



## **Inner Sound, Canisbay, Caithness**



### **Preliminary Geophysics Results**

MeyGen Limited Developments

September 2011



**Inner Sound**

**Canisbay,**

**Caithness**

**Geophysical Survey**

**2011**

**Final Report**

**Project No: 1114**

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**September 2011**

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## Executive Summary

*Following a baseline assessment of the onshore historic environment assets in the Canisbay Parish Area, Caithness, conducted by ORCA in August, 2011 (Saunders and Sharman 2011), a geophysical survey was undertaken over 6 key locations within Option 1 - Ness of Quoyoys and Option 2 - Ness of Huna. The work was in advance of the onshore aspects of a proposed offshore renewable energy project.*

*Due to the significance of a number of sites identified by the DBA and walkover baseline report (Saunders and Sharman 2011), a Strategy 2 mitigation was recommended for 6 target areas. Within Option 1 – Ness of Quoyoys, two areas to the south-east and east of Canisbay Kirk (ORCA 53, 54, 55) were targeted in order to determine the extent of activity associated with the broch site on which the kirk sits. Two further locations near the coast were designed to investigate a potential Norse site (ORCA 416) and a purported Cromwellian Battery (ORCA 414). The final area targeted a suspected prehistoric or Norse mound (ORCA 64). In Option 2 - Ness of Huna, a Norse settlement (ORCA 76, 78, 79) is known to lie to the west of the proposed development area and, the survey hoped to determine the eastern extent of this activity. The same survey block also targeted a number of cropmarks, thought likely to be indicative of prehistoric activity (ORCA 84). To the east, on the coast, is the reputed location of a "Picts' Village". In total 15.5 ha were surveyed using two fluxgate gradiometers in September 2011.*

*The geophysical survey has identified a number of potential archaeological features, but there are few that are considered to have particular cultural heritage significance. In Option 1 – Ness of Quoyoys, the survey blocks adjacent to Canisbay Kirk both contain an area of increased magnetic response which may relate to past settlement activity but there is no evidence for definable structures (e.g. walls or ditches) within the responses. The survey locations adjacent to the kirk also contain former field boundaries and other evidence of agricultural activity. Although these in themselves would be considered as having a low to negligible significance, the presence of such features in the data confirms that non-extant features are being detected, indicating that archaeological responses would also be identified if present. The geophysical survey does confirm that the mound (ORCA 64), to the north east of the kirk, contains responses which appear anthropogenic but with no definable structure. Several ditch like responses occur near the mound and may relate to it. There was no evidence that the reputed Cromwellian battery/magazine (ORCA 414) or the stone spread (ORCA 416) identified in the DBA and walkover (Saunders and Sharman 2011) have associated features inland.*

*Within Option 2 – Ness of Quoyoys, there is no evidence in the geophysical data that the Norse settlement (ORCA 76, 78, 79) extends into the development area. There are also no anomalies relating to the recorded cropmarks (ORCA 84), although this may be due to the underlying features being removed or masked by agricultural improvements during the latter half of the 20<sup>th</sup> century. The Pictish Settlement was not detected but the peat extraction, located in the same area, is evident in the data.*

*The geophysical survey has identified a number of responses, particularly in the vicinity of the mound (ORCA 64) that would require further intrusive investigation to confirm their true nature (age/significance) but generally the survey blocks contain very few additional sites that would be considered as having anything other than a low or negligible cultural heritage significance and would therefore require further mitigation.*

## **Acknowledgements**

Alistair Cormack

John Cormack

Christopher Reynolds (power of attorney for Mary Cormack)

Ed Rolling

Cliff Shepherd

## 1.0 Introduction

Geophysical survey was commissioned by MeyGen Developments Limited as part of the pre-planning process in advance of the proposed construction of the onshore aspects relating to offshore marine energy development. The survey was carried out between the 12<sup>th</sup> and 16<sup>th</sup> September 2011 using two fluxgate gradiometers (Bartington Grad 601-2).

The geophysical survey was undertaken in order to further investigate the areas around sites of high, moderate or uncertain significance identified in the DBA and walkover baseline report, produced by ORCA in August 2011 (Saunders and Sharman 2011). Each site identified in this previous work was given an ORCA number e.g. **ORCA 214** and for consistency, these numbers will also be used in this report. A full description of the sites is included in the DBA and walkover baseline report (Saunders and Sharman 2011). The areas surveyed were targeted in order to determine the probable nature and extent of any underlying archaeological features, thus helping to inform decisions on the development location.

## 2.0 Site Location, Land Use, Topography and Geology

### 2.1 Site Location

The survey areas lie on the northern edge of the Caithness coastline, in the parish of Canisbay. The geophysical surveys were in two proposed development blocks, Option 1 - Ness of Quoys and Option 2 - Ness of Huna. The two locations are approximately 1km apart and accessed by the A836 (Thurso to John O'Groats road) which bisects Option 1 and marks the southern limit of Option 2. Canisbay Kirk lies just to the west of Option 1 – Ness of Quoys, while the village of Huna lies to the west of Option 2 - Ness of Huna. The land generally slopes down to the coast which forms the northern edge of both development options.

Option 1 - Ness of Quoys covers 31ha, centred at ND 345 730, within which 4 areas were investigated by geophysical survey. These totalled an area of 7.5ha. Option 2 - Ness of Huna covers 28ha, centred at ND 365 735 in which 2 areas were surveyed, totalling approximately 8ha.

## **2.2 Land Use, Ground and Weather Conditions**

At the time of the survey most of the locations were under pasture, with livestock present in a few fields, predominantly cattle but also a few sheep in Option 2. The weather conditions varied from strong winds and rain to fair weather. At the time of the survey the ground was wet, becoming water logged along the coast with some standing water and ponds present. This was particularly true in the north eastern portion of the survey area where peat extraction and coarse vegetation made data collection difficult. (Plate 1)

The field boundaries in both options were generally formed by wire fences, and in some locations electrical fences had been installed. In some places, dual fences were present, with a gap of 5-10m between them. A few stone dykes were present, especially towards the road (A836).



**Plate 1.** Area F – facing south east; coarse vegetation within survey area.

## **2.3 Topography**

The land in both options generally slopes gently down from around 20m A.O.D in the south, to around 5m A.O.D. near the coast

## **2.4 Geology**

The solid geology is the Mey Flagstone Formation, part of the Upper Caithness Flagstone Group. There are Till (Devensian) deposits over the



site (BGS 2011). Peat deposits occur in the north-eastern portion of Option 2. These have been subject to extraction.

### 3.0 Archaeological Background and Fieldwork Aims and Objectives

The archaeological background of the area is covered in detail by the DBA and walkover baseline report (Saunders and Sharman 2011). This work classified cultural heritage sites in terms of significance, with each given a unique number. The geophysical survey was commissioned in the vicinity of sites of high, moderate and uncertain significance in order to assess the extent of any associated remains. These key locations (figure 1) were targeted based on the following information.

In Option 1 – Ness of Quoys, Areas A and B have a potential for the presence of archaeological features due to their proximity to Canisbay Kirk and graveyard (**ORCA 53, 55**) which are thought to overlie a prehistoric and potentially Norse site (**ORCA 54**) (Saunders and Sharman 2011). The church is outside Option 1, but as such sites are often large, the geophysical survey was designed to determine its precise extent and whether it extends south and east into the development area.

The walk over survey identified a stone spread on the coastal slope (**ORCA 416**) which may represent a small portion of an eroded site, the significance of which is uncertain. Area C1 (figure 1) was located approximately 20m inland from the site which was heavily overgrown and separated from the pasture field by dual fences. Geophysical survey was used to determine whether this site extended much further inland than the portion visible in the coastal section. The survey area was extended an additional 100m east, along the coast (Area C2), to identify any features associated with what has been postulated as a Cromwellian gun battery and magazine (**ORCA 414**). As the area was heavily overgrown, the geophysical survey was limited to the inland pasture field.

A mound (**ORCA 64**), measuring approximately 20m in diameter and 0.7m high, was identified approximately 430m north east of Canisbay Kirk. The size and character of the mound suggested it to be archaeological and it was assessed as having a moderate significance (Saunders and Sharman

2011). A 1ha survey block (Area D) was located over the mound in order to attempt to further characterise its nature and extent (figure 1).

On the Ness of Huna, to the west of Huna House, a series of Norse sites (**ORCA 76, 78, 79**), were identified in the DBA and walkover baseline report (Saunders and Sharman 2011). As it was felt that the settlement may extend east beyond Huna House and into the Option 2 development area, the geophysical survey (Area E) was located in such a way as to test this theory. The same pasture field contained cropmarks identified from a 1946 aerial photograph, indicative of a potential prehistoric site (**ORCA 84**). Area E was extended to cover the recorded location of the cropmarks in order to assess the character, nature and extent of the underlying features.

A 1930s documentary source refers to the existence of the remains of a “Picts’ Village” on Huna Links (**ORCA 82**). Although the precise location of the site is unknown, it is now attributed to the north eastern portion of the Ness of Huna. A 2ha survey area, Area F (figure 1), was located over the approximate location of the “Picts’ Village” in order to assess whether any subsurface remains appeared to be present. It also covered an area of peat extraction, **ORCA 429**.

## 4.0 Location of Survey Areas

Each survey area was positioned to answer the specific research questions outlined above, with the size and shape of each block based on the location of the sites identified by the DBA and walkover and on the possible extent of sub surface archaeological features. A contingency was in place to extend the area surveyed in cases where features could be seen to continue beyond the limits of the initial survey blocks.

Area A lay to the south east of Canisbay Kirk and to the south of the A836, Thurso to John O’ Groats road, while Area B was located to the north east and east of the church and churchyard. Both areas were positioned in order to detect any extra mural settlement or other activity associated with the broch (**ORCA 54**). Area A formed a strip, 100m wide by 200m long (c.2 ha), along the eastern edge of the minor road leading to Canisbay village. A newly built church hall lies at the junction of the road with the A836 so this corner of the area could not be investigated. Area B ran along the northern

side of the A836 for approximately 100m and north towards the coast for approximately 130m. The survey area continued west around the churchyard to a wire fence field boundary (c.2ha).

It was intended that Area C would establish if the stone spread (**ORCA 416**) identified on the coast did represent a structure or site which extended either inland or along the coast. For this reason the survey block was to be a strip 200m along the coast and 100m inland. However the coastal zone was both overgrown and separated from the pasture field by two parallel fences (approximately 8m apart), one electrified. A ditch with a fence either side marked the field boundary running north-south to the coast. This bisected the survey area and resulted in a gap in the data (figure 1) giving rise to two survey blocks (C1 and C2). The survey was carried out up to, but not beyond, the coastal fences. The survey area C2 was extended along the coast by an additional 80m (40m wide) to include the area immediately inland of **ORCA 414**.

Area D was positioned over a c. 20m diameter mound, identified in the walkover survey (**ORCA 64**). A 100m by 100m block was surveyed to ensure that the mound and any associated archaeological features would be covered. The location of the survey area was limited by the position of various field boundaries and it was therefore positioned slightly further north and west than originally intended but still covered the obvious topographical rise (figure 1).

A c. 6ha block was investigated in the north-west portion of Option 2 – Ness of Huna. This was designed to test whether the Norse sites (**ORCA 76, 78, 79**) to the west extended into this area and also to cover the location of a series of cropmarks, thought to be indicative of an underlying prehistoric site (**ORCA 84**).

The final area (F) consisted of a 100m wide strip of land running for 200m along the coast (c.2ha). This was aimed at locating the documented “Picts’ Village” (**ORCA 82**). The area was difficult to survey as the eastern half had been subject to peat cutting (**ORCA 429**) leaving it rutted and uneven. In addition thick undergrowth prevented data collection in some areas. Personal observations at this location suggested that the peat was less than 1m thick indicating that any archaeological features beneath the peat would be detectable with the instrument.

In total over 15 ha were investigated across the two development areas.

## 5.0 Fieldwork Methodology

The area to be surveyed was set out using a Trimble 5800 GNSS system. The GNSS system was used to position the survey grids in OS coordinates. Each grid covers an area of 20m by 20m, with the corners being located by GPS. The intermediate pegs and any additional grids were placed by the use of a tape.

The geophysical survey was conducted with a Bartington Grad 601 gradiometer, using a traverse interval of 1m and a sample interval of 0.25m. Grids were surveyed in an approximately west to east orientation. See Appendix 1 for a more detailed methodology.

The data is presented as a greyscale image; figure 2 shows a summary of the processed data from all the survey locations. The raw and processed data is included in the report for comparison. A scale of -1 to 2 nT was used to present the data.

## 6.0 Fieldwork Results

Individual strong ferrous responses are normally considered modern in origin and located on or close to the surface. Unless deemed significant due to association or alignment they are excluded from the general discussion of the results.

Anomalies indicated as (?Archaeology), in the interpretation figures, have the potential to be archaeological but intrusive investigation is required for confirmation.

### 6.1 Option 1 – Ness of Quoys

#### 6.1.1 Area A (Figure 7, 8 and 9)

A strong linear response (1), orientated ENE - WSW (figure 9) and a parallel weaker anomaly bisect the survey area. The main response is typical of a former field boundary and may indicate the line of the former track or road as indicated on the c.1835 map (Houston 1996: 463).

Two parallel linear responses (2) run perpendicular to anomaly (1), on an approximately north-south alignment. Parallel to these are a number of much weaker anomalies, suggesting that these anomalies relate to agricultural activity such as ridge and furrow cultivation. At 10m apart Anomalies (2) being 10m apart, could be particularly enhanced furrows or perhaps indicate the route of a trackway through the field. The greater enhancement of these two anomalies could also be due to this agricultural activity disturbing underlying archaeological features which contain magnetically enhanced material. Both linear responses have points where they are more amorphous which could be the original source of the magnetic enhancement. There is also a suggestion that the linear responses curve to the west as they approach the road (A836), this may represent the headland of the ridge and furrow. Linear response (3) occurs in the northern corner of the survey block and seems to be a short ditch like feature. This may represent a different phase of agricultural activity. The orientation of anomalies (2) suggests they represent pre-enclosure agricultural activity, dating to the early 19<sup>th</sup> Century.

The positive magnetic response (4) appears to be a continuation of the trend paralleling the road to the south. It lies close to the road and a suspected igneous dyke which make further interpretation difficult. It also lies partly in an area of increased magnetic response (5). Given the orientation of this anomaly, it seems most likely to be related in some way to post-enclosure agricultural activity.

Anomaly (5) forms a broad swathe (25m wide) around the northwest corner of the survey block, to the east of the church hall. This enhancement seems to be of anthropogenic origin but could be related to the construction of a new building located in this corner of the field (Plate 2). None of the anomalies have a strength or form which suggests the presence of substantial underlying archaeological structures, although it is clear that there has been human activity of some sort in this area. Full characterisation of the underlying features causing these responses would require intrusive evaluation.



**Plate 2.** Area A - facing southwest; new building in northwest corner of area

Other responses in the survey area are weak parallel trends. Where these have the same orientation as anomalies (2) and (3), they seem likely to represent a ridge and furrow cultivation system. Where they are parallel to the current field boundaries, they are likely to be indicative of modern ploughing methods. A few amorphous responses in the south east corner of the field coincide with marshy and wet ground and are thought to be natural in origin.

A small amount of interference occurred beneath the two power cables running southwest-northeast in the southern quarter of the survey block; this is seen as a series of broad, relatively weak, positive and negative responses running across the data (figure 3, figure 4). These responses have not detracted from the interpretation of the data.

