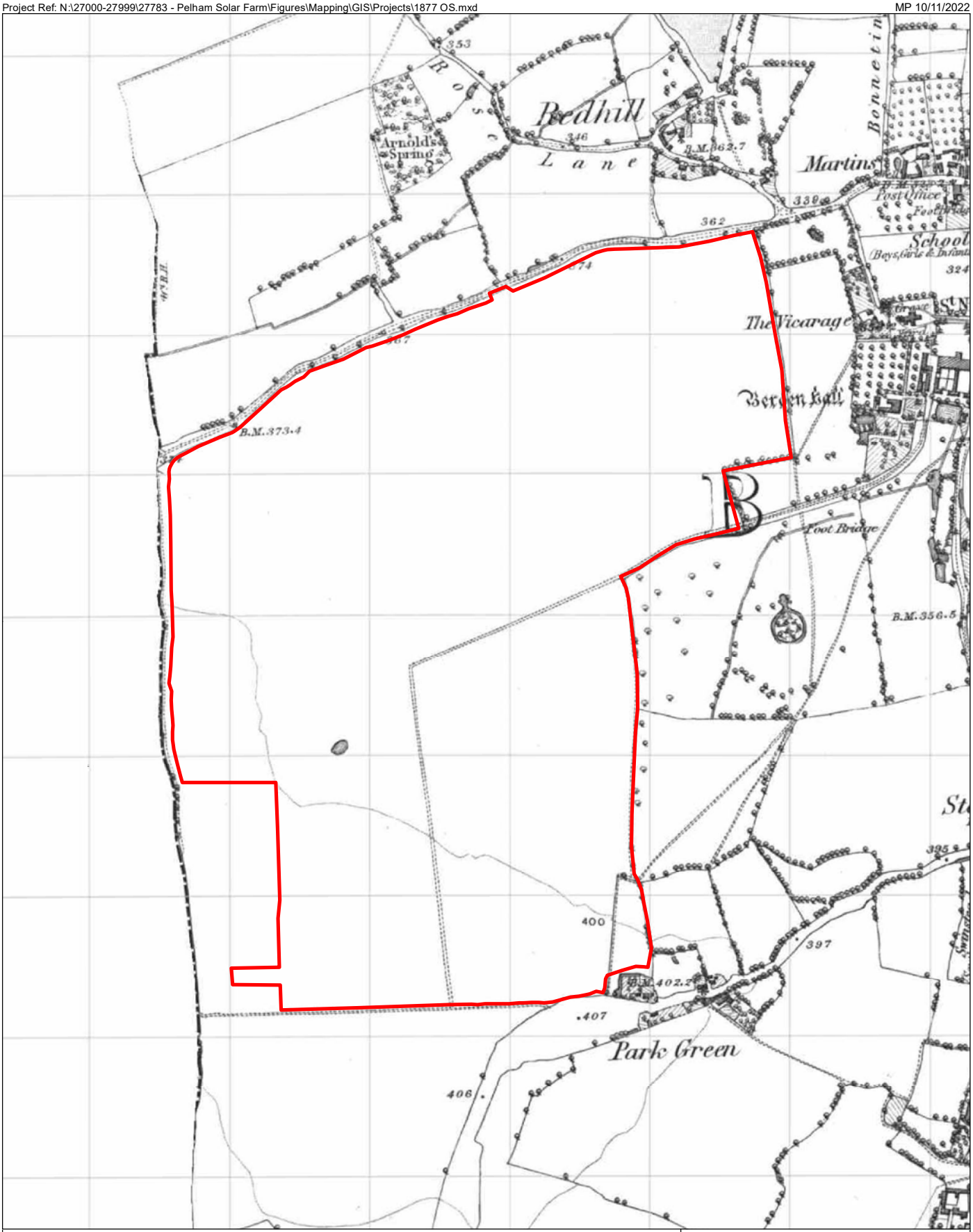
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 7

1839 Berden Tithe Map



Site Boundary

N

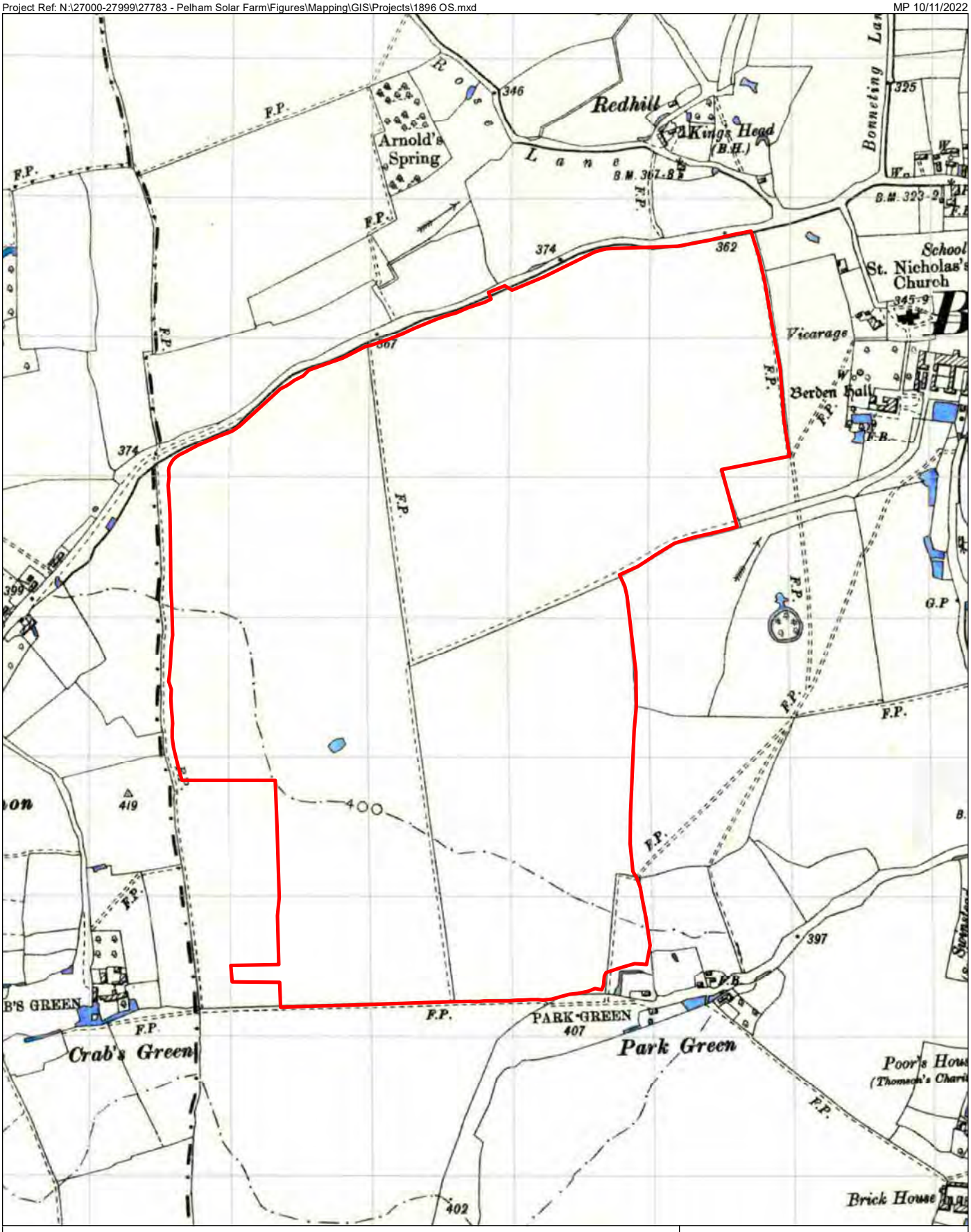
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 8

1877 Ordnance Survey 1:10,560



Site Boundary

N

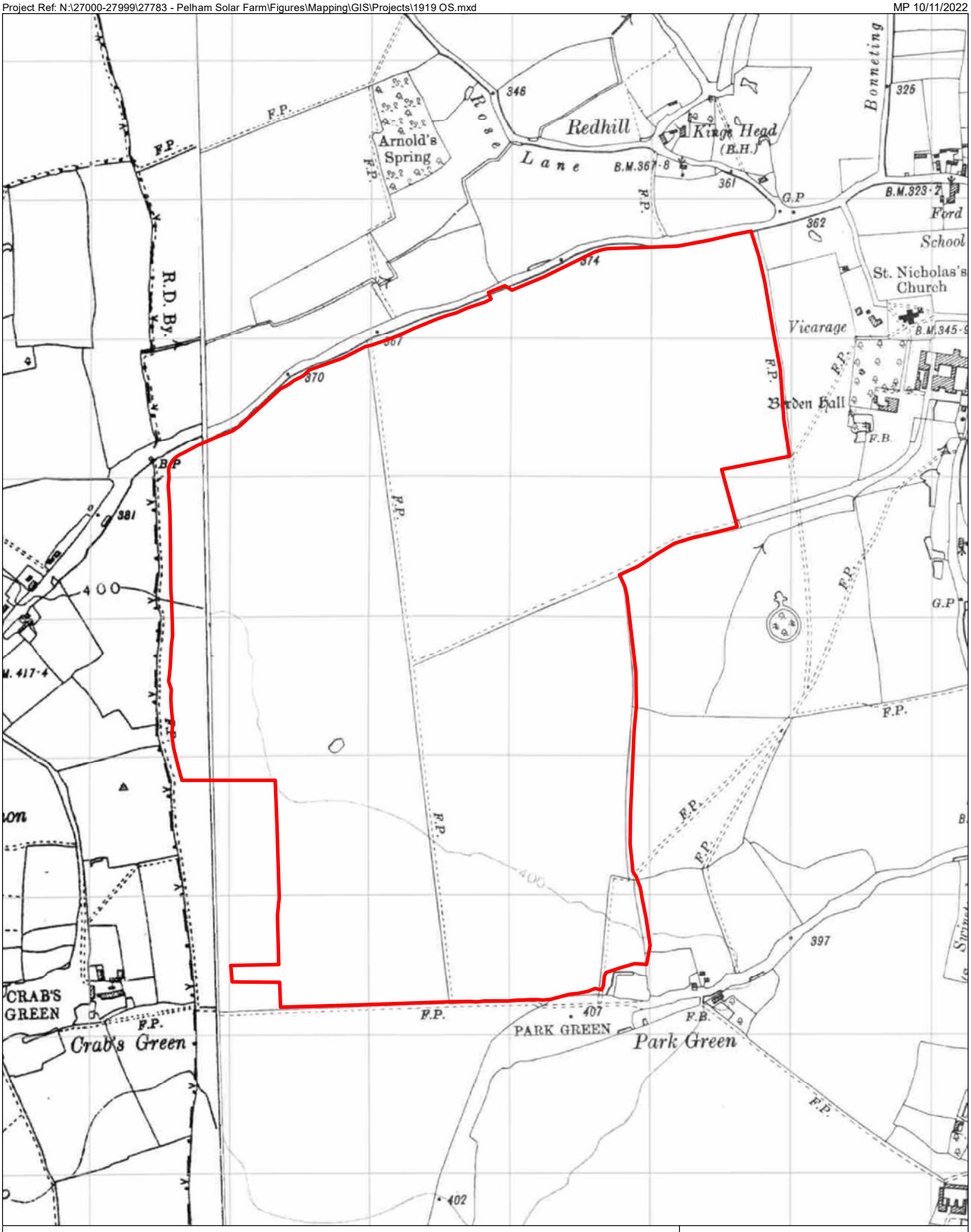
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 9

1896-98 Ordnance Survey
1:10,560



Site Boundary

N

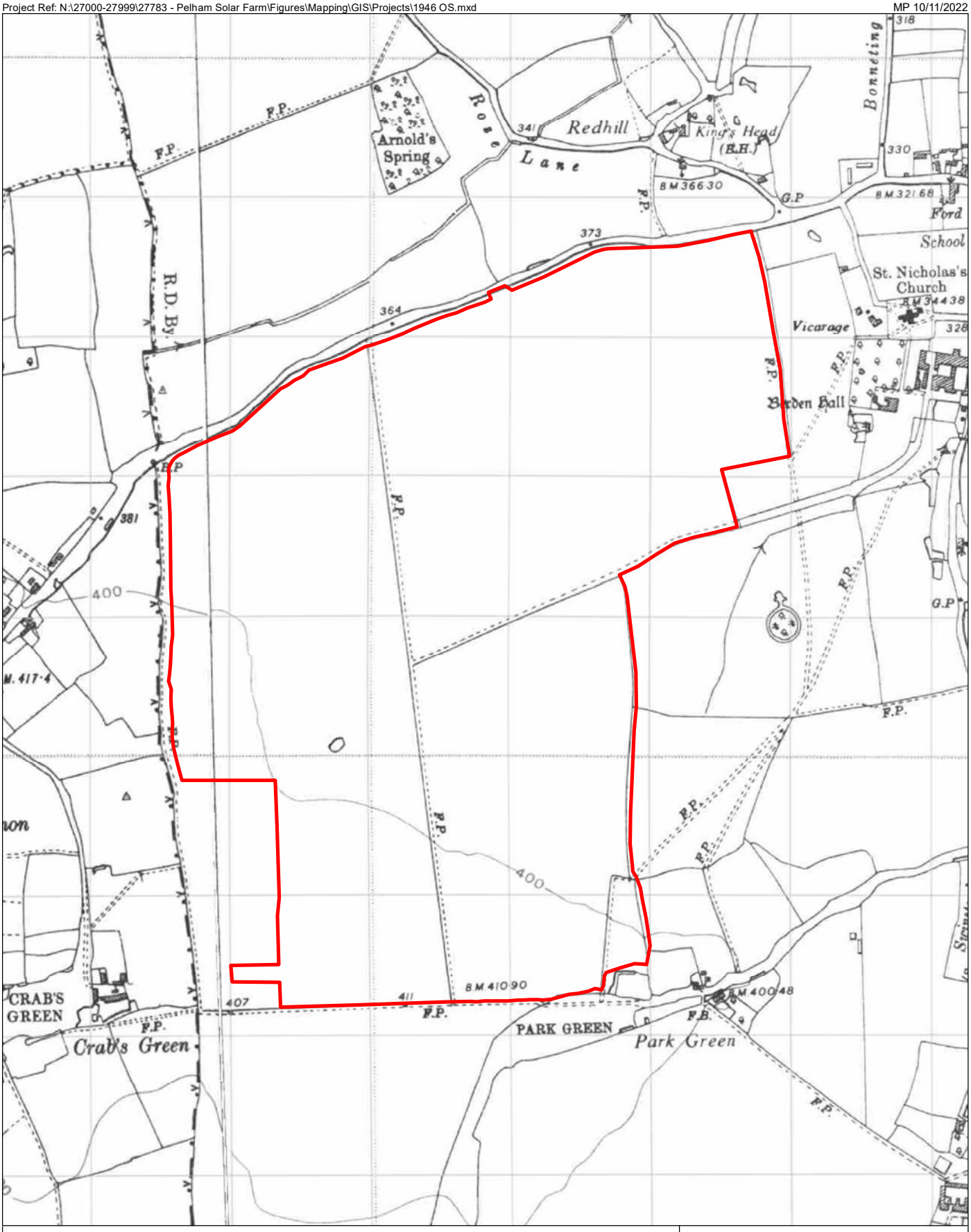
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 10

1919-23 Ordnance Survey
1:10,560



Site Boundary

N

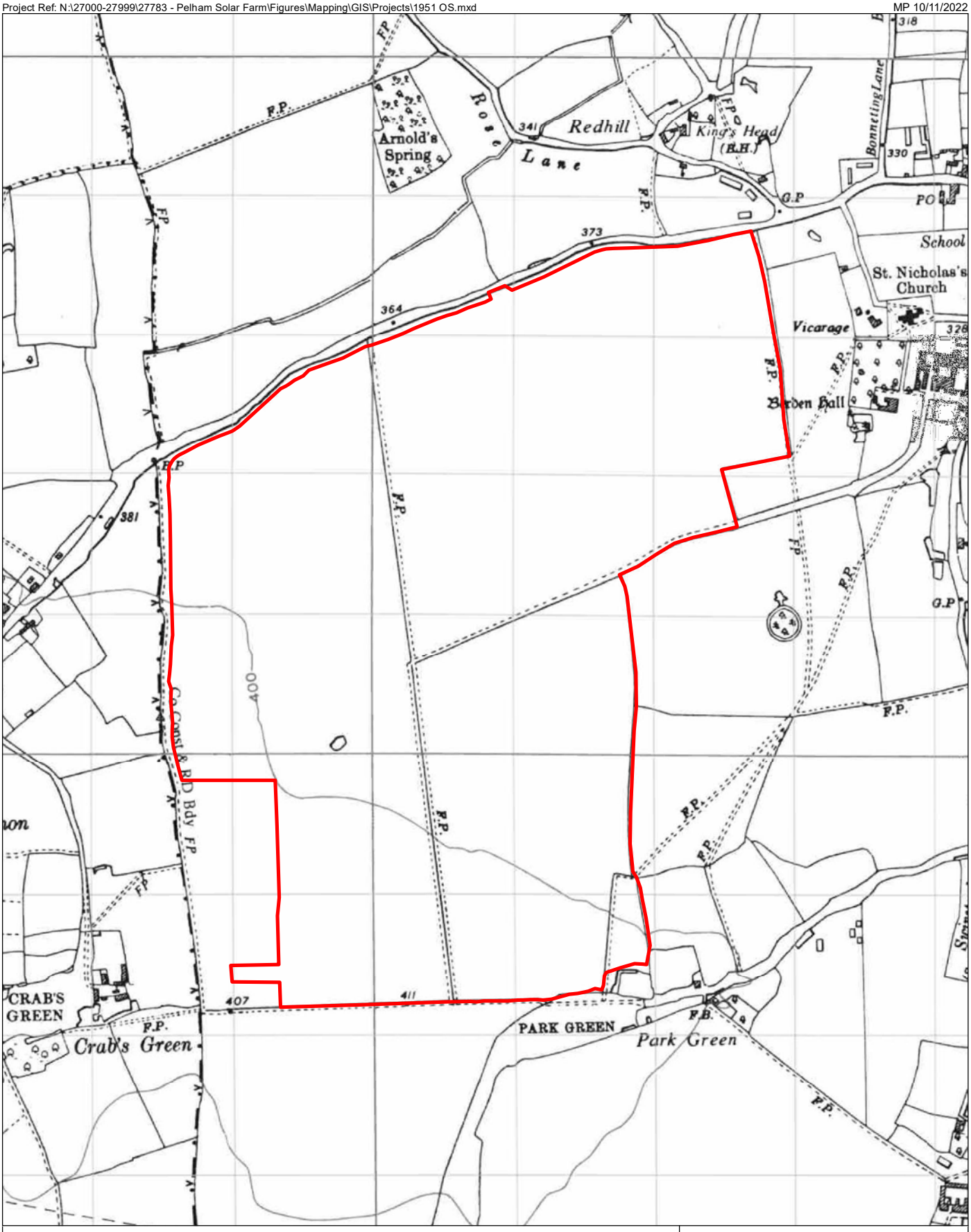
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 11

