# Table of contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>1</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>1</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td><strong>Introduction</strong></td>
</tr>
<tr>
<td>1.1</td>
<td>Project background</td>
</tr>
<tr>
<td>1.2</td>
<td>Scope of the document</td>
</tr>
<tr>
<td>1.3</td>
<td>Archaeological background</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><strong>Methodology</strong></td>
</tr>
<tr>
<td>2.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2.2</td>
<td>Aims and objectives</td>
</tr>
<tr>
<td>2.3</td>
<td>Fieldwork methodology</td>
</tr>
<tr>
<td>2.4</td>
<td>Data processing</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>Geophysical survey results and interpretation</strong></td>
</tr>
<tr>
<td>3.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>3.2</td>
<td>SW5</td>
</tr>
<tr>
<td>3.3</td>
<td>SW6</td>
</tr>
<tr>
<td>3.4</td>
<td>SW7</td>
</tr>
<tr>
<td>3.5</td>
<td>SW8</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td><strong>Discussion</strong></td>
</tr>
<tr>
<td>4.1</td>
<td>Gradiometer survey</td>
</tr>
<tr>
<td>4.2</td>
<td>GPR survey</td>
</tr>
<tr>
<td>4.3</td>
<td>Conclusion</td>
</tr>
<tr>
<td>4.4</td>
<td>Recommendations</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td><strong>Figures</strong></td>
</tr>
<tr>
<td><strong>Abbreviations List</strong></td>
<td><strong>84</strong></td>
</tr>
<tr>
<td>References</td>
<td><strong>84</strong></td>
</tr>
<tr>
<td>Appendices</td>
<td>i</td>
</tr>
<tr>
<td><strong>Appendix A</strong></td>
<td>Gradiometer Survey: Equipment and Data Processing</td>
</tr>
<tr>
<td>A.1</td>
<td>Survey methods and equipment</td>
</tr>
<tr>
<td>A.2</td>
<td>Post-Processing</td>
</tr>
<tr>
<td><strong>Appendix B</strong></td>
<td>GPR: equipment and data processing</td>
</tr>
<tr>
<td>B.1</td>
<td>Survey Methods and Equipment</td>
</tr>
<tr>
<td>B.2</td>
<td>Post-Processing</td>
</tr>
<tr>
<td><strong>Appendix C</strong></td>
<td>Relative Velocity to depth conversion for GPR Areas 9 – 16</td>
</tr>
<tr>
<td><strong>Appendix D</strong></td>
<td>Geophysical interpretation</td>
</tr>
</tbody>
</table>
Table of Figures

Figure 1  Site location and survey extents ........................................................... 42
Figure 2  SW5 south-west: Greyscale plot ........................................................... 43
Figure 3  SW5 north-west: Greyscale plot ........................................................... 44
Figure 4  SW5 south-east: Greyscale plot ........................................................... 45
Figure 5  SW5 north-east: Greyscale plot ........................................................... 46
Figure 6  SW5 south-west: Interpretation ........................................................... 47
Figure 7  SW5 north-west: Interpretation ........................................................... 48
Figure 8  SW5 south-east: Interpretation ........................................................... 49
Figure 9  SW5 north-east: Interpretation ........................................................... 50
Figure 10 SW6 west: Greyscale plot ................................................................. 51
Figure 11 SW6 east: Greyscale plot ................................................................. 52
Figure 12 SW6 west: Interpretation ................................................................. 53
Figure 13 SW6 east: Interpretation ................................................................. 54
Figure 14 SW7 west: Greyscale plot ................................................................. 55
Figure 15 SW7 east: Greyscale plot ................................................................. 56
Figure 16 SW7 west: Interpretation ................................................................. 57
Figure 17 SW7 east: Interpretation ................................................................. 58
Figure 18 SW8 west: Greyscale plot ................................................................. 59
Figure 19 SW8 central: Greyscale plot .............................................................. 60
Figure 20 SW8 east: Greyscale plot ................................................................. 61
Figure 21 SW8 west: Interpretation ................................................................. 62
Figure 22 SW8 central: Interpretation .............................................................. 63
Figure 23 SW8 east: Interpretation ................................................................. 64
Figure 24 SW6 GPR Survey location ................................................................. 65
Figure 25 SW5 GPR Area 9: Greyscale Timeslices ........................................... 66
Figure 26 SW5 GPR Area 9: Interpretation ....................................................... 67
Figure 27 SW5 GPR Area 10: Greyscale Timeslices ........................................... 68
Figure 28 SW5 GPR Area 10: Interpretation ..................................................... 69
Figure 29 SW6 GPR Area 11: Greyscale plot .................................................... 70
Figure 30 SW6 GPR Area 11: Interpretation ..................................................... 71
Figure 31 SW6 GPR Area 12: Greyscale Timeslices ........................................... 72
Figure 32 SW6 GPR Area 12: Interpretation ..................................................... 73
Figure 33 SW6 GPR Area 13: Greyscale Timeslices ........................................... 74
Figure 34 SW6 GPR Area 13: Interpretation ..................................................... 75
Figure 35 SW6 GPR Area 14: Greyscale Timeslices ........................................... 76
Figure 36 SW6 GPR Area 14: Interpretation ..................................................... 77
Figure 37 SW6 GPR Area 15: Greyscale Timeslices ........................................... 78
Figure 38 SW6 GPR Area 15: Interpretation ..................................................... 79
Figure 39 SW8 GPR Area 16: Greyscale Timeslices ........................................... 80
Figure 40 SW8 GPR Area 16: Interpretation ..................................................... 81
Figure 41 SW8 GPR Area 16: Greyscale Timeslices (Detailed View) ............... 82
Figure 42 SW8 GPR Area 16: Interpretation (Detailed View) ......................... 83

Table of Tables

Table 1  Velocity values for all GPR Areas ........................................................... vi
Table 2  Relative velocity to depth conversion SW5A – GPR Area 9 based on a dielectric constant of 10.87 for the 500 MHz antenna at........................................ vi
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 12.17 for the 500 MHz antenna at SW5B – GPR Area 10 ..................... vii</td>
</tr>
<tr>
<td>4</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 15.8 for the 500 MHz antenna at SW6A – GPR Area 11 ......................... vii</td>
</tr>
<tr>
<td>5</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 15.81 for the 500 MHz antenna at SW6B – GPR Area 12 ...................... viii</td>
</tr>
<tr>
<td>6</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 15.58 for the 500 MHz antenna at SW6C – GPR Area 13 ....................... viii</td>
</tr>
<tr>
<td>7</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 14.79 for the 500 MHz antenna at SW6D – GPR Area 14 ....................... ix</td>
</tr>
<tr>
<td>8</td>
<td>Relative velocity to depth conversion based on a dielectric constant of 14.42 for the 500 MHz antenna at SW6E – GPR Area 15 ....................... ix</td>
</tr>
</tbody>
</table>
Foreword

The geophysical survey was carried out by Wessex Archaeology and was commissioned by Arup Atkins Joint Venture on behalf of Highways England. The assistance of Andrew Holmes and Michael Baker is gratefully acknowledged in this regard.

Wessex Archaeology would also like to thank the landowners for their assistance during the course of the survey, including the Guinness family and their manager, Mr Doggrell (SW5–SW8), and Mrs Hosier (SW5).

The survey was undertaken by Rok Plesnicar, Rebecca Hall, Patricia Voke, Jennifer Smith, Stewart Wareing, Adrian Serbanescu and Sebastian Schuckelt. Nicholas Crabb, Alexander Schmidt and Rebecca Hall processed and interpreted the geophysical data. Nicholas Crabb wrote the report and the geophysical work was quality controlled by Tom Richardson, Lucy Learmonth, and Ben Urmston. Illustrations were prepared by Nicholas Crabb and Rob Goller. The project was managed on behalf of Wessex Archaeology by Lucy Learmonth.

The following report present the results of the detailed gradiometer and ground penetrating radar survey.

Executive Summary

A detailed gradiometer survey and a targeted ground penetrating radar (GPR) survey were conducted over four areas along the route of the A303. The survey forms part of an ongoing programme of archaeological works being undertaken along the A303 between Amesbury and Berwick Down to inform the PCF Stage 2 Options Assessment Phase for the A303 improvement scheme (NGR 406767, 140697 – NGR 4152612, 142253). This report details the second phase of geophysical survey undertaken as part of this scheme. The project was commissioned by Arup Atkins Joint Venture (AAJV) with the aim of establishing the presence, or otherwise, of potentially significant archaeology within the Stonehenge, Avebury and Associated Sites World Heritage Site (WHS) and wider proposed assessment corridors. It also aimed to define the extent and character of any features within each survey site.

The site comprises a number of arable fields covering a total area of 97.1 ha. The detailed gradiometer survey was undertaken between 20th February and 2nd August 2017. The detailed gradiometer survey has been successful in detecting a high density of anomalies of archaeological origin across the scheme, including some significant sites relating to the prehistoric funerary landscape and possible Romano-British settlement.

The anomalies identified by the detailed gradiometer survey are primarily ditch-like features, which take a number of different forms and date to a variety of different periods. These largely correspond with known archaeological remains identified from aerial sources and represent complexes of prehistoric funerary monuments. Evidence was also identified for field systems, settlement, a possible Romano-British building, and a variety of other archaeological features.

Several former field boundaries correlate with Ordnance Survey mapping and aerial photography for the scheme. Areas of increased magnetic response, superficial geological deposits, agricultural ploughing trends, and numerous modern services were also located.

The GPR survey was targeted over areas of the gradiometer survey where significant archaeological remains were identified. This comprised two relatively small areas in SW5...
(Areas 9-10), five areas in SW6 (Areas 11-15) and one large area in SW8 (Area 16). The majority of these were positioned over probable Bronze Age round barrows that were in the gradiometer survey (Areas 9, 11-15). The results of these GPR surveys confirmed this interpretation in most of the areas and provided additional detail regarding their character and extent (Area 9, 11, 13 and 15). In addition, this survey suggested that the features were extremely ploughed down and identified some possible internal features that were not visible in the gradiometer survey. However, in two of the areas (Area 12 and 14), the possible ring-ditch features identified in the gradiometer survey were shown to be more likely associated with modern ploughing activity.

The GPR survey of Area 10 was located over a rectilinear anomaly identified in the gradiometer survey of SW5 and was also recorded in the NHRE as a post-medieval pond. The combined analysis of both survey techniques has however suggested that this feature is more likely associated with a small enclosure for agricultural use.

GPR survey Area 16 in SW8 was positioned over a rectilinear building and several circular anomalies identified in the gradiometer survey. The results from the area surrounding the building provided a considerable amount of detail regarding the probable layout of the structure. It enabled the clearer identification of individual rooms, divisions, possible floor surfaces, entrances, and a possible well. It also displayed that there is probably a considerable amount of building debris surrounding the structure caused by extensive ploughing in the area.

The combination of the detailed gradiometer and the GPR survey identified a complex range of archaeological features and provided greater detail regarding their character and extent. It also helped to demonstrate that some of the possible archaeological features are not likely to be associated with significant archaeological remains in some areas. For example, within SW6, a semi-circular anomaly that was interpreted as a possible ring-ditch was not reciprocated in the subsequent GPR survey results (Area 14). This enabled an archaeological interpretation to be ruled out and as such, adds to our knowledge of the development of the prehistoric landscape within and adjacent to the WHS.
1 Introduction

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Arup Atkins Joint Venture (AAJV) to carry out a geophysical survey over four areas south of the route of the A303 (hereafter “the Scheme”, see Figure 1). The survey forms part of an ongoing programme of archaeological works being undertaken along the A303 between Amesbury and Berwick Down to inform the PCF Stage 2 Options Assessment Phase for the A303 improvement scheme.

1.1.2 In 2016, eight areas (SW1 – SW4, NW4, SE1, NE1 and NE2) were surveyed during the initial phase, covering a total of 227.8 ha. The second phase, undertaken between February and August 2017, covered four areas (SW5 – SW8) to the south of the A303, covering a total of 97.1 ha.

1.1.3 A written scheme of investigation (WSI) for the geophysical survey [1] was submitted to and approved by Wiltshire Council Archaeological Service (WCAS), acting on behalf of the Local Planning Authority, Wiltshire Council (WC), prior to the commencement of the ground works.

1.2 Scope of the 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.

1.2.2 A description of the location, topography, and geology of the eight areas is included in the results section. It is intended that each relevant section can be utilised as a summary of the results for each survey area. For ease of comprehension, an archaeological background for each survey is also provided within this section.

1.3 Archaeological background

1.3.1 The archaeological context has been presented in brief within the Archaeological Geophysical Survey Design Brief [2], which examined the potential for the survival of buried archaeological remains within the development area and surrounding landscape.

1.3.2 One of the survey sites is situated within the Stonehenge, Avebury and Associated Sites World Heritage Site (WHS) (SW5), whilst the remaining three (SW6, SW7 and SW8) are situated outside of the boundary. All the survey areas, however, are located within a landscape containing nationally and regionally important multi-period archaeology. A high density of archaeological features, potentially of national and international significance in terms of their contribution to the Avebury and Stonehenge WHS’s ‘Outstanding Universal Value’ (OUV), were identified by the Stonehenge World Heritage Site Mapping Project [3] surrounding the current A303. As such, much of the data on known archaeological remains from this area is derived from aerial sources.

1.3.3 The Stonehenge, Avebury and Associated Sites WHS is internationally important for its complexes of outstanding prehistoric monuments [4]. The 26 square kilometres of the WHS encompasses Stonehenge, Avebury, and a range of...
Neolithic and Bronze Age ceremonial and funerary monuments and associated sites that survive exceptionally well in the surrounding landscape. The area was a focus for ceremonial and funerary activity throughout the Neolithic and Bronze Age. There is a general potential across the Stonehenge WHS for the discovery of previously unrecorded archaeological remains relating to prehistoric and later activity.

1.3.4 Extensive surveys in association with the A303 Stonehenge Improvements have demonstrated the potential for the presence of archaeological remains (e.g. [5] [6] [7] [8]). In addition, the WHS Research Framework has been compiled and updated [9] [10] [11], and numerous major research projects have been carried out, such as the Stonehenge Riverside Project and the Stonehenge Hidden Landscapes Project [12] [12, pp. 9, and fig 1.9]. More recent large scale geophysical research has provided extensive and detailed mapping of the archaeological landscape [13] [14] [15].

1.3.5 Detailed gradiometer and GPR surveys have been conducted as part of an initial phase of archaeological investigation. These surveys were conducted over eight areas (SW1 – SW4, SE1, NE1 – NE2, NW4) and were undertaken to inform the PCF Stage 2 Options Assessment Phase for the A303 improvement scheme [16]. It was successful in detecting a high density of anomalies of archaeological interest, which corresponds with known archaeological remains derived from aerial sources. These remains represent complexes of prehistoric funerary monuments, with evidence identified for field systems, settlement, a Romano-British building, and a variety of other significant archaeological features.

1.3.6 Wessex Archaeology was also commissioned by AAJV to undertake an archaeological trial trench evaluation within two investigation areas of the WHS (SW1 and SW2). A total of 67 trenches were opened, 35 within SW1 and 32 within SW2 [17]. Notable features that were investigated included two early Neolithic long barrows, a small penannular ditched monument containing Beaker pottery, and the early 20th century Larkhill Military Light Railway.

1.3.7 A more extensive description of the known archaeological resource within the individual survey sites is given at the beginning of the results section for each area.

2 Methodology

2.1 Introduction

2.1.1 Geophysical surveys over each of the areas adhered to the methodology set out below, prepared in accordance with guidelines and recommendations published by English Heritage (now Historic England) in 2008 [18], as per the WSI [1].

2.2 Aims and objectives

2.2.1 The aim of this geophysical survey is to gather information to inform the design proposals and wider environmental disciplines for the selection of the final route options.

