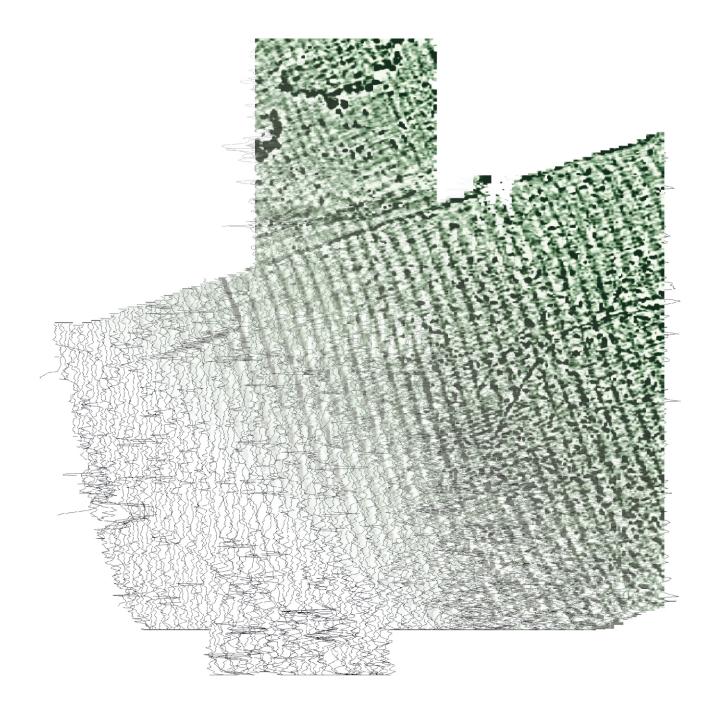
Land East of Daventry Northamptonshire

Recorded Scanning and Detailed Gradiometer Survey Report



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LAND EAST OF DAVENTRY NORTHAMPTONSHIRE

Recorded Scanning and Detailed Gradiometer Survey Report

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Summary

Wessex Archaeology was commissioned by CgMs Consulting, on behalf of their client Tencentral, to conduct a geophysical survey on land at Daventry, Northamptonshire, ahead of a proposed development approximately centred on NGR 459360 262265.

Recorded scanning was conducted over 156ha, comprising the land considered available for development. Following interpretation of the scanning data, 26.9ha of detailed survey was conducted in sixteen locations, positioned throughout the development area so as to investigate scanned anomalies, along with areas with quiet magnetic backgrounds. In addition to this a further 3.8ha of detailed survey had previously been conducted by Durham University within the Site; the results of which are also included in this report.

The significant features of archaeological interest are located in the north-eastern region of the Site. The features in these areas indicate the presence of enclosures and therefore a possible settlement, which may continue to the east, outside of the area surveyed for this report.

Several complexes of enclosures and field systems have been identified, along with a number of associated anomalies. Numerous relict fields and former field boundaries have also been identified, along with evidence for historic ploughing. Many of the other anomalies and trends detected through the detailed survey are likely to be of archaeological origin.

However, the recorded scanning survey indicates that the majority of the Site is magnetically quiet and does not contain features of archaeological interest.

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The fieldwork was directed by Ben Urmston, and assisted by Paul Baggaley, Cristina Serra Ruiz, Robert Fry, Simon Flaherty, Daniel Hart, Jonathan Pettitt, Gareth Owen and David Parry. Ben Urmston and Robert Fry processed and interpreted the geophysical data and wrote this report. Illustrations were prepared by Kitty Brandon and Karen Nichols. The project was managed and quality-controlled on behalf of Wessex Archaeology by Paul Baggaley.

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LAND EAST OF DAVENTRY NORTHAMPTONSHIRE

Recorded Scanning and Detailed Gradiometer Survey Report

1. INTRODUCTION

1.1. PROJECT BACKGROUND

- 1.1.1. Wessex Archaeology was commissioned by CgMs Consulting, on behalf of their Client Tencentral, to undertake a geophysical survey on land at Daventry, Northamptonshire (**Figure 1**), centred on NGR 459360 262265 (hereafter 'the Site'), ahead of a proposed development.
- 1.1.2. The aim of the project was to conduct a geophysical survey in an attempt to establish the presence/absence, extent, character and date of archaeological remains in view of the development proposal and its associated facilities, services and infrastructure.
- 1.1.3. This report presents a brief description of the methodology followed, the recorded scanning and detailed survey results, and the archaeological interpretation of the geophysical data.

1.2. SURVEY AREAS

- 1.2.1. The Site was divided into four areas (A to D), based upon land ownership as of May 2008. Each of these areas was then sub-divided into field numbers for recorded scanning and/or detailed survey (Figure 1). Thirty-two areas were scanned and sixteen areas surveyed in detail, selected following interpretation of the recorded scanning data.
- 1.2.2. Six areas in Area A were identified for detailed survey, three areas in B, one area in C, and six areas in D. These areas were chosen primarily to investigate scanned anomalies and extended regions of increased magnetic response; other areas of quieter magnetic background were selected for detailed survey in order to provide a control sample.

Area	Easting	Northing
A1*	459274	263453
A2**	459433	263477
A3*	459537	263492
A4**	459333	263321
A5**	459558	263397
A6*	459445	263082
A7*	459634	263214
A8*	459762	263057
A9	459451	262851
A10**	459718	262809
A11*	459823	262590
B1*	459691	262299

B2*	459438	262319			
B3	459323	262194			
B4*	459495	262133			
B5	459349	262089			
C1	459849	262356			
C2	459879	262199			
C3*	459699	262132			
D1*	459673	261527			
D2*	459331	261687			
D3	458804	261492			
D4*	459105	261554			
D5	459368	261481			
D6*	458724	261343			
D7	458856	261301			
D8*	459000	261289			
D9	459318	261243			
D10	459658	261139			
D11	459863	261170			
D12	458706	261173			
D13	458877	261104			
* Detailed survey conducted after scanning.					
** Detailed survey conducted by ASUD.					

** Detailed survey conducted by ASUD.

Table 1: Approximate centres of the survey areas

- 1.2.3. The areas for scanning totalled 156ha, the majority of which lay under wheat crops and pasture. Some parts of the developable area were heavily wooded or under dense vegetation unsuitable for gradiometer survey; such areas are generally confined to the immediate vicinity of field boundaries, however. Detailed survey was conducted directly after the recorded scanning survey, following initial interpretation of the data.
- 1.2.4. In addition to the geophysical surveys conducted by Wessex Archaeology, a number of areas within the Site had previously been surveyed by Durham University (ASUD, 2005). These areas were re-surveyed during the recorded scanning survey but were excluded from any areas selected for further investigation by detailed surveys.

2. METHODOLOGY

2.1. INTRODUCTION

- 2.1.1. A geophysical specification was prepared by WA to investigate the proposed study areas. The methodology consisted of recorded scanning and detailed gradiometer surveys conducted using a Bartington Grad 601-2 dual gradiometer system. These surveys were conducted in accordance with English Heritage Guidelines for Geophysical Surveys (1995).
- 2.1.2. The recorded scanning and detailed surveys were conducted by Wessex Archaeology's in-house geophysics team between the 6th May and 3rd June 2008. Survey grids were established at 20m x 20m using a Leica 1200 RTK GPS system, which is able to provide locations in real-time, accurate to within 2cm, and therefore exceed English Heritage recommendations.

- 2.1.3. The conditions for gradiometer survey were generally good, with some localised exceptions where woodland, ponds or overgrown hedgerows precluded any survey operations.
- 2.1.4. Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

3. RESULTS AND INTERPRETATION

3.1. INTRODUCTION

- 3.1.1. The recorded scanning survey successfully located targets for further detailed investigation (**Figures 2** to **4**). The results from the detailed survey confirm the interpretation of the recorded scanning data, both in areas that were interpreted as containing anomalies of archaeological potential and those that were magnetically quiet. The results are discussed firstly by area, then numerically by field number.
- 3.1.2. The interpretation of the detailed survey datasets highlights the presence of potential archaeological anomalies, trends, ferrous/burnt or fired objects, areas of general increased magnetic response, and anomalies of probable geological origin (Figures 5 to 23). Full definitions of these terms are provided in Appendix 2.
- 3.1.3. Small-scale ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to in the interpretation, unless considered relevant to the archaeological interpretation.

3.2. RECORDED SCANNING SURVEY RESULTS AND INTERPRETATIONS Area A (Figure 2)

- 3.2.1. In general, the magnetic background of Area A is quieter in the west with a much greater proportion of anomalies appearing in the eastern fields (Areas A8, A9, A11 and A12). Small parts of areas A2, A4, A5, A8, A10 and A11 had already by subject to detailed surveys by ASUD which had found no features of significant archaeological interest.
- 3.2.2. **A1**: A ferrous-like anomaly was evident towards the centre of the area, with a curvilinear trend around it which was targeted with 0.64ha of detailed survey.
- 3.2.3. **A2**: This area is dominated by strong ferrous responses, which appear to be associated with the Daventry to Norton road to the north and the farm buildings to the south.
- 3.2.4. **A3**: A strong ferrous anomaly in this area is probably consistent with a modern service and a region of increased magnetic response was selected for 0.48ha of detailed survey.
- 3.2.5. **A4**: Few anomalies of archaeological potential were identified in this area, and no detailed survey was conducted.

- 3.2.6. **A5**: The data in this area were dominated by strong magnetic disturbances, which were probably due to the proximity of the farm buildings and obvious landscaping in this area.
- 3.2.7. **A6**: A small region of magnetic enhancement was investigated through 0.48ha of detailed survey.
- 3.2.8. **A7**: Various discrete anomalies were evident throughout this area, and 1.52ha of detailed survey was placed accordingly to investigate a number of these anomalies further.
- 3.2.9. **A8**: A marked change in the magnetic background was evident across this area, with the northern portion being considerably quieter than the southern, where numerous anomalies are apparent. The responses seem to be similar in nature to those in **A11** and **A12**. 2.02ha of detailed survey was conducted in this area.
- 3.2.10. **A9**: A modern service dominates the data in the northern portion of this area.
- 3.2.11. **A10**: The magnetic background of this area is generally quiet, though a modern service bisects the area, orientated northeast to southwest.
- 3.2.12. A11: The modern service seen in A9 and A10 is evident in the north-western portion of this area, and regular anomalies are apparent in the magnetic background, which were similar to those in A8 and A12. 6.4ha of detailed survey was conducted in this area to sample several discrete anomalies and to place the magnetic background in a wider context.
- 3.2.13. **A12**: Numerous potential targets were apparent in the recorded scanning data in this area, along with a modern service extending from the southwest corner into **C1**.

Area B (Figure 3)

- 3.2.14. The magnetic background of Area B is relatively quiet in comparison with the eastern portion of Area A, although many small-scale, discrete anomalies are visible. A small section of area B1 had already by subject to a detailed survey by ASUD which had found no features of significant archaeological interest.
- 3.2.15. **B1**: Various small-scale anomalies were identified in this area, which were investigated through 2.88ha of detailed survey.
- 3.2.16. **B2**: Numerous anomalies in the north-eastern corner of this area are clearly different from the magnetic background to the south, where the magnetic field was relatively quiet. 0.9ha of detailed survey was carried out in this area.
- 3.2.17. **B3**: Several discrete anomalies are apparent in the dataset from this area, against a relatively quiet magnetic background.
- 3.2.18. **B4**: This area was magnetically quiet and so 1ha of detailed survey was undertaken to prove the interpretation of the recorded scanning survey.

- 3.2.19. **B5**: A handful of discrete, small-scale anomalies appear in this area.
- 3.2.20. **B6**: The dataset from this area is dominated by strong ferrous responses which were considered unlikely to be archaeological.

Area C (Figure 3)

- 3.2.21. The recorded scanning data from Area C show a generally quiet background magnetic field.
- 3.2.22. **C1**: The modern service seen in **A12** runs northwest to southeast through this area. Minor anomalies can be seen in the magnetic background.
- 3.2.23. **C2**: A modern service cuts across the northern portion of this area, extending into **C3**.
- 3.2.24. **C3**: The modern service seen in **C2** runs northeast to southwest across the northern portion of this area, with a number of discrete anomalies appearing to the south of it. These responses were investigated through 1.04ha of detailed survey.