1946-47 Ordnance Survey
1:10,560



Site Boundary

N

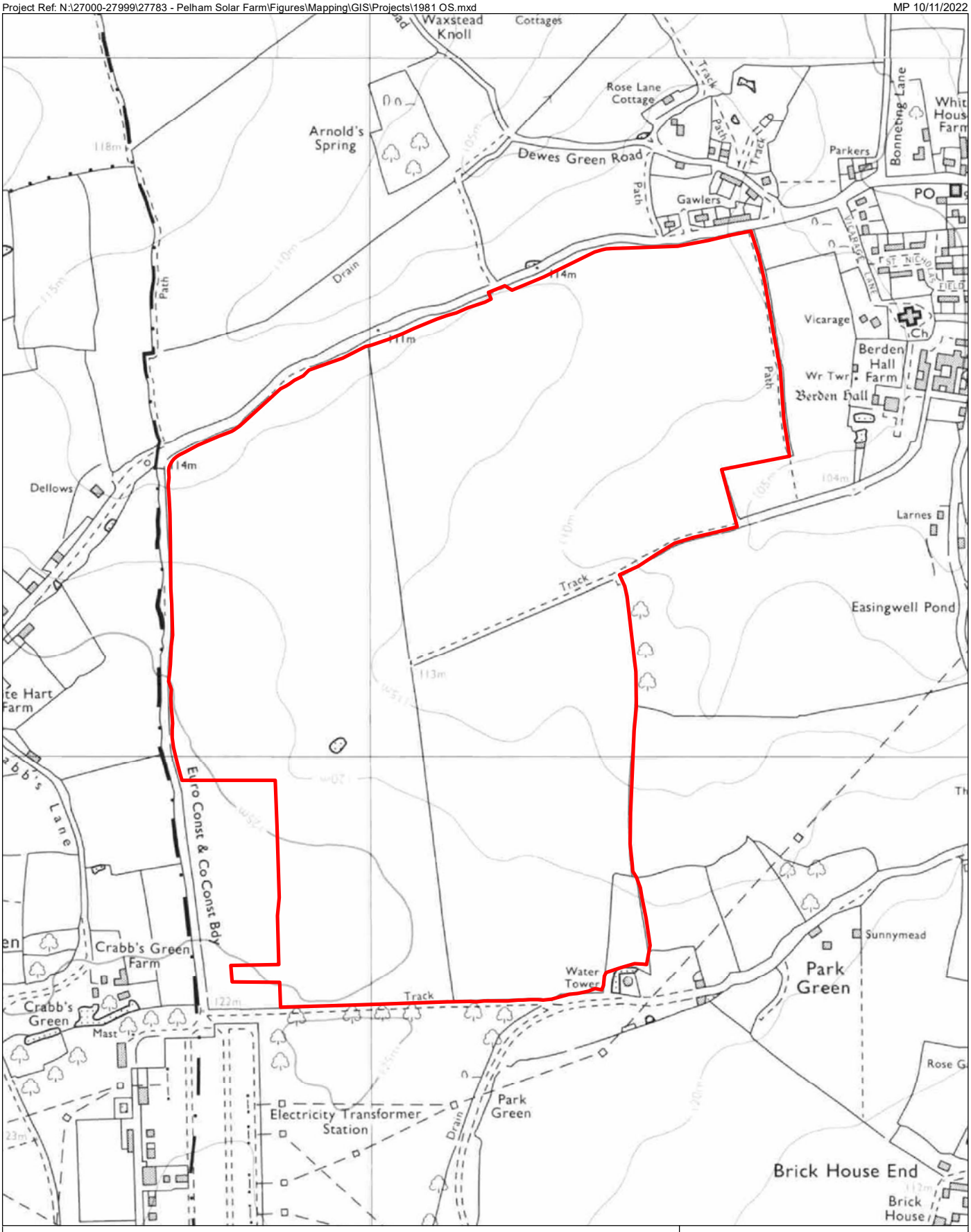
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 12

1951-52 Ordnance Survey
1:10,560



Site Boundary

N

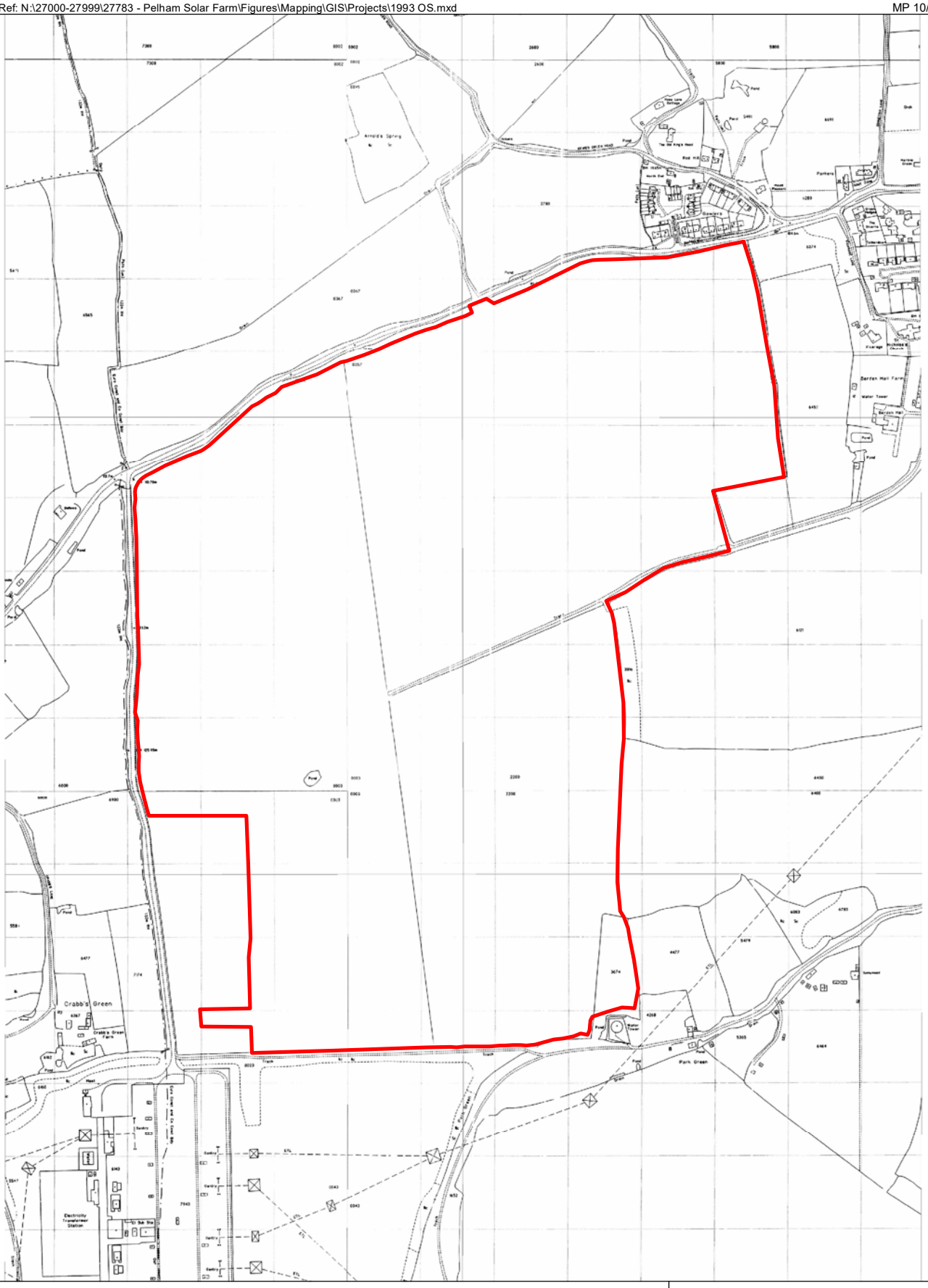
0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 13

1981 Ordnance Survey 1:10,000



Site Boundary

N

0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 14

1993 Ordnance Survey 1:10,000

MP 09/11/2022

Legend

- Site Boundary
- Search Radius 1km

Historic Landscape Characterisation:

- "20thC" ENCLOSURE
- 18TH-20TH CENTURY WOODLAND PLANTATION
- ANCIENT WOODLAND
- BOUNDARY LOSS
- BOUNDARY LOSS - WITH RELICT ELEMENTS
- BUILT-UP AREAS - URBAN DEVELOPMENT
- COMMONS WITH A BUILT
- COMMONS WITH AN OPEN
- FORMAL STYLE PARLIAMENTARY ENCLOSURE
- INDUSTRIAL
- IRREGULAR ENCLOSURE
- PIECEMEAL STYLE PARLIAMENTARY ENCLOSURE
- PIECEMEAL ENCLOSURE BY AGREEMENT
- INFORMAL PARKLAND

N

0 100 200m

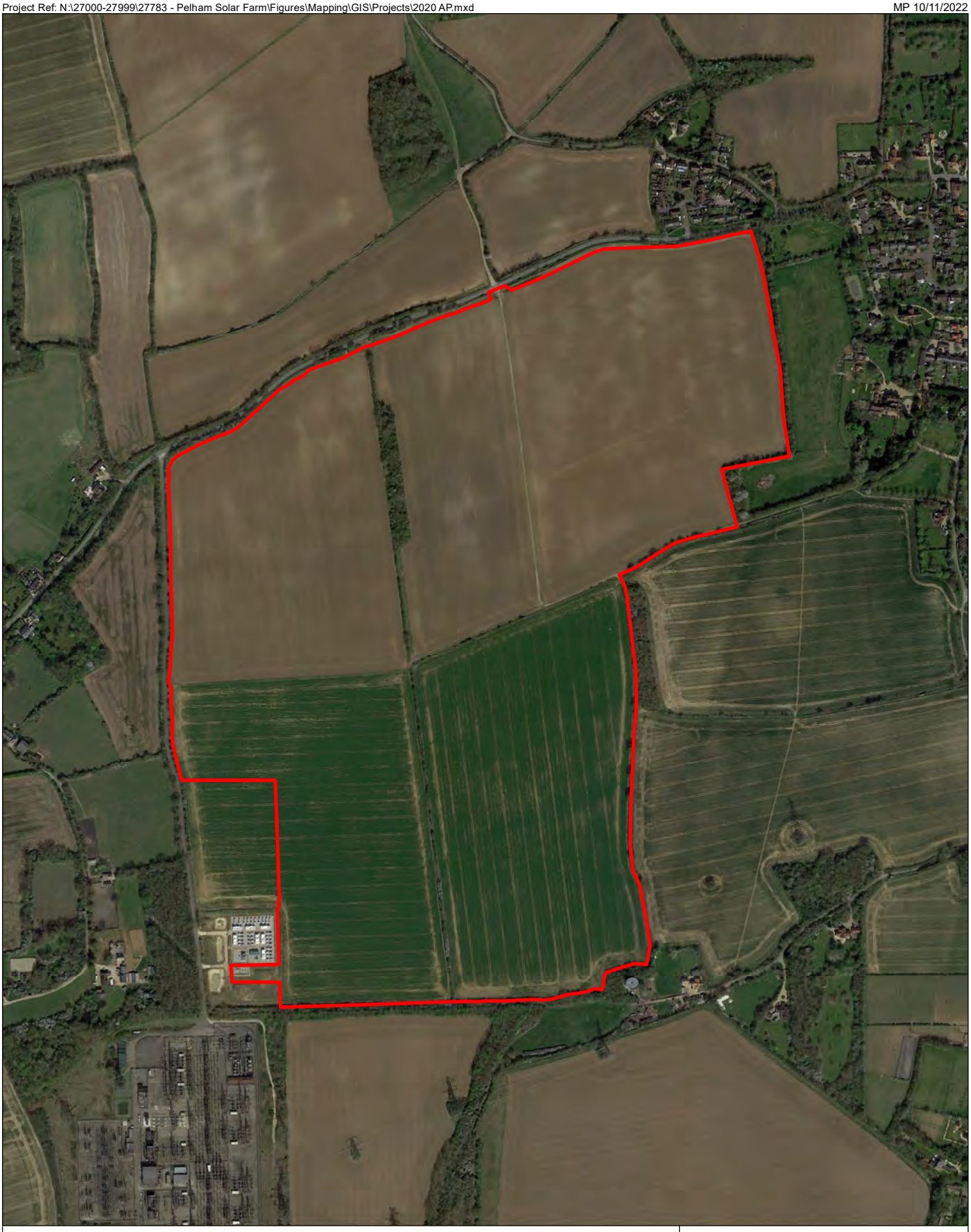
Scale at A3: 1:12,500

MAKING COMPLEX EASY

Figure 15

Historic Landscape Characterisation

Project Ref: N:\27000-27999\27783 - Pelham Solar Farm\Figures\Mapping\GIS\Projects\HLC.mxd



Site Boundary

N

0 75 150 225m

Scale at A4: 1:7,500

MAKING COMPLEX EASY

Figure 16

2020 Aerial Photograph (Google Earth)

APPENDICES

Appendix 1

Air Photo Services Ltd, March 2022. Pelham Solar Farm, Essex - Assessment of Aerial Photographs, Satellite Imagery and LiDAR Data for Archaeology

Pelham Solar Farm

Essex

Assessment of Aerial Photographs, Satellite Imagery and LiDAR Data for Archaeology

APS 221 12 02

Report APS 221 12 02_01

March 2022

Pelham Solar Farm, Essex
Assessment of Aerial Photographs, Satellite Imagery and LiDAR Data for Archaeology

Client	RPS Consulting UK & Ireland
Planning Authority	Uttlesford District Council, Essex
Air Photo Services Document	221 12 02_01
Air Photo Services Project Number	221 12 02
National Grid Reference (NGR)	TL 460290
Co-ordinates	546000,229000

Report Status	Draft v1.0
Issue date	7th March 2022
Report prepared by	Chris Cox MA MCIfA FSA
Interpretation, mapping and GIS	Adam Jarvis ACIfA
QA checked by	Nereide Gilhead ACCA Affil. CIFA

Disclaimer

This report has been prepared by Air Photo Services Ltd with all reasonable skill, care and diligence within the terms of the contract with the client, incorporation of our General Terms and Conditions of Business and taking account of the resources devoted to us by agreement with the client. We disclaim any responsibility to the client and others in respect of matters outside the scope of the above. This report is confidential to the client and we accept no responsibility for the actions and opinions of third parties, to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Table of Contents

Figures

Summary

S1. This assessment of aerial imagery considers land between Stocking Pelham and Berden in Essex, to inform archaeological mitigation in advance of development of a solar farm. The Site is centred at UK National Grid Reference TL 460290, coordinates 546000,229000.

S2. The object of this assessment is to provide information on the location and nature of buried and upstanding archaeological features which are visible on historic aerial photographs, modern aerial and satellite imagery and visualised Airborne Laser Scan (ALS) which is also known as Light Detection and Ranging (LiDAR) data to assess the topographic and micro topographic features within the site.

S3. This assessment identified and mapped fifteen areas of archaeological interest in the site redline and 50mm buffer area.

S4. Six of these areas, **APS_04, 05, 07, 08, 09** and **15** lie within, or partially within, the redline boundary. The remainder lie within 500m of the redline boundary and are mapped to provide landscape context.

S5. The Site contains evidence for a likely prehistoric – Roman ditched enclosure, which is eroded and visible only as a crop mark.

S6. Post-Medieval field systems are visible, and some of these fields may possibly derive from pre-Medieval land use.

S7. A ringwork motte, **APS_07**, lies partially within the redline boundary to the south of Berden. This feature is very residual, but remain will be present in the top and subsoils, as evidenced by their appearance as marks in soil there the buried features are brought to the surface by the plough.

S8. LiDAR survey indicates minimal residual topography over pre-Medieval sites and some very residual 'microtopographic' features in some places.

S9. It is highly likely that there will be further archaeological features within the site, as crop marks usually show only a portion of the buried features in this environment.

1. Introduction

1.1. This assessment considers land adjacent to Pelham Substation, north of Park Green Lane, between Stocking Pelham and Berden in Essex. The assessment was undertaken to inform mitigation strategy over the site of a proposed solar farm, in response to an advisory brief issued by Place Services, Essex County Council (Lee-Smith 2021) in July 2021. The Site is centred at UK National Grid Reference TL 460290, coordinates 546000,229000.

1.2. The object of this assessment is to provide information on the location and nature of buried and upstanding archaeological features which are visible on historic aerial photographs, modern aerial and satellite imagery and visualised Airborne Laser Scan (ALS) which is also known as Light Detection and Ranging (LiDAR) data to assess the topographic and micro topographic features within the site.

Sources of data

1.3. This assessment systematically examined the following sources of data:

- All vertical and specialist oblique aerial photographs, taken between 1946 and 2015, listed under Historic England (HE) Enquiry number 131862;
- Open source Environment Agency (EA) and EA National LiDAR Programme (NLP) visualised LiDAR data captured in 2007 at 50cm resolution and 2019 at 1m resolution;
- The Cambridge University Collection of Aerial Photographs (CUCAP) is closed for digitisation during the timescale of this assessment. The cover search, available by searching the online database at [redacted] indicates that there are specialist obliques, BEN68-71, taken in 1970, to the south of Berden. These were downloaded as lower resolution images, along with their published metadata, to inform the assessment with permission from CUCAP;
- Aerial and satellite images displayed at all the timelines at [redacted] and aerial imagery at [redacted] in December 2021;

- Historic England (then the Royal Commission on the Historic Monuments of England, RCHME) Essex National Mapping Programme (NMP) undertook survey between 1993 and 2003. These data are shown at [redacted] and no NMP data has been recorded over the core of the Site, whilst some is reflected in our report in the northwest part of the wider area;
- First Edition Ordnance Survey (OS) 6" to one mile map sheet Essex XIII; and
- Essex and Hertfordshire Historic Environment Records (EHER and HHER) data provided as shapefiles for GIS and as Portable Document Format (PDF) files by the Essex and Hertfordshire HERs.

Limitations of the data

1.4. It is important to note that aerial imagery usually only shows part of the horizontal and vertical extent of buried and upstanding features. Their capacity to reveal features as crop marks, vegetation marks, soil marks or as shadows cast by banks, ditches and walls, depends upon a number of environmental, lighting and agricultural factors prevalent at the time of the photographic survey.

Figure 1 Location of the Site

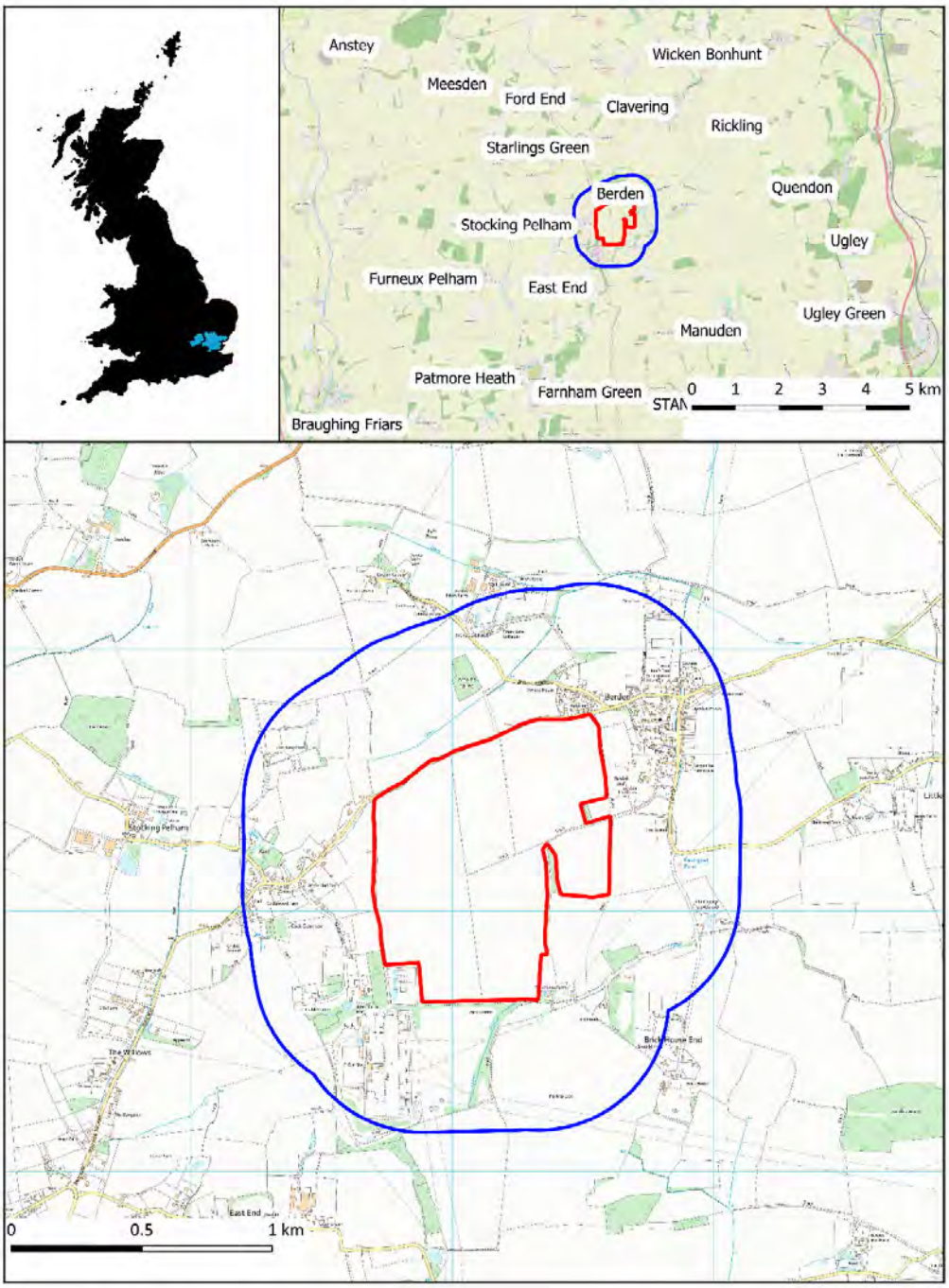


Figure 1: Site Location

Pelham Solar Farm
Assessment of Aerial Imagery
Client: RPS Group
Date: February 2022
Project: APS 221 12 02
By: Adam Jarvis ACIfA

Aims and objectives

1.5. This assessment aimed to provide information on the location and nature of buried and upstanding archaeological features visible on historic aerial photographs, modern aerial and satellite imagery and visualised LiDAR data to assess the buried, topographic and micro topographic features within the Site; and

1.6. The objective of this report is to identify the potential for heritage asset presence and preservation through the assessment of aerial imagery, LiDAR data and satellite imagery.

