

# A1 in Northumberland: Morpeth to Ellingham

**Scheme Number: TR010041**

## **6.7 Environmental Statement – Appendix 8.2 Geophysical Survey**

**Part A**

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed  
Forms and Procedure) Regulations 2009

June 2020

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning  
(Applications: Prescribed Forms and  
Procedure) Regulations 2009**

**The A1 in Northumberland: Morpeth to Ellingham  
Development Consent Order 20[xx]**

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**Environmental Statement - Appendix**

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ARCHAEOLOGICAL  
SERVICES  
DURHAM UNIVERSITY

for  
WSP  
on behalf of  
Highways England

A1 Morpeth to Felton  
Northumberland  
geophysical survey

report 4688  
March 2018

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Area 10:	Figure 5	Area 22:	Figures 21-23
Area 11:	Figure 6	Area 23:	Figures 21-23
Area 12:	Figure 6	Area 24:	Figure 24
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## **1. Summary**

### **The project**

- 1.1 This report presents the results of geophysical surveys conducted in advance of proposed improvements to the A1 road between Morpeth and Felton in Northumberland. The works comprised detailed geomagnetic survey of 61 areas totalling 119ha across two phases of work.
- 1.2 The works were commissioned by WSP on behalf of Highways England and conducted by Archaeological Services Durham University.

### **Results**

- 1.3 Features of possible archaeological origin were identified in many of the survey areas, including a possible pit alignment in Phase 1 Area 34, and several probable ditches.
- 1.4 Traces of previous plough regimes, including probable former ridge and furrow cultivation, were detected in many of the survey areas. In some areas the ridge and furrow survives as upstanding earthworks.
- 1.5 Historical features recorded on early Ordnance Survey maps were identified in many survey areas. These features include former field boundaries, a former quarry and the former course of the road which became the A1.
- 1.6 Anomalies corresponding to natural variation in the underlying soils and geology were detected in many of the survey areas. These vary from an igneous dyke in the central part of the survey area to areas of alluvium detected along the courses of rivers. Variation within the drift geology in this part of Northumberland often gives rise to geomagnetic anomalies; some of the anomalies identified as of potential archaeological origin may prove to be natural features.
- 1.7 Areas of disturbed ground or landscaping have been detected, including a large area of former hardstanding in Phase 1 Area 50, which is probably associated with the former airfield near the north end of the scheme.
- 1.8 Services and land drains were detected in many of the survey areas.

## 2. Project background

### Location (Figure 1)

- 2.1 The surveys were undertaken prior to proposed improvements to the A1 road between Morpeth and Felton in Northumberland (NGR south end: NZ 1824 8794; NGR north end: NU 1749 0098). Surveys have been undertaken adjacent to the existing road corridor in the south and north of the scheme and along the course of a proposed re-alignment in the central part of the scheme. Surveys were also undertaken over three proposed compound areas near the northern end of the scheme and two proposed work areas in the north of the central part. Towards the end of the survey phase a new redline boundary was prepared which required additional areas to be surveyed at various locations along the route, including additional proposed compound areas. In this report, the two phases of geophysical survey are referred to Phase 1 and Phase 2.
- 2.2 Within the original proposed road corridor and the five defined polygons for compound/works areas, approximately 125ha were identified which might be viable for survey. This comprised approximately 48ha of road corridor and 77ha of compounds and work areas, however, much of the proposed road corridor had already been surveyed by Archaeological Services in 2006 (see Section 3, below). There was considerable overlap between the areas within the road corridor surveyed in 2006 and those identified on the current plans. Areas within the development corridor which had not previously been surveyed totalled approximately 15ha. Together with the compound/works areas, there were therefore approximately 92ha for survey in Phase 1.
- 2.3 The Phase 2 survey areas, defined by the revised redline boundary, covered an additional 38ha.
- 2.4 Several of the Phase 2 surveys in the central part of the scheme were contiguous with Phase 1 surveys and have been included in the Phase 1 survey information below.
- 2.5 Ground conditions and access restrictions prevented survey in several of the proposed areas across both Phases of survey (see para. 4.1, below). In total, 61 areas were surveyed, covering approximately 119ha (43 areas, 106ha, were surveyed in Phase 1; 18 areas, 13ha, were surveyed in Phase 2).

### Development proposal

- 2.6 The proposed road improvements comprise: road-widening along the southern and northern sections of the route; a new road corridor in the central section; improved access and re-modelled junctions; and a series of reservoir ponds.

### Objective

- 2.7 The aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the proposed development area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the development.
- 2.8 The regional research framework *Shared Visions: The North-East Regional Research Framework for the Historic Environment* (Petts & Gerrard 2006) contains an agenda

for archaeological research in the region, which is incorporated into regional planning policy implementation. In this instance, the scheme of works was designed to address the following research priorities: Late Bronze Age and Iron Age lli. Settlement, liii. Landscapes; Roman Ri. The Iron Age to Roman transition, Rii. Roads and communication, Riv. Native and civilian life, Rix. Landscape and environment; Early Medieval EMi. Landscape, EMii. Settlement; Later Medieval MDi. Settlement, and MDii. Landscape.

#### **Methods statement**

- 2.9 The surveys have been undertaken in accordance with instructions from the client, proposals and methods statements submitted by Archaeological Services Durham University (refs. DH 17.448 & DH 17.506) and national standards and guidance (see para. 5.1 below).

#### **Dates**

- 2.10 The Phase 1 surveys were undertaken between 30th October and 14th December 2017; the Phase 2 surveys were undertaken on 8th-12th January and 5th February 2018. This report was prepared for March 2018.

#### **Personnel**

- 2.11 Fieldwork was conducted by Daniel Adamson, Duncan Hale, Adam Mead, Richie Villis (Supervisor), Laura Watson and Mark Woolston-Houshold (Supervisor). The geophysical data were processed by Richie Villis and Mark Woolston-Houshold. This report was prepared by Richie Villis and Duncan Hale (the Project Manager), with illustrations by Dr Helen Drinkall and Janine Watson.

#### **Archive/OASIS**

- 2.12 The site codes are **A1M2F17** and **A1M2F18**, for **A1 Morpeth 2 Felton 2017** (Phase 1) and **2018** (Phase 2). The survey archive will be retained at Archaeological Services Durham University and a copy supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **Online Access to the Index of archaeological investigations** project (**OASIS**). The OASIS ID number for this project is **archaeol3-312008**.

#### **Acknowledgements**

- 2.13 Archaeological Services Durham University is grateful for the co-operation of the landowners and tenants, and for the assistance of Paul Hine of Highways England in facilitating this scheme of works.

### **3. Historical and archaeological background**

#### **Previous works**

- 3.1 In 2006 Archaeological Services Durham University conducted 37ha of geomagnetic survey for the proposed upgrading of the A1 road between Morpeth and Felton (Archaeological Services 2006). No highly significant archaeological sites or remains were identified in those surveys, though potential archaeological remains were detected in 36 of the 40 survey areas. The likely remains included occasional ditches and pits, medieval ridge and furrow, former field systems and trackways, and possible hearths/kilns.

- 3.2 Archaeological Services Durham University also conducted geophysical surveys along the proposed course of the Morpeth Northern Bypass in 2010 (Archaeological Services 2010). The remains of soil-filled features of possible archaeological origin were detected in most survey areas, however, the anomalies were generally weak and disjointed and appeared to reflect truncated features. Former ridge and furrow cultivation was also detected in several areas. The geophysical survey was followed by a programme of archaeological trial trenching (Archaeological services 2011), which recorded features possibly associated with prehistoric settlement activity, as well as traces of former ridge and furrow cultivation and more recent features. Archaeological Services subsequently undertook a programme of mitigation works in 2015, which included further trial trench evaluation of the route, photographic survey of the setting of historic buildings, topographic survey and archaeological monitoring of the topsoil strip (Archaeological Services 2015).
- 3.3 Towards the northern end of the scheme, a historic environment assessment and a geophysical survey have previously been undertaken on the south side of the River Coquet near West Thirston (Archaeological Services 2017a & 2017b), and a geophysical survey has also been undertaken at Felton Park to the north of the River Coquet (Archaeological Services 2013). No significant features were identified in the former survey; post-medieval features were detected at Felton Park, together with later features associated with the site's former use as a WWII tank depot.
- 3.4 The historic environment assessment for the West Thirston area identified an archaeological resource which is typical of the broader area around the proposed Morpeth to Felton road improvement scheme: the recorded archaeological sites in the wider area predominantly consist of later prehistoric and Romano-British settlement sites, mainly identified from aerial photographs. Medieval and post-medieval field boundaries and areas of ridge and furrow cultivation are also common throughout the area.

## 4. Landuse, topography and geology

- 4.1 At the time of survey the proposed development area comprised mixed-use land, predominantly agricultural land under pastoral use and arable cultivation, but also several areas of tree plantation, a woodland burial site, roadside verges and residential properties. The tables below list the proposed survey areas for each phase of survey, along with pertinent information such as size, location and landuse.

### Phase 1 survey areas

Area	Instrument	Size (ha)	Landuse	NGR	Notes
1	Bartington (handheld)	0.96	pasture	NZ 18205 88857	slope down N to S; hedge & fence to A1 at E; hedge to house at S; p&w fence at N
2	Bartington (handheld)	0.13	pasture	NZ 18233 89087	flat; hedge & fence to A1 at E; p&w fences to N & S
3	Bartington (handheld)	0.36	pasture	NZ 18263 89535	slight slope down N to S; bank, fence & hedge to A1 at E; p&w fences to N & S
4	Bartington (handheld)	0.48	pasture	NZ 18321 89535	slight slope down N to S at N; slight slope down S to N at S; fence & hedge to A1 in E at N; bank/mound & hedge to A1 to E in S; p&w

					fences N & S; mound/made-ground in E at S; brick built culvert in SE with boggy ground & slight earthwork line of culvert running SW; upstanding N/S r&f in N
5	Bartington (handheld)	0.17	pasture	NZ 18222 89733	flat; fence & hedge to local road at S
6	Bartington (handheld)	0.87	pasture	NZ 18510 89843	slight slope down W to E; steep banks & gorse bushes in W; wood fence & hedge to A1 at W; p&w fence & hedge to local road at S; upstanding E/W r&f in E; telegraph pole in centre with E/W o/head cable; borehole in W
7	Bartington (handheld)	1.33	pasture	NZ 18432 89996	gentle undulation, generally rising to centre & W; wood fence & hedge to A1 at E; p&w fence & hedge to N; hedge to local road to S; p&w fence to W; cattle trough & feeder in W; borehole in S; telegraph poles with N/S o/head cables along E edge; telegraph pole with E/W o/head cable in S
8	Bartington (handheld)	1.56	arable - oilseed rape	NZ 18505 90592	slope down S to N; p&w fence & hedge at S; hedge & fence to local road at N; hedge to A1 at E; N/S modern plough
9	n/a		trees	NZ 18515 91105	not surveyed due to trees
10	Bartington (handheld)	0.92	pasture - sheep	NZ 18484 91587	fairly steep slope down S to N; boggy marsh grass & stream to N; p&w fence to trees to NE; p&w fence to hedge to A1 in E; old spoil heap/mound, nettles & brambles in SE
11	n/a		trees	NZ 18468 91693	not surveyed due to trees
12	Bartington (handheld)	3.44	arable - immature cereal	NZ 18391 92165	general slope down N to S, gets gradually steeper at S end; hedge to local road at N; hedges to NE & SW; trees to S; N/S modern plough; borehole in N
13	Bartington (handheld)	0.29	arable - immature cereal	NZ 18571 92613	flat; hedge to local road in S; copse to E; hedge & scrub verge to W; NE/SW modern plough
14	n/a		ploughed	NZ 18301 92802	not surveyed due to plough
15	n/a		o/g	NZ 18302 93030	not surveyed due to o/g scrub
16	Bartington (handheld)	1.65	arable - immature cereal	NZ 18336 93202	slope down N to S, steeper at S end; slight slope down E to W; hedge & fence to N; scrub & hedge to S; N/S modern plough
17	Bartington	0.12	rough pasture	NZ 18360 93396	flat; hedge & trees to E;



	(handheld)				hedge & fence to N & S; upstanding NE/SW r&f
<b>18</b>	Bartington (handheld)	0.12	rough pasture	NZ 18389 93413	flat; hedeg & trees to W; hedge & fences to N & S; upstanding NE/SW r&f
<b>19</b>	Bartington (handheld)	0.35	arable - oilseed rape	NZ 18403 93505	gentle slope down SE to NW; scrub & hedge to N & S; NE/SW modern plough
<b>20</b>	Bartington (handheld)	1.11	arable - oilseed rape	NZ 18474 93733	gentle slope down SW to NE & S to N; hedge to S; p&w fence & hedge to N; NW/SE modern plough
<b>21</b>	n/a		trees	NZ 18505 93913	not surveyed due to trees
<b>22</b>	Bartington (handheld)	0.56	arable - immature cereal	NZ 18569 93996	flat; hedge to local road in N; hedge & p&w fence to S; NE/SW modern plough
<b>23</b>	Bartington (handheld)	0.19	arable - immature cereal	NZ 18588 94123	flat; hedge to local road to SE; NE/SW modern plough
<b>24</b>	Bartington (handheld)	0.02	arable - immature cereal	NZ 18664 94695	flat; hedge & barbed wire fence to N; NE/SW modern plough
<b>25</b>	Bartington (handheld)	0.28	pasture	NZ 18684 94508	steep slope E/W in centre; barbed wire fence to caravans in E; barbed wire fence & hedge to S
<b>25a</b>	Bartington (handheld)	0.07	pasture	NZ 18657 94409	flat; barbed wire fence & hedge to S
<b>26</b>	n/a		caravans	NZ 18734 94555	not surveyed due to caravans
<b>27</b>	Sensys (towed)	14.66	pasture - sheep	NZ 18836 95023	general slope down N to S & E to W; steeper slope down E to W in NW corner; p&w fences to all sides; tree plantation to E & SE; housing to S; stream to W; local road to N; 2 steel gates in N; one steel gate in NW; telegraph pole in NW; gas pipe marker pole to SW; N/S recent plough
<b>27a</b>	Sensys (towed)	7.47	pasture	NZ 18498 95031	slope down W to E, getting steeper in E; p&w fence to all sides; local road to N; farm track to W; 2 steel gates to N; one steel gate to NE; one steel gate to S; one steel gate to NW; pumphouse in NE corner; cattle feeder in NW
<b>28</b>	Sensys (towed)	10.17	pasture	NZ 18599 94755	slopes down from centre to N, S and slightly to E; p&w fences to all sides; steel gates in N & NW; 2 telegraph poles in E with N/S o/head cables; gas pipe marker poles to SW & NE
<b>29</b>	Sensys (towed)	22.11	arable - immature cereal	NZ 18799 95562	slopes down from centre to E & W, steeper in the SW corner; p&w fences to all sides; A1 road to E; housing to SE; local road to S; farm track to W; rough-

					ground & tree plantation to NW; steel gate in S; inspection chamber cover in SW; 4 telegraph poles with E/W o/head cables in S; 3 telegraph poles with N/S o/head cables in W; N/S modern plough
<b>30</b>	Bartington (handheld)		arable - immature cereal		OVERLAIN BY <b>29</b>
<b>30a</b>	Bartington (handheld)		arable - immature cereal		OVERLAIN BY <b>29</b>
<b>31</b>	Sensys (towed)	8.92	arable - immature oilseed rape	NZ 18721 95975	slope down NE to SW; p&w fences to all sides; A1 road to NE; rough-ground & tree plantation to SW; rough-ground in SE; NE/SW modern plough; steel gate in NE; 3 telegraph poles with NE/SW o/head cables in N; telegraph pole with N/S o/head cables in SW
<b>32</b>	Sensys (towed)	6.05	arable - immature oilseed rape	NZ 18565 96199	slope down from centre to NW & SE; p&w fences to all sides; A1 to NE; steel gates in NE & SW; inspection chamber in W; NW/SE modern plough
<b>33</b>	Bartington (handheld)	0.85	arable - immature cereal	NZ 18369 96395	slight slope down S to N, steeper at S end; hedge & barbed wire fence to E; tall & thick scrub grass to S; NW/SE modern plough
<b>34</b>	Sensys (towed) (10.98ha) & Bartington (handheld) (1.91ha)	12.89	arable - immature cereal	NZ 18379 96627	gentle undulation, generally sloping down from SE with much steeper slope down from E to W in NW corner towards stream; p&w fencing & hedges to all sides, ditch to NW; A1 road to NE; local road to N; rough-ground in NW; trees to NW; steel gate in N; NW/SE modern plough
<b>35</b>	n/a		trees	NZ 18073 96880	not surveyed due to trees
<b>36</b>	n/a		o/g	NZ 18091 96994	not surveyed due to dense vegetation
<b>37</b>	n/a		verge	NZ 181135 97039	not surveyed due to dense vegetation & proximity to traffic
<b>38</b>			o/g	NZ 17899 97200	not surveyed due to dense vegetation
<b>39</b>	Bartington (handheld)	1.57	arable - immature cereal	NZ 17696 97491	general slope down from NW to SE; much steeper in SE towards stream; steep slope down to SW in SW; hedge & bank to A1 road to E; scrub & hedge to N; scrub to stream to S; NW/SE modern plough
<b>40</b>	n/a		verge	NZ 17640 97644	not surveyed due to dense vegetation & proximity to

					traffic
41	n/a		verge	NZ 17557 97833	not surveyed due to dense vegetation & proximity to traffic
42	Bartington (handheld)	0.57	arable - immature cereal	NZ 17480 97926	very flat; p&w fence & hedge to A1 road to E; scrub, p&w fence & hedge to local road to S; hedge to N; collapsed culvert in SE corner; E/W modern plough
43	Bartington (handheld)	0.19	arable - immature cereal	NZ 17470 98089	very flat; p&w fence & hedge to A1 road to E; p&w fence to trees to N; hedge to S; E/W modern plough
44	n/a		trees	NZ 17517 98086	not surveyed due to trees
45	n/a		trees	NZ 17498 98267	not surveyed due to trees
46	Bartington (handheld)	0.50	arable - immature cereal	NZ 17486 98447	flat; hedge to A1 road to W; p&w fence to S; scrub & old access road to N; E/W modern plough
47	Bartington (handheld)	0.13	arable - immature peas/beans	NZ 17452 98257	flat; hedge to A1 road to E; scrub & trees to S; N/S modern plough
47a	Bartington (handheld)	0.05	arable - immature peas/beans	NZ 17415 98665	flat; hedge to A1 road to E; p&w fence to trees to N; concrete & steel inspection chamber in NE; N/S modern plough
48	Bartington (handheld)	0.22	arable - immature cereal	NZ 17480 98599	flat; hedge to A1 road to W; scrub & old access road to S; p&w fence to local access road to N & NW; E/W modern plough
49	n/a		trees	NZ 17408 98712	not surveyed due to trees
50	Bartington (handheld)	0.62	pasture	NZ 17526 98775	flat; upstanding E/W r&f to E & NE; p&w fence & hedge to local access road to N & S; wooden slat fence to W; mobile phone mast & trees to SW
51	Bartington (handheld)	0.73	arable - immature cereal	NZ 17373 98884	flat; hedge to A1 road to E; hedge & p&w fence to local road to S; NE/SW & N/S modern plough; borehole in NE
52	Bartington (handheld)	0.37	arable - immature cereal	NZ 17523 98858	flat; p&w fence & hedge to local road to SE; wet & boggy in SW; NE/SE modern plough
53	Bartington (handheld)	0.19	arable - immature cereal	NZ 17449 99020	flat; p&w fence to trees to A1 road to W; p&w fence to N; telegraph pole with E/W overhead cables in N; N/S modern plough
54	n/a			NZ 17713 99089	not surveyed due to access restrictions
55	Sensys (towed)	2.83	pasture - horses, cows and sheep	NZ 17535 99639	slope down to N & S from centre, steeper in N; p&w fence to trees to A1 road to W; p&w fence to trees to River Coquet to N;

					sparse hedge to E; p&w fence to S; steel gate in SE corner
56	n/a			NU 17516 00057	not surveyed due to access restrictions

**Phase 2 survey areas**

Area	Instrument	Size (ha)	Landuse	NGR	Notes
1	Bartington (handheld)	0.31	grass verge	NZ 18254 88064	flat; hedge & trees to A1 road to W; local road to housing to E; local road to S; trees & electricity substation to N
2	n/a		arable - ploughed	NZ 18252 88222	not surveyed due to plough
3	n/a		arable - ploughed	NZ 18297 88353	not surveyed due to plough
4	n/a		arable - ploughed	NZ 18377 88424	not surveyed due to plough
5	n/a		arable - ploughed	NZ 18400 88560	not surveyed due to plough
6	Bartington (handheld)	0.20	pasture - sheep	NZ 18313 88717	flat; p&w fence & hedge to E; p&w fences to S & W; fallen trees & farmyard debris in S
7	n/a		arable - ploughed	NZ 18387 88810	not surveyed due to plough
8	Bartington (handheld)	0.33	pasture - sheep	NZ 18158 88701	flat; p&w fence & hedge to S; house to SE
9	Bartington (handheld)	0.21	pasture - mown and rolled	NZ 18472 89746	very flat; trees & scrub to NW; hedge to local road to NE; steel gate in NE corner; barbed wire fence to E
10	Bartington (handheld)	0.40	pasture	NZ 18592 89818	flat; upstanding E/W r&f; p&w fence & hedge to local road to S; p&w fence to E; metal feeder in SE; telegraph pole with E/W o/head cables in W
11	Bartington (handheld)	0.31	pasture	NZ 18476 89950	flat; upstanding E/W r&f in centre; p&w fence to N; p&w fence & hedge to A1 road to W
12	Bartington (handheld)	0.41	arable - immature cereal	NZ 18498 90095	slight slope down N to S; p&w fence, hedge & trees to A1 road to W; p&w fence to S; p&w fence & steel gate to local access road to N; N/S modern plough
13	Bartington (handheld)	0.44	arable - immature cereal	NZ 18518 90266	slight slope down N to S & E to W; wooden fence & hedge to A1 road to W; p&w fence to N; N/S modern plough
14	Bartington (handheld)	0.39	arable - immature cereal	NZ 18548 90461	slope down E to W; p&w fences N, S & W; N/S modern plough
14a	Bartington (handheld)	0.26	pasture	NZ 18535 90364	flat, slope down E to W in S; p&w fence N & S; fence & hedge to A1 road to W; upstanding E/W r&f in S; N/S r&f headland in W; thick gorse bushes in S
15	Bartington (handheld)	2.02	arable - immature cereal	NZ 18477 91082	slope down S to N; trees & scrub to A1 road to E; hedge to local access road

					to S; scrub to stream to N; N/S modern plough
16	Bartington (handheld)	0.83	arable - immature cereal	NZ 18533 91718	slope down N to S; hedge to A1 to E; hedge to W; hedge to stream to S; borehole in S; very wet & boggy in SW; NE/SW & NW/SE modern plough
17	Bartington (handheld)	0.15	arable - immature cereal	NZ 18797 92500	flat; hardcore track to hedge to local road to N; hedge to A1 road to E; E/W modern plough
18	Bartington (handheld)	0.33	arable - immature cereal	NZ 18592 94312	slope down SW to NE; hedge & p&w fence to local road to SW; hedge to NW; gate in W corner; NW/SE modern plough
19	n/a		scrub, disturbed ground, dumped materials; former racing track? (google earth images)	NZ 18513 95315	not surveyed due to dense vegetation, and unsuitable ground conditions
20	Bartington (handheld)	0.39	arable - immature cereal	NZ 17816 97441	slope down N to S; hedge to A1 to W; hedge to local road to E; trees to S; wet & boggy at S; NW/SE modern plough
21	Bartington (handheld)	0.34	arable - immature cereal	NZ 17435 98111	flat; p&w fence to trees to N; E/W modern plough
22	n/a			NZ 17892 98679	not surveyed due to access restrictions
23	Bartington (handheld)	0.50	arable - immature cereal	NZ 17347 98934	flat; hedge to A1 to E; N/S modern plough
24	Bartington (handheld)	5.37	pasture	NZ 17724 99690	gentle undulation, general slope down E to W; sparse hedge to W & SE; p&w fence to SW; p&w fence to trees to River Coquet to N; waterlogged gateway in W
25	n/a			NU 17375 00304	not surveyed due to access restrictions

- 4.2 The topography undulates between 80-110m OD throughout the southern and central parts of the proposed road scheme before levelling out towards the northern end, to around 60m OD south of the River Coquet and approximately 50m OD to the north of the river.
- 4.3 The underlying solid geology of the majority of the scheme comprises Carboniferous mudstone, siltstone and sandstone of the Stainmore Formation, with a north-east/south-west igneous intrusion of quartz-microgabbro (part of the Northern England Late Carboniferous Tholeiitic Dyke), crossing the central part of the scheme (at the south end of Area 29). Immediately north of the igneous dyke, underlying Areas 29, 31, 32 and the southern parts of Areas 33 and 34 are mudstones, siltstones and sandstones of the Pennine Lower Coal Measures Formation. Within the study area, these strata are typically overlain by Devensian till, with occasional alluvial deposits of clay, sand, silt and gravel. These give way to glaciofluvial sands and gravels at the northern end of the scheme.