2.2.2 The project specific objectives for this geophysical survey are defined by the Client as follows:
• To determine the presence/absence of potentially significant archaeology within the WHS and wider proposed assessment corridors;
• Define the extent and character of any features within each survey site; and
• Produce an interpretive report on the findings of the survey to inform the options screening process.

2.3 Fieldwork methodology

2.3.1 Individual survey nodes and extents were established using a Leica Viva RTK GNSS instrument at regular intervals for both the hand-held gradiometer and GPR surveys. The cart-based gradiometer system uses a Leica Captivate RTK GNSS instrument, which receives corrections from a network of reference stations operated by the Ordnance Survey (OS) and Leica Geosystems. Both instruments allow positions to be determined with a precision of 0.02 m in real-time and therefore exceed Historic England recommendations [18].

Gradiometer Survey

2.3.2 The detailed gradiometer survey was undertaken over all eight sites using Bartington Grad-01-1000L gradiometers at 1 m intervals mounted on a non-magnetic cart with an effective sensitivity of 0.03 nT. Data were collected at 0.25 m intervals or closer, along transects spaced 1 m apart, in accordance with Historic England guidelines [18].

GPR Survey

2.3.3 The GPR survey was conducted using a Malå RAMAC/GPR XV11 monitor and control unit with a shielded antenna. This was mounted on a rough terrain cart, which is fitted with an odometer to measure horizontal distance along the ground surface. This was deployed across all the GPR areas with data collected along traverses spaced 0.5 m apart. Data with the 500 MHz antenna were collected every 0.03 m within a time window of 60 ns.

2.3.4 A field test of the antenna frequency was undertaken prior to the commencement of the survey using 500 and 250 MHz antenna in accordance with Europae Archaeologiae Consilium [19] and Historic England guidelines [18]. This established that the 500 MHz antenna was likely to provide the most information regarding the nature of archaeological remains within each area and therefore no further survey was undertaken using alternative antennae.

2.3.5 Data were collected in the zigzag method across all areas, although additional cross-lines were collected at Area 15 (SW6) to resolve any potential smaller features.

2.4 Data processing

Gradiometer Survey

2.4.1 Data from the survey was subject to minimal data 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 very close together.

2.4.2 Further details of the geophysical and survey equipment, methods and processing are described in Appendix A.
GPR Survey

2.4.1 Data from the survey were subjected to common GPR correction processes. These comprise amplitude and wobble correction of the radar profile to correct for variance in temperature and soil moisture content, background and bandpass filtering to remove noise in the data from the surrounding area, and XYZ mean line to correct for mosaic effects from variance in the day-to-day conditions during the survey. These steps were applied to all the GPR datasets.

2.4.2 Further details of the geophysical survey equipment, methods, and processing are described in Appendix B.

2.4.3 The approximate depth conversions have been calculated on the assumption that the GPR pulse through the ground is travelling at a certain velocity, which are summarised in Appendix C (Table 1). The approximate depth conversions for individual areas are shown in Appendix C (Table 2 to Table 10).

2.4.4 It is possible to determine more precisely the average velocity of the GPR pulse through the ground if previously excavated features at known depths can be identified in the data; however, this is rarely possible. Instead, the radargrams were analysed for suitable hyperbolic reflections, which can be used to determine the velocity of the GPR pulse through the subsurface deposits. The measured signal travel times can then be converted to depths.
3 Geophysical survey results and interpretation

3.1 Introduction

3.1.1 Each geophysical survey area is discussed individually in the following section. A brief description of the location, topography, and geology is provided, as well as a consideration of the site specific archaeological background. Specific reference is also made to the ground coverage and conditions at the time of survey.

3.1.2 For ease of reference, each survey area is referred to independently, beginning in the east, at SW5 and finishing in the west at SW8.

Gradiometer Survey

3.1.3 The detailed gradiometer survey was undertaken in a single phase of survey between 20\textsuperscript{th} February and 15\textsuperscript{th} March 2017. The conditions at the time of survey were generally very good across the Scheme with favourable weather throughout the period of fieldwork. All the fields were either covered with short stubble, grass, or short crop, and were largely clear, with only minor obstructions preventing survey. Where larger impediments prevented survey, such as water reservoirs, hay stacks and manure piles, they are referred to in the following results section.

3.1.4 For each of the four areas, results are presented as a series of greyscale plots, and archaeological interpretations at a scale of 1:2000 (Figures 2-5; 10-11; 14-15; 18-20). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale images. The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous, burnt, or fired objects, and magnetic trends (Figures 6-9; 12-13; 16-17; 21-23). Full definitions of the interpretation terms used in this report are provided in Appendix D.

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

3.1.6 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 are present than have been identified through geophysical survey.

3.1.7 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 identification and appropriate equipment (e.g. CAT and Genny) should be used.

GPR Survey

3.1.8 The GPR survey was undertaken over eight selected areas across the Scheme (Areas 9-16, Figure 24), which were all identified as containing significant archaeology by the preceding detailed gradiometer survey.

3.1.9 The 500 MHz antenna used in this survey has the potential of detecting features to a depth of up to 3 m in optimal conditions, although the total depth reached varies depending on the specific conditions of each area.

3.1.10 For ease of interpretation, the most representative timeslices have been selected for presentation with the interpretation image detailing the salient results from each relevant timeslices c. 0.11 m in thickness. This is then followed by a
graphical summary of all the timeslices to provide a more complete understanding of how these anomalies may relate to each other.

3.1.11 The GPR surveys have identified numerous point reflectors, planar returns, and linear responses, along with anomalous areas of high and low amplitude in each area. Results are presented as a series of greyscale timeslices, and archaeological interpretations at a scale of 1:300 for Areas 11 – 15 (Figures 25-34). The greyscale plots display black representing high amplitude responses and white relating to low amplitude responses.

3.1.12 All features are described in terms of their geophysical character. It is important to stipulate that all the depths referred to in this report are approximate levels below the current ground surface. The interpretation of the GPR data highlights the presence of potential archaeological features, possible archaeological features, and high amplitude responses alongside a series of linear trends (Figures 26; 28; 30; 32; 34)

3.1.13 It should be noted that small or waterlogged features may produce responses that are below the detection threshold of the GPR antenna. Excessive disturbance can also impede the ability of geophysical techniques to detect archaeology. It may therefore be the case that more archaeological features are present than have been identified through the geophysical survey.

3.2 SW5

3.2.1 Site location, topography, and geology

SW5 is the easternmost of the four areas surveyed in the second phase of the Scheme. It is located c. 2.9 km west of Berwick St James and c. 1 km north of Druid’s Lodge, in the county of Wiltshire.

3.2.2 The survey in this location encompassed an area of 42.4 ha over two large fields of arable land covered by a short crop. The Site is bounded on the western edge by the A360, with further open agricultural land to the north and south. The south-eastern part of SW5 is bounded by a trackway and there is a pig field to the north-east, around which a buffer zone of 100 m was established.

3.2.3 The Site is on a slight north-west facing slope, ranging in elevation from c. 90 m above Ordnance Datum (aOD) in the north-east to c. 115 m aOD in the south-western corner.

3.2.4 The solid geology comprises the Seaford Chalk Formation. There are no recorded superficial deposits for most of the Site although a band of head deposits, comprising clay, silt, sand, and gravel deposits, borders the north of the area [20].

3.2.5 The soils underlying most of the Site are likely to consist of brown rendzinas of the 343h (Andover 1) association. In the east, they are of the 341 (Icknield) association [21]. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey. It is also likely such conditions will allow good penetration of the GPR pulses.

3.2.6 Archaeological background

This area is located within the WHS and contains several extant prehistoric monuments, including three scheduled monuments associated with the
ceremonial and funerary landscape of prehistoric monuments that surround Stonehenge. These are the linear boundary from south-east of Winterbourne Stoke crossroads to south-west of The Diamond on Wilsford Down (NHLE No. 1010837), which extends into the central northern part of the survey area. There is also a mostly levelled Bronze Age bowl barrow just beyond the north-eastern extent of the surveyed area (NHLE No. 1011708). The other scheduled monument is the very western edge of the Lake Barrow Group (NHLE No. 1010863). The part within the survey area appears to be a continuation of the aforementioned linear boundary.

3.2.7 Other archaeological features in this area include the extensive remains of a field system visible as cropmarks on aerial photographs. Such features are of unknown date, but some are likely to be prehistoric, possibly representing agricultural activity within the later prehistoric periods. There are other cropmarks including linear features, a large curving ditch, and part of a linear boundary that is likely to date from the Bronze Age or Iron Age. There is also a probable post-medieval dew pond in the western part of the survey area.

Gradiometer survey results and interpretation

3.2.8 The geophysical survey was undertaken by Wessex Archaeology’s in-house geophysics team between 6th – 15th March 2017. An overall coverage of 42.2 ha was achieved. It was not possible to survey 0.2 ha of the area due to the buffer zone established to the west of the adjacent pig field (Figures 2-9).

3.2.9 Across the entirety of SW5 there is a series of weakly positive and negative linear anomalies (6000–6014). These responses vary in shape, size, and strength but conform to an orthogonal arrangement. They are situated on an approximate north-east to south-west alignment, with several anomalies orientated perpendicular to this. It is likely that this relates to the extensive remains of the extensive co-axial field systems identified across Salisbury Plain via geophysical survey and assessments of aerial photographs. These are only occasionally dated through excavation, but are likely to represent large scale land division spanning the Mid-Late Bronze Age through to the Roman period.

3.2.10 Whilst many of the linear anomalies across SW5 conform to the same orientation and layout, it is not clear whether they belong to a single field system. There are also several areas where the character of the magnetic response varies, which may suggest a different phase, function, or character of the linear anomalies. However, as they not differ significantly in terms of orientation, and no distinct single phase of field system visibly superimposes another, it is possible that they are broadly contemporaneous.

3.2.11 There is an approximately rectangular area at 6000 that is defined by a series of linear anomalies. This covers an area measuring 200 m x 125 m with an additional 80 m north-easterly extension from the north-eastern side of the feature at 6001. The linear anomalies which form part of this arrangement are generally characterised by weakly positive magnetic values in the region of +0.5 – +1 nT, but on the outer edge there is a negative response (c. -0.5 nT). It measures between 6 m and 12 m in width and is at its widest in the north. This response suggests a small field enclosure with a broad, shallow ditch and bank. As it is orientated slightly askew to many of the other linear features in the area, and is also slightly stronger, it is possible that this may relate to some other form of enclosure. There is also a notable paucity of other internal features identified
within this, despite several subdivisions having been identified on aerial photographs within this area.

3.2.12 Extending from the south-east of 6000, there is a similar rectangular area at 6002. The outer edge of this is represented by negative values in the region of -1 nT, with a corresponding positive response on the inside edge (+0.5 – +1 nT). The negative element of the linear anomaly is slightly more prominent than at 6000, but is of a similar width, measuring 6 to 12 m. This likely represents a further field enclosure, perhaps with a large bank and smaller ditch. It also adjoins to 6000 and may therefore be associated; further work could establish this relationship.

3.2.13 To the south and west of 6000–6002, there are further linear anomalies that likely form field divisions (6003–6008). However, these are much more poorly defined and represented by very weak positive and negative magnetic values (c. +/-0.5 nT). They vary in width between 5 and 14 m, covering areas of different shapes and sizes. 6003 encloses a roughly square area (75 x 75 m), while 6004–6006 occupy larger rectangular areas, measuring approximately 160 x 115 m. To the north-east of this, an ‘H’-shaped division is visible at 6007, covering a total area of 100 x 130 m. It is probable that these represent heavily ploughed remains of a field system, possibly of a similar phase and date. It is likely that this only represents slightly better preserved remains of a more extensive field system identified on aerial photography. Several linear trends, which may be associated with these, are poorly represented within the gradiometer survey data.

3.2.14 Within the eastern field of SW5, there is a similar patchwork of field divisions at 6009–6011. At least six rectangular areas of varying size are delimited. The largest of these is at 6011, which covers a 65 x 55 m area and the smallest is in the south at 6009 (45 x 50 m). These are all represented by broad negative (c. -1 nT) linear anomalies measuring 5 m to 7 m in width, possibly suggesting that this is a series of fields divided by banks.

3.2.15 In the south-west corner of SW5, there are three further broad linear anomalies at 6012–6014. These are represented by weakly positive and negative (+/-0.5 nT) anomalies and are aligned north-west to south-east. They are slightly more isolated and less coherent than anomalies at 6000–6011, but likely form part of the wider network of field divisions across the area.

3.2.16 Intersecting 6012–6014, there is a strong positive linear anomaly (+1 – +3 nT) at 6015. This is roughly aligned north-east to south-west and extends for 125 m. It changes direction slightly in the southern extent, heading on a more westerly trajectory. In the centre of the feature there is a 45 m long north-westerly projection. This is consistently c. 2 m wide and likely represents a ditch-like feature.

3.2.17 30 m to the north-east of 6015, there is a similarly aligned linear anomaly extending 95 m (6016). This becomes much weaker in the north-east and is possibly truncated by the field enclosure identified at 6000. In the southern extent, there is a possible north-west to south-east aligned extension visible for 35 m before being truncated by 6017. It is likely that both 6015 and 6016 represent ditch-like features and form part of a co-axial field system. However, as they differ in shape and character to the broad linear features at 6000–6014, they may relate to a different phase of activity.
Traversing the site on a north-east to south-west alignment is a strong positive (+3 nT – +7 nT) linear anomaly (6017). This extends 445 m from the north-west corner of SW5. It has a corresponding negative response (c. -2 nT) on both the eastern and western edges and is approximately 6 m wide. It is likely that this represents a ditch-like feature which is visible as a cropmark on aerial photographs. This may be associated with the Oatlands hill settlement 750 m to the west of SW5. As such, it is possible that this may have prehistoric origins.

At 6018 there is a complex arrangement of anomalies, which likely relates to archaeological remains. Perhaps the clearest element of this is two positive (+1 nT – +3 nT) curvilinear ditch-like features. The largest of these is in the north-west and has an internal diameter of 9 m, with the ditch measuring 1.5 m in width. To the south-east of 6018 there is a smaller curvilinear feature with an internal diameter of approximately 6 m, and the ditch measuring closer to 1 m wide. It is likely that both features represent ring-ditches associated with possible Bronze Age barrows. Neither of these have been identified in aerial photographs of the area and are not recorded within the HER.

On the edges of these ring-ditch features, there are three strong dipolar (+/-9 nT) anomalies. It is not clear what these represent, but it is plausible they relate to later intrusions or disturbance.

At 6020, close to the north-western corner of 6000, there is a positive (+2 – +4 nT) rectilinear anomaly. This covers a small area measuring 11 m x 9 m and most likely represents a 1.5 m wide ditch-like feature. This is recorded in the National Record of the Historic Environment (NHRE) as a post-medieval pond identified from aerial photographs during 2001. However, the magnetic response of this feature does not correspond with such an interpretation. A pond feature would be expected to produce a strong positive response or, if backfilled, possibly a dipolar response. As such, an alternative interpretation may be suggested, but is not immediately obvious from the results of this geophysical survey alone. Further investigation would be required to elucidate this question.

Along the boundary between the eastern and western fields, two strong, positive (+3 nT – +5 nT) partially visible linear anomalies run parallel with the existing field boundary on a north-west to south-east alignment. The southerly of these two at 6021 is a 150 m long, 5 m wide linear feature. This extends north from a linear earthwork running north-west from the Lake Barrow Group (List Entry no. 1010863). It is partially obscured by ferrous response associated with the existing boundary, but may form a linear earthwork of prehistoric origin. To the north, at 6022, there is a 30 m linear feature, which measures 3 m in width. It is likely that 6021 and 6022 form a single linear feature; however, this is obscured by the presence of an existing boundary on the same alignment. It is plausible that this relates to a southern extension of the scheduled monument (List Entry no. 1010837), which is described as a linear boundary running south-west from the Diamond.