The strong ferrous responses along the northern boundary and in the eastern corner of the survey area are due to the proximity of the wire fence.

#### **6.1.2 Area B (Figures 10, 11 and 12)**

To the north of the road (A836), an area of magnetic enhancement (6), similar to anomaly (5) in Area A, can be seen. The proximity of these responses to the road and gateway perhaps suggest a relatively modern

explanation, however, they could relate to activities relating to the adjacent broch (**ORCA 54**), although no substantial structures are readily apparent. Intrusive archaeological evaluation would again be required to determine the nature of any underlying features.

A number of strong linear responses occur in both a northwest-southeast orientation (7) and southwest-northeast orientation (8). The responses are likely to have an agricultural origin. The two parallel responses (9) may represent a trackway as they align with the entrances of the field and are approximately 5m apart. These anomalies are also in the vicinity of a boundary shown on the c. 1835 map (Houston 1996: 463) and may relate to this. Anomaly (7) is perpendicular to anomalies (8) and (9) but does not appear to be parallel with the modern boundary or that shown on the 2<sup>nd</sup> Edition map (Ordnance Survey 1907). This suggests that these features probably relate to some kind of pre-enclosure agricultural activity.

The broad predominantly negative responses (10), orientated north-south, are thought to have a natural origin, most probably from variations in the make up of the soil or more likely the geology of the area. It is also possible that these responses could indicate the line of small palaeochannels.

Elsewhere in Area B, there are a number of weak trends, most aligning with anomalies (7, 8 and 9). These also seem likely to relate to agricultural activities.

The strong, fairly amorphous, but linear responses in the south east corner of the survey area relate to a suspected igneous dyke.

The southern edge of the survey area shows a strong ferrous response due to the proximity of the fence and gate.

### **6.1.3 Area C (Figure 13, 14 and 15)**

Area C is formed by two separate blocks (C1 and C2, figure 1) with the gap between the two blocks the result of the presence of a small stream with fences either side (see plate 3). No work was carried out between the two fences or beyond the coastal fence. The survey area was within 20m of the extant spread of stones (**ORCA 416**) and (**ORCA 414**), but there is no

indication that any associated structures extend into the survey area.



**Plate 3.** Area C2, facing north – double fences and burn to west.

The interpretation of anomaly (11) as archaeology is tentative; although the responses could indicate the presence of features such as short sections of ditch. There is a small area (c.15m diameter) of increased magnetic response (12) to the north of the positive anomalies (11) which may also be archaeological in origin. However these two anomalies occur in the corner of the field close to the entrance, which, at the time of the survey, was extremely wet and churned. It is possible that both sets of anomalies are the result of enhancement of the soil due to the passage of cattle and farm machinery.

The geophysical data contains numerous negative and positive responses (13) which are thought to have a natural origin. Here, close to the shore, the underlying geology is near the surface and responsible for the broad amorphous anomalies. Similar responses are seen in Area C2.

A few weak trends have been identified in both C1 and C2 these could be natural in origin or relate to agricultural activity.

The strong linear ferrous response (14) in Area C2 is typical of that from a modern pipe or service. The alignment is north-south and it would appear to continue north to the coast, close to **ORCA 414**, and south into Area D. The



strong ferrous responses at the edge of the survey blocks are due to the presence of wire fences.

#### **6.1.4 Area D (Figure 16, 17 and 18)**

Anomaly (15) is formed by a group of both positive and negative responses. There is no discernable structural pattern to the anomalies but their magnetic signature, together with their location on top of a mound, suggests they have an archaeological origin. To the west of this anomaly are two partially linear, ditch-like, responses (16 & 17) which may be associated with (15). Intrusive evaluation would be needed to fully characterise these features.

The parallel linear responses (18) are indicative of ridge and furrow cultivation. These align approximately with the existing field boundary which first appears on the 2<sup>nd</sup> edition map (Ordnance Survey 1907) and are spaced roughly 6 - 7m apart.

Several other weak linear trends have been identified within this survey block and are assumed to be of an agricultural origin.

The ferrous anomaly (14), identified in Area C2, continues south through this area.

The strong ferrous response on the southern side of the survey block is due to the proximity of a wire fence.

### **6.2 Option 2 – Ness of Huna**

#### **6.2.1 Area E (Figure 19, 20 and 21)**

In Area E, there is no obvious indication of any settlement remains extending eastwards from the previously identified Norse sites (**ORCA 76, 78 and 79**). There were also no obvious anomalies which could be related to the cropmarks identified in aerial photographs (**ORCA 84**). Although the agricultural improvement of this area has been intensive, should any substantial Norse site exist, some geophysical response would have been expected from it. It seems likely that the cropmark site has been entirely denuded by modern agricultural methods.

Three areas of magnetic disturbance (19) have been identified. They all

have a roughly north-south alignment and a moderate to strong magnetic response. The response (19a) may continue north as trend (22a) anomaly (19b) may extend north as trend (22b). It is possible that anomaly (19a) represent a former field boundary as it is on the approximate line of a mid 20<sup>th</sup> century boundary shown on the 1960s map. (Ordnance Survey 1968) Anomaly (19b) may be somehow associated with it.

The survey area contained numerous small ferrous responses usually indicative of the presence of modern material on or near the surface. To the north east corner of the survey area, car and machinery parts are visible in the top soil.

Anomaly (20) is a naturally occurring geological feature, probably an igneous dyke, which has a similar orientation to the intrusion seen in Area B.

There are a number of trends within the field, mostly orientated north-south and these are likely to relate to modern ploughing. Anomaly (21) is formed by two parallel trends running in a northwest to southeast orientation; the trends are weak and may be the result of ploughing or could represent a former track. Two anomalies (22a & b) give a defined linear response which may align with responses (19a & b).

To the northwest and southeast of the pond, there are two pit-like anomalies which are assumed to be natural given their isolated nature but may also relate to the improvement of the field.

### **6.2.2 Area F (Figures 21, 22 and 23)**

Within Area F, no anomalies have been identified which appear archaeological. It is therefore suggested that it is highly unlikely that the "Picts' Village" exists in this location. Although it is possible for deep peat to mask settlement remains, within the coastal section to the north of the survey area, the peat and underlying till is exposed (Plate 4). Here the peat is less than 1m thick and at this depth underlying archaeological features should be detectable.

Anomaly (23) is a linear response on the line of a fence marked on the 1960s map (Ordnance Survey 1968) but now removed.

The trends (24) in the eastern half of the field form a distinct rectangular

pattern which is assumed to be the peat extraction area. Evidence of peat extraction was still visible at the surface with well defined long linear depressions.

The strong ferrous response (25) had no obvious surface remains although there was a scattering of modern debris across the eastern half of the survey area (spades, plastic bottles, bags) which suggests it has been used as a modern dump (**ORCA 432**). It was not possible to expand the area to confirm the true extent of the anomaly as this corner of the survey area contained dense vegetation (Plate 1.) which continued to the south and east for 20-50m.

A number of faint ploughing trends, aligned roughly northeast to southwest occur in the western quarter of the survey area. Other trends in this area may relate to natural or man-made drainage channels.



**Plate 4.** Facing north into Area F; Arrow c.50cm, exposed peat section.  
White line – Peat above Till

## 7.0 Discussion

If any archaeological remains relating to the broch site at Canisbay Kirk (**ORCA 54**) do exist within the survey area, it seems most likely that these would be found in the vicinity of the areas of increased magnetic response. These were identified to the south of Canisbay Kirk in Area A (anomaly 5) and to the east of the churchyard in Area B (anomaly 6). The geophysical data does not contain any responses specifically indicative of structural remains, but the level of enhancement could be suggestive of the presence of midden deposits. In order to determine the nature of the features giving rise to these anomalies, intrusive evaluation would be required. The probable mid 19<sup>th</sup> century trackway (1) would be considered of low to negligible archaeological significance.

Areas A and B also contain a number of responses which may represent archaeological remains, notably anomalies (2, 7, 8 and 9). These appear to relate to pre-enclosure land divisions and agricultural practices but intrusive evaluation would be required to confirm this and to date the features.

In Area C a small area of increased magnetic response (12) and a potential series of cut features (11) have been identified in the corner of the survey area. These are some distance from the stone spread identified in the DBA and walkover (**ORCA 416**) (Saunders and Sharman 2011) but could potentially be significant. Intrusive evaluation would be required to establish the precise nature of the features giving rise to these anomalies.

There is no evidence that any features associated with the reputed Cromwellian battery and magazine extend into the area surveyed, however, it should be noted that the limit of the survey area was 15 - 20m further inland than the identified structure due to the location of the coastal fences. The suspected pipe also seen in this area (14) is considered modern but the client may wish to be aware of such a feature when development takes place.

Area D contains a significant archaeological anomaly (15); the DBA and walkover suggested that the associated mound (**ORCA 64**) could have a prehistoric or Norse origin. The topographical limits of the mound, identified in the walkover survey as c. 20m in diameter, match the extent of the geophysical responses. The character of the observed anomalies suggests

they are the result of anthropogenic activities but there is no clear indication of the presence of underlying structures. This may be due to the nature of the agricultural practices used in this area or to the nature and function of the mound. Two ditch-like anomalies were identified to the west of this structure and may relate to the feature.

Area E was surveyed to identify whether there was any extension to the Norse sites which lie to the west (**ORCA 76, 78, 79**). There is no indication, in the geophysical data that the settlement extends into the development area. Those responses that have been identified have either a modern origin or result from more recent agricultural activity. Some of the responses may relate to mid 20<sup>th</sup> century field boundaries.

The indication, by the current land owner, that this area has been improved may be a reason why no evidence for the source of the cropmarks (**ORCA 84**) was found. It is quite possible that a further 65 years of agricultural activity since the remains were observed has all but removed the underlying features. However, it should be remembered that non-domestic sites are not always discernable by geophysical methods and intrusive evaluation would be recommended in this area prior to any development occurring.

It is possible that agricultural improvement has removed features associated with the Norse activity found to the west (**ORCA 76, 78 and 79**), however, given that these sites seem to be a domestic, one would still expect the presence of magnetically enhanced material, even if the features themselves were extensively plough damaged. As the data show no evidence of any enhancement of this kind, it seems highly unlikely that the Norse settlement does extend this far east.

The aim of the geophysical survey in area F was to locate a "Picts' Village" (**ORCA 82**) mentioned in a 1931 documentary source (Canmore 2011). The precise location is unknown but is thought to be in the vicinity of the area targeted (Saunders and Sharman 2011). The survey area is also the location of peat extraction which is evident in the data. The settlement could be beneath the peat layer possible directly on the till or bedrock. The depth of the peat will therefore influence the ability of the instrument to detect underlying features. At this location personal observations suggest the peat is between 1 and 2m thick. At this depth geophysical responses from substantial features such as walls or deep ditches should be detectable,

however features with weak magnetic responses could be still be masked by the peat overburden.

A suspected field boundary and plough marks were identified in area F but these are considered as having a negligible to no archaeological significance. The strong ferrous anomaly in the south eastern corner is likely to be modern.

The detection of anomalies relating to former field boundaries ridge and furrow cultivation indicates that the geophysical survey is detecting anthropogenic anomalies. Lack of detection of the cropmarks could be due to the removal of these features by post-war agricultural activities or, in the case of the "Picts' village" because it does not exist in this location. It is also possible that the anomalies associated with the site lie outside the detection limits of the equipment due to the thickness of the peat layer but field observations suggest that this is unlikely.

The results of the geophysical survey support the DBA and walkover conclusions that potential archaeological sites exist around Canisbay Kirk and at the mound to the north east of the kirk.

## **8.0 Conclusions and Recommendations**

The geophysical survey has successfully identified responses which relate to past anthropogenic activity. The detection of these features is a good indicator that any archaeological structures would be identified if present. It seems that the responses identified within the surveyed areas are a good representation of the archaeological remains likely to be encountered during evaluation. It is possible, however, that non-domestic sites may remain undetected.

The anomalies of potential archaeological significance are all found in the Option 1 - Ness of Quoys development area. In Area A and B this includes two moderately sized (0.1 and 0.25ha) areas (5 & 6), near Canisbay Kirk, that appear to indicate anthropogenic activity, together with several linear anomalies (2,3 and 4) in Area A and (7,8 and 9) in Area B to the south and north of the kirk.

It would be preferable if these areas could be avoided by the development,

however, if this is not possible, mitigation would be required. It is suggested that intrusive evaluation is used over a subset of these features in order to determine their precise nature and form.

The increased magnetic response and potential archaeological features seen in Area C do not correspond to any features identified in the DBA and walkover. If these anomalies (11 & 12) could not be avoided by the development, they would require further intrusive evaluation to confirm if they are indeed archaeologically significant.

Because the northern limit of the survey area was approximately 20m from **ORCA 414** and **ORCA 416**, it is therefore recommended that intrusive evaluation be undertaken over them if any development is to take place close to these features.

In Area D, the mound to the north of the kirk (**ORCA 64**), identified in the DBA and walkover as moderately significant, does appear to be archaeological and may have associated ditch-like features nearby. Should it not be possible for the development to avoid these features, intrusive investigation of all these responses (15, 16 & 17) is recommended.

Although the geophysical survey did not identify any potential archaeology in the Option 2 - Ness of Huna development area, the agricultural improvement of Area E, and the peat cover in area F, may have resulted in the masking or even removal of underlying archaeological features. It is also possible that the cropmarks (**ORCA 84**) relate to a non-domestic site which does not have any magnetic enhancement.

Should the development occur in this area, intrusive evaluation of the cropmarks would be recommended. It may be advisable to first transcribe their location from the aerial photograph to help target the areas of investigation.

In area F, although it is felt unlikely that the "Picts' village" exists in this area, intrusive evaluation to establish the depth of peat in the area and whether it is masking underlying features would also be recommended or the employment of an archaeological watching brief during construction.

## 9.0 References

### 9.1 Policy and Advisory Documents

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage.

### 9.2 Bibliographic References

British Geological Survey 2011.

Canmore (2011) *The National Monuments Record of Scotland*, using the Canmore websites; <http://www.rcahms.gov.uk/>

[http://maps.bgs.ac.uk/geologyviewer\\_google/googleviewer.html](http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html). Viewed September 2011

Houston, A. (1996). *Lest We Forget: The Parish of Canisbay*. Highland News Group Ltd. Inverness.

Ordnance Survey (1877) *Ordnance Survey County Series 1:2500 (25" to 1 mile) 1<sup>st</sup> edition 1877*

Ordnance Survey (1907) *Ordnance Survey County Series 1:2500 (25" to 1 mile) 1<sup>st</sup> Revision (second edition) 1907*

Ordnance Survey (1968) *Ordnance Survey National Grid 1:2500 1968*

Saunders, M. K. and Sharman, P (2011). *Inner Sound, Canisbay, Caithness. Onshore Desk-based and Walkover Baseline Report*. ORCA unpublished report 266. 2011.



## Appendix 1: Methodology

### Data Collection

#### ***Gradiometer Survey***

Gradiometer survey was undertaken using a Bartington Grad601 gradiometer. The gradiometer comprises two fluxgate sensors mounted 1m apart on a vertical axis. Each sensor measures the earth's magnetic field, in nanoTesla (nT), and the instrument records the difference between the observed readings for each sensor. By doing so the instrument is recording subtle changes or anomalies in the earth's magnetic field caused by material in the top metre or so of the earth's surface. By measuring the magnetic field in this manner, variations due to large-scale geological variations and diurnal fluctuations are filtered out.

Data were collected at 0.25m intervals along traverses 1m apart, in 'zig-zag' fashion i.e. the direction of the traverse alternating between adjacent traverses, within a series of 20m by 20m grids which were later merged together.