2. Interpretation and mapping

2.1. All photos, satellite images and LiDAR data visualisations were interpreted and mapped at a level compatible with a 1:2500 scale base map.

2.2. Aerial photographs were closely examined by eye and under 1.5x and 3x magnification and interpreted with the aid of a mirror stereoscope where appropriate, or in detail on screen when consulted as digital files.

2.3. Aerial photographs and satellite images were digitally rectified to an OS base map using the QGIS rectification tool. This was done to remove perspective distortion and ensure correct rectification of aerial photographs to the OS map (Scollar 2002 and 2014). Images from Google Earth were also interpreted and rectified to OS map bases and used in accordance with observations made by Scollar and Palmer, 2008.

2.4. In all transformations prepared for this assessment, the mean mismatches were less than ± 2.5m *where possible*. The rectified files were set as background layers in QGIS where features were interpreted and drawn over the rectified photographs.

2.5. Layers from the final drawing have been used to prepare the illustration for this report and are provided digitally for import to a Geographic Information System, in ESRI Shapefile format.

2.6. LiDAR data were downloaded, visualised and imported to QGIS and ArcGIS for interpretation and mapping. These data were downloaded and visualised in accordance with standards and techniques set out by Bennett *et al* (2010), Hesse (2010), Historic England (2018) and Stular *et al* (2012).

3. Environment and previously recorded heritage assets

3.1. The nature of the environment has a complex effect on both the preservation and visibility of both buried and upstanding features from the air. Many factors combine to influence very marked seasonal and temporal limitations to visibility of cropmarks[1] soil marks[2] and earthworks[3]. land use, agricultural regimes, weather, geology and soil types are all major contributing factors to the visibility of heritage assets from airborne and satellite-derived sources.

Topography and Land Use

3.2. The site, **Figure 1,** is situated between Stocking Pelham, Cock Common and Berden, to the north of Park Green, in Essex.

3.3. The land lies between 115 and 125m Above Ordnance Datum (AOD) and is under arable cultivation with some small areas of deciduous woodland.

Geology and soils

3.4. The site lies on chalky till substrate, which gives rise to deep loamy soils[4] in the northwest part of the site, which are free draining, and slowly permeable calcareous deeper clay[5] in the main part of the site, (Cranfield University 2021, British Geological Survey (BGS) 2021). The extent, type and location of these two soil types is shown on **Figure 2**.

Topography, geology and soils conclusion

3.5. This site lies over a well-drained chalky bedrock, but the clay soils in the majority of the site have impeded drainage at times, However, crop marks have been recorded

[1] Where crops grow differentially over buried features such as ditches banks and walls and reveal the pattern of past sites and landscape in the colour and density of their growth.

[2] Differently coloured and toned soil which is part of buried features which are being directly brought to the surface by ploughing or erosion and are visible in contrast to the surrounding soil.

[3] Upstanding ditched and embanked features which show from the air *via* their shadows or *via* the differential topography revealed by visualised LiDAR data.

[4] MELFORD soil association, soil map symbol 571o
[5] HANSLOPE soil association, soil map symbol 411d

extensively on clays and are visible over buried features within the site under favourable environmental conditions.

Previously recorded heritage assets

3.6. The EHER and HHER demonstrate that the redline boundary ('the Site') and the wider environs and the site contain previously recorded undated but likely prehistoric – Roman cropmarked ditched enclosures and associated ditches. A later prehistoric enclosure is recorded within the site at White Hart Farm, EHER 47982, MonUID MEX1040815.

3.7. The Site and environs also contain Medieval and Post-Medieval moated sites. Within the Site, The Rookery, or Cumber Hills, (EHER 3854, MonUID MEX13883) is a Medieval 'ringwork motte' which was till extant but tree covered in the 1940s, and was indicated as an upstanding enclosing ditched feature on the 1881 First Edition OS 6" map sheet Essex XIII. The motte is now ploughed out and visible only as crop and soil marks and as micro topography recorded *via* visualised LiDAR data.

3.8. The Crump, a 'ringwork[6]' south of Berden, is a Scheduled Monument (SM) which is included in the National Heritage List for England as entry 1009308. The site was Scheduled in 1954 and the Scheduling amended in 1992, as:

[redacted]

3.9. Post-enclosure, and maybe earlier, field systems are visible as crop marks in places.

[6] Extract from NHLE 1009308: *Ringworks are medieval fortifications built and occupied from the late Anglo-Saxon period to the later 12th century. They comprised a small defended area containing buildings which was surrounded or partly surrounded by a substantial ditch and a bank surmounted by a timber palisade or, rarely, a stone wall. Occasionally a more lightly defended embanked enclosure, the bailey, adjoined the ringwork. Ringworks acted as strongholds for military operations and in some cases as defended aristocratic or manorial settlements. They are rare nationally with only 200 recorded examples and less than 60 with baileys. As such, and as one of a limited number and very restricted range of Anglo-Saxon and Norman fortifications, ringworks are of particular significance to our understanding of the period. Despite limited excavation, The Crump ringwork is well preserved and will retain archaeological information pertaining to the occupation of the site and environmental evidence relating both to the economy of its inhabitants and the landscape in which they lived.*

3.10. Findspots recorded by the HHER and EHER indicate a background presence of prehistoric to Post Medieval settlement and activity in this area.

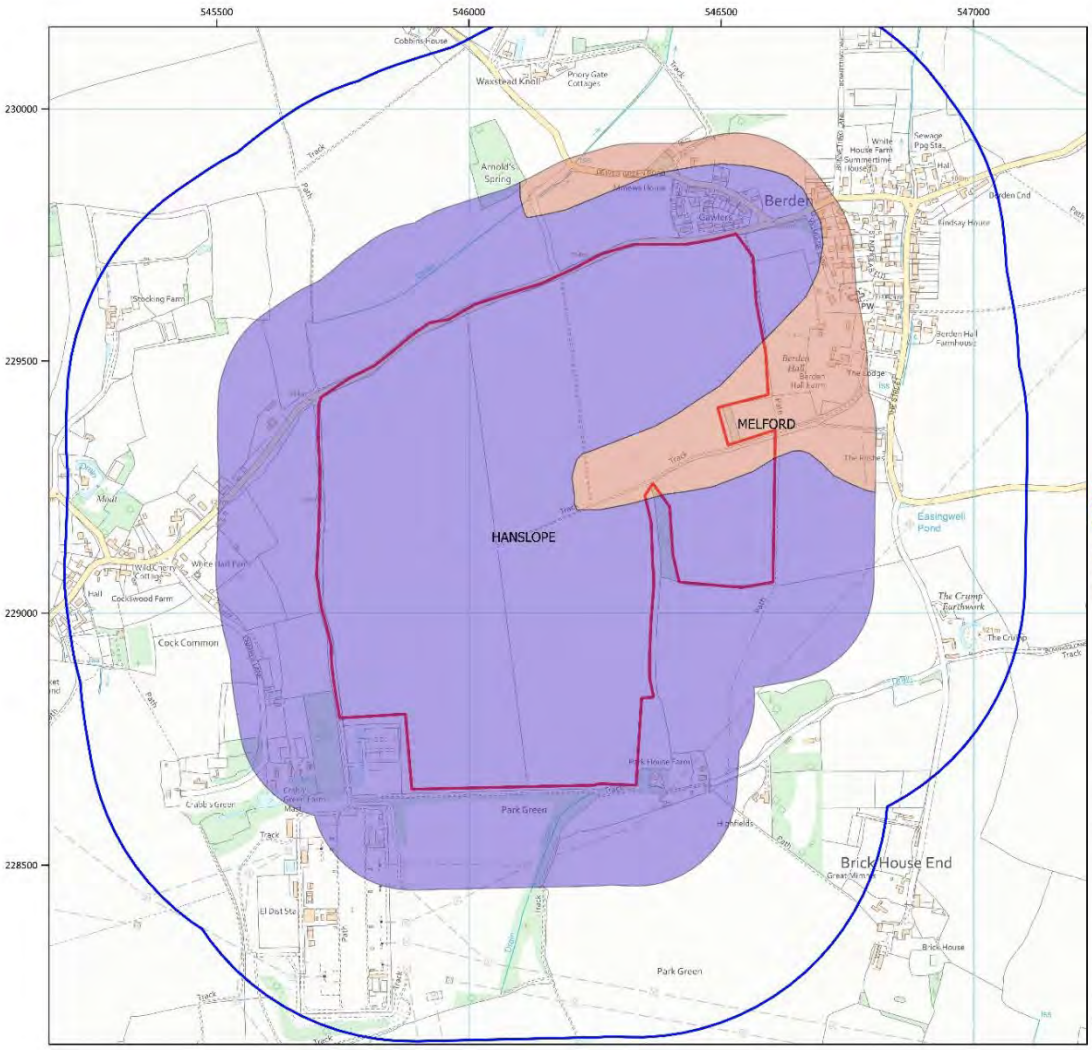


Figure 2 Soils over chalky substrate within the site

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Chris Cox MCIfA
Source	Cranfield University 2021, British Geological Survey (BGS) 2021

Baseline heritage assets conclusion

3.11. Overall, the HHER and EHERs demonstrate the range of known archaeological resources in the area and have informed this assessment, which has confirmed and expanded on its data in the redline boundary of the site and some parts of its environs.

4. Results

4.1. The results from the interpretation and mapping are presented in **Table 1**. **Figure 3** shows features which were recorded on the site and within 500m of the redline boundary. **Figure 4** shows features within the redline boundary only. **Figure 5** compares the mapping to the 1881 First Edition OS.

4.2. Fifteen individual features or groups of features were recorded within the site and the buffer area. Six of these areas, **APS_04, 05, 07, 08**, **09** and **15** lie within, or partially within, the redline boundary. The remainder lie within 500m of the redline boundary and are mapped to provide landscape context.

4.3. The detailed sources and condition notes are recorded in the Shapefiles which accompany and inform this report.

Table 1 Features recorded within the site or within 500m of the site redline boundary

APS_Site	Asset_Type	Within redline boundary	Period	MonUID	Comment	Easting	Northing	NGR
APS_01	Field System	Outside, within buffer area	Post-Medieval	MEX1036848	Cropmark remains of a former field system are visible on historic aerial photographs and satellite imagery and as residual earthwork remains on LiDAR data. Mapped by the OS, First Edition 1881 and no longer extant	546163	228101	TL 461 281
APS_02	Possible ring ditch	Outside, within buffer area	Unknown		Possible ring ditch visible on satellite imagery. Date and type are unknown	546420	228367	TL 464 283
APS_03	Field Boundary	Outside, within buffer area	Post-Medieval	MEX1036848	Former field boundaries visible as earthwork and cropmark remains. Boundary to the east removed between 1963 and 2000	546823	228749	TL 468 287
APS_04	Field System	Partially within redline boundary	Post Medieval, parts maybe earlier	MEX1036848, MEX13883	Cropmarked remains of former field system visible on historic aerial photographs with residual earthwork remains visible on LiDAR data. The eastern elements are mapped by the OS, First Edition 1881, but the western are not	546378	228886	TL 463 288

APS_Site	Asset_Type	Within redline boundary	Period	MonUID	Comment	Easting	Northing	NGR
APS_05	Ditch	Within redline boundary	Unknown		Cropmarked parallel ditches visible on historic aerial photographs	545867	228938	TL 458 289
APS_06	Moat	Outside, within buffer area	Medieval	MEX729 1009308	Scheduled Medieval moated site known as the Crump. The moat is extant on historic aerial photographs, satellite imagery and LiDAR. Feature mapped by OS, First Edition 1881	547002	228953	TL 470 289
APS_07	Ringwork motte	Within redline boundary	Medieval	MEX13883	Earthwork and later cropmark and soilmark over a formerly embanked 'ringwork motte'. Residual earthwork remains visible on LiDAR data. Feature mapped by OS, First Edition 1881	546540	229159	TL 465 291

APS_Site	Asset_Type	Within redline boundary	Period	MonUID	Comment	Easting	Northing	NGR
APS_08	Field Boundary	Within redline boundary	Unknown		Undated field boundary visible as cropmarks on historic aerial photographs and as residual earthworks on LiDAR data	546024	229222	TL 460 292
APS_09	Enclosure	Within redline boundary	Prehistoric	MEX1040815	Cropmarked rectilinear enclosure visible as a ditch on satellite imagery	545950	229241	TL 459 292
APS_10	Moat	Outside, within buffer area	Medieval	MHT1971	Extant moat, mapped by the OS and visible *via* historic aerial photos, satellite imagery and LiDAR data as an extant feature	545244	229266	TL 452 292
APS_11	Field Boundary	Outside, within buffer area	Likely Post-Medieval		Likely Post-Medieval field boundary visible as extant on 1940s aerial photographs, removed by the 1970s. Residual earthwork remains are visible on LiDAR data	545468	229407	TL 454 294
APS_12	Ditch	Outside, within buffer area	Post-Medieval		Former boundary and possible drainage ditch visible on historic aerial photographs, First Edition OS 1881 and satellite imagery	546023	229673	TL 460 296

APS_Site	Asset_Type	Within redline boundary	Period	MonUID	Comment	Easting	Northing	NGR
APS_13	Enclosure	Outside, within buffer area	Possible iron Age	MEX1038978 MHT7648	Possible Iron Age enclosure and ditches visible as cropmarks on historic aerial photographs and satellite imagery to the northwest of Arnold's Spring	545621	229898	TL 456 298
APS_14	Boundary	Outside, within buffer area	Post-Medieval	MEX42961	Post-Medieval field boundaries visible on historic aerial photographs, First Edition OS 1881 and as residual earthworks on LiDAR data	546312	229979	TL 463 299
APS_15	Pond	Within redline boundary	Post-Medieval		A former pond which is mapped on the OS First Edition 1881, and now visible as a residual sub-circular embanked and hollow feature *via* visualised LiDAR data. Could be mistaken for an archaeological feature	545960	229018	TL 459290

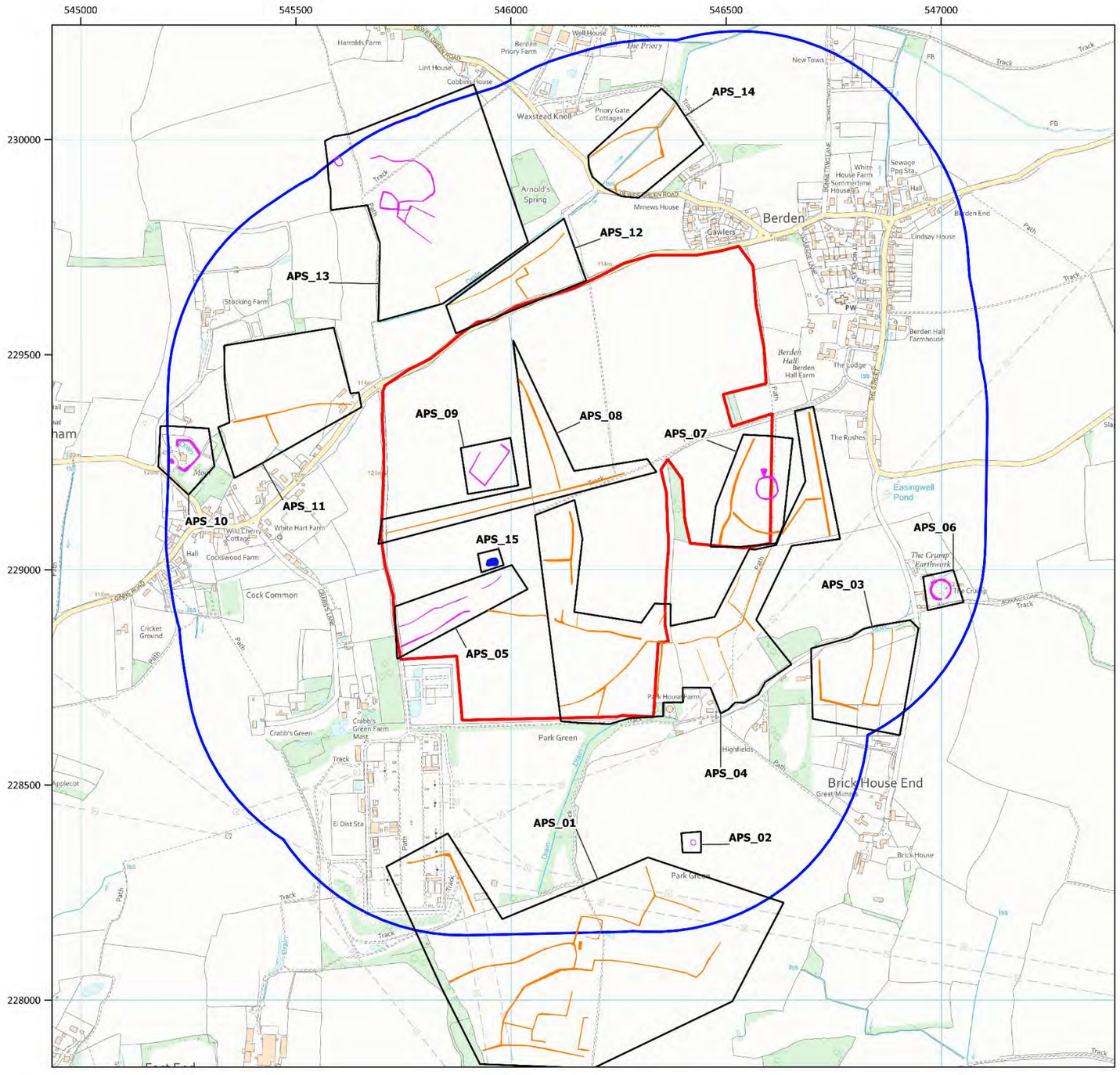


Figure 3
Features mapped within the site redline and buffer areas

Feature Mapping

221 12 02 Pelham Solar Farm Detail Mapping Polygons

- Ditch
- Ditched field system
- Pond
- 221 12 02 Pelham Solar Farm Site Polygons

Outlines & Buffers

- 221 12 02 Pelham Solar Farm 500m Buffer
- 221 12 02 Pelham Solar Farm Site Outline

N

0 100 200 300 400 m

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Adam Jarvis ACIfA
Source	Historic England Archive, www.google.com/earth, CUCAP EA Lidar 2007. 2019

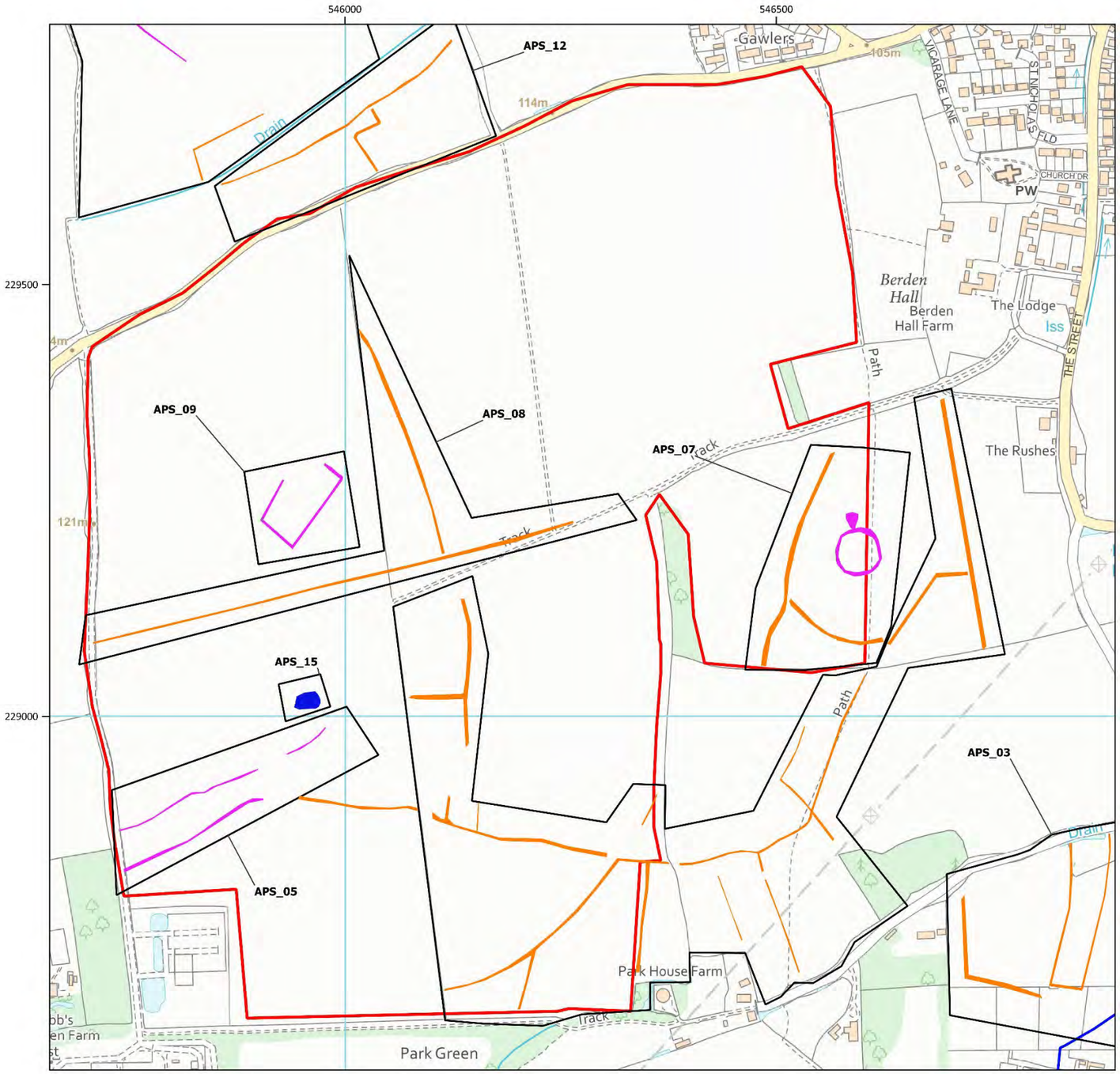


Figure 4 Features within the redline boundary

Feature Mapping

221 12 02 Pelham Solar Farm Detail Mapping Polygons

- Ditch
- Ditched field system
- Pond
- 221 12 02 Pelham Solar Farm Site Polygons