## 5. Geophysical survey

### Standards

- 5.1 The surveys and reporting were conducted in accordance with Historic England guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Chartered Institute for Archaeologists (CIfA) *Standard and Guidance for archaeological geophysical survey* (2014); the CIfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service & Digital Antiquity *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2013).

### Technique selection

- 5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.
- 5.3 In this instance it was considered likely that cut features such as ditches and pits might be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.
- 5.4 Given the anticipated depth of targets and the generally non-igneous geological environment of the study area, a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

### Field methods

- 5.5 Two types of geomagnetic instrument were used to measure vertical geomagnetic field gradient: Bartington Grad601-2 dual fluxgate gradiometers were used to collect data in Phase 1 Areas 1-8, 10, 12, 13, 16-20, 22-35a, 30, 30a, 33, 34, 39, 42, 43, 46-48, 50-53 & 55, and Phase 2 Areas 1, 6, 8-18, 20, 21, 23 & 24. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The instrument sensitivity was effectively 0.03 nanoTesla (nT), the sample interval was 0.25m and the traverse interval was 1m, thus providing 3,600 sample measurements per 30m grid unit.
- 5.6 A Sensys Magneto MX V3 multi-sensor magnetometer survey system, towed by a quad-bike, was used to collect data in Phase 1 Areas 27-29, 31, 32, 34 & 55. Eight FGM650/3 fluxgate gradiometer sensors were mounted at 0.5m intervals, logging data at less than 0.08m intervals along traverses, providing high density data collection.

- 5.7 In each case, data collection point locations were recorded in relation to the Ordnance Survey (OS) National Grid using a global navigation satellite system (GNSS) with real-time kinematic (RTK) correction typically providing 5-10mm accuracy.
- 5.8 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

### Data processing

- 5.9 For areas surveyed with the Bartington handheld instrument, Geoplot v.3 software was used to process the geophysical data and to produce continuous tone greyscale images and trace plots of the raw (minimally processed) data.
- 5.10 For areas surveyed with the Sensys towed instrument, Sensys MonMX, DLMGPS and MagnetoARCH software were used to record and display gradient and positional data and to create greyscale images of gridded values at 0.2m by 0.2m intervals. TerraSurveyor software was used to further process the data and produce continuous tone greyscale images and trace plots of filtered data.
- 5.11 The greyscale images and interpretations are presented in Figures 3-24. The trace plots provide no additional information with regard to possible archaeological features and are not presented in this report. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.
- 5.12 The following basic processing functions have been applied to the geomagnetic data:

<i>clip</i>	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
<i>de-spike</i>	locates and suppresses iron spikes in gradiometer data
<i>zero mean traverse</i>	(Bartington areas only) sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities
<i>de-stagger</i>	(Bartington areas only) corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
<i>interpolate</i>	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.1m x 0.1m intervals

- 5.13 The following filter has been applied to the multi-sensor geomagnetic data:

<i>low pass filter</i>	(applied with Gaussian weighting) to remove high frequency, small-scale spatial detail; for enhancing larger weak features and smoothing data
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### Interpretation: anomaly types

- 5.14 Colour-coded geophysical interpretation plans are provided. Three types of geomagnetic anomaly have been distinguished in the data:

<i>positive magnetic</i>	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches
<i>negative magnetic</i>	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
<i>dipolar magnetic</i>	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

### Interpretation: features

#### General comments

- 5.15 Colour-coded archaeological interpretation plans are provided. A summary of detected feature types and their locations are presented in the table below. This table should be used in conjunction with the relevant Area paragraphs below.

Feature type	Area number
Soil-filled feature	<b>Phase 1:</b> 3, 7, 20, 22, 23, 27, 28, 34, 34a, 39, 42, 46, 48, 53, 51, 52, 53, 55 <b>Phase 2:</b> 6, 9, 24
Ridge & furrow/former ploughing	<b>Phase 1:</b> 1, 3, 4, 6, 7, 10, 17, 18, 19, 25a, 27, 28, 29, 31, 32, 34, 34a, 39, 43, 46, 55 <b>Phase 2:</b> 1, 8, 10, 11, 12, 14, 14a, 18, 21, 23, 24
OS feature eg former field boundary/quarry/road base	<b>Phase 1:</b> 1, 2, 3, 4, 7, 8, 27, 28, 29 <b>Phase 2:</b> 11, 12
Geological feature/natural variation	<b>Phase 1:</b> 25, 27, 27a, 28, 29, 39
Services	<b>Phase 1:</b> 1, 27, 27a, 28, 29
Land drains	<b>Phase 1:</b> 7, 12, 27, 27a, 28, 39 <b>Phase 2:</b> 18
Recent plough texture	<b>Phase 1:</b> 19, 20, 22, 23, 24, 29, 31, 32, 33, 34, 39 <b>Phase 2:</b> 18
'Green waste' fertiliser	<b>Phase 1:</b> 8, 12, 13, 16, 34, 34a, 46, 48 <b>Phase 2:</b> 15, 16, 17
Existing features eg borehole, telegraph pole, trough etc	<b>Phase 1:</b> 6, 7, 27, 27a, 28, 29, 31, 32, 50 <b>Phase 2:</b> 10
Other features eg disturbed ground	<b>Phase 1:</b> 3, 4, 6, 29 <b>Phase 2:</b> 1, 12

- 5.16 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials. These are often sediments in cut archaeological features (such as ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning, however, in this instance such anomalies are often weak or irregular and it is likely that many of them do not reflect archaeological ditches.



- 5.17 Series of closely-spaced positive and negative magnetic striations have been detected across many of the survey areas (eg Phase 1 Areas 29-34). These anomalies reflect existing plough regimes and tractor tramlines. In some instances these may have a similar orientation to earlier agricultural practices, including ridge and furrow cultivation.
- 5.18 More widely-spaced, alternate positive and negative magnetic anomalies have also been detected; these are often slightly curved and almost certainly reflect former ridge and furrow cultivation (eg Phase 1 Areas 29 & 31; Phase 2 Areas 12 & 14). Similar parallel positive and negative magnetic anomalies have also been detected, which correspond to upstanding ridge and furrow earthworks (eg Phase 1 Areas 4, 6, 17 & 18; Phase 2 Area 10).
- 5.19 Features recorded on historic OS editions have been detected in many of the survey areas; these include former field boundaries (eg Phase 1 Areas 27 & 29), the course of an early road now largely beneath the A1 (Phase 1 Areas 3 & 4), a former track in Phase 1 Area 39 and an infilled quarry in Phase 1 Area 29.
- 5.20 Further series of parallel positive magnetic lineations have been detected in many areas, which almost certainly reflect land drains. These anomalies are typically straight and narrow, parallel and spaced at regular intervals of several metres. Drains are particularly clear in the data in the southern part of Phase 1 Area 12 and the western part of Phase 1 Area 28. In many instances the land drains follow the same alignment as modern and historic ploughing (eg Phase 2 Area 18).
- 5.21 Relatively weak and diffuse magnetic anomalies detected throughout the study area are likely to reflect slight geological and pedological variation, typical of the natural deposits in the area (eg Phase 1 Areas 27-29). In some instances, differences in the data closely correspond to known changes in the underlying drift geology, for example the anomalies detected at the southern end of Phase 1 Area 39 on the slope down towards a stream correspond to the change from till to alluvium in the stream valley. Similar anomalies detected in the northern part of Phase 1 Area 25 probably also reflect fluvial deposits associated with Earsdon Burn. A very intense positive magnetic anomaly detected in Phase 1 Area 29 in the central part of the road scheme corresponds to the Northern England Late Carboniferous Tholeiitic Dyke.
- 5.22 Phase 1 Areas 8, 12, 13 and 16 and Phase 2 Areas 15, 16 and 17 are characterised by high concentrations of small dipolar magnetic anomalies, which almost certainly reflect ferrous components within 'green waste' fertiliser. This can have a detrimental effect on geomagnetic surveys (Gerrard *et al.* 2015), particularly hindering the detection and interpretation of discrete features such as pits, postholes or hearths. Less intensive use of 'green waste' fertiliser may also account for the relatively high concentrations of dipolar magnetic anomalies in Phase 1 Areas 34, 46 and 48. In some instances (eg Phase 1 Areas 12 & 16) it is apparent that green waste has been added to the land between the 2006 surveys and the present surveys.
- 5.23 Chains of intense dipolar magnetic anomalies have been detected in many of the survey areas; these typically reflect buried services. A striking example crosses Phase 1 Areas 27 and 28. Occasional inspection chamber covers have also been noted (eg

Phase 1 Areas 29 and 31). Telegraph poles and pylons carrying overhead wires also crossed the PDA. Magnetic 'noise' detected across Phase 1 Area 31 corresponds to interference from overhead electricity cables.

5.24 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plans, however, they have been omitted from the archaeological interpretation plans and the following discussion. Except where stated otherwise, strong dipolar magnetic anomalies detected along the edges of surveys reflect the presence of adjacent metal fences.

5.25 Additional anomalies, of potential archaeological interest, are presented below by area, from south to north.

**Phase 2 Area 6 (Figure 3)**

5.26 A small positive magnetic anomaly detected in the east of this area could possibly reflect the truncated remains of a soil-filled feature.

**Phase 1 Area 3 (Figure 4)**

5.27 Positive magnetic anomalies detected in the centre of this area could reflect the remains of soil-filled features, such as ditches. The restricted width of the survey area has hindered a secure interpretation here.

**Phase 2 Area 9 (Figure 5)**

5.28 A broadly north-east/south-west aligned positive magnetic anomaly has been detected in this area. This may reflect the remains of a soil-filled feature, such as a ditch.

**Phase 1 Area 7 (Figure 6)**

5.29 Positive magnetic anomalies in the east of this area could reflect soil-filled features such as ditches or pits.

**Phase 1 Area 10 (Figure 7)**

5.30 Positive magnetic anomalies have been detected in the narrow part of this area. These may reflect soil-filled features such as ditches or pits.

**Phase 1 Areas 20, 22 & 23 (Figure 11)**

5.31 Occasional discrete positive magnetic anomalies have been detected across these areas. These types of anomalies can represent the remains of soil-filled pits or large postholes. The lack of any recognisable patterns or grouping to these anomalies could be indicative of a natural origin rather than anthropogenic.

**Phase 1 Areas 27 and 28 (Figures 12-14)**

5.32 Several linear and curvilinear positive magnetic anomalies have been detected in these areas. Some of the anomalies are rather irregular in shape but could reflect the remains of soil-filled ditches and other features.

**Phase 1 Area 34 (Figure 18)**

- 5.33 A north-east/south-west aligned sequence of regularly spaced positive magnetic anomalies has been detected in the north of this area. The anomalies could reflect soil-filled pits and may represent the remains of a pit alignment.
- 5.34 Several other, more diffuse, positive magnetic anomalies have also been detected in this area, on broadly east/west alignments. These could also reflect anthropogenic soil-filled features, or possibly geological variation.

**Phase 1 Area 42 (Figure 20)**

- 5.35 Two small irregular positive magnetic anomalies have been detected in the south-west corner of this area, which may reflect soil-filled features of uncertain origin.

**Phase 1 Area 50 (Figures 21-23)**

- 5.36 A concentration of strong dipolar magnetic anomalies has been detected across the central part of this area. The anomalies correspond to patches of concrete and hardcore noted on the ground and almost certainly represent the remains of hardstanding, perhaps associated with the former RAF airfield.

**Phase 1 Area 53 (Figures 21-23)**

- 5.37 A very weak north-west/south-east aligned positive magnetic anomaly has been detected in the north of this area. This probably reflects a soil-filled ditch, of possible archaeological origin.

**Phase 1 Area 55 (Figure 24)**

- 5.38 A broad and diffuse curvilinear positive magnetic anomaly has been detected in the north of the area. This could reflect the truncated remains of a soil-filled ditch.

**Phase 2 Area 24 (Figure 24)**

- 5.39 A broadly north-west/south-east aligned positive magnetic anomaly has been detected across the western half of the area. This probably reflects a soil-filled feature, such as a former boundary ditch. Several linear anomalies about this, which almost certainly reflect former ploughing. No former field boundaries are recorded here on historic OS maps, so this feature may pre-date the OS.

**6. Conclusions**

- 6.1 Approximately 119ha of detailed geomagnetic survey was undertaken prior to a proposed road improvement scheme for the A1 road between Morpeth and Felton in Northumberland. Surveys were undertaken adjacent to the existing road corridor in the south and north of the scheme and along the course of a proposed re-alignment in the central part of the scheme. Surveys were also undertaken over proposed compounds and works areas.
- 6.2 Features of possible archaeological origin were identified in many of the survey areas, including a possible pit alignment in Phase 1 Area 34, and several probable ditches.
- 6.3 Traces of previous plough regimes, including probable former ridge and furrow cultivation, were detected in many of the survey areas. In some areas the ridge and furrow survives as upstanding earthworks.

- 6.4 Historical features recorded on early Ordnance Survey maps were identified in many survey areas. These features include former field boundaries, a former quarry and the former course of the road which became the A1.
- 6.5 Anomalies corresponding to natural variation in the underlying soils and geology were detected in many of the survey areas. These vary from an igneous dyke in the central part of the survey area to areas of alluvium detected along the courses of rivers. Variation within the drift geology in this part of Northumberland often gives rise to geomagnetic anomalies; some of the anomalies identified as of potential archaeological origin may prove to be natural features.
- 6.6 Areas of disturbed ground or landscaping have been detected, including a large area of former hardstanding in Phase 1 Area 50, which is probably associated with the former airfield near the north end of the scheme.
- 6.7 Services and land drains were detected in many of the survey areas.

## 7. Sources

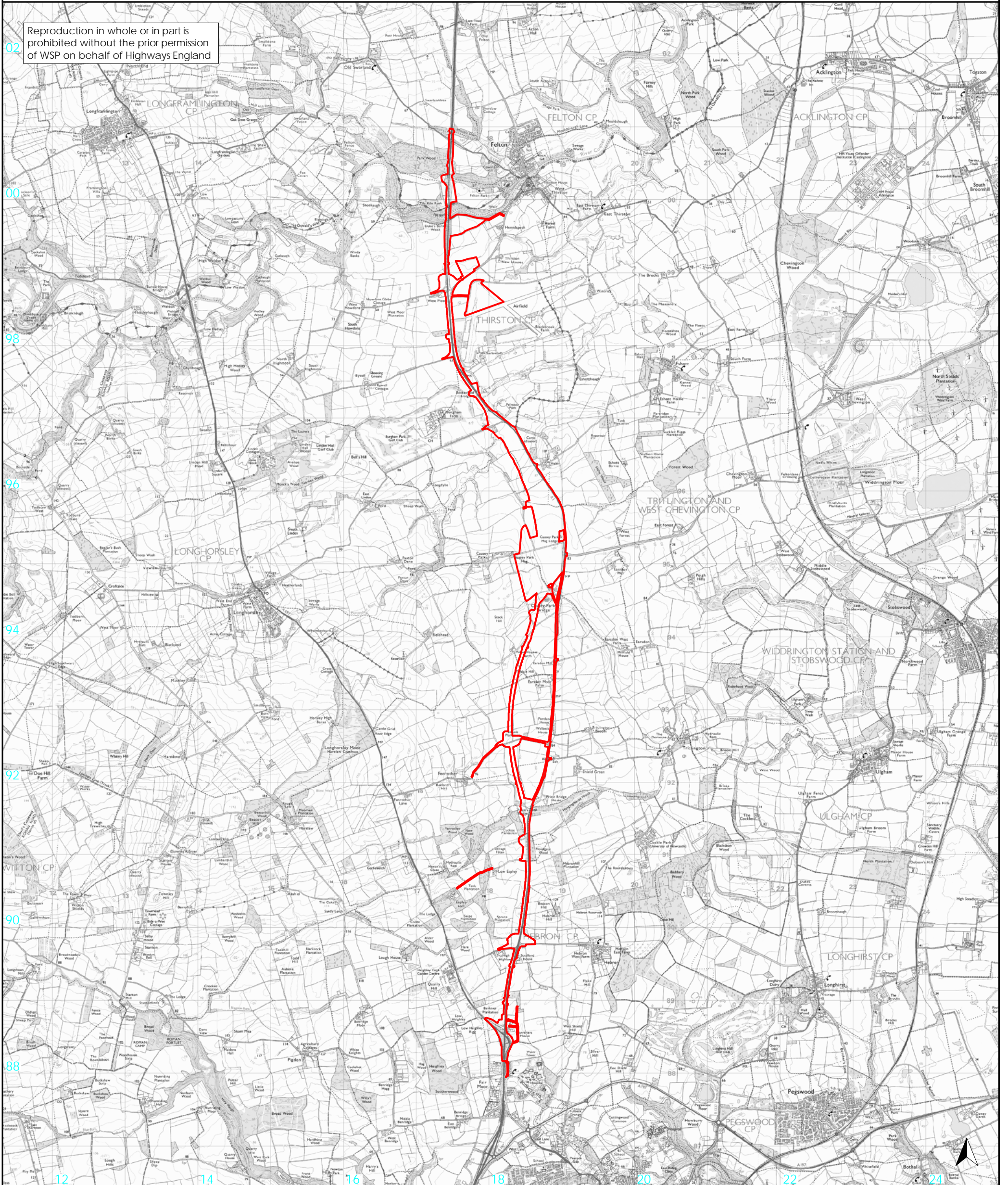
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 site location

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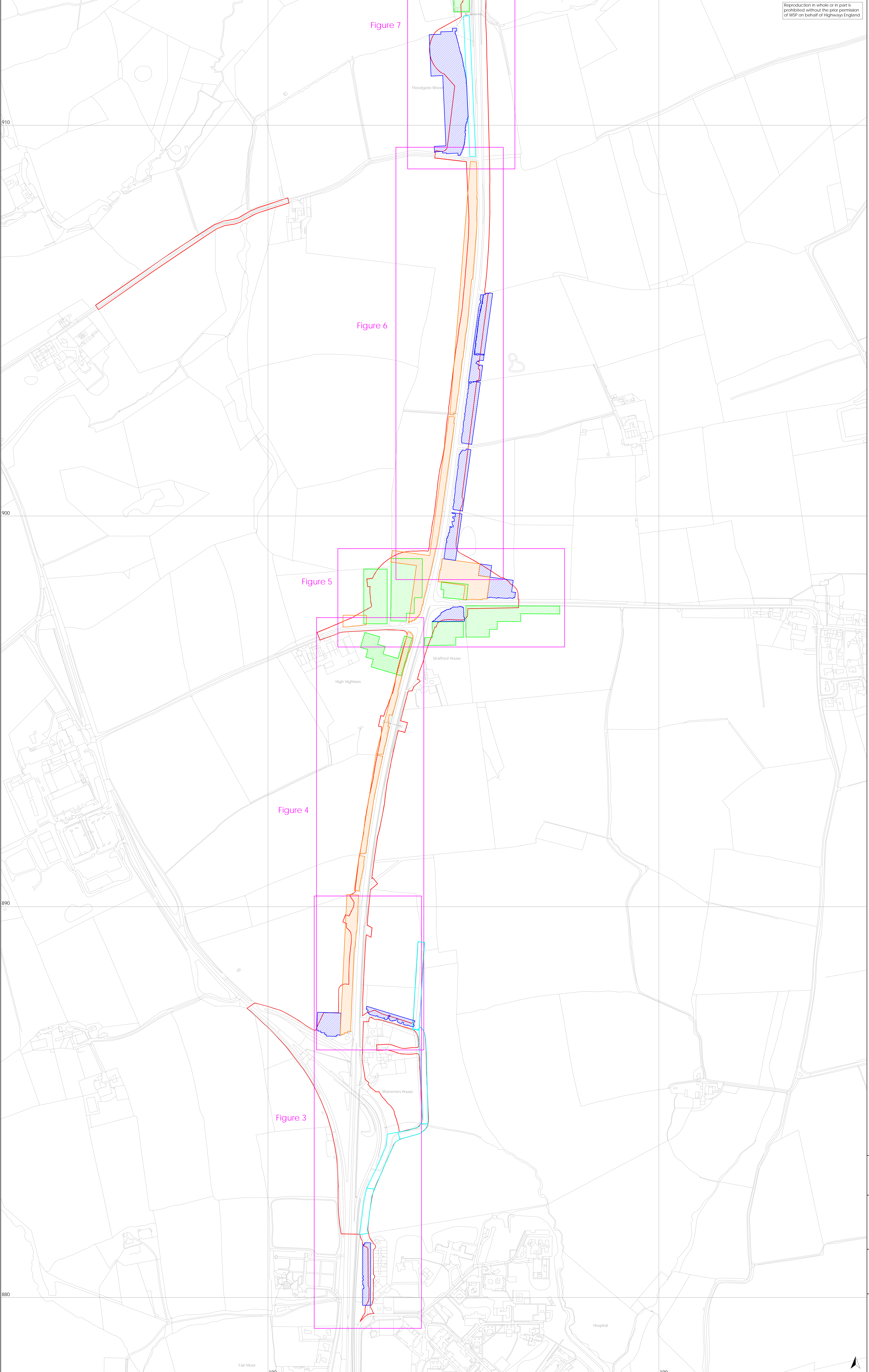
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Figure 1: Site location