In the centre of the eastern field of SW5 there is an irregularly shaped curvilinear anomaly at 6023. This is distinct from other linear features within this area and is markedly stronger, with magnetic values in the region of (+2 – +4 nT). The longest part of the feature is on the eastern side, measuring 85 m. To the northern extent, it turns towards a westerly trajectory and extends a further 40 m,
before turning again towards the south for 25 m. It is consistent in width (c. 2 m) and most likely represents a ditch-like feature.

3.2.24 At the eastern most point of SW5, there is a short positive (+2 nT – +4 nT) linear anomaly (6024). It measures 25 m in length and is 3 m wide, but likely continues to the north-west and south-east beyond the survey extents. This likely relates to an undated linear feature identified on aerial photography. This is one of a complex of 'boundary earthworks' that form a roughly coaxial system.

3.2.25 Close to the northern limit of SW5, there are numerous positive linear anomalies. Some of these likely relate to similar anomalies identified in the previous phase of geophysical survey undertaken as part of the Scheme (WA 2016). For example, 6025 and 6026 visibly continue into SW2 and form one singular feature linear ditch-like feature. This measures 235 m in length, 1.5 m in width and is approximately north-east to south-west aligned. They are also both characterised by values in the order of +1 nT.

3.2.26 20 m south of the northern extent of SW5, there is a series of positive parallel linear anomalies at 6027 and 6028. These are aligned roughly parallel east-north-east to west-south-west and are separated by 6 m. They are 1 m to 1.5 m wide and most likely represent ditch-like features of an unknown date and function.

3.2.27 At 6029 and 6030 there are further parallel positive anomalies, which are also on a similar alignment. These are slightly weaker than the aforementioned features, but are also likely to represent ditch-like features. Both 6029 and 6030 are c. 1 m wide, and extend for 245 m and 170 m respectively.

3.2.28 Close to the north-east corner there is a slightly stronger positive linear anomaly (6031), which also has a clear turn in the western extent. This measures 95 m in length, is 1 m wide and is most likely a ditch-like feature which denotes a former field division beyond the extent of SW5 to the north.

3.2.29 At 6032, there is a further c. 1 m wide weakly positive anomaly. This measures 65 m in length and is situated perpendicular to the ditch-like features at 6029. As this is also located at the south-eastern corner of 6000, it is feasible that this may relate to part of the extensive field systems identified across the area. The different size and character of the response may relate to a difference in phase and/or function. However, further investigation would be required to confirm this.

3.2.30 In the southernmost part of SW5 there are two positive linear anomalies. These measure 2.5 m in width and most likely represent ditch-like features. 6033 is orientated on the same alignment to the field systems identified to the north at 6000–6014; however, 6034 is situated closer to an east-north-east to west-south-west alignment. 6034 is slightly stronger (+2 – +5 nT) and may therefore reflect a different phase or function. However, this is not clear from the results of this geophysical survey alone and they are therefore interpreted as possible archaeology.

3.2.31 There are numerous additional north-east to south-west aligned linear anomalies that are interpreted as possible archaeology (6035–6038). These are represented by weakly positive and negative magnetic responses (c. +/-0.5 nT), but are very difficult to distinguish from the ploughing trends and possible ridge and furrow across the area. At 6039 there is a north-west to south-east aligned linear anomaly, which is very poorly defined. It is likely that these features are
associated with the field system identified across SW5, but as they are so difficult to delineate, they cannot be confidently attributed as individual field divisions.

3.2.32 There are numerous positive (+2 nT – +4 nT) discrete sub-circular features across the entirety of SW5. Many of these are interpreted as possible archaeology and the stronger, more regularly shaped features could represent pit-like features. However, it is equally likely that these represent natural undulations in the chalk bedrock. As they are not positioned in a clearly identifiable arrangement, it is difficult to provide more specific interpretations.

3.2.33 There is evidence for extensive ploughing across SW5. This is represented as weakly positive and negative linear trends on a north-west to south-east alignment, as well as a smaller number orientated to existing field boundaries. In addition, in the central southern part of SW5, there are a multitude of regularly spaced (10 to 12 m) parallel linear anomalies on a north-east to south-west alignment. It is likely that this relates to ridge and furrow ploughing of medieval or post-medieval date. As this also matches the same alignment as the extensive field system in this area (6000–6014) it is plausible that these may be associated, or were at least in existence contemporaneously.

3.2.34 Along the northern boundary of the site there are two broad areas interpreted as superficial geology (6040–6041). This is characterised by an area of increased magnetic response and correlates with recorded head deposits of clay, silt, sand, and gravel on geological mapping for the area (BGS 2017).

3.2.35 At 6042, there is an area of increased magnetic response containing several small dipolar ferrous anomalies. This extends for 270 m and traverses the eastern field of SW5. It measures c. 12 m in width and is most likely associated with a fence or field boundary. This also correlates with a rectangular boundary visible on historic OS mapping dating to 1925 and is therefore likely to be modern in origin.

3.2.36 In the centre of the western field, there is a weak negative (c. -1 nT) linear trend on an east-north-east to west-south-west alignment. This is perhaps clearest within 6000, and seemingly demarcates the extent of ridge and furrow ploughing. There are notably fewer anomalies to the north of this trend and a slight increased level of magnetic response to the south. It is likely that this represents a boundary of relatively recent origin as it is visible on historic OS mapping dating to 1877, where it is labelled as 'Tk Furrow'. In subsequent OS maps for the area it is highlighted as 'Boundary mounds'. It is possible that this trend may delimit the ridge and furrow and could, therefore have earlier origins.

GPR survey results and interpretation

Area 9

3.2.37 GPR Area 9 measures 30 x 40 m and is located over an area of linear and curvilinear anomalies identified in the gradiometer survey at 6015 and 6018. 6015 is likely related to an undated field system, while 6018 represents two previously unrecorded Bronze Age round barrows. As the barrows at 6018 are not recorded in the HER, GPR was deployed in this area to provide further detail regarding these features. In particular, it was hoped the GPR would provide further information regarding the preservation of the ring ditches and whether they
contain any internal features which have not been identified by the gradiometer survey.

3.2.38 The GPR survey at Area 9 was successful in identifying numerous high amplitude responses within the dataset, many of which are likely to relate to archaeological remains (Figures 25 and 26). A total depth of 2.28 m was reached and there were no obstacles preventing the collection of GPR data.

3.2.39 Timeslice 3 (0.22 m – 0.38 m) is the first to contain anomalies that may relate to archaeological activity. These comprise weak, fragmented linear anomalies in the east of the area (7000) and a cluster of discrete anomalies in the west (7001). The anomalies at 7000 cover an area of approximately 18 m x 17 m with linear features aligned north to south and east to west. These may relate to a former field system, although they do not correlate with the system seen in the gradiometer data (6015).

3.2.40 The cluster of anomalies at 7001 extends further east in Timeslices 4 and 5 (0.34 m – 0.49 m to 0.45 m – 0.6 m) to form a clearer three-sided rectilinear anomaly. The anomaly is approximately 12 m x 9 m and lies on a north-north-west to east-south-east orientation with an open side to the south. The exact origin of this anomaly is not clear; however, its composition of complex and hyperbola responses suggests that it may be a backfilled ditch, approximately 2.5 m wide. This possibly represents a small, undated enclosure, likely for agricultural purposes.

3.2.41 Between Timeslices 5 and 8 (0.45 m – 0.6 m to 0.78 m – 0.94 m), two fragmented circular anomalies can be seen at 7002 and 7003. These anomalies relate to the probable Bronze Age round barrows identified within the gradiometer data at 6018. 7002 is approximately 9 m in diameter and appears to have a 3.5 m gap in the south-eastern side. It is not clear whether this gap is contemporaneous with the rest of the feature, or caused by later plough damage as much of the ring ditch is fragmented. Most of the ditch is approximately 1 m wide, however areas in the west are up to 2.5 wide. It is possible that these wider areas of the ditch are the effect of plough damage distributing ditch fill throughout a more extensive volume. Several discrete anomalies (7004) at the centre of the ring ditch may relate to pits or other activity associated with the barrow. However, they could also relate to geological variation, which is seen across the area.

3.2.42 7003 lies 4.5 m south-east of 7002 and represents a smaller (6.5 m diameter) ring ditch with a 3.5 m opening to the north-west. The ditch is approximately 1 m in width and appears more complete than that of 7002. However, the responses are weak in places suggesting there is still likely to be plough damage. The position of the gap in the north-west may be of some significance as it aligns with one of the same size in the south-east of 7002. Any relationship due to these gaps cannot be confirmed from the geophysical data alone and would need further investigation. There are no anomalies that indicate internal activity within the barrow.

3.2.43 There are no further anomalies in the data that are thought to be of archaeological origin. There are many high amplitude responses, the majority of which are likely related to stones in the soil and geological variation. A band of differing geology can be seen on moving eastwards across the site with depth on
a north-east to south-west orientation. This may relate to head deposits recorded in the surrounding area.

Area 10

3.2.44 GPR Area 10 measures 25 x 25 m and is located over a rectilinear anomaly identified in the gradiometer survey at 6020. 6020 is recorded in the NHRE as a post-medieval pond, however the magnetic response was not that which would be expected from a backfilled pond. For this reason, GPR was deployed across the area to provide further detail regarding the feature. In particular, it was hoped the GPR would provide further information regarding the structure and origin of the feature.

3.2.45 The GPR survey at Area 10 was successful in identifying many high and low amplitude responses throughout the dataset, many of which are likely to relate to archaeological remains (Figures 27 and 28). A total depth of 2.15 m was reached and there were no obstacles preventing the collection of GPR data.

3.2.46 The first anomalies relating to archaeological activity are seen in Timeslice 3 (0.21 m – 0.36 m). A low amplitude rectilinear anomaly (7005) can be seen in the centre of the area on a north-west to south-east alignment. This is present down to Timeslice 5 (0.42 m – 0.57 m) and is related to the anomaly identified as a former pond in the NHRE (6020 in the gradiometer survey). The low amplitude anomaly is produced by a null response in the radargrams with dipping horizons on either side. This is indicative of a ditch feature cut into the bedrock, which has since become backfilled with a material that attenuates the radar energy, such as the clay head deposits recorded in the area. The ditch is approximately 1.5 m wide and appears to form three sides of a rectilinear feature, with the southern side open. It is likely that the southern side is formed by a wider field boundary ditch (7006). There is a moderately high amplitude response running around the internal side of the ditch, which may indicate the presence of a bank feature. However, this is not clear from the GPR data alone and would require further investigation to confirm. This anomaly bears many similarities to 7001 in GPR Area 9, and is likely to also form a small enclosure for agricultural use.

3.2.47 A low amplitude linear anomaly (7006) also extends across Timeslice 3 (0.21 m – 0.36 m), to the south of 7005, and is present down to Timeslice 8 (0.74 m – 0.89 m). The anomaly is approximately 5.5 m in width and is aligned north-east to south-west. As with the anomaly at 7005, the low amplitude anomaly is produced by an area of null responses in the radargrams, however there is no evidence of dipping horizons at either side. This suggests that this is likely to be a ditch feature with more vertical sides than that seen at 7005. This anomaly corresponds with a field system identified by the gradiometer survey (6000). Whilst it appears likely that this field boundary forms the southern edge of the rectilinear enclosure seen at 7005, this relationship cannot be confirmed from the geophysical data alone, and would require further investigation.

3.2.48 Between Timeslices 7 and 12 (0.63 m – 0.78 m to 1.16 m – 1.31 m) a high amplitude oval anomaly (7007) can be seen within the enclosure at 7005. This anomaly is approximately 2.5 m x 2 m and is a strong hyperbola in the radargrams. The cause of this anomaly is not certain; however, it most likely relates to a solid feature, perhaps a large stone. The anomaly’s position within the enclosure of 7005 indicates a possible archaeological origin, although this could equally be a natural feature.
3.2.49 The other anomalies detected are not thought to be archaeological in origin. High amplitude anomalies are present across the area, the majority of which are probably related to stones within the underlying soil. There is also a band of high amplitude responses in the south-east of the area, running north-east to south-west. This is a geological feature, likely related to head deposits recorded in the area. Several linear trends run across the data on various orientations, which are generally too weak to allow any definitive interpretation; however, they are most likely the result of ploughing.
3.3 SW6

Site location, topography, and geology

3.3.1 This area is located 2 km south-east of the village of Winterbourne Stoke and c. 1 km north of Druid’s Lodge, in the county of Wiltshire. The survey encompassed an area of 24.1 ha occupied by harrowed agricultural land. The Site is bounded by the A360 to the east and a thin woodland area on all other sides.

3.3.2 There is a low area of land traversing the Site on a north-east to south-west alignment. The lowest point of this, is roughly in the centre of the area, c. 108 m aOD. The highest points are in the north-western and south-eastern corners at around 126 m aOD and 117 m aOD respectively.

3.3.3 The solid geology comprises chalk of the Seaford Chalk Formation with a band of Head – clay, silt, sand, and gravel deposits corresponding with the lowest part of the field. In the north of the area, there is a further band, which extends on a westerly trajectory [20].

3.3.4 The soils underlying the west of the Site are likely to consist of grey rendzinas of the 343h (Andover 1) association [21]. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological background

3.3.5 This area is located outside of the WHS, but may contain archaeological remains associated with the ceremonial landscape surrounding Stonehenge. There are no scheduled monuments recorded within the area. Undated features visible as soil marks have been identified from aerial photographs. These may be the fragmentary remains of a probably prehistoric or Romano-British field system. Historic Ordnance Survey maps depict a chalk pit within the south-western part of the survey area in 1877. By 1901 the survey area had been surrounded by tree screening and is labelled as The Park. Subsequent maps show that this was subdivided by land divisions and that there was a building in the north-eastern part of the survey area.

3.3.6 To the north-west of the survey area, other cropmarks have been identified east of a possible Romano-British settlement on Oatlands Hill. These consist of a series of ditched enclosures containing compounds, pits and ditches set around a linear trackway that continues into SW5. The former World War Two airfield at Oatlands Hill also lies to the north-west.

Gradiometer survey results and interpretation

3.3.7 The geophysical survey was undertaken by Wessex Archaeology’s in-house geophysics team between 27th February and 1st March 2017. An overall coverage of 19.7 ha was achieved. Several obstructions prevented the collection of data including areas of thick overgrown grass, hay stacks, manure piles, and a large water reservoir in the south-west corner of the field. However, conditions across the rest of the Site were good with the field covered by short stubble (Figures 10-14).

3.3.8 The survey has identified several anomalies of archaeological and possible archaeological origin. Perhaps the clearest of these is located at 6100, where a fragmented, positive curvilinear anomaly is visible. This measures 11 m in
diameter and is circular in form, although there are short gaps within this. It is represented by magnetic values in the order of +1 nT – +2 nT and is most likely associated with a ring-ditch. The fragmented nature suggests that the ditch may be broken, most likely caused by plough damage. The ditch is c. 1 m wide and there are no identifiable internal features. Despite the fact there are no corresponding features on aerial photography and this is not identified within the HER, this is considered likely to be a Bronze Age round barrow.

3.3.9 In the north-east of SW6, there is an additional curvilinear positive (c. +1 nT) anomaly at 6101. This is also fragmented and circular in form. It is 13 m in diameter, with the ditch measuring c. 1.2 m wide. It contains three weakly positive (+1 nT – +2 nT) discrete features, which are approximately 1 m in diameter. These may represent pit-like features within a probable ring-ditch. This feature has also not been identified by aerial photography or recorded within the HER, but is likely that it is a further, previously unrecorded Bronze Age round barrow.