Outlines & Buffers

- 221 12 02 Pelham Solar Farm 500m Buffer
- 221 12 02 Pelham Solar Farm Site Outline

N

0 100 200 300 400 m

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Adam Jarvis ACIfA
Source	Historic England Archive, www.google.com/earth, CUCAP EA Lidar 2009. 2017

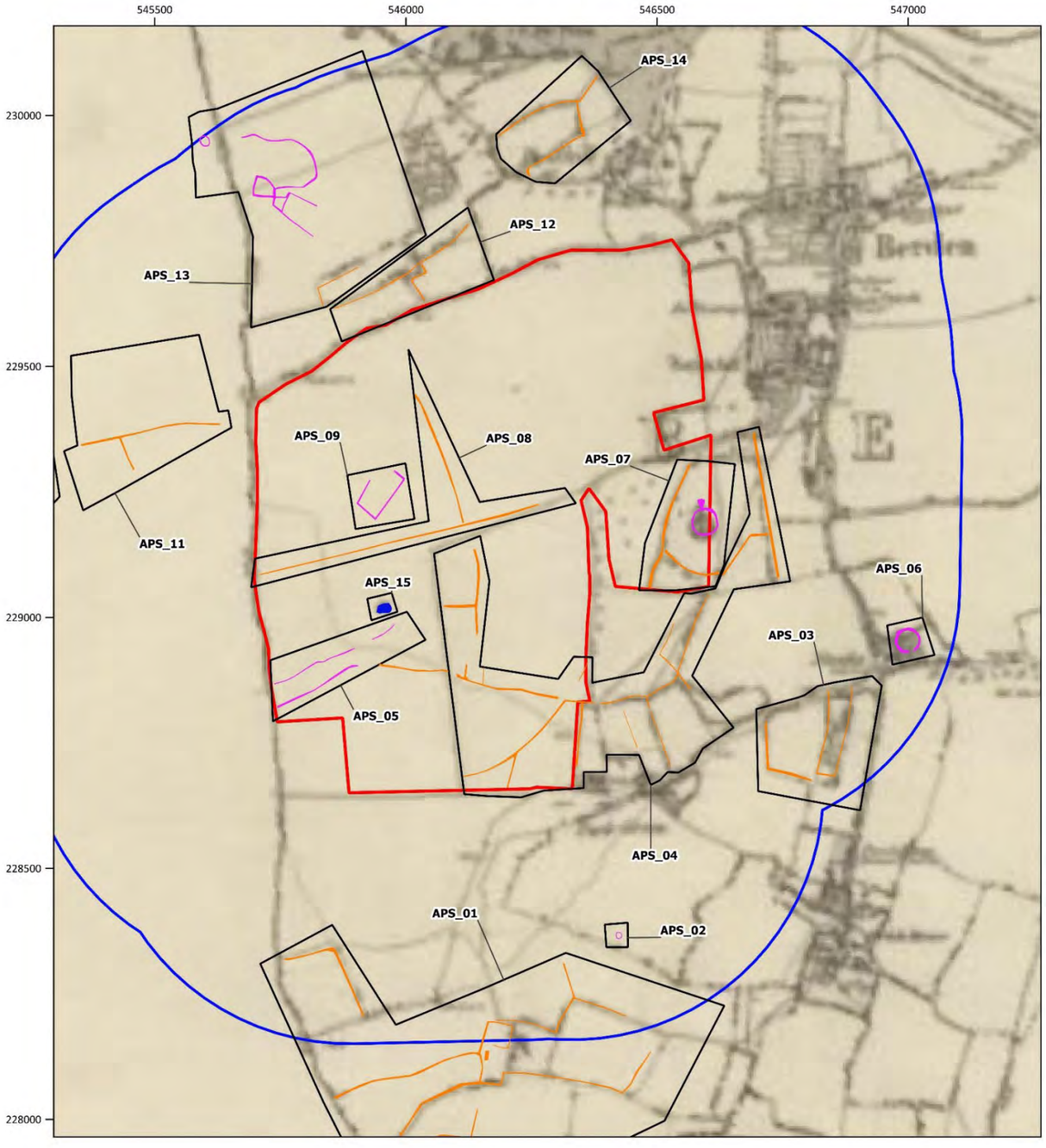


Figure 5
Comparison to the OS First Edition 1881 6" to one mile sheet Essex XIII

Feature Mapping

221 12 02 Pelham Solar Farm Detail Mapping Polygons

- Ditch
- Ditched field system
- Pond
- 221 12 02 Pelham Solar Farm Site Polygons

Outlines & Buffers

- 221 12 02 Pelham Solar Farm 500m Buffer
- 221 12 02 Pelham Solar Farm Site Outline

N

0 100 200 300 400 m

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Chris Cox MCIfA FSA
Source	Historic England Archive, www.google.com/earth, CUCAP EA Lidar 2007, 2019 OS 1881 6" to one mile Essex sheet XIII

4.4. **Figure 4** shows the Site in its environs, with detailed mapping by the NMP which indicates the complexity of prehistoric and Roman remains which are recorded as marks in the Site and its wider area.

Features within the redline area

Prehistoric and Roman periods

4.5. The Site contains the cropmarked remains of a buried ditched enclosure at White Hart Farm which may be a prehistoric or Roman settlement or stock management area. This site is recorded as **APS_09**, and by the EHER as 47982, MonUID MEX1040815.

4.6. Undated ditches to its south at **APS_05** may be prehistoric, but this is uncertain without intrusive investigation.

4.7. The relict Post-Medieval field systems in this area seem to connect into a cohesive agricultural landscape which in the area to the east and south of **APS_05** may have an earlier origin.

Medieval and Post-Medieval/Undated periods

4.8. The area has been ploughed heavily in modern times and there are no traces of Medieval open fields.

4.9. The remainder of the redline area contains evidence for a cohesive system of former post-enclosure field boundaries, some of which were removed in the later 20th Century. Others show only as marks in crops and soil over their embankments and former hedging ditches. Mapping of these features was undertaken largely from historic aerial photos. **Figure 5** shows the close correlation of this field system to the First Edition 6 inch to one mile OS map, Essex sheet XIII. Some features are not indicated on the OS mapping and may be the remains of earlier boundaries.

4.10. The site contains the plough-eroded remains of a 'ringwork motte' with surrounding boundaries or drains. The area, a The Rookery, or Cumber Hills, is recorded in the EHER as a Medieval ringwork, EHER 3854, MonUID13883.

4.11. The ‘ringwork’ was shown as an extant curvilinear enclosure with a cut feature on its north side, and vegetation within, on the First Edition OS mapping which was surveyed in 1881 (**Plate 1**). The feature was recorded on RAF aerial photos in the 1940s and 1960s, when it was still extant as a vegetated enclosure, shown on **Plate 2.**

Plate 1 Essex OS sheet XIII 6” to one mile 1881 (source: National Library of Scotland)

Plate 2 Part of RAF 106G UK 1635 frame 5248 ©Historic England Archive, taken in 1946, with the site redline boundary which bisects the feature.

4.12. The site was again recorded in 1970, by Dr JK St Joseph at CUCAP, when the features had been ploughed out and were visible as a clear mark in soil over the residual motte and surrounding boundaries and drains.

4.13. Oblique aerial photographs BEN68-71 were taken in the afternoon of the 11th April 1970, and are available to view as lower resolution thumbnails on the CUCAP online catalogue. **Plate 3** shows part of BEN68, which clearly shows the ploughed out mound and its surrounding features. It was not possible to rectify this image for mapping as it is very oblique, but is an instructive illustration. Features within the area have been mapped from additional sources.

Plate 3 Cambridge University Collection of Aerial Photography © copyright reserved

4.14. **Plate 4** shows the site when it was recorded in 2003 as a soilmark by Maxar Technologies satellite imagery, as shown at Google Earth.

Plate 4 Map data, Google: Maxar Technologies, October 2003

4.15. By 2019, The site is visible as a microtopographic feature *via* visualised LiDAR data which is shown over the page at **Plates 5** and **6.**

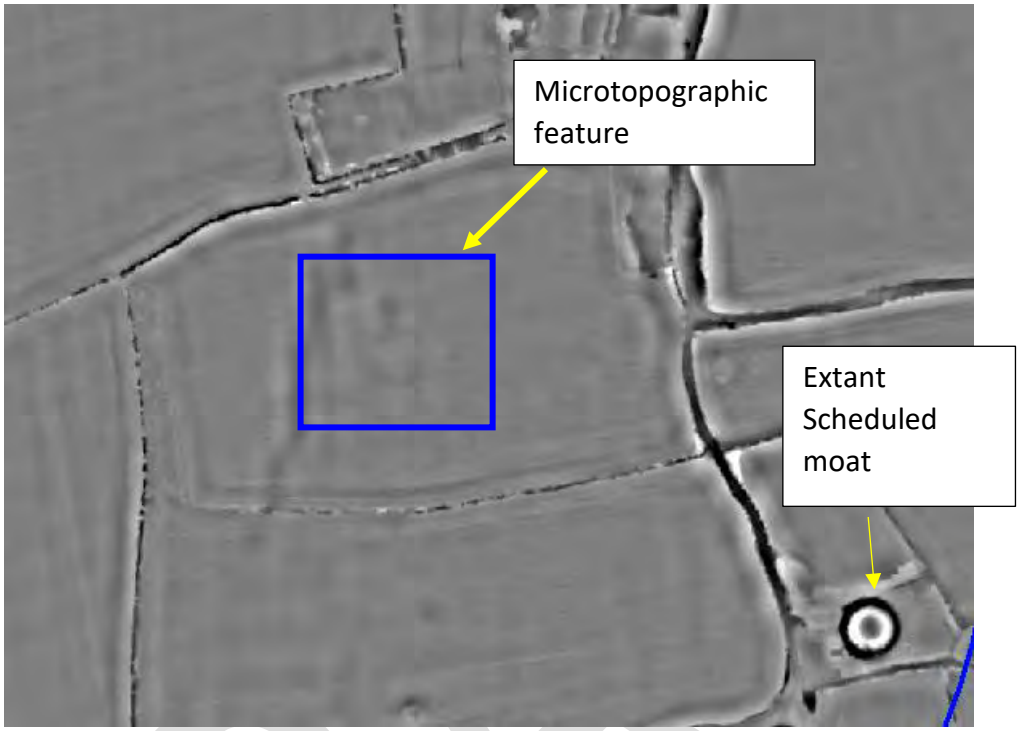


Plate 5 EA NLP LiDAR 1m DTM SLRM visualisation showing the residual feature partially within the redline boundary in comparison to the extant Scheduled moated site outside the redline.

Plate 6 the Hillshade visualisation does not show the very residual topography at the ringwork motte.

4.16. Visualised LiDAR data shown at **Figures 6** and **7** indicates the levels of erosion over the features mapped within the site and environs.

Figure 6
LiDAR SLRM visualisation, 2019 1m DTM

221 12 02 Pelham Solar Farm Site Outline
221 12 02 Pelham Solar Farm 500m Buffer
2019 1m NLP DTM_SLRM_R20
-1
1

N
0 100 200 300 400 m

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Chris Cox MCIfA FSA
Source	EA Lidar 2019 1m DTM SLRM

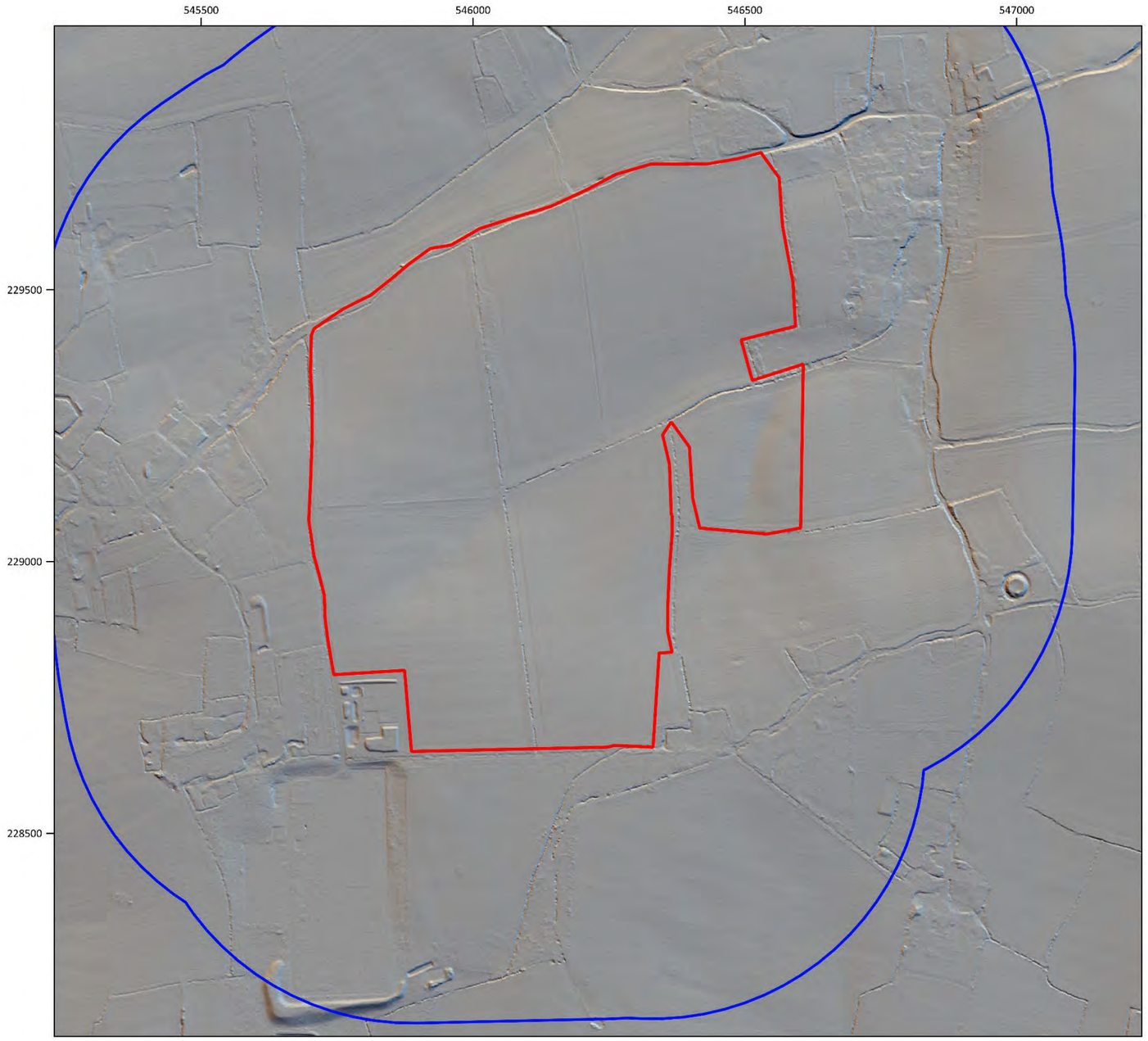


Figure 7
LiDAR Hillshade visualisation, 2019 1m DTM

221 12 02 Pelham Solar Farm Site Outline
221 12 02 Pelham Solar Farm 500m Buffer
2019 1m DTM_MULTI-HS_D16_H35

N

0 100 200 300 400 m

Pelham Solar Farm
Assessment of Aerial Imagery

Client	RPS Group
Date	March 2022
Project	APS 221 12 02
By	Chris Cox MCIfA FSA
Source	EA Lidar 2019 1m DTM Hillshade

The buffer area and environs

4.17. The buffer area contains further evidence for buried ditched enclosures, field systems and moated sites which are part of a much wider buried multi period archaeological and historic landscape.

5. Summary and Conclusion

5.1. This assessment has mapped 15 areas of archaeological interest in the wider environs of the site.

5.2. Six of these areas, **APS_04**, **05**, **07**, **08**, **09** and **15** lie within, or partially within, the redline boundary. The remainder lie within 500m of the redline boundary and are mapped to provide landscape context.

5.3. The site contains evidence for a likely prehistoric – Roman ditched enclosure, which is eroded and visible only as a crop mark.

5.4. Post-Medieval field systems are visible, and some of these fields may possibly derive from pre-Medieval land use.

5.5. A ringwork motte, **APS_07**, lies partially within the redline boundary to the south of Berden. This feature is very residual, but remain will be present in the top and subsoils, as evidenced by their appearance as marks in soil there the buried features are brought to the surface by the plough.

5.6. It is highly likely that there will be further archaeological features within the site, as crop marks usually show only a portion of the buried features in this environment.

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Štular, B. Kokalj, Ž. Oštir, K. Nuninger, L. 2012. 'Visualisation of LiDAR – derived relief models for detection of archaeological features' in *Journal of Archaeological Science* 39. PP. 3354-3360.

Acknowledgements

Many thanks to those who have supported this assessment through the provision of research materials and advice on sourcing documents and photographs during a time of restricted access:

- RPS UK and Ireland
- Historic England Archive;
- Essex and Hertfordshire HERs; and
- Professor Tom Spencer, Cambridge University Collection of Aerial Photographs.

