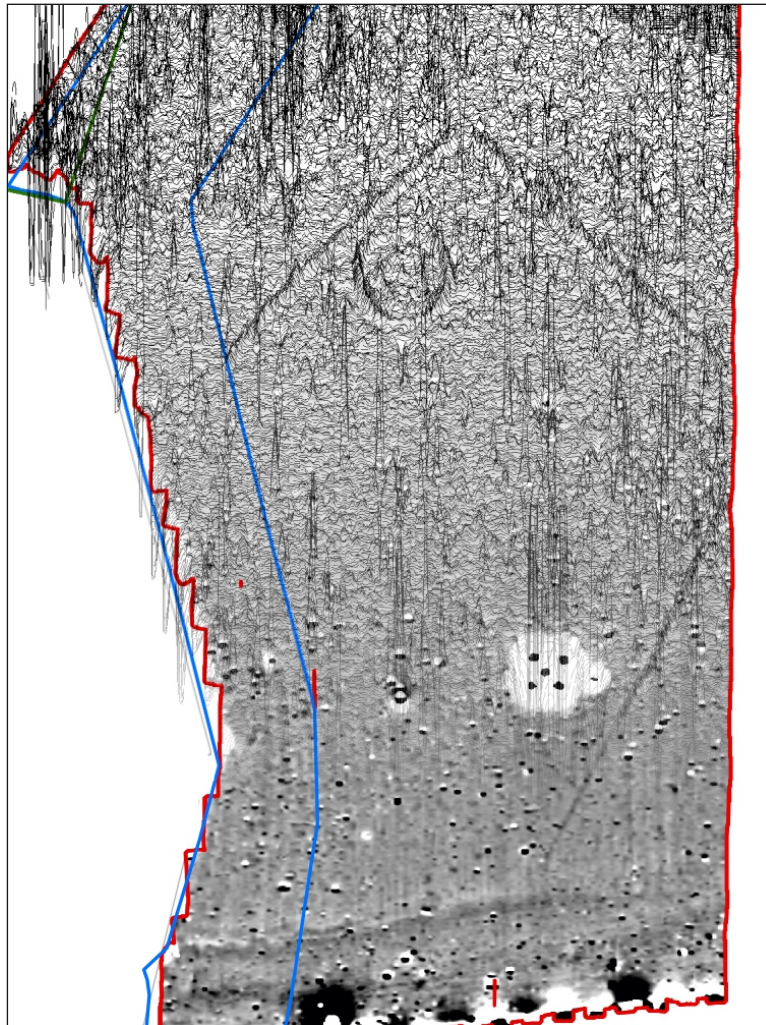




Larkhill SFA Haul Road, Larkhill, Wiltshire

Detailed Gradiometer Survey Report



Ref: 115980.01
March 2017



**Larkhill SFA Haul Road,
Larkhill, Wiltshire**

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land at Larkhill, Wiltshire (centred on NGR 414583, 144569). The project was commissioned by Lovell with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as a haul road and any associated infrastructure. These works form part of the wider Army Basing Programme and form the eastern part of the new area of Serviced Family Accommodation (SFA) at Larkhill.

The site comprises an irregular shaped survey area across two arable fields located between the villages of Larkhill and Durrington in Wiltshire, covering an area of 13.6 ha. The geophysical survey was undertaken on 13th – 18th February 2017. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of archaeological interest.

The anomalies identified as being of archaeological interest predominantly comprise ditch-like features and take a range of forms and are likely date to a variety of periods. They are located both within the specific route of the proposed haul road at Larkhill SFA and areas immediately adjacent.

A total of four ring-ditches have been located in the centre of the survey area. Some of these correspond to cropmarks clearly visible on modern satellite imagery, but are not recorded within the HER, despite being located directly north of the Stonehenge WHS. The ring-ditches are also intersected by a three-sided recti-linear ditched enclosure and it is suggested that these features form part of an extensive barrow cemetery of a possible Bronze Age date.

A number of pit-like features have also been detected within both within and surrounding these prehistoric features. Though many of these are poorly defined and are not arranged in any discernible pattern, they may be archaeological in origin.

In the south-west corner of the Site, there are two parallel ditches on a north-west – south-east alignment. These correspond with similar features identified in previous investigations and are therefore interpreted as a continuation of a prehistoric Wessex linear identified to the north-west.

In the north of the survey area, three fragmented former boundary ditches or land divisions have been detected, the precise date of which is not clear. However, as they do not appear on available historic mapping of the area, it is likely that they are archaeological in origin.

Several anomalies have been interpreted as superficial geological deposits. This includes two recorded areas of Head - Clay, Silt, Sand and Gravel (BGS 2017), as well as three circular anomalies interpreted as geological solution hollows (sink holes). In addition, areas of ferrous disturbance, increased magnetic response, agricultural ploughing trends and numerous modern services were also located.



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Acknowledgements

Wessex Archaeology would like to thank Lovell for commissioning the geophysical survey. The assistance of Rob Bartlett is gratefully acknowledged in this regard.

The fieldwork was undertaken by Rok Plesnicar and Adrian Serbanescu. Alexander Schmidt and Nicholas Crabb processed and interpreted the geophysical data and also wrote this report. The geophysical work was quality controlled by Tom Richardson and Lucy Learmonth and Illustrations were prepared by Nicholas Crabb. The project was managed on behalf of Wessex Archaeology by Simon Cleggett.



Larkhill SFA Haul Road, Larkhill, Wiltshire

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1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Lovell to carry out a geophysical survey at Larkhill, Wiltshire (hereafter “the Site”), centred on NGR 414583, 144569 (**Figure 1**). The survey forms part of a programme of archaeological works at Larkhill SFA for a proposed haul road and associated works. These works are part of the wider Army Basing Programme and form the eastern portion of the new area of Serviced Family Accommodation (SFA) at Larkhill.

1.1.2 This Site and the western part of the Larkhill SFA have already been subject to a number of archaeological investigations which have highlighted the potential for remains from the prehistoric through to the Second World War. The Site itself also lies immediately to the north of the Stonehenge, Avebury and Associated Sites World Heritage Site (WHS).

1.2 Scope of Document

1.2.1 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data. This is intended to inform subsequent archaeological supervision of ground stripping and the investigation and recording of any impacted archaeological remains.

1.3 The Site

1.3.1 The Site is located east of the village of Larkhill and approximately 14 km north of Salisbury, and 3 km north-west of Amesbury in the County of Wiltshire. This is also located to the east of Larkhill Camp, one of the main military facilities contained within the Defence Training Estates on Salisbury Plain.

1.3.2 The overall SFA area covers an area of approximately 23.14 ha and is located at the head of a dry valley that extends north-east towards the River Avon. The specific survey area presented within this report is located to the south and east of this and consists of a 13.6 ha area of agricultural land, currently a mix of arable and scrub. The area has open boundaries within a single field. Residential properties in the villages of Larkhill are to the west, and Durrington to the east. The Stonehenge Golf Centre lies to the south-west of the survey area and there is further agricultural land to the north.

1.3.3 The Site is on a slight south-west incline sloping from approximately 125 m above Ordnance Datum (aOD) at the south-western edge to approximately 91 m aOD at the north-eastern extent. The north of the Site is also situated in a slight valley, which begins to rise gradually immediately north of the survey area.



- 1.3.4 Overhead cables traverse the Site to the eastern edge of the field, on a north – south orientation. There are no water courses within the survey area, however the River Avon lies approximately 1.5 km to the east and 0.8 km to the south-east.
- 1.3.5 The solid geology is mapped as Cretaceous chalk of the Seaford Chalk Formation, with no overlying superficial geological deposits recorded across the majority of the Site. However, there are two bands of clay, silt, sand and gravel Head deposits traversing the north and south of the survey area (BGS 2015).
- 1.3.6 The soils underlying the Site are likely to consist of grey rendzinas of the 342a (Upton 1) association (SSEW SE Sheet 6 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.



2 ARCHAEOLOGICAL BACKGROUND

2.1 Introduction

2.1.1 An Archaeological Desk-Based Assessment (DBA) was prepared by WA for the land at Larkhill (Project Allenby/Connaught) which examined the potential for the survival of buried archaeological remains within the development area and a 1 km Study Area (DBA; WA 2013, revised 2014). The following background is not exhaustive, but is summarised from aspects of the DBA that are considered relevant to the interpretation of the geophysical survey data.

2.2 Summary of the archaeological resource

2.2.1 The Site is situated around 2km to the east of Stonehenge, and is directly north of the World Heritage Site (WHS) landscape, an area renowned for its rich and outstanding archaeological evidence for human activity from early prehistory onwards.