3.3.10 In the south-east of the area, at 6102, there is a smaller circular feature, located close to the eastern boundary of the field. It is characterised by a weakly positive (+0.5 nT – +1.5 nT) curvilinear anomaly and contains a central circular pit-like feature, which is stronger in magnitude at +2 nT. This relates to a ring-ditch, but is smaller than 6100 and 6101, measuring 7.5 m in diameter. However, the ditch itself is similarly 1 m wide. The pit measures approximately 1.5 m in diameter and is in the centre of the ring-ditch. This is thought to represent a further unrecorded Bronze Age barrow, though the smaller size and central pit may indicate a different type.

3.3.11 In the northern part of SW6, a fourth weakly positive (+0.5 – +1 nT) curvilinear anomaly has been identified (6103). This is located 141 m east of 6100 and 167 m west of 6101, and may represent a further Bronze Age barrow. The ditch is of similar dimensions to the other identified examples, approximately 1 m wide and 10 m in diameter, but is much more poorly defined. The eastern part of the feature is only faintly visible and is not as circular as 6100–6102. Whilst it is possible that this is caused by an increased level of ploughing, it is interpreted as possible archaeology. As such, further investigation would be required to confirm the precise nature of these remains.

3.3.12 In the north-east corner of the survey area, a short positive (+1 nT – +3 nT) curvilinear anomaly is visible at 6104. This measures 11 m in length, is 1.2 m wide, and roughly semi-circular in shape. It is highlighted as possible archaeology as it is situated in line with three other possible ring-ditch features (6100, 6101, 6103); however, it may simply relate to a plough turn at the edge of the field.

3.3.13 There are numerous positive (+2 nT – +4 nT) discrete sub-circular features across the entirety of SW6, many of which are interpreted as possible archaeology. The stronger, more regularly shaped features could represent pit-like features, but it is equally likely that these represent natural undulations in the chalk bedrock. There are two areas where these anomalies are notably larger and more concentrated, at 6105 and 6106. However, as they are not arranged in any discernible pattern, it is difficult to provide more specific interpretation at this time.

3.3.14 In the western part of SW6, there are three amorphous bands of increased magnetic response (6107–6109). These are characterised by magnetic values in the region of +/-2 nT and are orientated on an approximate north-west to south-
east alignment. They measure between 200 – 250 m in length and are 10 – 30 m wide. This alignment corresponds with a series of cropmarks identified in the south-west corner of the Site from aerial photography that are interpreted as undated field systems. Whilst it is possible that they represent such features, it is probable that any associated remains are severely truncated by ploughing. Furthermore, as these features are relatively wide, it is likely that they are poorly defined.

3.3.15 There are two bands of slightly positive (c. +1 nT) magnetic response traversing the Site, which are interpreted as superficial geology. The first of these forms a semi-circular arc across the north-east of the survey area (6110). This extends 370 m and is 11 m wide. The second is situated on a north-east to south-west alignment, is 11 m wide, and 255 m in length (6111). These are both associated with recorded head deposits of clay, silt, sand, and gravel (BGS 2017). Though they are mapped as fields systems from aerial photographs, it is considered that this type of response is more likely to be associated with superficial geological deposits as they also correspond with a notable area of low lying land.

3.3.16 At 6112 a linear band of increased magnetic response (+/-7 nT) protrudes from the centre of the northern boundary of SW6, on a north-east to south-west alignment. This is considered likely to represent drainage or another modern service, perhaps leading towards the reservoir in the south-western corner of the Site.

3.3.17 There are three strong dipolar linear anomalies (+/- 100 nT) associated with a modern service within the centre of SW6 (6113). This extends from the southern boundary on a northern trajectory and breaks into two south-west to north-east aligned extensions in the north.

GPR survey results and interpretation

Area 11

3.3.18 GPR Area 11 measures 20 x 20 m and is located over a fragmented, curvilinear anomaly identified in the gradiometer survey at 6100. This is considered likely to represent a previously unrecorded Bronze Age round barrow. However, there are no corresponding features on aerial photography and it is not identified within the HER. As such the GPR was deployed in this area to provide further detail regarding this feature. In particular, it was hoped the GPR would provide further information regarding the preservation of the ring ditch and whether it contains any internal features, which have not been identified by the gradiometer survey.

3.3.19 The GPR survey at Area 11 was successful in identifying a number of high amplitude responses throughout the dataset, many of which are likely to relate to archaeological remains (Figures 29 and 30). A total depth of 1.90 m was reached and there were no obstacles preventing the collection of GPR data.

3.3.20 The uppermost timeslices display a series of linear trends on an approximate north-east to south-west alignment. These are characterised by high and low amplitude responses and are visible within the data until Timeslice 4 (0.28 – 0.39 m). It is most likely that these are modern ploughing furrows. A similar arrangement of features is seen in the gradiometer data, although far fewer linear trends have been identified within the GPR dataset.
3.3.21 The first timeslice that displays responses likely associated with archaeological remains is Timeslice 4 (0.28 – 0.39 m). Within this image, a penannular high amplitude response is visible in the centre of the area (7100). This relates to a corresponding curvilinear feature identified in the gradiometer survey data at 6100, and is likely associated with the ploughed remains of a Bronze Age round barrow. The ditch has an internal diameter of approximately 8 m and a width between 0.5 m and 1 m. It can subsequently be seen within Timeslice 5 (0.38 – 0.49 m), although the feature appears slightly more interrupted at its north-eastern extent. Below this depth, the ditch is no longer clearly identifiable. However, there is a distinct area of low amplitude response in the southern part of the feature within Timeslice 9 (0.75 – 0.86 m). This is intermittently visible throughout the remainder of the timeslices and is likely associated with a ringing effect, caused by the near-surface features, rather than the ditch actually extending much beyond c. 0.5 m. This suggest that the remains of the probable round barrow are extremely ploughed-damaged, and that the ditch is very shallow and incomplete as a result of this activity.

3.3.22 In the south-eastern part of 7100, there is an irregularly-shaped, high amplitude response at 7101. This is visible between Timeslice 4 (0.28 – 0.39 m) and Timeslice 6 (0.47 – 0.58 m) and measures approximately 2.2 m x 2 m. This is interpreted as possible archaeology as it may relate to a pit-like feature. Though small pits and postholes of this nature are not always clearly identified by GPR, it is possible that flint inclusions within the feature may have caused a strong reflection to the radar pulse. It is difficult, however, to ascertain which responses pertain to deliberately placed flint inclusions or naturally occurring flint. Given that 7101 is located on the edge of a probable Bronze Age burial mound, a possible archaeological interpretation is suggested.

3.3.23 In the south-eastern part of Area 11, there are three small high amplitude responses, which are roughly circular in shape (7102). These measure c. 1 m in diameter and are visible in the GPR data between Timeslice 4 (0.28 – 0.39 m) and Timeslice 6 (0.47 – 0.58 m). They are interpreted as possible archaeology, as they are persistent throughout two or more timeslices and are also visible as weakly positive anomalies in the gradiometer survey data for the area.

3.3.24 It is difficult to ascertain which responses pertain to small archaeological features and which are likely to represent naturally occurring flints. There are several other randomly distributed high amplitude responses across the area, but these are considered to be natural in origin as they are not consistent across a number of timeslices, nor are they arranged in any obvious anthropogenic fashion.

3.3.25 Within the deeper timeslices there are no further features likely to be associated with archaeological remains. However, from Timeslice 10 (0.85 – 0.96 m) there is a series of amorphous high amplitude reflectors in the south-west corner of the area, interpreted as superficial geology. These are roughly aligned north-west to south-east and are most clearly visible at 7103 in Timeslice 14 (1.23 – 1.33 m). This continues throughout the remainder of the dataset to Timeslice 20 (1.79 – 1.90 m), and gradually shifts to a more south-westerly position as it descends, suggesting that this feature is gradually sloping from north-east to south-west. The relevant radargrams also confirm the presence of a dipping planar return, consistent with such a feature. This is likely to be associated with local geomorphology, presumably where dipping bands of weathering, marl or flint
bedding within the chalk appear as a series of high amplitude reflectors that migrate laterally.

**Area 12**

3.3.26 GPR Area 12 measures 20 x 20 m and is located 130 m to the east of Area 11. It is positioned over a very fragmented, positive curvilinear anomaly identified in the gradiometer survey at 6103. It is thought that this may represent a further Bronze Age barrow as the ditch is of similar dimensions to the other identified examples in SW6. However, it is poorly defined and was hoped that the GPR survey would assist in better defining this feature.

3.3.27 The GPR survey at Area 12 was successful in identifying a number of high amplitude responses throughout the dataset, none of which are considered likely to relate to archaeological remains (Figures 31 and 32). A total depth of 1.91 m was reached with no obstacles preventing the collection of GPR data.

3.3.28 As was the case with Area 11, the uppermost timeslices display a series of linear trends on an approximate north-east to south-west alignment. These are characterised by a series of low amplitude responses and are visible within the data until Timeslice 4 (0.28 – 0.39 m). They relate to modern ploughing furrows and can also be seen in the gradiometer data for the area.

3.3.29 Throughout the timeslices, numerous randomly dispersed high amplitude responses have been identified, but these are not considered to relate to archaeological remains as they do not form any coherent shape or pattern. This is a typical background response, particularly for areas with no clearly defined features, with the responses likely relating to flints or other natural variations in the underlying chalk bedrock.

3.3.30 There is no evidence within the GPR data for Area 12 that supports the possible archaeological interpretation of 6103. However, as this is very poorly represented within the gradiometer dataset, it is possible that the feature is extremely ploughed out and has therefore not been detected by the GPR. As such, intrusive field investigation would be required to confirm the presence or absence of a Bronze Age barrow within this area.

3.3.31 Within Timeslice 7 (0.57 – 0.68 m), there is a high amplitude linear anomaly which protrudes into the north of the area on a south-easterly trajectory 7104. It measures 6 m x 1 m and likely extends beyond the limits of the GPR survey area. The is consistently present throughout the remainder of the dataset until Timeslice 20 (1.80 – 1.91 m); however, the lower portion of this is likely caused by a ringing effect, as opposed to the actual presence of this feature at this depth. This corresponds with a linear band of increased magnetic response in the gradiometer survey results and is thought to relate to probable drainage of relatively modern origin.

**Area 13**

3.3.32 Area 13 is located 160 m west of Area 12 and measures 20 x 20 m. Within this area, the gradiometer survey identified a fragmented ring-ditch feature (6101). This contains three, approximately 1 m diameter, possible pit-like features, and is likely associated with a previously unidentified Bronze Age barrow. The GPR was deployed in this area to clarify the nature of the ring-ditch and establish whether any possible pit-like features exist within this.
3.3.33 The GPR survey of Area 13 was successful in identifying several high amplitude responses throughout the dataset, many of which are likely to relate to archaeological remains (Figures 33 and 34). A total depth of 2.03 m was reached, with no obstacles preventing the collection of GPR data.

3.3.34 Many of the timeslices display a series of faint linear trends on an approximate north-east to south-west alignment. These are characterised by weakly high and low amplitude response and are visible within the data from Timeslice 2 (0.10 – 0.21 m). They continue to be present or ‘ring’ through the remainder of the dataset, but are most likely associated near surface features. This relates to series of modern ploughing furrows, which are also identifiable in the gradiometer data for the area.

3.3.35 The first timeslice that displays responses likely to be associated with archaeological remains is Timeslice 5 (0.39 – 0.51 m). Within this image, an incomplete annular, high amplitude response can be seen at the centre of the area (7105). This relates to a corresponding penannular feature identified in the gradiometer survey data at 6101, which is interpreted as a Bronze Age round barrow. It can be seen in the immediately following Timeslice 6 (0.49 – 0.60 m), but it is only visible as a faint low amplitude response and is no longer clearly identifiable after this point. It has an internal diameter of approximately 11 m with a 1 m wide ditch. The short depth range of this feature (c. 0.2 m) and the intermittent nature of the response suggests that the feature is relatively shallow, likely due to plough damage. Despite this, a clear circular arrangement is apparent and this is most likely representative of a heavily ploughed-out Bronze Age barrow.

3.3.36 Within the gradiometer survey data, three possible pit-like responses were identified within the centre of the ring ditch at 6101. There are no corresponding anomalies within the GPR survey data; however, this does not necessarily preclude their existence. Discrete features like this are often poorly detected by GPR due to their limited size and lack of physical contrast. Consequently, further work would be required to determine the presence of any internal features located within the ring ditch at 7105.

3.3.37 In the western part of Timeslice 5 (0.39 – 0.51 m), there is a strong high amplitude response. This is linear in form and measures 6 m x 1 m. It is roughly oriented east to west and becomes more prominent throughout many of the subsequent timeslices, with a particularly strong high amplitude response in Timeslice 9 (0.79 – 0.90 m) at 7106. This continues throughout the dataset until Timeslice 14 (1.28 – 1.39 m), gradually shifting to the north. This suggests that this feature is gradually sloping from south to north. The radargrams for this area also show a series of hyperbolic reflections descending in this manner. This is interpreted as superficial geology and is likely to be associated with a dipping band of weathering, marl, or flint bedding within the chalk.

Area 14

3.3.38 Located in the north-eastern corner of SW6, GPR Area 14 measures 20 x 20 m. It is positioned over a roughly semi-circular anomaly (6104), which was highlighted as possible archaeology in the gradiometer survey results, largely because it is situated in line with three other possible ring-ditch features (6100, 6101, 6103). However, it is probable that this may simply relate to a plough turn at the edge of the field, as it is very poorly defined when compared with other examples within
SW6. It was therefore hoped that the GPR survey would help to better define the interpretation of this feature.

3.3.39 The GPR survey at Area 14 was successful in identifying a number of high amplitude responses throughout the dataset. It is not considered likely that any of these are associated with archaeological remains (Figures 35 and 36). A total depth of 1.91 m was reached, with no obstacles preventing the collection of GPR data.

3.3.40 The uppermost timeslices display a series of linear trends on an approximate north-east to south-west alignment. Along the eastern edge of the survey area there are several further linear trends aligned to the eastern edge of the field on an approximate north to south orientation. These trends are characterised by a series of high and low amplitude responses and are visible within the data until Timeslice 6 (0.47 – 0.58 m). They relate to modern ploughing furrows and can also be visualised in the gradiometer data for the area.

3.3.41 There is no trace within the GPR dataset of the sub-annular anomaly identified in the gradiometer data at 6104. This would suggest that the anomaly identified is more likely associated with a modern wheel rut or plough turn at the edge of the field, as opposed to a possible archaeological feature. However, further investigation would be required to confirm this as it is possible that the feature is extremely ploughed down and has therefore not been detected by the GPR.

3.3.42 Throughout the remainder of the timeslices, there are several anomalous high amplitude responses. These are not considered to relate to archaeological remains as they do not form any coherent shape or pattern. The responses are most likely associated with background material, such as flints or other natural variations in the bedrock.

Area 15

3.3.43 The smallest and most southerly GPR area is located 210 m south-east of Area 13. It measures 15 x 15 m and is located over a curvilinear anomaly containing a central pit-like feature, which was identified in the gradiometer survey data at 6102. This is thought to represent a further unrecorded Bronze Age barrow, but the smaller size and likely central pit feature may suggest that it is a different type to the other features identified.

3.3.44 The GPR survey at Area 15 was successful in identifying several high amplitude responses throughout the dataset, many of which are likely to relate to archaeological remains (Figures 37 and 38). A total depth of 2.04 m was reached, with no obstacles preventing the collection of GPR data.

3.3.45 Within the uppermost timeslices, a series of parallel linear responses of both high and low amplitude is visible. These trends are oriented on an approximate north-east to south-west alignment and are associated with modern ploughing. They also correlate with similarly interpreted features in the gradiometer survey.

3.3.46 The first timeslice containing anomalies that are likely to be associated with archaeological remains is Timeslice 5 (0.41 – 0.51 m). Within this it is possible to identify a curvilinear high amplitude response at 7107. This has an internal diameter of approximately 5 m and, although it is not consistently visible, the outline of a circular feature is apparent. It is also clearly identifiable within Timeslice 6 (0.51 – 0.62 m), but is very poorly defined and impossible to identify
beyond Timeslice 7 (0.61 – 0.72 m). This is probably associated with a ring-ditch measuring c. 1 m in width. This correlates with a similar feature identified in the gradiometer data at 6102 and likely represents the remains of a ploughed down Bronze Age barrow.