Area D (Figures 3 and 4)

- 3.2.25. Numerous anomalies are evident in the recorded scanning data from this area, particularly to the northeast and south.
- 3.2.26. **D1**: Numerous anomalies, both discrete and linear, were detected in this area. Two detailed survey areas were positioned to investigate these responses: one of 3.37ha (D1a) and the other 1.97ha (D1b).
- 3.2.27. **D2**: A cluster of anomalies in the centre of this area was investigated through 0.36ha of detailed survey.
- 3.2.28. **D3**: The majority of this area is currently in use as a quad bike or motocross track. Only the south-western corner has not been landscaped and the magnetic background in this area is relatively quiet.
- 3.2.29. **D4:** 2.52ha of detailed survey was positioned to investigate several anomalies towards the centre of this area, including a former field boundary and some potential linear anomalies.
- 3.2.30. **D5:** A cluster of anomalies towards the centre of **D5** appears to be significantly different from the magnetic background.
- 3.2.31. **D6:** 0.76ha of detailed survey was positioned in this area to investigate several linear trends in the recorded scanning data. A modern service runs southwards through the western portion of this area into **D12**, the route of which is evident in the field.
- 3.2.32. **D7**: There are a number of linear and curvilinear trends in this area.
- 3.2.33. **D8**: This area was magnetically quiet and so 0.48ha of detailed survey was undertaken to prove the interpretation of the recorded scanning survey.

- 3.2.34. **D9**: Numerous linear and discrete anomalies are apparent in the western portion of this area.
- 3.2.35. **D10**: A number of linear trends are evident in the dataset from this area. Any detailed survey would have been limited by the small size of the area and the ferrous disturbance from the buildings to the north.
- 3.2.36. **D11**: An anomaly due to modern services oriented east-west was the only response in this area.
- 3.2.37. **D12**: The modern service seen in **D6** divides near the northern boundary and the resulting disturbance dominates the dataset from this area. A further band of ferrous disturbance extends eastwards along the southern boundary into **D13**.
- 3.2.38. **D13**: Numerous linear trends and isolated anomalies can be seen in the recorded scanning data from this area.

3.3. DETAILED SURVEY RESULTS AND INTERPRETATION

Area A

- 3.3.1. A1 (Figure 5): The feature of most probable archaeological potential is linear anomaly 4001 which is likely to represent a former extension of the field boundary to the southeast. A less-distinct trend running north from this anomaly could represent an intersection with another former boundary. A series of anomalies, 4002, are pit-like in character and of possible interest, but lack a coherent distribution. A series of trends running across the dataset in an ENE-WSW alignment are likely to represent historic ploughing trends.
- 3.3.2. **A3 (Figure 6)**: The dataset from this area is dominated by relatively strong trends running ENE-WSW, which probably represent historic ploughing. There were no anomalies of archaeological potential detected by this detailed survey.
- 3.3.3. A6 (Figure 7): Anomaly 4003 near the centre of this dataset is of possible archaeological potential; however, due to its amorphous form, it is difficult to offer further interpretation. The response of anomaly 4004 is consistent with that of a large pit, given its non-ferrous nature and therefore of possible interest. A linear anomaly oriented east-west in the north is likely to be a modern service while linear ploughing trends can be seen orientated ENE-WSW across most of the dataset.
- 3.3.4. **A7 (Figure 8)**: The data from this area are largely dominated by linear trends, the majority orientated NNW-SSE and by their nature and relation to each other, probably represent historic ploughing. The responses comprising linear anomaly **4005** are largely ferrous in character. It is possible that they represent the remains of an old fenced field boundary, although more likely to be that of a modern service pipe despite the fact it is not as magnetic as other services identified within the Site.
- 3.3.5. **A8 (Figures 9 & 10)**: Numerous anomalies of definite archaeological potential can be seen in this dataset and probably represent field boundaries or agricultural enclosures. Linear anomaly **4006** is aligned north-south with a

branch off on its western side running west-east, probably indicating a junction of field boundaries. Anomaly **4007** appears to be more like an enclosure, with a curvilinear 'P' shape. Anomalies **4008** and **4009** could represent other enclosures or field boundaries. A large response **4010** orientated west-east may be a former field boundary or ploughing headland. A complex of anomalies **4011**, to the south of the dataset, is less well-defined than those discussed above but is considered to be of probable archaeological interest. The distribution is confused but perhaps represents field boundaries or further enclosure systems, though no definite form can be attributed to them. Quite noticeable in this dataset were the strong responses from ploughing, especially in the north-west, which might account for the confused nature of the archaeological responses.

A11 (Figures 11, 12 & 13): Two rectilinear anomalies of definite 3.3.6. archaeological interest 4012 and 4013 have been identified in the northeastern portion of the survey area, one seemingly crossing the other. Given their form, it is likely that they are part of a complex of enclosures; further detailed survey to the east was limited by the bounds of the developable area. In the south-western portion of the dataset, another series of archaeological anomalies 4014 appears to be another field enclosure which extends to the north and may be associated with linear anomaly 4015. Two curvilinear anomalies, 4016 and 4017, of possible archaeological interest have been identified, which appear to represent separate parts of the same feature and extend towards the southern edge of 4014. It is possible that these could correspond to a curvilinear boundary or ditches either side of a track-way leading to the enclosure. Linear anomaly 4018 is most likely to represent a former field boundary, currently occupying the interface between the polo pitch to the south and the fields under crop to the north. A region of increased magnetic response occupies the eastern portion of the survey area, which may be masking weaker archaeological anomalies. The difference in the magnetic background is perhaps due to differing former land use, although no definable anomaly marks the change in the magnetic texture. It is likely that the polo pitch has been landscaped, which may have resulted in this differentiation. Two regions of increased magnetic response 4019 are also identified to the north of 4018, which could be the result of near-surface superficial geology, or perhaps spreads of weakly magnetic debris. Many trends are apparent in this dataset, although their nature is uncertain. The majority are aligned with the extant NNW-SSE boundaries and somewhat sinuous in form, suggesting that they are the remnants of historic ploughing. It is also possible that they are associated with the drainage of the polo pitch.

Area B

- 3.3.7. B1 (Figure 14): Anomaly 4020 is of possible archaeological interest and its orientation east-west may correspond with a section of field boundary, although its response does not contrast greatly with the magnetic background. Numerous linear trends appear in this dataset which may, in the southern region of the area, represent ploughing trends aligned NNW-SSE.
- 3.3.8. **B2 (Figure 15)**: A region of increased magnetic response **4021** dominates this area, and may have some archaeological interest. The high proportion

- of ferrous anomalies in this area may suggest modern activity or landscaping however.
- 3.3.9. **B4 (Figure 16)**: This area was selected as it was interpreted as being magnetically quiet from the recorded scanning survey. While a series of small anomalies **4022** may be a linear arrangement of possible pits in the south-eastern corner of the survey, the area is predominantly free of archaeological features and is dominated by linear trends oriented approximately north-south, suggestive of historic ploughing.

Area C

3.3.10. **C3 (Figure 17)**: An area of increased magnetic response **4023**, similar in nature to **4021** in area **B2**, may be archaeological in origin, but the responses are diffuse and disordered. An archaeological interpretation is weakened by the proximity of modern services to **4023**.

Area D

- 3.3.11. D1a (Figure 18): The dataset is dominated by a broad band of increased response **4024** that is interspersed with stronger, clearly-defined anomalies. The amorphous appearance of **4024** and magnetic background immediately surrounding it is consistent with that of a geological or pedagogical response. Curvilinear anomalies 4026 and 4027 are of more definite form than 4024, with 4027 being the stronger of the two, and both are thought to be of possible archaeological significance. The proximity of curvilinear anomalies 4026 and 4027 suggests that they are perhaps associated with 4024. Two regions of increased magnetic response 4025 and 4028 are evident close to 4024 and 4027 and may be related, although there is little to suggest an archaeological origin aside from their proximity. Further regions of increased magnetic response lie to the west of 4026, which surround a number of discrete anomalies. Numerous trends are apparent in the northern portion of the survey area and are likely to be the remnants of historic ploughing, especially those aligned NNW-SSE as they share the orientation of the field boundary to the east.
- 3.3.12. D1b (Figure 19): Linear trend 4029 may represent a former field boundary or track, given the ferrous anomalies coincident with its line; it is possible that these ferrous anomalies have an archaeological origin. Some pit-like anomalies 4030 and 4031 are also of possible archaeological potential. Elsewhere, linear trends, likely to be the result of ploughing, are aligned NNW-SSE, sharing the orientation of the boundaries to the west and east.
- 3.3.13. **D2** (Figure 20): Amorphous anomaly 4032 may possibly have an archaeological origin, although it is conceivable that it is geological or pedological in nature. The nearby complex of pit-like anomalies 4033 also may possibly be archaeological in origin, although the anomalies lack a coherent distribution.
- 3.3.14. **D4 (Figure 21)**: Linear anomaly **4034** represents a former field boundary which appears on historic mapping. Sub-rectangular anomaly **4035**, some 26m NE-SW by 10m NW-SE, may represent the remains of an old agricultural outbuilding or compound, although the responses are weak and there seems to be a lack of associated magnetised rubble. To the west, isolated anomaly **4036** shows a non-ferrous response which could be

indicative of a large pit. Similar, smaller responses are marked by **4037**. A region of increased magnetic response **4038** lies to the south of **4035**. This area may contain archaeological responses relating to the above anomalies; the readings are too confused to make a conclusive interpretation, however. To the west of the survey area, modern services **4039** converge at a steel trough, suggesting they are to supply water.

- 3.3.15. **D6 (Figure 22)**: The dataset from **D6** is relatively quiet, showing few definite anomalies of archaeological potential. A few pit-like anomalies **4040** and **4041** are identified as being of possible archaeological interest but their form does not allow a conclusive interpretation. Amorphous anomaly **4042** indicates what is probably an area of superficial geology. Several weak trends may indicate the historic ploughing orientation.
- 3.3.16. D8 (Figure 23): This area was selected as it was interpreted as being magnetically quiet from the recorded scanning survey. The dataset is relatively sparse of archaeological anomalies confirming the results of the recorded scanning survey, with only a few discrete anomalies 4043 possibly representing small pit-like responses. Several other weak trends are approximately aligned with the northern field boundary.

Previous Work

- 3.3.17. University of Durham Archaeological Services (Figures 24 to 28): In addition to the geophysical surveys conducted by Wessex Archaeology, a number of areas within the Site had previously been surveyed by Durham University (Figure 24, after ASUD 2005).
- 3.3.18. The greyscale plots and interpretations from this survey are shown in **Figures 25** to **28**, and these areas cover a total of 3.8ha. The survey areas are discussed here from north to south.
- 3.3.19. At the northernmost extent of the survey area, two linear anomalies oriented NNW-SSE are apparent, which may have some archaeological potential (**Figures 25 & 27**). Trends aligned approximately northeast-southwest are likely to represent the remnants of historic ploughing. A large amorphous area of magnetic disturbance is likely to be of modern origin.
- 3.3.20. The three survey areas immediately west of Norton Grounds contain few anomalies of possible archaeological potential (Figures 25 & 27). It should be noted that the response highlighted as a possible linear anomaly lies near to an extended area of magnetic disturbance, itself presumably the result of the landscaping of the lawns to the south of the house. Elsewhere, traces of historic ploughing can be seen in the westernmost of the three areas, oriented approximately northeast-southwest.
- 3.3.21. In the survey areas to the south of Norton Grounds, traces of former ploughing can be seen oriented NNW-SSE, a similar alignment to the field boundaries nearby(Figures 25 to 28). In the narrow L-shaped area immediately south of this, few anomalies were detected. Around the southern boundary, several short curvilinear anomalies are apparent, which may have some archaeological potential.
- 3.3.22. Numerous ploughing trends oriented approximately east-west are evident in the survey area to the southeast of the oak spinney (**Figures 26 & 28**). In

the longer survey area to the south, trends indicating former ploughing arranged orthogonally in two groups: one oriented approximately northeast-southwest, and the other approximately northwest-southeast. In the southernmost survey area, two further groups of ploughing trends are apparent: one is oriented NNW-SSE and the other approximately north-south.

- 3.3.23. Elsewhere throughout the survey area, numerous weak trends and isolated anomalies may have some archaeological significance, but further interpretation is hampered by the limited width of the survey areas.
- 3.3.24. In terms of the field names used for this report the ASUD data were acquired in fields A2, A4, A5, A8, A10, A11 and B1. All of the survey areas covered by the ASUD data coincided with areas which were interpreted as being relatively quiet from the recorded scanning data acquired by WA. As such the ASUD data confirms the interpretation of the scanning data and extends the coverage of detailed survey data into four fields (A2, A4, A5 and A10) which did not need to be resurveyed by WA.

4. CONCLUSION

4.1. INTRODUCTION

- 4.1.1. The developable area of the Site comprised 156ha, of which all suitable land was subject to recorded scanning survey, and 26.9ha detailed survey was conducted in sixteen areas across the Site by WA, adding to the 3.8ha undertaken by ASUD in 2005. The locations of the areas of detailed survey conducted by WA were selected following interpretation of the recorded scanning survey.
- 4.1.2. The correlation between anomalies identified in the recorded scanning data and the results of the detailed survey was excellent. The two control areas selected by WA, **B4** and **D8**, along with the areas surveyed by ASUD proved that there are likely to be very few magnetic responses in other areas of the Site which were not identified from the results of the recorded scanning survey.