2.2.2 A combination of crop mark evidence from aerial photographs and archaeological fieldwork has identified extensive traces of multi-period activity associated with Durrington Walls located approximately 575 m south-east of the Site. Given the nature and density of prehistoric archaeology in the study area, the DBA suggests that further ceremonial and funerary monuments may once have existed in the area surrounding the Site.

2.2.3 Some of the settlements identifiable from crop mark evidence are likely to be in use during Iron Age and Romano-British periods, however, securely dated evidence for activity that corresponds to this is extremely sparse across the study area.

2.2.4 There appears to have been a substantial shift in land-use across the study area over the course of the Anglo-Saxon period. The extensive field systems covering the downs that were characteristic of later prehistory and the Romano-British periods were replaced with a pattern of settlements on the valley floors utilising a regime of open field agriculture on the lower slopes of the river valleys and open grazing land on the intervening downs.

2.2.5 Much of Salisbury Plain is thought to have continued to be used as pasture in the post-medieval period and historic mapping for the Site supports this. In the 20th century Larkhill was the site of a series of temporary practice camps. No permanent structures were built at the camp until 1914, when the replacement of the temporary barracks with hatted accommodation commenced. The outbreak of the First World War led to a rapid acceleration in the development of the camp.

2.2.6 Further information of the archaeological background can be found within the DBA (WA2013a) and the archaeological evaluation and geophysical reports (WA 2014a-h; WA 2015a-b). The information available in these documents will be referred and referenced as required during the interpretation of the gradiometer data from this survey.

2.3 Recent investigations in the area and the immediate vicinity

Geophysical survey

2.3.1 Several phases of detailed gradiometer survey were undertaken by Wessex Archaeology's in-house geophysics team in 2014 and 2016 (WA 2014a & b; WA 2016a). This was successful in identifying anomalies of archaeological interest as well as a large number of coherent ferrous responses. It identified a number of features associated with the prehistoric landscape of the area as well as several features thought to relate to use of the area for military training.

- 2.3.2 A large area covering the northern part of the Site, was previously surveyed using caesium vapour sensors in 2014. The most interesting anomalies were detected in the northern portion of the survey area, which lies outside of the haul road Site boundary. These were interpreted as two probable round barrows and a possible long barrow. Though no relationship can be inferred between these features from the geophysical survey alone, it is suggested that their location is not entirely coincidental, and that they may form part of a larger group of monuments.
- 2.3.3 Other features of potential archaeological interest detected by the geophysical survey included three large circular anomalies, which were aligned north-east to south-west along a broad linear dry river valley. These were interpreted as geological features such as solution hollows, however they were also considered to be of probable archaeological interest due to their size and magnetic response, and is not uncommon for such features to contain archaeological deposits.
- 2.3.4 In addition, several linear anomalies identified by the geophysical survey were also considered to be of potential archaeological interest. These are also included within the boundary of the haul road Site.

Trial Trench Evaluation

- 2.3.5 In March and April 2015, 107 trial trenches were excavated across the proposed development area, with 68 trenches in the West SFA and 39 in the East SFA (WA 2015). These trenches were positioned to investigate the results of the 2014 geophysical survey.
- 2.3.6 Evidence of Neolithic activity revealed by the evaluation was limited to a very small quantity of pottery. This low density of material was considered to be at odds with the quantities of material and density of activity known in the immediate surrounding area, suggesting that either evidence has been destroyed or exists in areas not targeted by evaluation.
- 2.3.7 Trench 88, in the south-eastern corner of the Site, contained a round barrow of probable Early to Middle Bronze Age date. Bronze Age material was also recovered from two natural sinkholes in Trenches 107 and 112, which corresponded with two of the three large anomalies detected during the earlier geophysical survey.
- 2.3.8 Widespread traces of field systems and enclosures of Middle and Late Bronze Age date were identified in the West SFA area. There was little settlement evidence to accompany these, although there was a grave in Trench 29 and a scatter of other ditches and pits across the evaluated area. Late Bronze Age and Iron Age enclosures and other features such as pits were found in Trenches 43-45 and 67, indicating a shift in the main foci for domestic activity. Two possible Iron Age pits were also recorded in Trench 102, located within the East SFA area.
- 2.3.9 A series of undated ditches and gullies were revealed in Trenches 69, 70 and 72, in the southern part of the Site, to the west of the Stonehenge Golf Centre. One of these features contained pottery identified as Late Bronze Age or Early Iron Age in date.
- 2.3.10 Evidence of Romano-British activity was limited to a system of lynchets encountered in trenches within the West SFA area. These were of different form, and on a different alignment to the prehistoric fields, suggesting a re-establishment of the agricultural landscape at some point around the Roman conquest.
- 2.3.11 A large number of modern features were observed within SFA West, most of which were military in origin, with 51 of the 68 trenches containing military training related archaeology in the form of practice trenches associated with preparations for both World Wars, as well



as from the inter- and post-war years. Remains related to barrack blocks as well as drainage and landscaping associated with other buildings were also identified.

Archaeological Excavation

- 2.3.12 Following on from the trial trench evaluation, several areas were proposed for strip, map and record excavation across both SFA areas. Excavation of the SFA West area, which is currently (March 2017) ongoing, yielded the remarkable discovery of part of a previously unrecorded Early Neolithic causewayed enclosure, the remainder of which extends beyond the excavation area, and into the existing perimeter of Larkhill Camp. The enclosure is broadly contemporary with Robin Hood's Ball, an analogous site located approximately 4 km north-west of Stonehenge, and is therefore amongst the earliest forms of monumental construction known in the vicinity of the WHS.
- 2.3.13 Other features investigated to date during the excavation of the SFA West area include a number of Early Bronze Age burials accompanied with Beaker pottery. Also in this area, a pit containing multiple prehistoric burials, Iron Age pits and a sub-rectangular prehistoric enclosure have been located.
- 2.3.14 The excavation of both SFA areas also uncovered an extensive complex of military practice trenches dating to the First World War along with several potential Second World War gun emplacements.
- 2.3.15 An excavation area within the south-eastern part of the SFA East area was targeted on a possible Bronze Age barrow identified in the geophysical survey and archaeological evaluation. This has been identified as a possible hengiform feature with views across toward prehistoric sites at Durrington Walls and Woodhenge (forthcoming client report). This feature may be associated with a number of other possible ring ditches, which are visible as cropmarks to the south-east of the Site on modern satellite imagery.



3 METHODOLOGY

3.1 Introduction

3.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 13th - 18th February 2017. Field conditions at the time of the survey were good with ploughed and rolled ground, and mostly dry conditions throughout the period of survey. All available areas were surveyed, aside from a small area to the north-east, which was deemed unsuitable for survey as it is currently in use a farm yard. A total coverage of 13.6 ha was achieved, with an additional area outside the site boundary surveyed to ensure total coverage and provide a better context for the results.

3.1.2 A small area in the south-eastern extent of the Site was not surveyed as this has been previously covered in by gradiometer survey (WA 2014), and has subsequently been covered by Trial Trench Evaluation (WA 2015).

3.2 Aims and objectives

3.2.1 The aims of the survey comprise the following:

- to conduct a detailed survey covering as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site;
- to determine the general nature of the remains present.

3.3 Fieldwork methodology

3.3.1 The detailed gradiometer survey was undertaken over all eight sites using Bartington Grad-01-1000L gradiometers at 1 m intervals mounted on either a non-magnetic cart or on a hand-held frame with an effective sensitivity of 0.03 nT. Data will be collected at 0.25 m intervals along transects spaced 1 m apart, in accordance with Historic England guidelines (2008).

3.4 Data processing

3.4.1 Data from the survey was subject to minimal data correction processes. These comprise a linear interpolation during the positioning process of the GPS data and a median destripe function (± 5 nT thresholds) applied to correct for any variation between the four Bartington sensors used. These two steps were applied throughout the survey area.

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



4 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

4.1 Introduction

- 4.1.1 The detailed gradiometer survey has identified anomalies of archaeological origin across the Site, along with evidence of superficial geological deposits and a large amount of ferrous anomalies. Results are presented as a series of greyscale plots, XY plots and archaeological interpretations at a scale of 1:2000 (**Figures 2 to 7**). The data are displayed at -2 nT (white) to +3 nT (black) for the greyscale image and ± 25 nT at 25 nT for the XY trace plots.
- 4.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 6 and 7**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 4.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.
- 4.1.5 Gradiometer survey may not detect all services present on Site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on Site.

