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# Pump House Field, Chichester, West Sussex

Detailed Gradiometer Survey Report

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wessexarchaeology



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#### Summary

A detailed gradiometer survey was conducted over land at Pump House Field, Chichester, West Sussex (centred on NGR 489330 106829). The project was commissioned by RPS Consulting Services Ltd. with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features.

The site comprises arable fields located 200 m south of the village of Strettington and 3.6 km north– east of Chichester, in the county of West Sussex, covering an area of 9.2 ha. The geophysical survey was undertaken on 13 February 2023 over two fields. The survey is a continuation from a gradiometer survey conducted in 2015 of the southern half of the northernmost field of the site. This previous survey detected several anomalies of prehistoric or Romano-British origin. These included a rectilinear enclosure feature, which contained several internal subdivisions. This was interpreted as potentially relating to possible settlement activity of Romano-British origin in the south-west of the site. In the south-east a curving linear shaped ditch interpreted as the remains of an enclosure and several pit-features indicating possible small-scale quarrying were also identified. Features of a later, possibly post-medieval date, such as an old pond, former field boundaries and previous ploughing regimes were also detected in the 2015 survey.

The detailed gradiometer survey of 2023 has been successful in detecting anomalies of archaeological and potential archaeological origin across the site.

A long linear feature has been detected in the north of the site which is considered to be the extension of a ditch previously detected in both geophysical survey and trenching in 2015. It is considered likely to be a late Iron Age or Romano-British field boundary given the dating evidence found near to it's very eastern extent in 2015. Several other much smaller curvilinear and linear anomalies have been detected across the north of the survey area however it is less certain whether these are of archaeological origin.

A grouping of discrete circular and more amorphous pit-like features has been detected in the north of the site in both the 2015 and 2023 surveys. Given the amorphous anomalies' similarity in shape and signal to an anomaly determined through trenching to be a small-scale quarrying pit in 2015 containing Romano-British pottery, it is possible that these anomalies are also small quarry pits from the same period. Other small discrete pit-like features have been detected across the site which may be archaeological pit features associated with agricultural or small-scale quarrying activity, although given a lack of a discernible pattern a geological origin cannot be ruled out.

A former field boundary and the former Strettington Lane End road have been identified in the north of the site.

An area of enhanced variation in the underlying geology has been detected in the north of the site.

Numerous magnetic trends have been identified in the north of the site. Some of these relate to modern ploughing trends, whilst others do not have a clear origin but may be old agricultural activity or drainage schemes. Ferrous responses and areas of magnetic disturbance have been detected that likely relate to telegraph poles, the building of the A27 and other modern activity. The remaining anomalies are thought to be modern, relating to services, drains, and extant field boundaries.

#### Acknowledgements

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

The fieldwork was undertaken by Jake Bishop and Ffion Lister. The geophysical data was processed by Lydia Jones. The geophysical data was interpreted by Lydia Jones, Jack Trueman and Amy Dunn. The report was written by Amy Dunn and Lydia Jones. The geophysical work was quality controlled by Rok Plesnicar. The project was managed on behalf of Wessex Archaeology by Patricia Edwards.

## Pump House Field, Chichester, West Sussex

### **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 Pump House Field, Chichester, West Sussex (centred on NGR 489330 106829) (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.
- 1.1.2 This geophysical survey is part of staged approach in determining the archaeological potential of the site and includes the northern half of a field previously partially surveyed in 2015 (Wessex Archaeology 2015).

#### 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 proposed geophysical survey area is located 200 m south of the village of Strettington and 3.6 km north–east of Chichester, in the county of West Sussex.
- 1.3.2 The survey comprises 9.2 ha of agricultural land spread over two fields, currently utilised for arable farming. The northern field (LP\_001) is bounded by Stane Street to the north and the A285 to the east, with a tree lined field boundary to the west and continuing arable land to the south. The southern field (LP\_002) is bounded by trees on all sides. Old Arundel Road bounds the northern edge of the site.
- 1.3.3 The site is on a slight incline sloping from 18 m above Ordnance Datum (aOD) at the southwest corner of the southern field to 25 m aOD at the north-east corner of the northern field.
- 1.3.4 The solid geology comprises a sedimentary bedrock of various shallow-marine chalks with overlying superficial geological deposits of head gravel, sand, silt, and clay accumulated by down-slope solifluction, soil creep, and hill wash to the east, and fluvial deposits of gravel, mud, and sand reflecting channels, floodplains, and levees of a river or estuary to the south–west (BGS 2023).
- 1.3.5 The soils underlying the site are likely to consist of a colluvial medium, loamy but locally light, silt-rich soil and subsoil of a mixed argillic-rudaceous grain across the site, with the western edge containing additional floodplain clays. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey (BGS 2023).
- 1.3.6 The fluvial deposits and floodplain soils reflect the lowest topographical points of the site, ranging from 17 m to 21 m aOD.