#### ***Metric Survey***

Metric survey was undertaken using a Trimble 5800/R8 differential GNSS system and a Trimble Geodimeter 5600 TST. Two points in each survey area were located to control quality using the GNSS before a predefined grid was draped over these points and set out accordingly. The GNSS base station gathers raw data for a minimum of 2 hours, after which the location of the base station and associated measurements from it can be post-processed with Ordnance Survey fixed station data to an accuracy of c. 1 - 2cm.

### Data Processing

#### ***Gradiometer data***

'Zero mean traverse' corrections have been applied to all the data. This process sets the mean of each line to zero. These corrections remove discontinuities between adjacent grids and striping effects within grids

caused by 'zig-zag' collection of data.

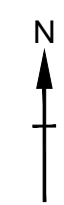
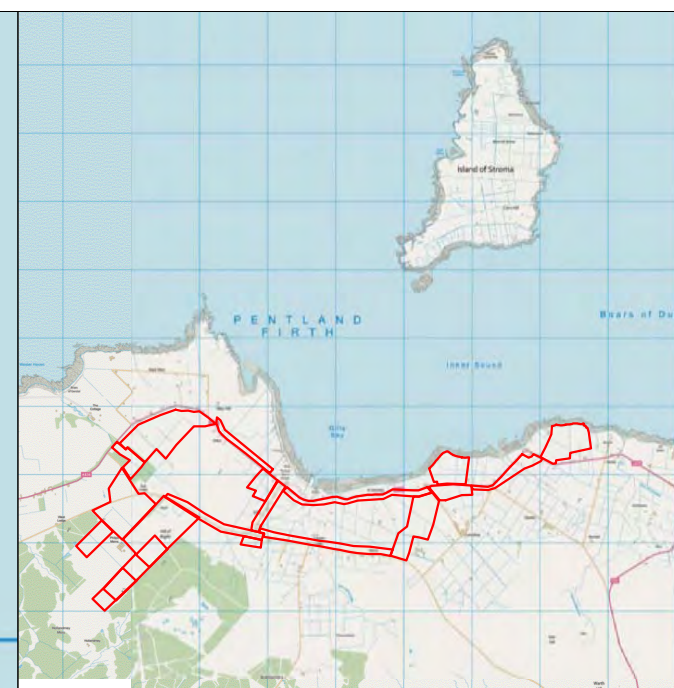
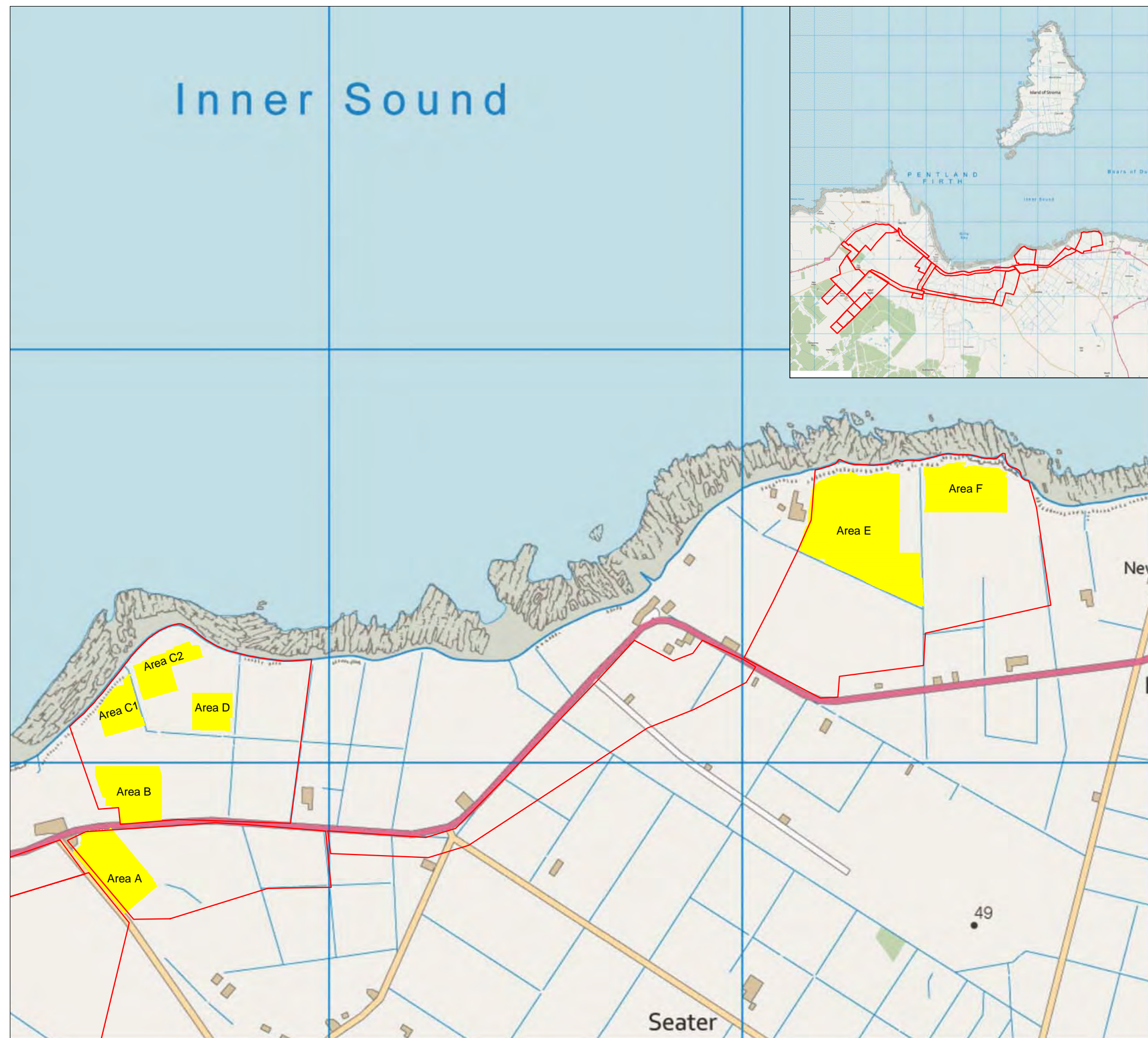
De-stagger has been applied to the data to remove positional errors in the data caused by collecting data in a 'zig-zag' fashion. This function shifts the data along even lines until it visually matches with the data in odd lines.

The data displayed as a greyscale has been interpolated twice in the Y direction to create a 'square' data set. This has the overall effect of smoothing the data.

## **Data Display**

### ***Gradiometer Survey***

Greyscale images: Greyscale images display the data within a predefined range with all values below the minimum being white and all values over the maximum being black with gradual increments between these two extremes.



974000

Location of survey area


X = 322550  
Y = 1023375  
Ordinance survey grid coordinates

973000



335000

336000



**ORCA**  
GEOPHYSICS

PROJECT: 1114 Caithness

TITLE: Site location

SCALE: 1:10000

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FIGURE 1

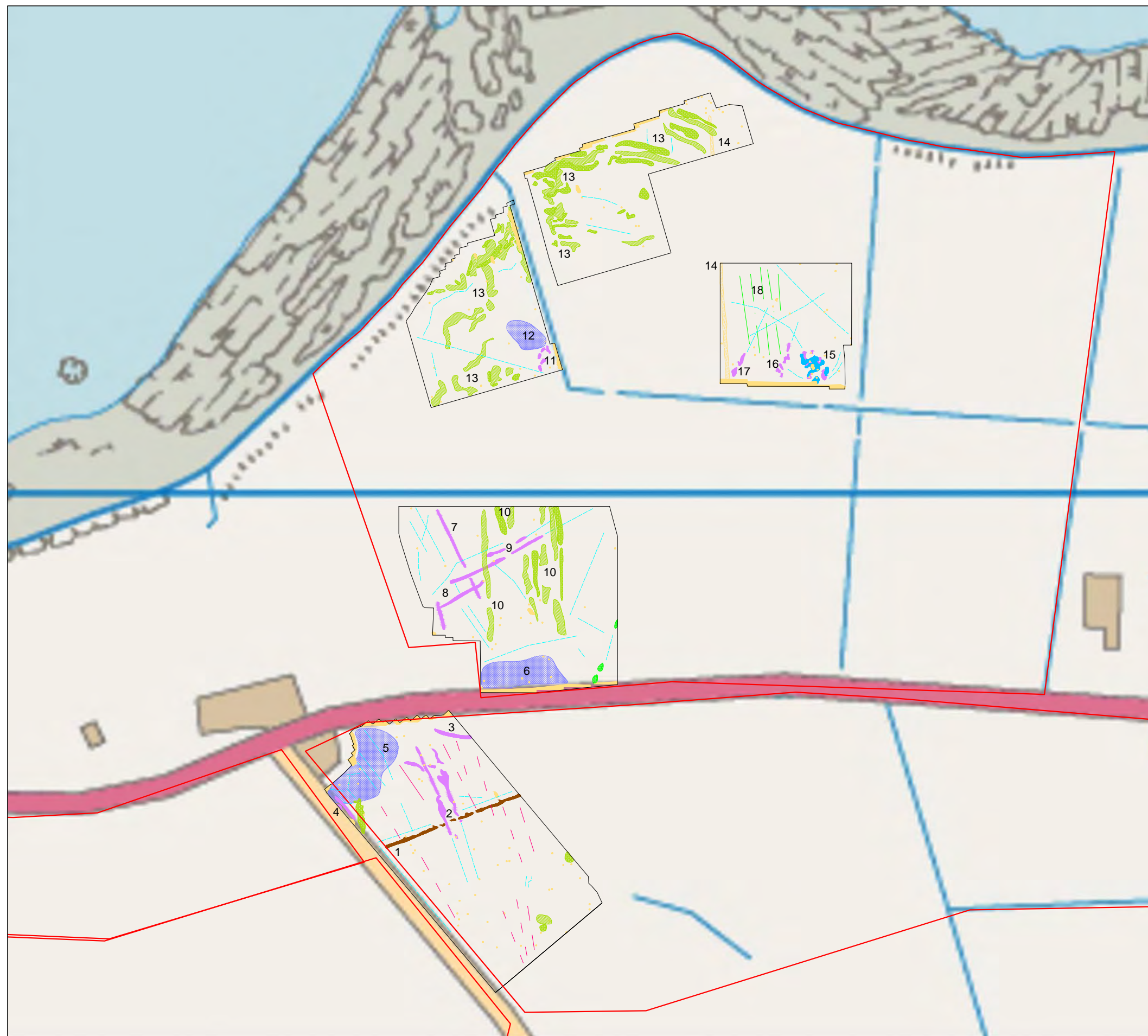












- ?Archaeology - positive response
- Increased magnetic response
- ?Old Field Boundary
- Trend
- Ploughing/Ridge and furrow cultivation
- ?Natural (positive anomaly)
- ?Natural (negative anomaly)
- Igneous dyke
- Ferrous
- 7 Anomaly number

# ORCA

## GEOPHYSICS

PROJECT: 1114 Caithness

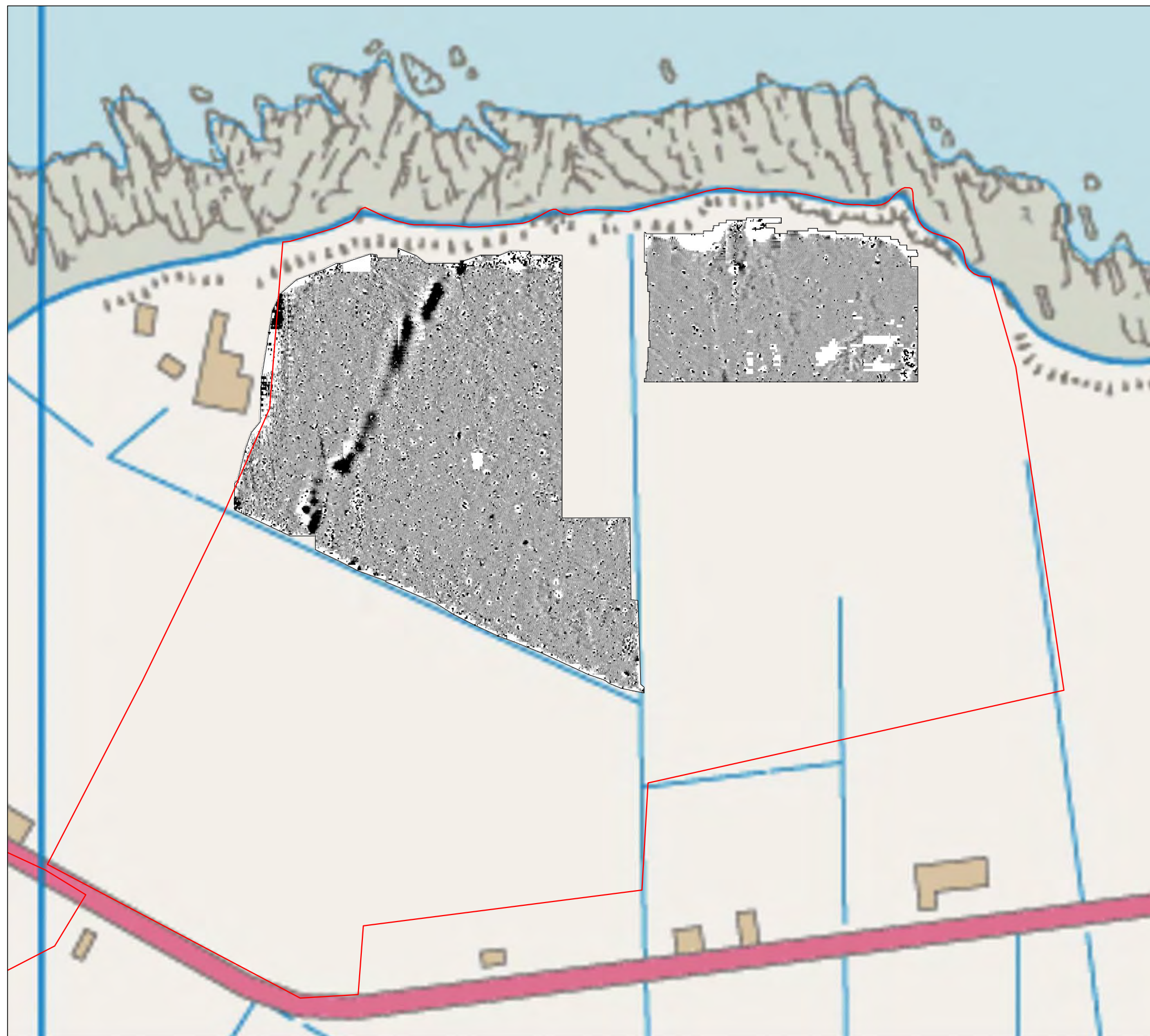
TITLE: Summary interpretation,  
Option 1 - Ness of Quoys