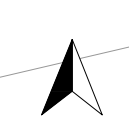
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- 2006 magnetic survey

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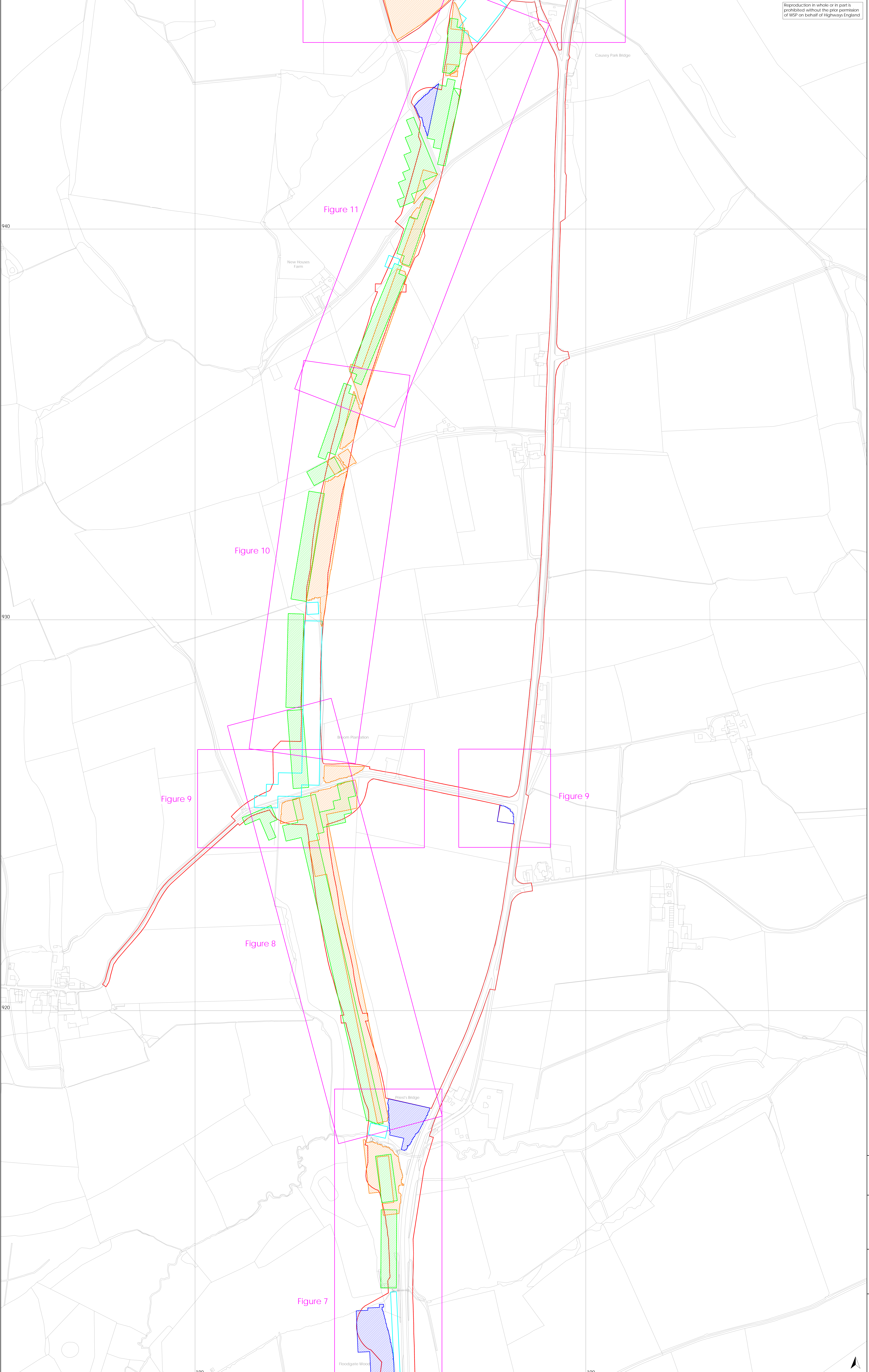
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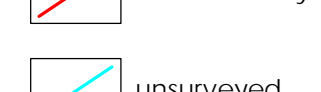



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Figure 2a: Morpeth to Floodgate Wood,  
survey locations







-  site boundary
-  unsurveyed
-  2018 magnetic survey
-  2017 magnetic survey
-  2006 magnetic survey

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Scale 1:2000 for A0 plot

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Figure 2b: Floodgate Wood to Causey Park Bridge, survey locations





Figure 20

Figure 19

Figure 18

Figures 15-17

Figures 12-14

- site boundary
- unsurveyed
- 2018 magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey

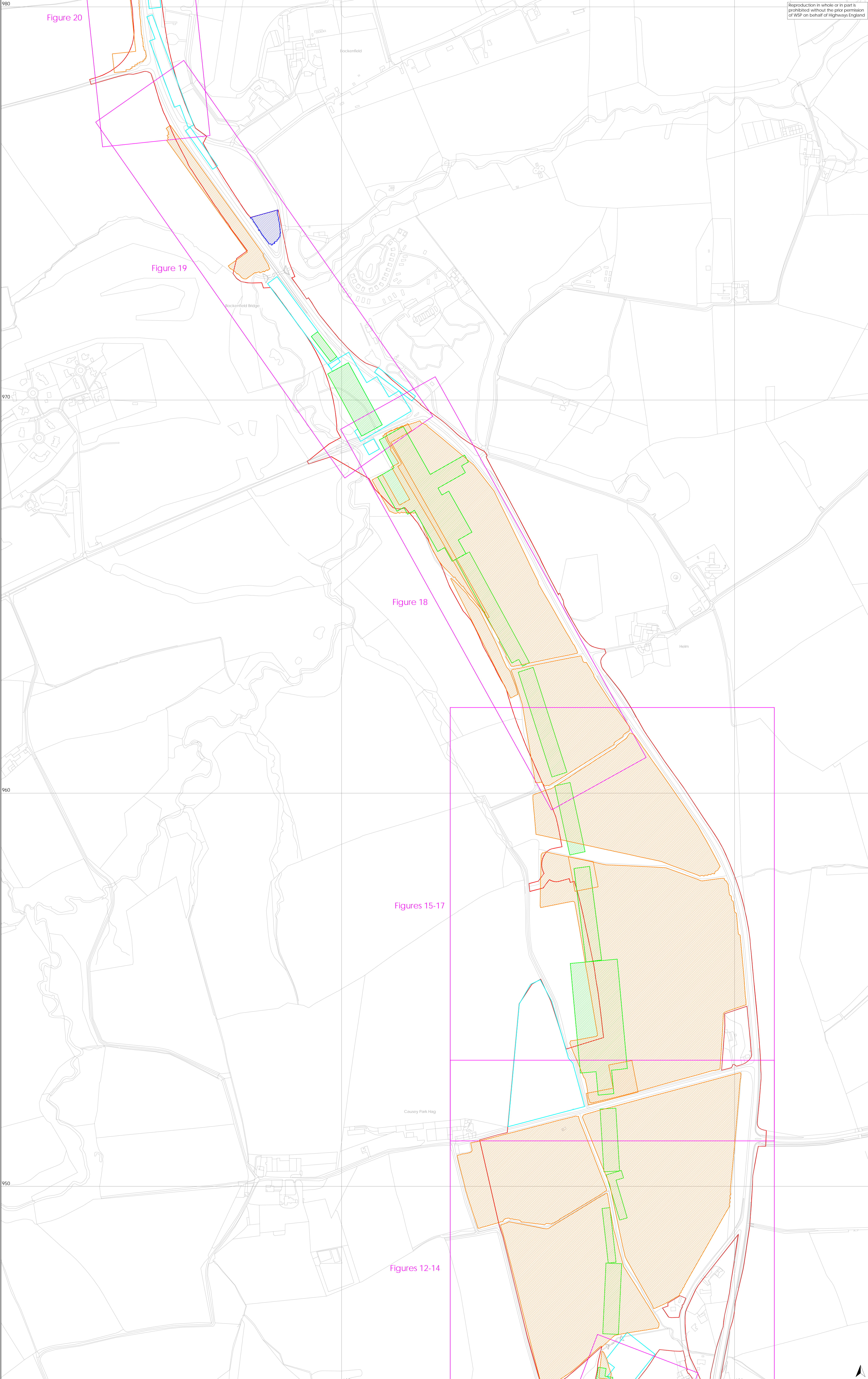
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Figure 2c: Causey Park Bridge to  
Bockenfield, survey locations





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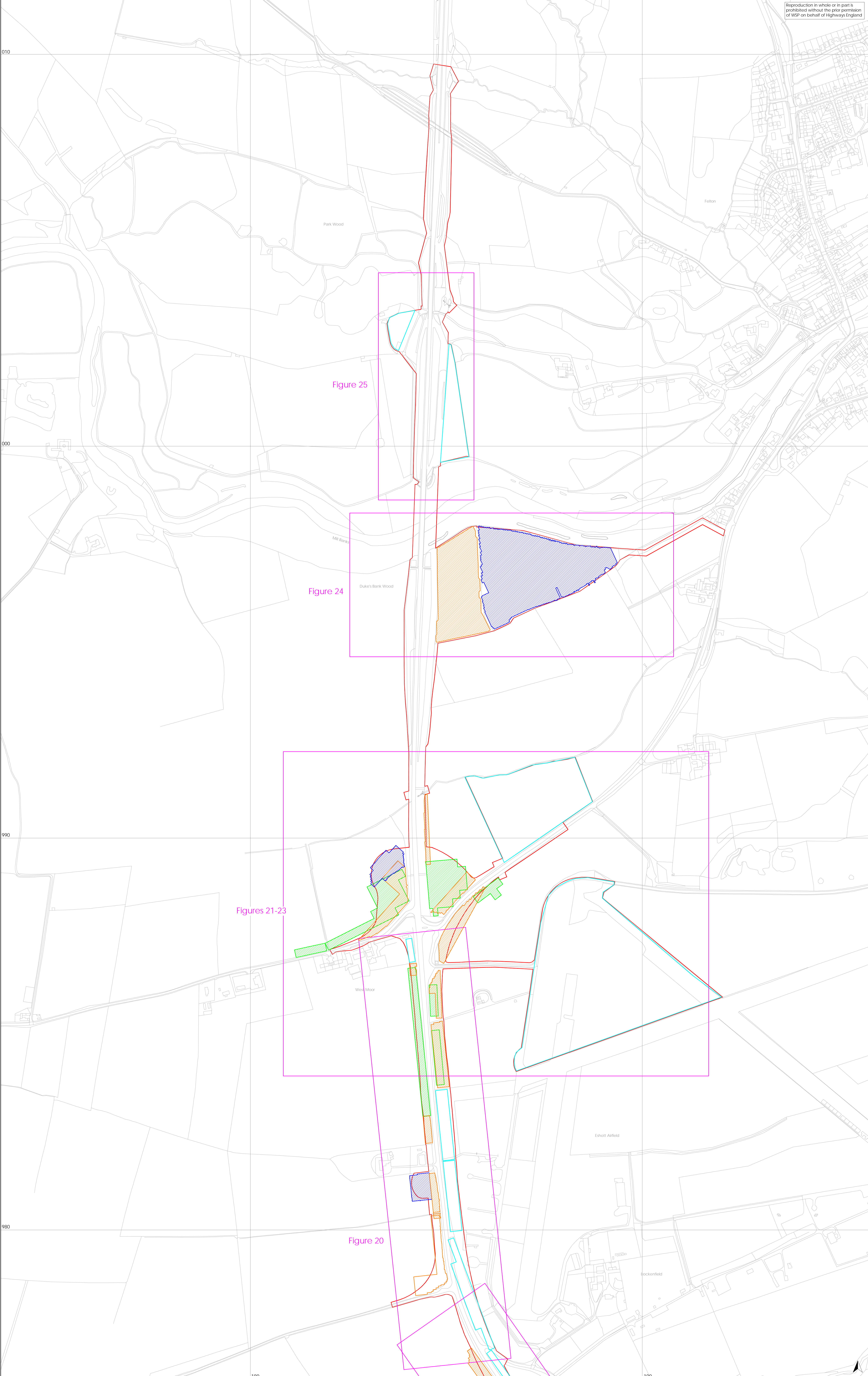


Figure 25

Figure 24

Figures 21-23

Figure 20

- site boundary
- unsurveyed
- 2018 magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey

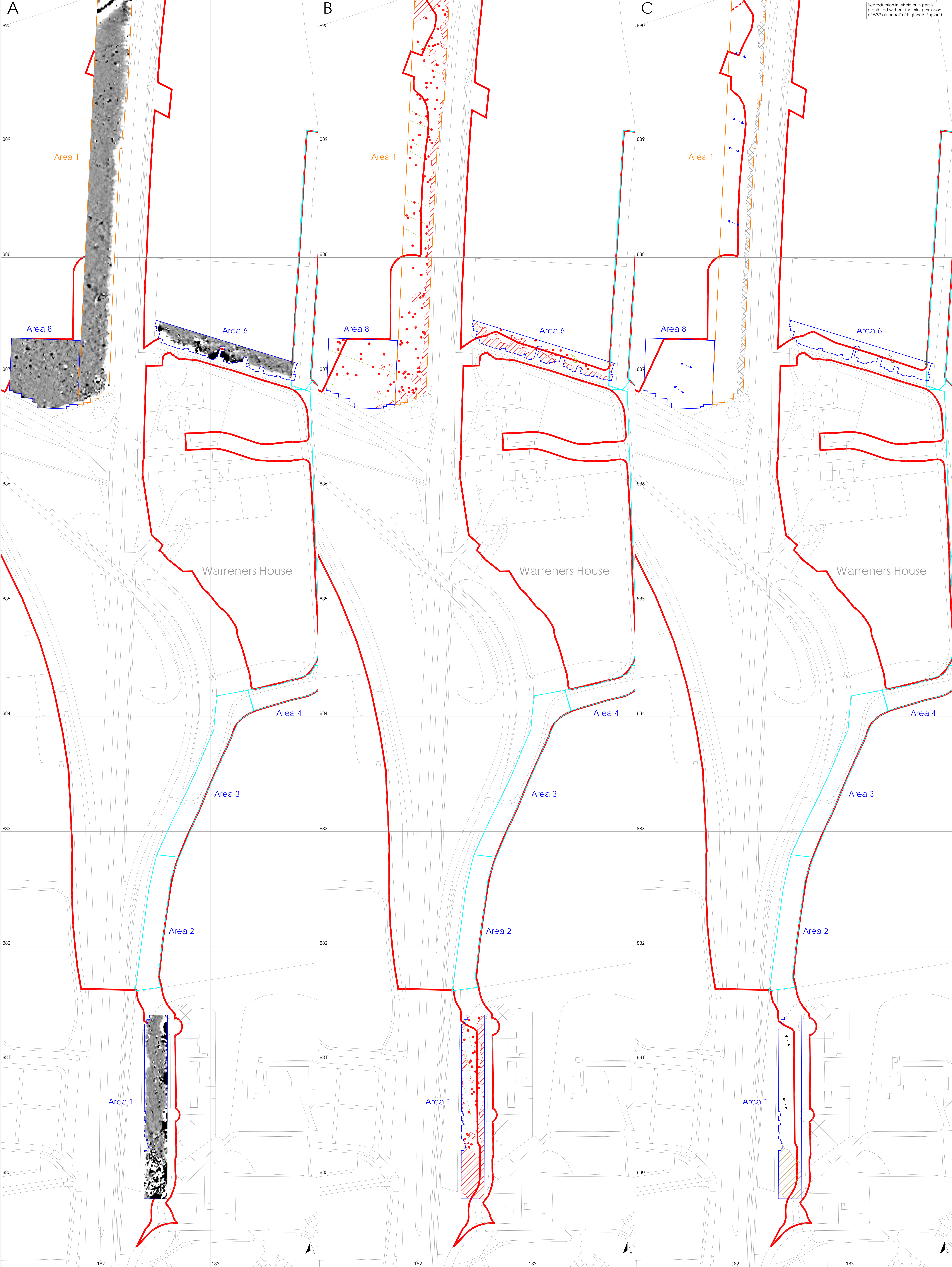
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Figure 2d: Bockenfield to Felton, survey  
locations

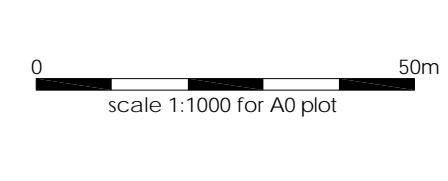




**A - geophysical survey**  
site boundary  
unsurveyed  
2017 magnetic survey  
2018 magnetic survey

**B - geophysical interpretation**  
dipolar magnetic anomaly  
positive magnetic anomaly

**C - archaeological interpretation**  
possible soil-filled feature  
former road base  
disturbed ground  
service  
ridge and furrow  
former ploughing



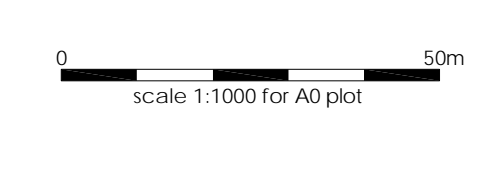
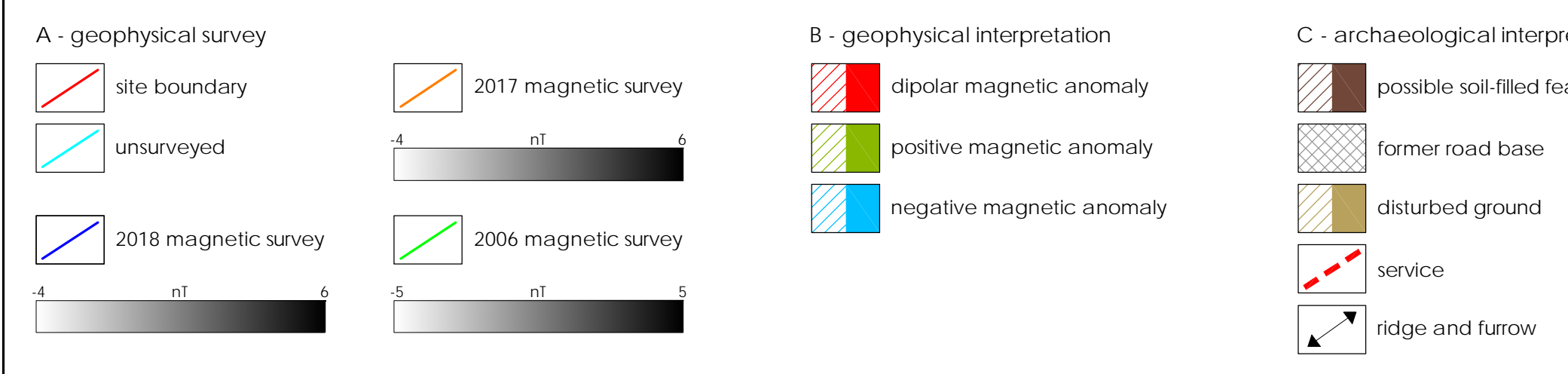
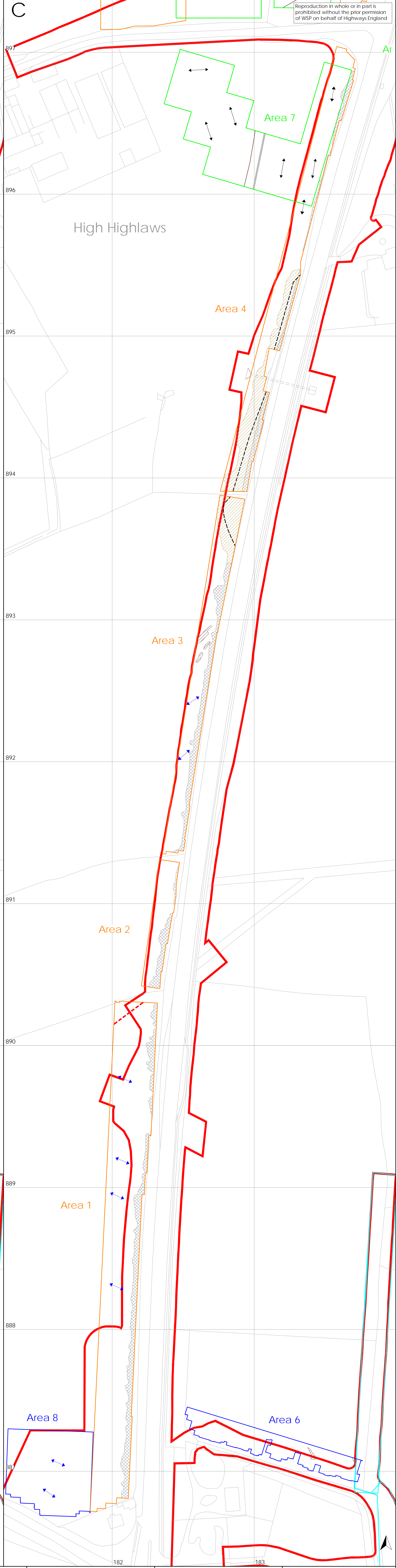
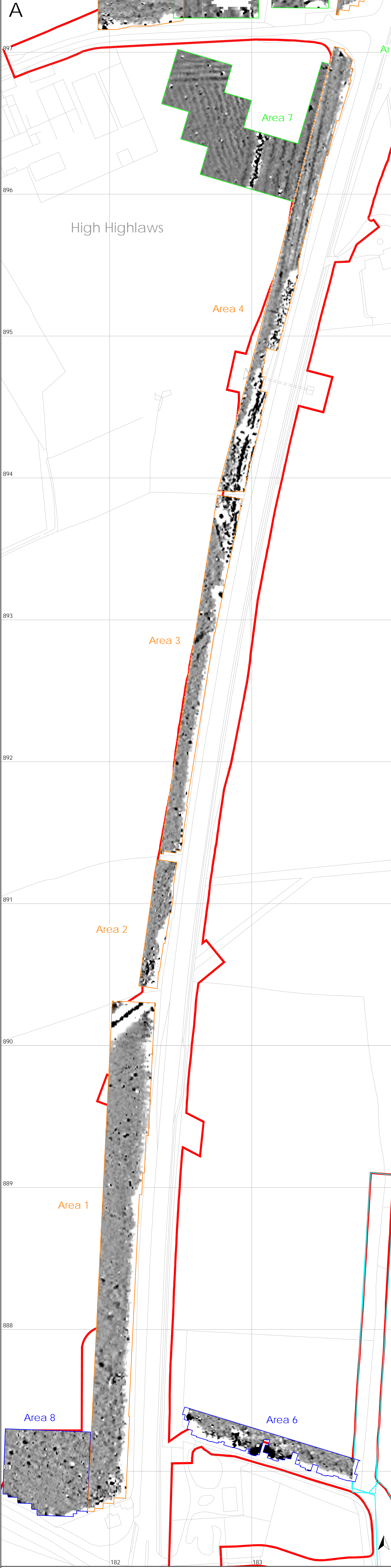
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Figure 3: Areas 1-4, 6 & 8 (2018),  
geophysical survey and  
interpretations