#### 2 ARCHAEOLOGICAL BACKGROUND

#### 2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a draft desk-based assessment (DBA) as yet to be submitted (RPS 2023), which considered the recorded historic environment resource within a 1.5 km study area of the site. The draft DBA used information from the Chichester District Historic Environment Record (HER) and the National Heritage List for England (NHLE). Additional sources of information are referenced, as appropriate. The findings of the draft DBA are summarised below.

#### 2.2 Previous Investigations in the Area

#### Geophysical Survey

- 2.2.1 In 2003 a geophysical survey, conducted to the east of the Council Depot, Westhampnett, 1.1 km south–west of the site, uncovered highly magnetic areas of archaeological interest for excavation later that year. It revealed possible kilns, as well as the ditches of the Stane Street Roman Road.
- 2.2.2 In 2015 land immediately to the east of the current survey area, as well as an area in the south of the northern field, was subject to geophysical survey to advise constraints for the then proposed Strettington Solar Farm (Wessex Archaeology 2015a). The geophysical survey identified various anomalies of archaeological interest including ditch-like features forming enclosures and field boundaries, and pit-like features. These were considered likely to be of Iron Age or Roman origin. Paleochannels, superficial geological responses and ploughing patterns were also identified.
- 2.2.3 In 2022 part of a rectilinear enclosure with possible surrounding tracks was identified from a geophysical survey conducted 100 m north of the site at Temple Bar, Boxgrove, for a solar farm proposal.

#### Archaeological excavations

- 2.2.4 Excavations in 1980, 1982, and 1983 of cropmarks at Copse Farm, Tangmere, and Oving 400 m south of the site uncovered Late Iron Age and Roman farmsteads with agricultural landscaping and trackways.
- 2.2.5 A rescue excavation in 1988 was conducted in Oxmarket at the church of St Andrew, 700 m west of the site. It uncovered a Roman building with mosaic, as well as 22 medieval to post-medieval burials.
- 2.2.6 Prior to excavations in 1991 and 1992 a fieldwalking survey was undertaken between Shopwyke Park and Maudlin Farm, 950 m south-west of the site. It produced fire-cracked flint, probably of prehistoric origin. Excavations in this area in 1991 and 1992 uncovered Iron Age and Roman features, as well some Bronze Age in-situ cremation urns.
- 2.2.7 Evaluation trenches were dug in 1991 for the A27 Westhampnett Bypass which runs to the south and south-east of the study site, and for the A285 road junction immediately east of the site. 13 of the 35 trenches uncovered features dating from the Neolithic through to Roman period.
- 2.2.8 In 1992 further excavations were carried out for the A27 bypass and A285 junction revealing finds and features ranging from the Mesolithic to the medieval, most notably an early Roman



cremation cemetery 25 m east of the site, which also contained several Anglo-Saxon inhumations. Other features from this excavation include significant Mesolithic flint scatters representing temporary camps 80 m south-west of the southern field, a Bronze Age barrow ring-ditch with a burial immediately south, a probably Late Bronze Age ring ditch 25 m to the east, a Late Bronze Age/Early Iron Age cremation 40 m to the south-east, a Roman rectangular ditched enclosure immediately south, and a number of Iron Age, Roman, and medieval ditches, buildings, and other features 500 m south of the site.