4.2. DISCUSSION

- 4.2.1. The recorded scanning survey indicates that the majority of the Site is magnetically quiet and does not contain features of archaeological interest which could be detected by further detailed gradiometer survey.
- 4.2.2. Good evidence for potential archaeology has been provided for a number of the survey areas and summaries of the interpretations is shown in Figures 29, 30 and 31. The extents of the archaeological anomalies interpreted from the recorded scanning data are shown alongside the summary interpretations.
- 4.2.3. The most significant features of archaeological interest are located in the north-eastern region of the Site in areas A8 and A11. The features in these areas indicate the presence of enclosures and therefore a possible settlement, which may continue to the east, outside of the proposed development.

- 4.2.4. The gradiometer results are particularly clear for rectilinear anomalies **4012** to **4015** in **A11**. The detailed survey indicates that **4012** and **4013** extend for at least 45m east-west by 117m north-south, and that **4014** and **4015** extend for at least 80m northwest-southeast by 66m northeast-southwest.
- 4.2.5. Linear and rectilinear anomalies **4006** to **4011** in **A8**, whilst not as clear as those in **A11**, may represent an extended complex of enclosures, which reaches southwards towards **A11**. If this is the case, the recorded scanning data suggest that the complex overall may extend for at least 740m north-south by 330m east-west (**Figure 29**), although this has not been confirmed through detailed survey.
- 4.2.6. Anomalies **4024** to **4028** in **D1a** are interesting as they exhibit responses consistent with both geological or pedagogical features and features of possible archaeological origin.
- 4.2.7. Additional detailed survey in these areas may further define the extents of the features described in this report but would be unlikely to identify any further sites of significant archaeological interest.
- 4.2.8. Elsewhere, numerous relict field systems and former field boundaries have been detected, with good evidence for extensive historic ploughing. Many other discrete anomalies and trends may be of archaeological interest, given their proximity to the enclosures identified above.
- 4.2.9. The ASUD detailed survey results (**Figures 24** to **28**) confirm the interpretation of the recorded scanning survey in areas not subjected to detailed survey by Wessex Archaeology. The majority of anomalies detected by ASUD are consistent with historic ploughing.

5. REFERENCES

Archaeological Services University of Durham, 2005. *Danetree Link Road, Daventry, Northamptonshire: geophysical survey.* Report ASUD 1263

English Heritage, 2008. *Geophysical survey in archaeological field evaluation*. Research and Professional Service Guideline No 1.

APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey Methods and Equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have a resolution of 0.1nT over a ±3000nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica 1200 RTK GPS system and then extended using tapes. The Leica 1200 RTK GPS system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined to an accuracy of 1-2cm in real-time and therefore exceed the level of accuracy recommended by English Heritage (1995) for geophysical surveys.

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

The detail surveys consist of 20m x 20m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. This gives 1600 measurements per grid and is the recommended methodology for archaeological surveys of this type (English Heritage, 2008).

Post-Processing

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

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

Typical data and image processing steps may include:

- Destripe Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;
- Destagger Shifting each traverse forward or backward by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Clipping Limiting the displayed range of the processed data to either ±3nT or ±3SD. in order to enhance the appearance of smaller anomalies.
- Despike Filtering any data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings caused by modern, small ferrous objects at the surface

Typical displays of the data used during processing and analysis:

- XY Plot Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This image can include a hidden line algorithm to remove certain lines and enhance the image. This type of image is useful as it shows the full range and shape of individual anomalies.
- Greyscale Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into two main categories: archaeological and unidentified responses.

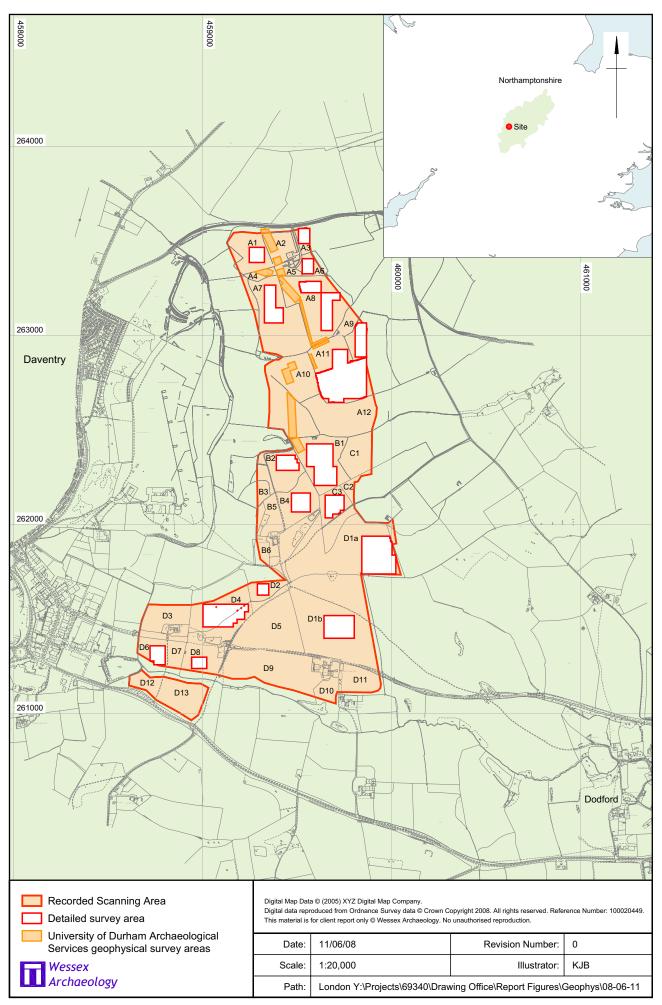
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

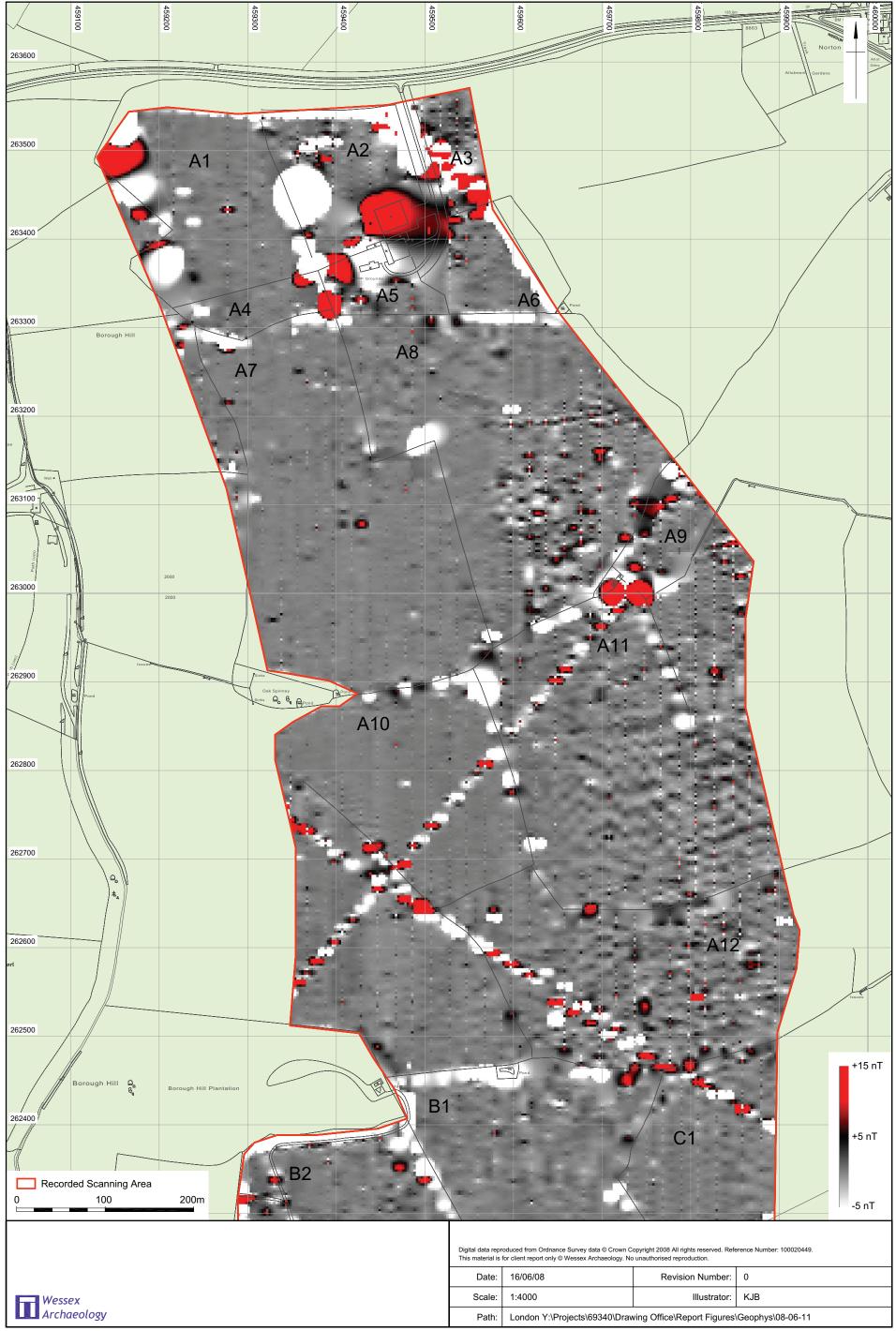
- Archaeology used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology used for features which give a clear response but which form incomplete patterns.

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

- Possible archaeology used for features which give a response but which form no discernable pattern or trend.
- Increased magnetic response used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend used for low amplitude or indistinct linear anomalies.
- Ferrous used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

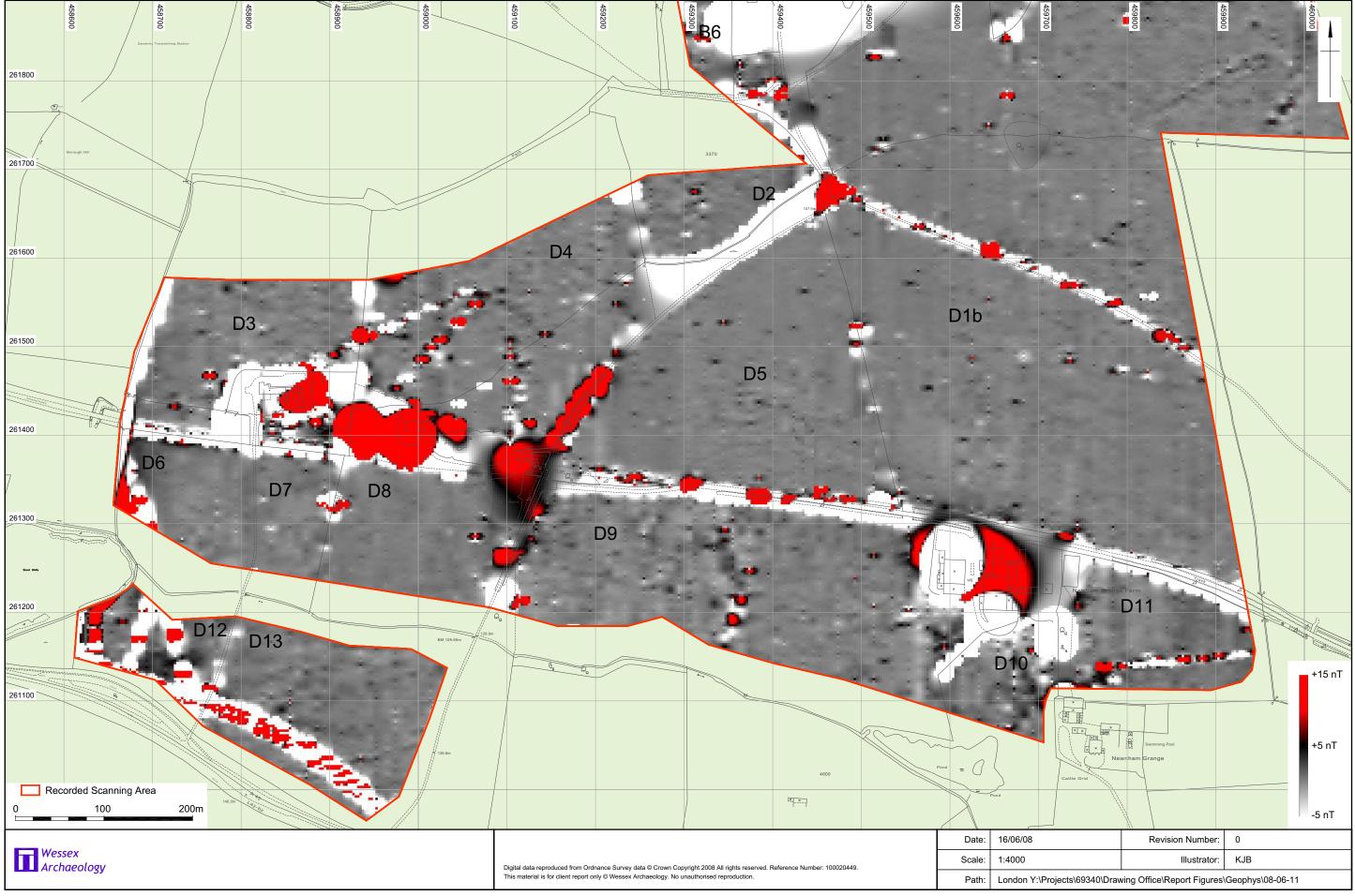
Finally, services such as water pipes are marked where they have been identified.