SCALE: 1:3000

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FIGURE 4





X = 322550  
Y = 1023375 Ordinance survey grid coordinates



PROJECT: 1114 Caithness

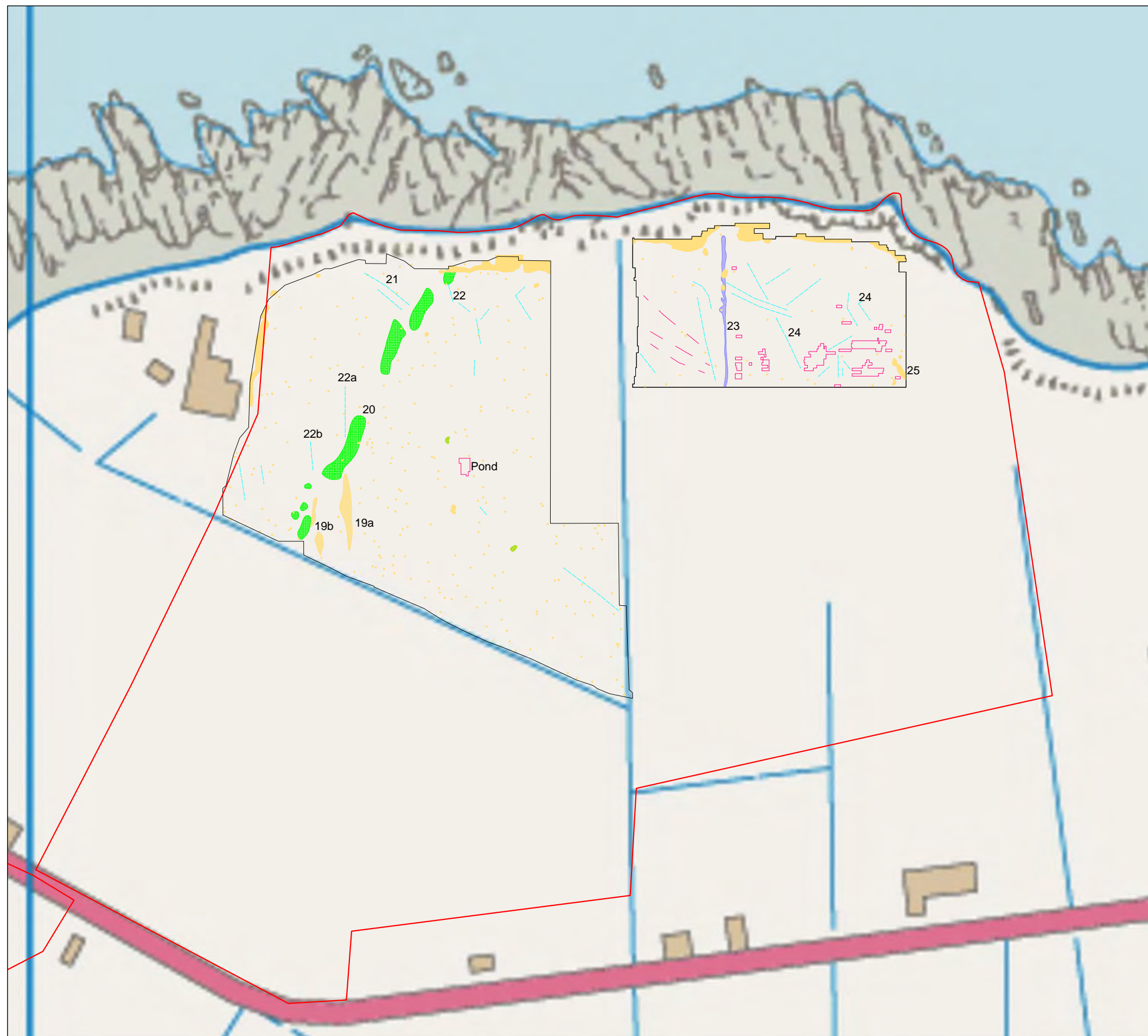
TITLE: Summary greyscales,  
Option 2 - Ness of Huna

SCALE: 1:3000

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FIGURE 5





- ?Archaeology - positive response
- Increased magnetic response
- ?Old Field Boundary
- Trend
- Ploughing/Ridge and furrow cultivation
- ?Natural (positive anomaly)
- ?Natural (negative anomaly)
- Igneous dyke
- Ferrous
- 7 Anomaly number



PROJECT: 1114 Caithness

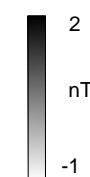
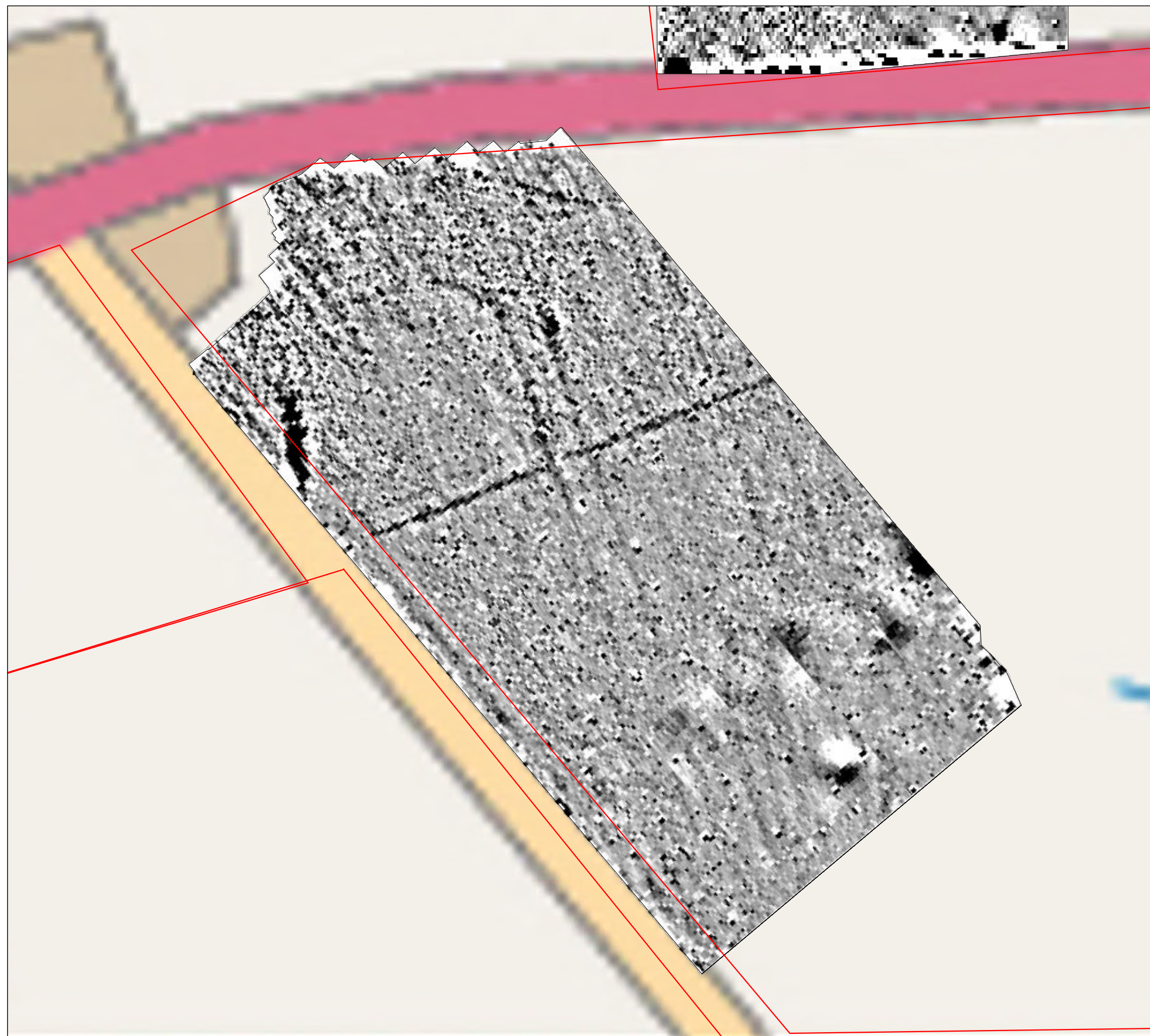
TITLE: Summary interpretation,  
Option 2 - Ness of Huna

SCALE: 1:3000

This map is reproduced from a site plan provided by the client; 2011 MeyGen Limited 1114 Caithness

FIGURE 6





PROJECT: 1114 Caithness

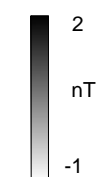
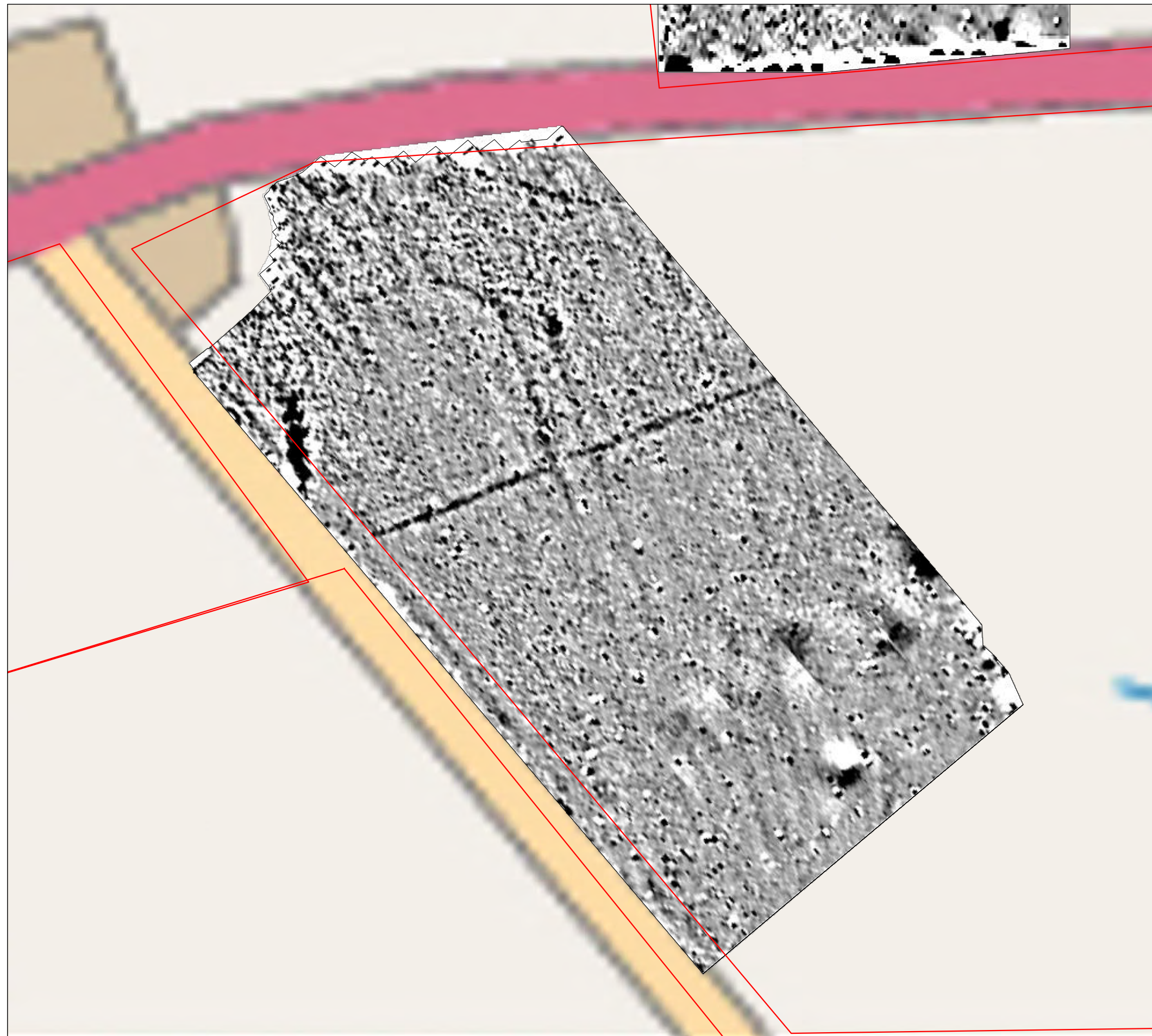
TITLE: Area A; Raw Magnetometer Greyscale

SCALE: 1:1000

This map is reproduced from a site plan provided by the client; 2011 MeyGen Limited 1114 Caithness

FIGURE 7





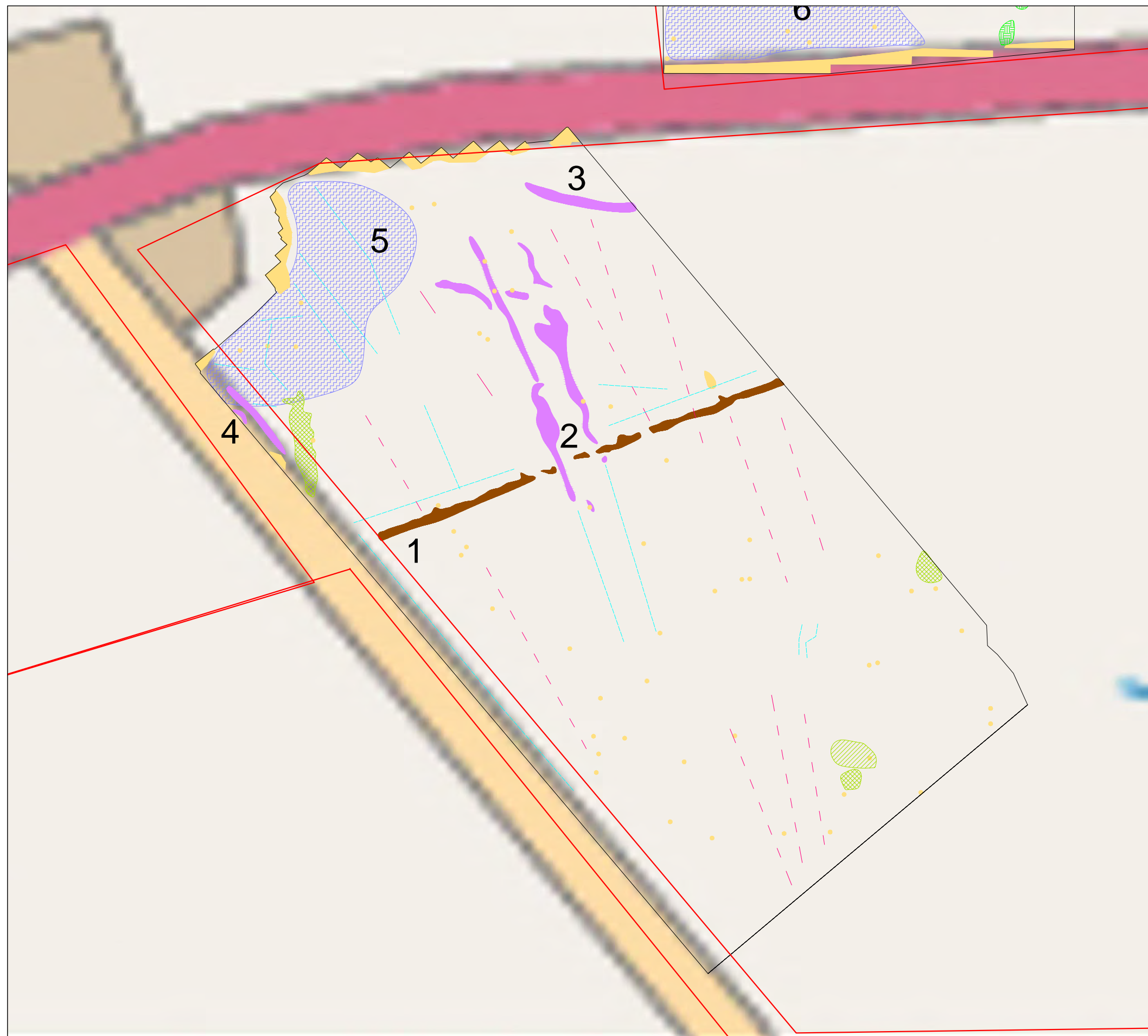
PROJECT: 1114 Caithness

TITLE: Area A; Processed Magnetometer Greyscale

SCALE: 1:1000

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FIGURE 8



- ?Archaeology - positive response
- Increased magnetic response
- ?Old Field Boundary
- Trend
- Ploughing/Ridge and furrow cultivation
- ?Natural (positive anomaly)
- ?Natural (negative anomaly)
- Igneous dyke
- Ferrous
- 7 Anomaly number