4.2 Gradiometer survey results and interpretation

- 4.2.1 The geophysical survey has identified a number of features that are likely to be associated with archaeological remains of significant importance. These are predominantly located in the centre of the site, and are associated with linear and curvi-linear ditch features.
- 4.2.2 Perhaps the clearest feature is located at **6000**, where two ring shaped anomalies and a smaller circular feature have been identified. These are all represented by positive magnetic values and are associated with two concentric ring-ditches surrounding a central pit. The outermost of these ditches has an internal diameter of 20 m and is c. 2.5 m wide. It is also notably stronger, with a magnitude in the region of +2 nT, which may suggest that it is of a different phase or character. The inner ditch has an internal diameter of 8 m and measures 1.5 m in width. Both this and the central pit feature are weakly positive (+0.5 nT to +1 nT). The pit is roughly circular in shape with a maximum diameter of 1.6 m.
- 4.2.3 Located 20 m north-east of **6000**, there is a further circular positive (+0.5 nT to +1.7 nT) anomaly at **6001**. This has an internal diameter of 10 m, with the ditch measuring 1.5 m wide. This is also likely to be associated with a ring-ditch and contains two smaller positive (c. +1 nT) circular pit-like anomalies within the centre. These measure approximately 1 m in diameter. The ring-ditch is seemingly truncated by two linear anomalies on its north-western (**6003**) and south-eastern axis (**6004**), respecting the centre of the feature.
- 4.2.4 Approximately 10 m north-west of **6001**, a third ring-ditch is visible within the survey results (**6002**). This is represented by a positive (+0.5 nT to 1.2 nT) circular anomaly of similar proportions to **6001**, with an internal c. 10 m, and the ditch measuring 1.5 m in width. It contains three circular randomly distributed positive pit-like anomalies. The largest of these

is located slightly north-east of centre and measures 1.2 m in diameter. Two smaller c. 0.6 m circular pits are located to the south and west of this. Although it is not clear what these internal pit features may represent, it is considered likely that they are associated with the ring-ditch.

- 4.2.5 Intersecting the probable ring-ditches at **6000** – **6002**, there are three c. 1.5 m wide ditch-like features arranged in a rectilinear fashion. At **6003**, a positive (+0.5 nT to +3 nT) linear anomaly can be identified to the north of **6000**. This extends on a north-easterly trajectory from the western boundary of the Site for 106 m, before turning ninety degrees towards **6001** for a further 19 m. Although the relationship with **6001** cannot be confirmed based on these results alone, the terminal end of **6003** appears to respect the position of the **6001**, possibly truncating the ring ditch. Similarly, this is the case at the south-east, where the north-western terminal of **6004** appears to truncate the ring-ditch. Further investigation would be required to confirm this, however the arrangement of features is certainly notable and may imply a degree of contemporaneity.
- 4.2.6 Extending south-west from **6001**, **6004** extends for 65 m towards the eastern survey extent. It is likely that this continues further south-east, plausibly turning approximately ninety degrees to the south-west, and continuing as part of **6005**. The positive linear ditch-like anomaly is orientated north-east – south-west and is 102 m in length. In the south-west part of the feature the anomaly gradually becomes weaker, with no corresponding north-west – south-east aligned feature. This may be due to excessive plough damage or an increased level of overlying deposits, perhaps associated with head deposits at **6019**. However it may be that **6003** – **6005** form a three-sided enclosure with an open south-western side. This enclosure and the three ring ditches (**6000** – **6002**), can all be clearly identified on modern satellite imagery, but are not identified within the HER. However, it is likely that they relate to a series of prehistoric funerary monuments and an enclosure located directly north of the Stonehenge WHS landscape.
- 4.2.7 Within the enclosure identified at **6003** – **6005**, there are several small (c. 1 – 2 m) discrete positive anomalies. Many of these are interpreted as possible archaeology, as they may represent pit-like features. Given their proximity to other clear archaeological features this is plausible, however they have no discernible arrangement, making a more specific interpretation difficult. It is equally possible that these anomalies are associated with natural pitting in the chalk bedrock and as such, further investigation would be required to better understand the extent of archaeological remains within this area.
- 4.2.8 In the centre of the survey area, close to the north-east corner of the driving range, a further weakly positive (+ 0.5 nT), circular anomaly has been identified (**6006**). This is 35 m north-west of the enclosure ditch at **6003** and most likely represents an additional ring-ditch. However, the south-east portion of the feature has not been detected, most likely due to plough damage. The ditch measures 1.3 m wide and has an internal diameter of c. 16 m. There are several discrete anomalies contained within the ring-ditch. These are poorly defined, but may represent possible associated archaeological features.
- 4.2.9 Excavations undertaken as part of the SFA and have identified a Bronze Age Barrow with hengiform features approximately 20 m to the west of the ring-ditch enclosure at **6006**. The backfilled remains of this have been identified in this geophysical survey as an area of increased magnetic response and ferrous anomalies (**6007**).
- 4.2.10 In the extreme south-west of the survey area, two parallel linear anomalies have been identified (**6008** – **6009**), spaced approximately 37 m apart. These both measure approximately 50 – 65 m long and are approximately 3 m wide, and are of relatively low magnitude (+0.5 to +1.5 nT). These represent ditch-like features and likely correspond with

similar features identified in previous geophysical survey (WA 2014; 2016), trial trench evaluation (WA 2015) and ongoing strip, map, and record of the SFA West. More specifically, the alignment of these features corresponds with an extension of a Wessex linear identified to the north-west and therefore this interpretation, and a prehistoric date, is probable.

- 4.2.11 In the north of the survey area a fragmented positive linear anomaly (**6010**) has been identified on an east – west alignment. This anomaly measures approximately 265 m long and is 1.5 m wide. It protrudes from the western boundary and likely continues outside the dataset to the north, and/or turns to the south-east, feasibly adjoining with **6011**. **6011** is aligned north-west – south-east, but is more fragmented. It measures 120 m in length and 1 m - 1.5 m wide. Both **6010** and **6011** are characterised by positive magnetic values in the region of (0 – +2 nT). A plausible interpretation for these features is that these are associated with a former boundary ditch or land division. The origin of this is not clear, but as they do not appear on available historic mapping of the area, it is likely that they are archaeological in origin.
- 4.2.12 A weak negative (c. -0.5 nT), linear anomaly has been identified aligned south-west – north-east across the north-western portion of the survey area (**6012**). This anomaly is approximately 220 m long by approximately 2 m wide. It is possible that this is truncated in the south-western extent by the sinkhole identified at **6014**, as it was not identified in an evaluation trench excavated in this area in 2015 (WA 2015a; Trench 112). As the feature is very straight and uniform, it is interpreted as possible archaeology, most likely attributed to a former field division. Whilst part of a field system has also been mapped from aerial photography in this area, this is situated on a slightly different alignment to **6012**. Moreover, the anomalies also appear close to a band of likely geological anomalies and therefore may relate to variations in the underlying superficial geological deposits.
- 4.2.13 There are numerous discrete features identified across the Site which are interpreted as possible archaeology. These are weakly positive (0 - + 2 nT) and between 1 m and 3 m in diameter. These may relate to possible pit-like features, but do not conform to any discernible anthropogenic pattern. Consequently, a more conclusive interpretation is not possible, as it is equally possible that these may relate to natural undulations in the chalk bedrock.
- 4.2.14 An area of increased magnetic response, characterised by strong positive and negative values (+/- 8 nT) has been identified in the northern portion of the survey area (**6013**). It intersects the area on a north-east – south-west alignment and is approximately 266 m long and 6 m wide. This corresponds to a path or track shown on historic Ordnance Survey (OS) mapping dating to 1879.
- 4.2.15 In the northern portion of the survey area, three broad positive (+2 to +4 nT) circular anomalies are visible (**6014** – **6016**). These are between 15 – 20 m in diameter, and are surrounded by a small area of weakly negative magnetic values (c. – 0.5 nT). These were all identified in a previous phase of geophysical survey, undertaken using caesium vapour sensors (WA 2014d), and were interpreted as superficial geology. The most southerly example (**6014**) was also targeted as part of the trial trench evaluation (WA 2015a; Trench 112) and was found to be associated with a geological solution hollows. As a result, it is likely that **6015** and **6016** relate to similar features.
- 4.2.16 Two areas of sinuous, broad linear features have been identified which are interpreted as superficial geology. In the north of the site these are located on an approximate north-east – south-west orientation (**6017**; **6018**), and are located in the same area as the suggested solution hollows (**6014** – **6016**). These are visible as roughly parallel, weak positive (+0.5 to



+1 nT) linear anomalies, extend for a combined distance of 180 m and are 4 – 7 m wide. Similar anomalies have been identified in the southern portion of the survey area (**6019**) extending for 160 m on an east – west alignment. These are also represented by weakly positive values of the same magnitude and measure 7 – 9 m wide. All of these anomalies correspond to weakly magnetised elements of superficial geological deposits recorded in this area as Head - Clay, Silt, Sand and Gravel (BGS 2017).