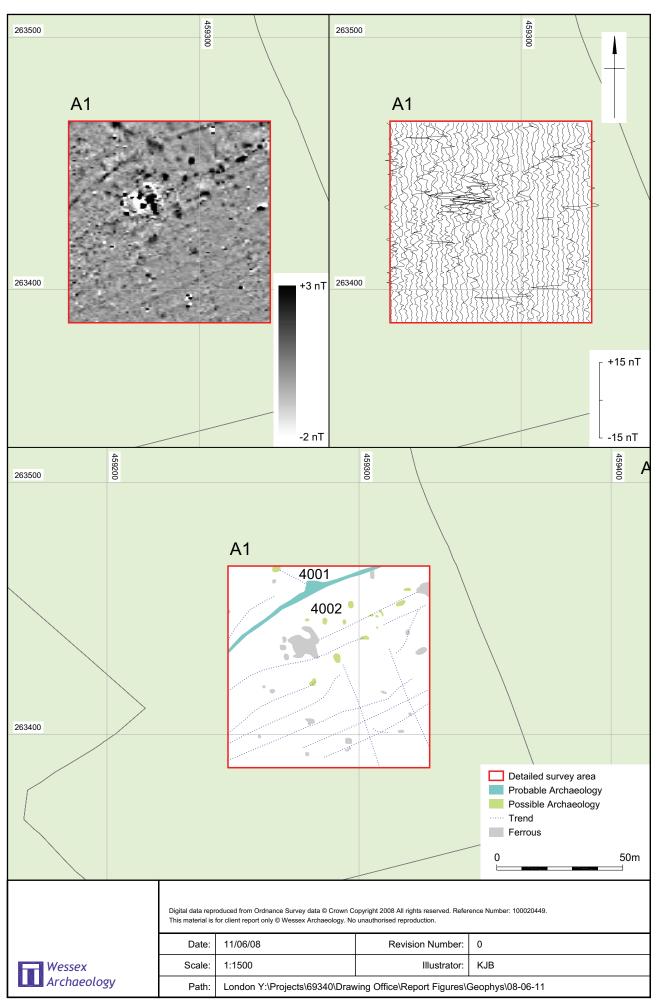




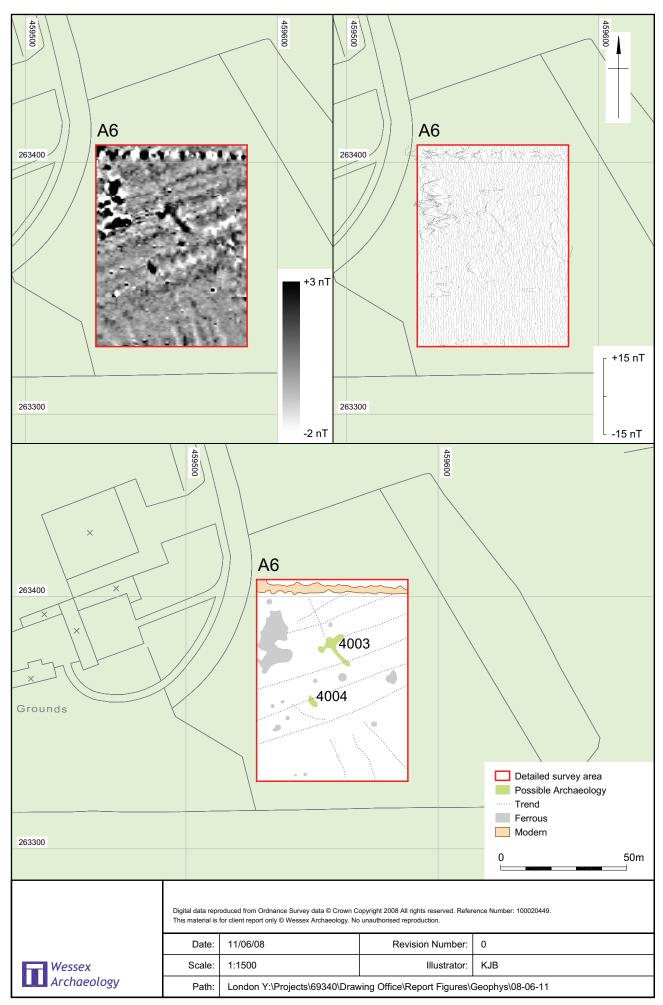


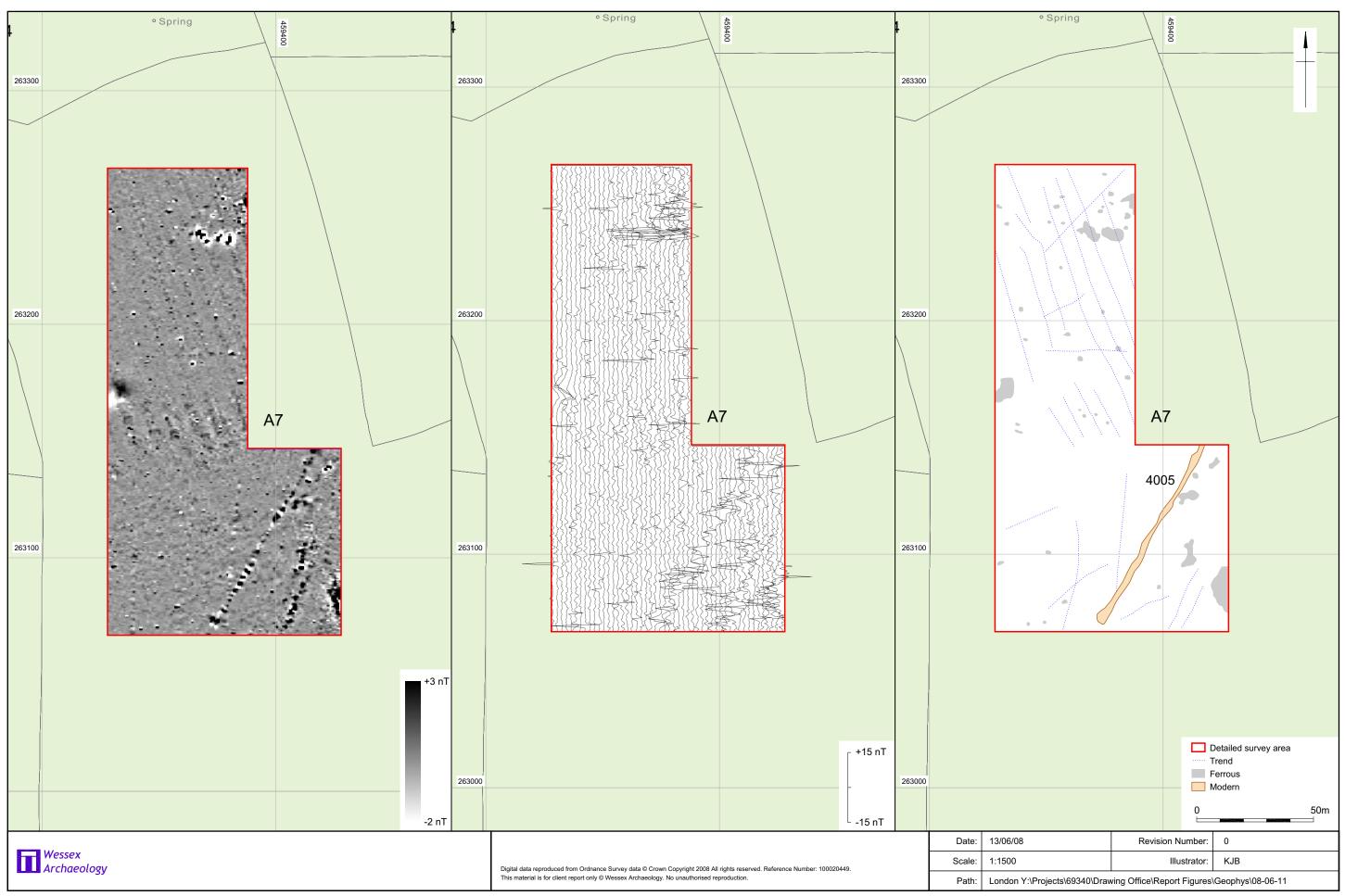
Recorded Scanning Results: Areas B & C



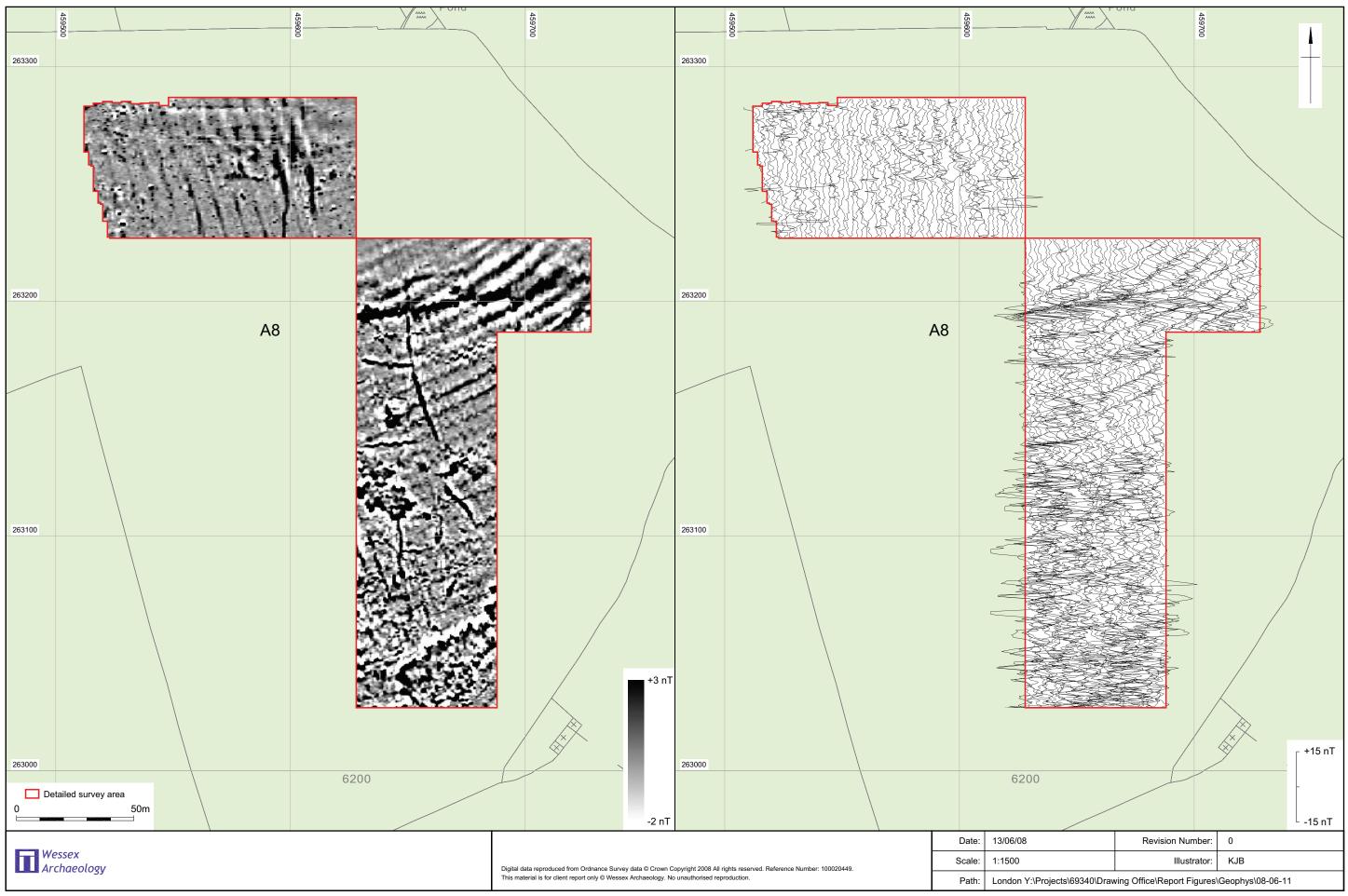