- 2.2.9 A 1999 two trench evaluation at Church Farm, Tangmere 200 m south of the site uncovered Late Iron Age and other undated features.
- 2.2.10 A series of evaluations and test pitting from 1999 to 2002 located 1 km south of the site for the River Lavant Flood Alleviation Scheme uncovered Middle to Late Iron Age, Romano-British and post-medieval activity, including an Early/Middle Iron Age to early Roman settlement.
- 2.2.11 Archaeological features from the Early, Middle, and Late Bronze Age, Iron Age, Roman ditches, and two Anglo–Saxon sunken floored buildings were uncovered in a 2000 2001 excavation at Claypit Lane, 600 m west of the site.
- 2.2.12 In 2001 a watching brief for the Shopwyke to Westhampnett pipeline located 1 km southwest of the site uncovered a post-medieval pit containing brick wasters as well as other stray prehistoric and Roman finds.
- 2.2.13 A large Roman ditch was uncovered at the Groundwater Treatment Works, Westhampnett in 2003, located 600 m south-west of the site.
- 2.2.14 In 2005 a fieldwalking survey starting 150 m south of the site produced finds indicative of a Roman farm.
- 2.2.15 In 2006 an evaluation prior to an extension of Westhampnett gravel pit 800 m west of the site uncovered evidence of Bronze Age or Roman occupation, though the material is limited.
- 2.2.16 An evaluation in 2012 uncovered prehistoric pits and ditches, a Roman pit, and a medieval farm building at Church Lane, Tangmere, 800 m south-east of the site.
- 2.2.17 Following the 2015 geophysical survey, evaluation trenches were dug by Wessex Archaeology (2015*b*) which uncovered two Early Neolithic pits and three Roman enclosures in the field immediately to the east of the site.
- 2.2.18 An evaluation in 2015 at Maudlin Nursery, 600 m south-west of the site, uncovered Early Neolithic, Bronze Age, Late Iron Age, Roman, and post-medieval features.
- 2.2.19 In 2017 an evaluation was completed for the Chichester Growth Scheme wastewater pipeline which ran just west of the site on either side of Stane Street, a Roman road. This work uncovered roman, medieval, and post-medieval features, "including a cobbled surface with bone and iron nails, which probably represents a medieval or post-medieval continuation of Sidengreen Lane, a 2.7 m wide ditch containing probably late post-medieval CBM, and a chalk block-built culvert, again of probably late post-medieval date." (ASE 2020).
- 2.2.20 In 2018 and 2019 an excavation ahead of a residential development at Madgwick Lane, Westhampnett located 1.1 km south-west of the site produced Early – Late Neolithic pits, a



Middle Bronze Age cremation cemetery, a series of major Late Bronze Age to Early Iron Age hilltop enclosures and a possible shrine, a small Middle Iron Age to Late Iron Age enclosure and routeway, two small Roman enclosures and pits, including one with evidence for structured deposition in the form of two copper-alloy child satyr busts, a few Anglo-Saxon and medieval pits, and a single post medieval field boundary.

2.2.21 In 2021 a watching brief for the Maudlin to Crockerhill Cable route at Boxgrove 1 km northeast of site uncovered three ditches with Bronze Age finds.

#### 2.3 Archaeological and Historical Context

#### Palaeolithic

2.3.1 The site is situated around 2.2 km south-west of Boxgrove Quarry Palaeolithic site, the findspot of Homo Hieldelbergensis fossils dated to *c*.500,000 BCE. Redeposited finds were identified during the evaluation of the A27 bypass including hand axes and a buried Late Upper Palaeolithic land surface, but no finds were discovered within the site.

#### Mesolithic

2.3.2 Field walking was undertaken within the site in 1974 – 5 and discovered up to 90 Mesolithic and Neolithic worked flints including a hammerstone. The majority of Mesolithic finds within the wider area were uncovered during the A27 bypass evaluation and consisted of worked flint tools and scatters. As discussed in Section 2.2 Mesolithic features and large quantities of worked Mesolithic flints, showing both production and use, have been found in the wider area around the site. It is considered the flint scatters represent temporary camp sites where tool manufacture took place.

#### Neolithic

- 2.3.3 Evidence of Neolithic settlement, including pottery, pits, cereal, and legume macrofossils and fragments of quern stones, were found 80 m to the south-west of the site. Immediately south of the site a crouched inhumation burial was found during excavation as well as a pit. Another Neolithic pit was also identified 40 m to the south-east of the site.
- 2.3.4 During the 2015 excavation in the field immediately to the east of the site two pits containing pottery, worked and burnt flint, as well as cereals, hazelnuts, and crab apple fragments were discovered. More pits, one containing pottery sherds and flint, and two containing flint, were discovered 420 m to the south, and 550 m to the south-west respectively. Further flint finds have been found in the wider area including a polished axe 870 m to the west, and a flint scraper and other worked flints 420 m to the south.

