Appendix A14.2: Archaeological Geophysical Survey and Aerial Imagery Analysis

A9/A96 Inshes to Smithton
Inverness, Scotland

Archaeological Geophysical Survey

and Aerial Imagery Analysis

National Grid Reference: NH 69863 45203

AOC Project No: 51877

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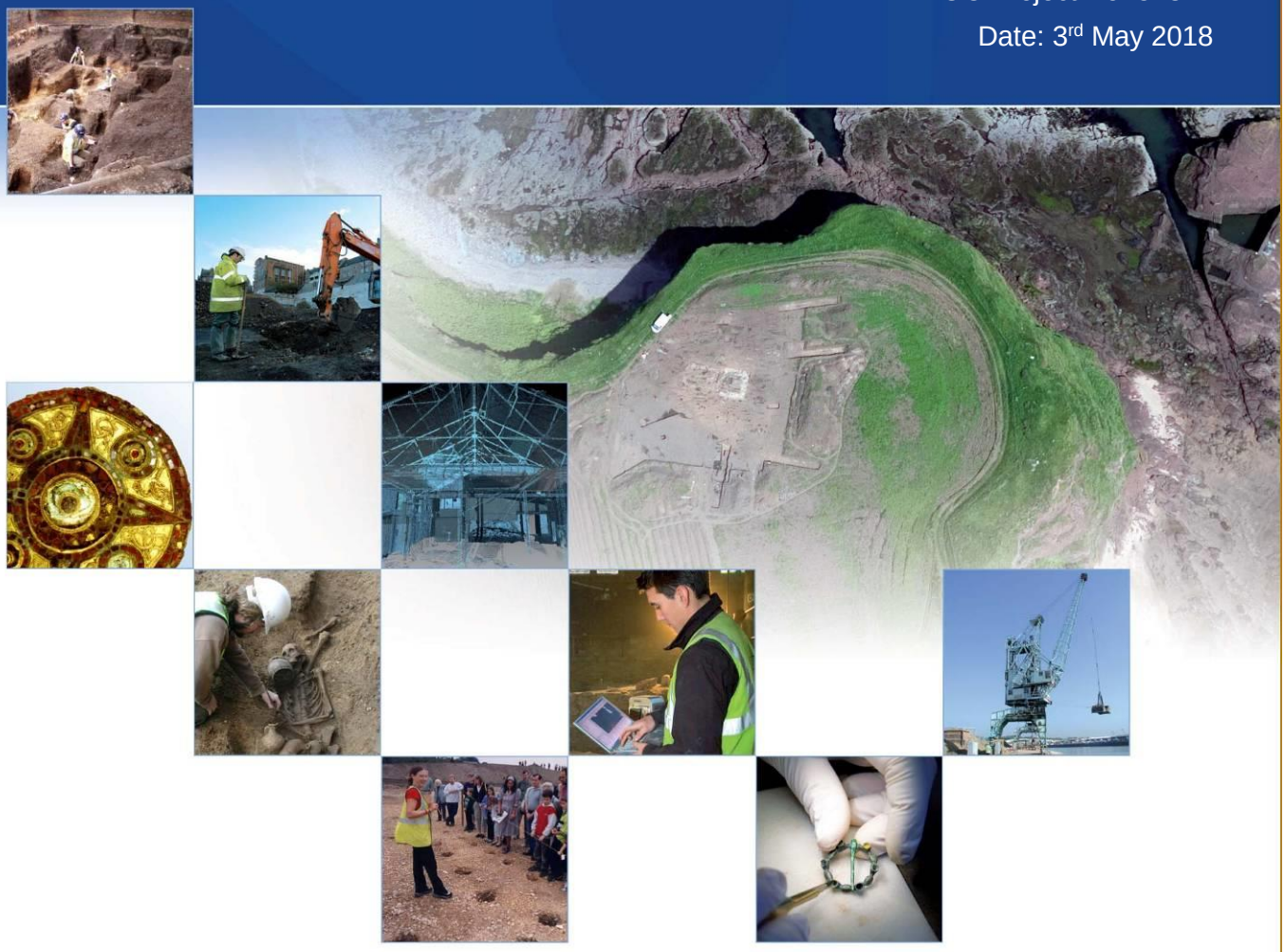

AOC Archaeology Group

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A9/A96 Inshes to Smithton

Inverness, Scotland

Archaeological Geophysical Survey and Aerial Imagery Analysis

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On Behalf of:	**Jacobs UK Ltd** **160 Dundee Street** **Edinburgh** **EH11 1DQ**
National Grid Reference (NGR):	**NH 69863 45203**
AOC Project No:	**51877**
Prepared by:	**Kimberley Teale, James Lawton and Graeme Cavers**
Illustrations by:	**James Lawton**
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This document has been prepared in accordance with AOC standard operating procedures.

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Enquiries to: AOC Archaeology Group
The Raylor Centre
James Street
York
YO10 3DW

Tel. 01904 413404
e-mail. york@aocarchaeology.com

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Non-Technical Summary

AOC Archaeology Group was commissioned by Jacobs UK Ltd to undertake an archaeological geophysical (gradiometer and earth resistivity) survey to investigate the potential for buried archaeological remains on land as part of the A9/A96 Inshes to Smithton scheme near Inverness. An aerial imagery analysis exercise was also undertaken and is discussed in section 9 of this report.

A total of twelve parcels of land totalling approximately 25.45ha were designated for a magnetometer survey (centred at NH 69863 45203). The survey includes the Scheduled Monument of "Ashton Farm Cottages, ring ditch 415m SW and pit circles 460m WSW of" (SM11535). A second survey was carried out over the Scheduled Monument using resistivity, designed to enhance the results of the magnetometry survey.

The results of the survey have identified a number of definitive pit-like anomalies of archaeological remains which match those depicted in aerial photography. These are associated with the aerial photographs of the Scheduled Monument of "Ashton Farm Cottages, ring ditch 415m SW and pit circles 460m WSW of" (SM11535). This Monument is not clearly visible in the magnetometry survey data, but is clearly identifiable in the resistivity results. The anomalies that represent this Monument present as negative magnetic responses, possibly due to the soils filling the ditches and pits being less magnetic than the background geology - the opposite of which is more common in Britain. The magnetometry results are generally inconclusive, meaning that these anomalies have only been tentatively identified as archaeological features.

Resistivity results are more conclusive, identifying the Scheduled Monument as penannular trends of low resistance

The results also suggested the presence of a number of discrete pit-like anomalies across the survey area which match those visible in aerial photography.

The interpretation of the survey results was difficult due to the very varied and noisy background level of magnetism found across the site in the natural soils and geology, making interpretation tentative. As a consequence, a low level of confidence is placed in many of the features identified in the survey results away from the Scheduled Monument visible in the aerial imagery.

Only intrusive investigation will determine the reliability of the interpretation offered in this report. However, in the interests of identifying potential archaeological remains, all features considered possibly archaeological have been highlighted.

A number of agricultural features have been noted across the site marking ploughing headlands at the edges of fields, as well as field drains. A former field boundary which is visible on historic Ordinance Survey mapping of the area has also been identified in the data.

Several modern services were also detected as well as other areas of isolated modern disturbance around field edges.

1 Introduction

1.1 AOC Archaeology Group was commissioned by Jacobs UK Ltd (hereafter 'Jacobs') to undertake an archaeological geophysical survey of twelve land parcels in Inverness, as part of a wider scheme of archaeological assessment for the A9/A96 Inshes to Smithton Scheme. This work is being carried out on behalf of Transport Scotland with the Highland Council Historic Environment Team as the Curator.

1.2 The survey was carried out to provide information on the extent and significance of potential buried archaeological remains within the proposed development site and to inform the Cultural Heritage chapter of the DMRB Stage 3 Environmental Impact Assessment Report for the project.

2 Site Location and Description

2.1 The twelve parcels of land designated for geophysical survey are located less than a mile to the east of the A9/A96 junction, east of Inverness Retail and Business Park and north of the Inverness College University of the Highlands and Island campus. The area designated for survey is centred at NH 69863 45203 (see Figure 1).

2.2 The twelve survey parcels (hereafter the 'site') collectively cover an area of approximately 25.45ha across pasture and arable stubble fields (see Figure 2).

2.3 The site has an undulating topography and slopes down gradually towards the north, ranging from 40m aOD (above Ordnance Datum) in the south to 20m aOD in the north.

2.4 The bedrock recorded geology within the survey area consists of the Hillhead Sandstone Formation; a sedimentary Devonian sandstone laid in an environment previously dominated by rivers and the Inshes Flagstone Formation in the southern portion (BGS, 2018).

2.5 The following description is taken from the Specification for Archaeological Geophysical Survey (Jacobs, 2017). The bedrock is overlain by drift deposits including: made ground; alluvium; a variety of Flandrian and late Devensian raised marine deposits; and late Devensian glacial deposits. Made ground is expected to be locally derived and generally limited to areas of existing road or railway embankment.

2.6 Alluvial deposits within the survey area are generally located underlying the flood plains of existing burns. They are normally comprised of soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.

2.7 Raised marine deposits are located in the north of the survey area, approximately along the line of the A96 Inverness to Aberdeen Trunk Road, and are comprised of a mixture of gravel and sand, which is commonly silty. Gravel is typically cobble grade and poorly sorted, while sand is mainly medium-grained.

2.8 Late Devensian raised tidal flats are described as silt, clay and fine-grained sand with lenses of gravel, and are located north of Smithton.

2.9 Tidal flats are normally composed of a consolidated soft silty clay, with layers of sand, gravel and peat. They are located in the north of the survey area adjacent to the Moray Firth.

2.10 Glacial deposits within the survey area include glaciofluvial sheet deposits, glaciomarine silts, hummocky glacial deposits and till.

2.11 These are all overlain by Humus-iron podzols derived from fluvioglacial and raised beach sand parent materials (Scotland's Soils, 2018).

2.12 Gradiometer survey is suggested to provide a good response to this type of bedrock geology, however results can vary over the variable alluviums and gravels making up the drift geology of the area (David *et al.* 2008, 15).

2.13 The survey took place over two phases; with the main block surveyed from the 17th to 25th January 2018 and Parcels 3 and 5 surveyed from the 9th to 18th April 2018 due to the presence of livestock during the earlier survey.

3 Archaeological Background

3.1 The archaeological background below is drawn from sites recorded in the National Record of the Historic Environment (NRHE, 2018).