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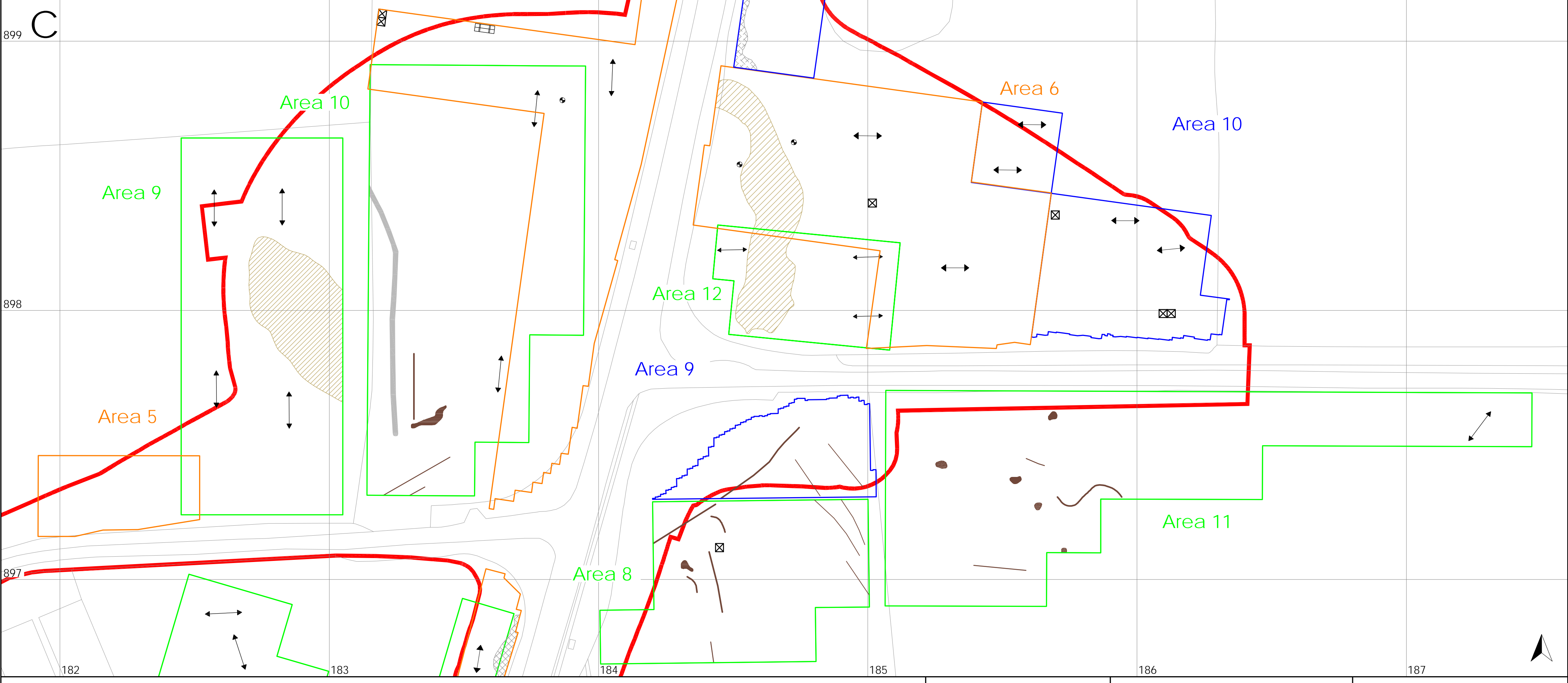
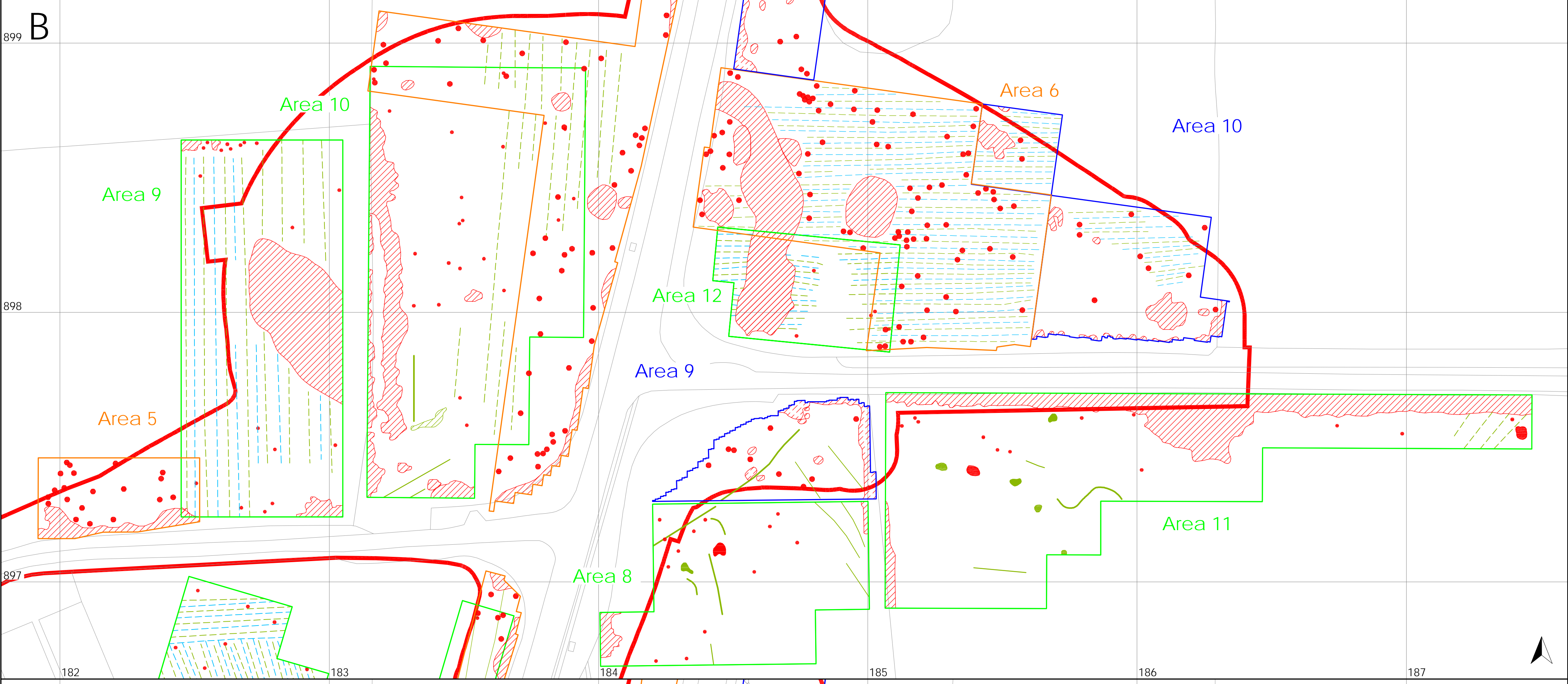
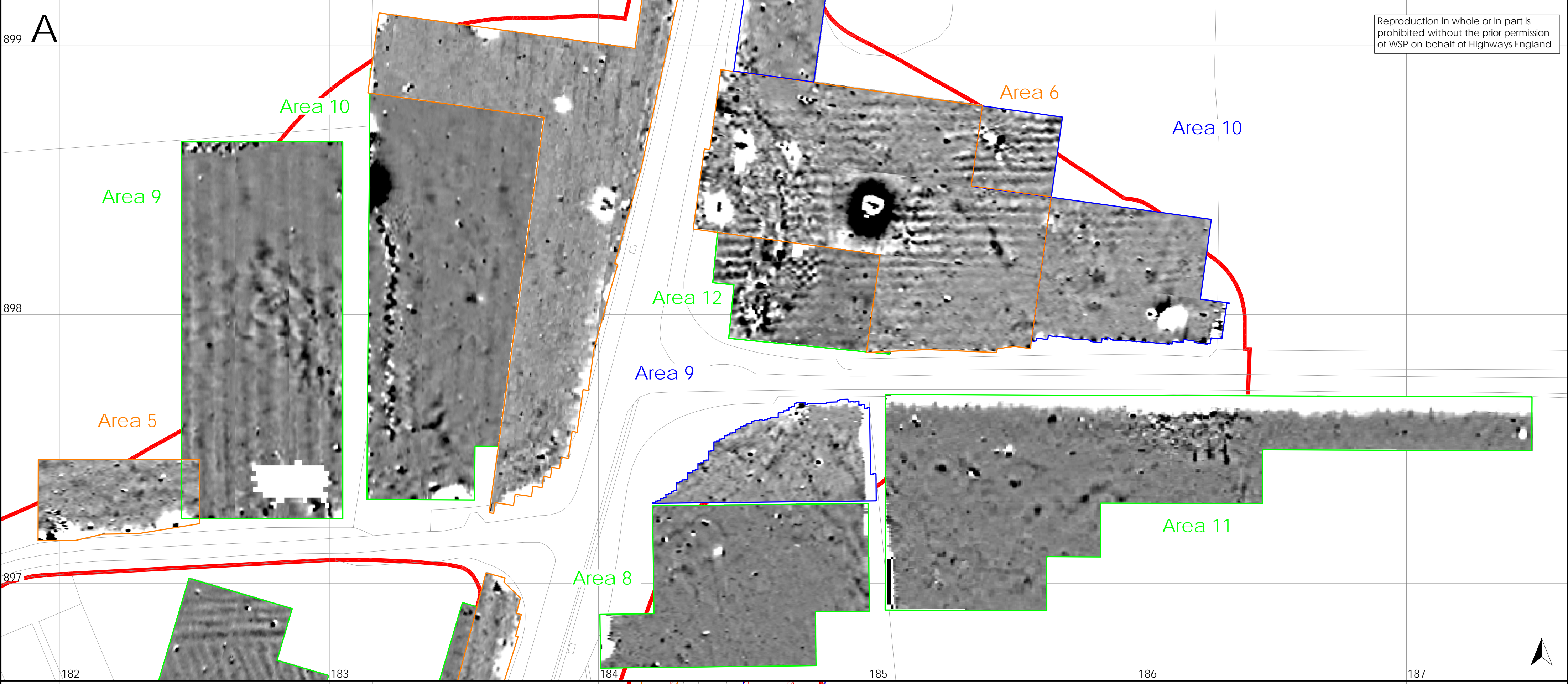


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A1 Morpeth to Felton Northumberland geophysical survey report 4688 Figure 4: Areas 1-4 (2017) and 7 (2006), geophysical survey and interpretations

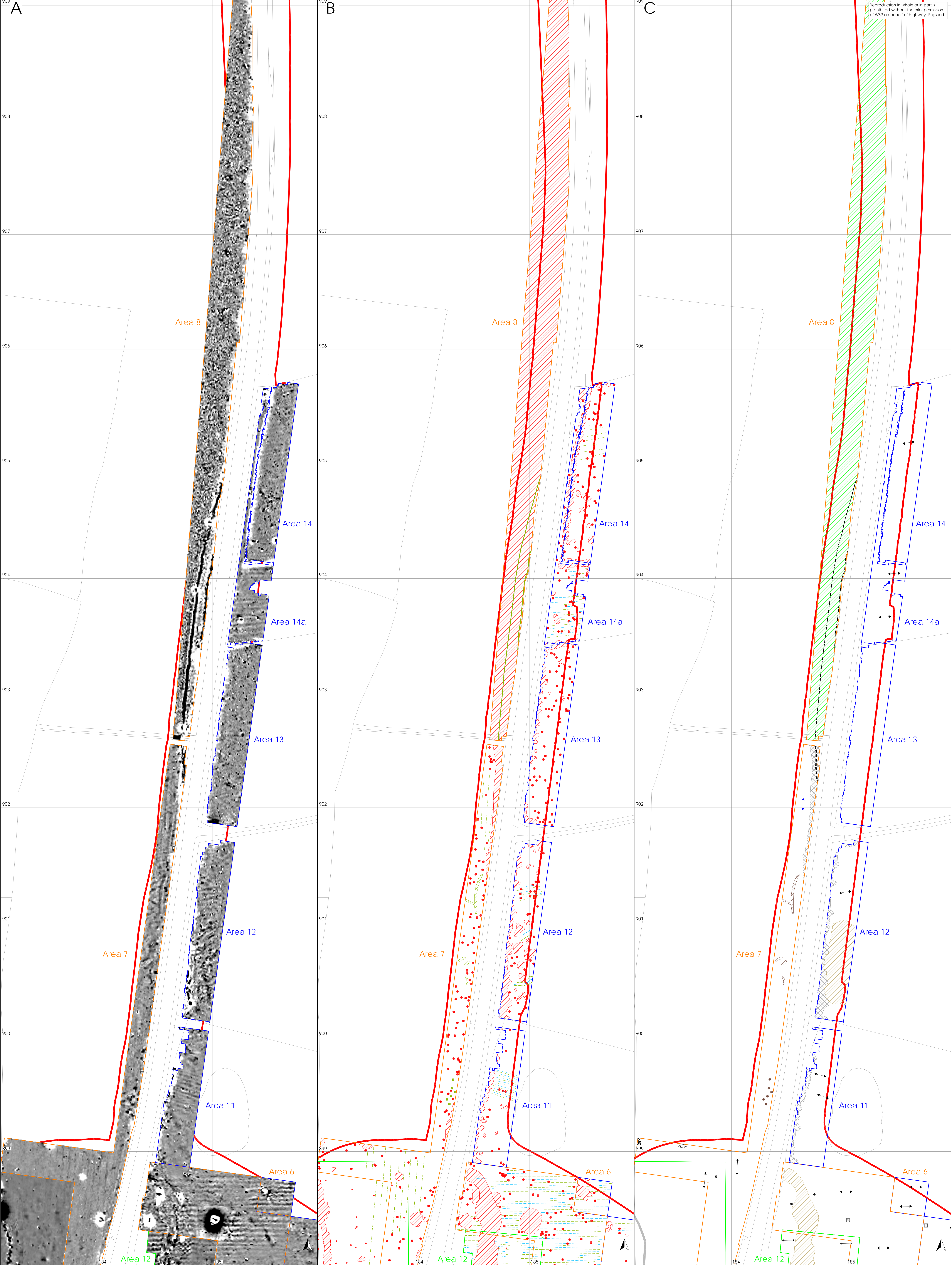




<p><b>A - geophysical survey</b></p> <ul style="list-style-type: none"> <li>site boundary</li> <li>unsurveyed</li> <li>2018 magnetic survey</li> </ul>	<p><b>B - geophysical interpretation</b></p> <ul style="list-style-type: none"> <li>dipolar magnetic anomaly</li> <li>positive magnetic anomaly</li> <li>negative magnetic anomaly</li> </ul>	<p><b>C - archaeological interpretation</b></p> <ul style="list-style-type: none"> <li>soil-filled feature</li> <li>former road base</li> <li>disturbed ground</li> <li>palaeochannel</li> <li>ridge and furrow</li> </ul>	<p>for WSP on behalf of Highways England</p> <ul style="list-style-type: none"> <li>land drain</li> <li>bank/ former track</li> <li>borehole</li> <li>telegraph pole</li> <li>cattle feeder</li> <li>trough</li> </ul>	<p>0 50m scale 1:1000 for A1 plot</p>	<p>ARCHAEOLOGICAL SERVICES DURHAM UNIVERSITY</p>	<p>A1 Morpeth to Felton Northumberland geophysical survey report 4688 Figure 5: Areas 8-12 (2006), 5-6 (2017) and 9-10 (2018), geophysical survey and interpretations</p>
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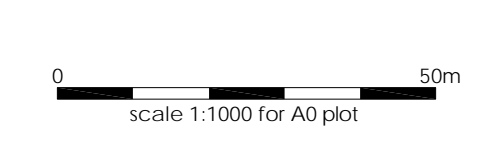
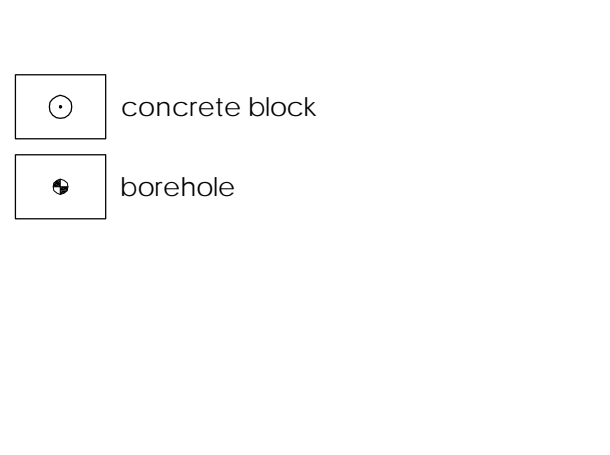
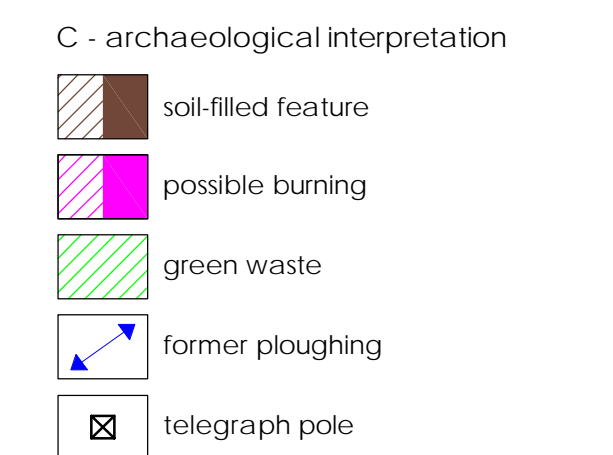
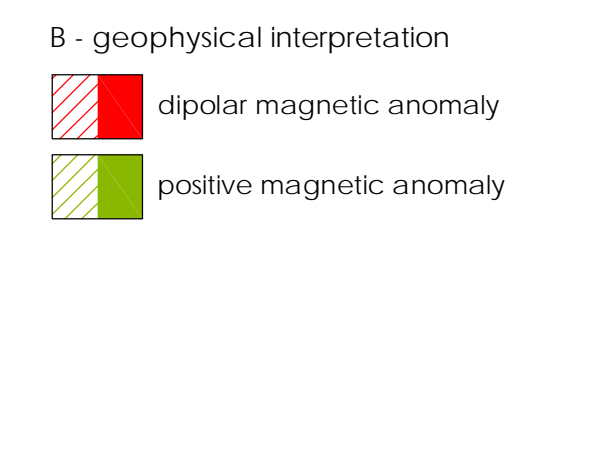
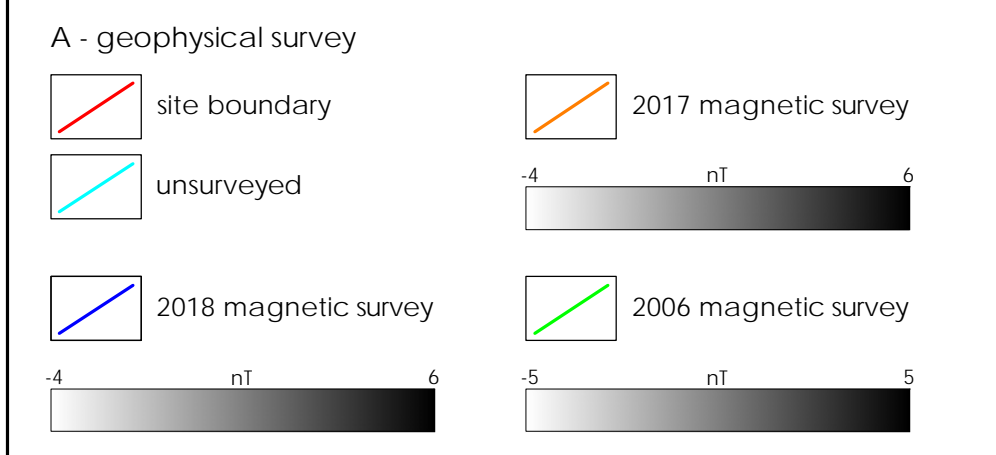