#### Bronze Age

- 2.3.5 During a site walkover by RPS burnt flint was identified across the northern field of the site, with a denser concentration closer to the centre of the northern boundary. No other Bronze Age records are located within the site. A settlement dating to the Early Bronze Age was discovered during excavation 80 m to the south-west of the site including an enclosure, numerous pits, a possible hearth, a complete Bell Beaker, urn sherds, and charcoal and plant macrofossils. A ring ditch was discovered 80 m to the south-east of the site.
- 2.3.6 In the wider area Early Bronze Age cremation burials, located 300 m to the south-west, 800 m to the west and 900 m to the south-west of the site have been recorded. A flat axe head was discovered 750 m west of the site and a scatter of flint finds was discovered 390 m to the south-east of the site.



- 2.3.7 An excavation immediately to the west of the site discovered Early and Middle Bronze Age pottery within a rectilinear pit, as well as four cut bronze fragments. In the field immediately to the south of the site a barrow was discovered containing a urn cremation, as well as an un-urned cremation. In the wider area many further Mid Late Bronze Age finds and features have been discovered. Evidence of funerary practice is widespread including cremation burials 620 m to the west, small round barrows and un-urned cremation burials 750 m to the west, a cremation burial 400 m to the south-west, and three further cremation burials 750 m to the south-west.
- 2.3.8 Other Mid to Late Bronze Age features and finds include occupation features such as pits and ditches 400 m and 800 m to the west, a large field system 620 m to the west, a series of irregular features with many pottery sherds and worked flints 50 m to the east, a number of pits and post holes 50 m to the east and 50 m to the north, pottery sherds 1.1 km and 1.4 km to the south-west, a ditch terminal or pit (Late Bronze Age / Early Iron Age) 900 m to the south, and various pits, ditches, and a possible double-ditched trackway 950 m to the south-east (although these may also date to the Iron Age).

#### Iron Age

- 2.3.9 There are no Iron Age records within the site. Evidence of Iron Age activity is however widespread in the wider area. During the geophysical survey conducted immediately to the east and an area in the south of the northern field various anomalies of archaeological interest including ditch-like and pit-like features were discovered. These were considered likely to be of Iron Age or Roman origin.
- 2.3.10 A later prehistoric plough soil and three Iron age features, as well as Early Late Iron Age pottery was discovered 80 m to the south-east of the site. In this area a Late Iron Age religious site of between 2 and 4 small square ditched shrines, a range of pyre sites and related features and 161 cremation burials were found.
- 2.3.11 Settlement evidence is plentiful and includes an extensive middle Iron Age Settlement 500 m to the south-west, likely related to the ditches and gullies making up a further settlement recorded 750 m to the south-west of the site; an Iron Age roundhouse, with one posthole containing Middle Iron Age pottery and truncated in the north by a Late Iron Age ditch 900 m to the south; a Late Iron Age farmstead 500 m to the south-west along with metal working slag; a Late Iron Age occupation 180 m to the south; and a Late Iron Age farmstead including ditched enclosure, ring gully, post holes, pits, iron working, and elements of three human burials 1 km to the south.
- 2.3.12 Other features discovered include a Middle Iron Age ditch and circular pit containing Late Iron Age / Early Romano-British pottery 1.1 km to the south-east and Late Iron Age to Early Roman ditches 640 m to the south-west. Iron Age finds in the wider area include between 200 300 Late Iron Age starters and a broken gold torc 600 m to the south-east, several sherds of pottery 900 m to the south-east, 'late prehistoric' pottery 1 km to the south-west, and probable Iron Age metalwork in the Weshampnett area.

#### Romano-British

2.3.13 The Roman road of Stane Street forms the site's northern boundary. The Chichester – Arundel Roman road, now Old Arundel Road, bisects the site east – west. During excavation works at Westhampnett the side ditches and eroded agger of Stane Street were exposed showing the road was 25 m wide and comprised at least two carriageways. Metalling was seen on the southern carriageway, but none was present on the north. In some places the roadside ditches of Stane Street survive as a depression of up to 7 m wide and 0.8 m in depth.