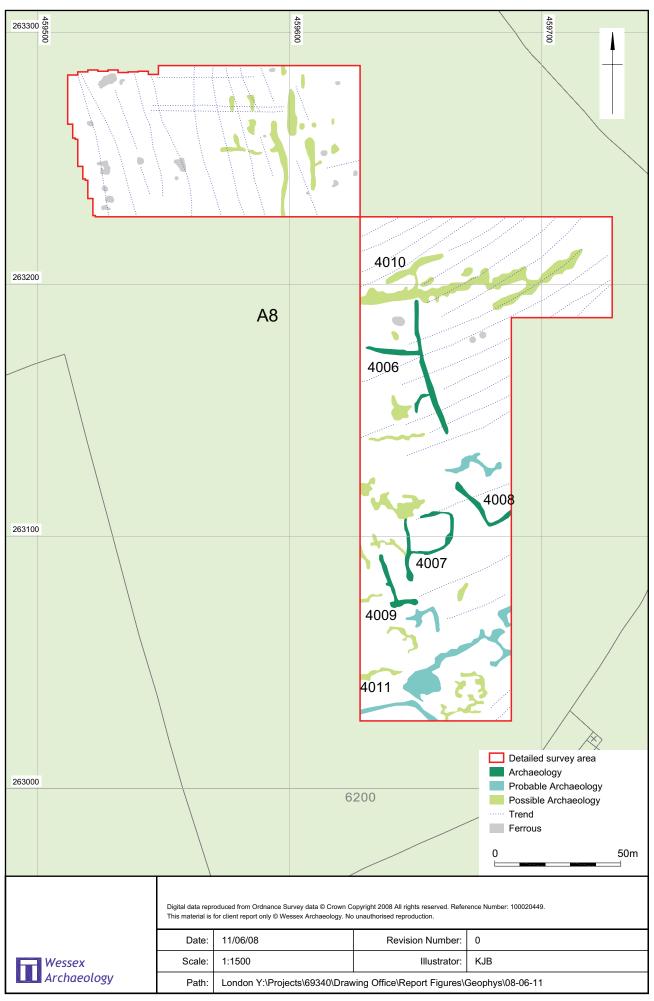


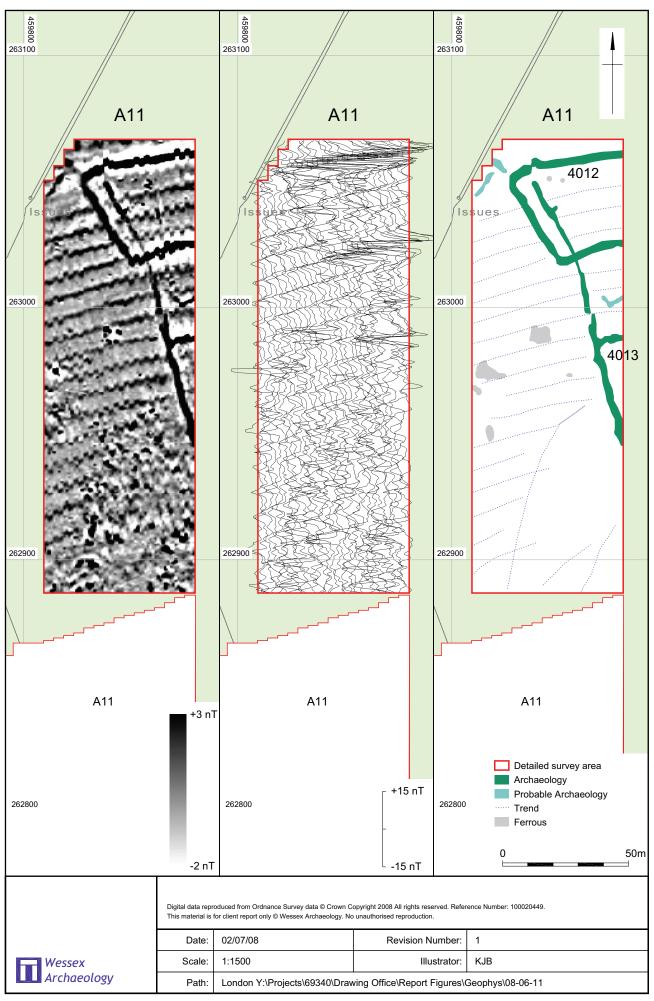


Detailed Survey: Area A7 Greyscale, XY Trace and Interpretation



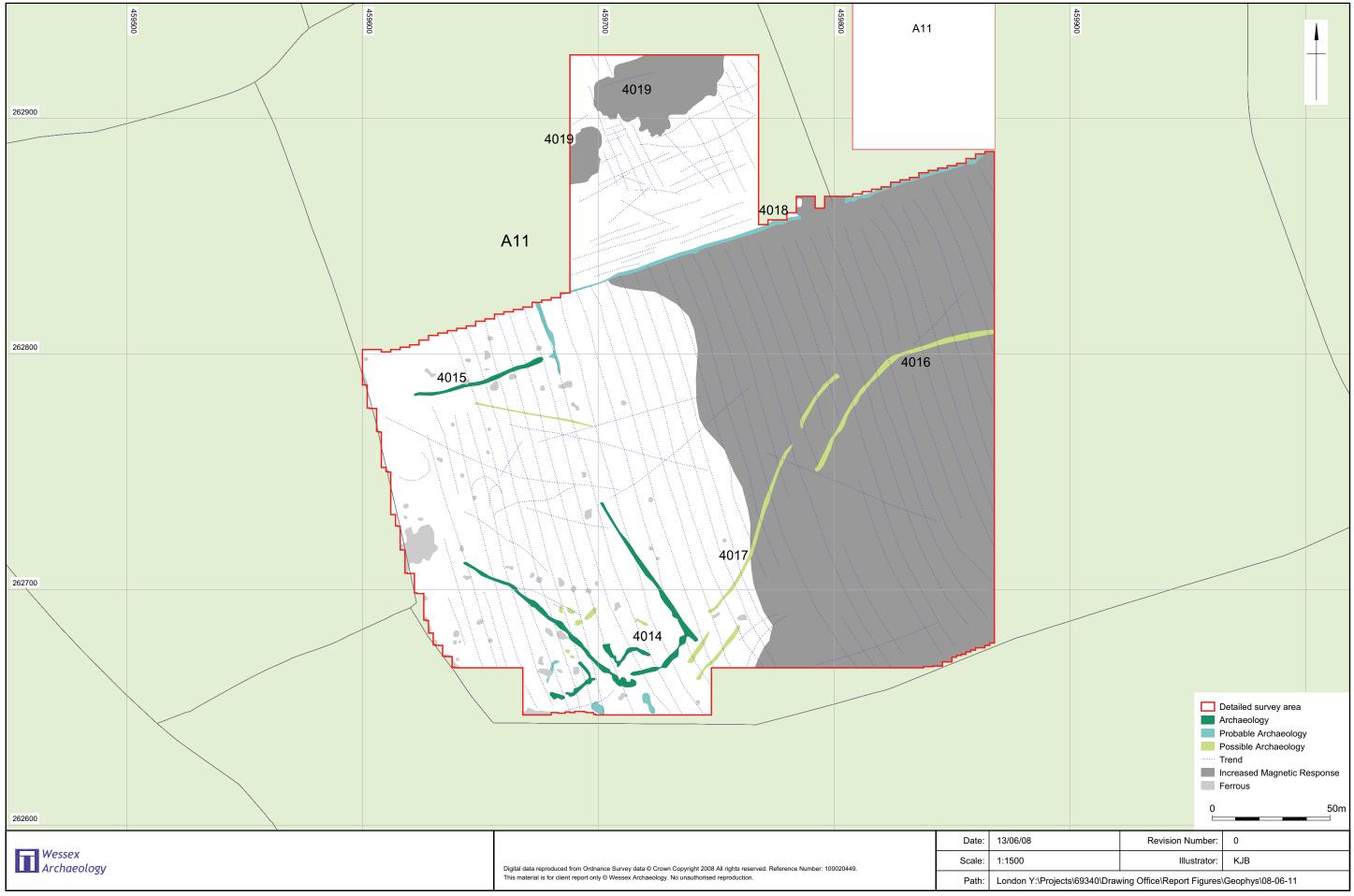
Detailed Survey: Area A8 Greyscale and XY Trace