- 4.2.17 Several modern services have been identified within the results of this geophysical survey. In the north-west of the survey area, a strong dipolar (+/-100 nT), linear anomaly aligned north-west – south-east is located at **6020**. Two more anomalies parallel to each other have been identified along the same alignment in the central portion of the survey area (**6020** and **6021**). These were also identified in the previous geophysical survey (WA 2014) and relate to known services within the area.
- 4.2.18 In the south-west of the Site, a further dipolar anomaly is present on an east – west alignment. This follows the southern boundary of the driving range and has also been interpreted as a modern service (**6022**).
- 4.2.19 There is a strong dipolar anomaly at **6023**, which is interpreted as ferrous. This is probably associated with the base of a former pylon and is most likely of modern origin.
- 4.2.20 In the extreme north-east, an area of highly magnetic disturbance (+/-100 nT) has been identified (**6024**). This corresponds to an access area of hard standing and existing farm buildings.
- 4.2.21 Throughout the survey area a multitude of closely spaced, weakly positive (c. +0.5 nT) parallel linear anomalies. These are generally on a north – south alignment, with some variation in the south where they are east – west. These are interpreted as evidence of modern agricultural activity such as ploughing.

5 DISCUSSION

- 5.1.1 The detailed gradiometer survey has been successful in detecting a high density of anomalies of significant archaeological interest across the Site. These anomalies are predominantly ditch-like features taking a number of forms and dating to a variety of periods. They are located both within the specific route of the proposed haul road at Larkhill SFA and immediately adjacent.
- 5.1.2 Perhaps, the most conspicuous features identified within this geophysical survey are the three curvi-linear anomalies in the centre of the survey (**6000 – 6002**). These represent three ring-ditches and contain discrete features, which may represent burials or pits. They correspond to cropmarks clearly visible on satellite imagery, but are not recorded within the HER, despite being located directly north of the Stonehenge WHS. It is probable that they are associated with an extension of this funerary landscape, and are most likely associated with a Bronze Age barrow cemetery. Whilst an earlier date is also possible, it is not clear if these features relate to the same, or several phases of activity. However, **6001** and **6002** are very similarly sized (c. 8 – 10 m), and the internal ditch at **6000** also falls within this region. The outer ditch at **6000**, is a much stronger magnetic anomaly which suggests that it relates to a different character or phase.
- 5.1.3 The ring-ditches are intersected by a three-sided recti-linear ditched enclosure at **6003 – 6005**. Of particular note is the way in which this respects **6001**. This ring ditch is seemingly truncated by the enclosure ditch, which terminates just inside the circular feature on both the north-west and south-east axis. It is plausible that this respects the presence of a mound, no longer extant, and suggests that when the enclosure ditch was excavated, this was still upstanding. In addition, it may also imply that the enclosure has a degree of contemporaneity with the ring-ditches, although further investigation would be required to confirm this.
- 5.1.4 Within the proposed route of the haul road, close to the north-east corner of the driving range, there is a further ring-ditch at **6004**. This is more poorly preserved, with only the northern half of the feature visible. It is situated 10 m west of the recently excavated possible hengiform feature (forthcoming client report), and is likely associated with the barrows at **6000 – 6002**. Further to the east of the survey there are several other ring-shaped cropmarks visible modern satellite imagery which may also be attributable to such features. This suggests that these features form part of a more extensive barrow cemetery, situated on a slight promontory in the landscape, with the topography declining gently towards the north and south.
- 5.1.5 A number of pit-like features have also been detected within and surrounding **6000 – 6005**. Although many of these are poorly defined and are not arranged in any discernible pattern, it is likely that they may be archaeological in origin. In addition, it should be emphasised that small, weakly magnetised features may produce responses that are below the detection of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. This is particularly pertinent as prehistoric funerary monuments are known to have provided a focal point for secondary burials. Such features are frequently not detected by gradiometer survey and therefore the presence of archaeological features of this nature cannot be ruled out.
- 5.1.6 In the south-west corner of the Site, directly north of the road known as the Packway, there are two parallel ditches on a north-west – south-east alignment (**6008; 6009**). These correspond with similar features identified in previous geophysical surveys (WA 2014a; 2016), trial trench evaluation (WA 2015) and ongoing strip, map and record of the SFA West. They are interpreted as an extension of the possible Wessex linear identified in these



investigations and a prehistoric date is therefore hypothesised. It is tentatively suggested that this alignment corresponds with the axis of the Durrington Avenue, which runs from Durrington walls (370 m south of the Site) to the riverside, and forms part of a ceremonial complex associated with the Stonehenge WHS.

- 5.1.7 In the north of the survey area, two fragmented positive linear anomalies have been identified as boundary ditches or land divisions. A weakly negative anomaly has also been identified and it is suggested that this may also relate to a former land division. The precise date of these features is not clear, but as they do not appear on available historic mapping of the area, it is likely that they are archaeological in origin.
- 5.1.8 Several anomalies have been interpreted as superficial geological deposits. This includes two recorded areas of Head - Clay, Silt, Sand and Gravel (BGS 2017), as well as three circular anomalies interpreted as geological solution hollows. Though these are not considered to be of archaeological interest; however, it is considered possible that they may contain archaeological deposits.
- 5.1.9 In addition, areas of ferrous disturbance, increased magnetic response, agricultural ploughing trends and numerous modern services were also located.



5.2 Recommendations

- 5.2.1 Following the results of the geophysical survey, it is considered that further archaeological investigations may be required by the Local Planning Authority. It is possible that this may comprise a trial trenching strategy. Should this be the case, it is recommended that the anomalies identified as possible archaeology are tested.

- 5.2.2 Additionally, further data should be collected from the areas identified as highly ferrous / potential spreads to ensure that these responses are not masking weaker and potentially archaeological responses. Trenches should also be planned to investigate areas where no anomalies of potential archaeological interest have been identified within the Site.



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Wessex Archaeology 2014b. *Army Rebasing: Bulford SFA North Site, Salisbury, Wiltshire: Detailed Gradiometer Survey Report*. Unpublished client report 104151.03, Salisbury

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Wessex Archaeology 2015b *Army Rebasing: Larkhill Lower West Site, Salisbury, Wiltshire. Detailed Gradiometer Survey Report*. Unpublished client report 107941.01, Salisbury

Wessex Archaeology 2014d. *Larkhill East and West SFA, Further work, Salisbury, Wiltshire: Detailed Gradiometer Survey Report*. Unpublished client report 107947.02, Salisbury

6.2 Cartographic and documentary sources

Ordnance Survey 1983 *Soil Survey of England and Wales Sheet 6, Soils of South East England*. Southampton.

6.3 Online resources

British Geological Survey Geology of Britain Viewer (accessed February 2017)
<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Old Maps (accessed February 2017)
<https://www.old-maps.co.uk>



APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey methods and equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer cart-based system. This instrument has a number of sensor pairs fixed horizontally 1m apart allowing multiple 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.

The gradiometers have an effective resolution of 0.03nT over a ± 100 nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are then relayed to a Leica Viva CS35 tablet, running the MLgrad601 program, which is used to record the survey data from the array of Grad601 probes at a rate of 6Hz. The program also receives measurements from a GPS system, which is fixed to the cart at a measured distance from the sensors, providing real time locational data for each data point.

The cart-based system relies upon accurate GPS location data which is collected using a Leica Viva system with rover and base station. This receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by Historic England (English Heritage 2008) for geophysical surveys.

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart exceeding recommendation by Historic England (English Heritage 2008) for characterisation surveys.

Post-processing

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

The cart-based system generally requires a lesser amount of post-processing than the handheld Bartington Grad 601-2 fluxgate gradiometer instrument. This is largely because mounting the gradiometers on the cart reduces the occurrence of operator error; caused by inconsistent walking speeds and deviation in traverse position due to varying ground cover and topography.