- 2.3.14 Investigations in 2018 found that Iron Age field systems were modified in the Early Roman period and such field systems, associated settlement features including structures, ditches, post holes, enclosures, trackways, gravel extraction, pottery assemblages, coins, metalwork, and human bone fragments were identified along the two aforementioned roads close to the site.
- 2.3.15 A Roman cremation cemetery was identified 195 m to the east of the southern field of the site positioned around an undated circular gully just 25 m to the east of an Iron Age cemetery. Early Roman glass vessels and a mirror were found near the Roman cemetery along with building materials which suggests a substantial settlement in the vicinity.
- 2.3.16 Around 40 m to the east of the site a ditch and other Roman finds were discovered. During the geophysical survey conducted immediately to the east and an area in the south of the northern field various anomalies of archaeological interest including ditch-like pit-like features were discovered. These were considered likely to be of Iron Age or Roman origin. Immediately to the south of the site a square enclosure and associated occupation was recorded including a possible defensive palisade, ditch, finds of the 2nd 4th centuries, burials, animal bones, brick, tile, and a potential associated field system. In the wider area numerous other Roman features and finds have been discovered including burials, field systems, buildings, enclosures, pottery, brooches, and coins.

#### Anglo-Saxon (Early medieval)

- 2.3.17 Nearby Chichester appears to have been abandoned between the end of the Roman period and late Saxon period. An Anglo-Saxon cemetery of 10 graves was discovered 80 m to the south-east of the site. A sunken building was recorded 190 m to the south of the site, and two further sunken buildings were located 800 m to the west. Two fragments of pottery were recovered in Westhampnett. A former Anglo-Saxon settlement is recorded 400 m west of the site based on the place name of 'Loddesdown'.
- 2.3.18 In the wider area the village of Tangmere, 960 m to the south-east, is referred to as a village in the Anglo-Saxon period and the Parish Church of St Peter located 850 m to the south-west also dates from this period. The villages of Boxgrove and Strettington to the north of the site also have their origins in the early medieval period.

#### Medieval

- 2.3.19 The area around the site continued to develop in the medieval period, including the building of manors, estates, villages, and repair and replacement of churches. A mill was located 430 m to the south-west of the site and a deer park was 800 m to the south-east. Boxgrove Priory, a scheduled monument (NHLE 1005891), was founded in the 12th century and is located 400 m to the north-east of the site. Various finds have been recorded in association with the Priory.
- 2.3.20 A hospital for lepers is recorded 400 m to the west of the site, at the same location as a former Anglo-Saxon settlement. Closer to the site a ditch was recorded 40 m to the southeast, and a further ditch containing various pottery sherds was discovered 190 m to the south east. More ditches were also discovered 1.1 km to the west of the site, and an enclosure was discovered 800 m to the east containing pottery sherds and quern fragments.

#### Post-medieval - Modern

2.3.21 Various post-medieval and modern features and finds are recorded in the area surrounding the site. These include a kiln, brickyard, old gravel pits, claypits, numerous farmsteads, two military airfields, and concentrations of listed buildings mainly within the surrounding



villages. Map regression during this period shows the removal of several field boundaries, construction of power lines, the widening of Old Arundel Road, the removal of Strettington Lane End that ran through the north of the site, and the construction of the A27 Westhampnett Bypass.

#### 3 METHODOLOGY

#### 3.1 Introduction

- 3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 13 February. Field conditions were dry, and it was sunny throughout the period of survey. An overall coverage of 9 ha was achieved, reductions to the overall hectarage were due to hedges and obstructions within the field.
- 3.1.2 The methods and standards employed throughout the geophysical survey conform to that set out in the Written Scheme of Investigation (WSI) (Wessex Archaeology 2023), as well as to current best practice, 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 or equivalent, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems or equivalent. 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 hand-pushed cart. 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 The detailed gradiometer surveys of both 2015 and 2023 have identified magnetic anomalies of archaeological and potential archaeological origin across the site, along with natural variations in the underlying deposits, ploughing trends, a drain, and areas of increased magnetic response. Section 4.2 describes the 2023 results in detail. More detailed description of the 2015 results can be found in the previous geophysical report (Wessex, 2015a). The results of the 2015 and 2023 surveys are discussed in Section 5.1. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:2000 (Figures 2 − 5). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image. Results from the 2015 survey are also presented to provide wider context. They are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:3,250 (Figures 6 − 7).
- 4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous responses, burnt or fired objects, and magnetic trends (**Figures 3 & 5**). 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 A positive linear anomaly (4000) has been identified transecting LP\_001 on a north-west to south-east alignment (Figure 3). It is 252 m long and 4.5 m wide and indicates a ditch-like feature. The feature is on the same alignment, and appears to be the continuation of a ditch identified in the 2015 geophysical survey (Wessex Archaeology 2015a) in the field immediately to the east (4000b) (Figure 7). This feature was also identified in the 2015 excavation as a ditch (Wessex Archaeology 2015b). Whilst no dating material was found within this feature during excavation, a very similar ditched feature that it crosses was found to contain Romano-British pottery. 4000 has been bisected by the construction of the A285 which truncates it on north-south alignment. It is likely to be a field boundary, potentially for animal management, dating from the Romano-British period or earlier.
- 4.2.2 Several small curvilinear anomalies have been detected within the south-west of LP\_001. Perhaps the clearest is seen at **4001** (**Figure 3**), close to an existing telegraph pole. It is an L-shaped anomaly that is 6.3 m in length and 2.3 m in width. Its full extent is continued for a further 4.7 m in the geophysical data of 2015 giving it a total length of 11 m. It is strongly positive at its northern extent and weaker in the south. This difference in strength may relate