3.2 Two entries are located within the site boundary; both of which are ascribed to the prehistoric period.

Prehistoric

3.3 The Scheduled Monument of *"Ashton Farm Cottages, ring ditch 415m SW and pit circles 460m WSW of" (SM11535)* is located in Parcel 7 (SM11535). Located through aerial photographs taken in 1978; they consist of a 'Field Boundary, Pits and an Unenclosed Settlement' (Site no. NH64NE 99, Canmore ID 13457) and a 'Ring Ditch' (Site no. NH64NE 39, Canmore ID 13391). All features are undated but are likely to be prehistoric in age.

3.4 The cropmarks of a possible prehistoric barrow have also been located through aerial photography, just to the south of the survey area in Parcel 2. The 'Barrow and Enclosure' (Site no. NH74NW 112, Canmore ID 146154) are adjacent to a number of other indeterminate cropmarks and pits in the surrounding area; some of which may have been located in the geophysical survey data.

3.5 A full and more comprehensive archaeological background is in the process of being produced by Jacobs for the A9/96 Inshes to Smithton Scheme.

4 Aims

4.1 The main aim of the geophysical survey is to inform and support the cultural heritage chapter of the Environmental Impact Assessment Report for A9/A96 Inshes to Smithton Scheme. It will provide information that will be used in the assessment of the value of known heritage assets and the potential for unknown archaeological remains within the survey parcels, and the potential magnitude of the impact of the scheme on them.

4.2 Other aims of the gradiometer survey were:

- to determine (so far as possible) the presence or absence of buried archaeological remains in the survey parcels;
- to clarify the extent and layout of known sites of archaeological interest within the survey parcels;
- to clarify the extent and layout of previously unknown buried remains within the survey parcels;
- to interpret any geophysical anomalies identified by the survey; and
- disseminate the results of the archaeological geophysical survey through the deposition of an ordered archive and detailed report at the National Record of the Historic Environment (NRHE).

5 Methodology

5.1 All geophysical survey work was carried out in accordance with recommended good practice specified in guideline documents published by Highland Council (Highland Council 2012, Section 5, pp.21-24) as well as English Heritage – now Historic England (David *et al.* 2008) and the Chartered Institute for Archaeologists *Standard and Guidance for archaeological geophysical survey* (2014).

5.2 Parameters were selected that were suitable for the prospective aims of the survey and in accordance with recommended professional good practice (David *et al.* 2008, 8).

5.3 The gradiometer survey was carried out using Bartington Grad601-2 fluxgate gradiometers (see Appendices 2 and 3). Data was collected on an east west alignment using zig-zag traverses, with a sample interval of 0.25m and a traverse interval of 1m. A total of 424 full or partial 30m by 30m grids were surveyed within the specified area, totalling an area of approximately 24.45ha.

5.4 Care was taken to avoid metal obstacles present within the survey area during data collection using gradiometers. Gradiometer survey is affected by 'above-ground noise' such as metal objects, and avoiding these improves the overall data quality and results obtained.

5.5 The gradiometer data were downloaded using Bartington Grad601 PC Software v313 and processed using Geoscan Geoplot v3.0 / v4.0. The details of these processes can be found in Appendices 4 and 5. Data processing, storage and documentation were carried out in accordance with the good practice specifications detailed in the guidelines issued by the Archaeology Data Service (Schmidt and Ernenwein, 2009).

5.6 Interpretations of the data were created as layers in AutoCAD LT 2009 / GIS and the technical terminology used to describe the identified features can be found in Appendix 6.

6 Results and Interpretation

6.1 The gradiometer survey results have been visualised as greyscale plots, with the minimally processed data plotted at -1nT to 2nT in Figures 3, 5, 8, 11, 14, 17, 20, 23, 26, 29 and 32. The processed data is also plotted at -1nT to 2nT and can be seen in Figures 4, 6, 9, 12, 15, 18, 21, 24, 27, 30 and 33. Individual interpretations of the data can be seen in Figures 7, 10, 13, 16, 19, 22, 25, 28, 31 and 34 and an individual characterisation of the identified anomalies follows this in Appendix 1.

Parcel 1 & 1A (Anomaly Code A) (Figures 5 – 7)

Archaeology

6.2 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.3 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but is isolated in its location and association with other features.

6.4 Across Parcel 1 a number of pit-like anomalies were interpreted, many of which may or may not be archaeological (**A1** and **A2**). This interpretation was based on comparison with known pits identified in the areas. It may be that these are confirmed as being natural in origin following intrusive investigative works.

Linear Trend (Unclear origin)

6.5 These anomalies are of a linear / curvilinear form which are composed of a weak or small change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear they have an archaeological origin.

6.6 Across Parcel 1 a clear alignment of weak anomalies are visible, running north-west to south-east with a curvilinear feature at the northern end (**A3**). These could be geological in origin, related to variation in soil character. The trends may also have an archaeological origin, but further interpretation is tentative and only further investigation will ascertain their nature.

6.7 In the north-east of Parcel 1A a number of broad linear responses of unclear origin have been identified (**A4**). These could be related to archaeological features, possible boundaries or enclosures. However, they are considered equally likely to be related to geological or agricultural practices in the area.

6.8 In the south-west of Parcel 1A a number of unclear anomalies have been interpreted in a group and form what could be a small enclosure (**A5**). Again, however, this interpretation is tentative and these anomalies could be the result of a geological variation in the area. Located close to these are two curvilinear responses which resemble responses to archaeological remains in the Scheduled Monument Area and could relate to a possible hut circle (**A6**).

6.9 A larger possible hut circle has been identified to the south-west of these features (**A7**). However, the close proximity to a nearby modern service as well as possible geological origins mean that only a low level of confidence can be placed in this interpretation.

6.10 Three further smaller circular anomalies have been recorded (**A8** and **A9**). These again resemble hut circles, although the geology in these areas is such that they could instead represent natural variations.

6.11 Three areas of more tentative circular features have been recorded (**A10**). All three of these are most likely to be geological, however an archaeological origin cannot be ruled out.

6.12 Across this survey parcel a number of tentative linear and rectilinear trends have been recorded (**A11**, **A12**, **A13** and **A14**). All of these trends are tentatively identified due to the background magnetism and are most likely to be related to geology.

Agricultural

6.13 A large linear trend has been recorded running west to east in the far north of Parcel 1 and 1A (**A15**). This comprises a series of regular linear anomalies either composed of an increased or decreased magnetic response compared to background values. In this case anomalies seen adjacent to field edges are representative of agricultural headlands caused by ploughing.

Non-archaeology

6.14 Two bands of geology running north - south have been identified in the data set in both Parcel 1 and 1A (**A16**). These areas of disturbance are normally composed of irregular significant increases or decreases in magnetic values compared with background readings and are likely to indicate natural variations in soil composition or geology.

6.15 A linear trend composed of contrasting high positive and negative values has been detected crossing north-east to south-west across Parcel 1A (**A17**). Such anomalies usually signify a feature with a high level of magnetisation and are likely to belong to modern activity such as pipe lines or modern services.

6.16 Three areas of magnetic noise have been detected in the results (**A18**). These are located within Parcel 1A and may well be the remains of modern activity or larger pieces of magnetic debris such as plough fragments or fencing. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.17 Across the data set in both parcels is a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 2 (Anomaly Code B) (Figures 8 – 10)

Archaeology

6.18 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.19 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but are isolated and not associated with other features.

6.20 Across Parcel 2, a number of pit-like anomalies were identified, many of which have the possibility of being archaeological in origin (**B1** - **B5**). These were identified through comparison with known pits identified from the aerial photography. Further intrusive investigation will ascertain whether the pits have an archaeological origin, or if they are more natural in origin.

Linear Trend (Unclear origin)

6.21 These anomalies are of a linear / curvilinear form which are composed of a weak or different change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.22 Across Parcel 2 a number of unclear anomalies were identified with a curvilinear appearance, forming a possible circular shape (**B6** - **B8**). In particular, features **B7** and **B8** are pennanular in plan. These could be geological in origin related to variation in the soils. Equally, however, they may also have an archaeological origin, possibly relating to former hut circles relating to settlement activity.

6.23 Three more tentative linear features have been recorded (**B9** - **B11**). All three of these are most likely to be geological although an archaeological origin cannot be ruled out possibly forming previous field divisions. In particular **B11** appears to run through and adjoin a similar linear feature in Parcel 4 suggesting a wider ranging boundary.

Agricultural

6.24 A number of linear trends adjoining one another are seen in the data in the west of Parcel 2 and are likely to be related to agricultural field drains (**B12**). Field drains normally comprise a series of linear anomalies, usually with a regular or herringbone patterning and regular spacing.

Non-archaeology

6.25 Across the data set in Parcel 2 are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or highly magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 3 (Anomaly Code i) (Figures 29 – 31)

Archaeology

6.26 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology?

6.27 A magnetically positive linear trend runs north-west to south-east in the north of the dataset and could be archaeological in origin (**i1**). Anomalies of this are classed as having a linear / curvilinear / rectilinear

form either composed of an increased or decreased signal compared to magnetic background values suggesting the presence of a possible ditch feature. It is possible that the trend is related to a former field division however at present there is no cartographic evidence that this is the case.

Discrete Archaeology? Pit-like anomalies

6.28 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but which are isolated from other features.

6.29 Across Parcel 3 an increased number of pit-like anomalies were interpreted, many of which may or may not be archaeological (**i2** - **i5**). These were based on comparison with known pits identified in the areas. It may be that with further intrusive works these are confirmed as being natural in origin.

6.30 The discrete pit-like anomalies would appear to be a combination of isolated pits (e.g.**i2** and **i4**) as well as a clustered group of pits (e.g. **i3**). Interestingly, one of these pits does appear to coincide with circular features of an unclear origin (e.g. **i5**) and it is possible that it may be related and may be archaeological in origin. However, the trends may relate to natural variations rather than being of an archaeological origin.

Linear Trend (Unclear origin)

6.31 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.32 Across Parcel 3 a number of unclear linear, rectilinear and curvilinear / circular features have been recorded. These could be geological in origin related to variation of soils, but equally they may also have an archaeological origin, such as enclosures, hut circles and former boundaries.

6.33 The possible settlement features in this area (**i6** and **i9)** are all formed by a number of trends forming circular features, possibly relating to hut circles. Furthermore other linear and curvilinear responses have a patterning suggestive of enclosures (**i8** and **i10**). Two parallel linear anomalies have also been identified, suggesting a possible trackway through the area (**i7**).

6.34 A final unclear trend is noted in the far south of the parcel and this could also be related to the wider settlement divisions (**i11**).