Appendix

The following source of data were consulted:

Historic England Archive enquiry number 131862 December 2021

Oblique aerial photographs

Photo reference (NGR and Index number)	Film and frame number		Date	NGR
TL 4529 / 1	NMR 10448	/ 9 A	17 JUL 1970	TL 454299
TL 4529 / 2	NMR 10448	/ 10 A	17 JUL 1970	TL 454299
TL 4529 / 8	HEA 29391	/ 031	03 JUL 2015	TL 458298
TL 4529 / 9	HEA 29391	/ 032	03 JUL 2015	TL 458298
TL 4529 / 10	HEA 29391	/ 033	03 JUL 2015	TL 458297
TL 4529 / 11	HEA 29391	/ 034	03 JUL 2015	TL 457299
TL 4529 / 12	HEA 29391	/ 035	03 JUL 2015	TL 457298
TL 4529 / 13	HEA 29391	/ 037	03 JUL 2015	TL 457299
TL 4529 / 14	HEA 29391	/ 038	03 JUL 2015	TL 456299
TL 4529 / 15	HEA 29391	/ 039	03 JUL 2015	TL 457299
TL 4529 / 16	HEA 29391	/ 040	03 JUL 2015	TL 456299
TL 4628 / 1	NMR 15739	/ 13	29 JUL 1997	TL 469289
TL 4629 / 1	EXC 16573	/ 07	12 JUL 1995	TL 463299

Vertical aerial photographs

Sortie number	Camera position	Frame number	Held	Centre point	Run	Date	Sortie quality	Scale 1:
RAF/106G/UK/1635	V	5248	P	TL 459 292	21	09 JUL 1946	AC	10000
RAF/106G/UK/1635	V	5249	P	TL 465 293	21	09 JUL 1946	AC	10000
RAF/CPE/UK/1917	RP	3087	P	TL 453 294	4	09 JAN 1947	AB	9840
RAF/CPE/UK/1917	RP	3088	P	TL 463 293	4	09 JAN 1947	AB	9840
RAF/543/2337	1F22	212	P	TL 465 285	20	30 JUL 1963	AB	10000
RAF/58/4646	F42	120	P	TL 470 287	21	28 AUG 1961	A	12000
RAF/58/4646	F42	121	P	TL 461 286	21	28 AUG 1961	A	12000
RAF/58/4646	F42	122	P	TL 453 286	21	28 AUG 1961	A	12000
RAF/58/42	V	5246	P	TL 467 286	14	19 MAY 1948	A	7700
RAF/58/42	V	5247	P	TL 460 285	14	19 MAY 1948	A	7700
RAF/58/42	V	5283	P	TL 459 296	7	19 MAY 1948	A	7700
RAF/58/42	V	5284	P	TL 466 296	7	19 MAY 1948	A	7700
MAL/80032(Z)	V	5	N	TL 463 279	3	09 OCT 1980	A	12000
MAL/80032(Z)	V	162	P	TL 462 299	1	09 OCT 1980	A	12000
RAF/106G/UK/1639	V	5288	P	TL 464 281	3	09 JUL 1946	AC	10057
RAF/106G/UK/1639	V	5289	P	TL 459 281	3	09 JUL 1946	AC	10057
OS/73102	V	878	P	TL 459 287	3	26 APR 1973	A	7500
OS/73102	V	879	P	TL 466 287	3	26 APR 1973	A	7500
OS/52R26	V	88	P	TL 464 287	4	22 MAY 1952	A	8150
OS/52R26	V	89	P	TL 461 292	4	22 MAY 1952	A	8150
OS/52R26	V	90	P	TL 458 297	4	22 MAY 1952	A	8150
MAL/61466	V	89786	P	TL 461 298	4	05 MAR 1961	A	11000
MAL/61466	V	89787	P	TL 458 289	4	05 MAR 1961	A	11000
MAL/61465	V	89370	P	TL 460 279	2	03 MAR 1961	A	10500
MAL/61465	V	89371	P	TL 467 280	2	03 MAR 1961	A	10500
MAL/61464	V	89070	P	TL 460 297	1	14 MAR 1961	A	10500
MAL/61464	V	89071	P	TL 468 298	1	14 MAR 1961	A	10500

Google Earth, accessed in November 2021

2020, 10 April	Google
2018, 25 June	Google
2017, 8 April	Maxar Technologies
2017, 26 March	Google
2014, July	Maxar Technologies
2013, May	Maxar Technologies
2012	Bluesky
2010	Getmapping plc
2009, July	Getmapping plc
2008, October	Infoterra and Bluesky
2006, November	Infoterra and Bluesky
2004, April	Maxar Technologies
2003, October	Maxar Technologies

2000 Infoterra and Bluesky

Bing.com/maps – aerial was consulted in December 2021

LiDAR Metadata

OS tilename	Resolution	Year
TL4525	1	2019
TL4528	0.5	2007
TL4628	0.5	2007
TL4529	0.5	2007
TL4629	0.5	2007

Air Photo Services Ltd

The Shaftesbury Centre

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+44 (0) 7827 810361

info@airphotoservices.co.uk

Appendix 2

Wessex Archaeology, May 2022. Pelham Solar Farm, Berden, Essex - Detailed Gradiometer Survey Report

Pelham Solar Farm, Berden, Essex

Detailed Gradiometer Survey Report

Ref: 258760.03
May 2022

wessexarchaeology

Portway House
Old Sarum Park
Salisbury
Wiltshire
SP4 6EB

Wessex Archaeology Ltd is a Registered Charity no. 287786 (England & Wales) and SC042630 (Scotland)

Document Information

Document title	Pelham Solar Farm, Berden, Essex
Document subtitle	Detailed Gradiometer Survey Report
Document reference	258760.03
Client name	RPS Consulting Services Ltd
Address	20 Western Avenue Milton Park Abingdon Oxfordshire OX14 4SH
Site location	Ginns Road, Berden, Bishop's Stortford, CM23 1AL
County	Essex
National grid reference	546497 229766 (TL 46497 29766)
WA project name	Pelham Solar Farm, Berden, Hertfordshire
WA project code	258760
Dates of fieldwork	24 March 2022 – 14 April 2022
Fieldwork directed by	Pamela Warne; Joanne Instone-Brewer
Project management by	Tom Richardson
Document compiled by	Brett Howard
Contributions from	Pamela Warne; Jake Bishop
Graphics by	Brett Howard

Quality Assurance

Issue	Date	Author	Approved by
1	05/05/2022	BH	[redacted] TR

Contents

List of Figures

Summary

A detailed gradiometer survey was conducted over land at Pelham Solar Farm, Berden, Essex (centred on NGR 546497 229766). The project was commissioned by RPS Consulting Services Ltd with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as a solar farm.

The site comprises arable fields located south-west of Berden, covering an area of 73 ha. The geophysical survey was undertaken on 28 March – 13 April. The detailed gradiometer survey has demonstrated the presence of a substantial number of anomalies of potential archaeological interest across the site.

An area of settlement activity has been identified in the north of the site. The settlement activity appears to present as multi-phased occupancy. There is an area which may be enclosed by a ditch system, similar to a banjo enclosure in character, and has a distinct entrance way to the south-east. This leads towards an inner, focal, area of greater activity. The characteristics of the features imply an Iron Age or Romano-British date.

However, there are more regular linear features which suggest an alternative phase of occupation, most likely later, possibly Anglo-Saxon through to medieval. There is known 'Ringwork' fortification to the south-east of the site, dated as late Anglo-Saxon to 12th century date. This 'Ringwork' may be associated with later phase activity on this site. Linear features in the southern portion of the site have been interpreted as a field system. Again it is possible that multiple phases of activity are present within the field system, making it difficult to attribute a date.

Further to the 'Ringwork', a strong circular feature is apparent in the east of the site. This is noted on historical OS maps as a ring pond with trees in the centre. However, it would appear this may be a moated enclosure of similar construction dimensions to the 'Ringwork' towards the south-east.

Several anomalies have been identified that relate to the recent agricultural past of the site. These include area of probably post-medieval ridge and furrow, a former field boundary, and a backfilled pond. A series of positive linear features identified across the central and southern portion of the site appear to be drainage associated with the former pond.

The remaining anomalies are thought to be modern or natural in origin. The modern anomalies are mostly associated with ferrous debris.

Acknowledgements

Wessex Archaeology would like to thank RPS Consulting Services for commissioning the geophysical survey. The assistance of Nikki Cook is gratefully acknowledged in this regard.

The fieldwork was undertaken by Pamela Warne, Callum Jervis, Jo Instone-Brewer and Jake Bishop. Brett Howard processed and interpreted the geophysical data, wrote the report, and prepared illustrations. The geophysical work was quality controlled and managed on behalf of Wessex Archaeology by Tom Richardson.

Pelham Solar Farm, Berden, Essex

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by RPS Consulting Services Ltd to carry out a geophysical survey at Berden, Essex (centred on NGR 546497 229766) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for the development of the site as a solar farm.

1.2 Scope of document

1.2.1 This report presents a brief description of the methodology followed by the detailed survey results and the archaeological interpretation of the geophysical data.

1.3 The site

1.3.1 The site is located 150 m east of the village of Berden, and 8.5 km south of Bishop Stortford, in the county of Essex.

1.3.2 The survey comprises 73 ha of agricultural land, currently utilised for arable crop. The site is bounded by Ginns Road to the north, hedgerows to the south and east, with an access lane to the west, and a substation in the south-west corner.

1.3.3 The site is on an incline slope from 115 m above Ordnance Datum (aOD) at the north-eastern corner to 127 m aOD at the south-western corner.

1.3.4 An electrical substation is present in the south-western corner of the site.

1.3.5 The solid geology comprises Mudstone, Siltstone, and Sandstone of the Lowestoft Formation, with overlying superficial geological deposits of diamicton (BGS 2022).

1.3.6 The soils underlying the site are likely to consist of argillic brown earths of the 571o (Melford) association, and typical calcareous pelosols of the 411 d (Hanslope) association (SSEW SE Sheet 3 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

2 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 The following background was produced using in-house, and online resources. The background is not exhaustive, but is summarised information considered relevant to the interpretation of the geophysical survey data. A search radius of 1 km was used for the archaeological context.

2.2 Summary of the archaeological resource

2.2.1 White Hart Farm is an enclosure identified from cropmarks, which is present in the north-west portion of the site. It is described as a rectangular enclosure 99 m by 60 m, with no visible internal features or entrances. It is of unconfirmed date but has been categorised as later prehistoric.

2.2.2 A series of cropmarks, noted of possible later prehistoric or Romano-British are recorded 390 m north of the site.

2.2.3 A find spot of a Bronze Age inhumation, accompanied by a Developed Southern Beaker, was discovered in 1907, 410 m to the north-east of the site.

2.2.4 A scheduled monument, named The Crump (NHLE: 1009308), is located 620 m east of the site. The Crump is classified as a 'Ringwork', which is a medieval fortification in use from the late Anglo-Saxon period to the latter half of the 12th century.

2.2.5 There are a total of 1 Grade I, 3 Grade II*, and 31 Grade II listed buildings within the 1 km search radius.

2.2.6 The Church of St. Nicholas (NHLE: 1170264) is a Grade I listed building, located 200 m east of the site. The nave is of 12th century origin, with 13th century chancel and transepts.

2.2.7 Berden Hall (NHLE: 1112468), is a 16th century red brick Grade II* listed building, 130 m east of the site. Berden Priory (NHLE: 1112470) is a late 16th century timber framed Grade II* listed building, 500 m north of the site. Well House and Treadmill (NHLE: 1170289) is a 17th century timber framed building Grade II* listed building, 570 m north of the site.

2.2.8 The further 31 Grade II listed buildings are arranged around the site, with concentrations in Berden and Stocking Pelham.

3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 24 March 2022 and 14 April 2022. Field conditions were mixed with periods of heavy rain. An overall coverage of 67.2 ha was achieved, with reductions attributable to water-logged ground conditions.

3.1.2 The methods and standards employed throughout the geophysical survey conform, and guidance outlined by the Chartered Institute for Archaeologists' (CIfA 2014) and European Archaeologiae Consilium (Schmidt *et al.* 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- To determine, as far as is reasonably possible, the nature of the detectable archaeological resource within a specified area using appropriate methods and practices; and
- To inform either the scope and nature of any further archaeological work that may be required; or the formation of a mitigation strategy (to offset the impact of the development on the archaeological resource); or a management strategy.

3.2.2 In order to achieve the above aims, the objectives of the geophysical survey are:

- To conduct a geophysical survey covering as much of the specified area as possible, allowing for on-site obstructions;
- To clarify the presence/absence of anomalies of archaeological potential; and

- Where possible, to determine the general nature of any anomalies of archaeological potential.

3.3 Fieldwork methodology

3.3.1 The cart-based gradiometer system used a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Such instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceeds European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015).

3.3.2 The detailed gradiometer survey was undertaken using four SenSys FGM650/3 magnetic gradiometers spaced at 1 m intervals and mounted on a non-magnetic cart towed by an ATV. Data were collected with an effective sensitivity of ±8 µT over ±1000 nT range at a rate of 100 Hz, producing intervals of 0.02 m along transects spaced 4 m apart.

3.4 Data processing

3.4.1 Data from the survey were subjected to minimal correction processes. These comprise a 'Destripe' function (±5 nT thresholds), applied to correct for any variation between the sensors, and an interpolation used to grid the data and discard overlaps where transects have been collected too close together.

3.4.2 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

4.1.1 Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:5000 for greyscale and interpretation overviews (**Figures 2** and **3**), and at a scale of 1:2000 for detailed greyscale and interpretations (**Figures 4** to **13**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images.

4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figure 5**, **7**, **9**, **11**, and **13**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

4.1.5 Gradiometer survey may not detect all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

4.2 Gradiometer survey results and interpretation

4.2.1 The geophysical survey identified features likely to be associated with archaeological remains. These are situated across the site, and are associated with linear and curvilinear ditch features, pit features, areas of ridge and furrow, areas of increased magnetic response, and former field boundaries.

4.2.2 The densest concentration of anomalies is located in the north of the site at **4000** (**Fig. 9**, **11**, and **13**). A positive curvilinear anomaly forms an oval with an open west side, delineating a concentration of positive linear, curvilinear, and discrete anomalies. The oval anomaly covers 90 m east – west by 60 m north – south and may extend west beyond the surveyed area. The southern side forms a straighter edge with a 17.5 m gap that may relate to an entrance. This is indicative of an enclosure ditch and has a width of 2.5 m – 4.5 m. Within this several smaller ditch-like anomalies may form internal divisions or separate phases of activity. There are also several positive discrete anomalies that may relate to storage or refuse pits.

4.2.3 Within the south of the enclosure a 7 m diameter dipolar anomaly has been identified at **4001**. This moderately strong response is indicative of burning activity. This may relate to a hearth associated with settlement activity within the enclosure.

4.2.4 Given the dense concentration in this area, the enclosure may form the focus of settlement activity in the area. The form of the features suggest a late prehistoric, possibly Iron Age, date; however, it is likely that several phases are present. This is clear in the south-west corner of the enclosure where an arrangement of linear anomalies appear to cross the enclosing ditch at **4002**. The anomalies form a fork extending 41 m north-west and 31 m west. This is indicative of two ditch features that may relate to boundary or enclosure ditches. It is not possible from the geophysical data alone to determine whether they are earlier or later than the enclosure at **4000**.

4.2.5 A series of positive curvilinear anomalies have been identified to the south (**4003**) and east (**4004**) of the enclosure. The anomaly at **4003** extends 100 m east – west with a 50 m diameter crescent at its western end. At the southern end it turns south for 42 m. The anomaly at **4004** extends 233 m north – south with a 63 m westerly projection and 108 m easterly projection at its northern end. Together these anomalies appear to form a wider enclosing ditch around the settlement activity at **4000**. However, the function of the crescent shaped ditch at the west of **4003** is unclear. It is possible that it once formed a circular enclosure. The ditches may form the remnants of an Iron Age banjo enclosure with the entrance to the south-east. The entrance way may extend to the south-east at **4005** (**Fig. 7** and **11**) where two parallel linear anomalies are seen on the same projected alignment. However, it is not possible to confirm this relationship from the geophysical data alone due to the presence of modern field boundaries creating a 70 m gap.

4.2.6 Within the entrance way of the potential bajo enclosure are two parallel positive linear anomalies at **4006**. These are 72 m and 62 m long respectively on a north-west to south-east alignment, similar to that of the entrance, and separated by 7 m. These are indicative of ditch features and may relate to the entrance way or an earlier iteration of it.

4.2.7 Within the east of the possible banjo enclosure, an ‘R’ shaped positive anomaly is evident at **4007** (**Fig. 9, 11** and **13**). This anomaly is 31 m south-east to north-west and 19 m north-east to south-west. Central to the curvilinear portion of the anomaly, is a discrete positive anomaly 2 m in width. These anomalies indicate an enclosure, or dwelling, with a central pit feature, associated with archaeological settlement activity. There is no evidence of burning to suggest a kiln or similar feature.

4.2.8 To the north of the possible banjo enclosure is a positive curvilinear anomaly at **4008**. It encloses and area of 100 m south-east to north-west by 75 m north-east to south-west and

appears to extend west from the ditch feature at **4004**. The anomaly is 4 m wide and likely forms an enclosure. It is not clear what, if any, relationship this has with the settlement activity immediately to the south. A linear positive anomaly (**4009**) partially bisects the enclosure. This anomaly is 56 m on a north-east to south-west orientation and is 4 m in width. While this may relate to an internal division, it more likely represents a separate phase of activity.

4.2.9 Further linear and rectilinear anomalies are evident within the discussed settlement activity, but their characteristics suggest a different phase of activity. A strong positive partial rectilinear anomaly is evident at **4010**. This 4 m wide anomaly is 105 m north-east to south-west, before turning 80 degrees to the west and continuing for 65 m. This anomaly intersects with several linear and curvilinear anomalies already discussed, and shows no contemporary relation with them, suggestive of a different phase of activity.

4.2.10 Immediately to the north-west of **4010**, is a positive rectilinear anomaly at **4011**. The anomaly is 30 m east – west, 39 m north – south, and is 2 m wide. A discrete positive anomaly is evident within the rectilinear anomaly which is 4 m in diameter. These anomalies indicate an enclosure ditch with a potential pit within. The enclosure is of similar characteristics as **4010** and may form the same phase of activity.

4.2.11 To the west of the settlement activity is a positive rectilinear anomaly at **4012** (**Fig. 9**). This shares a similar north-east to south-west alignment as the anomalies at **4010** and **4011**. The anomaly is 108 m by 48 m, with a linear width of 3 m. A 49 m break in the rectilinear is evident at the north-western corner of the anomaly. This anomaly indicates a separate phase of activity to the likely Iron Age settlement, and may date from the Romano-British to early medieval period. This anomaly has also been identified previously from cropmarks and is recorded as later prehistoric enclosure.

4.2.12 Throughout the area of settlement in the north of the site are numerous weak positive linear and curvilinear anomalies at **4013** – **4015**. While most likely archaeological, these are generally weaker or more sinuous, so interpreted with a lower degree of confidence. At **4013** and **4014** the anomalies are generally longer and more linear, with **4013** forming a 117 m north-west to south-east aligned anomaly. These most likely relate to land divisions or boundaries of unknown date. To the south at **4015** the anomalies are smaller and more curvilinear, possibly relating to smaller enclosures or settlement activity. These anomalies have little alignment with surrounding anomalies and appear to cross others suggesting a separate phase or phases of activity of unknown date.

4.2.13 Two circular anomalies have been identified within the area of settlement. The first is on the eastern periphery at **4016**. This is 21 m in diameter, with an anomaly with of 2 m. The second is to the south at **4017**. This is smaller at 13 m diameter and is open on the south-eastern side. These indicate ring ditches and could relate to round houses or barrows. However, their weak nature makes confident interpretation difficult, and they could equally be natural.

4.2.14 Across the south of the site a series of positive linear anomalies have been identified at **4018** – **4027** (**Fig. 5**, **7**, and **9**). It is thought that these form a field system of unknown date, which may be associated with one or multiple phases of the settlement activity to the north. Two of the linear anomalies (**4018** and **4020**) extend south from the settlement activity, parallel to each other with a 27 m separation. These may form a drove way into the field system which likely extends east and west beyond the survey extents.

4.2.15 A rectilinear anomaly (**4022**; **Figure 17**) is located at the south-eastern corner of the site. This anomaly is 51 m east – west and 16 m north – south. This may relate to a small enclosure forming part of the wider field system. However, it could equally be the intersection of different phases of land division.

4.2.16 While the anomalies at **4018** – **4026** all share similar characteristics in terms of magnetic signature and being 2 m wide, it is not clear how many phases of activity are present. There are areas, such as at **4021** and **4023**, where the boundaries appear to cross at points not consistent with a field system. This suggests that there are at least two phases of agricultural land division across the south of the site; however, the dates of these phases are not clear.

4.2.17 The anomalies at **4000** – **4026** represent a focus of settlement with surrounding agricultural land spanning multiple phases of activity, likely covering the Iron Age to the early medieval period. There are several areas of weaker anomalies or slightly removed areas that may be associated with this activity at **4027** – **4032**.

4.2.18 The most complex collection of these anomalies is identified in the north-west of the site at **4027** (**Figure 9**). These anomalies cover an area of 133 m north-south and 127 m east-west, all with an approximate width of 2 m. These anomalies likely indicate a small central enclosure, with linear enclosure ditches or boundaries radiating from it. The weak nature of these anomalies makes confident interpretation difficult, and they could equally relate to natural variation in the underlying bedrock.

4.2.19 In the south-west of the site at **4028** is a positive rectilinear anomaly. This extends 75 m north-east before turning south for 79 m and is 2.5 m wide. While this is seen close to the field system identified across the south of the site, it is more angular in form suggesting another function. It is possible this relates to an enclosure feature, but it is not possible to determine its date from the geophysical data alone.

4.2.20 In the east of the site a weak positive semi-circular anomaly (**4029**) and circular anomaly (**4030**) have been identified (**Figure 7**). The anomaly at **4029** is 38 m in diameter, with a break towards the north-east, and has an anomaly width of 2 m. The anomaly at **4030** is 20 m in diameter and 2 m wide. These indicate ditches that may relate to enclosures. Where the anomaly at **4030** forms a clearer circle it has the potential to relate to a prehistoric round barrow. However, due to the weak character this may be a product of modern agricultural practices or variation in natural geology.

4.2.21 Also in the east of the site, a weak positive linear anomaly is evident at **4031**. The anomaly is 123 m in length and 2 m in width. This indicates a ditch feature that may be part of the surrounding field system. However, due to the weak character this may be a product of modern agricultural practices or variation in natural geology.

4.2.22 Further to the east a sinuous linear anomaly has been identified at **4032**. This is 220 m long by 2 m wide and may relate to the field system identified across the south of the site. However, there is no direct relationship in the data due to modern field boundaries and the shape of the survey area. It is possible this anomaly relates to a natural feature.

4.2.23 At the eastern boundary of the site a strong dipolar circular anomaly has been identified at **4033** (**Figure 11**). The anomaly is 45 m in diameter, with a protrusion toward the north measuring 32 m by 32 m. This anomaly indicates an area backfilled with foreign material with an increased magnetism. The anomaly may relate to a moated enclosure and is evident on OS maps from 1898. A similar feature is noted in the wider landscape from the archaeological background and provides dates between the late Anglo-Saxon to 12th century.