to the telegraph pole and overhead cables noted in this location. Several other amorphous and circular strong positive anomalies are located immediately to its north. The anomaly identified at **4001** is typical of an infilled ditch-like feature. The surrounding amorphous and circular shaped anomalies are more typical of pit features. Whilst they may be archaeological in origin, the proximity to the pylon indicates the possibility these features may be the result of ground disturbance or the product of ploughing in an arch around the pylon.

- 4.2.3 A further linear, weakly positive anomaly has been detected at 4002 (Figure 3). It is 10.3 m in length and 1.9 m in width, aligned on a north south alignment. It is possibly a small archaeological ditched feature. To the south of this some 21 m two positive anomalies (4003), between 0.8 and 1.6 m wide, have been detected which form a sub-rectangular shape which measures 10 m wide. Both anomalies are weakly positive in nature and are typical of a ditched feature. Whilst this could be the remains of a small enclosure, more recent agricultural activity cannot be ruled out.
- 4.2.4 At **4004a** (**Figure 3**), 40 m to the north-west of **4001**, a group of amorphous and circular anomalies has been detected. The two amorphous anomalies measure between 3.7 m and 10 m wide, and the circular features have a diameter between 0.8 m and 2.6 m. All the anomalies have a strong positive magnetic values. The circular features are typical of infilled pit features. The larger amorphous anomalies may be larger cut features or given their less-defined shape and strength of response areas of extraction. In the 2015 geophysical survey anomalies with similar signal and morphology were detected, and the excavation over one of these features (4004b) (Figure 7) identified it as an elongated pit, interpreted as a potential small quarry pit, containing Romano-British pottery. Whilst these cut features could represent former quarrying due they equally could indicate a geological feature, such as natural pitting in the bedrock.
- 4.2.5 Discrete positive anomalies measuring between 0.5 m and 4.5 m in diameter have been detected across both LP\_001 and LP\_002. They are typical of pit features. These may be archaeological in origin and related to settlement activity due to the proximity of extensive Romano-British archaeological remains in the wider vicinity of the site. However, given their lack of any discernible pattern it is also possible that they relate to variations in the underlying geology or more recent agricultural activity.
- 4.2.6 A former field boundary has been identified in LP\_001 on a north south orientation (**4005**) (**Figure 3**). It consists of a series of fragmented, linear anomalies of enhanced magnetic value, measuring 126 m long. It is in the same location as a field boundary recorded on the 1899 historical OS mapping (Sussex sheet LXI.NE, Second Edition, 1899).
- 4.2.7 In the east of LP\_001 a linear highly magnetic anomaly has been detected (**4006**) (**Figure 3**). It is 151 m in length and 4.8 m wide, and surrounded by a wider area of ferrous response. It is in the same location as road named Strettington Lane End recorded on historical OS mapping from 1899 (Sussex sheet LXII.NW, Second Edition, 1899).
- 4.2.8 In the north-east of LP\_001 two broad weakly dipolar sinuous anomalies (4007 4008) (Figure 3) have been detected. Given their magnetic properties and morphology, they are considered to be representative of variations in the underlying geology.
- 4.2.9 Numerous linear weakly positive, narrowly spaced anomalies have been identified throughout LP\_001 (**Figure 3**). Given their morphology and orientation these are considered likely to be modern ploughing trends.
- 4.2.10 A dipolar linear anomaly (**4009**) (**Figure 5**) has been detected in the south of LP\_002. It is typical of a fired clay drain.
- 4.2.11 Several narrow linear have been identified across LP\_001 (**Figure 3**). These exhibit as weakly positive magnetic signal and are seen on various orientations. It is likely these are



agricultural in nature, such as ploughing trends or drainage, however as they do not correspond with the current plough regime visible in satellite imagery, an earlier archaeological origin cannot be ruled out.