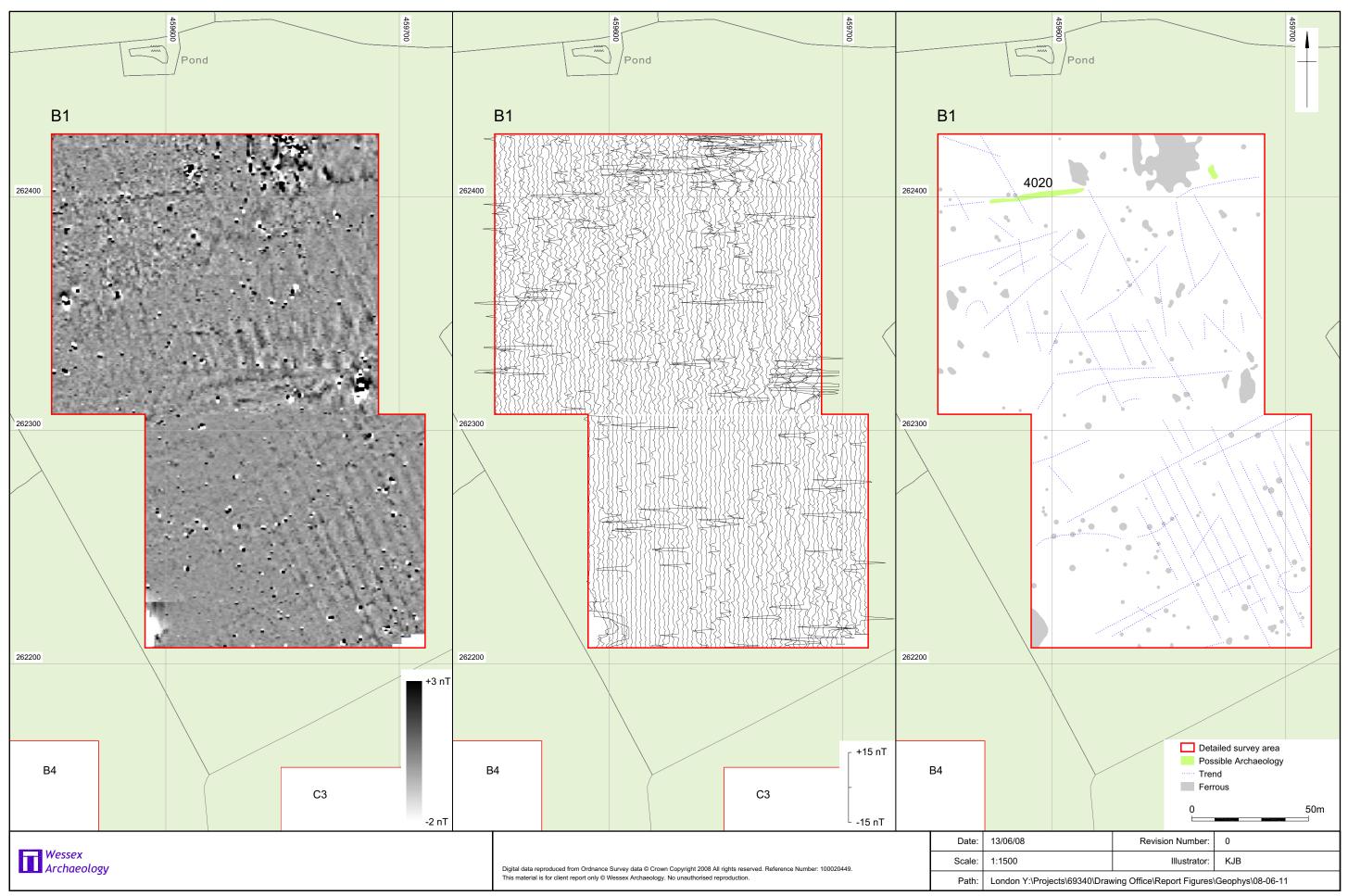




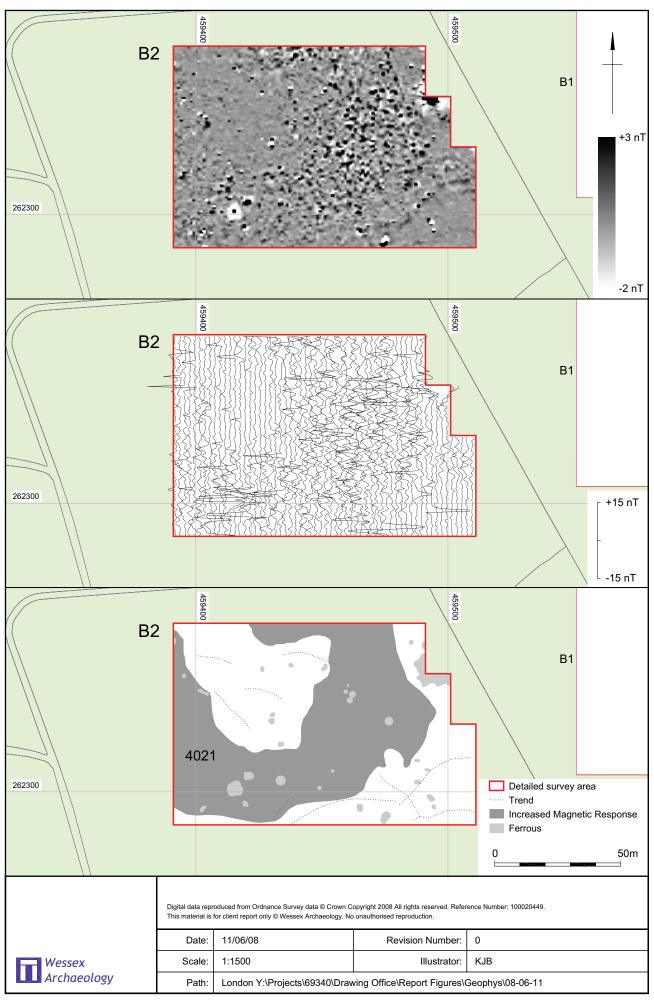


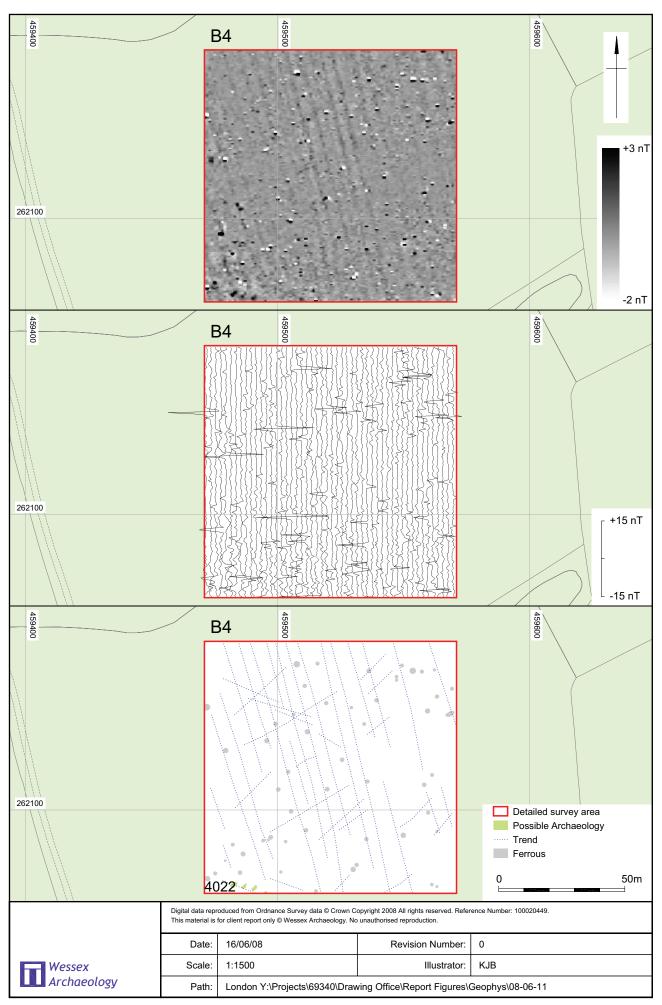
Detailed Survey: Area A11 Greyscale and XY Trace

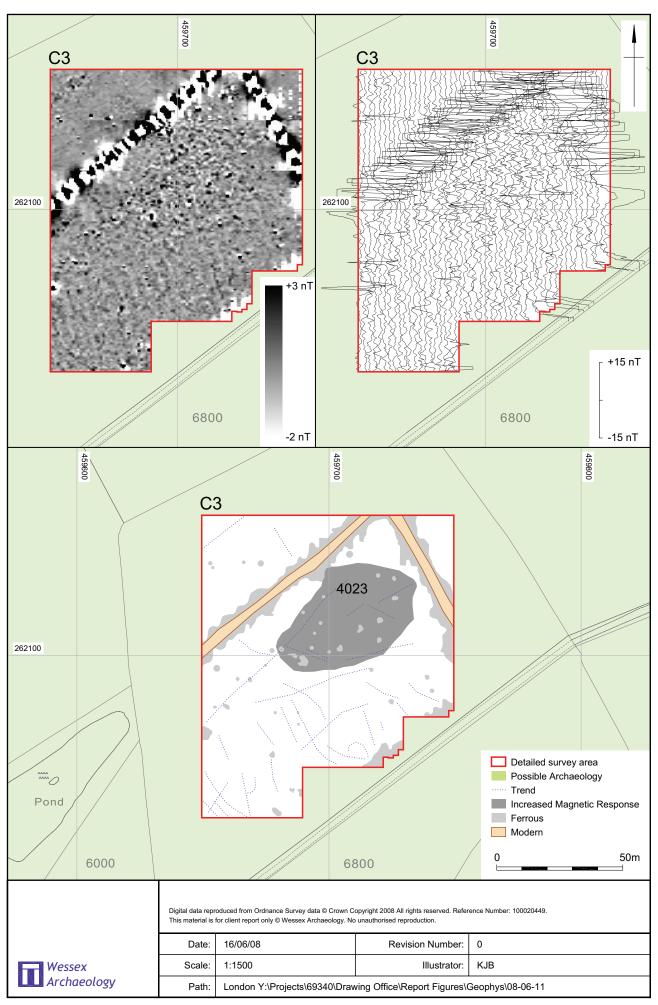


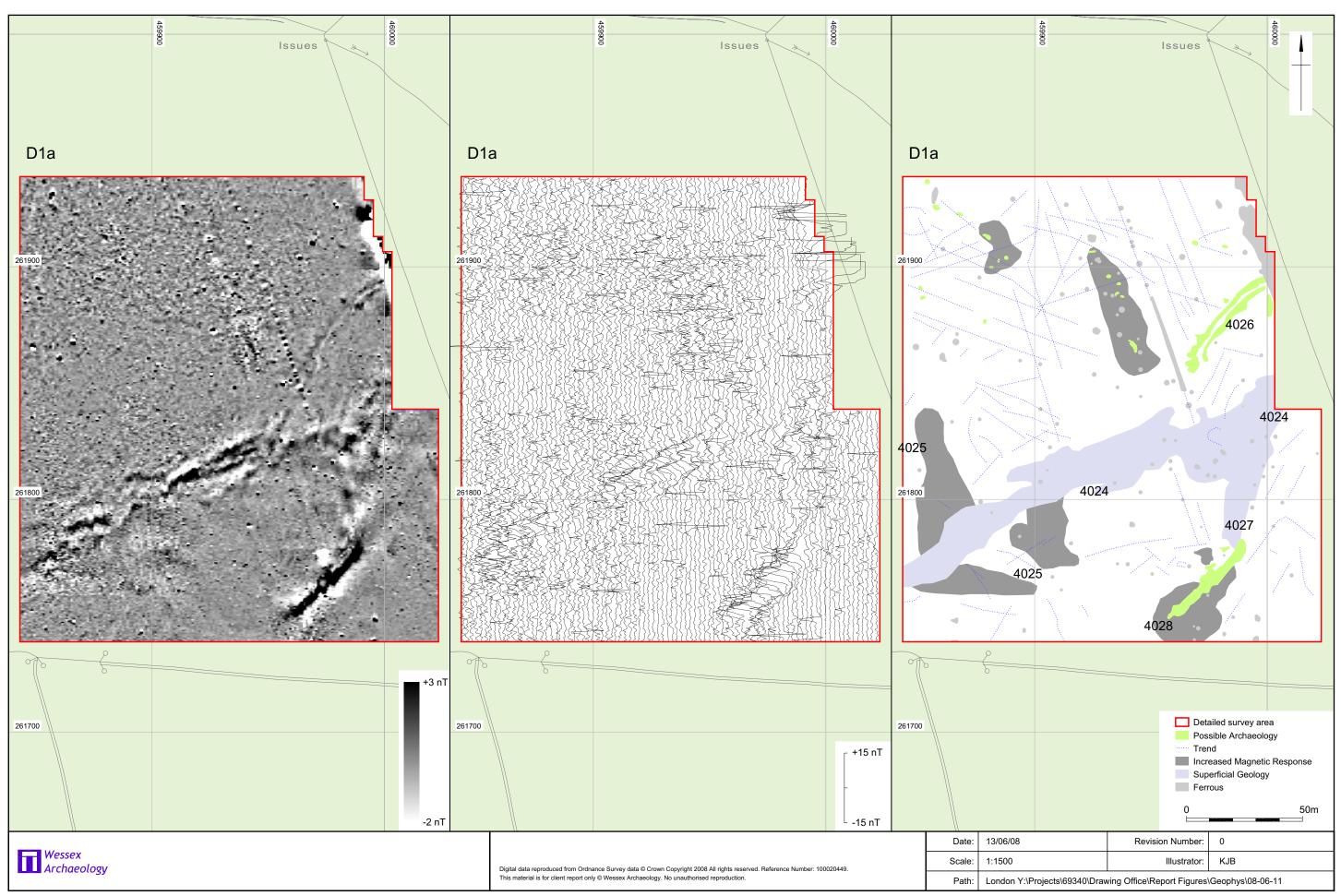


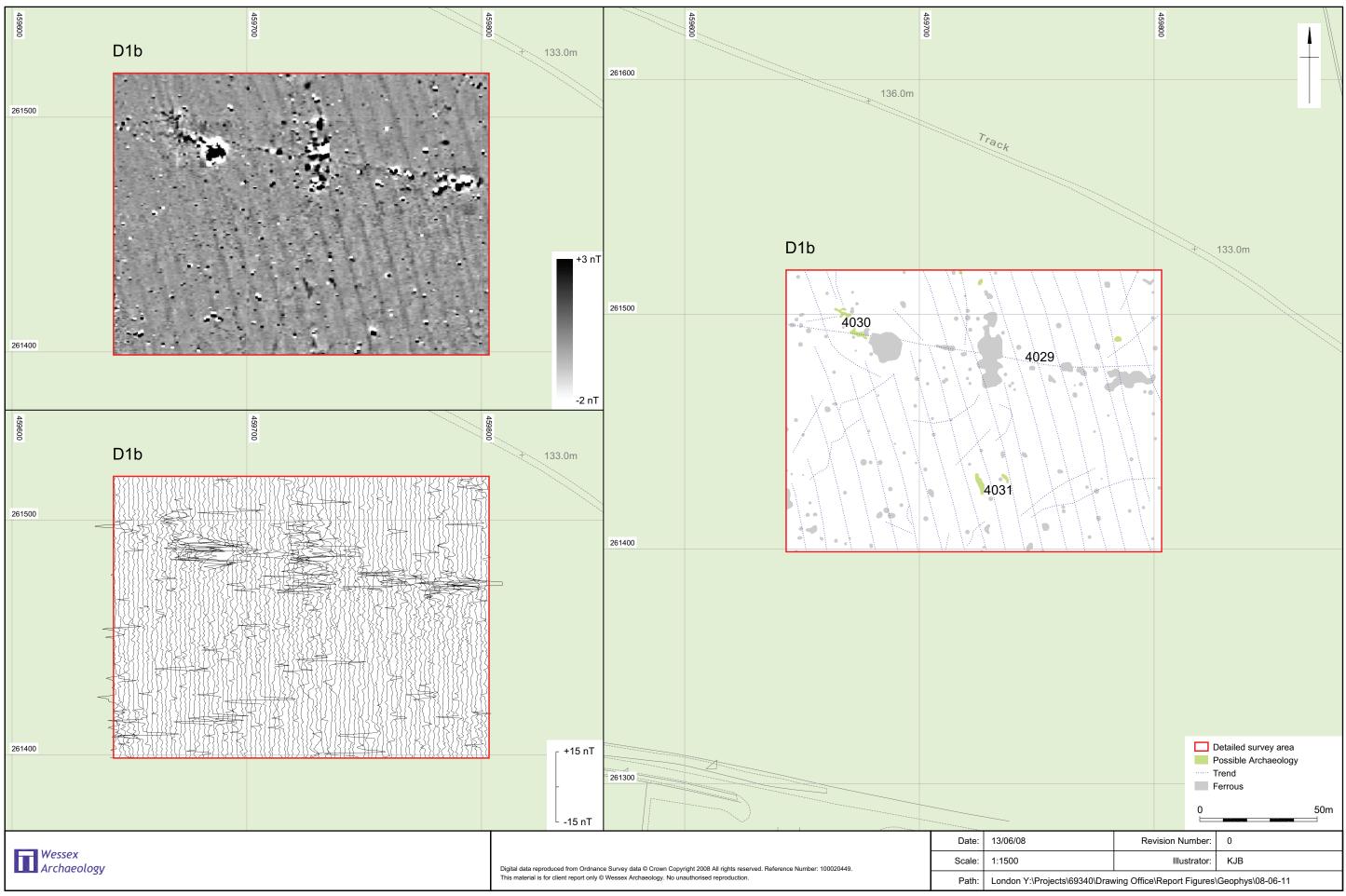
Detailed Survey: Area B1 Greyscale, XY Trace and Interpretation