Non-archaeology

6.35 An area of magnetic noise has been detected in the results (**i12**). Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings. The anomaly is located in the south of the dataset against the field boundary and is a result of a large drilling rig which was present in the survey block and was avoided (**i13**), hence the gap in the data in this area.

6.36 Across the dataset in both parcels are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background ‘noise’ within the data set.

Parcel 4 (Anomaly Code C) (Figures 11 – 13)

Archaeology

6.37 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.38 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but which are isolated from other features.

6.39 Across Parcel 4, an increased number of pit-like anomalies were identified (**C1 - C6**). These were identified following comparison with known pits identified in the area. It may be that with further intrusive works these are confirmed as being natural in origin.

6.40 The discrete pit-like anomalies would appear to be a combination of isolated (e.g. **C1** and **C6**) as well as clustered groups of pits (e.g. **C2** and **C4**). Interestingly, some of these pits do appear to coincide with circular features of an unclear origin e.g. **C4** and it is possible that they may be related and archaeological in origin. However, these clusters of discrete pit-like anomalies may rather be pockets of differing geology.

Linear Trend (Unclear origin)

6.41 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.42 Across Parcel 4 a number of unclear linear, rectilinear, curvilinear/circular features have been recorded. These could be geological in origin related to variation of soils, but equally they may also have an archaeological origin, possibly enclosures, hut circles and former boundaries.

6.43 The possible enclosure features (**C7, C12, C14** and **C16**) are all formed by a number of trends forming enclosure shaped patterns. In particular, **C7** would appear to show a possible enclosure alongside a number of curvilinear and sub-circular trends. By contract, **C12** appears to be much narrower and less enclosure-like, but does contain possible pits and suggestions of rectilinear features.

6.44 An isolated rectilinear trend in the south-east of the dataset may be archaeological in origin and the rectilinear nature of the trends are suggestive of a former field division (**C14**).

6.45 The final possible enclosure **C16** is again similar to **C7,** in that it consists of a group of circular anomalies and trends that potentially could indicate settlement activity. Equally, however, its location in the corner of a number of adjoining fields and Scretan Burn might suggest that the features are related to geological variations and a number of anomalies close by have been interpreted as geological rather than archaeological.

6.46 A number of circular unclear anomalies have been recorded in this parcel (**C8** – **C11, C13** and **C15**). These would all appear to be forming shapes resembling possible hut circles. In particular, **C13** would look to be associated with the possible discrete pit **C5** and, if proven to be archaeological could be related to one another. As with the possibly rectilinear features, geological origins must be considered equally likely.

6.47 Also within this parcel are a number of more tentative curvilinear and linear trends (**C17** - **C22**). These trends are all weaker in strength and shape and therefore are more likely to be non-archaeological or related to former boundaries. In particular, **C17** would appear to be related and adjoining a possible boundary which was identified in Parcel 2 (**B11**).

Agricultural

6.48 A number of possible linear trends related to drainage systems have been recorded in the south-east of Parcel 4 (**C24**). Field drains normally comprise a series of linear anomalies of an indeterminate date, usually with a regular or herringbone patterning and regular spacing.

Non-archaeology

6.49 A band of geology running north-east to south-west has been interpreted in the dataset in the south of Parcel 4 (**C23**). These areas of disturbance are normally composed of irregular significant increases or decreases in magnetic values compared with background readings and are likely to indicate natural variations in soil composition or geology.

6.50 Two areas of magnetic noise have been detected in the results (**C25** and **C26**). These are located at the northern and southern boundaries and are as a result of adjacent boundary gates or fences. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.51 Across the dataset in both parcels are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 5 (Anomaly Code J) (Figures 32 – 34)

Archaeology

6.52 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.53 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but which are isolated from other features.

6.54 In Parcel 5 two clusters of pit-like anomalies were interpreted, some of which may be archaeological in origin (**J1** and **J2**). These were based on comparison with known pits identified in the area. It may be that with further intrusive works these are confirmed as being natural in origin.

6.55 Interestingly a large cluster of pits are visible in the southern part of the area (**J1**). It is unclear if these are a result of archaeological activity in the area or geological variations such as a large number of pockets of sands or gravels in the area.

6.56 Two other larger singular pits were interpreted (**J2**). These could be archaeological but again could be geological as well and therefore only further intrusive works will determine the origin of these anomalies.

Linear Trend (Unclear origin)

6.57 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.58 In Parcel 5 a number of unclear linear, rectilinear, curvilinear/circular features have been recorded. These could be geological in origin related to variation of soils, but equally they may also have an archaeological origin, possibly enclosures, hut circles and former boundaries.

6.59 The possible enclosure feature (**J5**) is only tentative but it does appear to surround the group of possible pit features **J1**. Although this might form an enclosure it likewise could be the effect of the changing geology in the area.

6.60 Two hut circle like features are noted in the north of the area (**J3**) and a further broader curvilinear feature is visible to the east of this which may represent a further enclosure (**J4**). Again, these might

represent settlement evidence but the interpretation is only tentative due to the geological variations across the site.

Non-archaeology

6.61 Two areas of magnetic noise have been detected in the results (**J6** and **J7**). These are located at the north-east boundary of the survey parcel (**J6**) and along the southern boundary of the survey parcel (**J7**).

6.62 In the case of **J7**, this anomaly would appear to represent a pipe like feature running east west through the survey parcel. Anomaly **J6** is the result of modern disturbance in the area. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.63 Across the dataset in both parcels are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 6 (Anomaly Code D) (Figures 14 – 16)

Archaeology

6.64 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.65 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but is isolated in its location and association with other features.

6.66 Across Parcel 6 a number of pit-like anomalies were interpreted (**D1 - D5**). This interpretation was based on comparison with known pits identified in the area. It may be that with further intrusive works, these are confirmed as being natural in origin. A number of these pits in this parcel are located in areas which are potentially geological in origin and it is therefore considered probable that these are related to variations in geology rather than archaeology.

Linear Trend (Unclear origin)

6.67 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.68 Across Parcel 6 two areas of features of unclear origin have been recorded. The first anomaly noted (**D6**) although located close to probable geological variations, would appear to be different in shape and is considered to be potentially archaeological, though an interpretation is not obvious.

6.69 The second area is potentially that of a former pond or larger feature (**D7**). Its circular shape and anomaly strength would indicate a feature which is soil-filled, such as a pond or quarry pit.

6.70 A number of more tentative features curvilinear in shape have also been interpreted in the area, which could be archaeological in origin (**D8** and **D9**). These are, however, weak in strength and could be geological in origin, representing slight variations in soil changes. A modern agricultural origin, such as ploughing trends, cannot be ruled out.

Non-archaeology

6.71 Several bands of geology running predominately north-east to south-west have been identified in the dataset (**D10**). These areas of disturbance are normally composed of irregular significant increases or

decreases in magnetic values compared with background readings and are likely to indicate natural variations in soil composition or geology.

6.72 Several areas of magnetic noise have been detected in the results (**D11**). These are located at or along field boundaries and are as a result of metallic boundary gates or fences. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.73 Across the data set in both parts of the survey area are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 7 and 7A (Anomaly Code E) (Figures 17 – 19)

Archaeology

6.74 A number of pit-like anomalies of an archaeological origin have been noted in the parcel (**E1** and **E2**). These pits have been confirmed through aerial photographic evidence which correlates with the survey data.

Discrete Trend Archaeology?

6.75 Three curvilinear / circular features of discrete archaeology have been noted in the area (**E3 - E5**). These features fall in the area of Scheduled Monument *"Ashton Farm Cottages, ring ditch 415m SW and pit circles 460m WSW of" (SM11535).* These features are clearly visible in the aerial imagery, but the geological background magnetism means that, in the magnetometry dataset, these features show up as negative magnetic anomalies. All three are clearly visible in aerial photographs and are designated as a Scheduled Monument as a result of the clarity of the hut and pit circles. However, the corresponding features do not appear as clearly in the geophysics results.

Discrete Archaeology? Pit-like anomalies

6.76 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but are isolated in their location and association with other features.

6.77 Across Parcel 7 and 7A numerous pit-like anomalies were interpreted, many of which may be archaeological (**E6 - E11**). This interpretation was based on comparison with known pits identified in the area, some of which may be shown to be directly related once more intrusive works take place (**E6 - E8**). A number of pits were identified with other circular anomalies of an unclear date and these may well be related to one another (**E9** and **E10**). Likewise, with further intrusive works others may be found to be natural in origin; in particular, **E11** would suggest a more likely non-archaeological origin.

Linear Trend (Unclear origin)

6.78 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, the anomaly is difficult to interpret and it is unclear whether it has an archaeological origin.

6.79 Across Parcels 7 and 7A four broad anomalies were recorded of an unclear origin (**E12 - E15**). The first of these comprises two parallel linear responses that are suggestive of a trackway (**E12**).

6.80 The other three anomalies of this type are all circular in shape and are possibly related to settlement activity, compromising possible hut circles (**E13 - E15**). These responses are however difficult to interpret and could alternatively be the result of geological variations in the area.

6.81 Across both parcels a number of more tentative curvilinear / circular features have been recorded (**E16 - E21**). Many of these resemble further possible settlement evidence similar to the features visible in the Scheduled Monument area, such as further enclosures.

6.82 A number of curvilinear and rectilinear trends in the north-west may relate to enclosures or evidence of human activity (**E16** and **E17**) however interpretation is tentative. Whether or not these are archaeological, geological or even agricultural can only be established through intrusive evaluation.

6.83 **E18** and **E20** are interpreted as small circular anomalies and are associated with other possible archaeological remains or discrete pit-like anomalies. Therefore it is felt that these are most likely to be archaeological, but a geological origin cannot be ruled out.

6.84 In the south-east of Parcel 7, a number of small sub-circular anomalies of an unclear origin are visible amongst a number of tentative pit-like anomalies (**E21**). These anomalies are likely to represent either a large geological outcrop or faint discrete archaeological remains. Only intrusive investigation will determine their origin.

6.85 Four sets of linear trends of an unclear origin have been interpreted in Parcel 7 (**E19, E22, E23** and **E24**). **E19** does have some curvilinear sections; however, the feature is predominately on the same alignment as the other anomalies in this group. All four of these linear groups appear to be running north-west to south-east and, if archaeological, could be former field systems.

Agricultural

6.86 A former field boundary has been detected in the data running through Parcel 7 although the trend is only very weakly negative (**E25**). This former field boundary is visible on historic Ordinance Survey mapping of 1843-1882, Six-inch 1st edition (NLS, 2018). Such isolated long linear anomalies, in this case represented as a negative magnetic trend, are often related to former field boundaries.