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<p><b>A - geophysical survey</b></p> <ul style="list-style-type: none"> <li> site boundary</li> <li> unsurveyed</li> <li> 2018 magnetic survey</li> <li> 2006 magnetic survey</li> </ul>	<p><b>B - geophysical interpretation</b></p> <ul style="list-style-type: none"> <li> dipolar magnetic anomaly</li> <li> positive magnetic anomaly</li> <li> negative magnetic anomaly</li> </ul>	<p><b>C - archaeological interpretation</b></p> <ul style="list-style-type: none"> <li> ridge and furrow</li> <li> former ploughing</li> <li> land drain</li> <li> former field boundary</li> <li> bank/former track</li> <li> soil-filled feature</li> <li> former road base</li> <li> disturbed ground</li> <li> palaeochannel</li> <li> green waste</li> <li> borehole</li> <li> cattle feeder</li> <li> trough</li> </ul>	<p>Scale 1:10000 to A3 plot</p> <p>0 10m</p>	<p>for WSP on behalf of Highways England</p>	<p><b>ARCHAEOLOGICAL SERVICES</b> DURHAM UNIVERSITY</p>	<p>A1 Morpeth to Felton Northumberland geophysical survey report 4688 Figure 6: Areas 7&amp;8 (2017) and 11-14a (2018), geophysical survey and interpretations</p>
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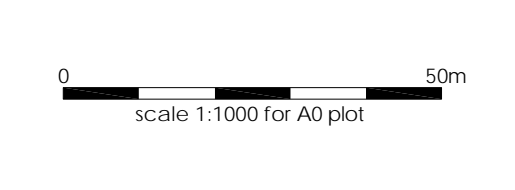
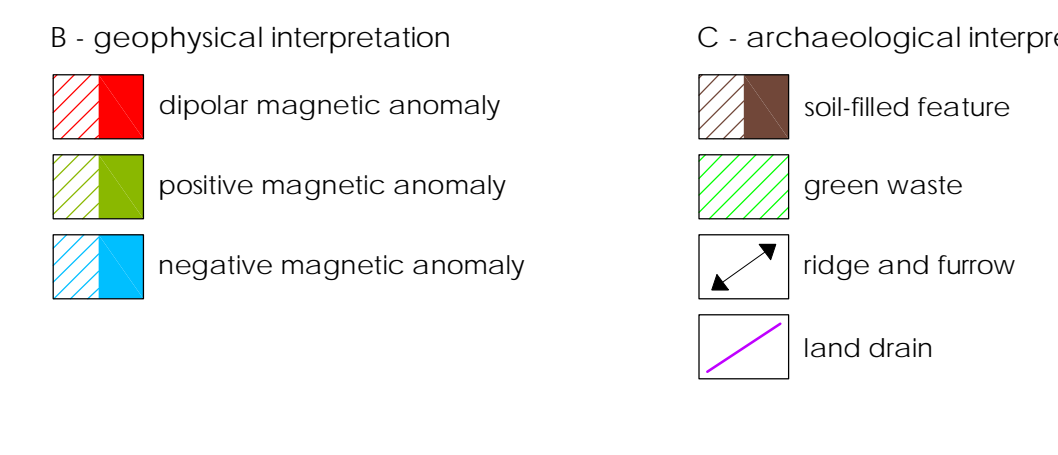
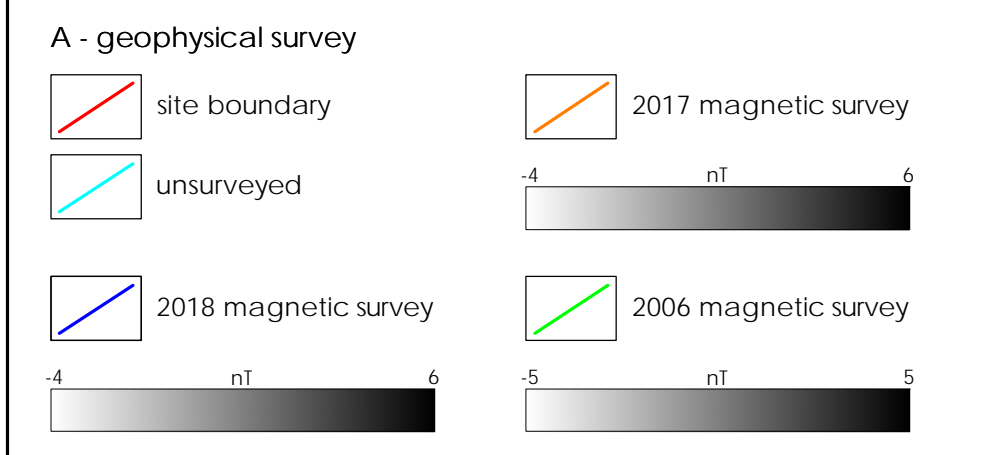
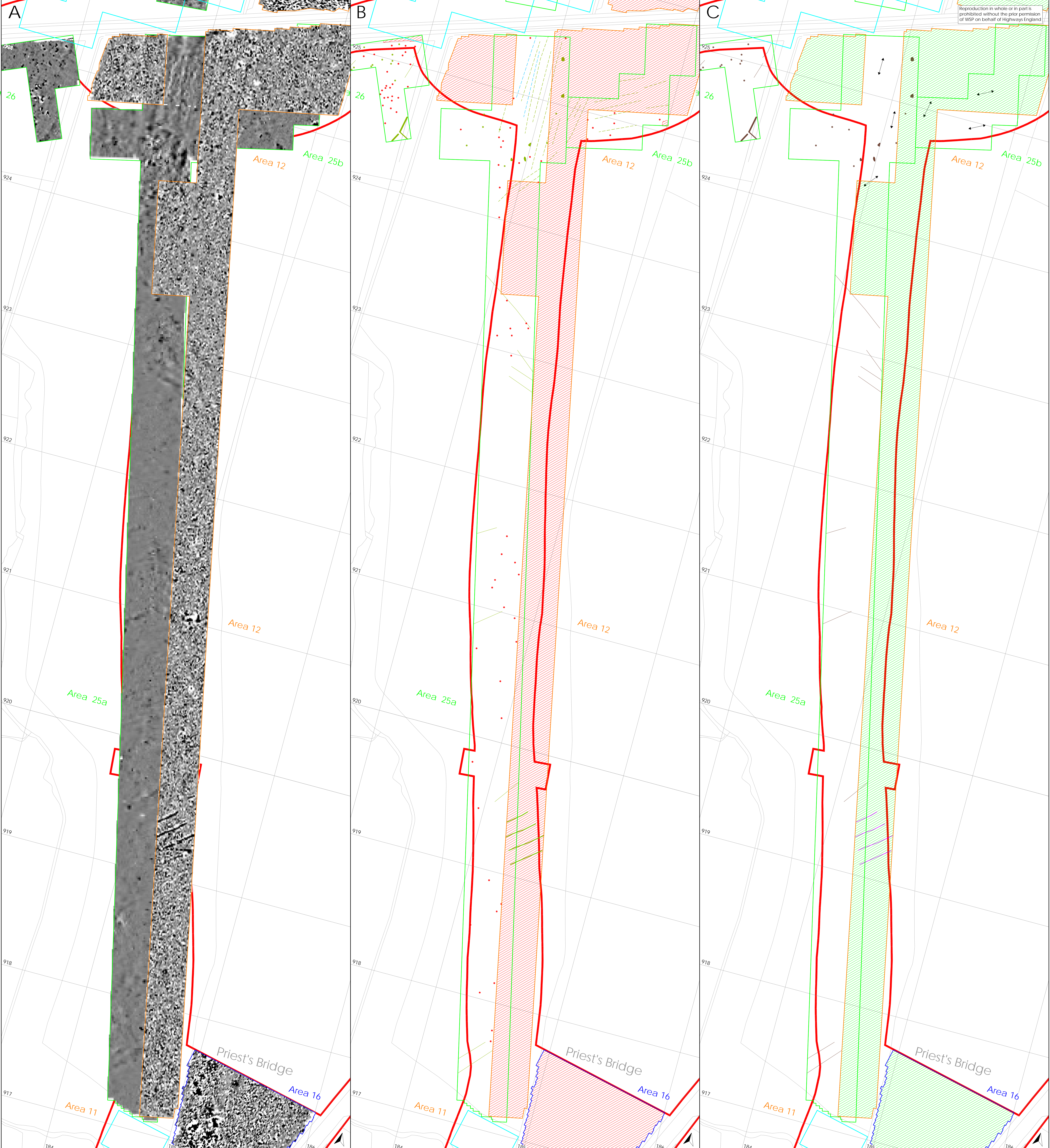


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 7: Areas 23a & b (2006),  
9-11(2017) and 15 & 16 (2018),  
geophysical survey and  
interpretations



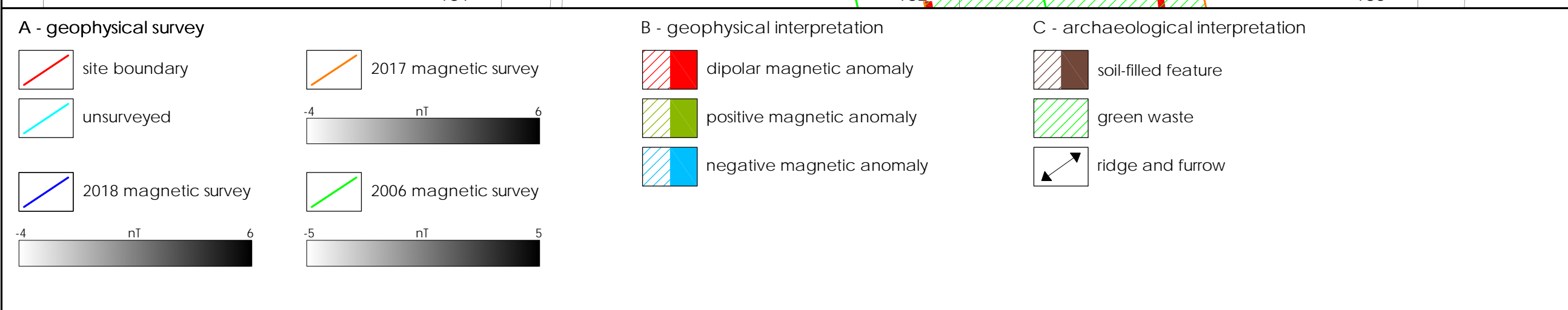


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 8: Area 25a (2006) and 12  
(2017), geophysical survey and  
interpretations





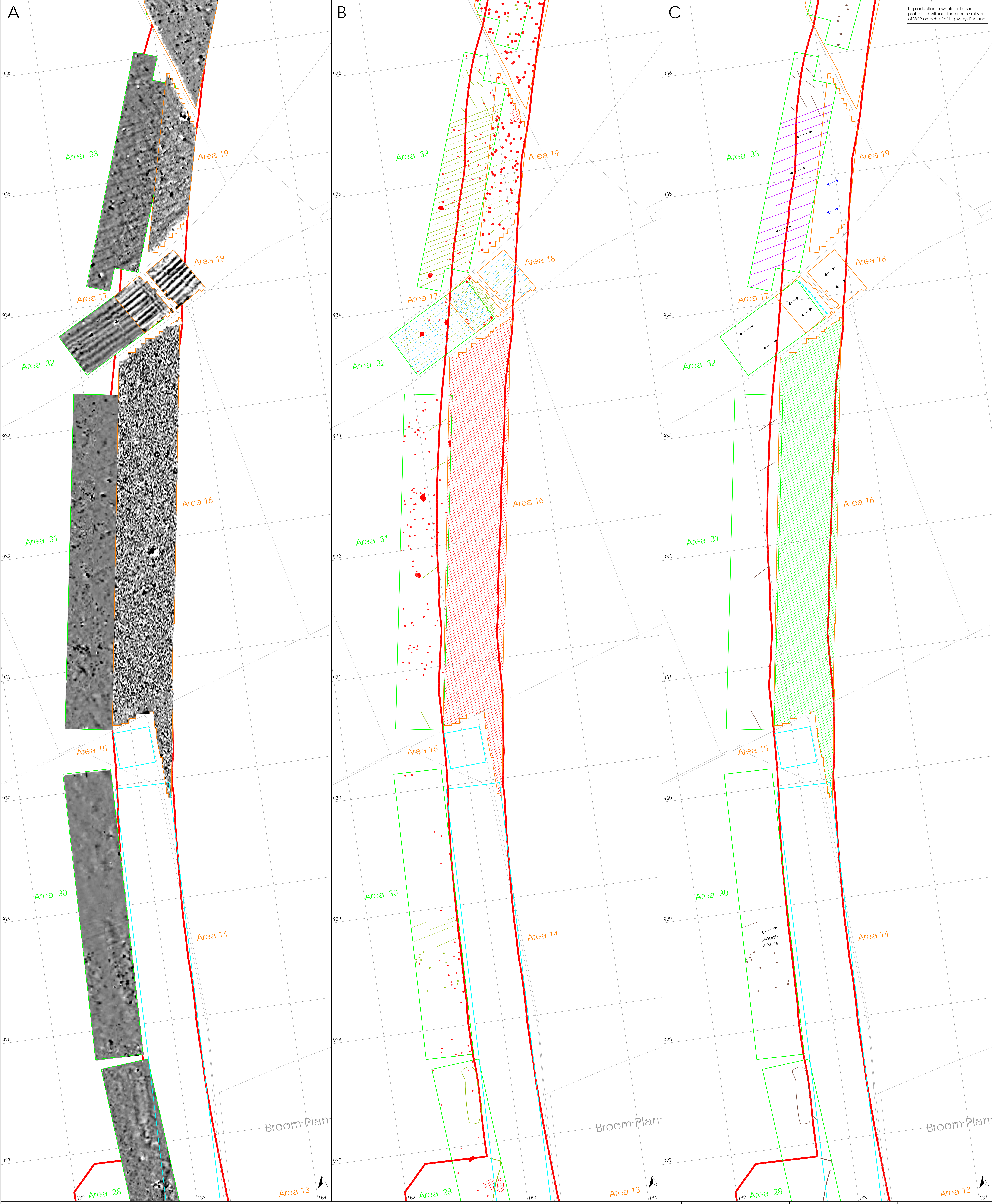
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0 50m  
scale 1:1000 for A1 plot

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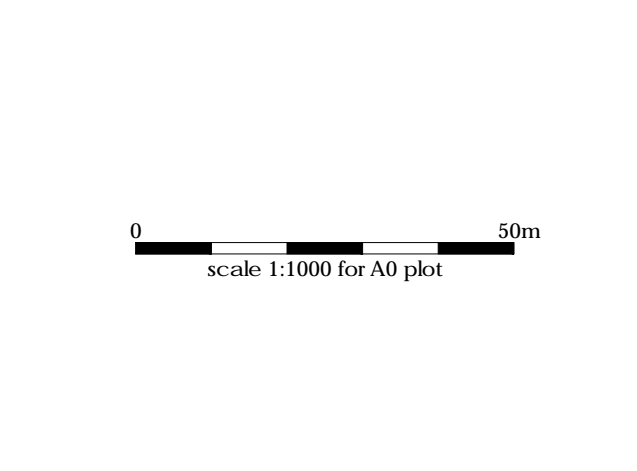
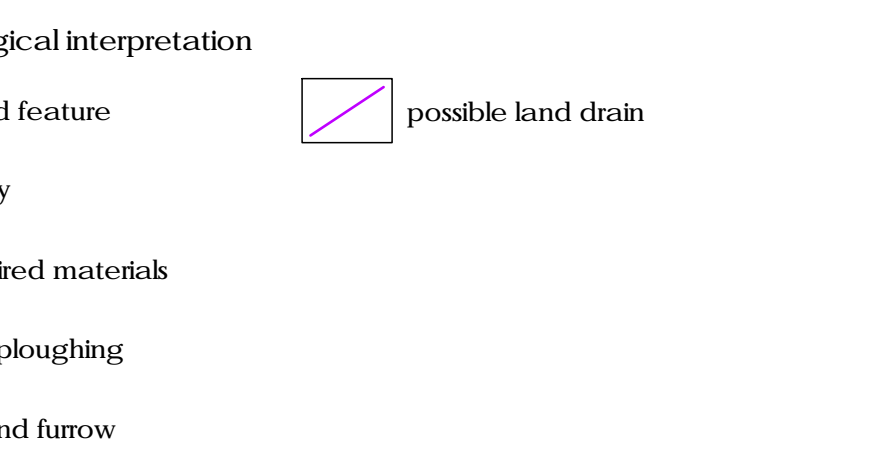
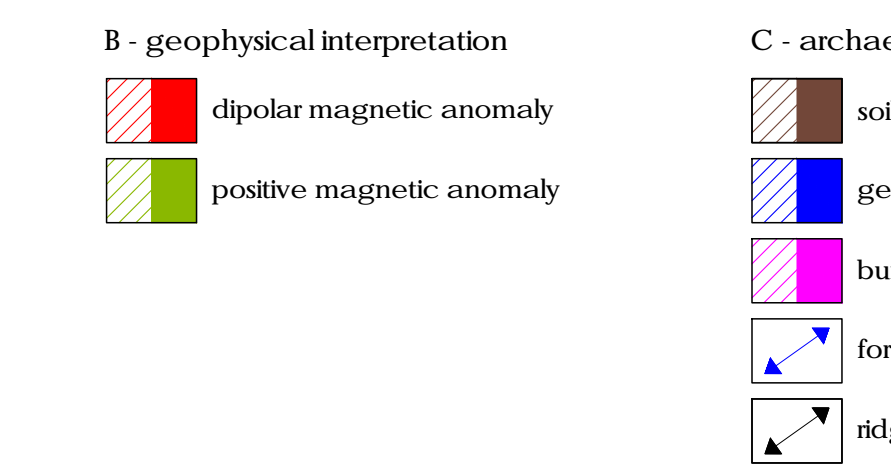
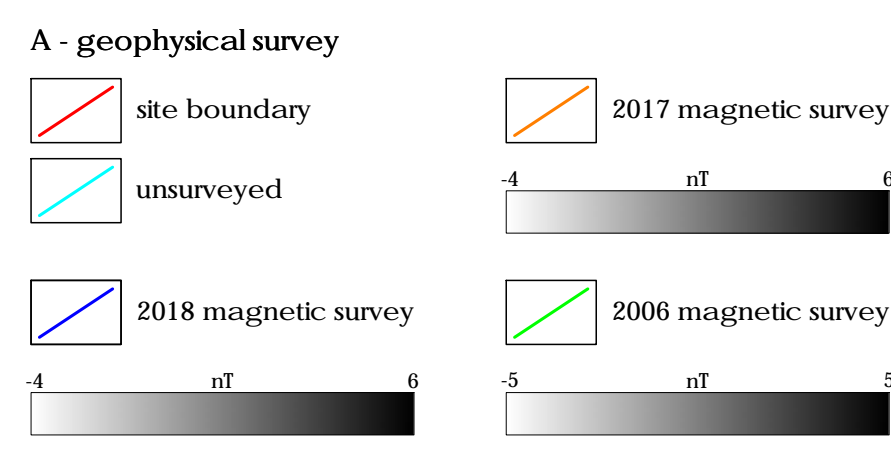
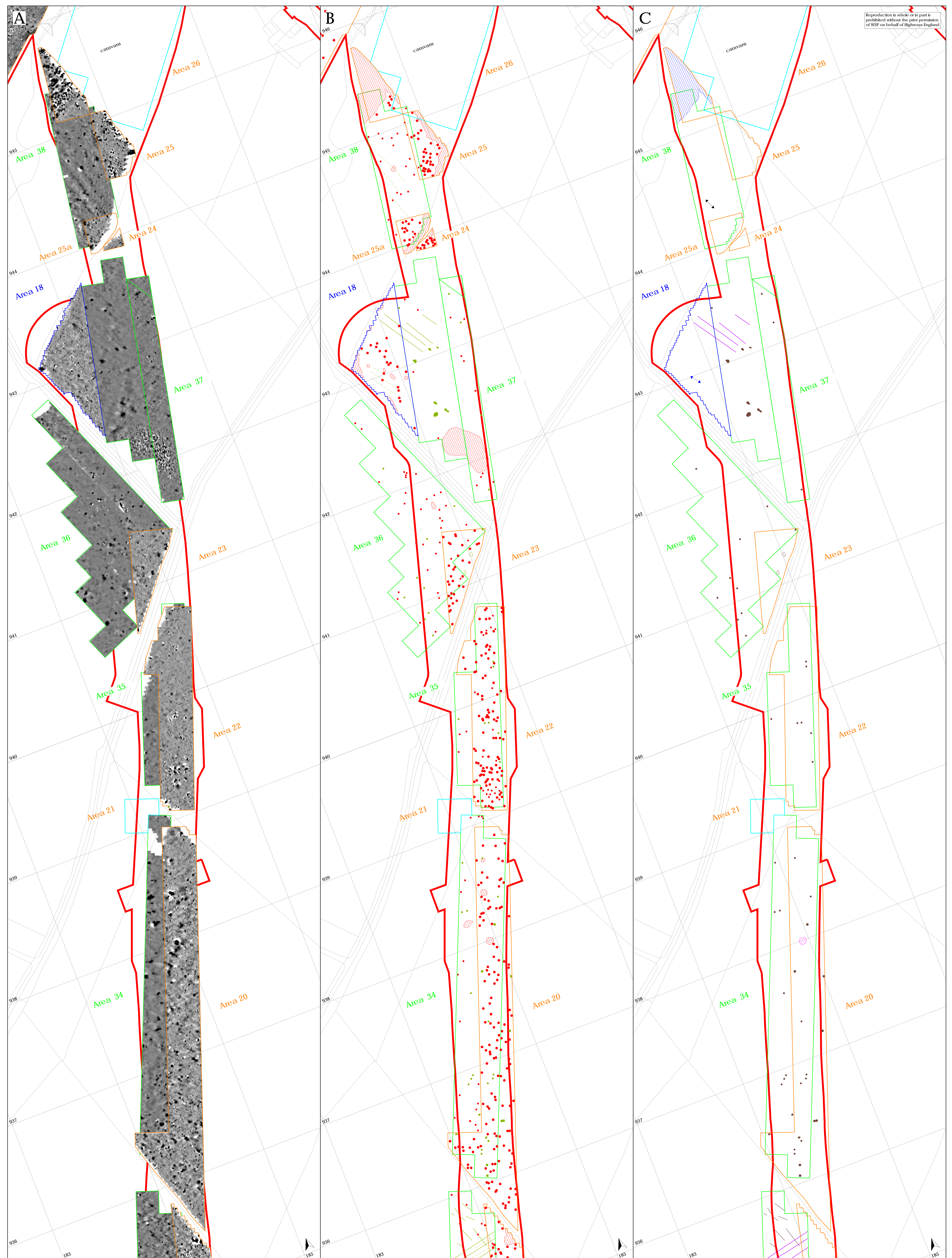
A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 9: Areas 25b & 26 (2006), 13  
(2017) and 17 (2018), geophysical  
survey and interpretations