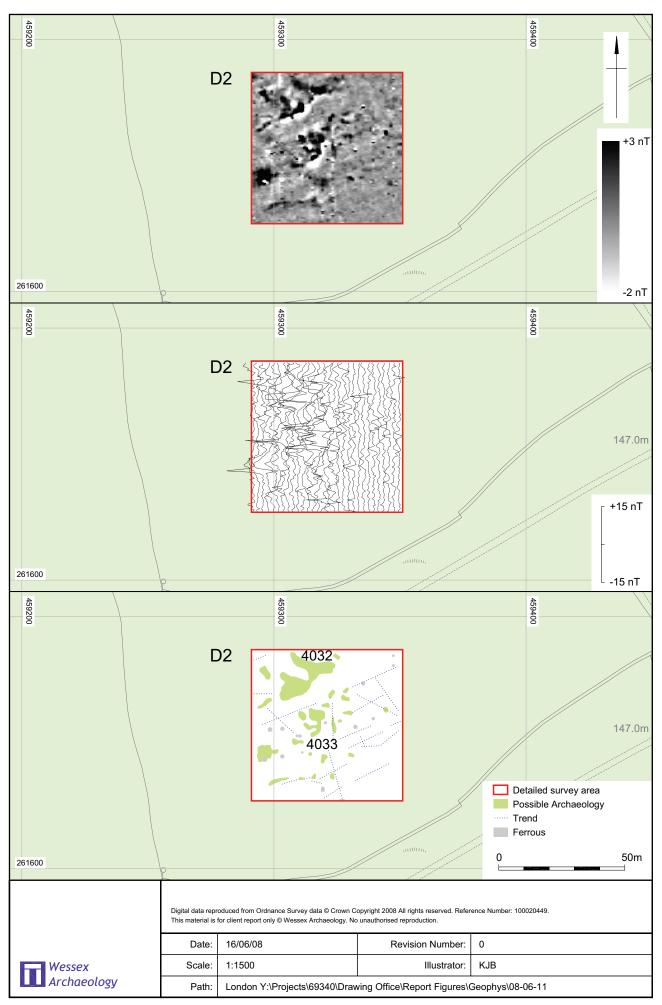


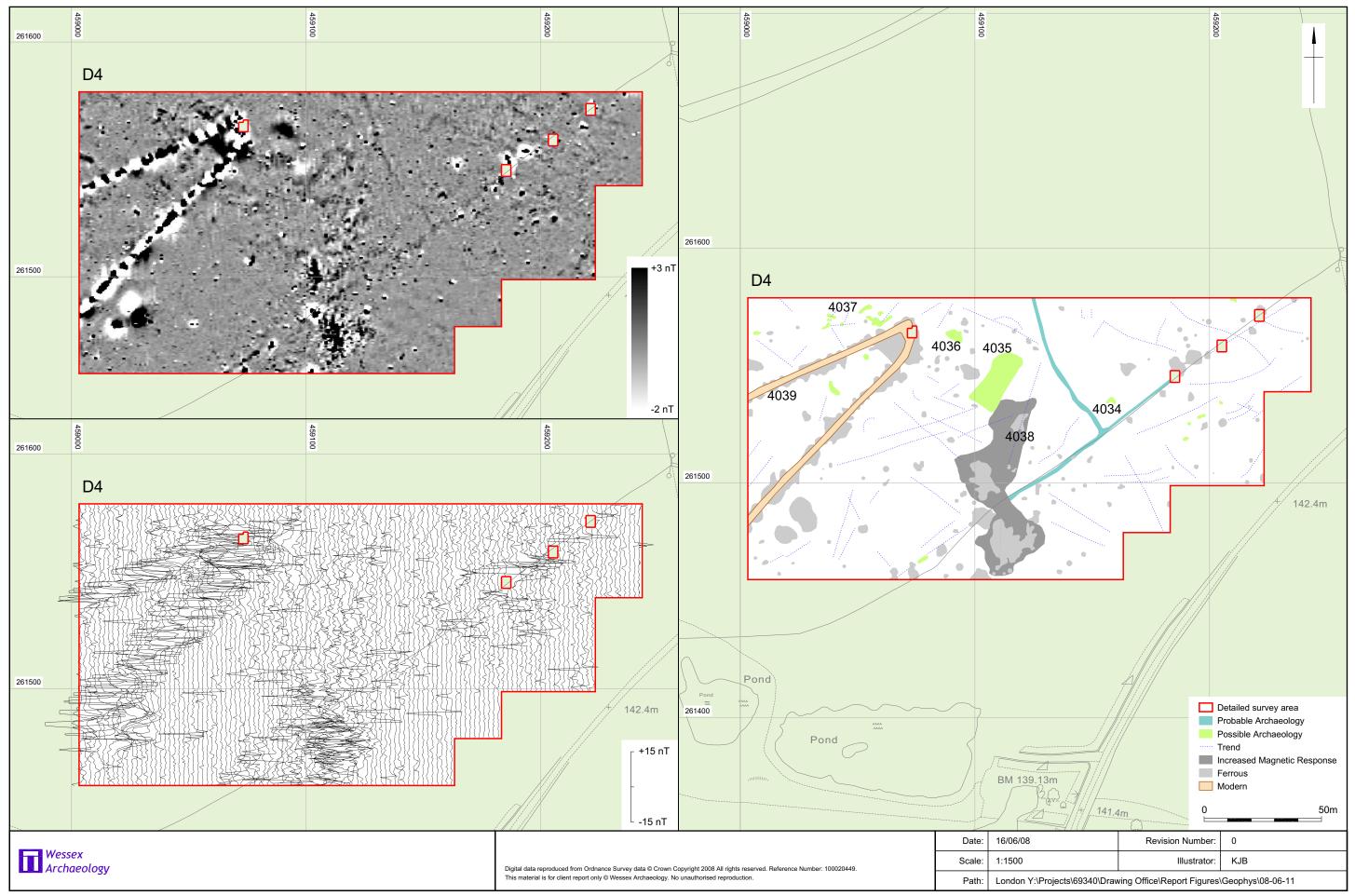


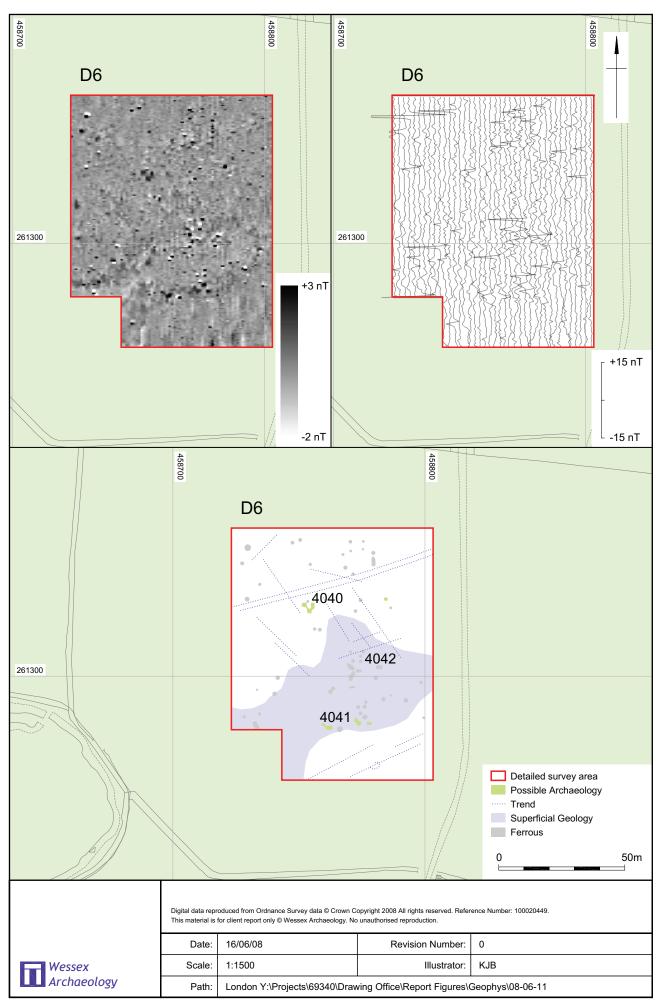


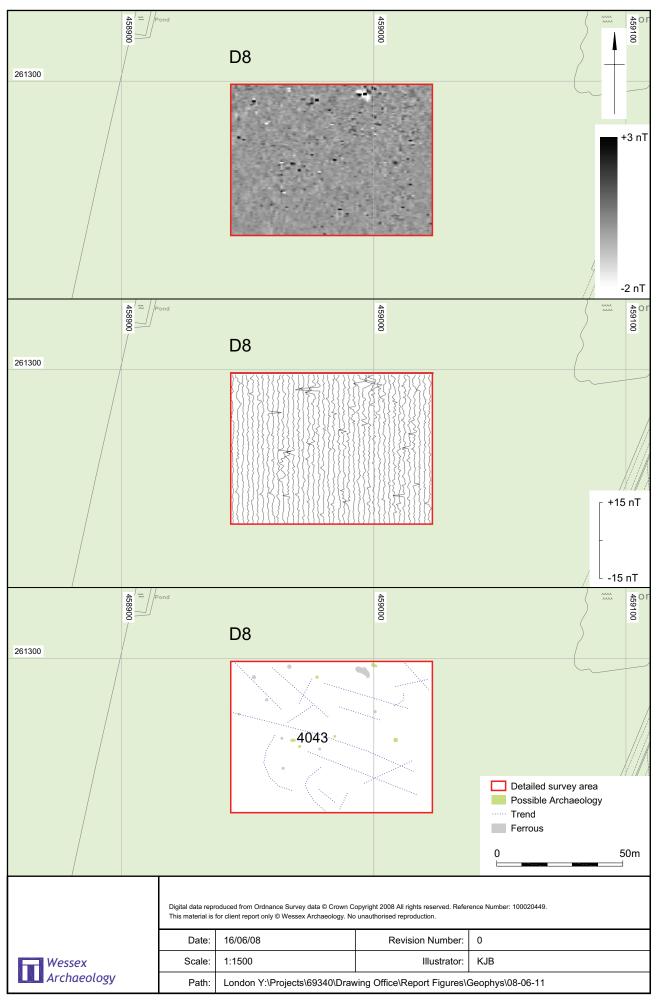