PROJECT: 1114 Caithness

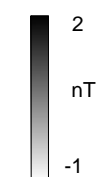
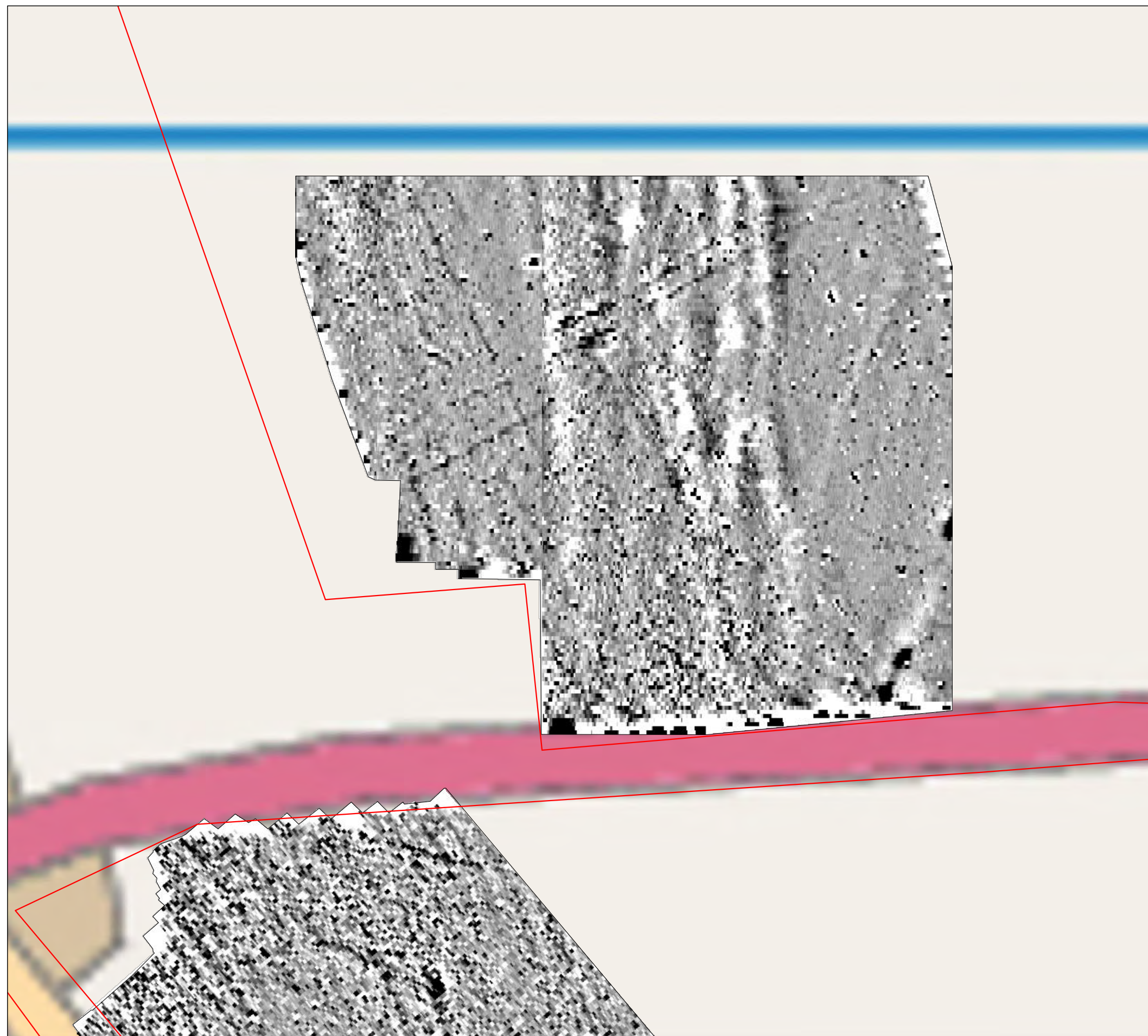
TITLE: Area A; interpretation

SCALE: 1:1000

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FIGURE 9





0 40m



PROJECT: 1114 Caithness

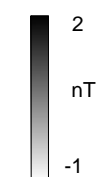
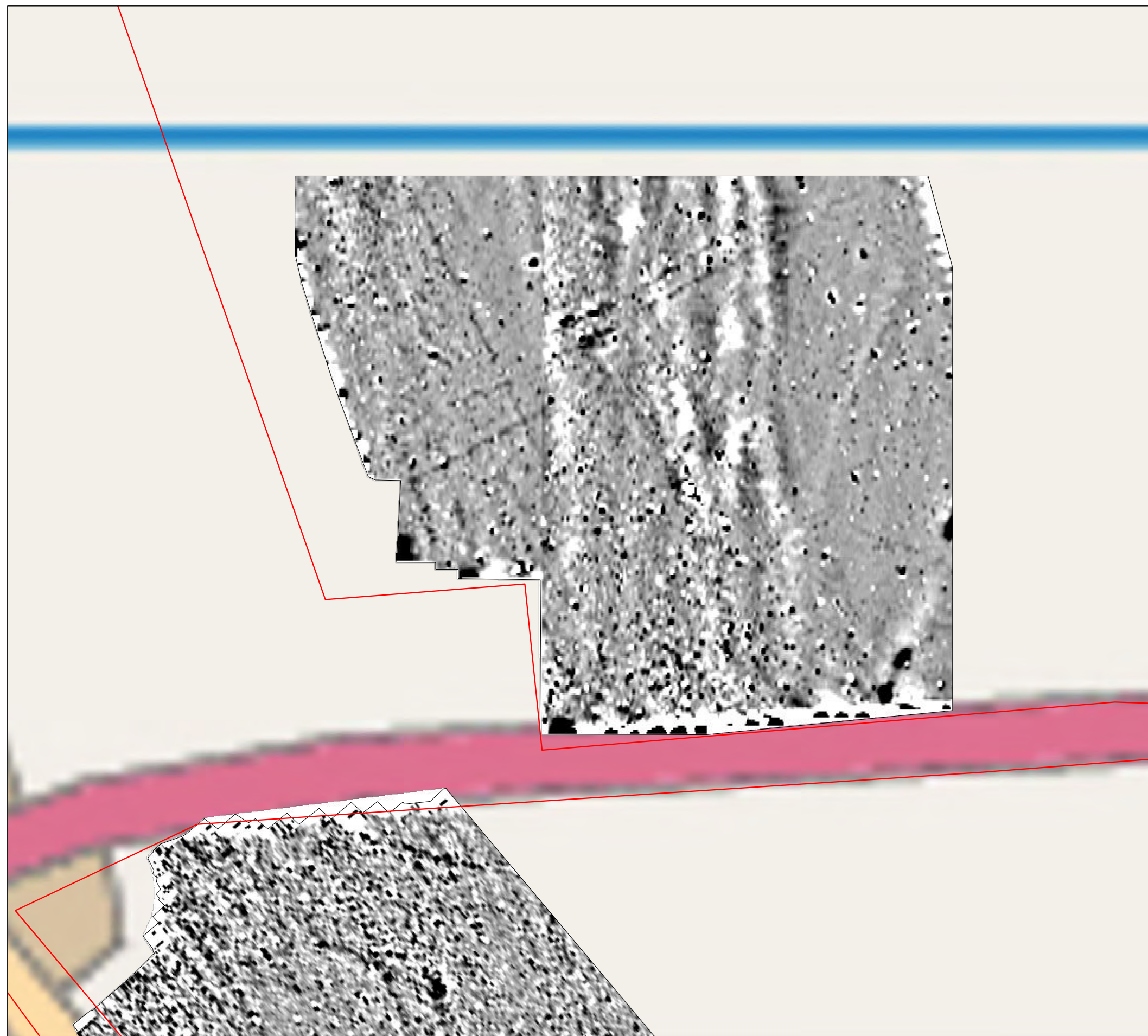
TITLE: Area B; Raw Magnetometer Greyscale

SCALE: 1:1000

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FIGURE 10





0 40m



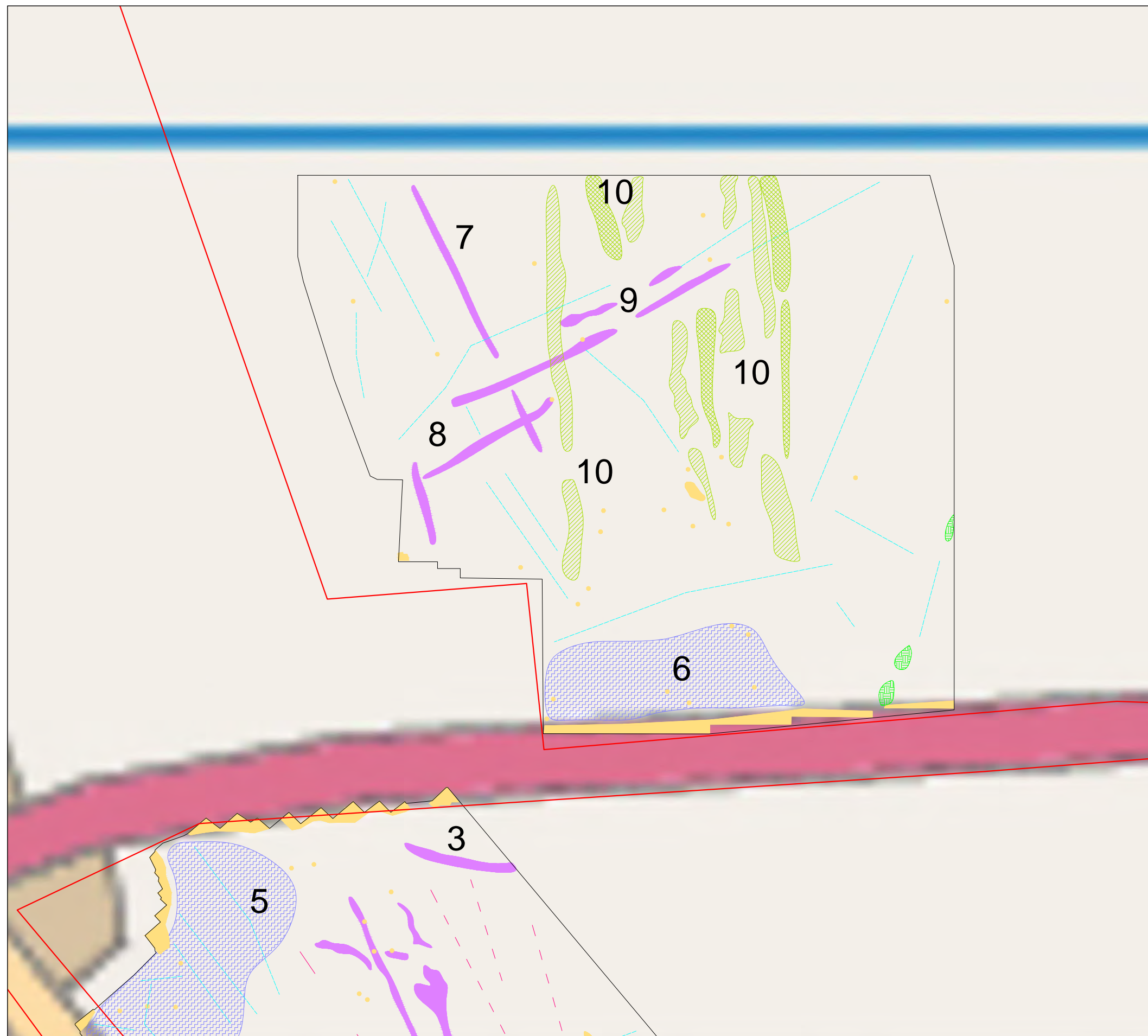
PROJECT: 1114 Caithness

TITLE: Area B; Processed Magnetometer Greyscale

SCALE: 1:1000

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FIGURE 11



- ?Archaeology - positive response
- Increased magnetic response
- Trend
- Ploughing/Ridge and furrow cultivation
- ?Natural (positive anomaly)
- ?Natural (negative anomaly)
- Igneous dyke
- Ferrous
- 7 Anomaly number



PROJECT: 1114 Caithness

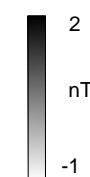
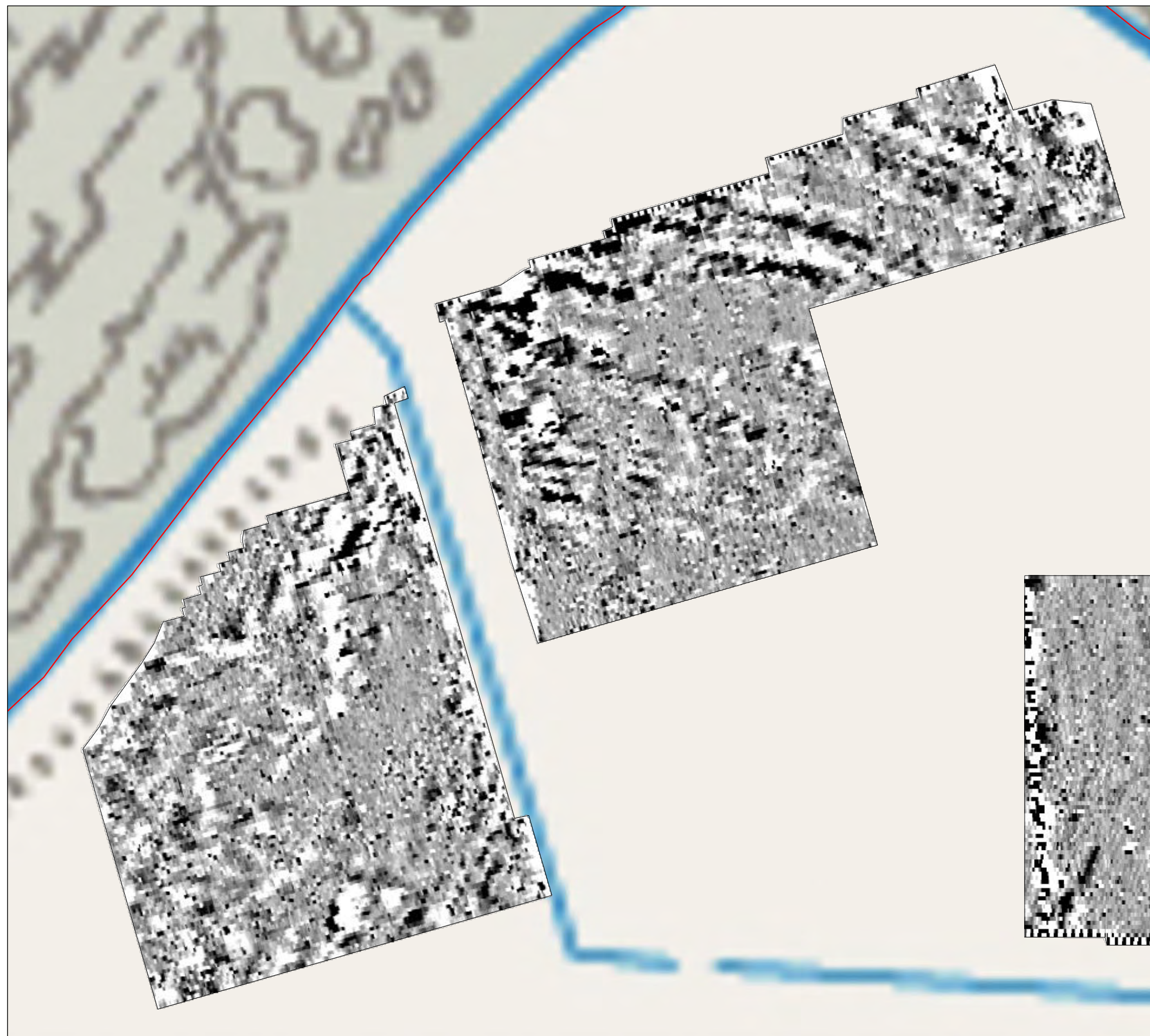
TITLE: Area B; interpretation