- 4.2.12 Three separate areas of grouped ferrous anomalies, and magnetic disturbance (4010 4012), have been detected in the south of LP\_001 (Figure 3) and correspond with the location of existing pylons. There are large areas of magnetic disturbance in the south of LP\_002 (Figure 5) measuring 14 m x 15 m (4013) 23 m x 31m (4014). They indicate a spread of magnetically enhanced material across the ground which is likely related to the construction of the A27 immediately to the south.
- 4.2.13 A linear strongly dipolar anomaly has been detected in the north of LP\_002 (4015) (Figure 5) which is indicative of a modern service.

#### 5 DISCUSSION

#### 5.1 Results

- 5.1.1 The detailed gradiometer survey has been successful in detecting anomalies of archaeological and potential archaeological origin across the site.
- 5.1.2 A long linear feature has been detected in the north of the site which is considered to be the extension of a ditch previously detected in both geophysical survey and trenching in 2015. It is considered likely to be a late Iron Age or Romano-British field boundary given the dating evidence found near to its very eastern extent during excavations in 2015. Several other much smaller curvilinear anomalies have been detected across the north of the survey area however it is less certain whether these are of archaeological origin.
- 5.1.3 A grouping of discrete circular and more amorphous pit-like features were detected in the north of the site. Given the amorphous anomalies' similarity in shape and magnetic properties to an anomaly identified as a Romano-British quarrying pit during previous geophysical and archaeological excavation, it is possible that these anomalies are also small quarrying pits from the same period.
- 5.1.4 Small pit-like features have been detected across the site which may be archaeological associated with agricultural or small-scale quarrying activity, although given a lack of a discernible pattern a geological origin cannot be ruled out.
- 5.1.5 The 2015 gradiometer survey detected various anomalies of archaeological origin, likely Romano-British or earlier date, in the south-west of the northernmost field. A 29 m x 36 rectilinear positive anomaly with internal rectilinear subdivisions was detected in the south-west of this field. This is typical of a series of interlinking ditch features forming several enclosures indicating potential settlement activity. In the east of the northernmost field an L-shaped ditch was detected measuring 73 m in length and 2 m in width which likely indicates the remnants of a ditch forming an enclosure. Several pit-like features, potentially small-scale quarrying, were also detected in the south of this same field. A linear ditch-like anomaly was also discovered in the northernmost field, which may be archaeological in origin. However, given its position stretching between two former field boundaries, it may signify a previously unmapped field boundary.
- 5.1.6 A former field boundary and the former Strettington Lane End road, both depicted on historical OS mapping as far back as 1899 (Sussex sheet LXII.NW, Second Edition, 1899) have been identified in the north of the site.



- 5.1.7 Two areas of enhanced variation in the underlying geology have been detected in the north of the site.
- 5.1.8 Numerous magnetic trends have been identified in the north of the site. Some of these relate to modern ploughing trends, whilst others do not have a clear origin but may be old agricultural activity or drainage schemes.
- 5.1.9 Ferrous responses and areas of magnetic disturbance have been detected that are likely relate to telegraph poles, the building of the A27 and other modern activity. The remaining anomalies are thought to be modern, relating to services, drains and extant field boundaries.
- 5.1.10 The 2015 gradiometer survey also detected a former pond, old field boundaries visible on historical OS mapping, previous ploughing regimes, and more modern agricultural trends, as well as variations in the underlying geology of the site and areas of increased magnetic and ferrous response.