6.87 Two large linear trends have been recorded running west to east in the north and eastern boundaries of Parcel 7 (**E26**). These comprise a series of regular linear anomalies either composed of an increased or decreased magnetic response compared to background values. In this case anomalies seen adjacent to field edges are representative of agricultural headlands caused by ploughing.

Non-archaeology

6.88 Three areas of magnetic noise have been detected in the results (**E27 - E29**). These are located around the boundaries of the parcels and are likely to be a reflection of metallic boundary fences and gates. In the case of **E28** this is the result of the rail line which runs along the southern boundary of the area. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.89 Across the data set in both parcels are a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

Parcel 8 (Anomaly Code F) (Figures 20 – 22)

Archaeology

6.90 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.91 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but are isolated in their location and association with other features.

6.92 Across Parcel 8 a number of discrete pit-like anomalies were interpreted, many of which may be archaeological in origin (**F1 - F5**). This interpretation was based on comparison with known pits identified in the area.

6.93 The discrete pit-like anomalies in this parcel are split in to two groups. The first are three sets of pits which are isolated in their location (**F1** – **F4**). These pits, although potentially archaeological, are considered equally likely to be related to geological variations. The second group of pits are more grouped and may represent a circular anomaly of their own, such as an enclosure (**F5**). They also may be associated to features observed to the north (**F9**) and south (**F6**).

Linear Trend (Unclear origin)

6.94 These anomalies are of a linear / curvilinear form which are composed of a weak or different change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.95 Parcel 8 contains one circular discrete trend (**F6**) which could be linked to the discrete pit anomalies in anomaly **F4**. The anomaly could be geological in origin, related to variation of soils, but equally it may have an archaeological origin and relate to a hut circle or enclosure.

6.96 **F7 - F9** are all trends which are tentative in their identification and most likely have geological origins; however, they do have the potential to be archaeological in origin. If archaeological, they could indicate a combination of field boundaries and settlement evidence, such as enclosures.

Non-archaeology

6.97 Across the data set a large quantity of isolated dipolar anomalies (iron spikes) are visible.

Parcel 9 (Anomaly Code G) (Figures 23 – 25)

Archaeology

6.98 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.99 These are anomalies composed of an increase in magnetic values with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but are isolated in their location and association with other features.

6.100 Three groups of discrete pits have been identified in this survey parcel (**G1 - G3**). These are all potentially associated with other adjacent anomalies in the survey area. However, whether these are archaeological or geological in origin is uncertain.

Linear Trend (Unclear origin)

6.101 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.102 Two sub-circular anomalies representing possible hut circle features have been interpreted in the dataset (**G4** and **G5**). Alternatively, they could equally be the result of geological variation and therefore can only be classed as unclear in origin.

6.103 Two parallel linear anomalies run north-east to south-west in the west of the parcel (**G6**). The anomalies are potentially similar to anomaly **E12** in Parcel 7 and may represent a trackway of an archaeological origin. However, this anomaly does appear to terminate at a possible modern service and therefore a modern origin must be considered possible.

6.104 A rectilinear anomaly (**G7**) has been identified in the south of the parcel. This may have an archaeological origin due to its magnetic strength and appearance, such as an enclosure; however, the anomaly is unusual in shape and it is possible that this feature is related to a nearby service, or has a geological origin.

6.105 A number of linear and rectilinear trends have been tentatively interpreted in the data (**G8**). These trends are possibly related to archaeology and could form boundaries and evidence of settlement. However, they could equally be related to geological variations in the area.

Agricultural

6.106 A former field boundary has been detected in the data running through Parcel 9, although the trend is only very weakly negative (**G9**). This former field boundary is visible on historic Ordinance Survey mapping of 1843-1882, Six-inch 1st edition (NLS, 2018). Such isolated long linear anomalies, in this case represented by a negative magnetic trend, are often related to former field boundaries.

Non-archaeology

6.107 A linear trend related to the rail line in the north of the parcel has been detected along the northern extremity of Parcel 9 running from the north-west towards the south-east (**G10**). Anomalies of a linear form often composed of contrasting high positive and negative values. Such anomalies usually signify a feature with a high level of magnetisation and are likely to derive from modern activity such as pipe lines or modern services.

6.108 A second linear trend of a possible modern service with strong positive and negative magnetic values has been detected crossing Parcel 9, running east-west (**G11**). Such anomalies usually signify a feature with a high level of magnetisation and are likely to derive from modern activity such as pipe lines or modern services.

6.109 One area of magnetic noise has been detected in the results (**G12**). This is located in the south-west of the parcel and may be the remains of modern activity or larger pieces of magnetic debris such as fragments of plough or fencing. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.110 A small unsurveyable area has also been identified in the survey parcel which relates to a waterlogged pond in the area at the time of survey (**G13**).

6.111 Across the dataset is a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or high magnetically susceptible material on the surface or within the topsoil of the site; it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background ‘noise’ within the dataset.

Parcel 10 and 10A (Anomaly Code H) (Figures 26 – 28)

Archaeology

6.112 No responses indicating definitive archaeological remains have been confirmed in this survey parcel.

Discrete Archaeology? Pit-like anomalies

6.113 These anomalies are typically composed of an increase in magnetic values, with a patterning on the XY trace plot that is suggestive of buried remains, such as the infill of a pit, but are isolated in their location and association with other features.

6.114 Across Parcels 10 and 10A, four sets of discrete pit-like anomalies were interpreted (**H1 – H4**). However, they are all isolated and appear to be unrelated to any other anomalies in the dataset. In this parcel it is considered that these anomalies are more likely to be related to geological variations which appear to be more clearly defined in this area.

Linear Trend (Unclear origin)

6.115 These anomalies are of a linear / curvilinear form which are composed of a weak or variable change in magnetic values. Coupled with poor patterning, these anomalies are difficult to interpret and it is unclear whether they have an archaeological origin.

6.116 Across Parcel 10 and 10A four sets of anomalies have been identified and as it is not possible to ascertain at this stage if the anomalies are archaeological or geological, they have been categorised as having unclear origins (**H5 - H8**).

6.117 **H5** comprises a large circular feature and a smaller semi-circular anomaly, both of which appear to be archaeological. However, neither are clearly defined and because of this a natural or modern origin cannot be ruled out.

6.118 **H6** and **H7** are both circular features of a similar shape and size. They are similar in form to hut circles, but in this parcel they are located close to geological bands and it may be that they derive from this rather than archaeology.

6.119 In the south of the parcel, a large number of circular and curvilinear features have been interpreted (**H8**). These anomalies appear to form a possible enclosure; however, they also may have been caused by natural or geological variations.

6.120 Throughout the parcels a number of weaker and more tentative linear trends have been recorded (**H9-H11**). These unclear trends are likely to be geological in origin due to the clearer, better defined geological variations in this parcel. Alternatively, they could be related to weaker archaeological settlement evidence and possible boundaries.

Agricultural

6.121 A large linear trend has been recorded running west to east in the far south of Parcel 10 and 10A (**H12**). These comprise a series of regular linear anomalies either composed of an increased or decreased magnetic response compared to background values. In this case anomalies seen adjacent to field edges are representative of agricultural headlands caused by ploughing.

Non-archaeology

6.122 A number of bands of geological variations running north-east to south-west have been identified in the datasets for both Parcel 10 and 10A (**H13**). These areas of disturbance are normally composed of irregular significant increases or decreases in magnetic values compared with background readings and are likely to indicate natural variations in soil composition or geology.

6.123 A linear trend of a possible modern service has been detected, running east-west and crossing Parcel 10 (**H14**). Anomalies of a linear form often composed of contrasting high positive and negative values. Such anomalies usually signify a feature with a high level of magnetisation and are likely to belong to modern activity such as pipe lines or modern services.

6.124 Two areas of magnetic noise have been detected in the results (**H15** and **H16**). These are located around the edges of Parcel 10 and 10A and may well be the remains of modern activity or larger pieces of magnetic debris such as bits of plough or fencing in the field boundaries. Areas of modern disturbance are characterised by significant increases or decreases in values compared with background readings.

6.125 Across the data set in both parcels is a large quantity of isolated dipolar anomalies (iron spikes). These are commonly caused by ferrous or highly magnetically susceptible material on the surface or within the topsoil of the site, and it is likely that modern agricultural activity has changed the magnetic properties of the top soil and created a high level of background 'noise' within the data set.

7 Magnetometry Survey: Conclusion

7.1 The gradiometer survey has identified a number of pit anomalies of a definitive archaeological nature. These were also recorded in aerial photography of the site.

7.2 Across the central Parcel 7, a number of discrete linear trends were identified, but due to their poor strength and patterning only a tentative interpretation can be given as to their origin. Even with aerial photography confirming the presence of these features, they are not clearly enough defined in the magnetometry results to be classed as definitive archaeology.

7.3 Interestingly, the features detected of a similar shape and size in the Scheduled Monument areas are, unusually, presenting as negative anomalies. Typically in Britain archaeological features present as magnetic variations which are increased compared the background magnetism. It appears that on this site the background geology is generally rather magnetic, so that the archaeological features such as ditch fills are actually magnetically weaker than background, so that they present as negative, rather than positive anomalies.

7.4 Discrete pit-like anomalies have been detected throughout. Many are similar in form to the known pits in the Scheduled Monument area.

7.5 Across all the parcels many unclear trends have been interpreted which all have the potential to be archaeological in nature. The geological background has, however, caused a low level of confidence in the interpretation of these features. The fact that the archaeological remains are so clear in the aerial photography lends weight to the interpretation that at least some of the trends and pits in the datasets should be considered as archaeological in nature. However, the geology of the area has certainly influenced some of the datasets and made a confident interpretation of anomalies and trends difficult.

7.6 A number of agricultural trends, most likely related to former ploughing headlands, have also been identified in certain parcels. Similar linear trends related to field drainage have also been recorded across the site. Two former field boundaries noted from historic mapping were also recorded in the survey data.

7.7 Clearly the geology has influenced the magnetometer results, although this influence is not as strong as can be expected in some parts of Scotland. There are some clear geological anomalies running throughout the survey areas, however interpretation of other features has been difficult given the similarity of the geology to features of a possible archaeological origin. In particular, comparisons can be made across the whole site between weak negative anomalies and those which are thought to represent the Scheduled Monument.

7.8 Several areas of magnetic disturbance of a likely modern date were also detected, including several modern services, as well as disturbance around field edges as a result of the railway passing through the site and metallic boundary fencing surrounding the fields.