SCALE: 1:1000

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FIGURE 12





0 40m



PROJECT: 1114 Caithness

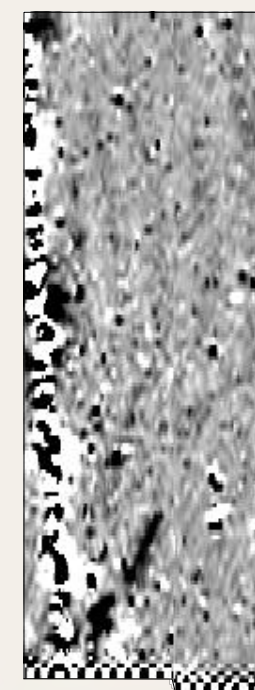
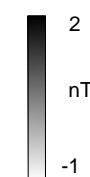
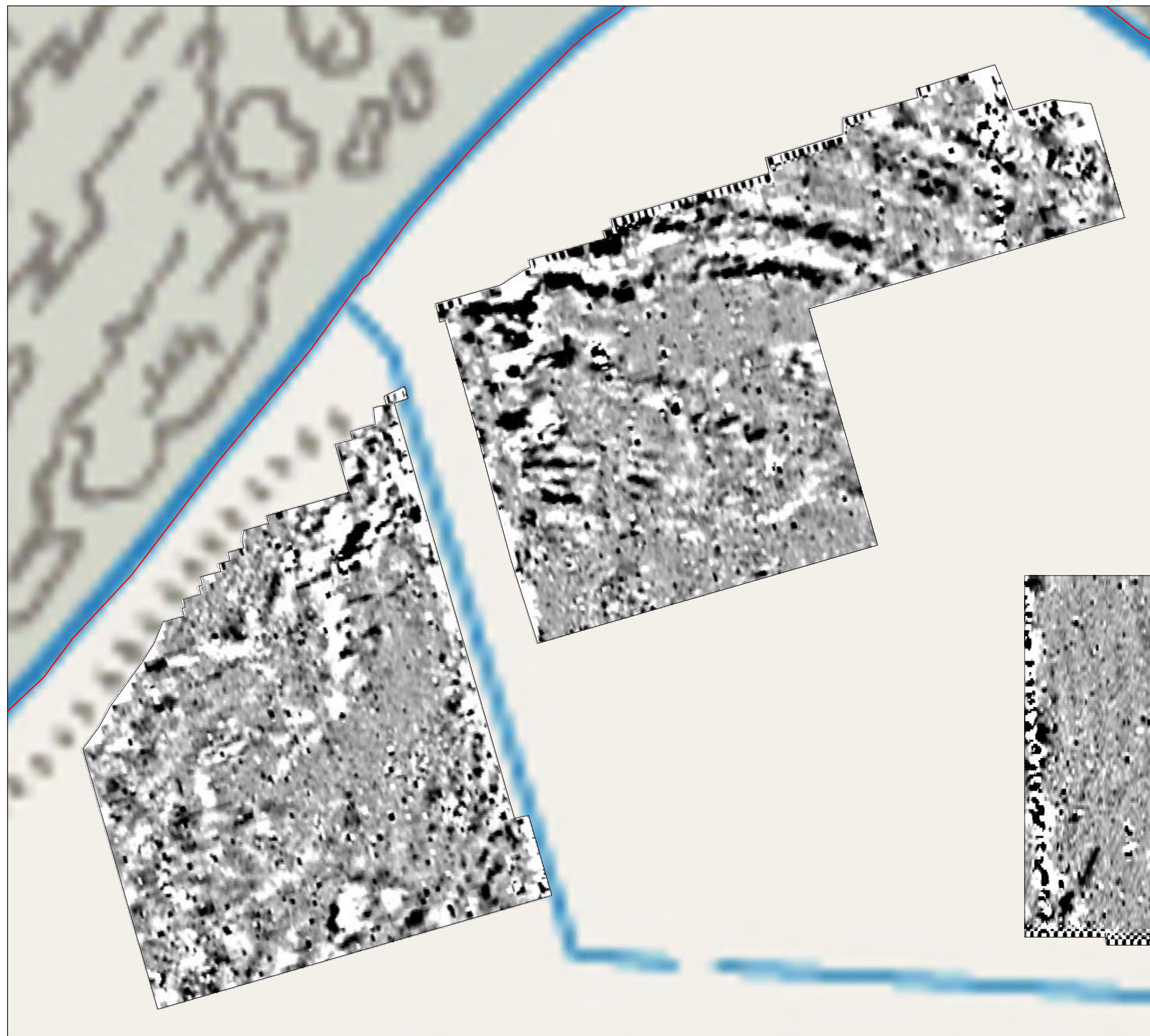
TITLE: Area C; Raw Magnetometer Greyscale

SCALE: 1:1000

This map is reproduced from a site plan provided by the client; 2011 MeyGen Limited 1114 Caithness

FIGURE 13





0 40m



PROJECT: 1114 Caithness

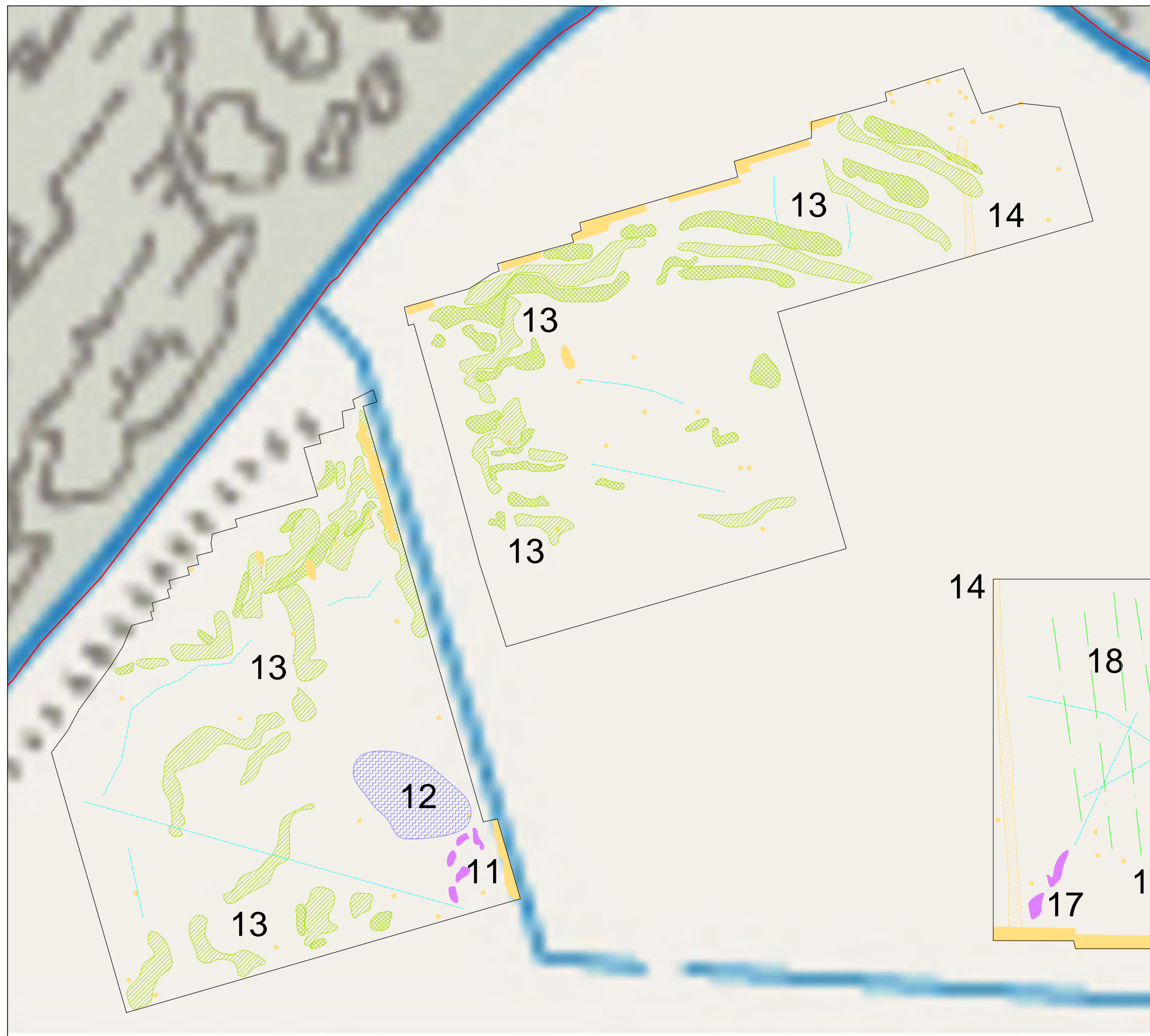
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






SCALE: 1:1000


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FIGURE 14





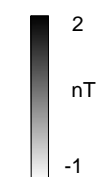
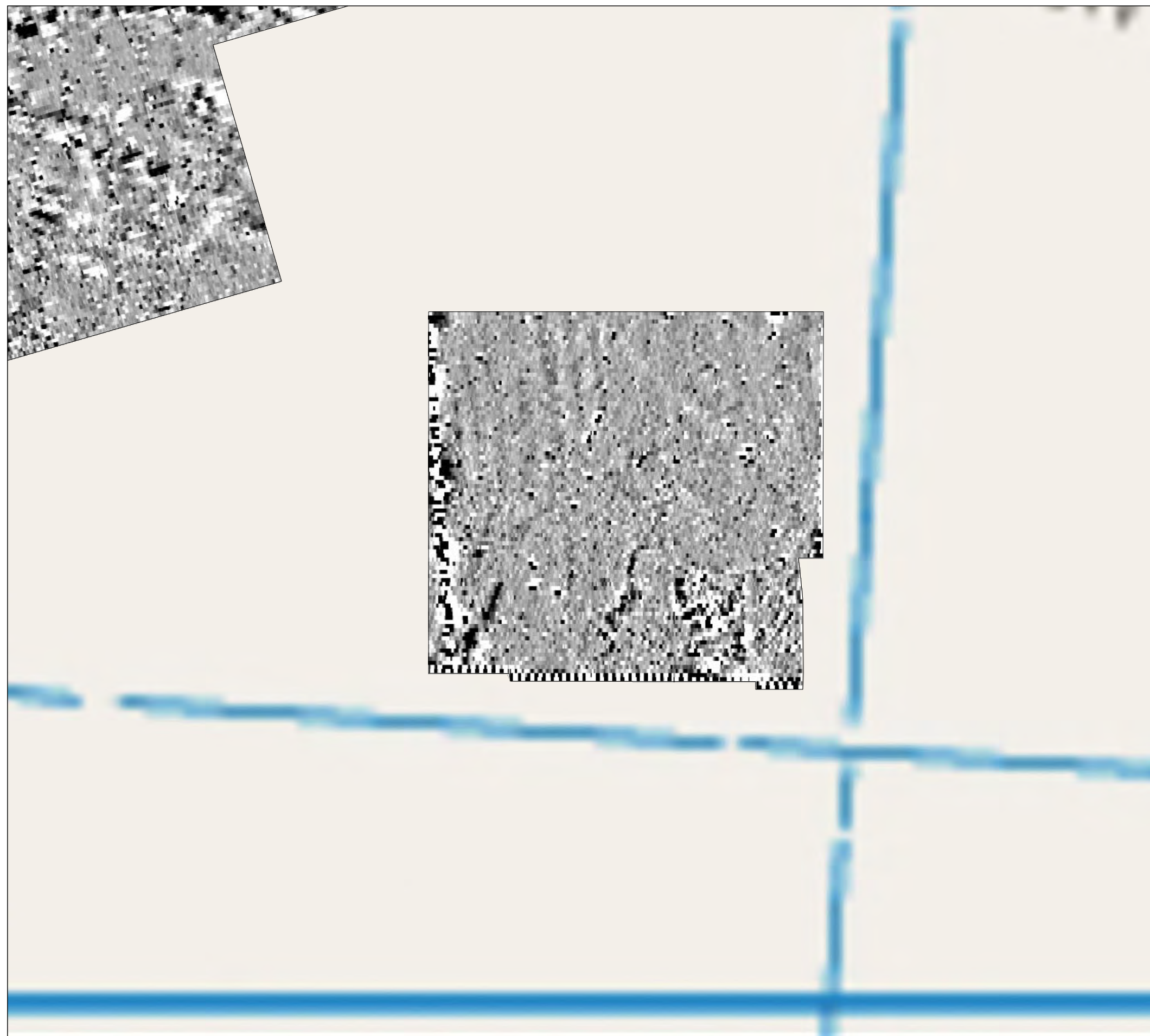
-  ?Archaeology - positive response
-  Increased magnetic response
-  Trend
-  Ridge and furrow cultivation
-  ?Natural (positive anomaly)
-  ?Natural (negative anomaly)
-  Ferrous
-  ?Pipe
- 7** Anomaly number