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#### APPENDICES

#### Appendix 1 Survey equipment and data processing

#### Survey methods and equipment

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  $\pm 8 \ \mu$ T over  $\pm 1000 \ n$ T 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 100 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 or equivalent. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems or equivalent, 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 subdivided 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		Pump House Field, Chichester, West Sussex						
Type of project		Detailed gradiometer survey (Field evaluation)						
Type of project Project description		Detailed gradiometer survey (Field evaluation) A long linear feature has been detected in the north of the site which is considered to be the extension of a ditch previously detected in both geophysical survey and trenching in 2015. It is considered likely to be a late Iron Age or Romano-British field boundary given the dating evidence found near to it's very eastern extent in 2015. Several other much smaller curvilinear anomalies have been detected across the north of the survey area however it is less certain whether these are of archaeological origin. Pit-like features were detected in the north. Given the amorphous anomalies' similarity in shape and signal to an anomaly determined through trenching to be a small-scale quarrying pit in 2015 containing Romano-British pottery, it is possible that these anomalies are also small quarry pits. Other small discrete pit-like features have been detected across the site which may be archaeological pit features associated with agricultural or small-scale quarrying activity, although given a lack of a discernible pattern a geological origin cannot be ruled out. An old field boundary and the former Strettington Lane End road have been identified in the north of the site. An area of enhanced variation in the underlying geology has been detected in the north of the site. Numerous magnetic trends have been identified in the north of the site. Some of these relate to modern ploughing trends, whilst others do not have a clear origin. Ferrous responses and areas of magnetic disturbance have been detected that are likely relate to telegraph poles, the building of the A27. The remaining anomalies are thought to be modern, relating to services, drains and extant field boundarrise.						
Project dates		Start: 13-02-23			End: 13-02	2-23		
Previous work		DBA						
Future work								
Project Code:	PN275980	HER event no.		N/A	OASIS form ID:	e.g., we	ssexar1-513670	
		NMR no.		N/A				
		SM no.		N/A				
Planning Application Ref.				·	·	·		
Site Status		None						
Land use		Arable						
Monument type		N/A		Period	) N/A			
Project Location:	1				1			
Site Address Stane Street, Stret		tington, Chichester			Postcode PO18 0PD		PO18 0PD	
County	West Sussex	District	Goodwoo Mundhar	od; North n & Tangmere	Parish		Boxgrove; Tangmere	
Study Area	9.2 ha	Height OD	17 – 21 r	n aOD	NGR 489330 106829		489330 106829	
Project Creators:								
Name of Organisation		Wessex Archaeology						
Project brief originator		RPS Consulting Services Ltd Project desig		n originator RPS Consulting Services Ltd		RPS Consulting Services Ltd		
Project Manager		Patricia Edwards Project Supe		Project Super	pervisor Jake Bishop		Jake Bishop	
Sponsor or funding body		RPS Consulting Services Ltd Type of Spon		nsor Private				
Project Archive and	d Bibliography:		1	•	1			
Physical archive	N/A	Digital Archive Geophysical and report		ical survey rt	Paper Arc	hive	N/A	
Report title	Pump House Field Report	eld, Chichester, West Sussex: Detailed Gradiometer Survey Date 2023			2023			
Author	Wessex Archaeology	Description Unpublished report			Report ref.	PN275980.03		







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·	Figure 2: Detailed grad plot LP_001	diometer	survey results:	greyscale



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	Archaeology
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/	Figure 3: Detailed gradiometer survey results: interpretation LP_001





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	Archaeology Possible archaeology
	Former field boundary     Historic landscape feature     Trend
	<ul> <li>– Historic cultivation</li> <li>– Agricultural feature</li> </ul>
	Increased response Ferrous
	<ul> <li>Modern service</li> <li>Drain</li> </ul>
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	Figure 5: Detailed gradiometer survey results: interpretation LP_001 & LP_002







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	<ul> <li>Site boundary</li> <li>Detailed survey extent 2015</li> <li>Detailed survey extent 2023</li> <li>Archaeology</li> <li>Possible archaeology</li> <li>Former field boundary</li> <li>Historic landscape feature</li> <li>- Historic cultivation</li> <li>Trend</li> <li>Agricultural feature</li> <li>Drain</li> <li>Geology</li> <li>Increased response</li> <li>Ferrous</li> <li>Modern service</li> </ul>
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	Coordinate system: OSGB 1936 British National Grid Digital data reproduced from Ordnance Survey data © Crown Copyright (2023) All rights reserved. Reference Number: 100022432. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.
	Date: 06/03/2023 Created by: LJ
	Figure 7: Detailed gradiometer survey results:
	Interpretation 2013 & 2023







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