Typical data and image processing steps may include:

- Destripe – Applying a smooth function in order to remove differences caused by directional effects inherent in the magnetometer;
- Despiking – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

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



APPENDIX 2: GEOPHYSICAL INTERPRETATION

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

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

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

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

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

The agricultural category is used for the following:

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

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

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



6.4 Appendix 3: OASIS form

Project Details:

Project name		Larkhill SFA Haul Road, Larkhill, Wiltshire			
Type of project		Detailed gradiometer survey (Field evaluation)			
Project description		<p>A detailed gradiometer survey was conducted over land at Larkhill, Wiltshire (centred on NGR 414583, 144569). The project was commissioned by Lovell with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in support of a planning application for the development of the site as a haul road and any associated infrastructure. These works form part of the wider Army Basing Programme and form the eastern part of the new area of Serviced Family Accommodation (SFA) at Larkhill.</p> <p>The anomalies identified as being of archaeological interest predominantly comprise ditch-like features and take a number of forms and likely date to a variety of periods. They are located both within the specific route of the proposed haul road at Larkhill SFA and immediately adjacent.</p>			
Project dates		Start: 13-02-2017		End: 17-02-2017	
Previous work		Yes - Geophysical survey, trial trenching and strip, map and record excavations.			
Future work		TBC – most likely watching brief/excavation			
Project Code:	115980	HER event no.	N/A	OASIS form ID:	wessexar1-278351
		NMR no.	N/A		
		SM no.	N/A		
Planning Application Ref.					
Site Status		The site is immediately to the north of the Stonehenge World Heritage Site.			
Land use		Arable			
Monument type				Period	

Project Location:

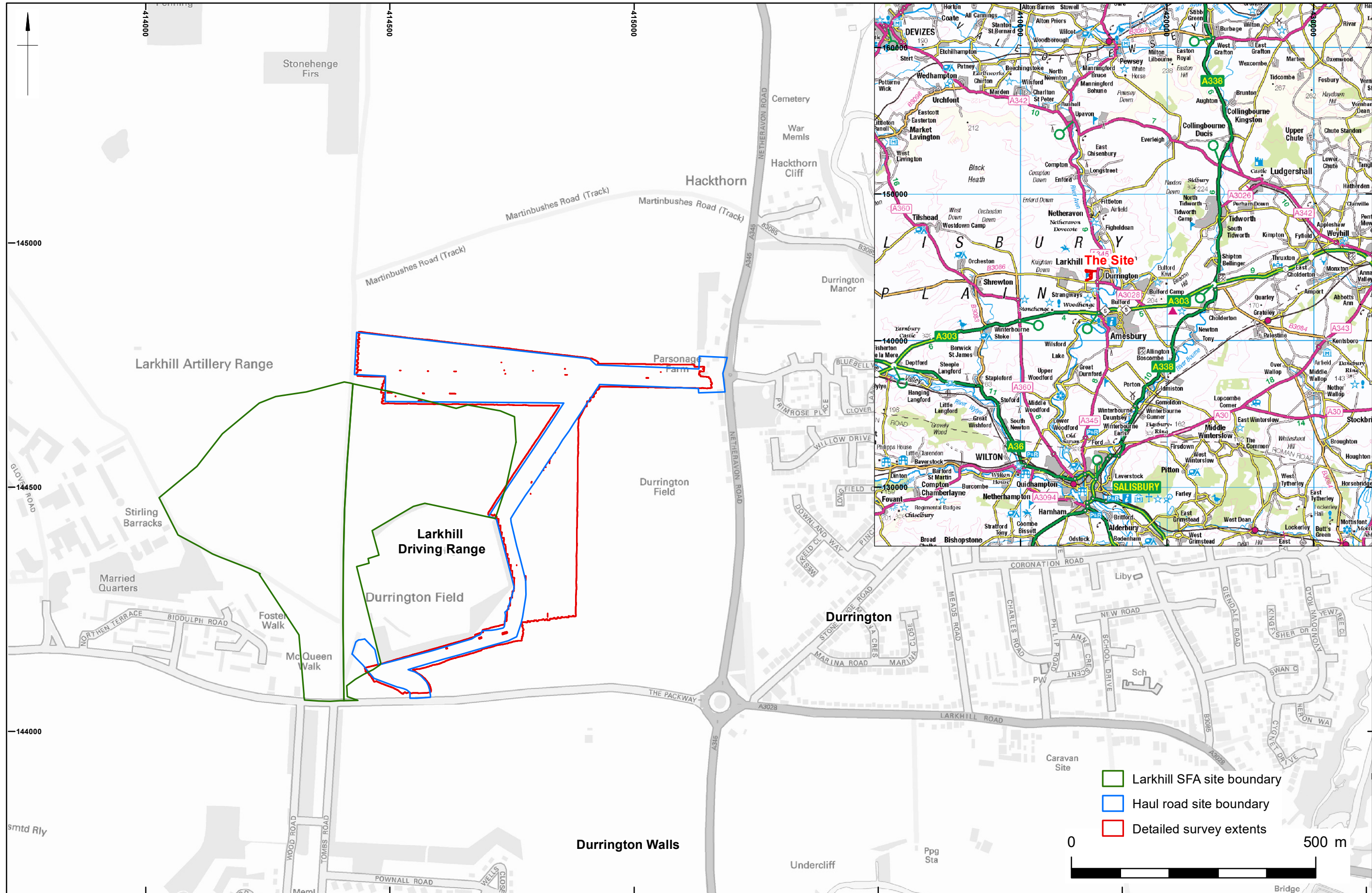
Site Address	Durrington Field, The Packway, Larkhill, Salisbury			Postcode	SP4 8PY
County	Wiltshire	District	Salisbury	Parish	Amesbury
Study Area	13.6 ha	Height OD	90 - 115 m aOD	NGR	414583, 144569

Project Creators:

Name of Organisation		Wessex Archaeology			
Project brief originator		Lovell		Project design originator	Wessex Archaeology
Project Manager		Simon Cleggett		Project Supervisor	Rok Plesnicar
Sponsor or funding body		Lovell		Type of Sponsor	Developer

Project Archive and Bibliography:

Physical archive	N/A	Digital Archive	Geophysics, survey and report	Paper Archive	N/A
Report title	Larkhill SFA Haul Road, Larkhill, Wiltshire: Detailed Gradiometer Survey Results			Date	2017
Author	Wessex Archaeology	Description	Unpublished report	Report ref.	115980.01



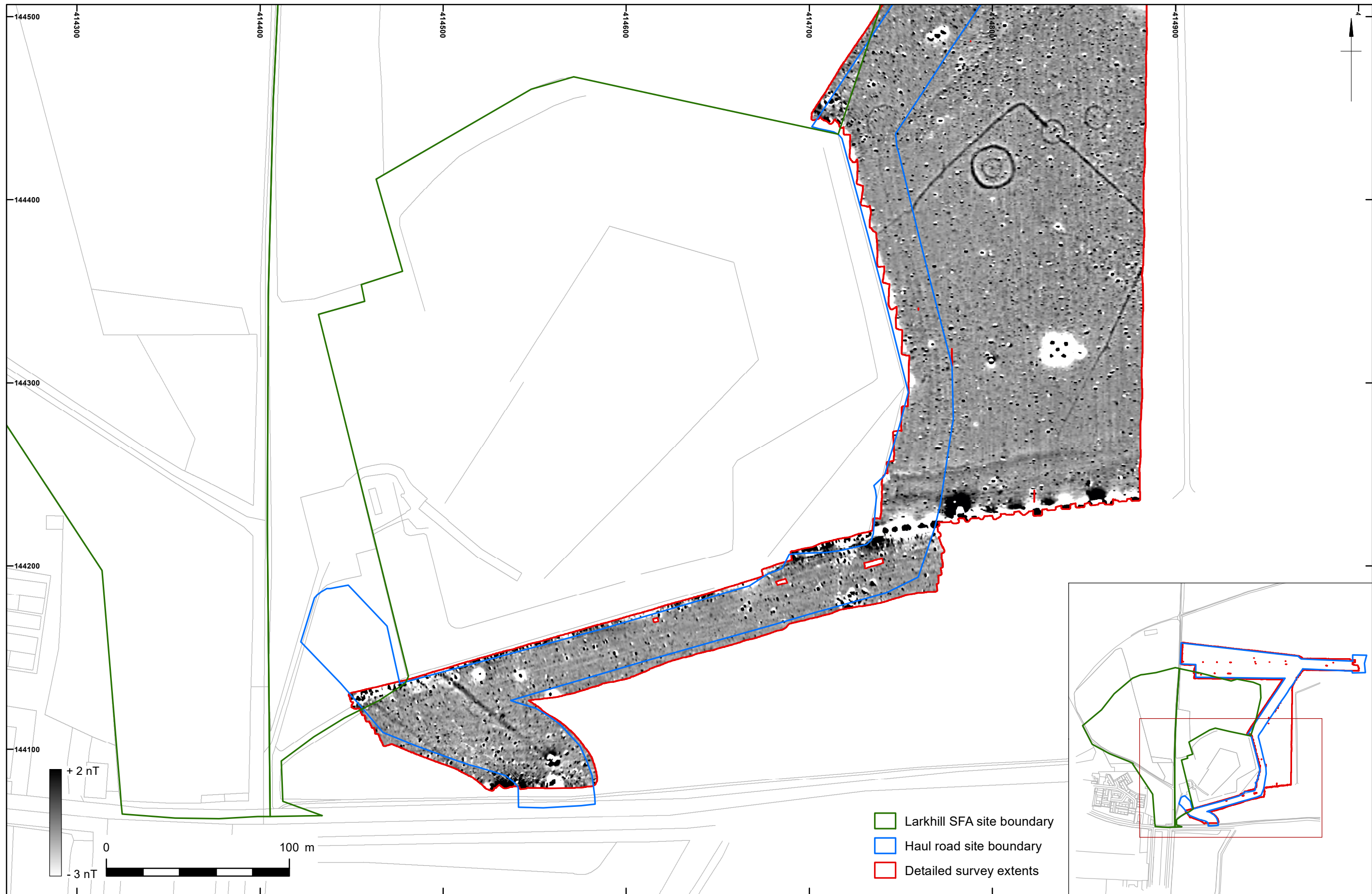
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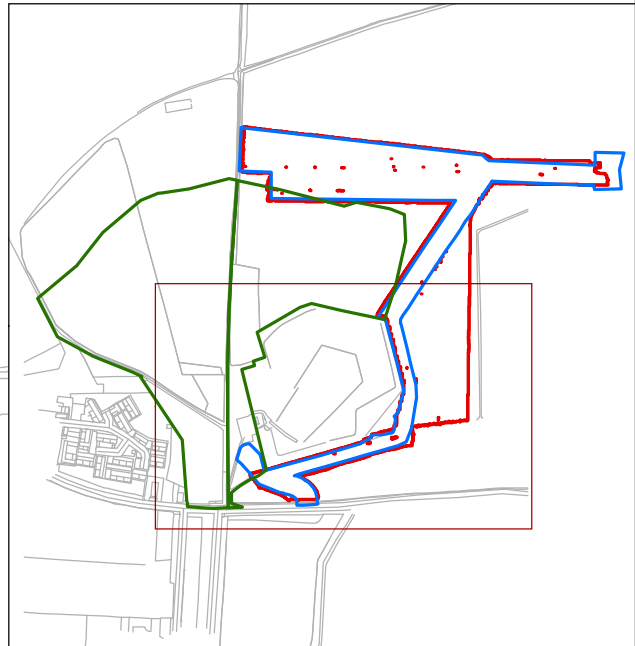
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Site location and survey extents