<b>A - geophysical survey</b> <ul style="list-style-type: none"><li>site boundary</li><li>unsurveyed</li><li>2018 magnetic survey</li></ul>	<b>2017 magnetic survey</b> <ul style="list-style-type: none"><li>2006 magnetic survey</li></ul>	<b>B - geophysical interpretation</b> <ul style="list-style-type: none"><li>dipolar magnetic anomaly</li><li>positive magnetic anomaly</li><li>negative magnetic anomaly</li></ul>	<b>C - archaeological interpretation</b> <ul style="list-style-type: none"><li>soil-filled feature</li><li>green waste</li><li>ridge and furrow</li><li>former ploughing</li><li>land drain</li></ul>	<b>plough headland</b>		for WSP on behalf of Highways England	<b>ARCHAEOLOGICAL SERVICES</b> DURHAM UNIVERSITY	A1 Morpeth to Felton Northumberland geophysical survey report 4688 Figure 10: Areas 28, 30-33 (2006) and 14-19 (2017), geophysical survey and interpretations
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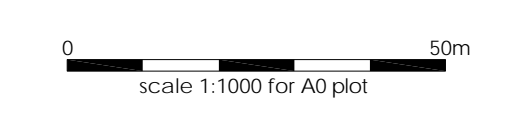
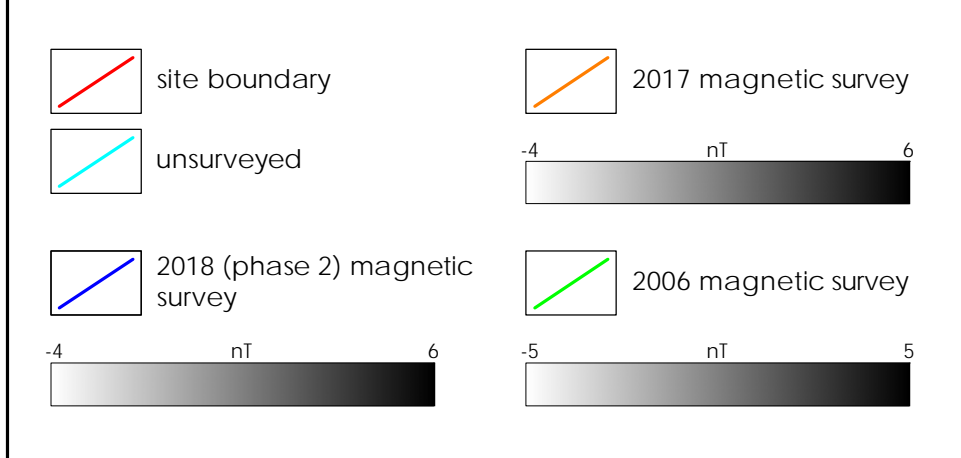
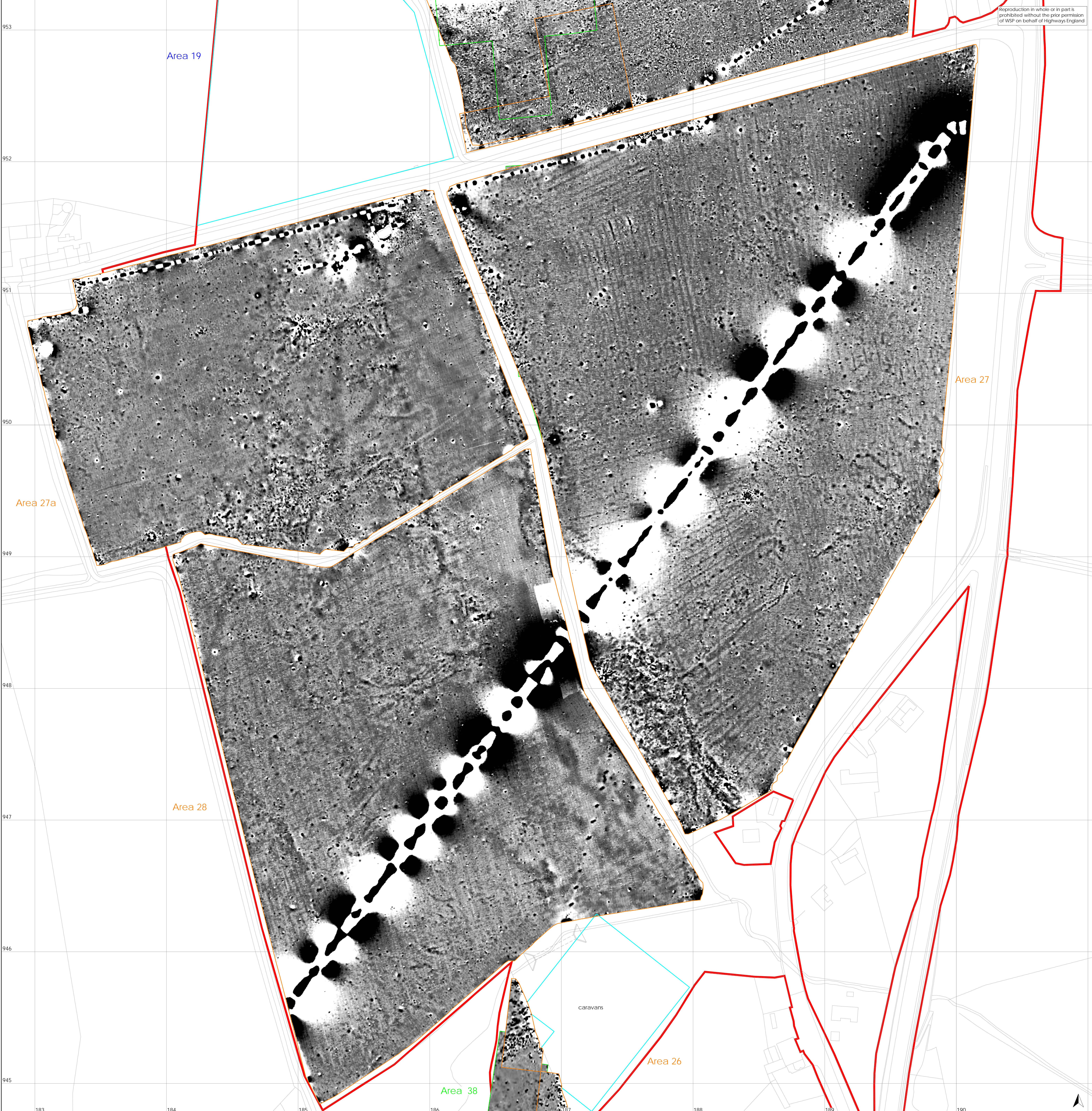


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 11: Areas 34-38 (2006), 20-25a  
(2017) and 18 (2018), geophysical  
survey and interpretations



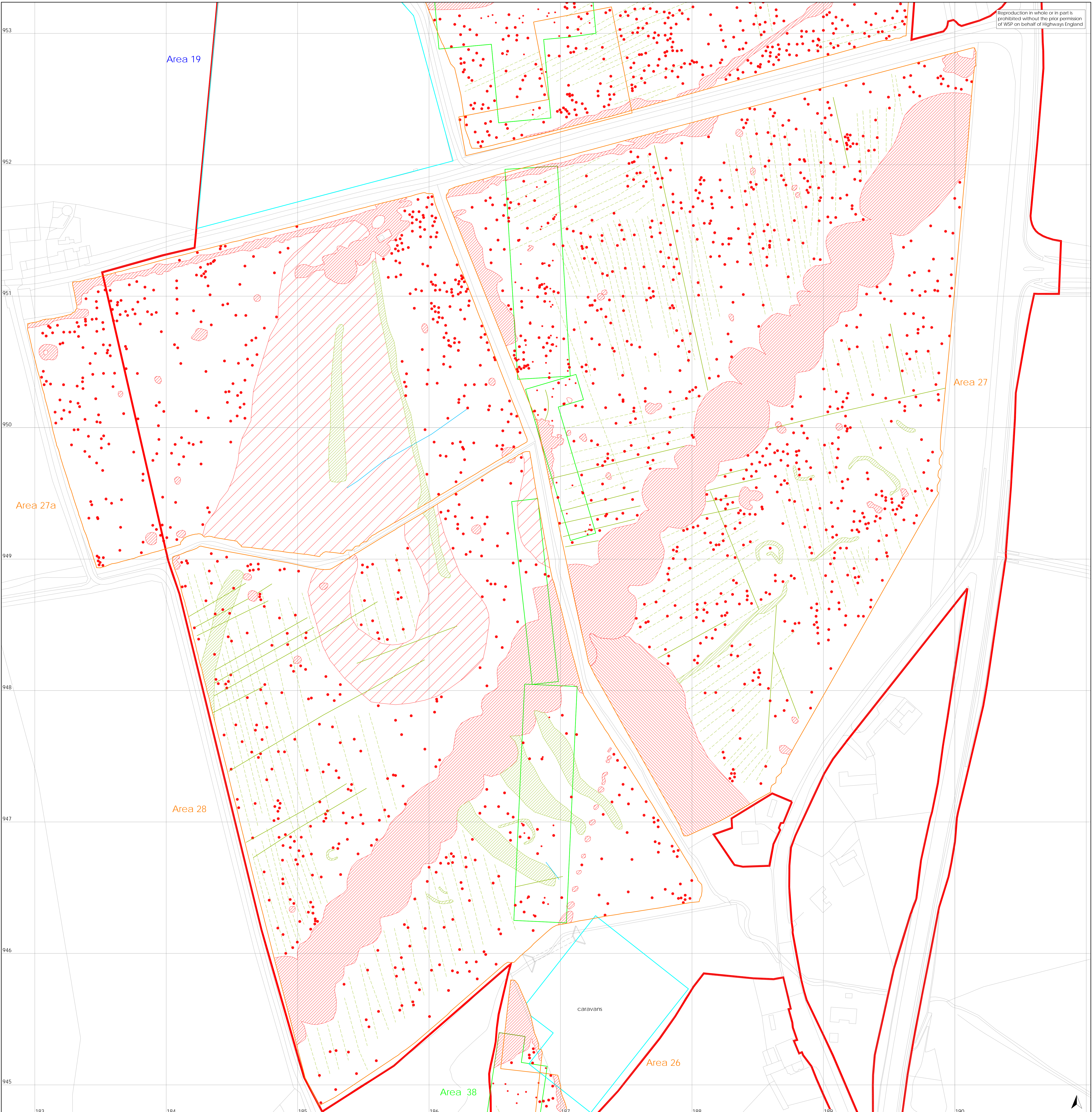


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 12: Areas 40-41 (2006) and  
26-28 (2017), geophysical survey





- site boundary
- unsurveyed
- 2018 (phase 2) magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey
- dipolar magnetic anomaly
- positive magnetic anomaly
- negative magnetic anomaly

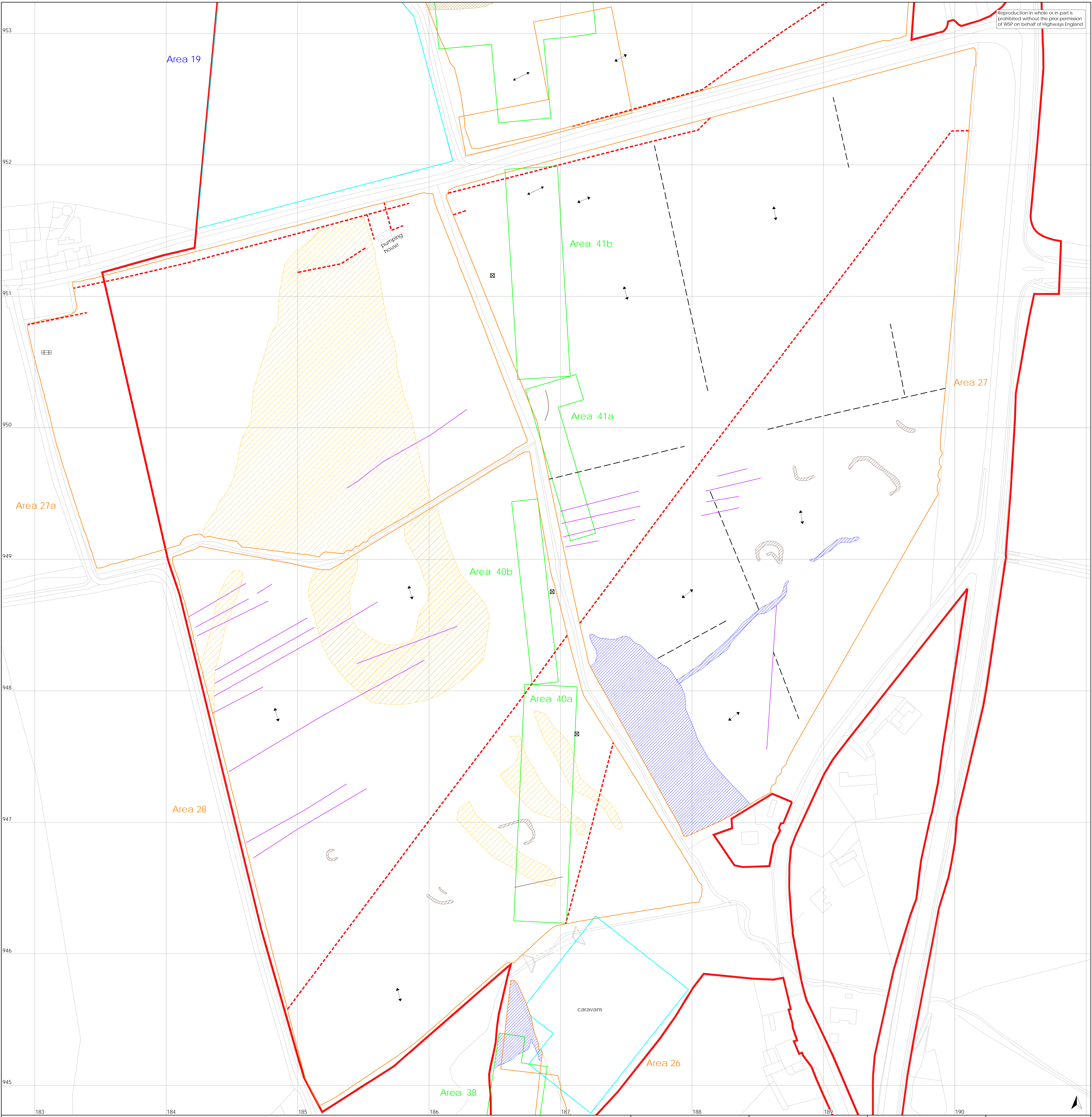


















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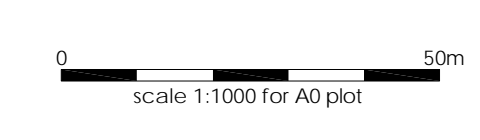
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A1 Morpeth to Felton Northumberland  
geophysical survey report 4688  
Figure 13: Areas 40-41 (2006) and 26-28 (2017), geophysical interpretation





-  site boundary
-  unsurveyed
-  2018 (phase 2) magnetic survey
-  2017 magnetic survey
-  2006 magnetic survey
-  soil-filled feature
-  geology
-  natural variation
-  former quarry
-  ridge and furrow
-  ridge and furrow
-  service
-  former field boundary
-  land drain
-  cattle feeder
-  telegraph pole

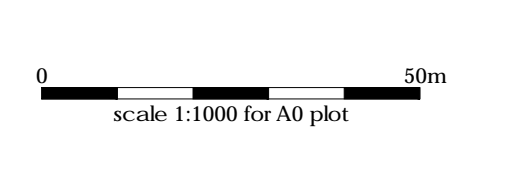
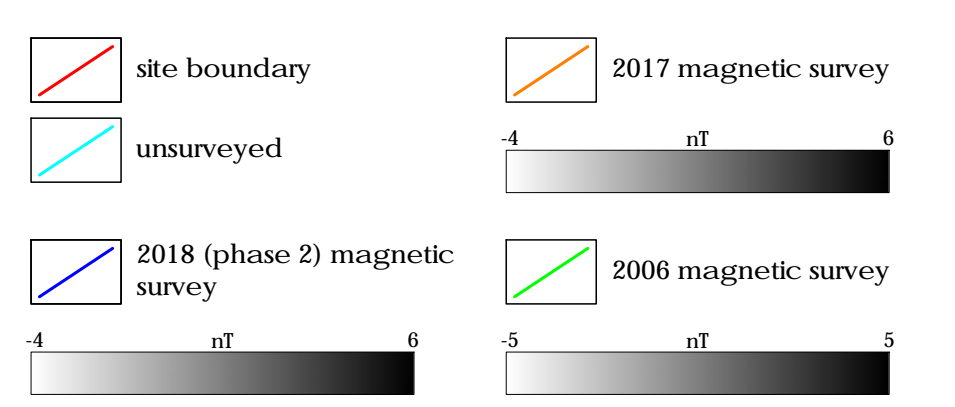
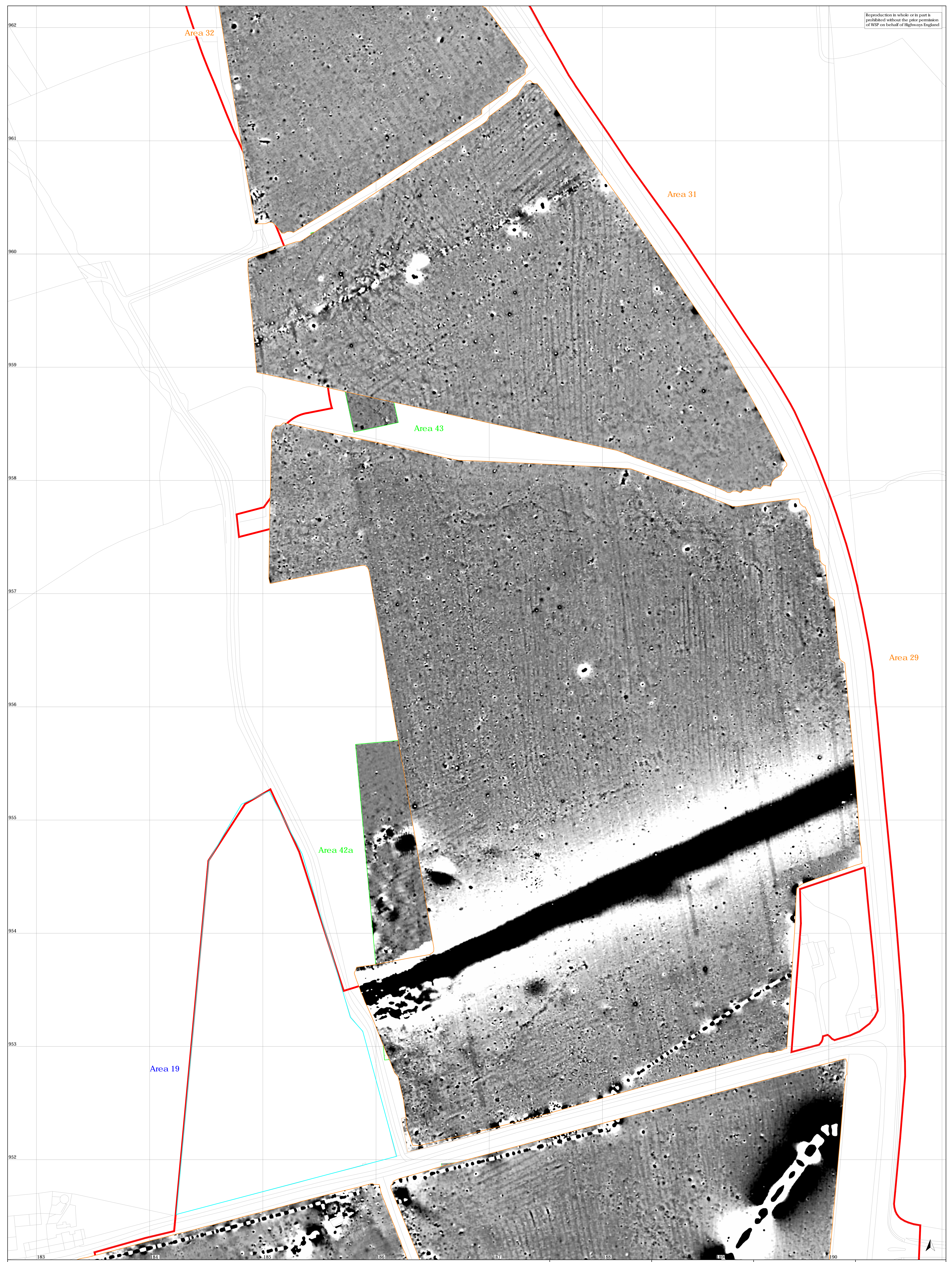


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 14: Areas 40-41 (2006) and  
26-28 (2017), archaeological  
interpretation