7.9 In conclusion, the results have highlighted a large number of anomalies which potentially could be archaeological. The difficulty on this site is the fact the Scheduled Monument is not clearly visible in the geophysical data. The anomalies present within the Scheduled areas are negatively magnetic, if these are compared to similar features across the site, then there are many other possible

archaeological features. The present surveyors have aimed to highlight as many of these possible archaeological anomalies as possible. It is likely that the interpretation of this survey could be calibrated and given greater confidence by intrusive evaluation designed to test the reliability of the features identified above.

8. Resistivity Survey

8.1 In order to enhance the results of the magnetometry survey and test the visibility of the archaeology surrounding the Scheduled Monument using an alternative prospection technique, a resistivity survey was carried out over approximately 3.5ha in Parcel 7 between the 9th and 18th April 2018.

8.2 The resistivity survey was carried out using an RM-15 Advanced earth resistance meter, using the PA5 probe array with 0.5m probe spacing. Parameters were selected to suit the prospective aims of the survey, and data was collected in 30m x 30m grids, at 1m sample resolution and 1m spaced transects. Background resistance readings were high, meaning that survey on the 0.1 mA range was required (see Appendix 2). The data were processed in Terrasurveyor (see Appendix 5).

8.3 Weather conditions during the survey were fine, generally overcast with occasional showers (Plate 11 and 12). Access to some areas of Parcel 7 was not possible owing to the presence of GI drilling works, but survey of the majority of the southern area was completed.

Resistivity Results (Anomaly Code R) (Figures 35 – 36)

8.4 The resistivity data have been visualised as greyscale plots with the range 120 to 440 ohms in Figure 35. Interpretations of the data are provided in Figure 36 and individual characterisation of the identified anomalies are provided in Appendix 1.

General observations

8.5 The resistivity survey has provided greater clarity on the Scheduled features detected through magnetometry survey, in particular confirming the extent and location of the penannular ring ditch in the eastern Scheduled area. As was suspected on the basis of the magnetometry results, there are indications of extensive archaeological features in Parcel 7, although those located outside the Scheduled areas can only be tentatively identified.

Archaeology

8.6 The post-defined roundhouse located in the west of the Scheduled area, clearly visible in the aerial photography for the site but poorly defined in the magnetometry data is partially visible in the resistivity data (**R1**). The post-defined porch feature located on the western side of the structure is visible, as is a curvilinear trend of low-resistance data forming the south side of the structure. The northern half of the building is not clearly visible in the data.

8.7 The most clearly defined archaeology detected by the resistivity survey is the penannular ring ditch located in the eastern Scheduled area, visible as an enclosure 12m in diameter, with an entrance located in the south-eastern quadrant (**R2**). To the north and east of **R2**, two large pits are visible as areas of low resistance (**R3** and **R4**); these may be associated with the settlement indicated by **R2**.

Archaeology – possible

8.8 Other circular anomalies are less clearly defined but may indicate the presence of further structures in both the north and south areas of Parcel 7. Immediately south-west of ring ditch **R2**, a weak ring of low resistance may indicate the presence of a further ring ditch or enclosure (**R5**). Close to the northern extent of the survey area, three low-resistance rings, each c. 13m in diameter (**R6, R7, R8**) may indicate the presence of further ring-ditches, though these are less confidently identified. A linear band of low resistance readings immediately to the north of these possible structures (**R9**) may indicate the presence of an associated boundary ditch, though again, this feature is poorly defined.

8.9 Other circular features are tentatively suggested by the presence of rings of high-resistance readings. In the north of the survey area, a faint ring c. 13m in diameter is visible (**R10**), associated with a linear feature running to the north-west. Between the scheduled areas in the south of the survey area, two further penannular high-resistance anomalies are visible (**R11** and **R12**), though again these are poorly defined. A further possible structure, elongated oval in shape, is visible immediately to the east (**R13**). A possible enclosure, either representing the remains of a bank or ditch, may be indicated close to the westernmost scheduled area by the presence of a band of high-resistance readings (**R14, R15** and **R16)**.

8.10 If these anomalies are indeed archaeological in character, it is unclear why they appear as high-resistance features whereas the more clearly identifiable archaeology presents as low-resistance anomalies. It is possible that this difference is an indication of structural variation (e.g. the presence of paving or other stonework), or a variation in the character of the fills of cut features (e.g. containing a higher proportion of gravels). However, given their indistinct character, this cannot be confidently determined without intrusive excavation; it remains a possibility, furthermore, that some or all of these features are geological in origin.

Linear features – archaeology

8.11 In the south-east of the survey area, two linear features defined by low-resistance trends are visible (**R17** and **R18**), possibly representing the remains of an enclosure or boundary. These cannot be demonstrably shown to be associated with the other archaeological features in the survey area.

Linear features – archaeology (possible)

8.12 Faint linear trends are visible immediately to the west of the possible circular structure R10 (**R19** and **R20),** possibly forming an enclosure or boundary. In the north of the survey area, a single linear trend of low resistance does not respect the modern ploughing orientation and may be archaeological in character (**R21**). A similarly isolated linear trend (**R22**) cuts across the modern ploughing orientation and may be a similar boundary or enclosure. In the extreme east of the survey area, a series of linear features defined by faint low resistance trends are visible (**R23** and **R24**); again, these may represent the remains of smaller enclosures.

Modern features

8.13 The survey area is currently ploughed, and linear ploughing trends are visible across the dataset (**R25**)**.** Ploughing headlands of differing depths are visible at the extreme south and north-east of the surveyed area (**R26** and **R27**), associated with the modern agricultural regime.

Resistivity Survey – Conclusion

8.14 The resistivity survey has added clarity on the extent and location of the Scheduled Monument located in Parcel 7 and has additionally suggested the presence of further circular anomalies. Although these are less well defined and consequently less confidently identified, this result tallies with the indications provided by the magnetometry survey that suggest there may be numerous features of archaeological character in Parcel 7.

8.15 The resistivity survey has confirmed reliably the precise location of the easternmost ring ditch in the Scheduled Monument (SM 11535). This shows that the digitised polygon establishing the extent of the Scheduled area is located c.12m west of the correct location. It is probable that this error has been incurred during the rectification of the oblique aerial image used to transcribe the extent of the ring ditch. In addition, pits **R3** and **R4** show that features associated with the ring ditch are located outside the Scheduled area.

9. Aerial Imagery analysis

9.1 In order to assess the concordance of the geophysical survey results with the available aerial photography, comparison was made between photographs held by the National Record for the Historic Environment (NRHE) by Historic Environment Scotland (HES) and the geophysical data obtained during this survey.

9.2 At the time of writing, the majority of relevant aerial images had been removed from the NRHE by HES for digitising as part of HES' ongoing image digitisation programme, and so were unavailable for consultation. However, in discussion with HES AOC were able to obtain access to a single georeferenced image of the Ashton Farm field containing the Scheduled Monument *"Ashton Farm Cottages, ring ditch 415m SW and pit circles 460m WSW of" (SM11535).* In addition, linework transcribed from that image by HES's aerial survey team was made available. The image obtained was C52911.tif; linework file C52911.dxf.

9.3 The features identified in the aerial image and transcribed by HES comprise a probable ring-ditch house c.9m in diameter (though Scheduling document states 6m) defined by a ditch 1m in width and with an entrance on the south-east (eastern area) and a group of pits forming at least two probable roundhouses 10m in external diameter (western site). A scatter of related pits is visible surrounding the roundhouses.

9.4 The magnetometry data for the Scheduled areas is somewhat noisy, with the effect of the background subsoil variations masking the visibility of clear archaeological features. However, the ring ditch of the eastern site is evident in the magnetometry data, although located c. 12m north-east of the plotted position based on the Aerial Photograph transcription. The post-ring houses of the western site are also visible in the magnetometry data, although similarly offset from the Aerial Photography transcribed position; in this case the Aerial Photograph transcription is plotted c.7m north-west of the features identified in the magnetometry.

9.5 The magnetometry data draws attention to the probable presence of further ring ditch structures in the same field, one of which may be visible in the aerial image. This structure (**E15**) is indicated by a magnetically noisy area probably defining a circular structure close to the northern field boundary. At this location, a faint penannular ditch approximately 15m in diameter is visible in the aerial imagery, with a series of possible pits in close proximity. These features were transcribed from the aerial image as 'roundhouse' and 'pit' (see Figures 37 - 40).

9.6 The combined evidence from the aerial imagery and the magnetometry survey indicates the probability of a prehistoric settlement, likely to be of Bronze or Iron Age date, in the Ashton Cottages fields. The results of both analyses suggest that the buried archaeological remains are more extensive than those previously identified through aerial photography.

10. Statement of Indemnity

10.1. Although the results and interpretation detailed in this report have been produced as accurately as possible, it should be noted that the conclusions offered are a subjective assessment of collected data sets.

10.2. The success of a geophysical survey in identifying archaeological remains can be heavily influenced by several factors, including geology, seasonality, field conditions and the properties of the features being detected. Therefore, the geophysical interpretation may only reveal certain archaeological features and not produce a complete plan of all of the archaeological remains within a survey area.