Figure 1



- Larkhill SFA site boundary
- Haul road site boundary
- Detailed survey extents



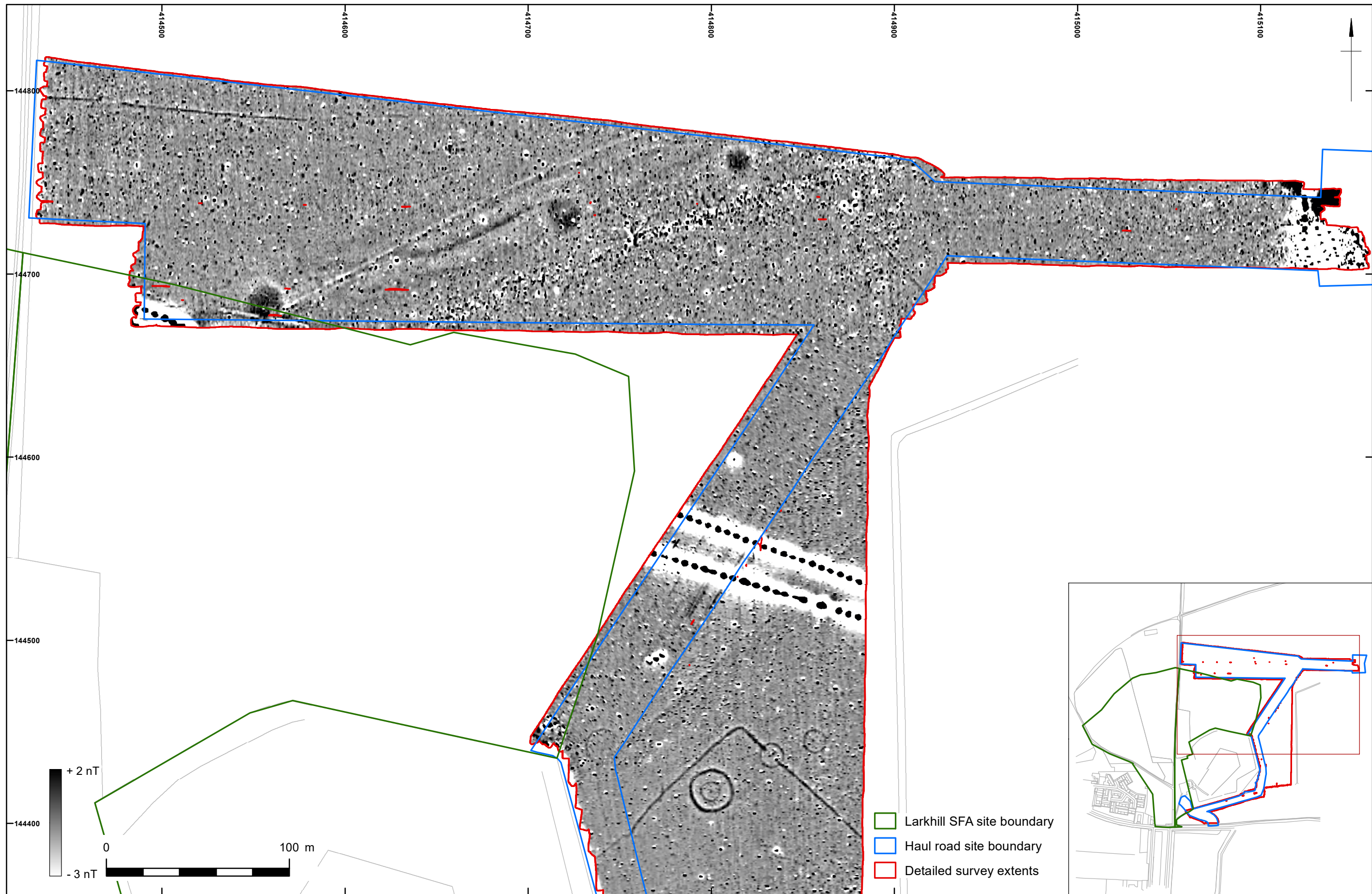
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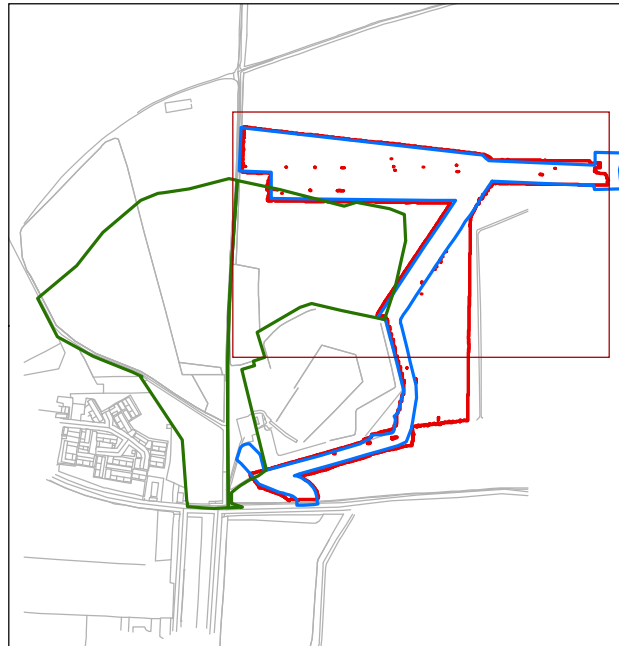
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Geophysical Survey Results: Greyscale plot (south)