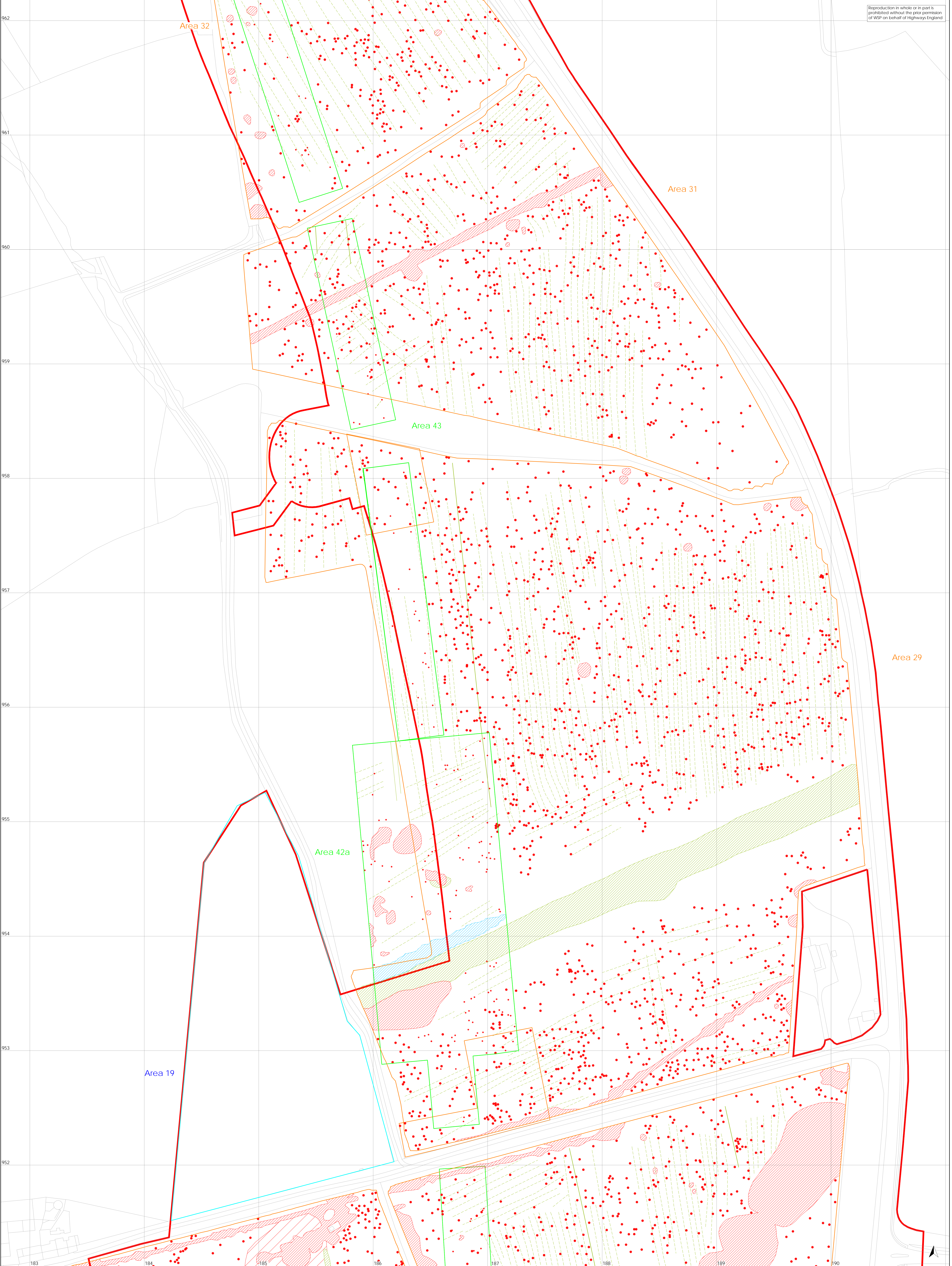


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Highways England

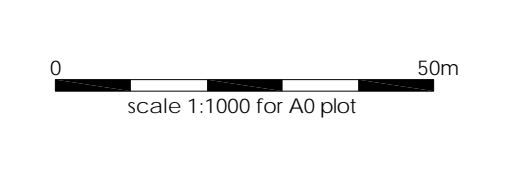
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A1 Morpeth to Felton  
Northumbria  
geophysical survey  
report 4688  
Figure 15: Areas 42-44 (2006), 29 &  
31 (2017), geophysical survey





- site boundary
- unsurveyed
- 2018 (phase 2) magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey
- dipolar magnetic anomaly
- positive magnetic anomaly
- negative magnetic anomaly

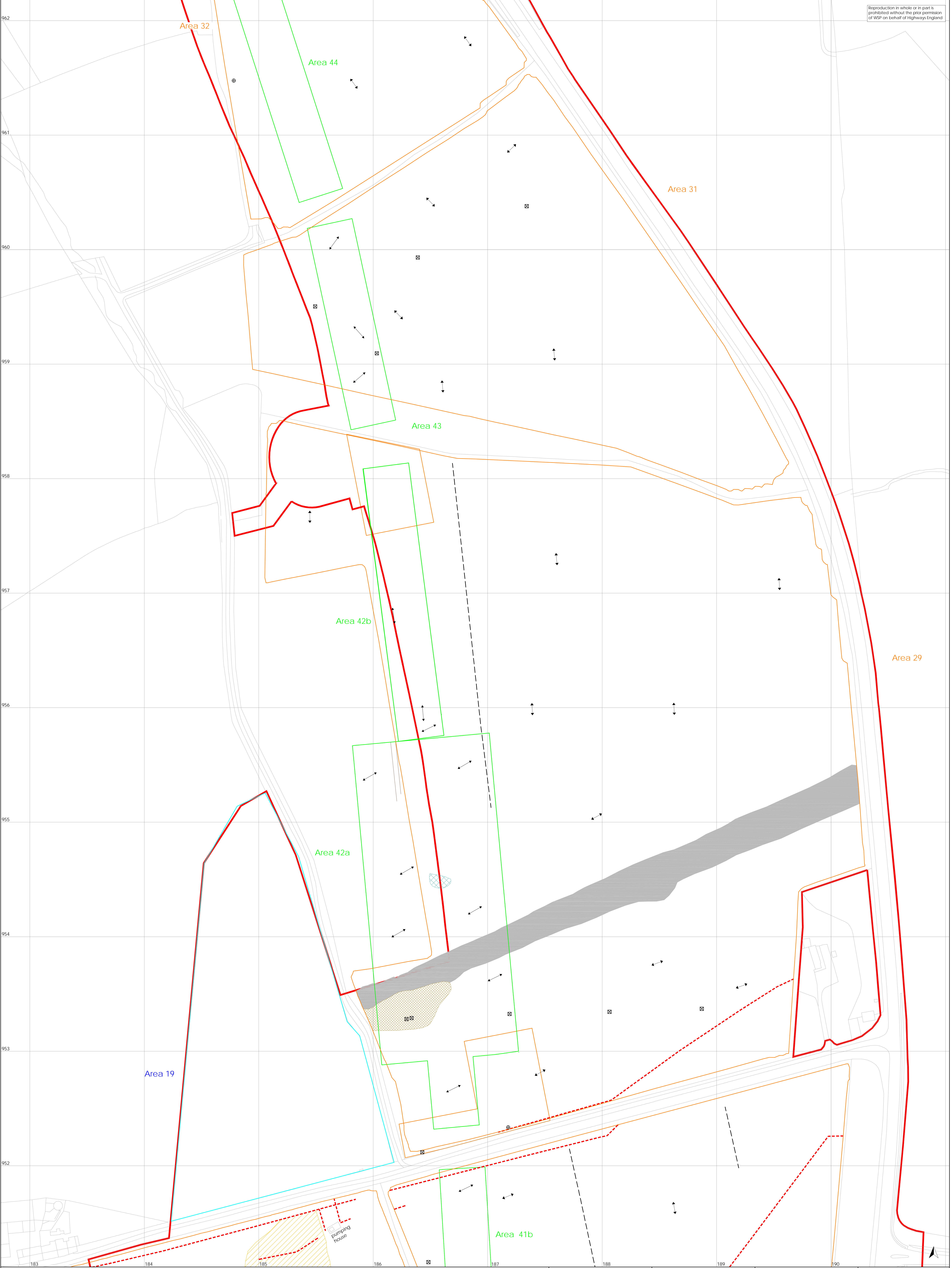


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WSP  
on behalf of  
Highways England

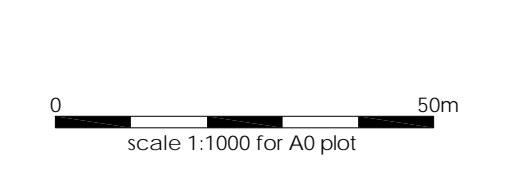
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DURHAM UNIVERSITY

A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 16: Areas 42-44 (2006), 29 &  
31 (2017), geophysical interpretation





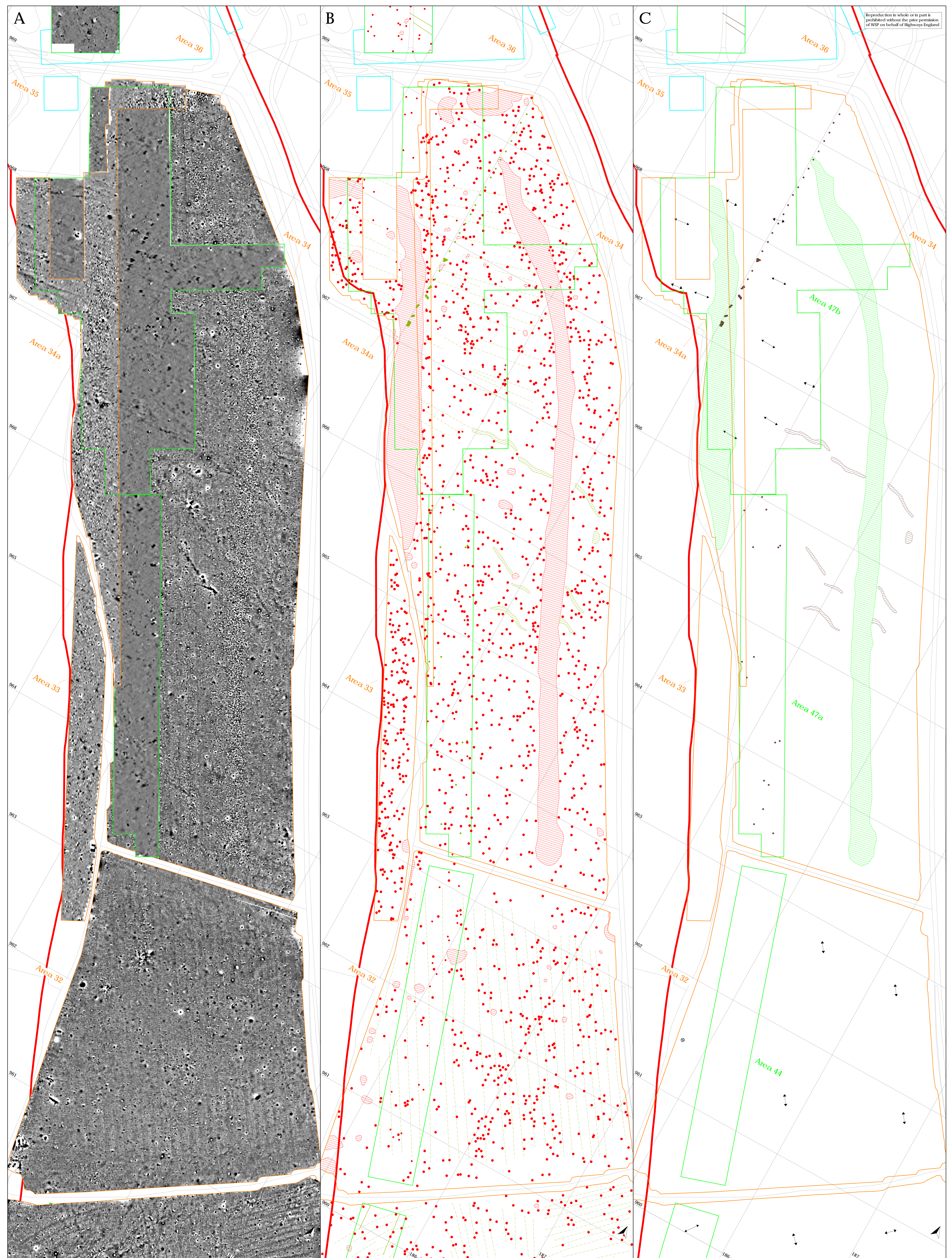
- |                                |                     |                       |
|--------------------------------|---------------------|-----------------------|
| site boundary                  | soil-filled feature | ridge and furrow      |
| unsurveyed                     | natural variation   | service               |
| 2018 (phase 2) magnetic survey | geological feature  | former field boundary |
| 2017 magnetic survey           | former quarry       | telegraph pole        |
| 2006 magnetic survey           | igneous dyke        | inspection cover      |



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A - geophysical survey	B - geophysical interpretation	C - archaeological interpretation
site boundary	dipolar magnetic anomaly	soft-filled feature
unsurveyed	positive magnetic anomaly	edge and furrow
2017 magnetic survey	negative magnetic anomaly	inspection cover
	green waste	

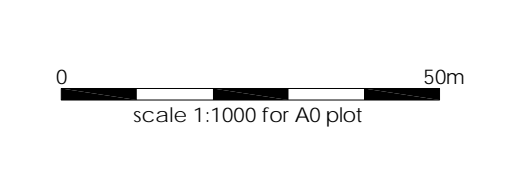
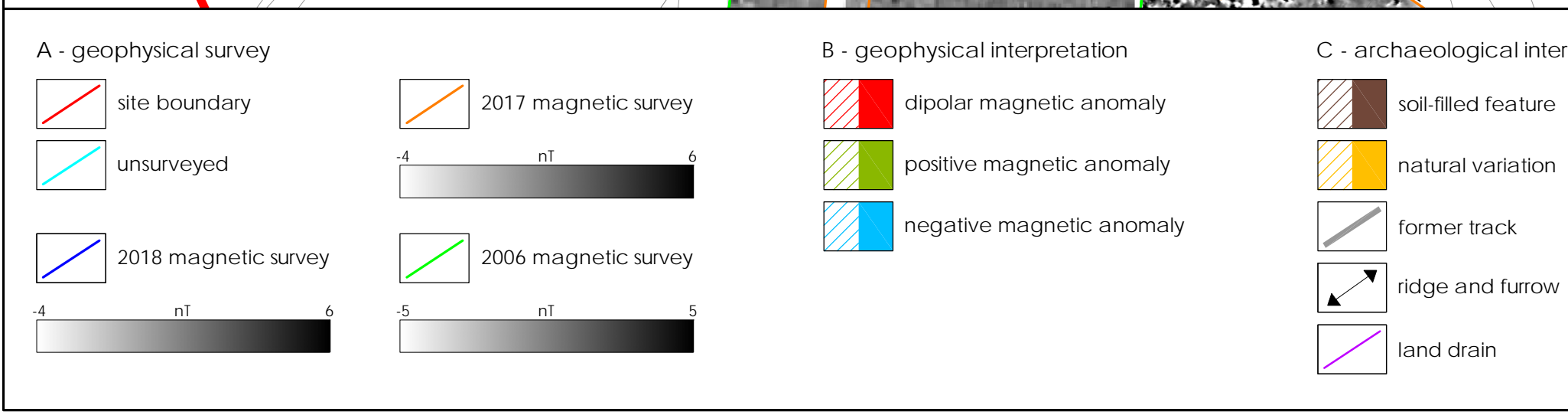
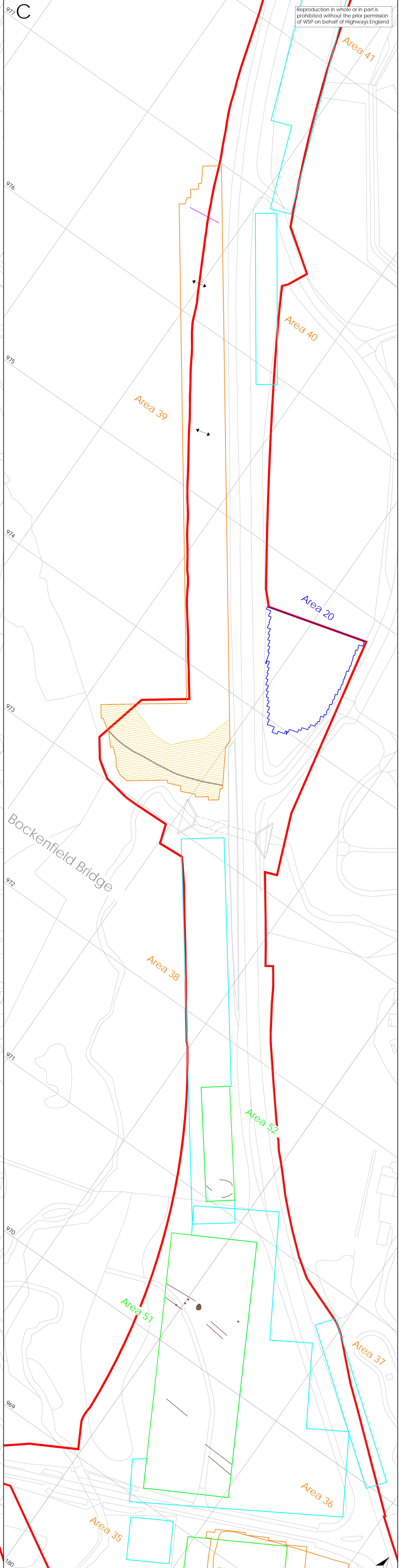
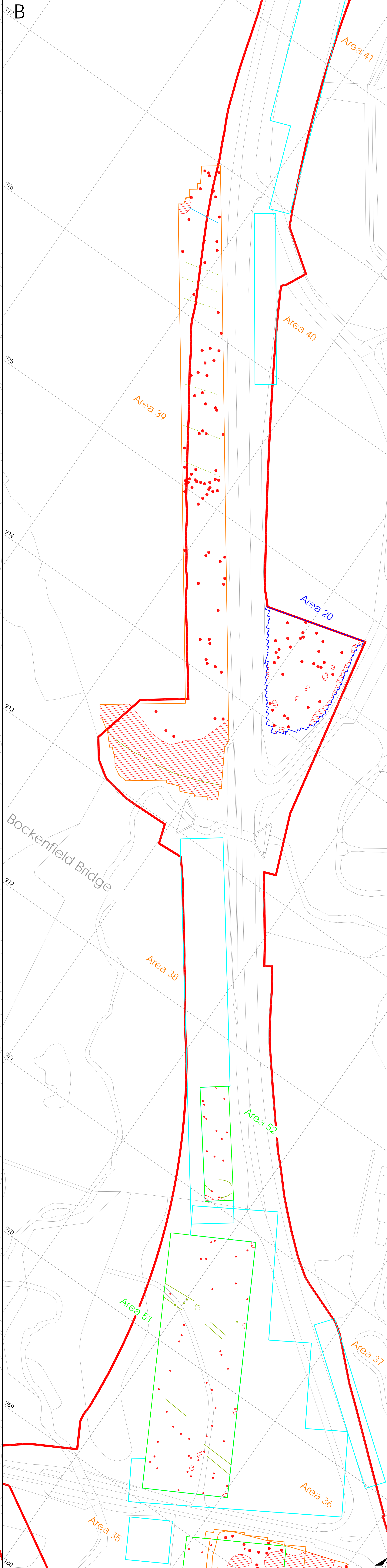
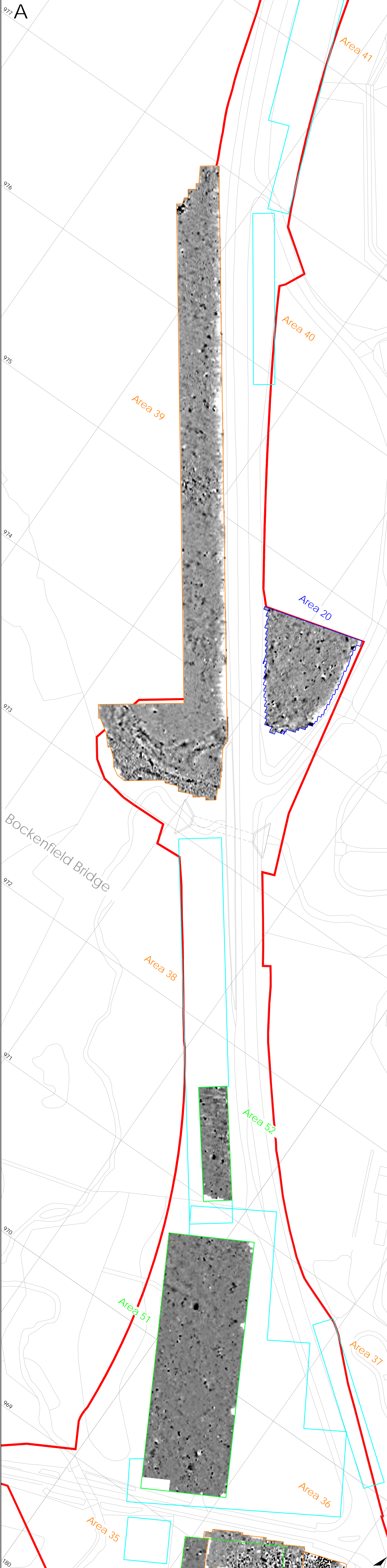
Scale 1:1000 for A3 plot

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A1 Morpeth to Felton Northumberland  
geophysical survey report 4888  
Figure 18: Areas 44 and 47 (2006) and 32-34a (2017), geophysical survey and interpretations



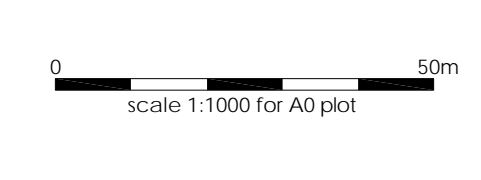
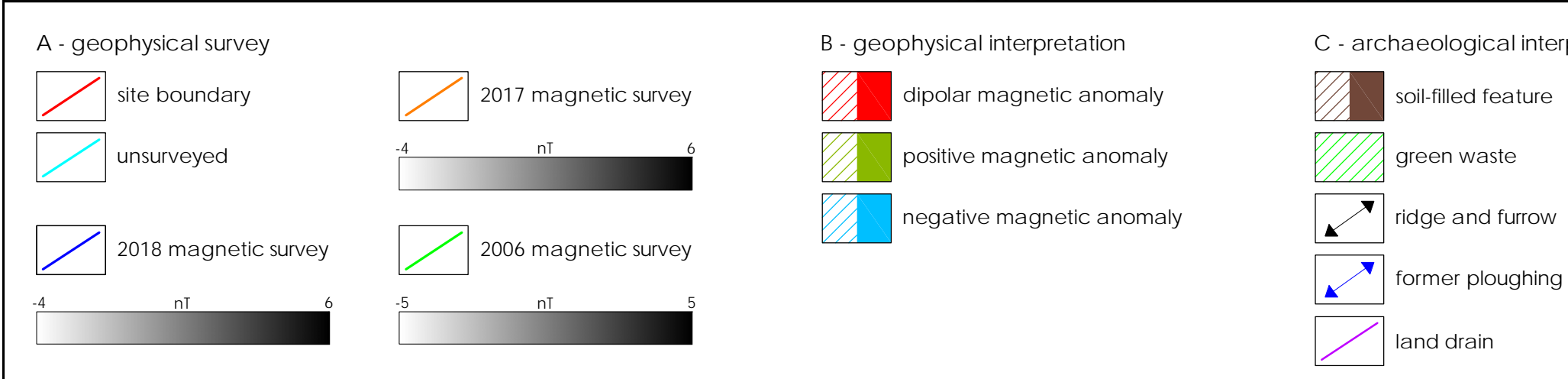