3.3.47 Within the centre of 7107, there is a small roughly circular high amplitude response. This is visible within Timeslice 5 (0.41 – 0.51 m) and Timeslice 6 (0.51 – 0.62 m) as a small 0.7 m in diameter feature. However, in Timeslice 7 (0.61 – 0.72 m) and Timeslice 8 (0.71 – 0.82 m) the feature appears more irregular in shape and increases in size to c. 1.3 m in diameter (7108). It is possible that this pit-like feature increases in diameter as the depth increases, with the position gradually shifting in a northerly direction. However, intrusive field investigation would be required to confirm this as it is equally possible that this may relate to a spurious response from a large piece of naturally occurring flint or similar.

3.3.48 Between Timeslice 9 (0.81 – 0.92 m) and Timeslice 11 (1.01 – 1.13 m), there are four circular high amplitude responses (7109). These measure 0.7 m in diameter and are all located on the inside edge of the ring ditch at 7107. These are interpreted as possible archaeology and most likely pertain to pits or postholes located within 7107. Although this is below the depth range of the ditch and central pit at 7108, it is likely that these features are associated with, or at least respect, the Bronze Age barrow. However, the precise form and function is not clear from the results of this GPR survey.

3.3.49 From Timeslice 12 (1.11 – 1.23 m), there are no further features which are considered likely to relate to archaeological features. However, there are several high amplitude responses likely to be associated with superficial geology. This is perhaps most clearly visible within Timeslice 15 (1.42 – 1.53 m), where two amorphous linear bands of high amplitude can be identified (7110–7111). These are c. 10 m in length and c. 2 m wide, but both likely extend beyond the survey area. 7110 is aligned approximately north-west to south-east, and 7111 is orientated north-east to south-west. These are both likely to be associated with dipping bands of weathering, marl, or flint bedding within the natural chalk bedrock.
3.4 SW7

3.4.1 Site location, topography, and geology

SW7 is located directly west of SW6 and is the smallest area surveyed across this second phase of the Scheme. It is located 1.4 km south-east of Winterbourne Stoke and c. 1.8 km north-east of Berwick St James, in the county of Wiltshire. The survey encompassed an area of 13.1 ha comprising three arable fields intersected by two tracks. The Site is open on the western, northern, and southern edges, and is bounded by a small strip of woodland to the east.

3.4.2 The Site slopes downwards from the centre of the area to the west, ranging from c. 131 m aOD in the south to c. 101 m aOD. Heading towards the east there is a gentler decline to c. 123 m aOD along the eastern boundary.

3.4.3 The solid geology comprises the Seaford Chalk Formation, with no recorded superficial deposits across most the area. A small band of Head – clay, silt, sand, and gravel deposits is present in the north-west [20].

3.4.4 The soils underlying the majority of the Site are likely to consist of brown rendzinas of the 343h (Andover 1) association, however the westernmost edge of the site is recorded as of the 342a (Upton 1) association [21]. Soils derived from such geological parent materials have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

3.4.5 Archaeological background

This area is located outside of the WHS and is not known to contain any remains related to the prehistoric landscape at Stonehenge. The area lies within the southern part of the World War Two Oatlands Hill aerodrome. Possible lynchetts of unknown date are visible as indistinct cropmarks and low earthworks on aerial photographs along the western edge of the survey area. They are possibly of medieval or post-medieval date, but may have earlier origins.

3.4.6 Three Beaker period pits were excavated prior to the construction of the dairy unit, just to the north of the survey area in 2004. A possible Romano-British settlement lies further to the north on Oatlands Hill.

3.4.7 Gradiometer survey results and interpretation

The geophysical survey was undertaken by Wessex Archaeology’s in-house geophysics team on the 20th – 21st February 2017. An overall coverage of 13.6 ha was achieved, with a slightly larger area being surveyed to ensure total coverage. There were no obstructions preventing the collection of data; however, the easternmost field is divided by several fence lines and a trackway (Figures 14-17).

3.4.8 There are three parallel positive linear anomalies located close to the western extent of SW7. These represent ditch-like features and are characterised by magnetic values in the region of 0 – +1.5 nT. All three of these are aligned approximately north-east to south-west. The southern linear features (6200–6201) are separated by 20 m and are slightly fragmented, but extend for a length of 235 m across the survey area. In the north-west, there is a further, shorter linear anomaly at 6202, which measures 96 m in length. The width of the features is consistently between 1.5 m – 2 m. It is likely that these anomalies are associated
with lynchets of an unknown date. They correspond with features identified as cropmarks and low earthworks on aerial photography and are probably of medieval or post-medieval date, but may have earlier origins.

3.4.9 In the central field at SW7 there are four linear anomalies that are interpreted as archaeology (6203–6206). These are most likely associated with ditch-like features and are approximately situated on a north-east to south-west orientation, although they curve and are slightly sinuous in nature. The western pair of linear features (6203–6204) are separated by 97 m. The eastern pair (6205–6206), by approximately 38 m, although some of this is likely due to the ferrous response associated with a modern service at 6228. All four anomalies are weakly positive (0 – +1 nT) and measure between 2 – 4 m in width. The discontinuous and weak nature of these features is probably due to erosion caused by heavy ploughing. It is likely that they originally formed two parallel linear features separated by c. 15 m. These features are on a similar alignment to an undated field system visible on aerial photography directly north of the central part of SW7. As such, it is likely that 6203–6206 represent a southerly extension of this. Although these features are spaced quite widely apart, it is possible that these could represent trackway ditches, as they follow the same alignment as features identified outside of the survey area, further to the north. However, intrusive field investigation would be required to confirm this.

3.4.10 Traversing both sides of the track that separates the two western fields of SW7, are several east to west aligned linear anomalies (6207–6213). These are weakly positive (0 – +1 nT) and between 1 m and 3 m in width. For the most part, they are relatively consistent in length, extending c. 165 m to 185 m (6207–6211). There are some shorter exceptions to this at 6212 and 6213, measuring 67 m and 46 m respectively. However, it is very likely that they comprise part of the same arrangement of ditch-like features and are therefore interpreted as possible archaeology. As four of the linear anomalies identified are regularly separated by c. 35 m (6207–6210), it is plausible that this is a former field system, which is supported by evidence of similar aligned undated features visible on aerial photographs, 300 m north of SW7 near Winterbourne Stoke/Horse down.

3.4.11 At 6214, there is a weak positive (0 – +0.5 nT) linear anomaly crossing the Site on a west-north-west to east-south-east orientation. It extends 235 m and is 2 m in width. This does not respect any of the other linear features within SW7, but is on a similar alignment to the extant boundaries of the western field. It is therefore likely that this represents a former field boundary. However, as this cannot be identified on available mapping or aerial photography it is not possible to rule out an archaeological interpretation.

3.4.12 In the south-west corner of SW7, there are several short weakly positive (0 – +0.5 nT) linear anomalies at 6215. These vary in length from 7 m – 30 m, but all are aligned parallel, on a north-west to south-east orientation. They measure 1 m in width and are poorly defined. Whilst it is possible that these could be associated with the lynchet at 6200, it is equally possible that they are of a modern agricultural or natural origin. As such they are interpreted as possible archaeology, but intrusive field investigation would be required to confirm.

3.4.13 At 6216, two positive (0 – +1 nT) linear anomalies are visible protruding from the north-west extent of SW7 on a south-westerly trajectory. The broadest of these measures 57 m in length, c. 5 m in width, and is probably associated with a
lynchet or former field boundary. The smaller anomaly to the south is harder to define, but may represent an additional short ditch-like feature. The relationship with other probable archaeological features in the vicinity is not clear. As they are positioned roughly perpendicular to 6200 and 6201, it is possible that they may be associated.

3.4.14 At 6217, there is a positive linear anomaly orientated north-east to south-west. It is characterised by moderate magnetic values (+1 – +3 nT), measures 90 m in length, and 3 m wide. It most likely relates to a ditch-like feature and may be associated with the undated field system located 25 m to the west (6203–6206).

3.4.15 In the easternmost field of SW7, there is an east to west aligned linear anomaly at 6218. This measures 2 m wide and extends for 109 m. It is weakly positive (0 – +1 nT) and may represent a ditch-like feature or former field boundary. As it does not continue further west, and is on the same alignment as the ploughing trends in this area, it is probable that this is a former field boundary. However, as this is also the same alignment as the field system identified to the west at 6207–6210, an archaeological interpretation is equally feasible.

3.4.16 In the eastern part of SW7, there is a series of weakly positive (0 – +1 nT) linear anomalies (6219–6221). 6219 measures 50 m in length and between 2 m and 4 m in width. It is orientated on an approximate north-west to south-east alignment. Perpendicular and to the south, is a 20 m long linear anomaly at 6220. It is possible that a 25 m extension of this is seen 50 m north-east at 6221, and that they would once have formed a single 95 m long ditch feature. A likely interpretation of this is that these features correlate with a possible field system identified on aerial photographs. However, extensive ploughing and a concentration of ferrous response within the area has obscured the precise arrangement of this. Therefore, intrusive field investigation would be required to confirm a possible archaeological interpretation.

3.4.17 At 6222, there is a 40 m long strongly positive (+2 – +4 nT) linear anomaly located in the north-eastern corner of SW7. This is interpreted as possible archaeology and is thought to represent a probable ditch-like feature. It also correlates with a field system identified in aerial photographs, but is much stronger than the features identified at 6219 – 6221, which may suggest that it is of a different phase, character, or function. Additionally, as it is located in close proximity to the existing field boundary at the eastern extent of the field, it is possible that it is of a more recent origin.

3.4.18 In the centre of the westernmost field in SW7, there is a broad, amorphous area of very weakly positive (c. +0.5 nT) magnetic response (6223). This measures 140 m in length and a maximum of 18 m wide. It is poorly defined, but is roughly aligned north to south. This is not considered to be associated with archaeological remains, but may be related to superficial geology, most likely in the form of unrecorded head deposits.

3.4.19 A modern trackway traverses the Site in the north-east corner and runs towards the entrance of SW8 (6224). This is visible on aerial photography and was also identified on the surface during the survey. It is represented in the gradiometer survey results as two parallel c. +1 nT positive linear anomalies in the south-east, and a large ferrous response in the north-west.
3.4.20 To the west of 6224, there are three linear dipolar magnetic anomalies arranged in an orthogonal fashion (6225–6227). These are situated on an approximate north-west to south-east alignment and are associated with existing fenced boundaries within the eastern field of SW7.

3.4.21 At 6228, in the central field there is a roughly north to south aligned dipolar (+/- 100 nT) response characteristic of a buried modern service.

3.4.22 Perpendicular to the service at 6228 is negative linear anomaly (-1 nT) interpreted as another modern service (6229). This leads towards the Oatlands and is probably related to a plastic pipe.
3.5 SW8

Site location, topography, and geology

3.5.1 SW8 lies 750 m to the west of SW7. The Site is located c. 300 m north of Berwick St James and 600 m south-west of Amesbury, in the county of Wiltshire. The survey area encompasses 21.6 ha and covers part of four fields with open boundaries to the north and south. In the west, it is divided through the centre by a large field boundary which matches the alignment of the survey area. There is a further boundary on an approximate north to south orientation which divides the area roughly in half. Further east, it is intersected by Berwick Rd (B3083) and is bounded by a small woodland at the eastern limit of the area.

3.5.2 The Site gently slopes from the west at c. 103 m aOD to c. 78 m aOD at the eastern boundary, close to the River Till.

3.5.3 The solid geology comprises the Seaford Chalk Formation with no recorded superficial deposits across much of the area. A band of Head – clay, silt, sand, and gravel deposits is recorded curving through the western part of the Site on a roughly east to west orientation [20].

3.5.4 The soils underlying the Site mostly consist of the 342a (Upton 1) association. However, the western extent of the area is likely of the 343h (Andover 1) association, and the east of 511f (Coombe 1) [21]. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological background

3.5.5 This area is located outside of the WHS and is not known to contain any remains related to the prehistoric landscape at Stonehenge. There is evidence for field systems of an unknown date within the survey area, visible as indistinct cropmarks, as well as two sides of a possible prehistoric or Romano-British enclosure.

3.5.6 Two circular features, which may be possible Bronze Age round barrows, have been identified to the north and south of the survey area. These may be contemporaneous with the Stonehenge landscape.

Gradiometer survey results and interpretation

3.5.7 The geophysical survey was undertaken by Wessex Archaeology’s in-house geophysics team between the 22nd and 28th February 2017. An overall coverage of 21.1 ha was achieved, with the only obstruction being a small area of thick grass and scrub in the south. The field boundaries and road intersecting the area also resulted in a minor reduction to the surveyed area (Figures 18-23).

3.5.8 Perhaps the clearest evidence of archaeological remains is in the east of the area, at 6300. Here there is a rectangular arrangement of negative linear anomalies (-0.5 to -1.5 nT). This is representative of probable structural remains and covers a rectangular area measuring 18 x 31 m. It is orientated approximately east to west with several internal divisions indicated by further negative linear anomalies. The western part of the feature is generally much weaker than the east, possibly indicating differing levels of preservation or a possible variance in design or function. In the eastern extent, there is a short break which may
suggest an external doorway. Furthermore, in the north of the building there is a
strong positive anomaly (+4 – +6 nT) that could represent an area of burning or
firing. There are no corresponding features on aerial photography or historic
mapping, and the structure is not identified within the HER. Roman finds have;
however, been identified near the Site, and the layout of these remains is similar
to what one would expect of a Romano-British villa in plan. Furthermore, the
position close to a river is also typical of such a feature. However, alternative
explanations are also plausible and it is possible that this relates to a medieval or
post-medieval farmstead. As such, further investigation would be required to
better understand the precise nature of these remains.

3.5.9 A series of c. 1.5 – 2.5 m wide positive linear anomalies (+0.5 – +1.5 nT)
surround 6300 in a recti-linear arrangement (6301–6303). These align north to
south orientation and in the most part respect the structure at 6300; however,
some are slightly offset, on an approximate north-west to south-east alignment.
This most likely represents a ditched enclosure covering an area of c. 60 x 140 m
and likely extends south beyond the survey area.

3.5.10 The longest of the linear features associated with this enclosure is the outer and
most westerly, which extends for 118 m, before turning 90 degrees towards the
east, extending for a further 46 m (6302). Within this, and roughly offset by 6 m to
10 m, is an interior ditch at 6301. The shortest linear feature is in the east, and is
intermittently visible for 45 m (6303). In the south of the survey area is a further
orthogonal layout of linear features (6304) covering a total area of 47 x 21 m. It is
probable that these ditch-like features form part of the same enclosure system,
although it is not clear from these results whether they belong to the same phase
of activity. It is likely that they are associated and contemporaneous with the
probable structural remains at 6300.

3.5.11 Located in the north-west of SW8 there is a concentration of linear anomalies
associated with a probable field system identified on aerial photography (6305–
6312). These traverse the two fields at the western extent of SW8 and present a
complex, roughly orthogonal arrangement.

3.5.12 There are three north-west to south-east aligned positive linear ditch-like features,
all of which measure between 1.5 m and 2.5 m in width. 6305 and 6306 are
parallel and extend for 145 m and 121 m respectively. Further south there is a
shorter example at 6307, which extends for 52 m. These are all characterised by
magnetic values in the region of +0.5 – +1 nT, except for 6505, which is notably
stronger (+1 – +2.5 nT).