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Plate 1. Parcel 1 looking south-east

Plate 2. Parcel 2 looking north towards Parcel 1

Plate 3. Parcel 4 looking south-west

Plate 4. Parcel 6 looking east across the Greenway

Plate 5. Northern section of Parcel 7 looking north

Plate 6. Parcel 7 looking east

Plate 7. Parcel 7 looking west-north-west across the Scheduled Monument areas

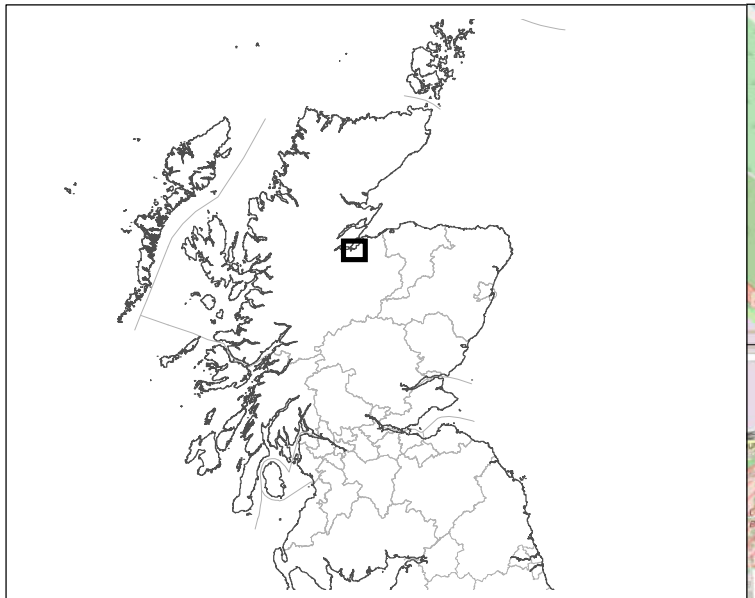
Plate 8. Parcel 8 looking north-west

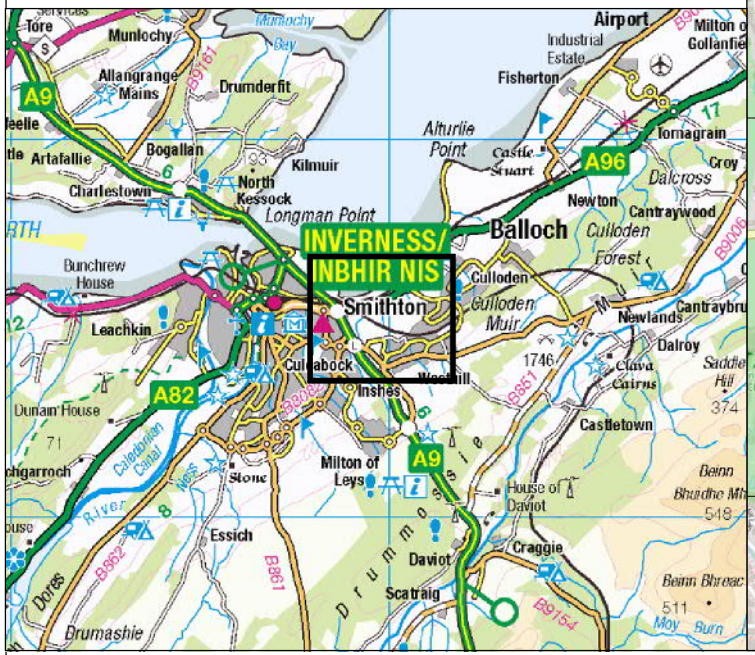
Plate 9. Parcel 9 looking east

Plate 10. Parcel 10 looking north

Plate 11: Parcel 7 (north-west corner) during resistivity survey

Plate 12: Parcel 7 (north-east corner), during resistivity survey





Site Location Plan

Figure 1

Red Line Boundary

Scheduled Area

N

0 600m

1:20,000 at A4

Project Title:" A9/A96 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 1 - Site Location Plan		
V1/51877/GEO/F1/26.01.18		
Drawn by: SO	Checked by: GH	Approved by: KT
26/01/2018	26/01/2018	26/01/2018

AOC Archaeology Group

Figure	2

Survey parcels

Jacobs supplied Parcels

Magnetometry nT

Value

+2

-2

FOR

JACOBS

Drawn/checked:	GC/JL
DWG no:	01/51877/Rep/02
AOC Project No.:	51877

AOC Archaeology Group

N

Map Frame Lower Left: 268921E 844462N m
Map Frame Upper Right: 270950E 846070N m

SYSTEM

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936

SCALE

1:6,000 @ A3

SCALE

0 50 100 150 200 250

Meters

Minimally processed Gradiometer survey results - Overall Greyscale plot

N

0 200m

1:5000 at A3

Figure 3

Scale 2nT -1nT

Project Title: A96 / A9 Inshes to Smithton
Project No: 51877

Drawing Title: Figure 3 - Minimally processed Gradiometer survey results - Overall Greyscale plot

V1/51877/GEO/F3/03.05.18

Drawn by: KT	Checked by: JL	Approved by: JL
03/05/2018	03/05/2018	03/05/2018

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Parcel 1
Parcel 1A
Parcel 2
Parcel 3
Parcel 4
Parcel 5
Parcel 6
Parcel 7A
Parcel 8
Parcel 7
Parcel 9
Parcel 10
Parcel 10A

Processed Gradiometer survey results - Overall Greyscale plot

N
0 200m
1:5000 at A3

Figure 4

Scale
2nT
-1nT

Project Title: A96 / A9 Inshes to Smithton
Project No: 51877

Drawing Title: Figure 4 - Processed Gradiometer survey results - Overall Greyscale plot

V1/51877/GEO/F4/03.05.18

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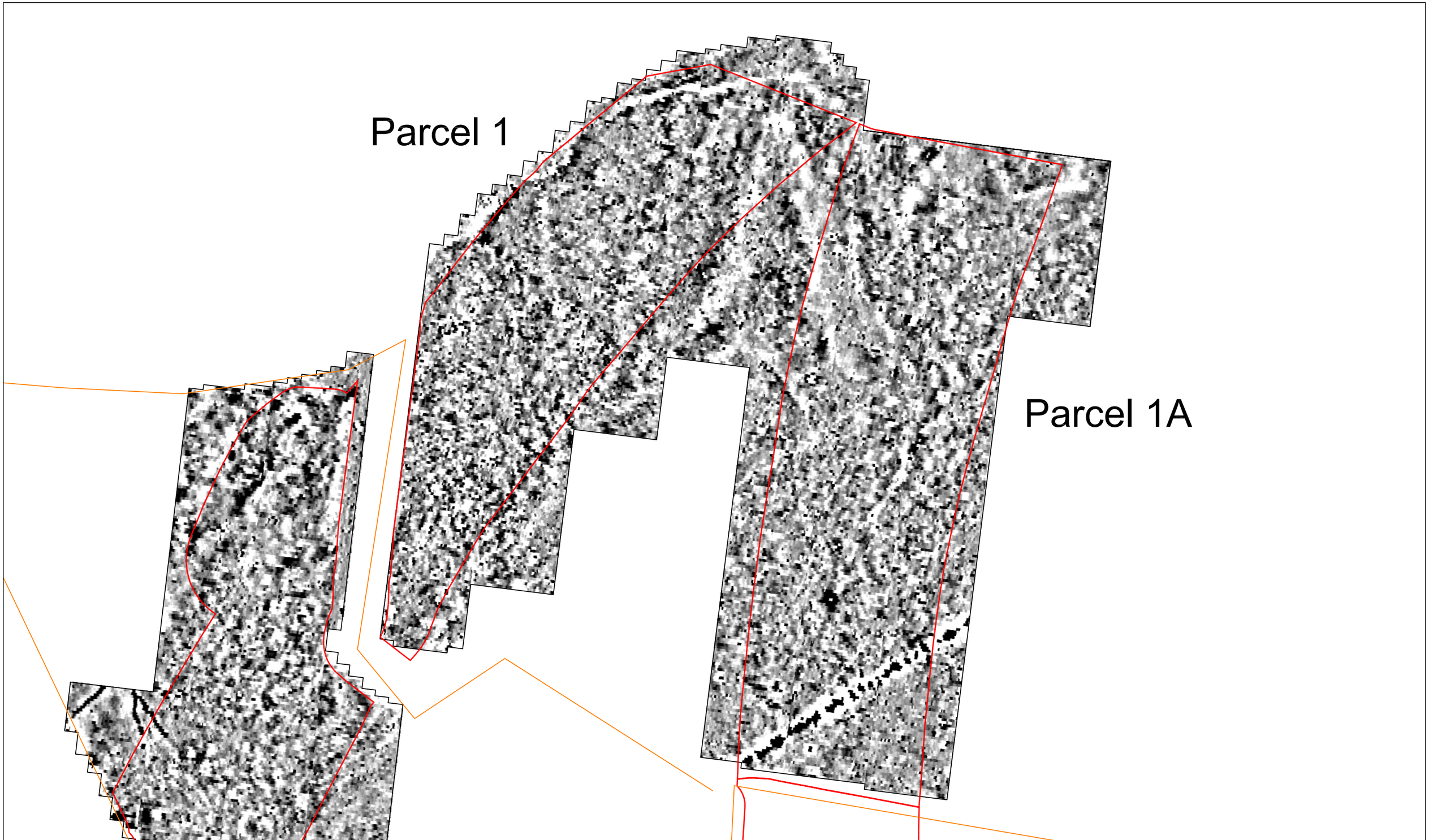

Minimally processed Gradiometer survey results - Greyscale plot - Parcel 1 & 1A

Figure 5	Scale: 2nT / -1nT	N; 0 – 50m; 1:1250 at A3	Project Title: A96 / A9 Inshes to Smithton Project No: 51877 Drawing Title: Figure 5 - Minimally processed Gradiometer survey results - Greyscale plot - Parcel 1 & 1A V1/51877/GEO/F5/30.01.18	AOC Archaeology Group

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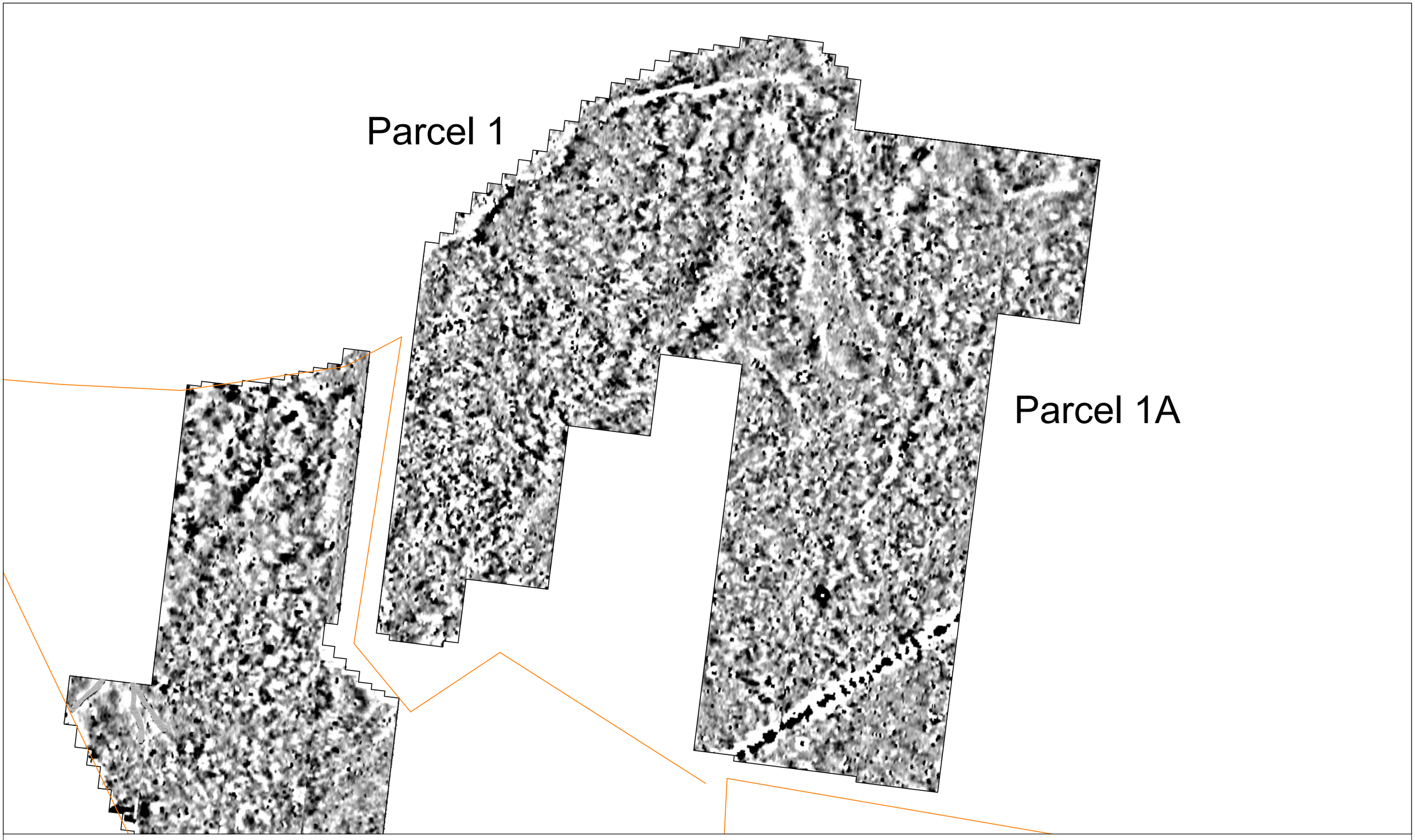