 **ORCA**  
GEOPHYSICS

PROJECT: 1114 Caithness  
TITLE: Area C; interpretation  
SCALE: 1:1000

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FIGURE 15



PROJECT: 1114 Caithness

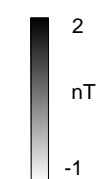
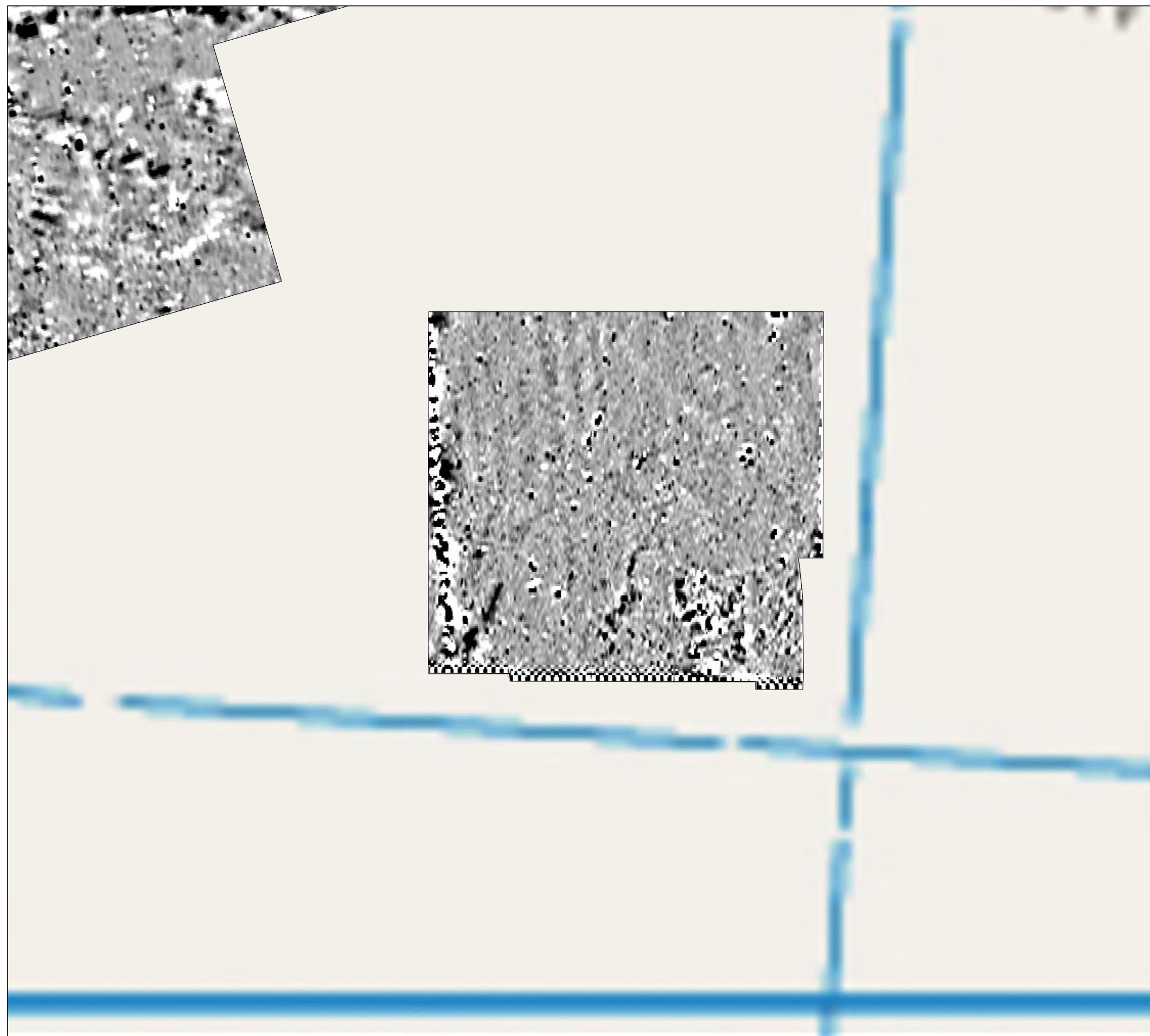
TITLE: Area D; Raw Magnetometer Greyscale

SCALE: 1:1000

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FIGURE 16





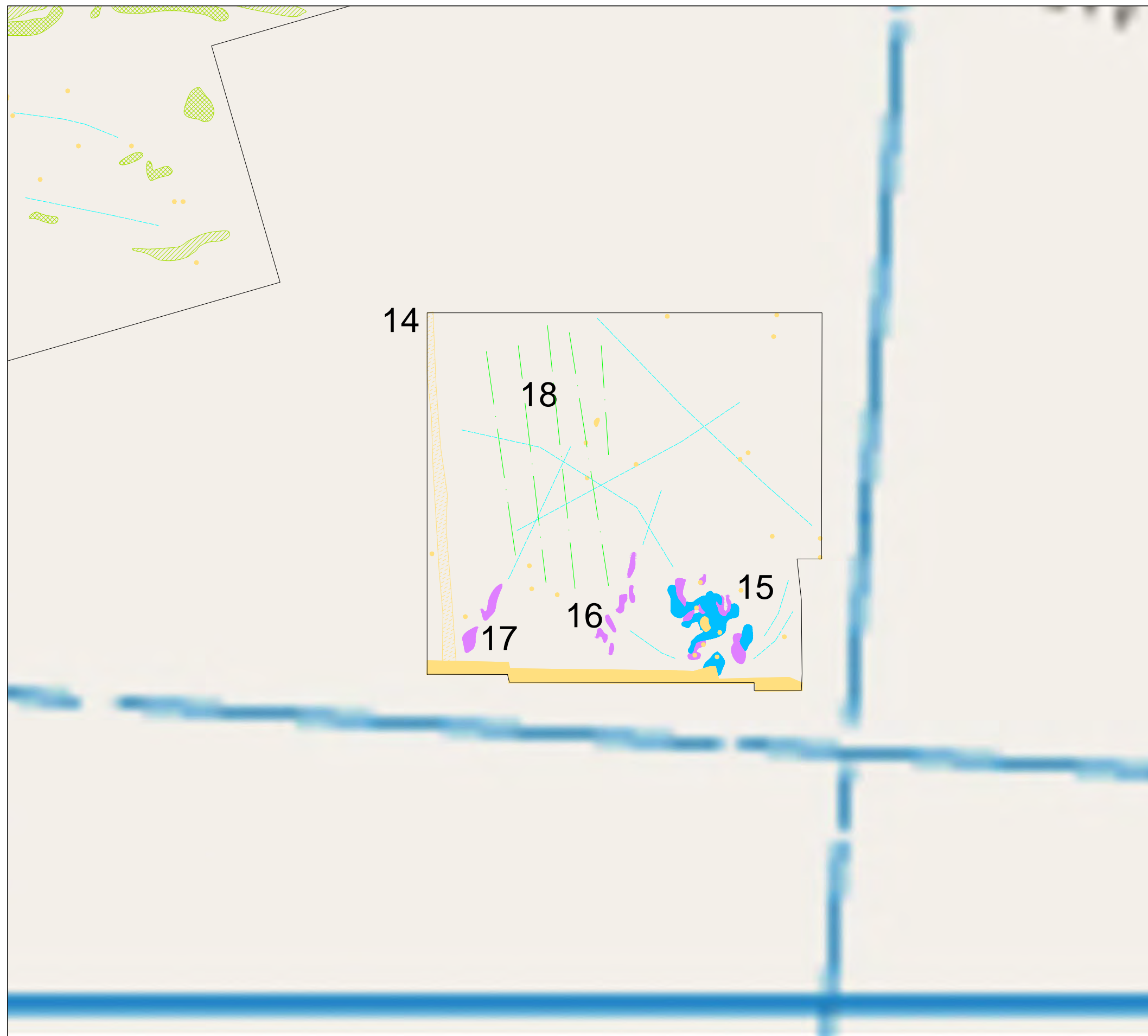
PROJECT: 1114 Caithness

TITLE: Area D; Processed Magnetometer Greyscale

SCALE: 1:1000

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FIGURE 17



- ?Archaeology - positive response
- ?Archaeology - negative response
- Trend
- Ridge and furrow cultivation
- ?Natural (positive anomaly)
- ?Natural (negative anomaly)
- Ferrous
- ?Pipe
- 7 Anomaly number



PROJECT: 1114 Caithness

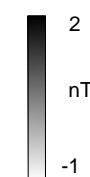
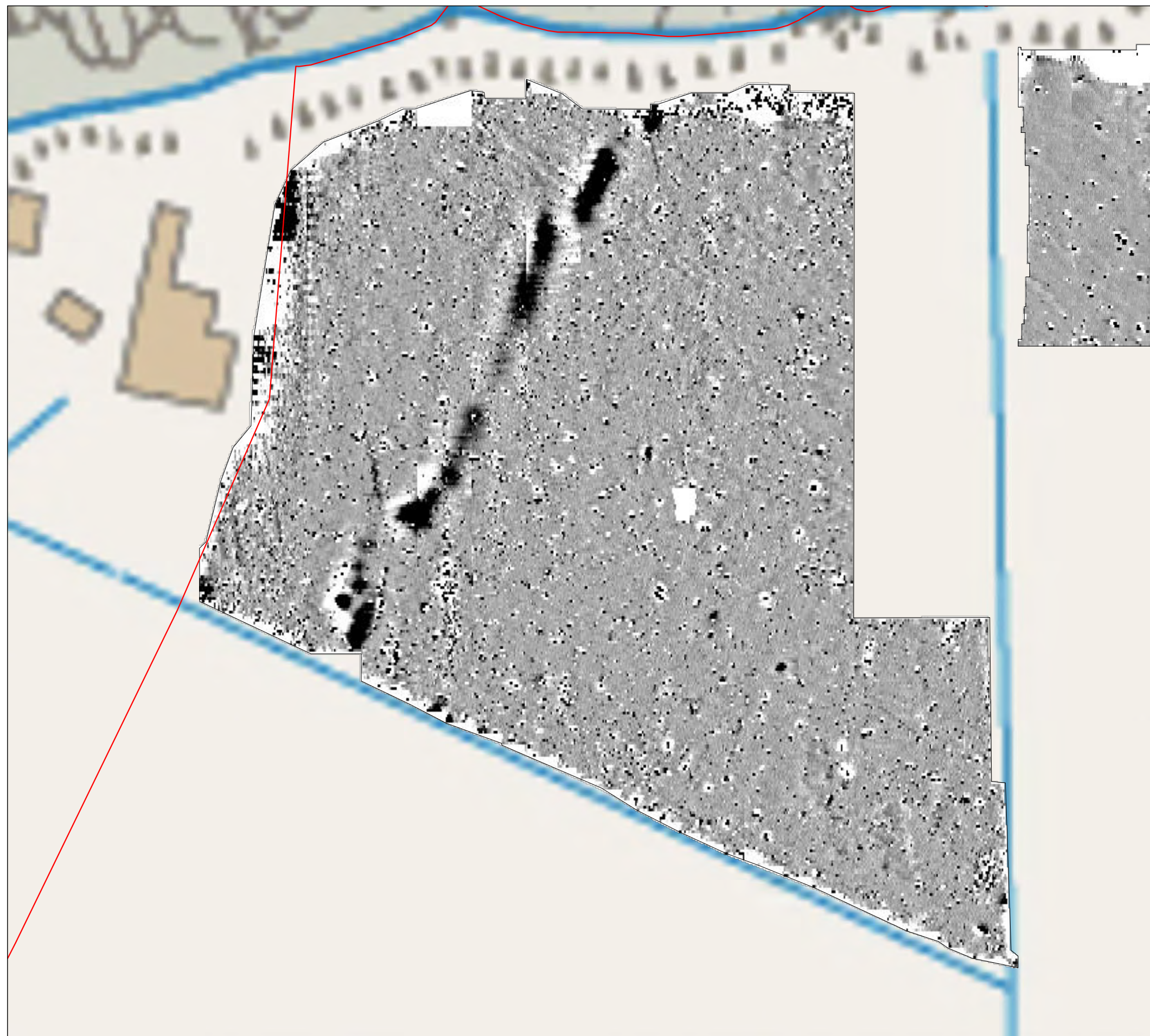
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SCALE: 1:1000

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FIGURE 18





PROJECT: 1114 Caithness

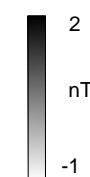
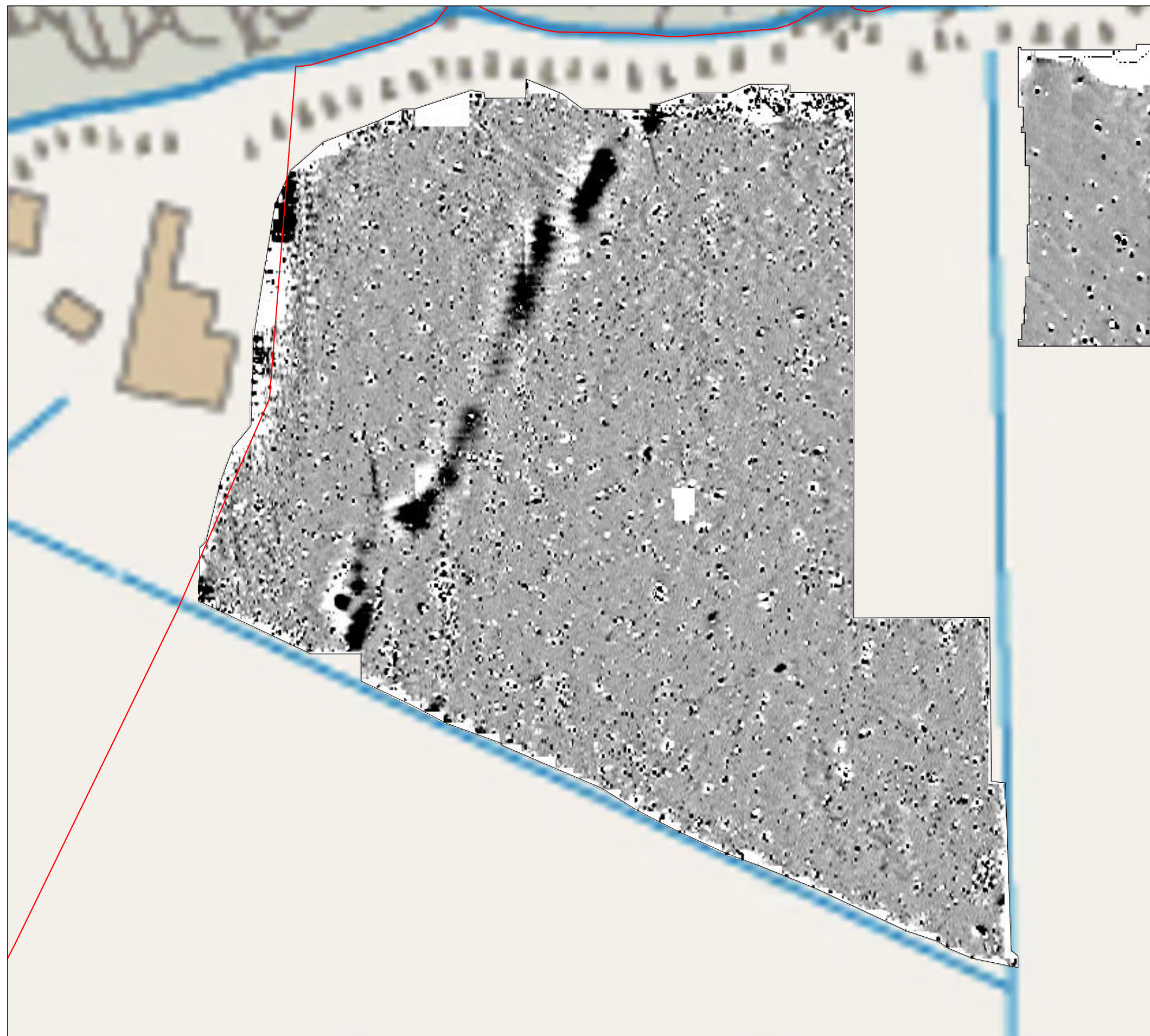
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SCALE: 1:1500