3.5.13 Situated perpendicular to 6305–6307, there are five broader linear anomalies
(6308–6312). These are represented by both weakly positive (c. +0.5 nT) and
weakly negative (c. -0.5 nT) magnetic values. The negative response is
consistently situated on the northern edge of the features, which may imply a
small bank on this side. The positive element is much broader and more poorly
defined, suggesting a wide, gradual ditch-like feature. These all vary in length with
the shortest located in the south at 6312 extending 60 m, and the longest at 6311,
which measures 240 m. They are relatively consistent in width, measuring 6 to 9
m, though the western part of 6309 is broken into two thinner features of a similar
character. It is considered likely that these represent lynchets associated with the
probable undated field system.
3.5.14 Close to the southern limit of SW8, there are several weakly positive (c. +0.5 nT) north to south aligned linear features extending from a slightly stronger (c. +1.5 nT) east to west aligned feature (6313–6315). It is likely that the east to west orientated example (6314) is an extension of 6313, although there is no visible relationship. This extends for 180 m and varies in width from 2 m to 5 m. The north to south aligned (6315; 6316) features extend for c. 40 m and are 1.5 to 2 m wide. In addition, there is an east to west aligned linear trend feature located 23 m north of 6314, at 6317. These are representative of ditch-like features and are most likely associated with a field system. Only 6313 and 6314 are identified on aerial photography, but it is likely that they form part of the same system. However, intrusive field investigation would be required to confirm this.

3.5.15 To the west of the field system identified at 6313–6317, there are further features which are also aligned orthogonally (6318–6321). These are positive linear anomalies characterised by magnetic values in the order of +0.5 nT. It is likely that these features correspond with the field system identified on aerial photography. However, they are also situated perpendicular to a multitude of linear ploughing trends and evidence for ridge and furrow (6338), making their origin uncertain. The east to west linear features extend for the longest distance measuring between 105 m and 117 m in length (6220 and 6221). The north to south aligned features at 6318 and 6319 are shorter at 18 m and 50 m respectively. They are relatively consistent in width measuring c. 1.5 m.

3.5.16 At 6322 there is a positive (+0.5 – +1.5 nT) linear anomaly located close to the north-western corner of SW8. This measures 3 m in width, 37 m in length, and probably continues beyond the survey extent towards the north. It is aligned differently to the other linear anomalies close by (6305–6312), on an approximate north-east to south-west orientation. However, it is plausible that this relates to an extension of the undated field system.

3.5.17 In the south-west corner of SW8, there is a further positive (+0.5 – +1.5 nT) linear anomaly at 6323. This is orientated roughly north-west to south-east and extends for 157 m. It measures c. 2 m in width and likely continues beyond the survey area towards the south and the west. Though there is no visible relationship with the field system identified in the north, this may be associated with 6305–6312. Furthermore, as it is not visible on aerial photographs or on any historic mapping it is unlikely that it relates to a modern former field division.

3.5.18 In the most easterly field there are six roughly circular areas of increased magnetic response (6324–6329). These are characterised by negative magnetic values in the region of -1 nT and cover an area measuring 20 m to 40 m in diameter. Within each of these, there are several irregularly shaped positive magnetic anomalies (+2 – +4 nT). These vary in size and shape, with some amorphous in form (6324–6327) and others more circular (6328–6329). It is considered most likely that these relate to superficial geological deposits, probably associated with solution hollows. However, an archaeological origin cannot be ruled out. 6328 and 6329 are the most likely candidates to be associated with archaeological remains of this type, as they are the most regular in form. Moreover, geological features of this nature can often be found to contain archaeological deposits and they are accordingly interpreted as possible archaeology.
3.5.19 Within the enclosure ditches (6301–6304) surrounding 6300, there are several moderately strong sub-circular positive anomalies (+1 – +3 nT), although some of these are more linear in shape. At 6330, there is a 9 m x 1.5 m, east to west aligned anomaly located close to the ditch at 6302. In the north of this area there is another east to west aligned linear, which extends for 8 m before turning 90 degrees towards the north for 4.5 m (6311). It is unclear what these anomalies may represent precisely; however, their location near the possible Romano-British villa at 6300, strongly suggests that they are archaeological in origin.

3.5.20 11 m to the west of the outer ditch at 6302, there is a short weakly positive linear anomaly, c. +0.5 nT. This measures 14 m x 4 m and is aligned on a north-east to south-west orientation. It is interpreted as possible archaeology and probably represents a ditch-like feature. However, it is not clear if is associated with either the features located to the east (6301–6304) or with the undated field systems identified to the west (6313–6321).

3.5.21 At 6333, there is a curvilinear arrangement of small sub-circular features. These have a diameter of 1 m to 1.7 m and are represented by positive magnetic values around +1.5 nT. It is possible that this represents a semi-circular arrangement of pits or post-holes, but further investigation would be required to elaborate on the precise nature of this.

3.5.22 In the easternmost field, there are two amorphous, weakly positive (c. +0.5 nT) linear anomalies. The shorter of these measures 71 m in length and 5 m in width (6334). It is orientated on an approximate north-east to south-west alignment, with a short gap of 11 m centrally. The longer example measures 133 m and is approximately 10 m wide (6335). This is situated on an east to west alignment, although it curves slightly to the north in the western extent. It is considered likely that both features are representative of superficial geology, most likely in the form of paleo-channels. However, this is not recorded on geological mapping of the area.

3.5.23 In the west and central fields, there is a very broad and long amorphous feature. This is divided into two, with a roughly east to west (6336) and a north-east to south-west (6337) aligned curvilinear positive anomalies. These likely form a single feature, which varies in width from 23 m to 32 m. This corresponds with an area of superficial deposits recorded on geological mapping of the area, and is likely composed of Head deposits of clay, silt, sand, and gravel [20].

3.5.24 There are two areas where ridge and furrow ploughing identified. It is clearest in the central field at 6338, where a series of parallel north to south aligned linear trends are visible. These are weakly positive, in the region of +0.5 nT, and separated by 10 m to 17 m. They measure c. 2 m in width and are predominantly located in the south-east corner of the central field, but likely extend beyond this area.

3.5.25 At 6339, there is further evidence for ridge and furrow ploughing, albeit of a slightly different character to that of 6338. Here there are fewer ploughing furrows, and they are more widely spaced (c. 20 m). They are also situated on the same alignment as the undated field system in this area (6308 – 6310) and may have historic origins. It is likely that this agricultural practice is more widespread, but has simply not been clearly identified by this geophysical survey.
3.5.26 There are two modern services traversing SW8. One is located along the western boundary of the Site (6340), and the other is located centrally, on a similar alignment to the existing field divisions (6341). These are characterised by a strong dipolar response of +/-100 nT.

GPR survey results and interpretation

Area 16

3.5.27 GPR Area 16 measures 120 x 90 m and is located over a rectilinear building (6300) and several circular anomalies (6326 – 6329) identified in the gradiometer survey. The building at 6300 is enclosed by a larger rectilinear ditch feature, and is considered likely to date to the Romano-British period, however it may relate to medieval or post-medieval farmstead. The circular anomalies have been classified as being of possible archaeological origin, likely relating to geological features that may contain archaeological deposits. None of these anomalies identified in the gradiometer survey are recorded in the HER. Therefore, GPR was deployed to provide more information and detail regarding the date and structure of the building, as well as to clarify the origin of the circular anomalies.

3.5.28 The GPR survey at Area 16 was successful in identifying numerous high amplitude responses throughout the dataset, many of which are likely to relate to archaeological remains (Figures 39 and 40). A total depth of 2.44 m was reached and there were no obstacles preventing the collection of GPR data.

3.5.29 The first responses considered likely to be associated with archaeological remains are present in Timeslice 3 (0.24 m – 0.41 m). At 7300 an area of high amplitude linear and discrete anomalies has been identified in the east of the area. These are visible down to Timeslice 16 (1.79 m – 1.96 m) and form a rectilinear area, with several internal divisions. This is related to the building seen in the gradiometer survey (6300). It is also notable that there is a broad area of high amplitude response surrounding this, which is most clearly visible in the uppermost timeslices. This may be indicative of building debris resulting from the building’s abandonment. Several more specific aspects of the precise layout of the building can be discerned within the GPR dataset, and these will be discussed in detail later in the report.

3.5.30 Two areas of high amplitude response are visible in Timeslice 4 (0.36 m – 0.53 m) that may be associated with the building at 7300. To the north-west of the building, a roughly oval feature (7301) has been identified. This is present down to Timeslice 5 (0.48 m – 0.65 m) and measures approximately 9 m x 4.5 m with a 7 m easterly projection at its northern end. A similar anomaly is present to the south-east of the building, at 7302. This can also be seen to extend to Timeslice 5 and is roughly oval in plan, with short projections to the north-east and south. The anomaly at 7302 is smaller than that at 7301, measuring approximately 4.5 m x 3 m. Whilst these anomalies may be associated with the nearby building (7300), their exact cause is not clear.

3.5.31 To the west of the building, two low amplitude curvilinear anomalies have been identified at 7303 and 7304. Both are visible in Timeslice 4 (0.36 m – 0.53 m), with 7303 also present in Timeslice 5 (0.48 m – 0.65 m). These responses relate to 6326 and 6328 in the gradiometer survey and are characterised by very weak, low amplitude returns. This suggests that there is little difference between the material that comprises these features to that of the background material. This,
combined with the information from the gradiometer survey, suggests these are likely to be superficial geological deposits related to solution hollows, as opposed to features of an archaeological origin. However, the possibility that these contain archaeological deposits cannot be discounted.

3.5.32 There are no other identifiable features thought to be of archaeological or possible archaeological origin within the remainder of the GPR survey data for SW8. Parallel linear anomalies aligned roughly north to south have been identified in the first three timeslices (0 m – 0.17 m to 0.24 m – 0.41 m). These are evidence of modern agricultural activity, such as ploughing. Two areas of parallel high amplitude linear anomalies at 7305 and 7306 are related to a modern trackway present at the time of survey. These are visible between Timeslices 6 and 8 (0.6 m – 0.77 m to 0.84 m – 1.01 m).

3.5.33 There are three bands of high amplitude response that extend east to west across Area 16. These are visible between Timeslices 3 and 12 (0.24 m – 0.41 m to 1.31 m – 1.48 m) and are likely related to the superficial head deposits recorded in the area [20]. In addition, several other high amplitude anomalies and linear trends are identifiable. Most of these are likely related to stones and ploughing trends.

3.5.34 Figures 41 – 42 focus on the areas of the GPR survey covering the building identified at 7300. For this, a new set of Timeslices were made to enhance the finer details of any features contained within this area. The selected Timeslices also focus on the upper part of this dataset where most the responses occur. In addition aspects of the results labelled on Figure 42 (A – H) in order highlight specific interpretations.

3.5.35 The form of the building is typically Roman in appearance, constructed of three corridors (B, C, D) surrounding an 11.5 m x 6 m courtyard (A). A high amplitude response (E) can be identified within the courtyard could relate to a well, or another pit-like feature extending to significant depth. A possible entrance to the building lies to the east of the courtyard at F, where a gap (2 m) can be seen in the eastern wall of the building, opening into a smaller courtyard or room (4.5 m x 6 m). Within the north-eastern corner of the possible smaller courtyard a 1.5 m square room (G) has been identified. A similar 1.5 m x 1 m (H) area of high amplitude can be also seen externally to the north-west of the building.

3.5.36 The central courtyard (A) is the first clearly delineated feature in the timeslices. It is first identified in Timeslice 4 (0.32 m – 0.47 m) and is visible down to Timeslice 14 (1.41 m – 1.56 m). The walls of the courtyard structure are approximately 0.8 m thick. Gaps can be seen in the south-western and north-eastern extents of this wall, suggesting that these may have been entrances. However, it is also possible that these may represent greater levels of plough damage. It is likely that there would be further entrances and doorways throughout the building, but these are not easily identifiable as the GPR is likely detecting the foundations of the walls at a similar level.

3.5.37 The corridor to the north of the courtyard (B) is approximately 17 m long and 3 m wide. Five individual rooms can be discerned from the data, although it is possible that there may be further divisions. These rooms vary in size from 1.5 m x 3 m to 4 m x 3 m. The external wall of the building (north side of the corridor) is approximately 1 m thick, with the internal walls approximately 0.8 m thick. These
are visible as high amplitude responses between Timeslices 4 and 14 (0.32 m – 0.47 m to 1.41 m – 1.56 m).

3.5.38 The western corridor (C) is approximately 3.5 m x 13 m. A 5 m long, high amplitude linear response extends down the centre of this corridor southwards from the northern extent of the corridor and may relate to the small external structure identified at (H). Alternatively, it could relate to a drain or other possible structural feature. The features relating to this western corridor are visible between Timeslices 5 and 19 (0.43 m – 0.58 m to 1.95 m – 2.1 m). There are no other divisions apparent within this area and the external wall (west side of corridor) is approximately 1 m thick.

3.5.39 The southern corridor (D) is approximately 17 m x 3 m. There are no clear divisions within the corridor, although a low amplitude linear anomaly has been identified at the eastern end of the corridor in Timeslice 13 (1.3 m – 1.45 m). Given the depth of this and the distance from the end of the corridor (1 m) it seems likely that this feature lies below the floor surface of the building rather than representing a wall. As with the other corridors the external wall is approximately 1 m thick, although it does appear to bow outwards at the centre. This is likely related to a spread of rubble around the wall caused by plough damage, rather than a representation of how the wall would once have stood. Anomalies relating to the corridor can be seen in Timeslices 4 to 14 (0.32 m – 0.47 m to 1.41 m – 1.56 m).

3.5.40 The high amplitude response (E) within the central courtyard forms a rounded 3 m square. The anomaly appears to abut the southern wall of the courtyard, 4.5 m from the western wall. This anomaly is composed of complex responses that ring down through the radargrams, indicative of a void. The narrow nature of the feature suggests this is a shaft, likely related to a well. This anomaly is seen in the data from Timeslice 4 (0.32 m – 0.47 m) downwards.

3.5.41 The possible entrance (F) lies immediately east of the central courtyard. It is not possible to determine from the geophysical data alone whether this would have been a further courtyard or a covered room. The 2 m gap in the eastern wall is likely the main entrance to the building, with no other such gaps visible in the external wall. The anomalies in this area are visible in Timeslices 4 to 11 (0.32 m – 0.47 m to 1.08 m – 1.23 m).

3.5.42 Within the entrance room/courtyard a small square anomaly (G) has been identified. This lies in the north-eastern corner and likely relates to a small room, however there is a 4 m southerly projection from the south-western corner of the room that is harder to interpret. This projection is approximately 1.8 m wide and does not appear to connect to any other part of the building. It is possible that this is a structure lying below the floor surface of the building, although its purpose is unclear. It is possible that a broad area of high amplitude responses in Timeslices 4 to 6 (0.32 m – 0.47 m to 0.54 m – 0.69 m) relates to the floor surface of the building, although this cannot be confirmed without further investigation. If this were the case then the projection would lie below this, seen in Timeslices 8 to 16 (0.76 m – 0.91 m to 1.62 m – 1.77 m). The small square building is seen in Timeslices 6 to 17 (0.54 m – 0.69 m 1.73 m – 1.88 m).

3.5.43 The roughly square anomaly (H) to the north-west of the building is also of uncertain function. Whilst it is likely a walled structure, it is not possible to
determine whether it would have been a covered room or an open area. The structure appears to abut the external wall of the building, suggesting its function is associated. One possible explanation is that it is a furnace, perhaps part of a hypocaust system. However, there is no evidence of burning in the gradiometer data. As previously stated, this feature appears to extend into the western corridor (C). Further investigation would be required to determine the relationship between this structure and the rest of the building. Anomalies relating to the structure are visible in Timeslices 11 to 14 (1.08 m – 1.23 m to 1.41 m – 1.56 m).