4.2.24 Numerous discrete positive anomalies have been identified from across the site, an example is identified at **4034** (**Fig. 5** and **7**). These anomalies indicate pit features and may be archaeological, such as refuse or extraction pits. However, it is equally possible that these anomalies are a product of modern agricultural practices, or variation in the local geology.

4.2.25 An area of increased magnetic response has been identified in the west of the site at **4035** (**Figure 5**). This is 77 m in diameter and corresponds to a backfilled pond recorded on OS maps from 1862 to 1896.

4.2.26 A weak positive linear anomaly is present to the east of the site at **4036** (**Fig. 7**, **11**, and **13**). The anomaly is 246 m in length, bisecting the eastern land parcel broadly north to south, and is 6 m in width. This anomaly corresponds to a former field boundary identified on OS maps from 1862 to 1896.

4.2.27 Weak positive parallel linear anomalies are evident across the site but are most prominent in the south-west at **4037** (**Figure 5**). These anomalies are interpreted as ridge and furrow ploughing due to the wide, consistent nature and spacing of the lines. The straight and regular nature suggests a post-medieval date. It is also possible that these anomalies relate to drainage features.

4.2.28 Multiple positive linear anomalies have been identified towards the centre of the site (**4038** to **4042**; **Fig. 5, 9,** and **11**). Due to their interaction with a former pond, it is likely these are drains.

4.2.29 Weak positive amorphous anomalies are evident in the north-eastern portion of the site, at **4043** (**Figure 13**). This has been identified as an area of variation in the superficial geology.

4.2.30 Numerous weak positive linear and curvilinear anomalies have been identified across the site. These anomalies are too weak to provide interpretational evidence, and so have been marked as trends.

5 DISCUSSION

5.1.1 The detailed gradiometer survey has identified extensive archaeological features across the site. A complex arrangement of linear and curvilinear ditch features dominates the central and southern portions of the site. These have been interpreted as enclosure features, related to an intense area of settlement activity.

5.1.2 The settlement activity appears to present as multi-phased occupancy. There is an area which may be enclosed by a ditch system, similar to a banjo enclosure in character, and has a distinct entrance way to the south-east. This leads towards an inner, focal, area of greater activity. The characteristics of the features imply an Iron Age or Romano-British date.

5.1.3 However, there are more regular linear features which suggest an alternative phase of occupation, most likely later, possibly Anglo-Saxon through to medieval. There is known ‘Ringwork’ fortification to the south-east of the site, dated as late Anglo-Saxon to 12th century date. This ‘Ringwork’ may be associated with later phase activity on this site. The linear features in the southern portion of the site have been interpreted as a field system. Again it is possible that multiple phases of activity are present within the field system, making it difficult to attribute a date.

5.1.4 Further to the ‘Ringwork’, a strong circular feature is apparent in the east of the site. This is noted on historical OS maps as a ring pond with trees in the centre. However, it would appear this may be a moated enclosure of similar construction dimensions to the ‘Ringwork’ towards the south-east.

5.1.5 Weaker anomalies are present across the site, with clusters in the north-west and adjacent to the stronger archaeological settlement features. These have been interpreted as further potential settlement activity, likely associated with another phase of occupation.

5.1.6 Numerous discrete positive anomalies were identified across the site. These were interpreted as potential archaeological pit features, such as refuse or extraction pits.

Equally, however they may be a product of modern agricultural activity, or variation in local geology.

5.1.7 Several anomalies have been identified that relate to the recent agricultural past of the site. These include area of probably post-medieval ridge and furrow, a former field boundary, and a backfilled pond. A series of positive linear features identified across the central and southern portion of the site appear to be drainage associated with the former pond.

5.1.8 The remaining anomalies are thought to be modern or natural in origin. The modern anomalies are mostly associated with ferrous debris.

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Historic England (HE) website [redacted] (accessed April 2022)

Old Maps (accessed April 2022) [redacted]

APPENDICES

Appendix 1: Gradiometer Survey Equipment and Data Processing (Sensys)

The magnetic data for this project were acquired using a non-magnetic cart fitted with four SenSys FGM650/3 magnetic gradiometers. The instrument has four sensor assemblies fixed horizontally 1 m apart allowing four traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 0.6 m separation and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of ±8 µT over ±1000 nT range. All of the data are then relayed to a CS35 tablet, running the MONMX program, which is used to record the survey data from the array of FMG650/3 probes at a rate of 20 Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Captivate system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by European Archaeologiae Consilium recommendations (Schmidt *et al.* 2015) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.01 m intervals along traverses spaced up to 0.25m apart.

Post-processing

The magnetic data collected during the survey is downloaded from the system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

Typical data and image processing steps may include:

- GPS DeStripe – Determines the median of each transect and then subtracts that value from each datapoint in the transect within the defined window. May be used to remove the striping effect seen within a survey caused by directional effects, drift, etc.

- Discard Overlaps - Intended to eliminate a track(s) that have been collected too close to one another. Without this, the results of the interpolation process can be distorted as it tries to accommodate very close points with potentially differing values.

- GPS Base Interpolation – Sets the X & Y interval of the interpolated data and the track radius (area around each datapoint that is included in the interpolated result).

Typical displays of the data used during processing and analysis:

- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.

Appendix 2: Geophysical Interpretation

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural, and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response, but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative, or broad bipolar (positive and negative) anomalies.

Appendix 3: OASIS form

Project Details:

Project name		Pelham Solar Farm, Berden, Essex			
Type of project		Detailed gradiometer survey (Field evaluation)			
Project description		A complex arrangement of linear and curvilinear ditch features dominates the central and southern portions of the site. These have been interpreted as enclosure features, related to an intense area of settlement activity. The settlement activity appears to present as multi-phased occupancy. There is an area which may be enclosed by a ditch system, similar to a banjo enclosure in character, and has a distinct entrance way to the south-east. This leads towards an inner, focal, area of greater activity. The characteristics of the features imply an Iron Age or Romano-British date. There is a known 'Ringwork' fortification to the south-east of the site, dated to Late Anglo-Saxon to 12th century date. This 'Ringwork' may be associated with later phase activity on this site. The linear features in the southern portion of the site have been interpreted as a field system, most likely associated a later phase of occupation. A strong circular feature is apparent toward the east of the site. This is noted on historic OS maps as a ring pond with trees in the centre. However, it would appear this may be a moated enclosure of similar construction dimensions to the 'Ringwork' towards the south-east. Weaker anomalies are present across the site, with clusters in the north-west and adjacent to the stronger archaeological settlement features. These have been interpreted as further potential settlement activity, likely associated with the earlier phase of occupation. Numerous discrete positive anomalies were identified across the site. These were interpreted as potential archaeological pit features, such as refuse or extraction pits. Equally, however they may be a product of modern agricultural activity, or variation in local geology. An area of increased magnetic response was identified toward the central south-western portion of the site. This corresponds to a pond noted on historic OS maps. A former field boundary was noted to the east of the site. This is evident on historic OS maps. Areas of multiple weak positive parallel, close spaced, linear features were identified on site. These have been interpreted as ridge and furrow ploughing. A series of positive linear features were identified across the central and southern portion of the site. These have been interpreted as water management drains, due to their interaction with the former pond.			
Project dates		**Start:** 24-03-2022		**End:** 14-04-2022	
Previous work		Not Known			
Future work		Not Known			
Project Code:	258760	**HER event no.**	N/A	**OASIS form ID:**	wessexar1-506463
		NMR no.	N/A		
		SM no.	N/A		
Planning Application Ref.		N/A			
Site Status		None			
Land use		Arable			
Monument type		Enclosure and settlement activity	**Period**	Iron Age (700 BC – AD 43) to 12th Century	

Project Location:

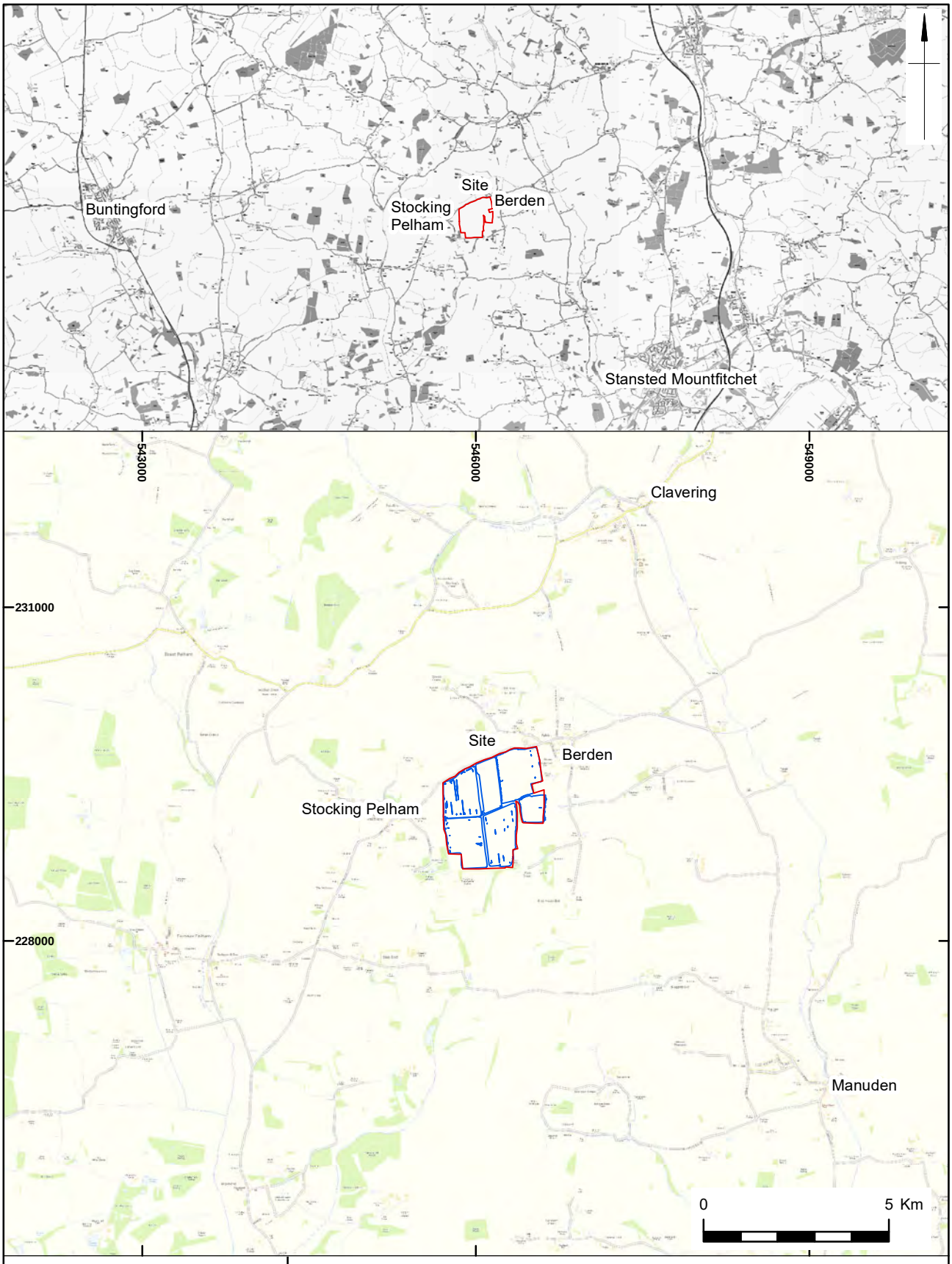
Site Address	Ginns Road, Berden, Essex			**Postcode**	CM23 1AL
County	Essex	**District**	Uttlesford	**Parish**	Berden
Study Area	73 ha	**Height OD**	115 - 125 m aOD	**NGR**	546497 229766

Project Creators:

Name of Organisation	Wessex Archaeology		
Project brief originator	RPS Consulting Services Ltd	**Project design originator**	RPS Consulting Services Ltd
Project Manager	Tom Richardson	**Project Supervisor**	Pamela Warne; Jo Instone-Brewer
Sponsor or funding body	RPS Consulting Services Ltd	**Type of Sponsor**	Private Corporation

Project Archive and Bibliography:

Physical archive	N/A	**Digital Archive**	Geophysical survey and report	**Paper Archive**	N/A
Report title	Pelham Solar Farm, Berden, Essex			**Date**	2022
Author	Wessex Archaeology	**Description**	Unpublished report	**Report ref.**	258760.03



Detailed Survey Extents

Site Boundary

Coordinate system: OSGB36
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Date:	03/05/2022	Revision Number:	0
Scale:	1:150 000 & 1:50 000 at A4	Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD		

Site location and survey extents

Figure 1

545500
546000
546500
229500
229000

Detailed Survey Extents
Site Boundary

-2 nT
3 nT

0
250 m

Coordinate system: OSGB36
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Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot overview

Figure 2

545500
546000
546500
229500
229000

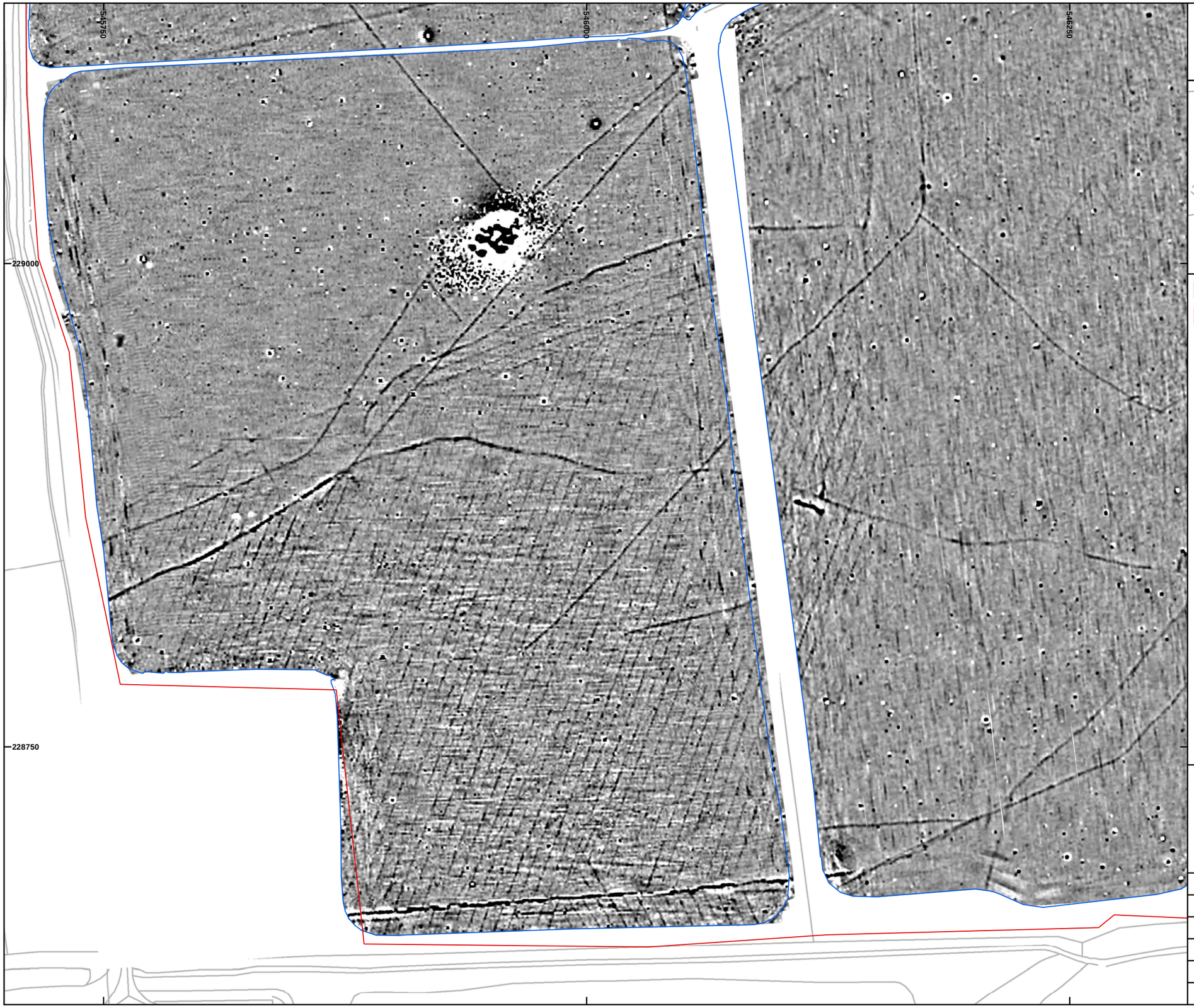
Detailed Survey Extents
Site Boundary
Archaeology
Possible Archaeology
Thermoremnant
Former Field Boundary
Increased Magnetic Response
Ridge and Furrow
Plough Line
Drainage
Superficial Geology
Trend
Ferrous

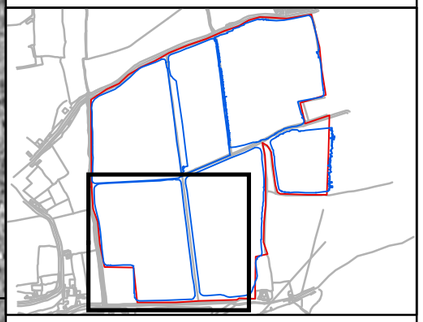
0 250 m

Date:	05/05/2022
Revision Number:	0
Scale:	1:5,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation overview

Figure 3





Detailed Survey Extents

Site Boundary

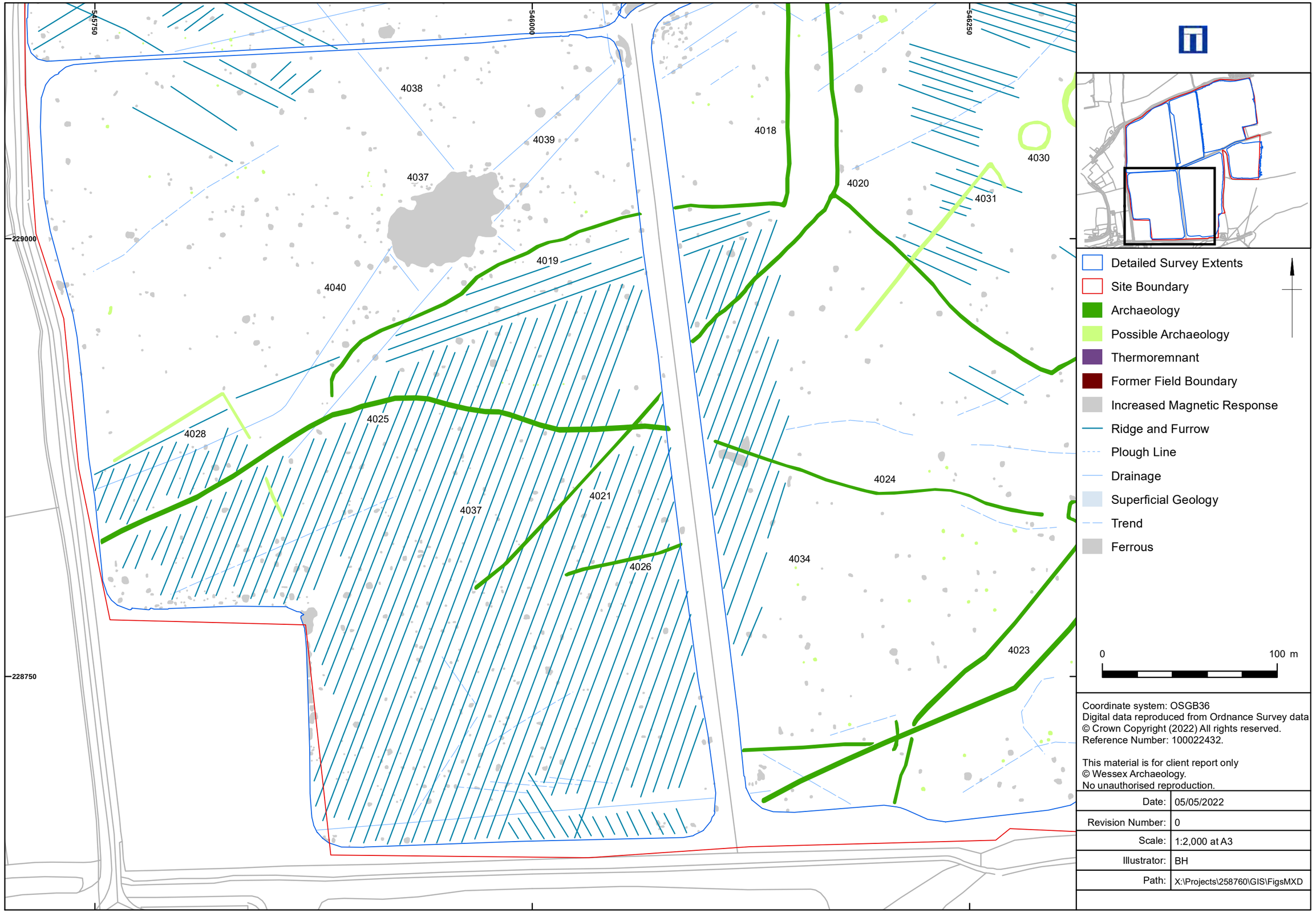
-2 nT 3 nT

0 100 m

Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (south-west)