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FIGURE 19





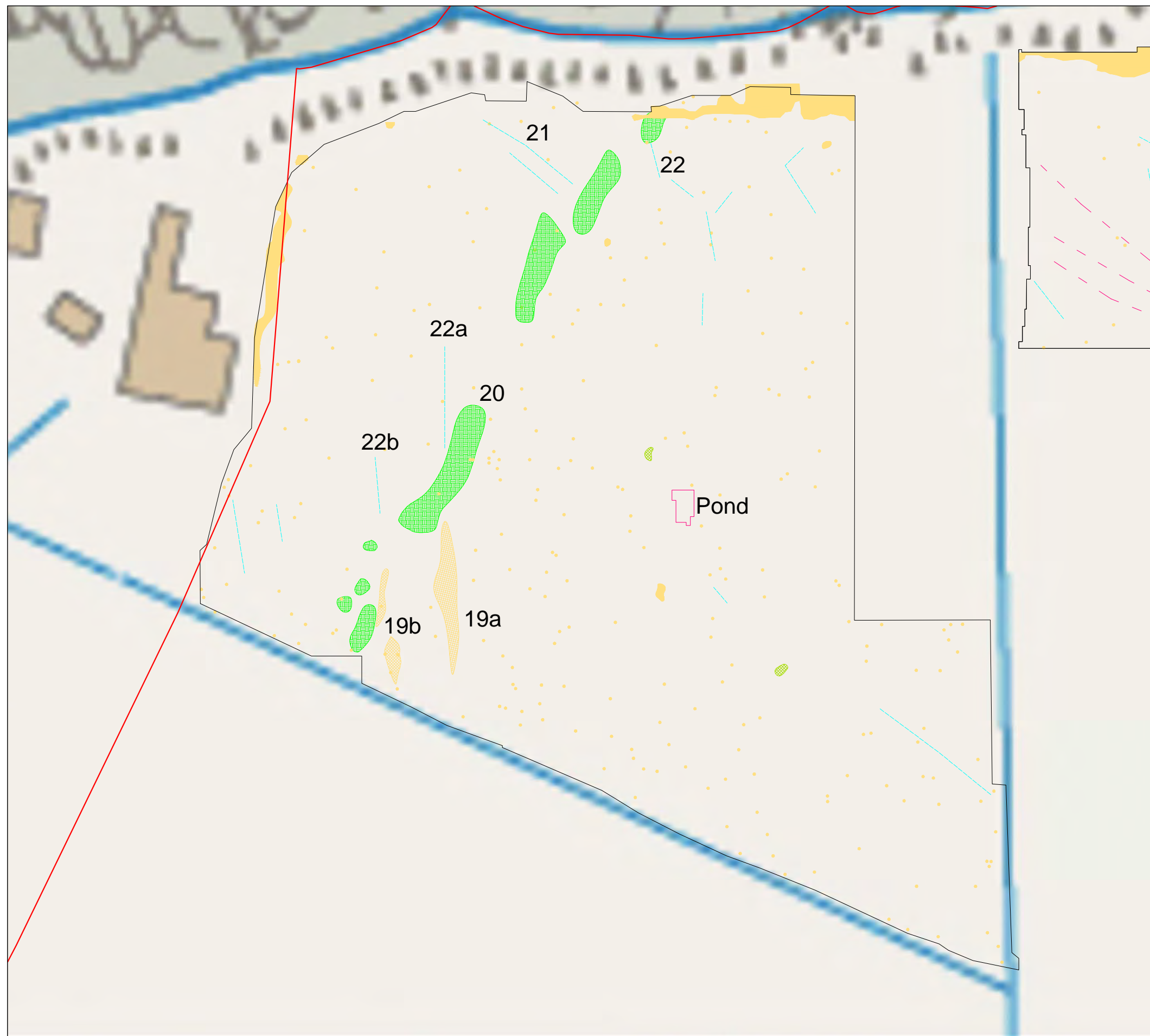
PROJECT: 1114 Caithness







TITLE: Area E; Processed Magnetometer Greyscale

SCALE: 1:1500

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FIGURE 20



-  ?Natural (positive anomaly)
-  Trend
-  Ploughing/Ridge and furrow cultivation
-  Magnetic Disturbance
-  Igneous dyke
-  Ferrous
- 7** Anomaly number



PROJECT: 1114 Caithness

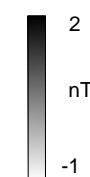
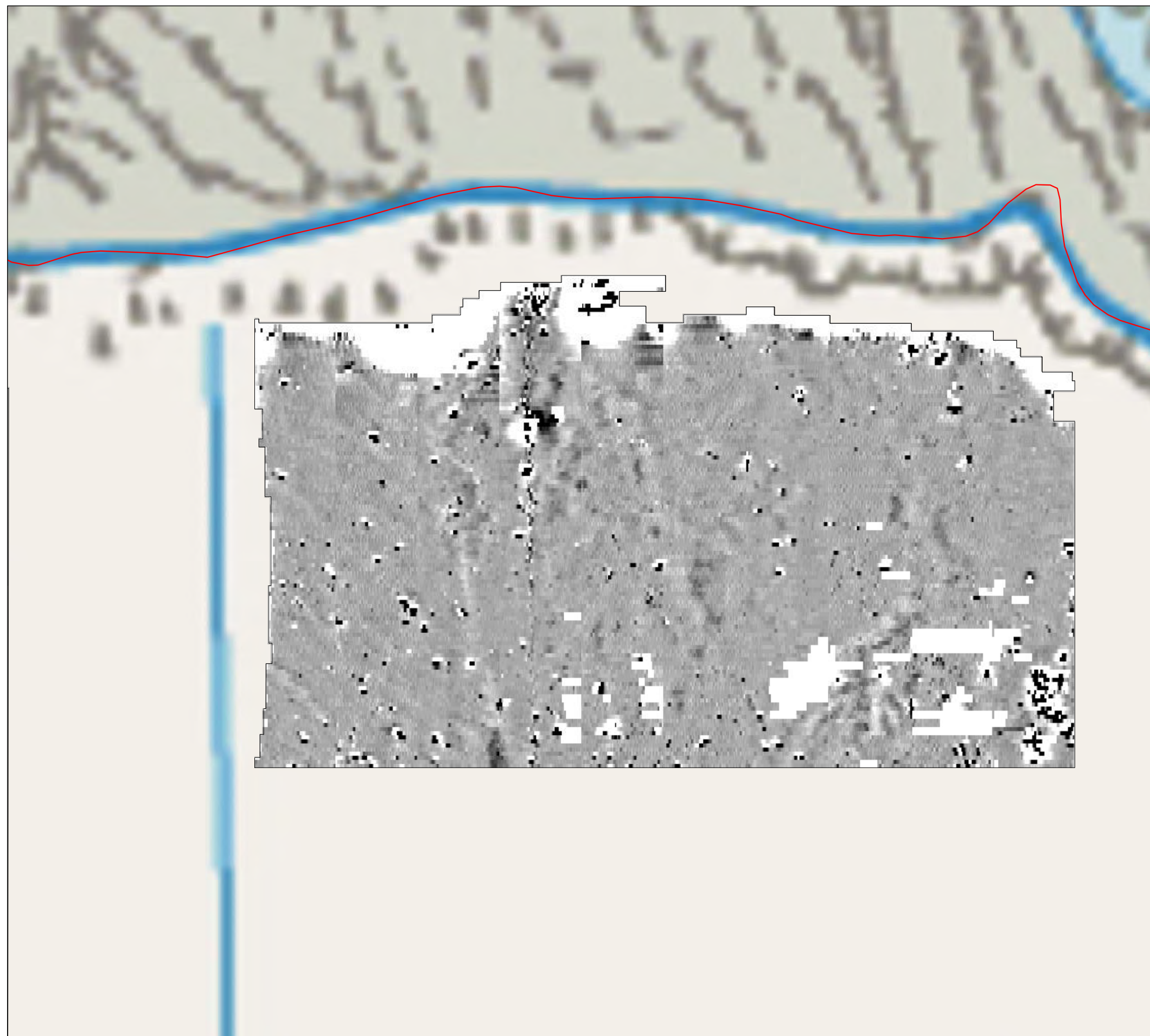
TITLE: Area E; interpretation

SCALE: 1:1500

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FIGURE 21





0 40m



PROJECT: 1114 Caithness

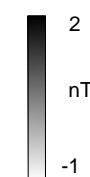
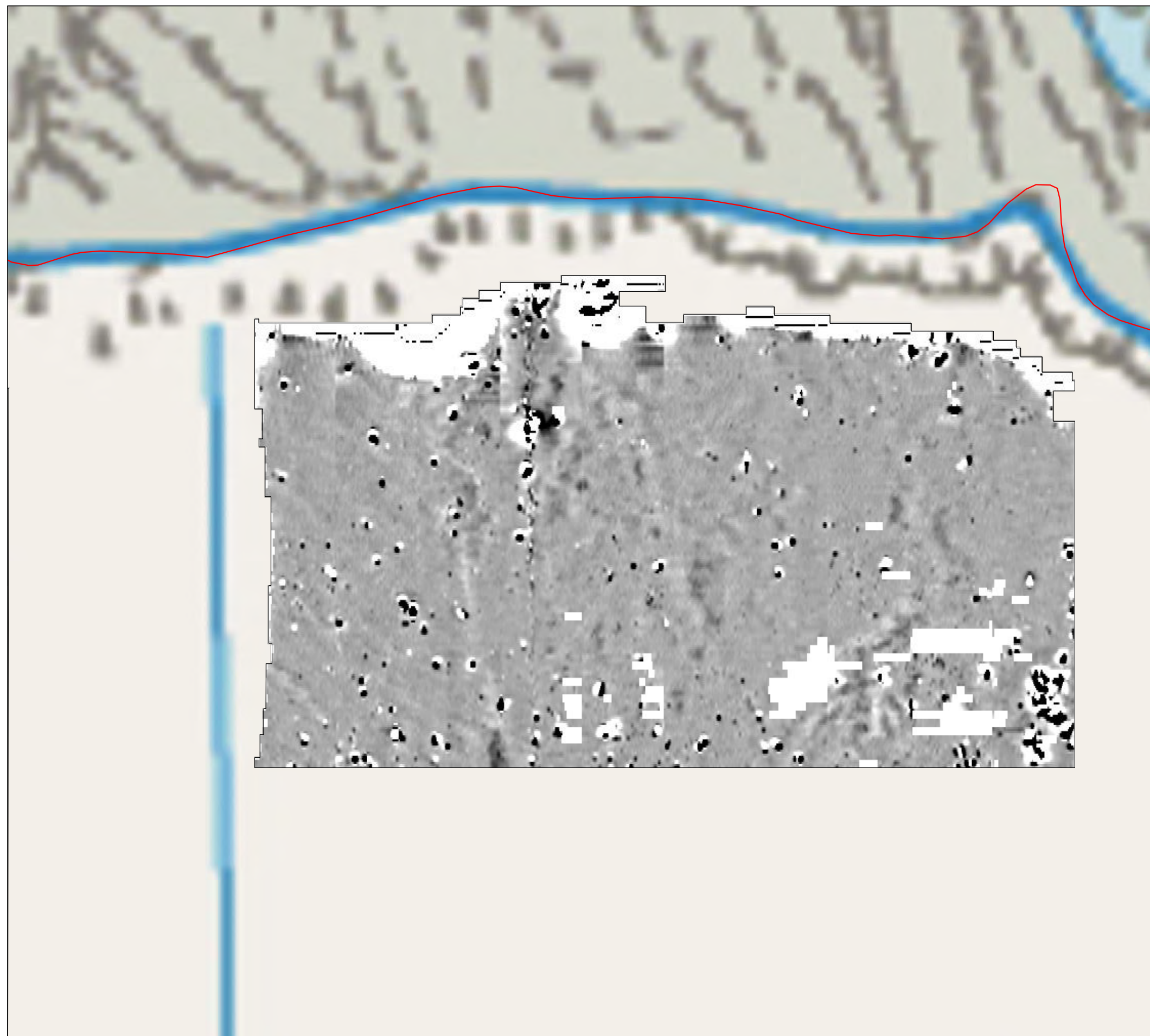
TITLE: Area F; Raw Magnetometer Greyscale

SCALE: 1:1000

This map is reproduced from a site plan provided by the client; 2011 MeyGen Limited 1114 Caithness

FIGURE 22





0 40m



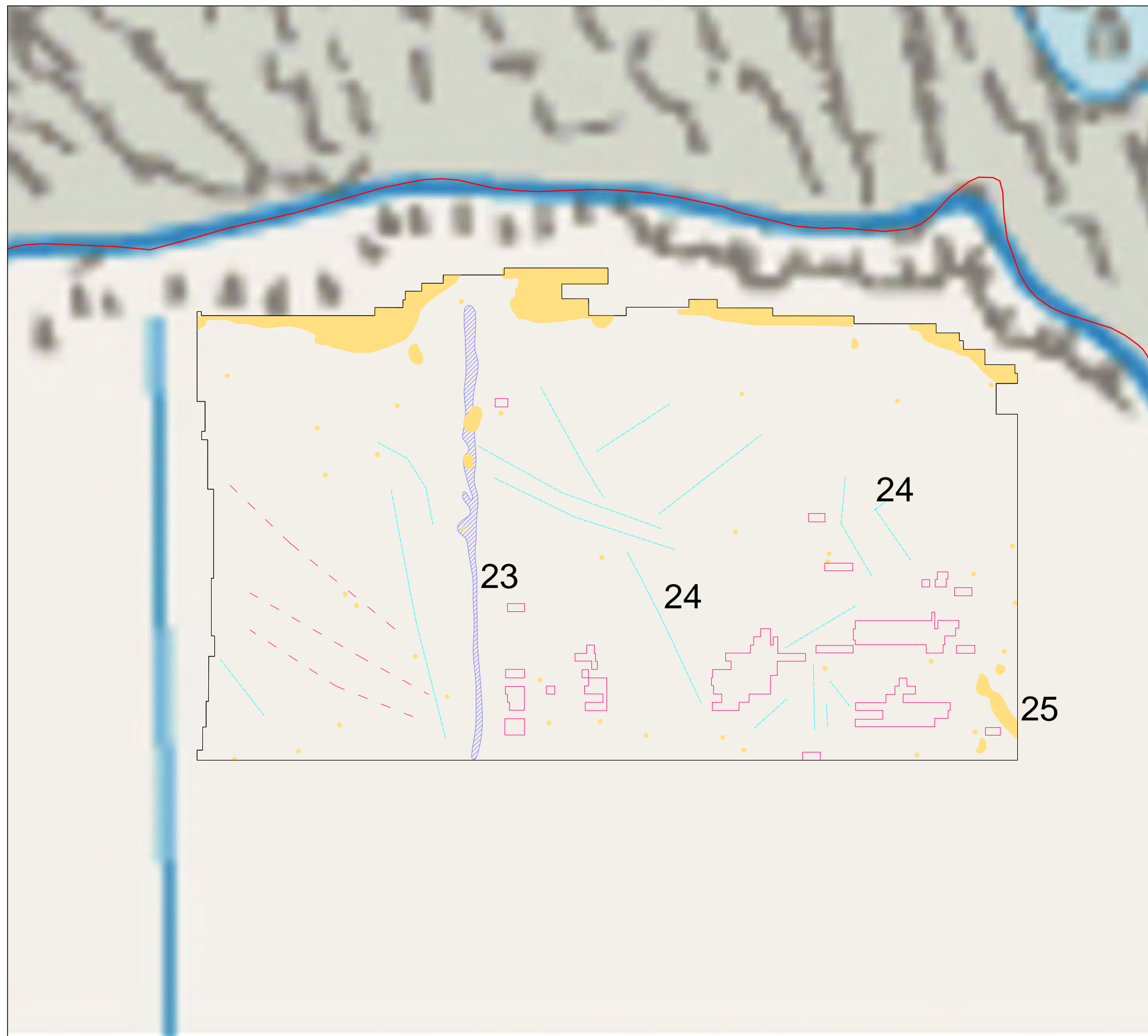
PROJECT: 1114 Caithness







TITLE: Area F; Processed Magnetometer Greyscale


SCALE: 1:1000

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FIGURE 23



-  ?Modern
-  Trend
-  Ploughing
-  Not Surveyed
-  Ferrous
-  Anomaly number



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## GEOPHYSICS

PROJECT: 1114 Caithness

TITLE: Area F; interpretation

SCALE: 1:1000

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FIGURE 24