3.5.44 As well as the anomalies relating to walls and other structures, broader high amplitude anomalies have been identified across the building area. These may relate to the former floor surfaces of the building; however further investigation would be required to confirm this. These anomalies increase in depth from east to west, being first seen at Timeslice 4 (0.32 m – 0.47 m) in the east and Timeslice 9 (0.87 m – 1.01 m) in the west. This may be due to topographical changes, the west lying on higher ground than the east.
4 Discussion

4.1 Gradiometer survey

4.1.1 The detailed gradiometer survey has been successful in detecting a high density of anomalies of archaeological origin across the Scheme. The anomalies are primarily ditch-like features, which take a number of forms and date to a variety of periods. These largely correspond with known, archaeological remains derived from aerial sources and represent complexes of prehistoric monuments. However, several previously unrecorded archaeological features have also been identified.

4.1.2 Several former field boundaries were identified which correlate with OS mapping and aerial photography for the Scheme. Areas of increased magnetic response, superficial geological deposits, agricultural ploughing trends, and numerous modern services were also located.

4.1.3 The largest area of the Scheme is SW5. The results of the gradiometer survey over this area are dominated by extensive remains of a field system visible as positive and negative linear anomalies. These correspond extremely well with cropmarks previously identified on aerial photographs, revealing a complex rectilinear arrangement. Although there are significantly more linear features mapped from the aerial photography, it is likely that many of these are associated with extensive ploughing that has also been identified within the gradiometer survey results. The field system is of unknown date, but it is possible that some of this is associated with agricultural activity within the later prehistoric to Romano-British periods.

4.1.4 Elsewhere within SW5 there are several other anomalies which may have their origins in the mid-late Bronze Age. In the west, this includes 6017, which may extend from the Oatlands Hill settlement located c. 500 m to the north-west of the area. In the east, part of a linear boundary that extends from the south-east of Winterbourne Stoke crossroads to south-west of The Diamond on Wilsford Down (NHLE No. 1010837) extends into the survey area. The result of this survey suggest that it may be continuous through to the western edge of the Lake Barrow Group (NHLE No. 1010863) in the south (6021–6022).

4.1.5 In the south-west of SW5, two previously unidentified ring-ditches associated with possible late Neolithic to mid Bronze Age barrows were identified at 6018. This interpretation was later confirmed by the results of the GPR survey.

4.1.6 At 6020, a small rectangular linear feature was identified which has previously been recorded as a post-medieval dew pond. However, it is considered unlikely that the magnetic response of this feature corresponds with such an interpretation. The results of the GPR survey were also inconsistent with the notion of this feature as a pond, and its alternative interpretation as an enclosure has therefore been suggested.

4.1.7 SW6 is located just outside of the WHS, but the gradiometer survey has identified several archaeological features that are likely associated with the ceremonial landscape surrounding Stonehenge. These include at least three previously unrecorded ring-ditches which are associated with the ploughed down remains of probable Bronze Age round barrows (6100–6102). In addition, there are two
further possible examples of such remains (6103–6104), but these are much more poorly defined. These were all subsequently investigated by GPR survey and are therefore discussed in more detail with reference to the GPR results.

4.1.8 To the north-west of SW6, cropmarks have been identified that are associated with the Romano-British settlement on Oatlands Hill. The gradiometer survey does not identify any features likely associated with a more southerly extension of this and the only linear features are three amorphous bands of increased magnetic response (6107–6109). It is suggested that these are more likely to be associated with undated field systems to the south-west of the area.

4.1.9 Within SW7 a number of linear features have been distinguished as archaeological features. In the west of the area, these are representative of possible lynchets that are also visible as indistinct cropmarks and low earthworks on aerial photographs. These are possibly of medieval or post-medieval date, but may have earlier origins. In the central field at SW7, several ditch-like features have been identified on a similar alignment to a field system visible on aerial photography directly to the north (6203–6206). These are undated, but most likely represent a southerly continuation of these former fields.

4.1.10 Across the remainder of SW7, there are several other linear anomalies, which may be associated with archaeological remains. It is possible that these could be associated with ditch-like or lynchet features, but this is not clear from the results of this survey alone. Moreover, it is equally possible that they are of a modern agricultural origin as many of them are positioned on an alignment similar to that of the existing field boundaries. In the east of SW7 ferrous responses become increasing dense and, as the area lies within the southern part of the WWII Oatlands Hill aerodrome, it is possible this is associated with military activity.

4.1.11 SW8 is located at the western limit of the scheme. Perhaps the clearest evidence of archaeological remains is located at 6300. Here there is a rectangular arrangement of negative linear anomalies, which is representative of structural remains. There are no corresponding features on aerial photography or historic mapping, and the structure is not identified within the HER. Roman finds have; however, been identified in close proximity to the Site, and the layout of these remains is consistent with a building of Romano-British date. However, a later date cannot be ruled out and it is possible that it could relate to a medieval or post-medieval farmstead.

4.1.12 On roughly the same orientation as 6300, there are also a series of ditch-like features forming a probable enclosure surrounding these structural remains. Within this there are several pit-like features, which are likely associated with extramural activity associated with the structure.

4.1.13 To the north-west of 6300, six roughly circular areas of increased magnetic response have also been identified (6324–6329). These are considered most likely to be associated with superficial geological deposits, probably relating to solution hollows. However, given the propensity of archaeological remains of a curvilinear or circular nature within the WHS, an archaeological origin cannot be ruled out.

4.1.14 Within the north-west of SW8 there is a concentration of linear features. These are associated with field systems of an unknown date that are also visible as indistinct cropmarks on aerial photography. Similar features across the remainder
of SW8 are also likely to be associated with such remains and there is widespread evidence of ridge and furrow ploughing.

4.2 GPR survey

4.2.1 The main aim of the GPR survey was to improve the understanding of the extent and character of key features previously identified by the detailed gradiometer survey. It also aimed to establish whether any change to the interpretation is needed on the basis that further significant features are present within these survey areas.

4.2.2 In SW5 two areas were selected for GPR survey (Area 9 and 10). Area 9 was positioned over two probable Bronze Age round barrows located very close to one another in the gradiometer survey. These were also identified by the GPR survey which suggested that the features were extremely ploughed down with each ring-ditch intermittently detected. In addition to this, some possible internal features were also detected that were not visible in the gradiometer survey of the area.

4.2.3 Area 10 was situated over a rectilinear anomaly identified in the gradiometer survey that is also recorded in the NHRE as a post-medieval pond, however the magnetic response was not that which would be expected from a backfilled pond, and this is also the case with the result of the GPR survey. This suggests that this feature is more likely associated with a small enclosure for agricultural use and is not a pond.

4.2.4 The GPR survey of five areas in SW6 (Areas 11 – 15) has detected several features, which are likely to be associated with archaeological remains. These all relate to probable funerary monuments in the form of Bronze Age round barrows. Within Area 11, 13, and 15 ring-ditches associated with probable Bronze Age barrows were detected as high amplitude responses. These were all present within a similar depth range of c. 0.4 – 0.6 m below the ground surface. This suggests that the barrows are relatively shallow and have been badly affected by modern ploughing. However, several internal features have also been identified by the GPR survey and this has added to our understanding of the probable character of the monuments.

4.2.5 Within the gradiometer survey of SW6 two additional ring-ditches were hypothesised. These were targeted in the GPR survey of Area 12 and 14, however no corresponding responses were identified. This suggests that the anomalies identified in the gradiometer data are more likely associated with modern ploughing activity as opposed to archaeological remains.

4.2.6 The GPR survey of a large area within SW8 was positioned over a rectilinear building and several circular anomalies identified in the gradiometer survey. The results from the area surrounding the building provided a considerable amount of detail regarding the probable layout of the structure. It enabled the clearer identification of individual rooms, divisions, possible floor surfaces, entrances, and a possible well. It also displayed that there is probably a considerable amount of building debris surrounding the structure caused by extensive ploughing in the area.

4.2.7 The circular anomalies in the north-west of Area 16 were also corroborated by the GPR survey results, and were shown to be most likely of geological origin.
However, the possibility that these features contain archaeological material cannot be discarded.

4.3 Conclusion

4.3.1 In conclusion, the detailed gradiometer survey has been successful in fulfilling the overarching geophysical survey objectives. The targeted GPR survey of the salient archaeological features resulting from this has also helped to define their extent and character. Both datasets corroborate each other and have also shown that a significant amount of plough damage has occurred across these survey areas. While it is impossible to comment precisely on phasing and dating, the surveys have assisted in the recognition of an extensive range of additional archaeological features. This, therefore adds to our knowledge of the development of the prehistoric and historic landscape within, and adjacent to, the WHS.

4.4 Recommendations

4.4.1 Following the results of the geophysical survey, any route to the south of Winterbourne Stoke will require further archaeological investigation to determine the significance, extent, and survival of archaeology identified by this phase of geophysical survey. A written scheme of investigation (WSI) should be produced for any proposed evaluation work and submitted for approval to the Wiltshire Council Archaeological Service (WCAS), acting on behalf of the Local Planning Authority, Wiltshire Council (WC), prior to the commencement of the ground works.

4.4.2 Additionally, it is recommended that further data should be collected during any future trial trenching in this area from the locations identified as superficial archaeology / potential spreads, to ensure that these responses are not masking weaker archaeological responses. Trenches should also be planned to investigate areas where no anomalies of potential archaeological interest have been identified within the Site.
5 Figures
Figure 1 Site location and survey extents

Location of geophysical survey areas

Date: 03/06/2017  
Revision Number: 0

Scale: 1:25,000 & 1:250,000 @ A3  
Illustrator: RG

Path: X:\PROJECTS\111320\Graphics_Office\Rep_figs\Geophysics\2017_06_03
Figure 4 SW5 south-east: Greyscale plot
Figure 8 SW5 south-east: Interpretation
Figure 9 SW5 north-east: Interpretation
Figure 12 SW6 west: Interpretation
Figure 19: SW8 central: Greyscale plot.
Figure 20 SW8 east: Greyscale plot
Figure 24 SW6 GPR Survey location
Figure 25 SW5 GPR Area 9: Greyscale Timeslices

Timeslice 3: 2.46 – 5.85 ns (0.11 – 0.27 m)

Timeslice 4: 7.37 – 10.76 ns (0.34 – 0.49 m)

Timeslice 6: 12.28 – 15.68 ns (0.56 – 0.71 m)

Timeslice 7: 14.74 – 18.13 ns (0.67 – 0.83 m)

Timeslice 10: 22.11 – 25.5 ns (1.01 – 1.16 m)

Detailed Gradiometer Survey - Greyscale Plot

GPR Survey results - SWS Area 9: Greyscale Timeslices
Figure 26 SW5 GPR Area 9: Interpretation

Timeslice 3: 2.46 – 5.85 ns (0.11 – 0.27 m)

Timeslice 4: 7.37 – 10.76 ns (0.34 – 0.49 m)

Timeslice 6: 12.28 – 15.68 ns (0.56 – 0.71 m)

Timeslice 7: 14.74 – 18.13 ns (0.67 – 0.83 m)

Timeslice 10: 22.11 – 25.5 ns (1.01 – 1.16 m)

Graphical summary of GPR survey results - Area 16
Figure 27 SW5 GPR Area 10: Greyscale Timeslices

Timeslice 4: 7.37 – 10.76 ns (0.32 – 0.46 m)

Timeslice 5: 9.83 – 13.22 ns (0.42 – 0.57 m)

Timeslice 7: 14.74 – 18.13 ns (0.63 – 0.78 m)

Timeslice 10: 22.11 – 25.5 ns (0.95 – 1.10 m)

Timeslice 15: 34.39 – 37.79 ns (1.48 – 1.62 m)

Coordinate system:
OSGB36 (OSTN15/OSGM15)

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Figure 28 SW5 GPR Area 10: Interpretation

Timeslice 4: 7.37 – 10.76 ns (0.32 – 0.46 m)
Timeslice 5: 9.83 – 13.22 ns (0.42 – 0.57 m)
Timeslice 7: 14.74 – 18.13 ns (0.63 – 0.78 m)

Timeslice 10: 22.11 – 25.5 ns (0.95 – 1.10 m)
Timeslice 15: 34.38 – 37.79 ns (1.48 – 1.62 m)

Graphical summary of GPR survey results - Area 10

GPR Survey results - SW5 Area 10: Greyscale Timeslices
Figure 29 SW6 GPR Area 11: Greyscale Timeslices

Timeslice 2: 2.52 – 5.39 ns (0.09 - 0.20 m)

Timeslice 4: 7.55 – 10.42 ns (0.28 - 0.39 m)

Timeslice 5: 10.06 – 12.93 ns (0.38 – 0.49 m)

Timeslice 9: 20.13 – 23.00 ns (0.75 – 0.86 m)

Timeslice 14: 32.71 – 35.58 ns (1.23 – 1.33 m)

GPR Survey results - SW6 Area 11: Greyscale Timeslices
Figure 31 SW6 GPR Area 12: Greyscale Timeslices

- Timeslice 3: 5.05 – 7.92 ns (0.19 – 0.30 m)
- Timeslice 7: 15.15 – 18.02 ns (0.57 – 0.68 m)
- Timeslice 14: 32.83 – 35.70 ns (1.23 – 1.34 m)

GPR Survey results - SW6 Area 12: Greyscale timeslices
Figure 32 SW6 GPR Area 12: Interpretation

Timeslice 3: 5.05 – 7.92 ns (0.19 – 0.30 m)

Timeslice 7: 15.15 – 18.02 ns (0.57 – 0.68 m)

Timeslice 14: 32.83 – 35.70 ns (1.23 – 1.34 m)

Graphical summary of GPR survey results - Area 12
Figure 33 SW6 GPR Area 13: Greyscale Timeslices

Timeslice 2: 2.58 – 5.45 ns (0.10 – 0.21 m)

Timeslice 5: 10.33 – 13.20 ns (0.40 – 0.51 m)

Timeslice 6: 12.92 – 15.79 ns (0.50 – 0.62 m)

Timeslice 9: 20.66 – 23.53 ns (0.81 – 0.92 m)

Timeslice 14: 33.58 – 36.45 ns (1.31 – 1.42 m)

Digital image of GPR results - SW6 Area 13: Greyscale plots

Coordinate system: OSGB36 (OSNT15/OSGM15)

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Date: 07/09/2017
Revision Number: 1
Scale: 1:300 at A3
Illustrator: NLC
Path: X:\PROJECTS\11323\GPR\FigMXD\GPR
Figure 34 SW6 GPR Area 13: Interpretation

Timeslice 2: 2.52 – 5.39 ns (0.09 – 0.20 m)
Timeslice 5: 10.10 – 12.97 ns (0.38 – 0.49 m)
Timeslice 6: 12.63 – 15.50 ns (0.47 – 0.58 m)

Timeslice 9: 20.21 – 23.08 ns (0.76 – 0.87 m)
Timeslice 14: 32.83 – 35.70 ns (1.23 – 1.34 m)

Graphical summary of GPR survey results - Area 13

GPR Survey results - SW6 Area 13: Interpretations
Figure 35 SW6 GPR Area 14: Greyscale timeslices

Timeslice 2: 2.53 – 5.40 ns (0.10 – 0.21 m)

Timeslice 6: 12.63 – 15.50 ns (0.49 – 0.60 m)

Timeslice 14: 32.83 – 35.70 ns (1.28 – 1.39 m)

Detailed Gradiometer Survey - Greyscale plot
Figure 36 SW6 GPR Area 14: Interpretation

Timeslice 2: 2.53 – 5.40 ns (0.10 – 0.21 m)

Timeslice 6: 12.63 – 15.50 ns (0.49 – 0.60 m)

Timeslice 14: 32.83 – 35.70 ns (1.28 – 1.39 m)

Graphical summary of GPR survey results - Area 14
Figure 37 SW6 GPR Area 15: Greyscale Timeslices

Timeslice 2: 2.56 – 5.43 ns (0.10 – 0.21 m)

Timeslice 5: 10.26 – 13.13 ns (0.41 – 0.51 m)

Timeslice 8: 17.95 – 20.82 ns (0.71 – 0.82 m)