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A1 Morpeth to Felton Northumberland  
geophysical survey report 4688  
Figure 19: Areas 51-52 (2006), 35-40 (2017) and 20 (2018), geophysical survey and interpretations



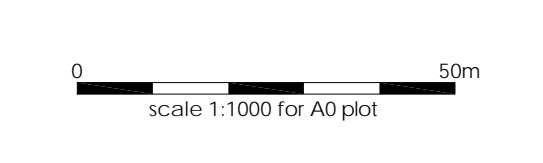
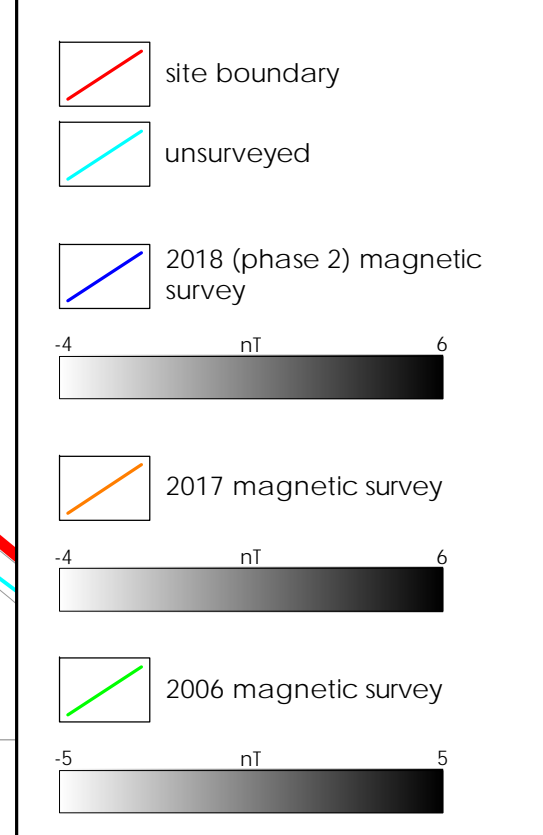


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A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 20: Areas 63-65 (2006), 41-49  
(2017) and 21 (2018), geophysical  
survey and interpretations

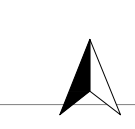




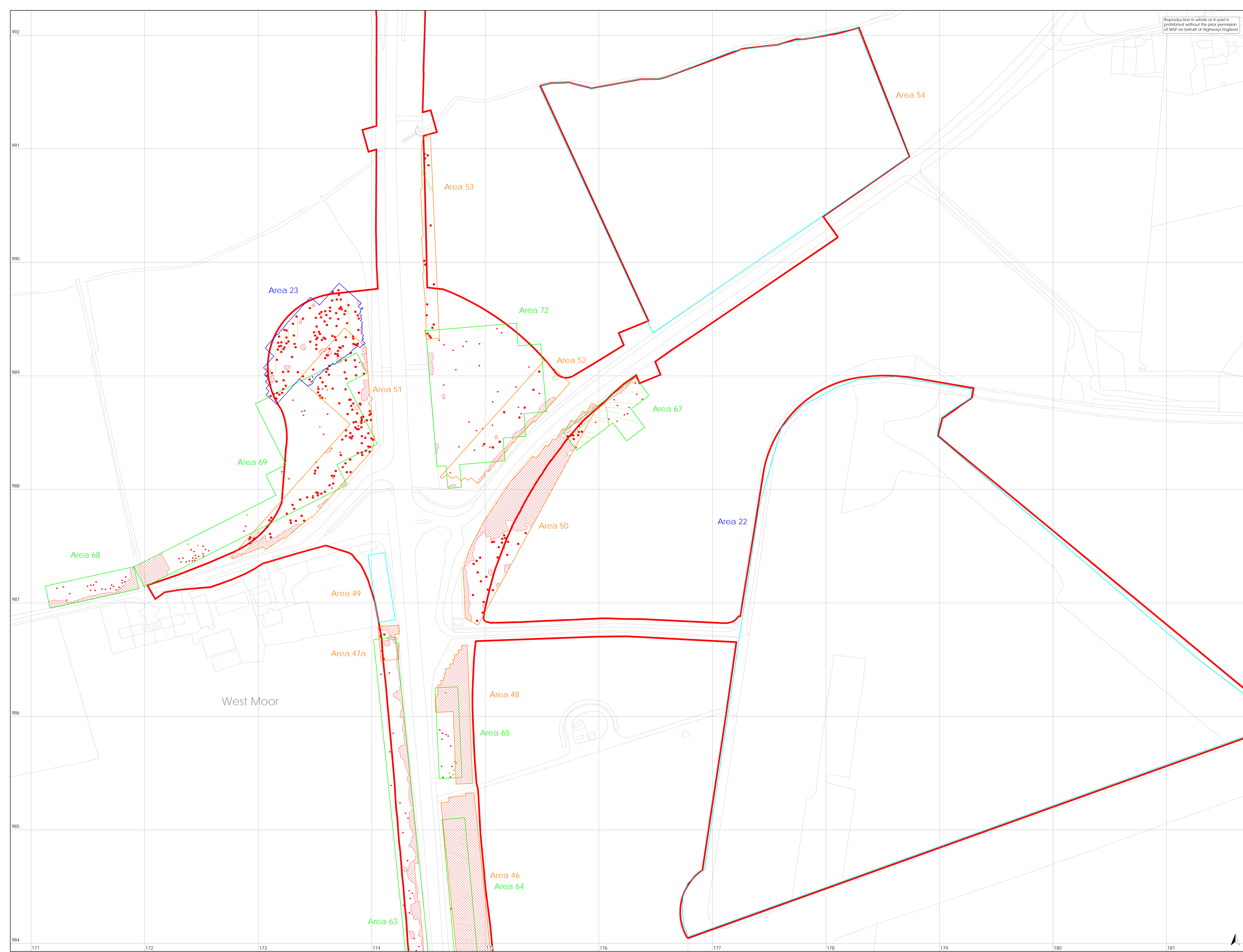
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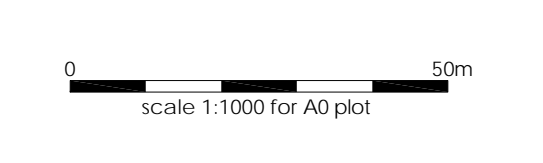
A1 Morpeth to Felton  
Northumbria  
geophysical survey  
report 4688  
Figure 21: Areas 65, 67-69 & 72 (2006),  
47a-53 (2017) and 22 & 23 (2018),  
geophysical survey







- site boundary
- unsurveyed
- 2018 (phase 2) magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey
- dipolar magnetic anomaly
- positive magnetic anomaly
- negative magnetic anomaly

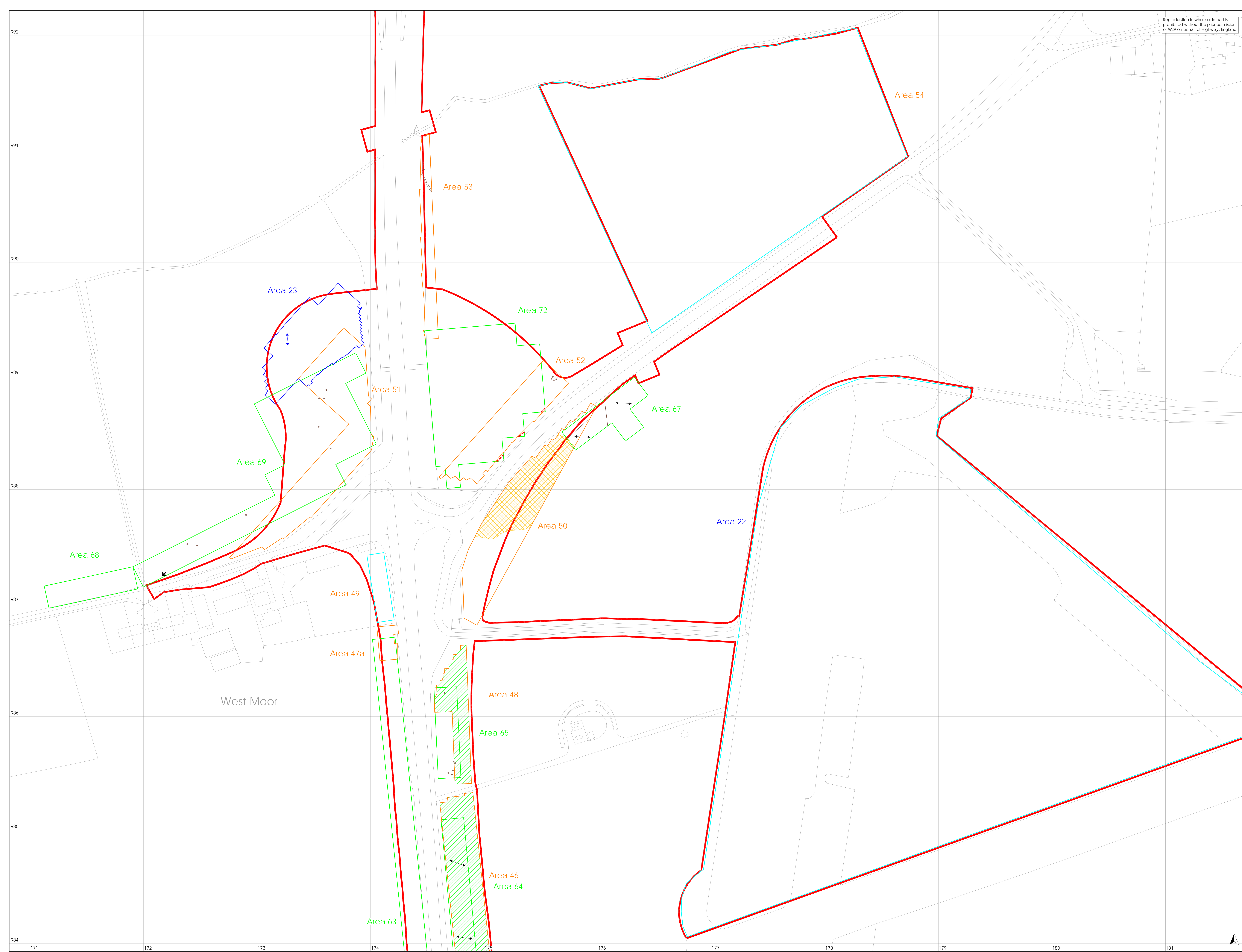


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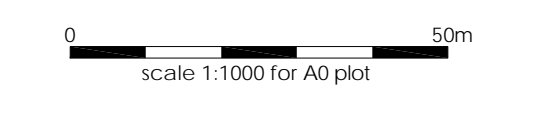
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on behalf of  
Highways England

A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 22: Areas 65, 67-69 & 72 (2006),  
47a-53 (2017) and 22 & 23 (2018),  
geophysical interpretation





- site boundary
- unsurveyed
- 2018 (phase 2) magnetic survey
- 2017 magnetic survey
- 2006 magnetic survey
- soil-filled feature
- green waste
- concrete hardstanding
- ridge and furrow
- former ploughing
- service pipe
- telegraph pole

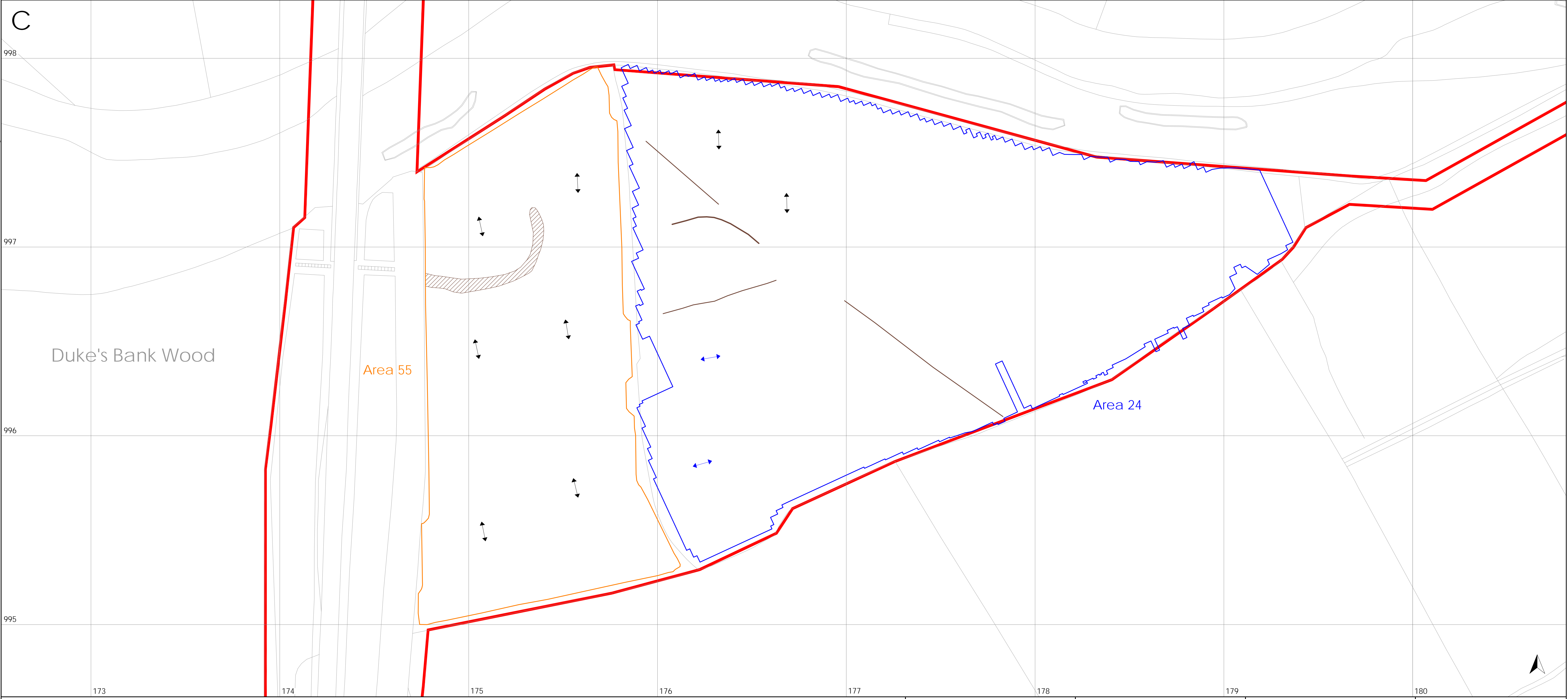
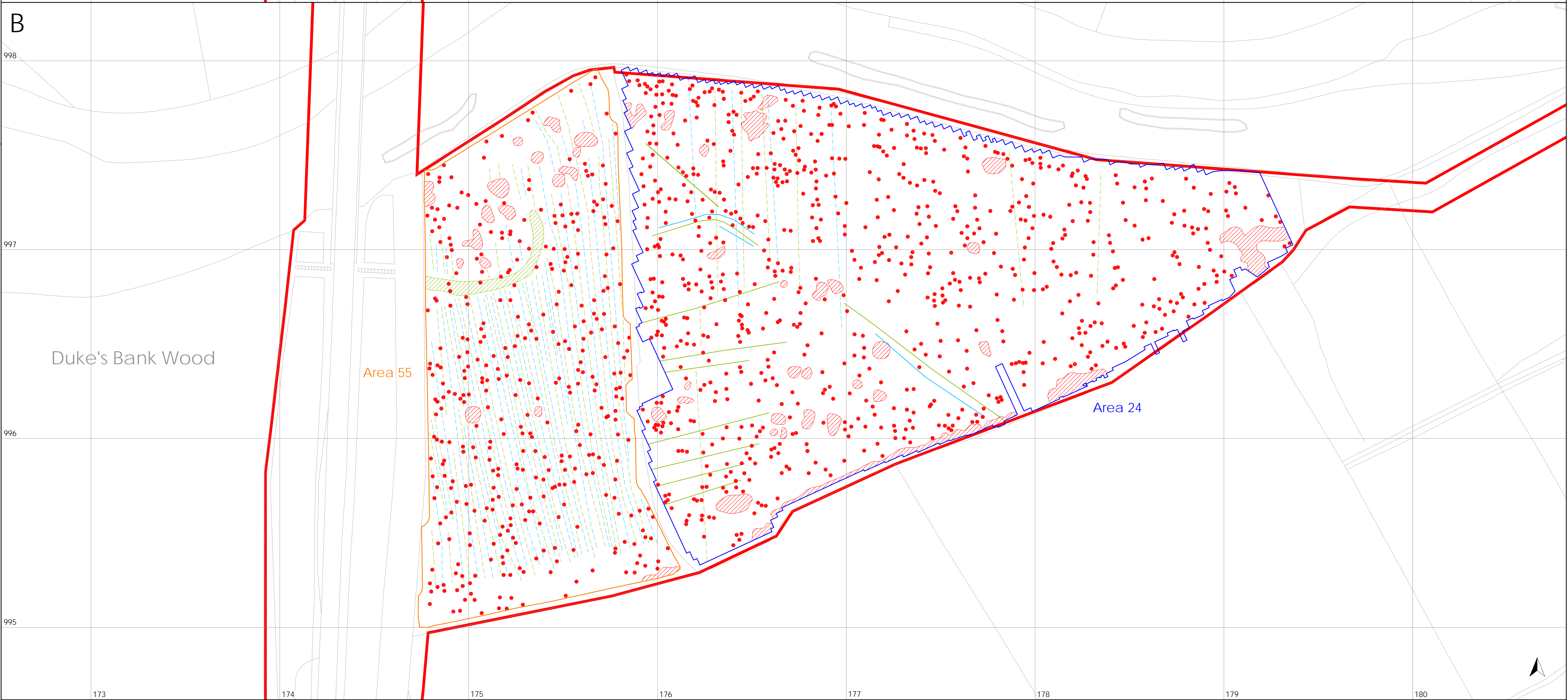
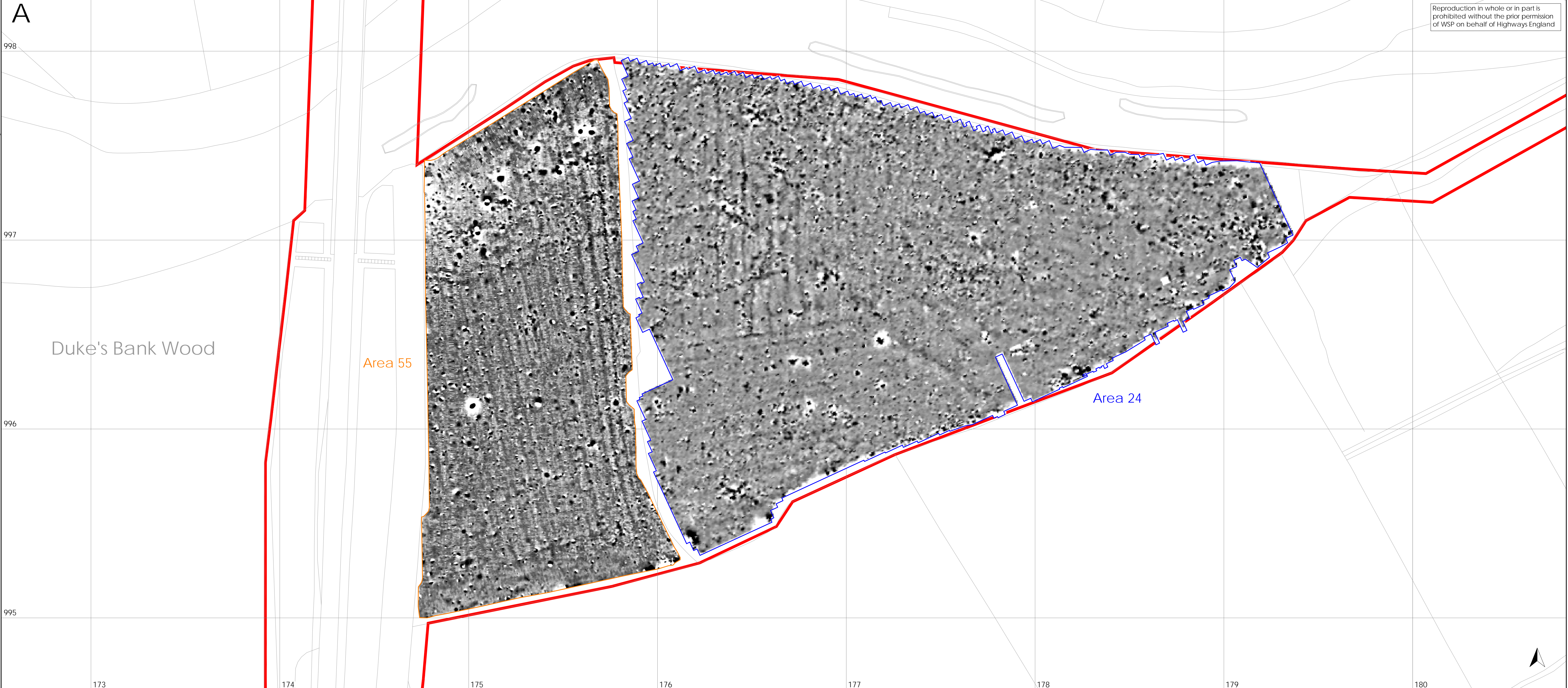


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Highways England

A1 Morpeth to Felton  
Northumberland  
geophysical survey  
report 4688  
Figure 23: Areas 65, 67-69 & 72 (2006),  
47a-53 (2017) and 22 & 23 (2018),  
archaeological interpretation





<b>A - geophysical survey</b> site boundary 2017 magnetic survey 2018 (phase 2) magnetic survey	<b>B - geophysical interpretation</b> dipolar magnetic anomaly positive magnetic anomaly negative magnetic anomaly	<b>C - archaeological interpretation</b> soil-filled feature ridge and furrow former ploughing	0 50m Scale 1:1000 for A0 plot	for WSP on behalf of Highways England	<b>ARCHAEOLOGICAL SERVICES</b> DURHAM UNIVERSITY	A1 Morpeth to Felton Northumberland geophysical survey report 4688 Figure 24: Areas 55 (2017) and 24 (2018), geophysical survey and interpretations
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