Processed Gradiometer survey results - Greyscale plot - Parcel 1 & 1A

Figure 6

Scale
2nT
-1nT

N
0
50m
1:1250 at A3

Project Title: A96 / A9 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 6 - Processed Gradiometer survey results - Greyscale plot - Parcel 1 & 1A		
V1/51877/GEO/F6/30.01.18		
Drawn by: KT	Checked by: JL	Approved by: JL
30/01/2018	30/01/2018	30/01/2018

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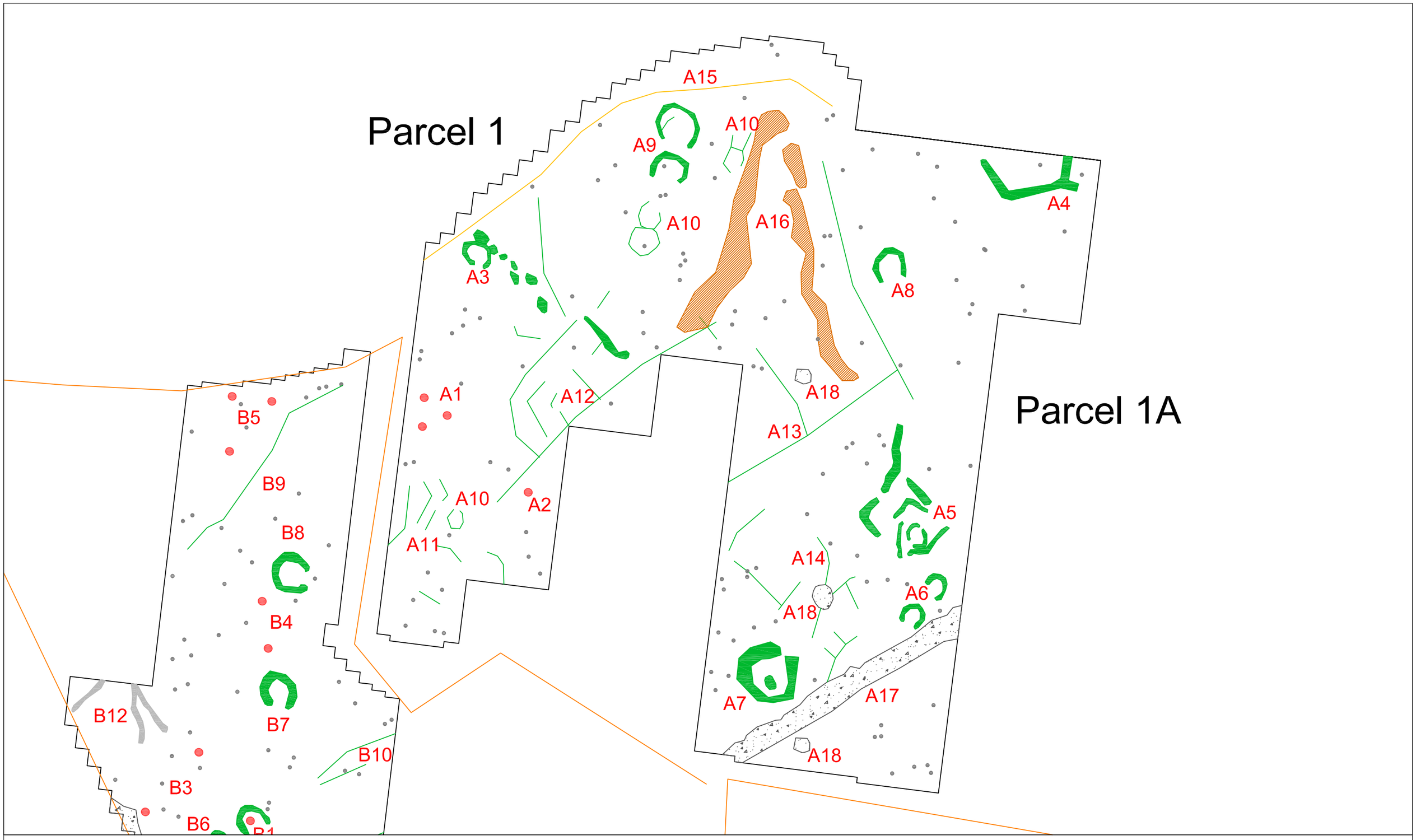

Interpretation of Gradiometer survey results - Parcel 1 & 1A

Figure 7

- Trend (Archaeology)
- Area of Disturbance (Archaeology)
- Pit (Archaeology)
- Discrete Trend (Archaeology?)
- Discrete Area of Disturbance (Archaeology?)
- Discrete Pit (Archaeology?)
- Trend (Unclear Origin)
- Area of Disturbance (Unclear Origin)
- Old Field Boundary
- Linear Trend (Ridge and Furrow)
- Linear Trend (Ploughing)
- Linear Trend (Field Drains)
- Geology / Natural
- Linear Trend (Modern Service)
- Area of Disturbance (Modern)
- Ferrous / Iron Spikes

N

0 50m

1:1250 at A3

Project Title: A96 / A9 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 7 - Interpretation of Gradiometer survey results - Parcel 1 & 1A		
V1/51877/GEO/F7/30.01.18		
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Minimally processed Gradiometer survey results - Greyscale plot - Parcel 2

Figure 8

Scale
2nT
-1nT

N

0 50m

1:1250 at A3

Project Title: A96 / A9 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 8 - Minimally processed Gradiometer survey results - Greyscale plot - Parcel 2		
V1/51877/GEO/F8/30.01.18		
Drawn by: KT	Checked by: JL	Approved by: JL
30/01/2018	30/01/2018	30/01/2018

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Processed Gradiometer survey results - Greyscale plot - Parcel 2

Figure 9

Scale
2nT
-1nT

N

0 50m

1:1250 at A3

Project Title: A96 / A9 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 9 - Processed Gradiometer survey results - Greyscale plot - Parcel 2		
V1/51877/GEO/F9/30.01.18		
Drawn by: KT	Checked by: JL	Approved by: JL
30/01/2018	30/01/2018	30/01/2018

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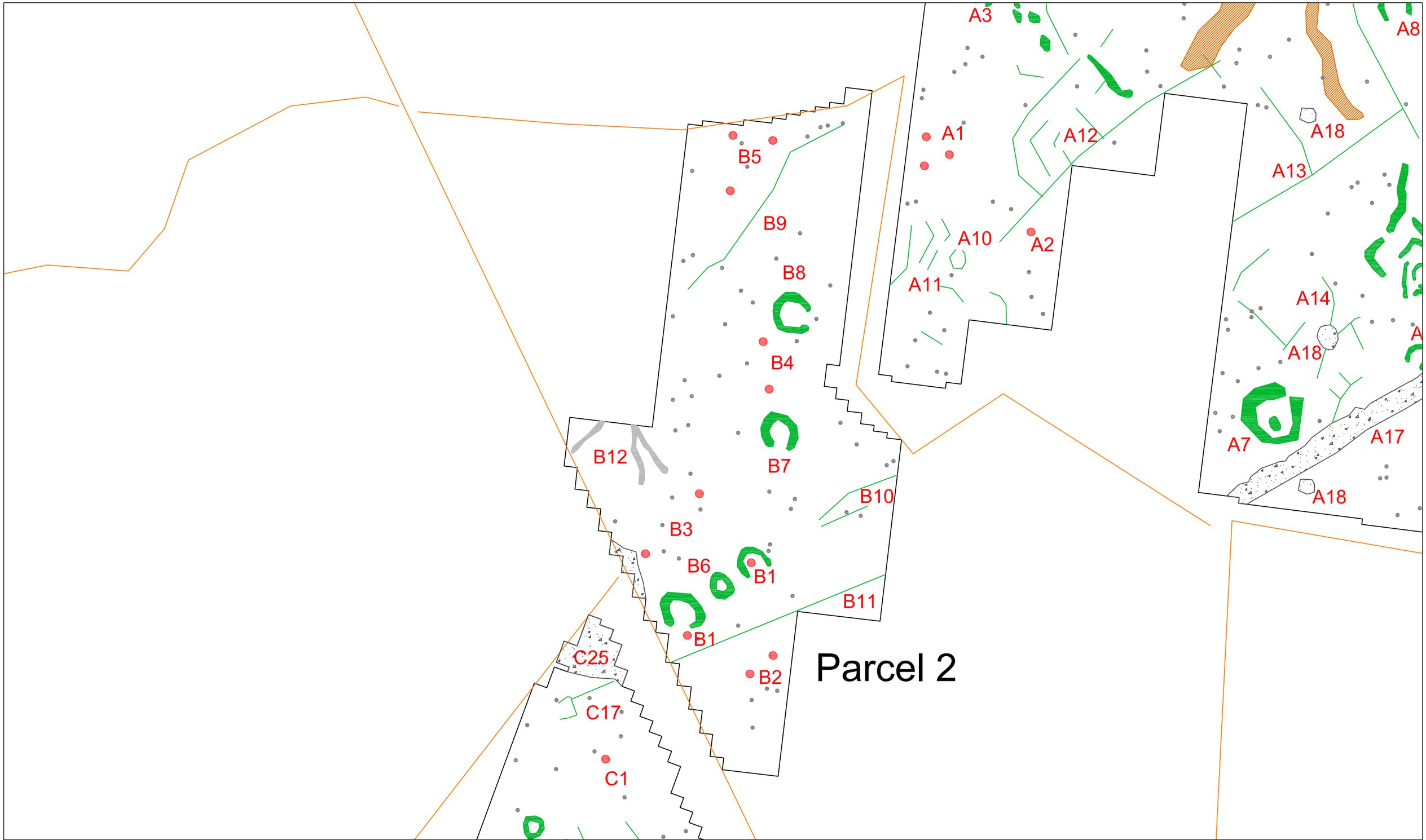