Timeslice 10: 23.08 – 25.95 ns (0.91 – 1.02 m)

Timeslice 14: 33.33 – 36.20 ns (1.32 – 1.43 m)

Detailed GPR Survey - Greyscale plot
Figure 38 SW6 GPR Area 15: Interpretation

Timeslice 2: 2.56 – 5.43 ns (0.10 – 0.21 m)

Timeslice 5: 10.26 – 13.13 ns (0.41 – 0.51 m)

Timeslice 8: 17.95 – 20.82 ns (0.71 – 0.82 m)

Timeslice 10: 23.08 – 25.95 ns (0.91 – 1.02 m)

Timeslice 14: 33.33 – 36.20 ns (1.32 – 1.43 m)

Graphical summary of GPR survey results - Area 15
Figure 39 SW8 GPR Area 16: Greyscale Timeslices

Timeslice 2: 2.49 – 6.02 ns (0.12 – 0.29 m)

Timeslice 4: 7.47 – 11.0 ns (0.36 – 0.53 m)

Timeslice 7: 14.94 – 18.47 ns (0.72 – 0.89 m)

Timeslice 9: 19.92 – 23.45 ns (0.96 – 1.13 m)

Timeslice 12: 27.4 – 30.92 ns (1.31 – 1.48 m)
Figure 40 SW8 GPR Area 16: Interpretation
Figure 42 SW8 GPR Area 16: Interpretation (Detailed View)

Timeslice 4: 6.76 – 9.88 ns (0.32 – 0.47 m)

Timeslice 6: 11.26 – 14.39 ns (0.54 – 0.69 m)

Timeslice 7: 13.52 – 16.64 ns (0.65 – 0.8 m)

Timeslice 10: 20.28 – 23.4 ns (0.97 – 1.12 m)

Timeslice 12: 24.78 – 27.9 ns (1.19 – 1.34 m)

Graphical Summary of GPR survey results - Area 16 (Detailed)
Abbreviations List

AAJV  Arup Atkins Joint Venture
CIfA  Chartered Institute for Archaeologists
GPR  Ground Penetrating Radar
GPS  Global Positioning System
NHRE National Record of the Historic Environment
WCAS Wiltshire Council Archaeological Service
WHER Wiltshire Historic Environment Record
WHS World Heritage Site

References


Appendices
Appendix A  Gradiometer Survey: Equipment and Data Processing

A.1 Survey methods and equipment
A.1.1 The magnetic data for this project was largely acquired using a non-magnetic cart fitted with 4x Bartington Grad-01-1000L 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 1m 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.

A.1.1.1 The gradiometers have an effective resolution of 0.03 nT over a ±100 nT range, and measurements from each sensor are logged at a rate of 8 Hz (intervals of c. 0.13 m). All of the data are stored on a Leica Viva CS35 tablet controller using the data acquisition program MLGrad 601. This also collects readings streamed by a Leica GS14 GNSS receiver, which is fixed to the cart at a measured distance from the sensors.

A.1.1.2 The use of the non-magnetic cart has several advantages over the use of the Bartington Grad 601-2 fluxgate gradiometer instrument. Perhaps chief amongst these is that it has a higher sample rate resulting in higher resolution dataset. The addition of the GPS receiver also negates the need to establish a survey grid prior to the survey and therefore increases efficiency. Mounting the instrument on the cart also reduces the occurrence of operator error caused by inconsistent walking speeds and variation in traverse position due to varying ground cover and topography.

A.1.1.3 Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. When not using the handheld Bartington 601-2 dual magnetic gradiometer, both types depend upon the establishment of an accurate 20 m or 30 m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system 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 0.02 m in real-time and therefore exceed the level of accuracy recommended by Historic England [18] for geophysical surveys.

A.1.1.4 Scanning surveys consist of recording data at 0.25 m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

A.1.1.5 The detailed surveys consist of 20 m x 20 m or 30 m x 30 m grids, and data are collected at 0.25 m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20 m or 30 m grid respectively, and are the recommended methodologies for archaeological surveys of this type [18].

A.1.1.6 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
0.125 m intervals along traverses spaced up to 0.25 m apart, resulting in a maximum of 28800 readings per 30 m grid, exceeding that recommended by Historic England [18] for characterisation surveys.

A.2 Post-Processing

A.2.1.1 The magnetic data collected during the detail survey are downloaded from the Bartington 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 to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

A.2.1.2 As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

A.2.1.3 Typical data and image processing steps for the non-magnetic cart fitted system may include:

- Destripe – Removes striping effects caused by directional variation, drift and operational habits. This is achieved by determining the median of each transect and subtracting that value from each data point.
- Discard Overlap – Eliminates portions of the tracks that have been collected too close one another. Without this, the results of the interpolation process can be distorted as very close points with potentially differing values.
- Interpolation – Sets the X and Y interval of the data and the track radius around each data point that is included in the interpolated result.

A.2.1.4 Typical displays of the data used during processing and analysis:

- 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.
- Greyscale – Presents the data in plan 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.
Appendix B  GPR: equipment and data processing

B.1  Survey Methods and Equipment

B.1.1.1 The ground penetrating radar (GPR) data were collected using a cart-based shielded antenna with central frequencies suitable for the types of target being investigated. Lower frequency antennae are able to acquire data from deeper below the surface, whereas higher frequencies allow high resolution imaging of near-surface targets at the expense of deep penetration. The exact make and model of equipment varies.

B.1.1.2 The depth of penetration of GPR systems is determined by the central frequency of the antenna and the relative dielectric permittivity (RDP) of the material through which the GPR signal passes. In general, soils in floodplain settings may have a wide range of RDPs, although around 8 may be considered average, resulting in a maximum depth of penetration c. 2.5m with the GPR signal having a velocity of approximately 0.1m/ns.

B.1.1.3 The GPR beam is conical in shape, however, and whilst most of the energy is concentrated in the centre of the cone, the GPR signal illuminates a horizontal footprint which becomes wider with increasing depth. At the maximum depth of the antenna, it becomes impossible to resolve any feature smaller than the horizontal footprint for the corresponding depth. The size of the footprint is dependent upon central frequency, and its size increases as the central frequency decreases.

B.1.1.4 The vertical resolution is similarly dependent upon the central frequency; for the 500MHz antenna, features of the order of 0.05m may be resolved vertically. Antennae with lower frequencies can therefore penetrate more deeply but are less resolute in both horizontal and vertical directions. Choice of antenna frequency is guided largely by the anticipated depth to the target and the required resolution.

B.1.1.5 GPR data for detailed surveys are collected along traverses of varying length separated by 0.5m with cross lines collected running perpendicular to these traverses at wider separations. The data sampling resolution is governed by the data logger and a minimum separation of 0.05m between traces is collected for all surveys.

B.2  Post-Processing

B.2.1.1 The radar data collected during the detail survey are downloaded from the GPR system for processing and analysis using commercial software (GPR Slice). 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.

B.2.1.2 Typical data and image processing steps may include:

- Gain – Amplifies GPR data based upon its position in the profile, which boosts the contrast between anomalies and background. A wobble correction is also applied during this step;
• Background Filter - is used to remove banding noises that are seen across the radargrams
• Bandpass – Removes GPR data lying outside a specified range, which removes high- and low-frequency noise.

B.2.1.3 Typical displays of the data used during processing and analysis:

• Timeslice – Presents the data as a series of successive plan views of the variation of reflector energy from the surface to the deepest recorded response. The variation in amplitude is represented using a colour scale with red indicating high amplitude and blue indicating low amplitude responses.
• Radargram – Presents each radar profile in a vertical view with distance along the profile expressed along the x axis and depth along the y axis. The amplitude variation is expressed using a greyscale.
Appendix C  Relative Velocity to depth conversion for GPR Areas 9 – 16

Table 1  Velocity values for all GPR Areas

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<th>Area</th>
<th>Velocity m/ns</th>
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<td>SW5B – Area 10</td>
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<td>SW6C – Area 13</td>
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</tr>
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<td>SW6D – Area 14</td>
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</tr>
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<td>SW6E – Area 15</td>
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<td>SW8A – Area 16</td>
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Table 2  Relative velocity to depth conversion SW5A – GPR Area 9 based on a dielectric constant of 10.87 for the 500 MHz antenna at

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<th>Depth (cm)</th>
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Table 3  Relative velocity to depth conversion based on a dielectric constant of 12.17 for the 500 MHz antenna at SW5B – GPR Area 10

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Table 4  Relative velocity to depth conversion based on a dielectric constant of 15.8 for the 500 MHz antenna at SW6A – GPR Area 11

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Table 5  Relative velocity to depth conversion based on a dielectric constant of 15.81 for the 500 MHz antenna at SW6B – GPR Area 12

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Table 6  Relative velocity to depth conversion based on a dielectric constant of 15.58 for the 500 MHz antenna at SW6C – GPR Area 13

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## Table 7  Relative velocity to depth conversion based on a dielectric constant of 14.79 for the 500 MHz antenna at SW6D – GPR Area 14

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<td>12</td>
<td>27.78 – 30.65</td>
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<td>1.18 – 1.29</td>
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<tr>
<td>14</td>
<td>32.83 – 35.70</td>
<td>1.28 – 1.39</td>
</tr>
<tr>
<td>15</td>
<td>35.36 – 38.23</td>
<td>1.38 – 1.49</td>
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<tr>
<td>16</td>
<td>37.89 – 40.76</td>
<td>1.48 – 1.59</td>
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<tr>
<td>17</td>
<td>40.41 – 43.28</td>
<td>1.58 – 1.69</td>
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<tr>
<td>18</td>
<td>42.94 – 45.81</td>
<td>1.67 – 1.79</td>
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<tr>
<td>19</td>
<td>45.46 – 48.33</td>
<td>1.77 – 1.89</td>
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<td>47.99 – 50.86</td>
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## Table 8  Relative velocity to depth conversion based on a dielectric constant of 14.42 for the 500 MHz antenna at SW6E – GPR Area 15

<table>
<thead>
<tr>
<th>Time Slice</th>
<th>Time (ns)</th>
<th>Depth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0 – 2.87</td>
<td>0.0 – 0.11</td>
</tr>
<tr>
<td>2</td>
<td>2.56 – 5.43</td>
<td>0.10 – 0.21</td>
</tr>
<tr>
<td>3</td>
<td>5.13 – 8.00</td>
<td>0.20 – 0.31</td>
</tr>
<tr>
<td>4</td>
<td>7.69 – 10.56</td>
<td>0.30 – 0.42</td>
</tr>
<tr>
<td>Time Slice</td>
<td>Time (ns)</td>
<td>Depth (cm)</td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td>1</td>
<td>0.0 – 3.53</td>
<td>0.0 – 0.17</td>
</tr>
<tr>
<td>2</td>
<td>2.49 – 6.02</td>
<td>0.12 – 0.29</td>
</tr>
<tr>
<td>3</td>
<td>4.98 – 8.51</td>
<td>0.24 – 0.41</td>
</tr>
<tr>
<td>4</td>
<td>7.47 – 11.00</td>
<td>0.36 – 0.53</td>
</tr>
<tr>
<td>5</td>
<td>9.96 – 13.49</td>
<td>0.48 – 0.65</td>
</tr>
<tr>
<td>6</td>
<td>12.45 – 15.98</td>
<td>0.60 – 0.77</td>
</tr>
<tr>
<td>7</td>
<td>14.94 – 18.47</td>
<td>0.72 – 0.89</td>
</tr>
<tr>
<td>8</td>
<td>17.43 – 20.96</td>
<td>0.84 – 1.01</td>
</tr>
<tr>
<td>9</td>
<td>19.92 – 23.45</td>
<td>0.96 – 1.13</td>
</tr>
<tr>
<td>10</td>
<td>22.41 – 25.94</td>
<td>1.08 – 1.25</td>
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<tr>
<td>11</td>
<td>24.91 – 28.43</td>
<td>1.20 – 1.36</td>
</tr>
<tr>
<td>12</td>
<td>27.40 – 30.92</td>
<td>1.31 – 1.48</td>
</tr>
<tr>
<td>13</td>
<td>29.89 – 33.41</td>
<td>1.43 – 1.60</td>
</tr>
<tr>
<td>14</td>
<td>32.38 – 35.91</td>
<td>1.55 – 1.72</td>
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<tr>
<td>15</td>
<td>34.87 – 38.40</td>
<td>1.67 – 1.84</td>
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<td>1.79 – 1.96</td>
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<tr>
<td>17</td>
<td>39.85 – 43.38</td>
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<td>44.83 – 48.36</td>
<td>2.15 – 2.32</td>
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<tr>
<td>20</td>
<td>47.32 – 50.85</td>
<td>2.27 – 2.44</td>
</tr>
</tbody>
</table>

Table 9: Relative velocity to depth conversion based on a dielectric constant of 9.77 for the 500 MHz antenna at SW8 – GPR Area 16
Table 10  Relative velocity to depth conversion based on a dielectric constant of 9.77 for the 500 MHz antenna at SW8 – GPR Area 16 (Detailed view)

<table>
<thead>
<tr>
<th>Time Slice</th>
<th>Time (ns)</th>
<th>Depth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0 – 3.12</td>
<td>0.0 – 0.15</td>
</tr>
<tr>
<td>2</td>
<td>2.25 – 5.37</td>
<td>0.11 – 0.26</td>
</tr>
<tr>
<td>3</td>
<td>4.51 – 7.63</td>
<td>0.22 – 0.37</td>
</tr>
<tr>
<td>4</td>
<td>6.76 – 9.88</td>
<td>0.32 – 0.47</td>
</tr>
<tr>
<td>5</td>
<td>9.01 – 12.13</td>
<td>0.43 – 0.58</td>
</tr>
<tr>
<td>6</td>
<td>11.26 – 14.39</td>
<td>0.54 – 0.69</td>
</tr>
<tr>
<td>7</td>
<td>13.52 – 16.64</td>
<td>0.65 – 0.80</td>
</tr>
<tr>
<td>8</td>
<td>15.77 – 18.89</td>
<td>0.76 – 0.91</td>
</tr>
<tr>
<td>9</td>
<td>18.02 – 21.15</td>
<td>0.87 – 1.01</td>
</tr>
<tr>
<td>10</td>
<td>20.28 – 23.40</td>
<td>0.97 – 1.12</td>
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<tr>
<td>11</td>
<td>22.53 – 25.65</td>
<td>1.08 – 1.23</td>
</tr>
<tr>
<td>12</td>
<td>24.78 – 27.90</td>
<td>1.19 – 1.34</td>
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<td>27.04 – 30.16</td>
<td>1.30 – 1.45</td>
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<tr>
<td>14</td>
<td>29.29 – 32.41</td>
<td>1.41 – 1.56</td>
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<tr>
<td>15</td>
<td>31.54 – 34.66</td>
<td>1.51 – 1.66</td>
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<td>16</td>
<td>33.79 – 36.92</td>
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<tr>
<td>17</td>
<td>36.05 – 39.17</td>
<td>1.73 – 1.88</td>
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<td>18</td>
<td>38.30 – 41.42</td>
<td>1.84 – 1.99</td>
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<td>19</td>
<td>40.55 – 43.68</td>
<td>1.95 – 2.10</td>
</tr>
<tr>
<td>20</td>
<td>42.81 – 45.93</td>
<td>2.05 – 2.20</td>
</tr>
</tbody>
</table>
Appendix D  Geophysical interpretation

D.1.1.1  The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural and uncertain origin/geological.

D.1.1.2  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.

D.1.1.3  For the interpretation of GPR datasets two additional categories are also employed:

- High Amplitude – used for features which give a notably high amplitude response but display no discernible patterns.
- Low Amplitude – used for features which give a notably low amplitude response but display no discernible patterns.

D.1.1.4  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.
- Coherent ferrous – used for anomalies caused by ferrous material that can be directly linked to a specific or known 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.

D.1.1.5  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.

D.1.1.6  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.