Figure 4



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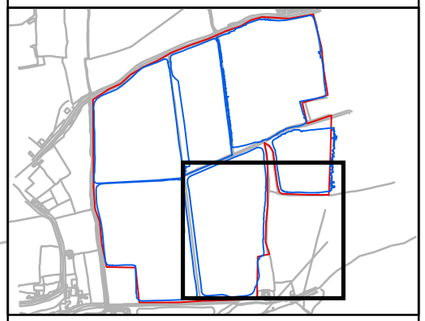
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation (south-west)

Figure 5



Detailed Survey Extents

Site Boundary

-2 nT

3 nT

0

100 m

Coordinate system: OSGB36
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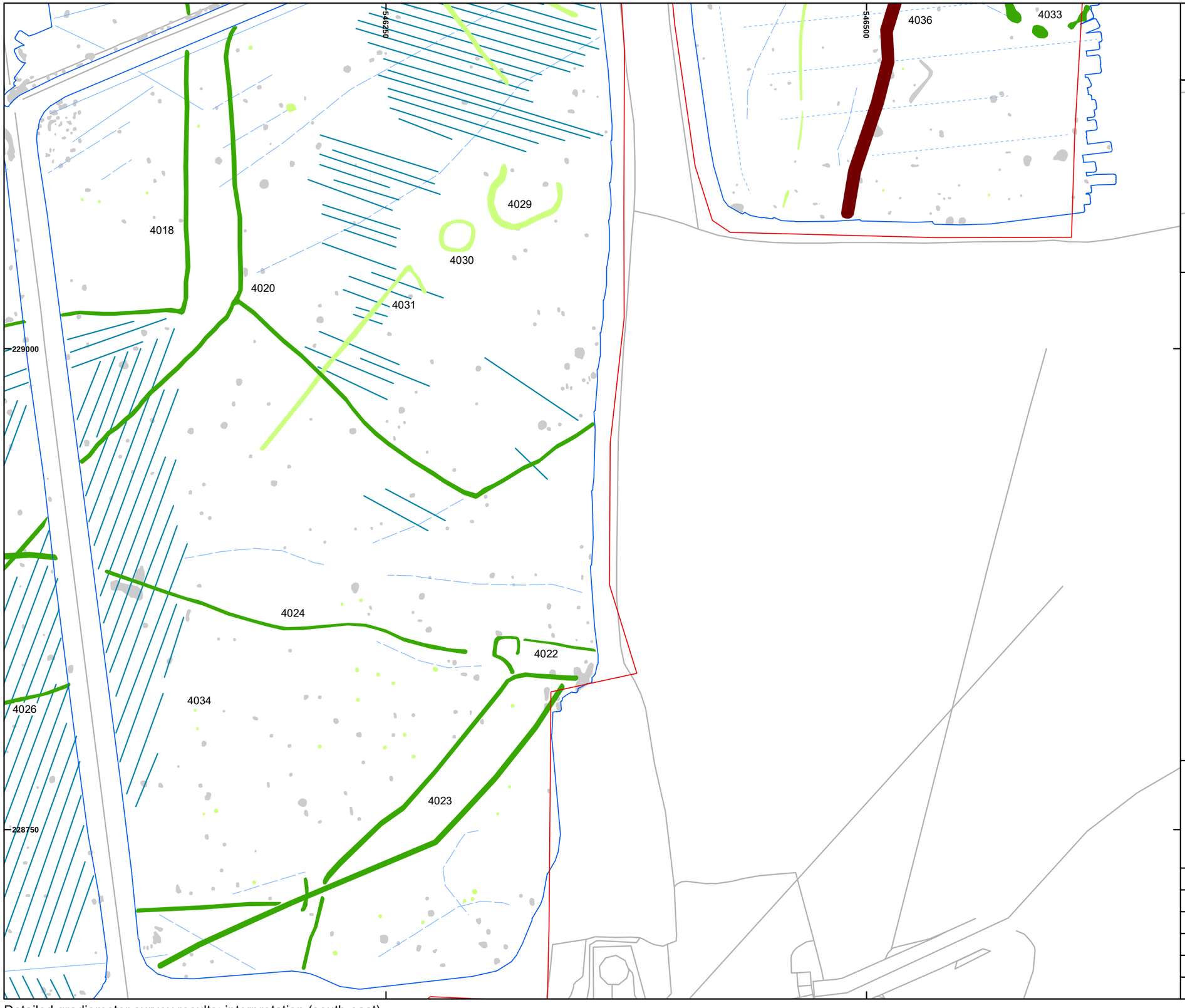
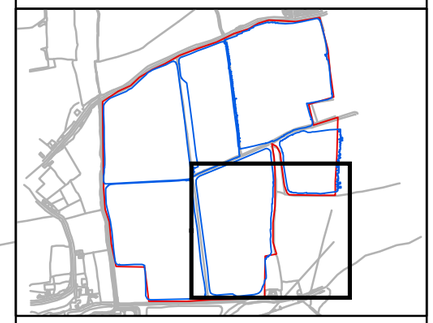
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (south-east)

Figure 6





Detailed Survey Extents
Site Boundary
Archaeology
Possible Archaeology
Thermoremnant
Former Field Boundary
Increased Magnetic Response
Ridge and Furrow
Plough Line
Drainage
Superficial Geology
Trend
Ferrous

0 100 m

Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation (south-east)

Figure 7

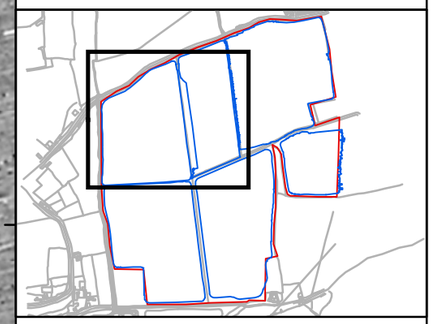
545750

546000

546250

229500

229250



Detailed Survey Extents

Site Boundary

-2 nT

3 nT

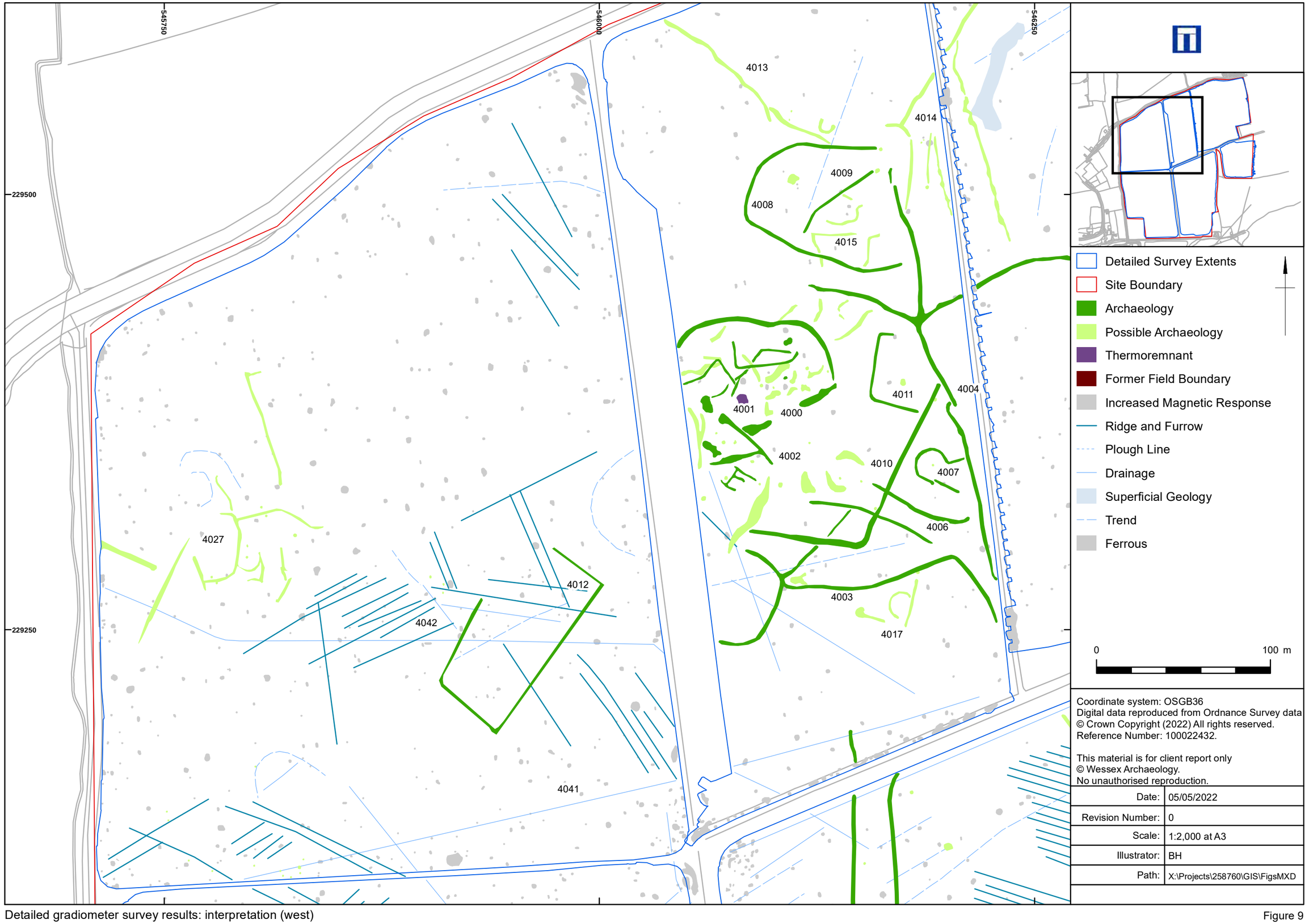
0

100 m

Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (west)

Figure 8



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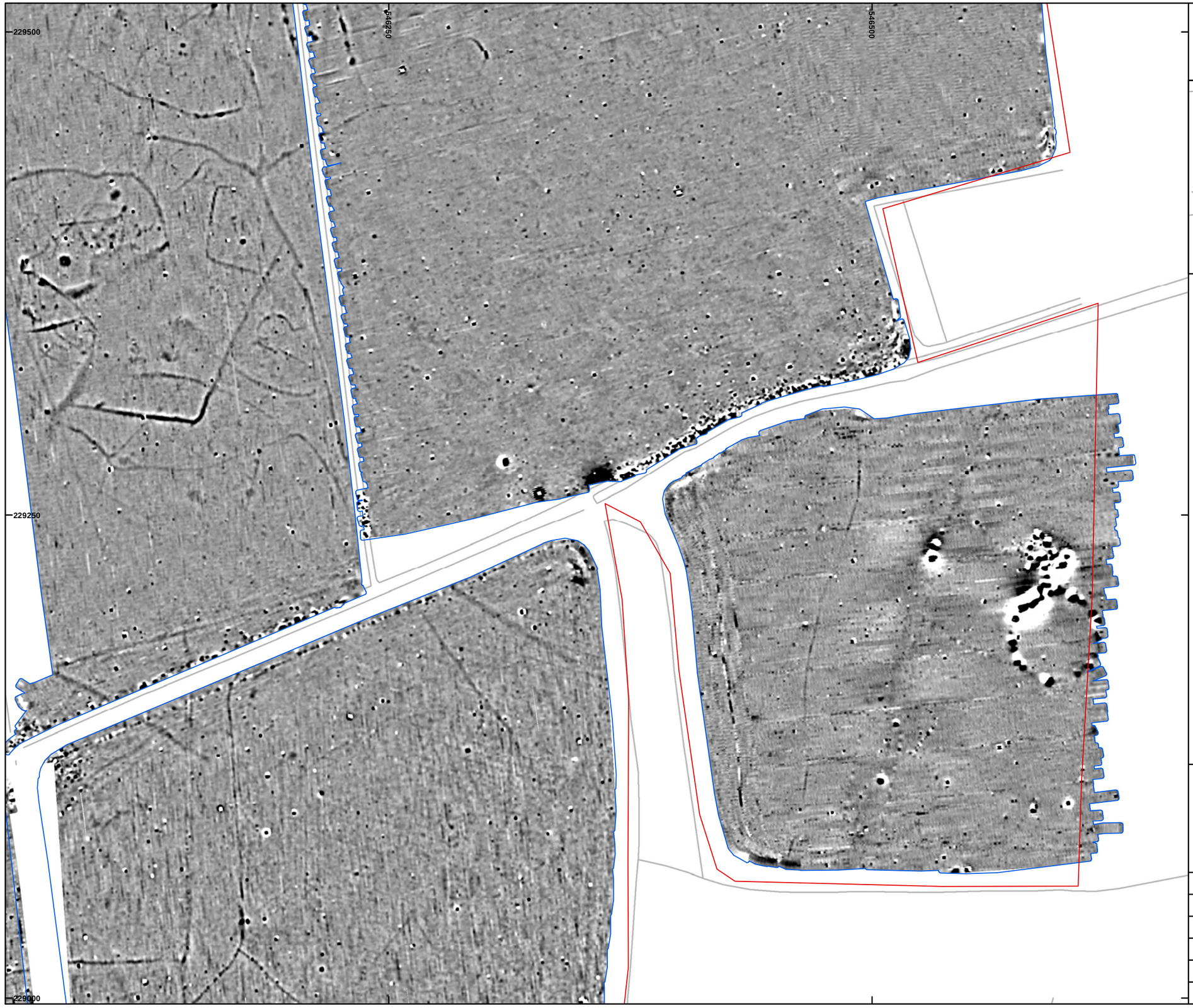
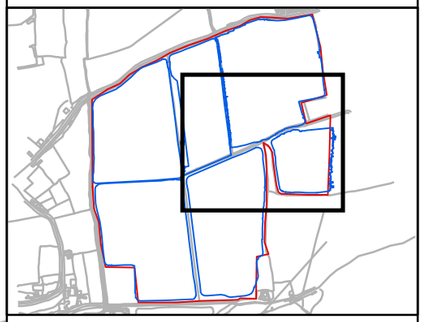
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation (west)

Figure 9





Detailed Survey Extents
Site Boundary

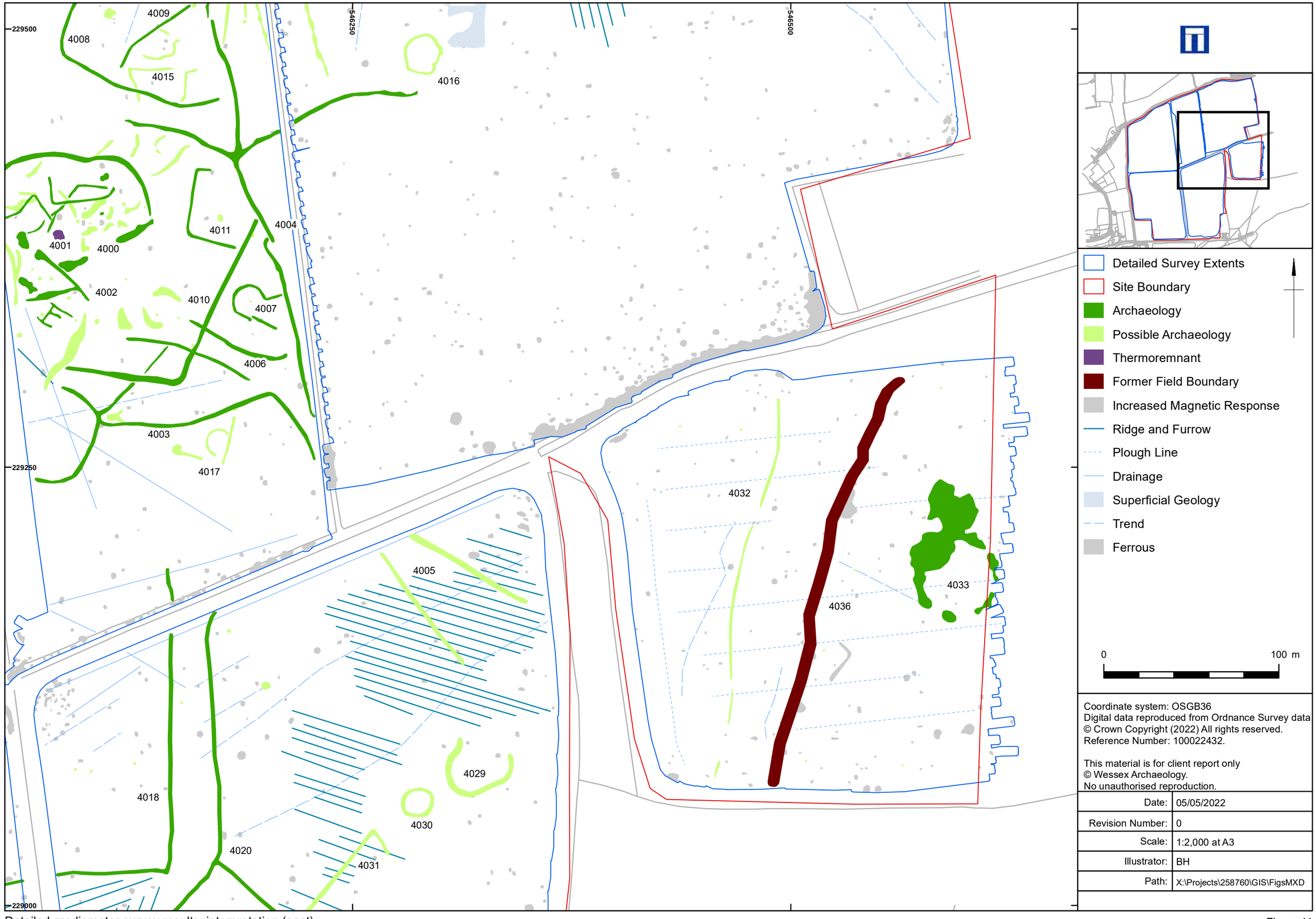
-2 nT 3 nT

0 100 m

Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (east)

Figure 10



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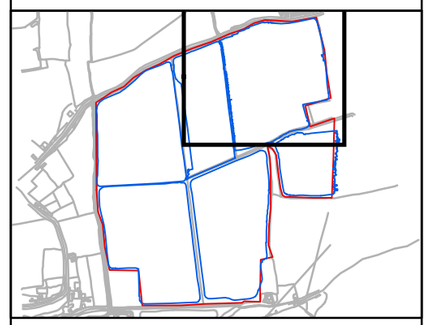
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation (east)

Figure 11



Detailed Survey Extents

Site Boundary

-2 nT

3 nT

0

100 m

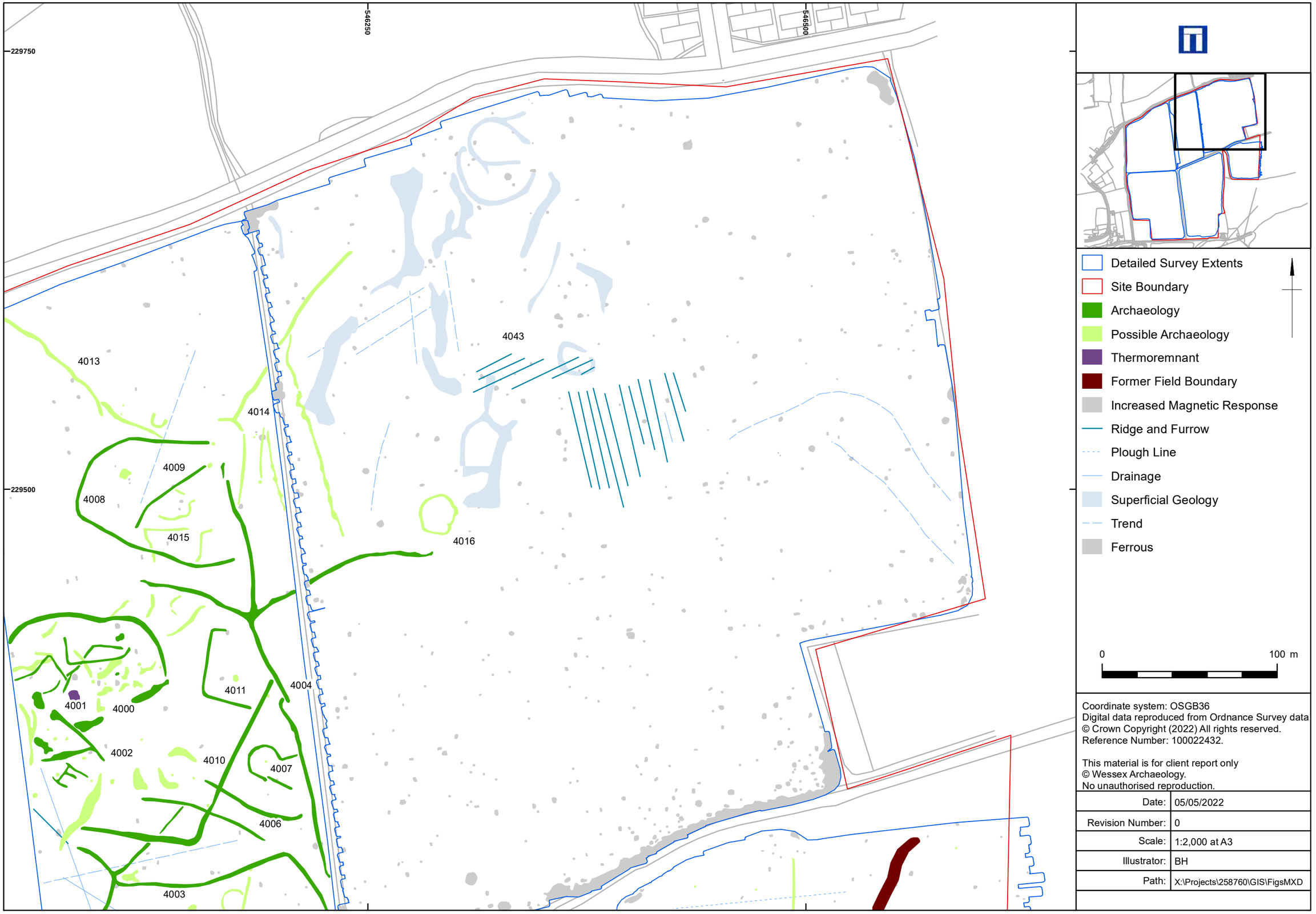
Coordinate system: OSGB36
Digital data reproduced from Ordnance Survey data

Reference Number: 100022432.

Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: greyscale plot (north-east)

Figure 12



Date:	05/05/2022
Revision Number:	0
Scale:	1:2,000 at A3
Illustrator:	BH
Path:	X:\Projects\258760\GIS\FigsMXD

Detailed gradiometer survey results: interpretation (north-east)

Figure 13

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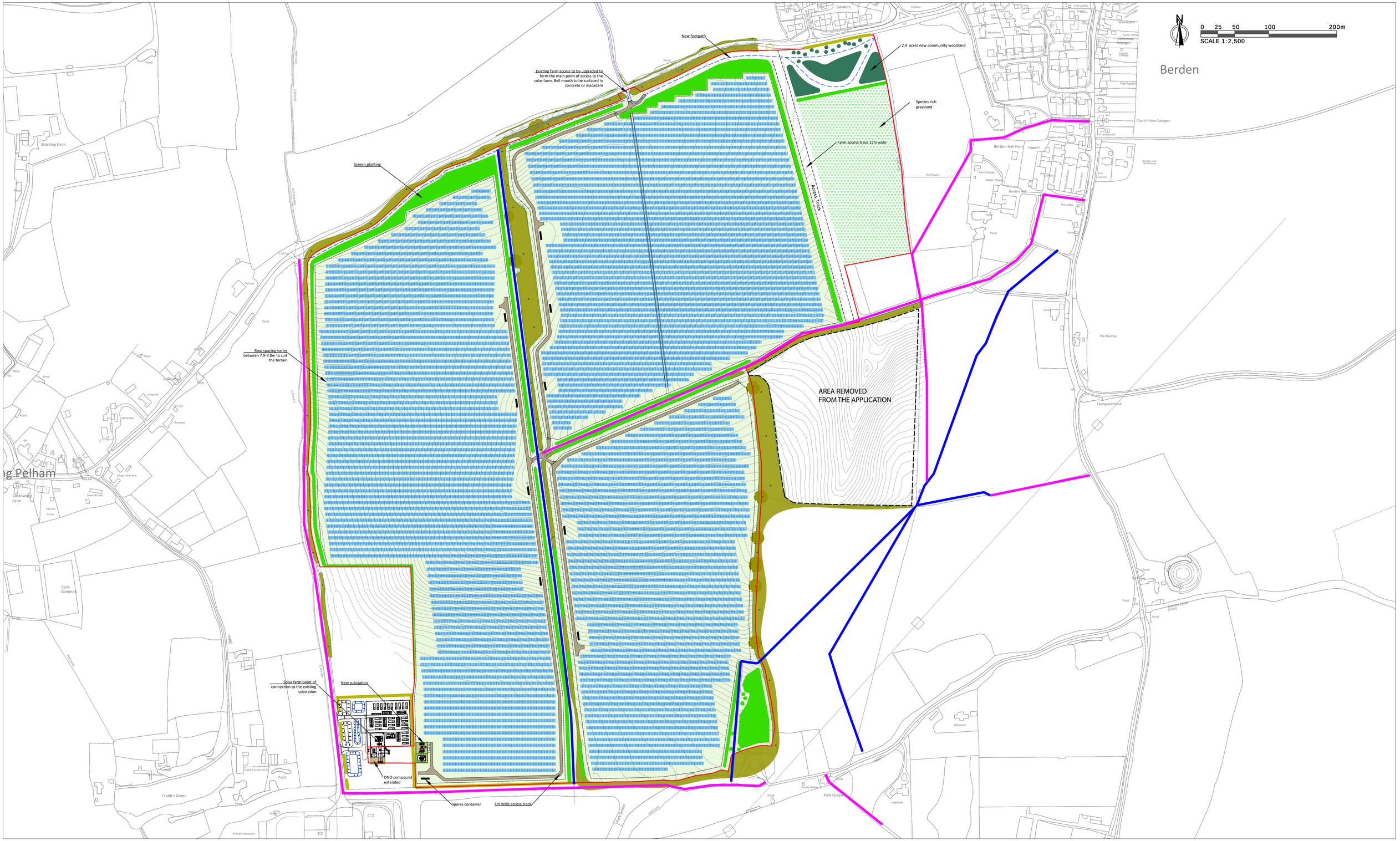
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www. wessexarch.co.uk

FS 606559

Appendix 3

Block Plan and Planting Plan (revised boundary)



Site boundary	Existing woodland and hedges	New community woodland
Proposed solar panels	New woodland and hedges	Wildflower meadow grassland
Public Right of Way	Proposed stone access tracks	New public footpath
2m high post and wire deer fence	Transformer substation (10 no. total)	Area of land omitted from application

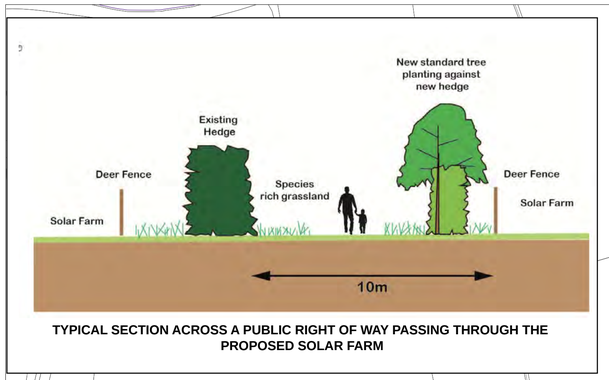
Revision	Date	Comment
A	06.10.22	Definitive Rights of Way highlighted
B	02.11.22	The scheme has beenn altered to omit panels in the easternmost field to avoid potential impacts on buried archaeology and the red line has been altered to remove this land from the application.

ON BEHALF
Statera

PROJECT
Proposed Solar Farm, Stocking Pelham, Essex

DATE	28th January 2022
SCALE	1 : 2,500 @ A1
DWG No	375_MP_03_Rev B
APPROVED	CMcD

TITLE
Block Plan



TYPICAL SECTION ACROSS A PUBLIC RIGHT OF WAY PASSING THROUGH THE PROPOSED SOLAR FARM

SWARD ESTABLISHMENT

The sward inside the deer fence is to be sown with a Solar Park Permanent Grassland – Low Maintenance (Ref: MIXSPPG) at a rate of 25 Kg per hectare, available from Cotswold Grass Seeds Direct (https://www.cotswoldseeds.com) or similar mix from another supplier to approval.

The woodland areas are to be sown with PIAB1 The Operation Pollinator Mix (Just Legumes) Ref: MIXOPANTS at a rate of 12.5 Kg per hectare, available from Cotswold Grass Seeds Direct or another supplier of a similar product to approval.

All areas outside the deer fence but within the Site are to be sown with: Chalk & Limestone Soil Mixture (Ref: Ref: MIXCHA) at a rate of 25 Kg per hectare available from Cotswold Grass Seeds Direct or another supplier of a similar product to approval.

ESTABLISHMENT AND MAINTENANCE

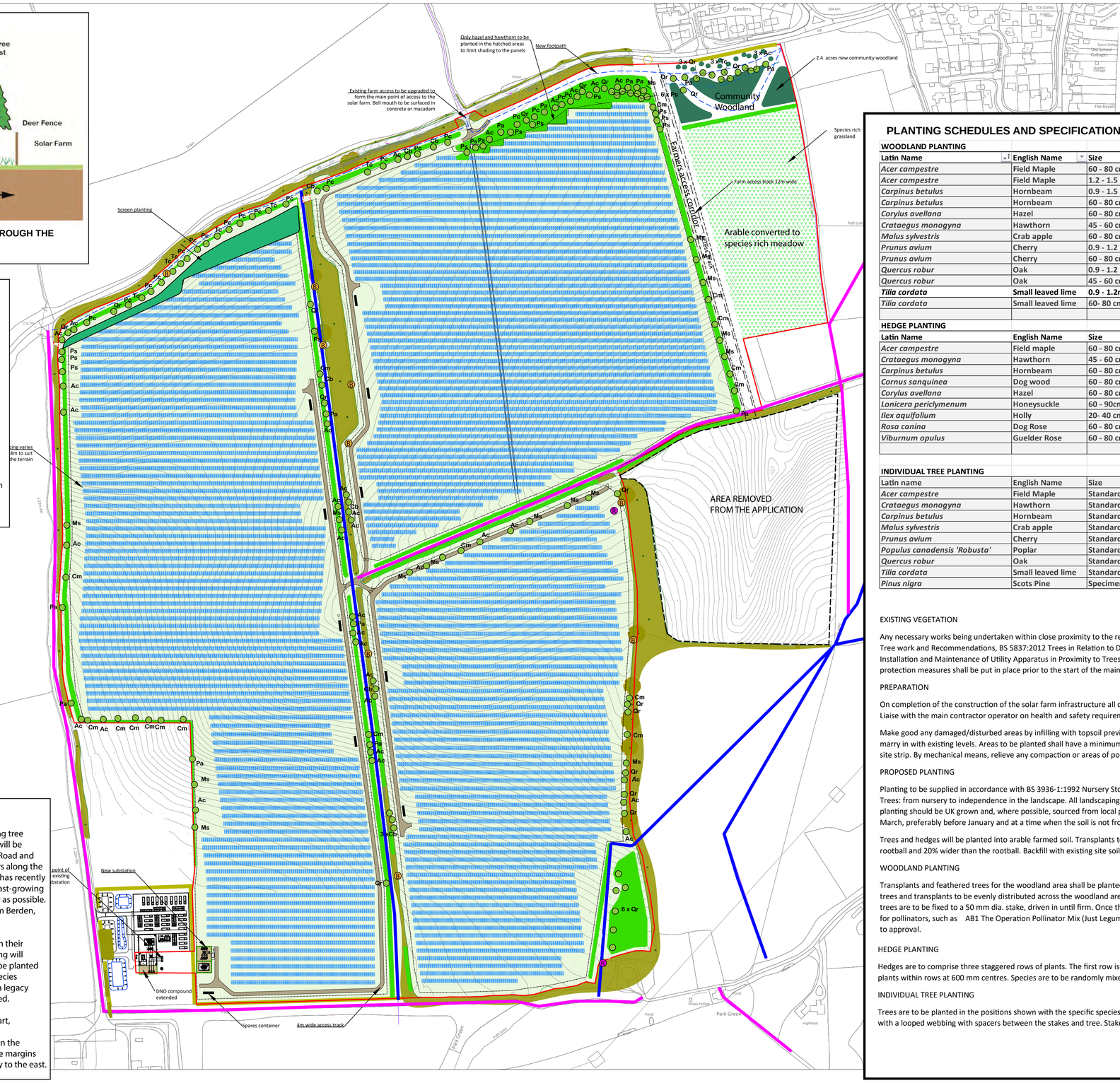
The contractor shall follow the tasks set out in the Landscape and Ecological Management Plan (Sightline Landscape 2022) for the establishment and maintenance of the trees, woodland, hedges and swards.

LANDSCAPE STRATEGY

Visual analysis indicates that the proposed solar farm will be well screened by existing tree and hedge cover which lies to the south and west. The more open areas to the east will be screened by hedge and tree planting. The most significant views will be from Ginns Road and higher ground further north. For this reason, it is proposed to plant woodland buffers along the northern edge to augment the existing roadside tree cover and a new hedge which has recently been planted by the landowner. As well as the woodland planting some individual fast-growing trees have been specified to ensure the views from the north are screened as rapidly as possible. Blocks of woodland planting alomng the eastern edge will screen the solar farm from Berden, nearby footpaths and in long distant views from high ground to the east.

The public rights of way which will pass through the solar farm will be maintained on their current alignment, set within 10 m wide corridors, within which native hedge planting will screen the solar farm from view when in leaf (see inset above). Tall stature trees will be planted where space and shading issues allow, while on other boundaries smaller stature species such as hawthorn and field maple will be planted. The proposed planting will leave a legacy of tree and hedge cover across the Site once the solar farm has been decommissioned.

The slight north facing slope means that the panels will be spaces sufficiently far apart, which combined with the short solar farm grass mix, will provide good nesting opportunities for skylark nesting. The grass sward will also allow sheep grazing within the solar farm if appropriate/practical. Species rich grassland will be specified around the margins and 2.7 hectares of permanent meadow will be established on land outside the array to the east.



PLANTING SCHEDULES AND SPECIFICATIONS

WOODLAND PLANTING

Latin Name	English Name	Size	Specification	%
Acer campestre	Field Maple	60 - 80 cm high	Bare root	10
Acer campestre	Field Maple	1.2 - 1.5 m high	Bare root feathered tree	5
Carpinus betulus	Hornbeam	0.9 - 1.5 m high	Bare root feathered tree	4
Carpinus betulus	Hornbeam	60 - 80 cm transplant	Bare root 1+1	7
Corylus avellana	Hazel	60 - 80 cm high	Bare root 1+1	25
Crataegus monogyna	Hawthorn	45 - 60 cm high	Bare root 1+1	17
Malus sylvestris	Crab apple	60 - 80 cm transplant	Bare root transplant 1+1	4
Prunus avium	Cherry	0.9 - 1.2 m high	Bare root feathered tree	4
Prunus avium	Cherry	60 - 80 cm transplant	Bare root 1+1	5
Quercus robur	Oak	0.9 - 1.2 m high	Bare root feathered tree	2
Quercus robur	Oak	45 - 60 cm transplant	Bare root 1+1	*8*
Tilia cordata	**Small leaved lime**	**0.9 - 1.2m high**	**Bare root feathered tree**	**4**
Tilia cordata	Small leaved lime	60- 80 cm transplant	Bare root 1+1	5
				100

HEDGE PLANTING

Latin Name	English Name	Size	Specification	%
Acer campestre	Field maple	60 - 80 cm high	Bare root 1+1	30
Crataegus monogyna	Hawthorn	45 - 60 cm high	Bare root 1+1	25
Carpinus betulus	Hornbeam	60 - 80 cm high	Bare root 1+1	13
Cornus sanquinea	Dog wood	60 - 80 cm high	Bare root 1+1	7
Corylus avellana	Hazel	60 - 80 cm high	Bare root 1+1	12
Lonicera periclymenum	Honeysuckle	60 - 90cm high	2 litre container grown	1
Ilex aquifolium	Holly	20- 40 cm high	2 litre Container grown	2
Rosa canina	Dog Rose	60 - 80 cm high	Bare root 1+1	5
Viburnum opulus	Guelder Rose	60 - 80 cm high	Bare root 1+1	5
				100

INDIVIDUAL TREE PLANTING

Latin name	English Name	Size	Specification	Code
Acer campestre	Field Maple	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Ac
Crataegus monogyna	Hawthorn	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Cm
Carpinus betulus	Hornbeam	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Cb
Malus sylvestris	Crab apple	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Ms
Prunus avium	Cherry	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Pa
Populus canadensis 'Robusta'	Poplar	Standard Tree	2.5 - 3.0 m high feathered tree	Pc
Quercus robur	Oak	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Qr
Tilia cordata	Small leaved lime	Standard Tree	8 - 10 cm girth 2.5 - 3.0m high	Tc
Pinus nigra	Scots Pine	Specimen	1.25 - 1.5 m high container grown	Ps

EXISTING VEGETATION

Any necessary works being undertaken within close proximity to the retained tree and hedgerows should be carried out in accordance with BS 3998:2010 Tree work and Recommendations, BS 5837:2012 Trees in Relation to Design Demolition and Construction and NJUG 4 Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees and in consultation with the Tree Protection Plan for the Site. Tree and hedgerow protection measures shall be put in place prior to the start of the main construction works.

PREPARATION

On completion of the construction of the solar farm infrastructure all deleterious construction materials and waste products shall be removed from site. Liaise with the main contractor operator on health and safety requirements, particularly in relation to any excavations near buried electrical cables.

Make good any damaged/disturbed areas by infilling with topsoil previously stripped from hardstanding areas within the site, grading out and cultivating to marry in with existing levels. Areas to be planted shall have a minimum depth of 350 mm topsoil. If less than this, make up the deficit with topsoil from the site strip. By mechanical means, relieve any compaction or areas of poor drainage arising from the construction works

PROPOSED PLANTING

Planting to be supplied in accordance with BS 3936-1:1992 Nursery Stock. specification for trees and shrubs, BS 3936-4:2007 Nursery Stock, BS 8545:2014 Trees: from nursery to independence in the landscape. All landscaping works to be in accordance with BS4428:1989 "General Landscaping Works." All planting should be UK grown and, where possible, sourced from local provenance certified stock. Planting to take place during the months of November to March, preferably before January and at a time when the soil is not frozen or waterlogged.

Trees and hedges will be planted into arable farmed soil. Transplants to be notch planted and trees to be pit planted with the pit being the depth of the rootball and 20% wider than the rootball. Backfill with existing site soil.

WOODLAND PLANTING

Transplants and feathered trees for the woodland area shall be planted in a loose grid at 2.25m centres. Species shall be randomly mixed and feathered trees and transplants to be evenly distributed across the woodland area. Transplants to be protected with biodegradable, staked deer shelters Feathered trees are to be fixed to a 50 mm dia. stake, driven in until firm. Once the woodland has been planted it is to be sown with a legume rich seed mix designed for pollinators, such as AB1 The Operation Pollinator Mix (Just Legumes) Ref: mixopants available from Cotswolds Grass Seeds Direct or another supplier to approval.

HEDGE PLANTING

Hedges are to comprise three staggered rows of plants. The first row is to be planted 2.5 m from the deer fence and the rows are to be 400mm apart with plants within rows at 600 mm centres. Species are to be randomly mixed along the lengths. Protect transplants with spiral rabbit guards and a cane.

INDIVIDUAL TREE PLANTING

Trees are to be planted in the positions shown with the specific species as indicated on the plan. Trees are to be double staked either side of the rootball with a looped webbing with spacers between the stakes and tree. Stakes to be driven in until firm and typically 0.9 – 1.2 metres above ground.

STATERA
BALANCING THE GRID

- Site boundary
- Proposed solar panels
- Public Right of Way
- 2m high post and wire deer fence
- Existing woodland and hedges
- New woodland and hedges
- Proposed stone access tracks
- Transformer substation (10 no. total)
- Area of woodland on the northern edge where only hazel and hawthorn to be planted to prevent shading to panels
- New community woodland
- Wildflower meadow grassland
- New public footpath
- Area of land omitted from application
- Footpath
- Restricted Byway
- (R) 1.5 x 1.5 x 0.75 m high pile of dead wood from the site to enhance the habitat for reptiles and invertebrates
- (B) A bird box is to be installed at these locations. The exact position to be determined by an ecologist.
- Qr Individual standard trees (See Schedule for tree species codes)

Revision	Date	Comment
A	08.11.22	Definitive Rights of Way highlighted. The scheme has beenn altered to omit panels in the easternmost field to avoid potential impacts on buried archaeology and the red line has been altered to remove this land from the application. Skylark plots removed and replaced with off site plots as mitigation.

ON BEHALF
Statera

PROJECT
Proposed Solar Farm, Stocking Pelham, Essex

DATE 28th January 2022
SCALE 1 : 2,500 @ A1
DWG No 375_MP_04_Rev A
APPROVED CMcD

TITLE
Planting Plan

MAKING
COMPLEX
EASY

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