Figure 2



- Larkhill SFA site boundary
- Haul road site boundary
- Detailed survey extents



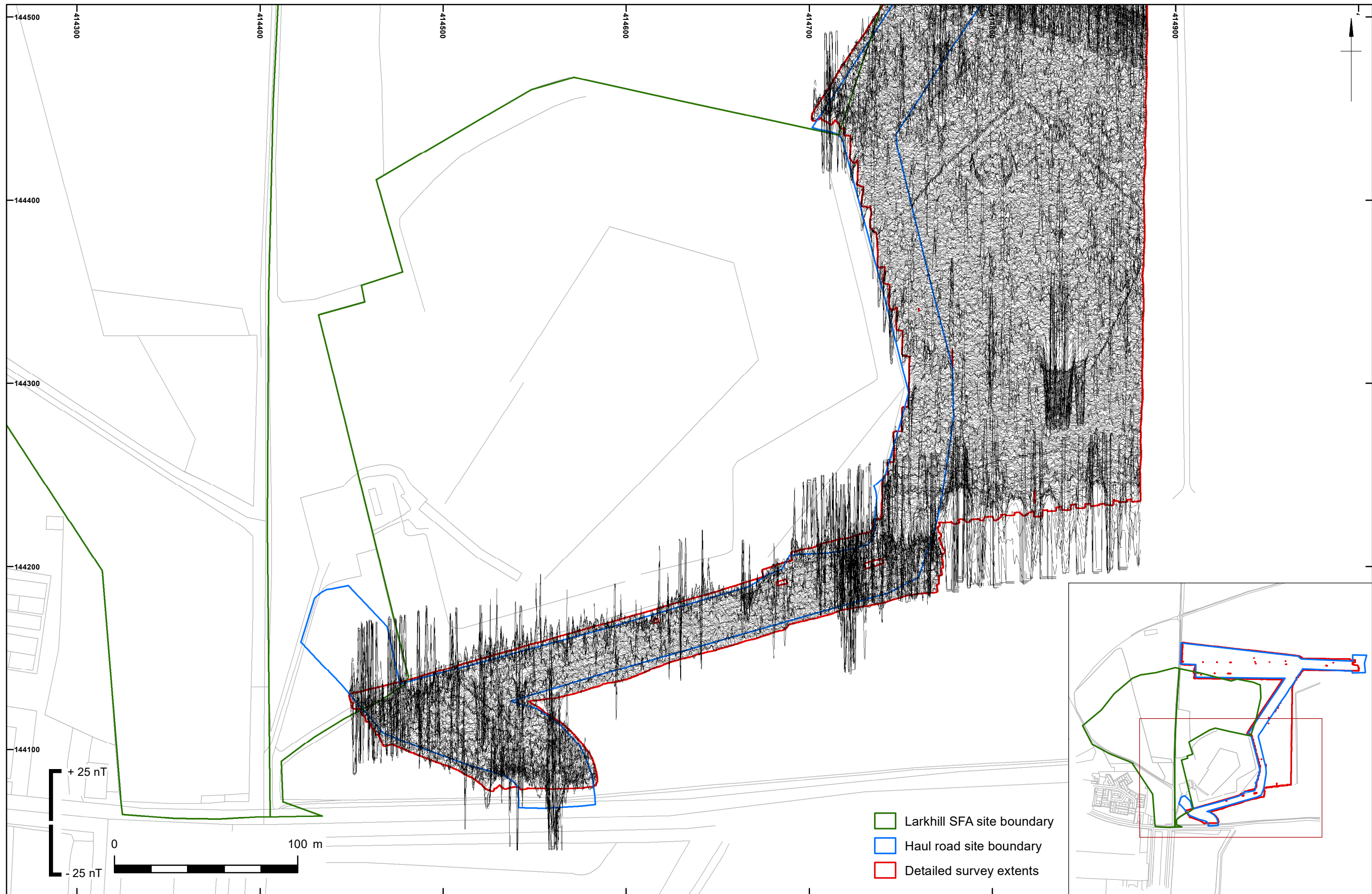
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Geophysical Survey Results: Greyscale plot (north)

Figure 3



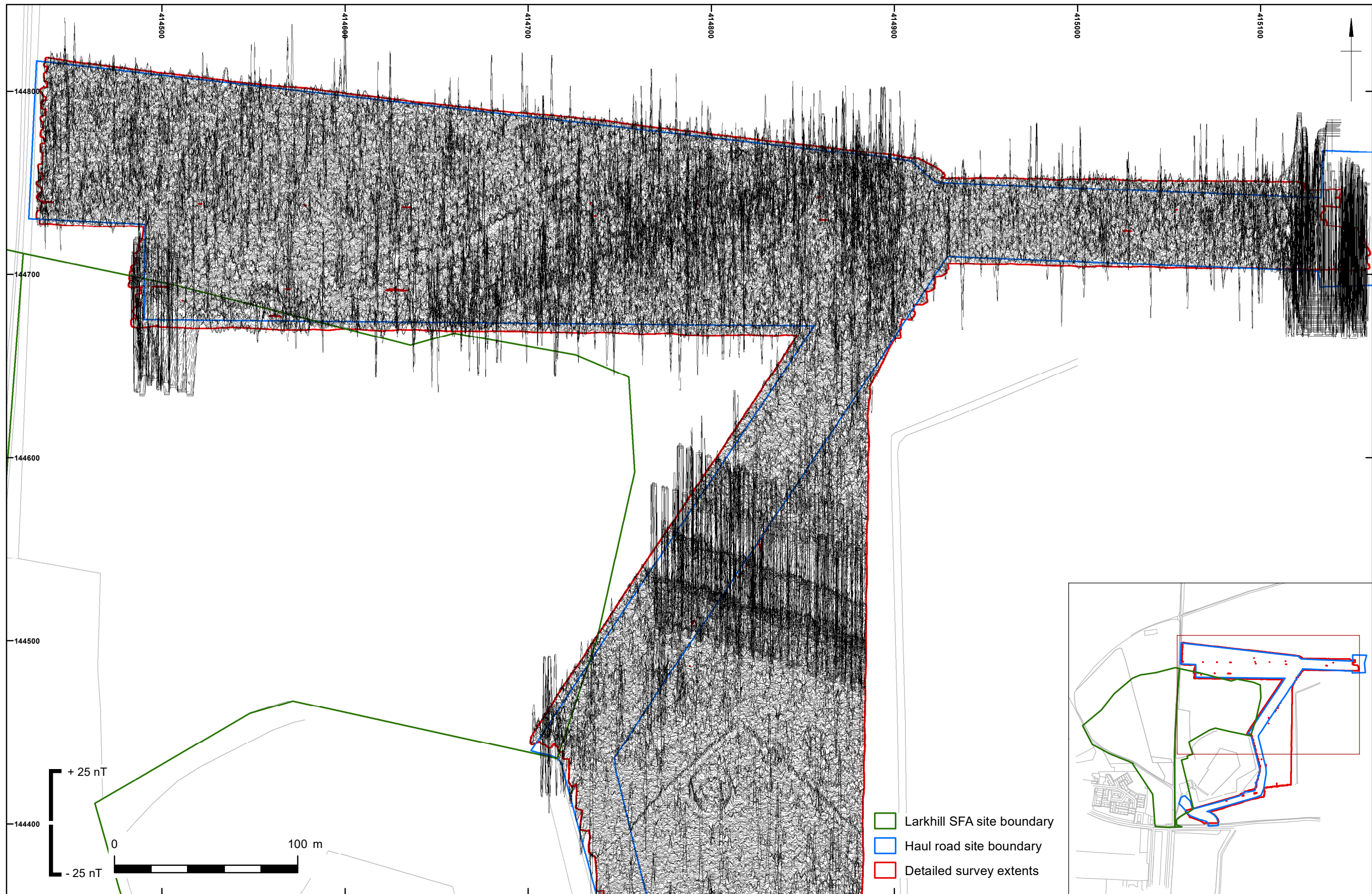
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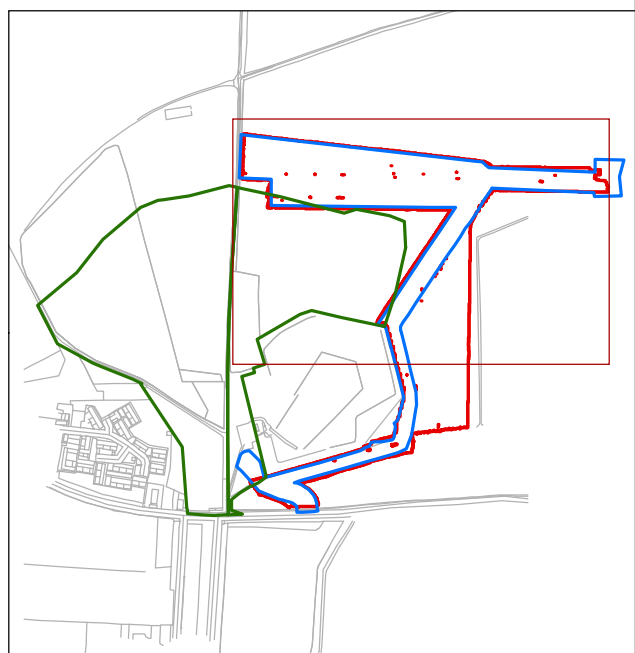
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Geophysical Survey Results: XY trace plot (south)

Figure 4



- ▭ Larkhill SFA site boundary
- ▭ Haul road site boundary
- ▭ Detailed survey extents