Interpretation of Gradiometer survey results - Parcel 2

Figure 10

- Trend (Archaeology)
- Area of Disturbance (Archaeology)
- Pit (Archaeology)
- Discrete Trend (Archaeology?)
- Discrete Area of Disturbance (Archaeology?)
- Discrete Pit (Archaeology?)
- Trend (Unclear Origin)
- Area of Disturbance (Unclear Origin)
- Old Field Boundary
- Linear Trend (Ridge and Furrow)
- Linear Trend (Ploughing)
- Linear Trend (Field Drains)
- Geology / Natural
- Linear Trend (Modern Service)
- Area of Disturbance (Modern)
- Ferrous / Iron Spikes

N

0 50m

1:1250 at A3

Project Title: A96 / A9 Inshes to Smithton Project No: 51877		
Drawing Title: Figure 10 - Interpretation of Gradiometer survey results - Parcel 2		
V1/51877/GEO/F10/30.01.18		
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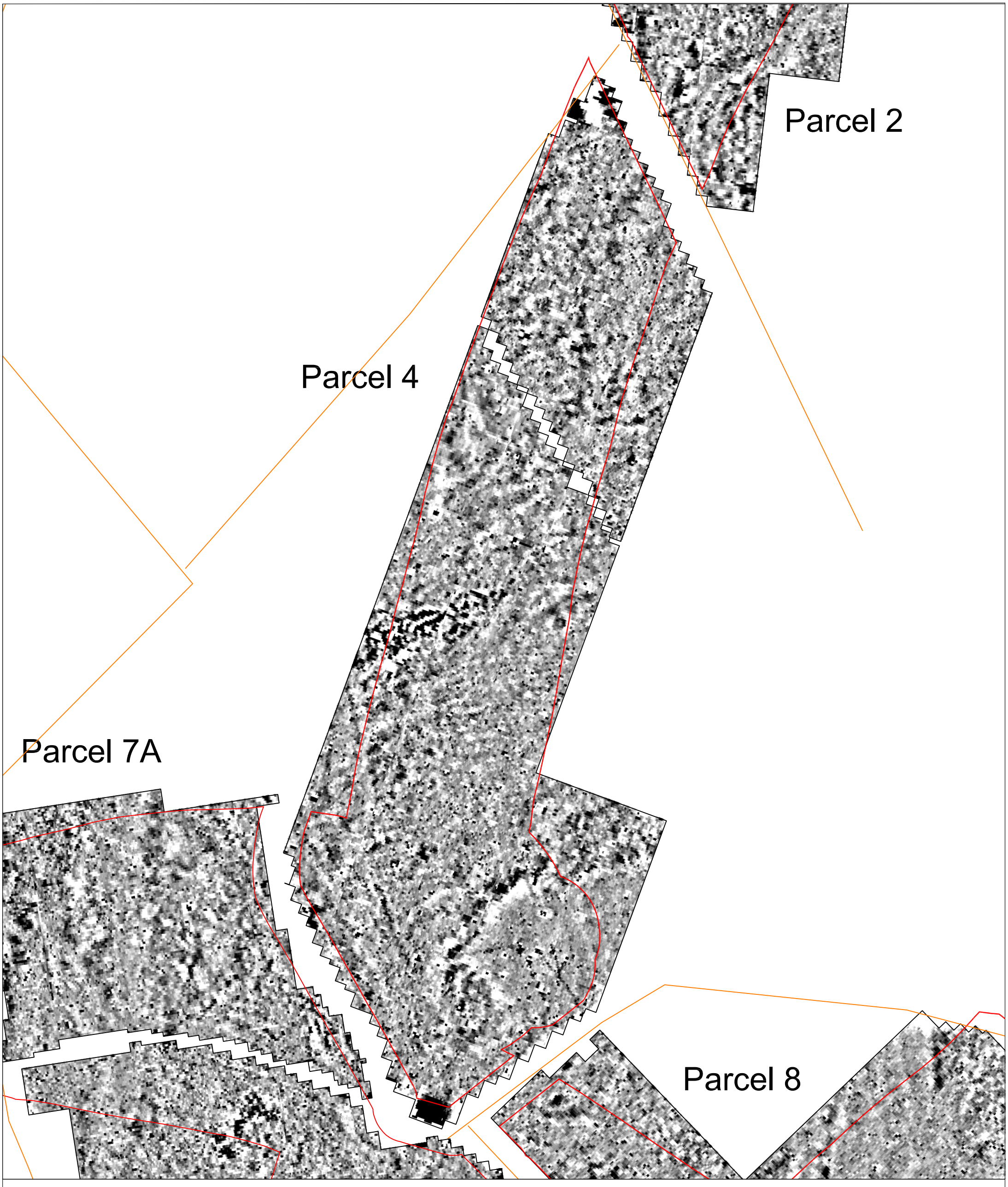

Minimally processed Gradiometer survey results - Greyscale plot - Parcel 4

N

0 60m

1:1500 at A3

Figure 11

Scale 2nT -1nT

Project Title: A96 / A9 Inshes to Smithton
Project No: 51877

Drawing Title: Figure 11 - Minimally processed Gradiometer survey results - Greyscale plot - Parcel 4

V1/51877/GEO/F11/30.01.18

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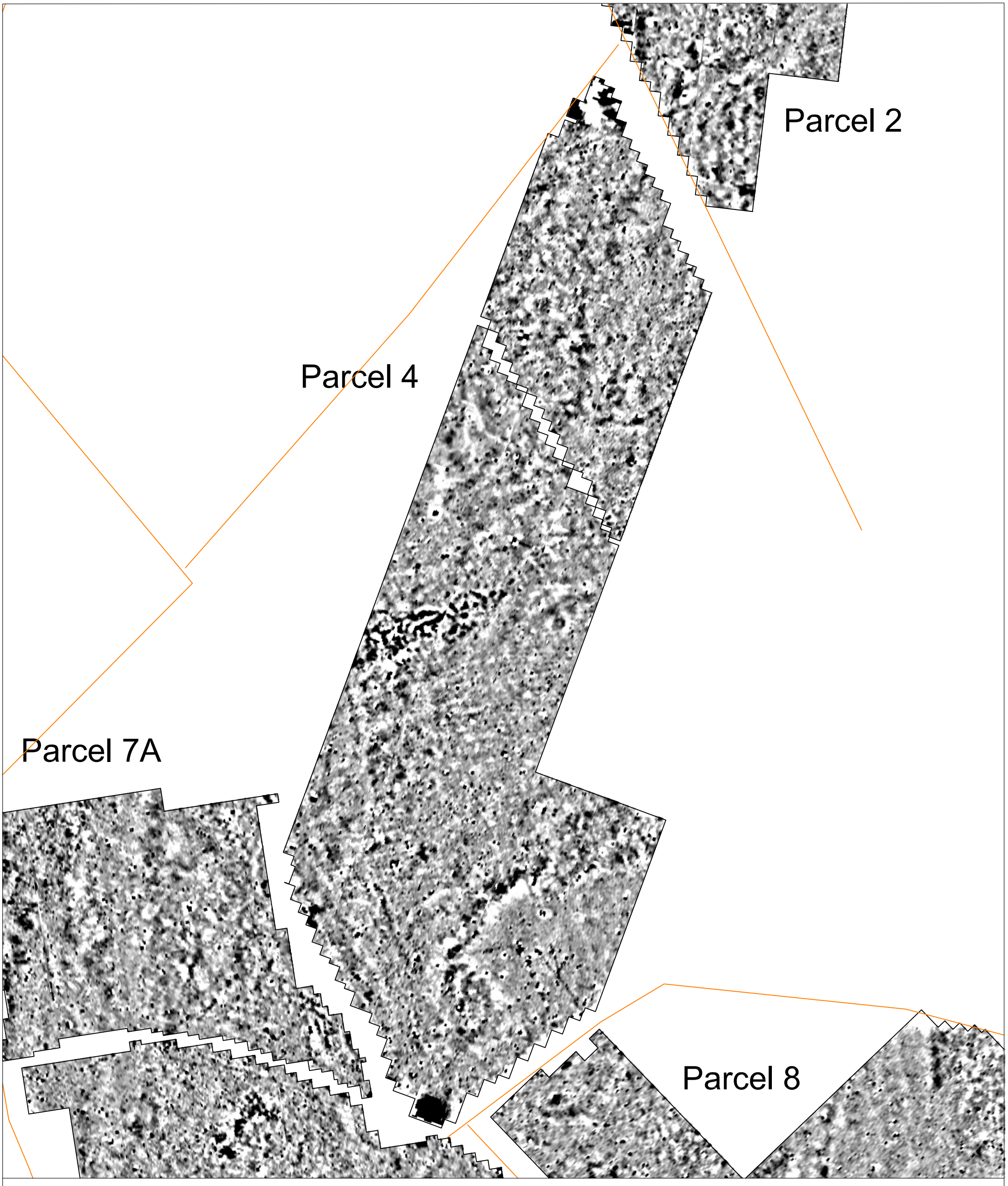

Processed Gradiometer survey results - Greyscale plot - Parcel 4

N

0 60m

1:1500 at A3

Figure 12

Scale 2nT -1nT

Project Title: A96 / A9 Inshes to Smithton
Project No: 51877

Drawing Title: Figure 12 - Processed Gradiometer survey results - Greyscale plot - Parcel 4

V1/51877/GEO/F12/30.01.18

Drawn by: KT	Checked by: JL	Approved by: JL
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