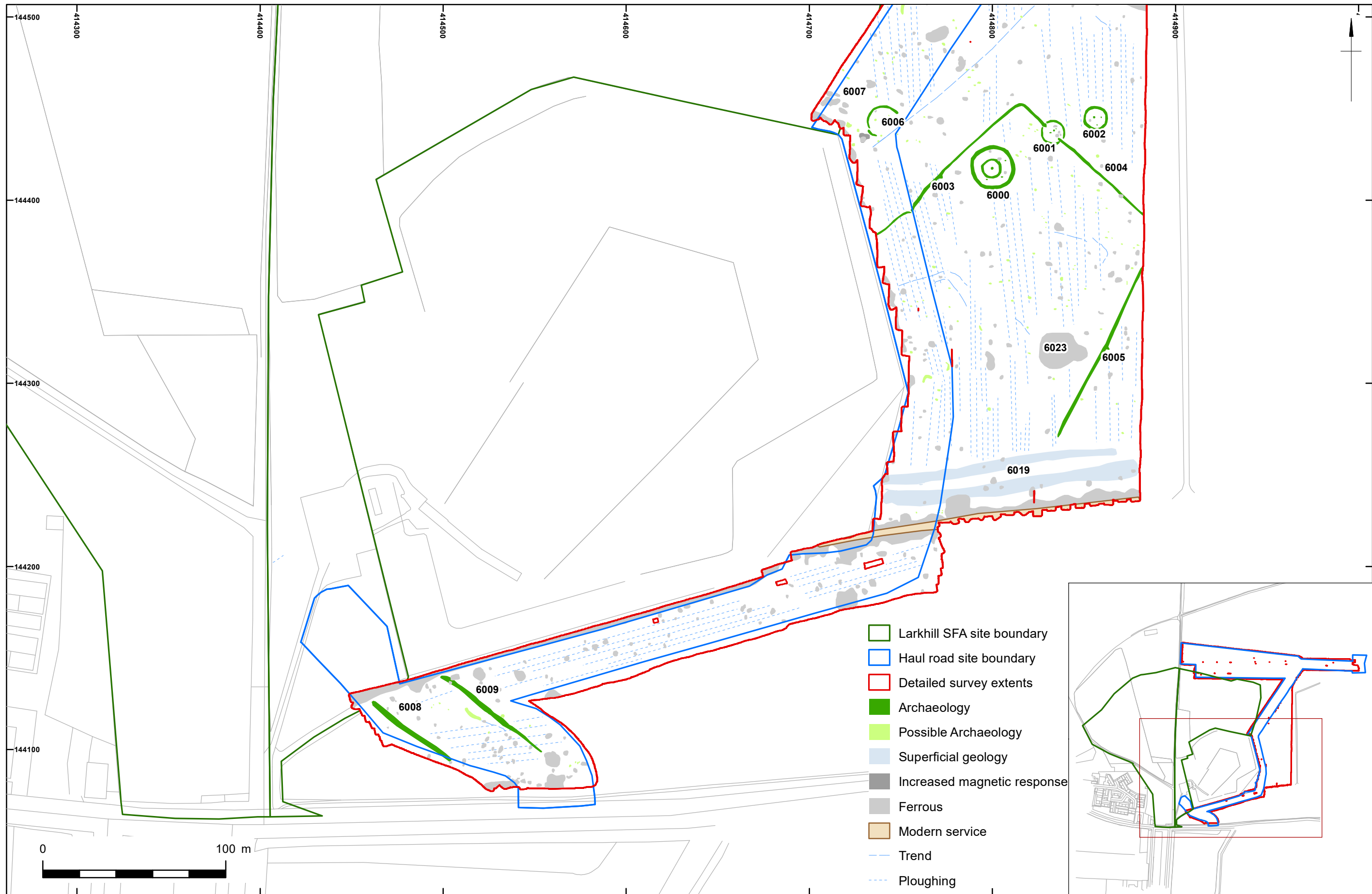
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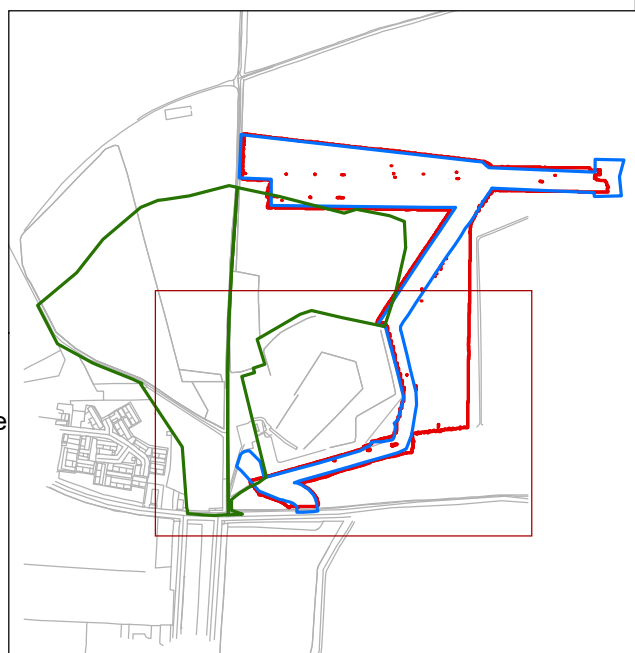
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Geophysical Survey Results: XY trace plot (north)

Figure 5



- Larkhill SFA site boundary
- Haul road site boundary
- Detailed survey extents
- Archaeology
- Possible Archaeology
- Superficial geology
- Increased magnetic response
- Ferrous
- Modern service
- Trend
- Ploughing

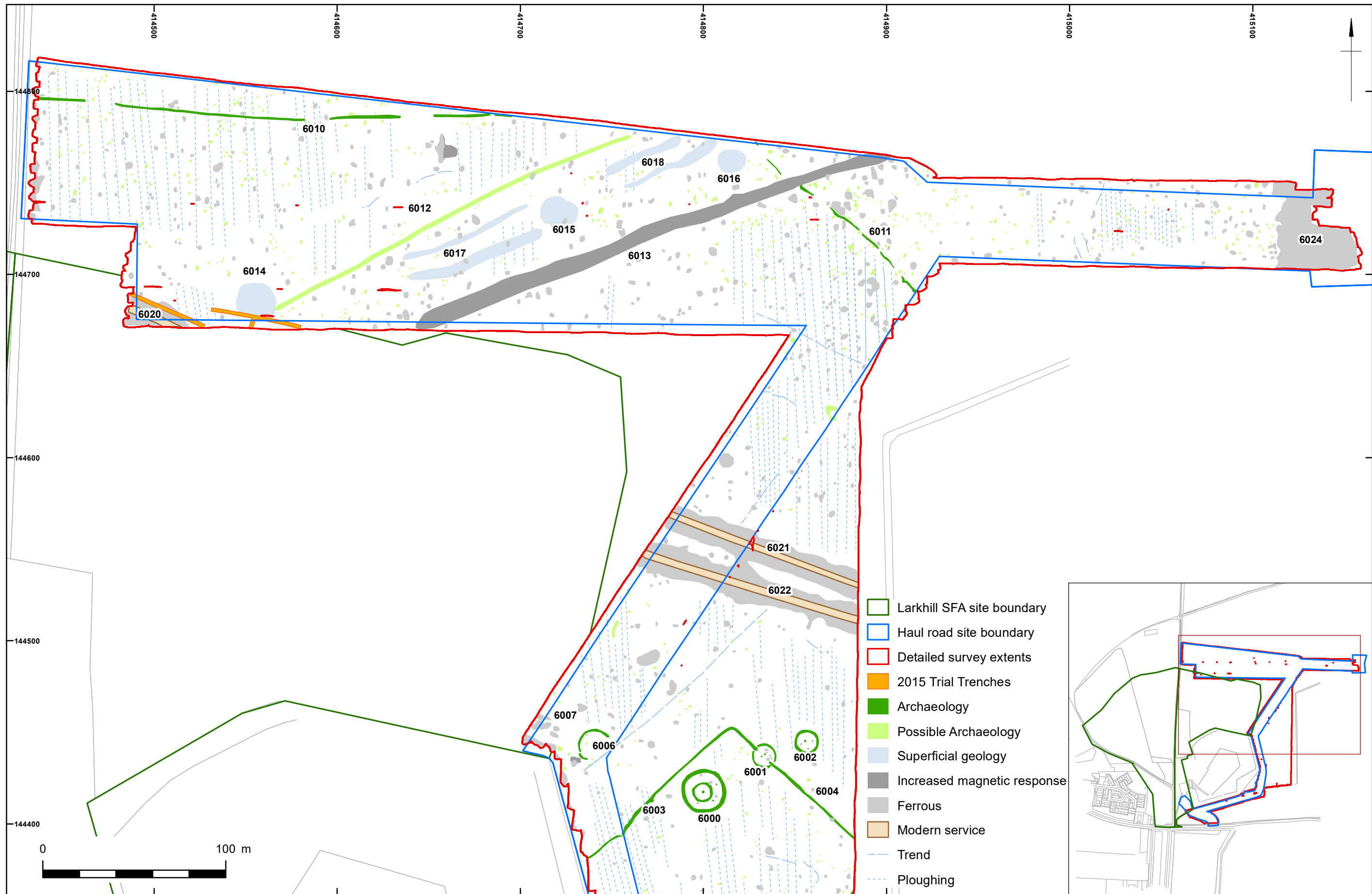


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