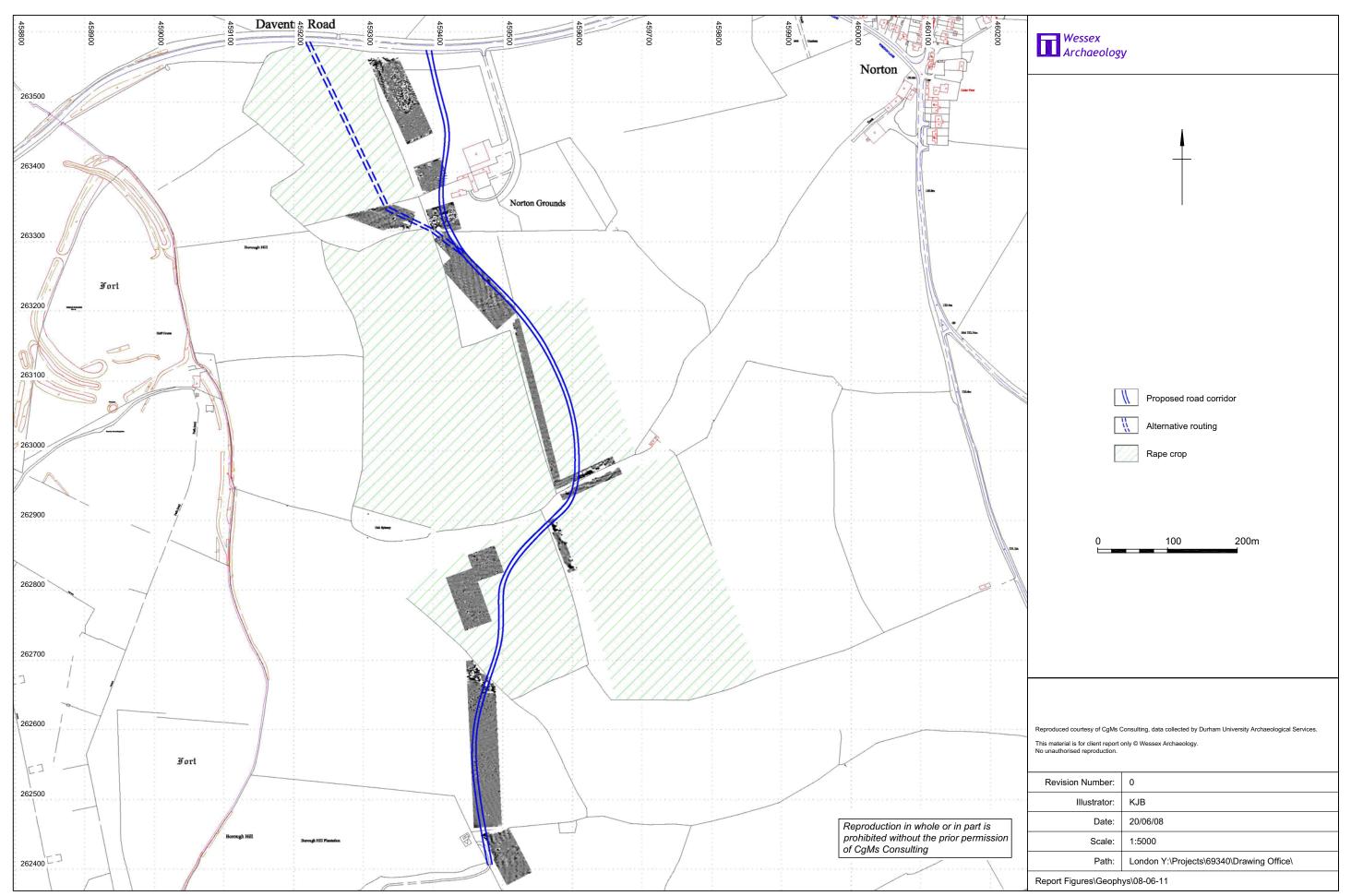


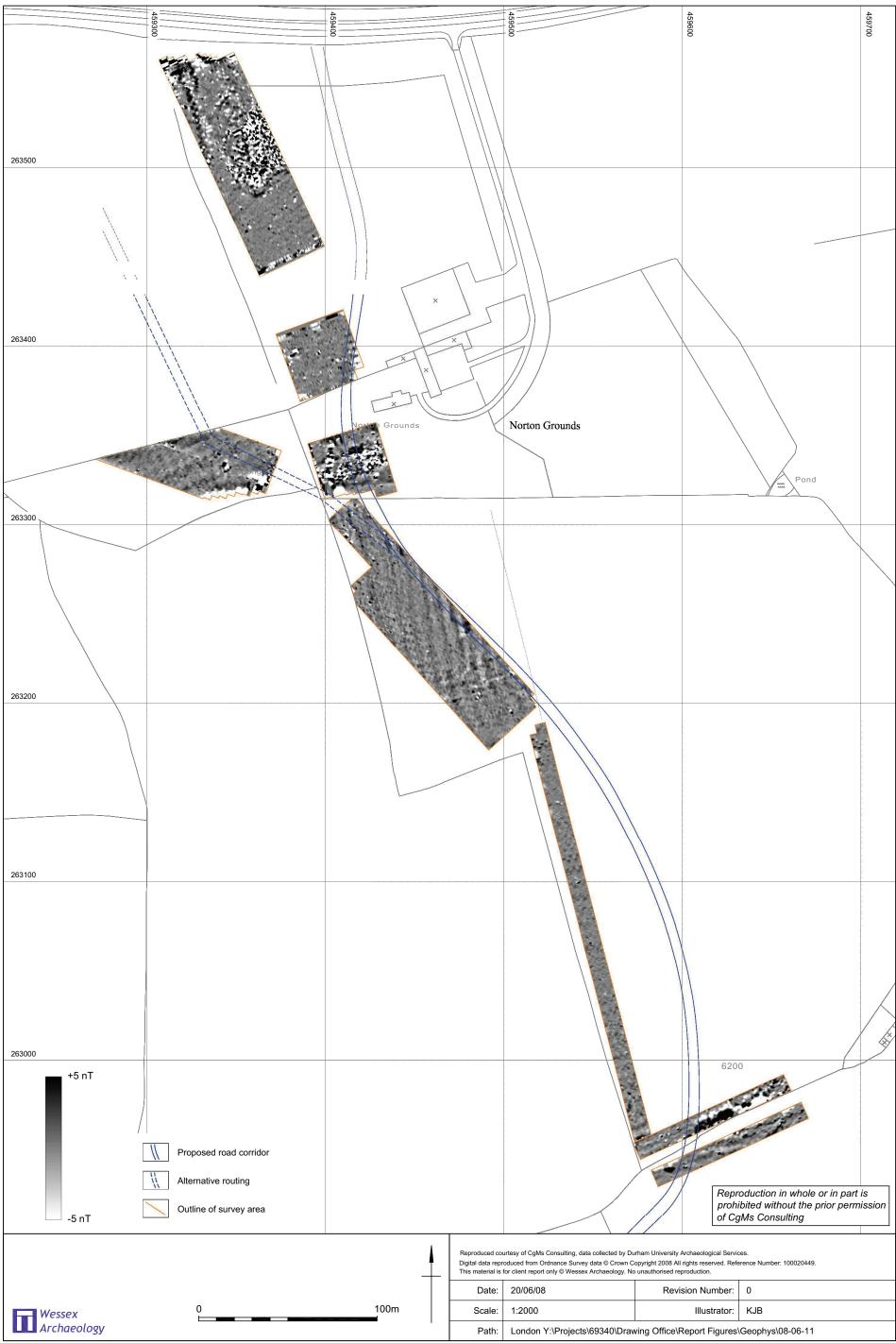


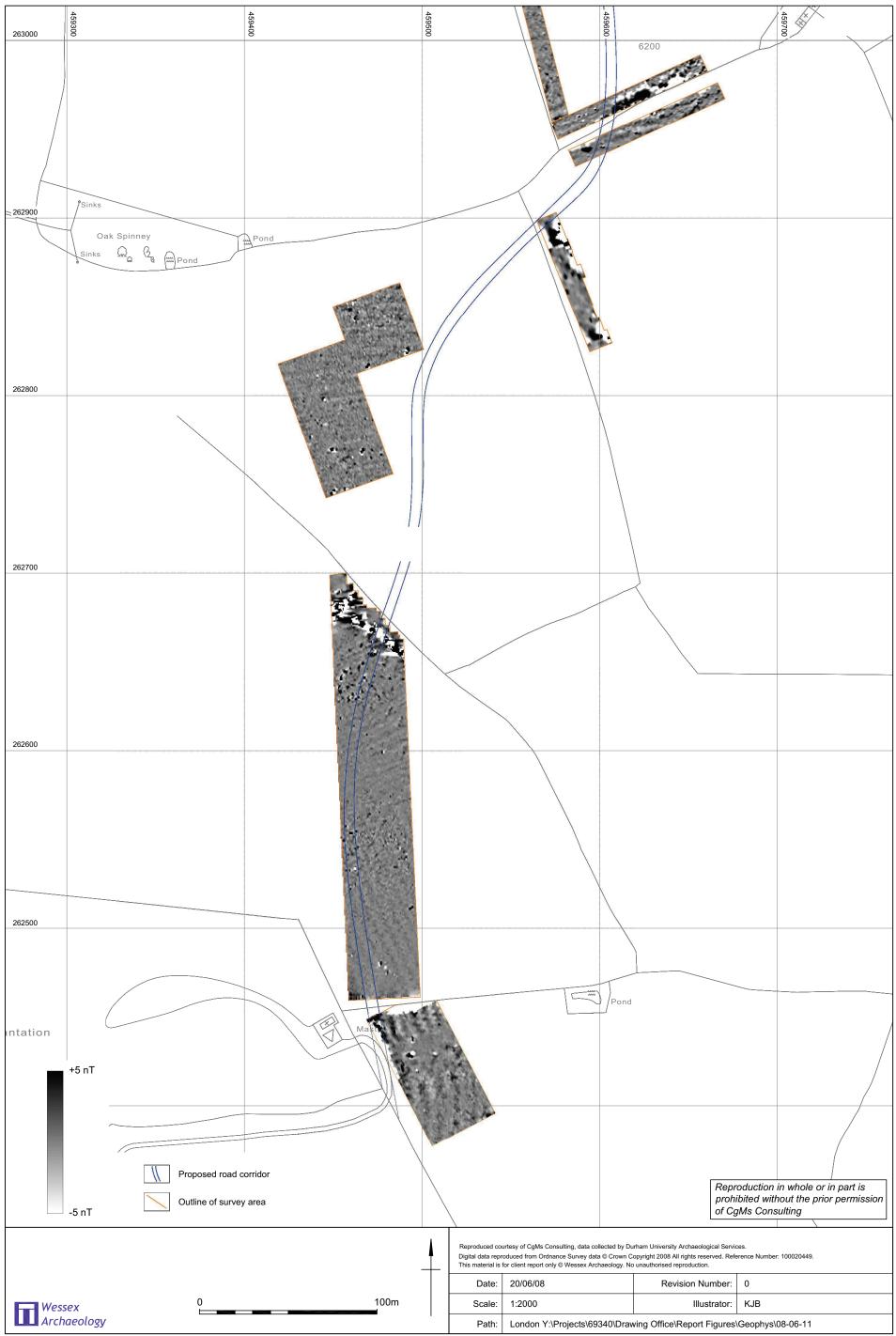






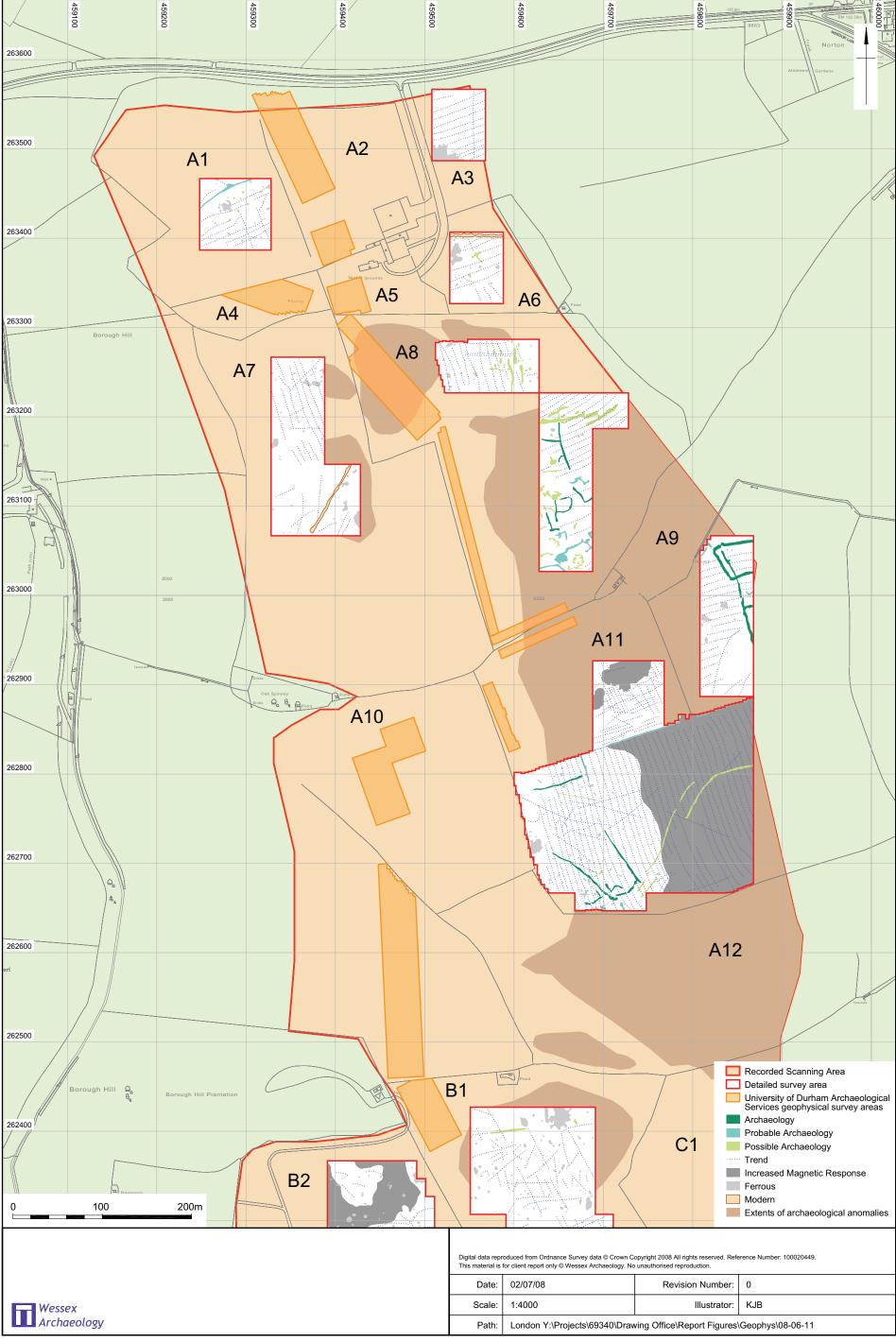




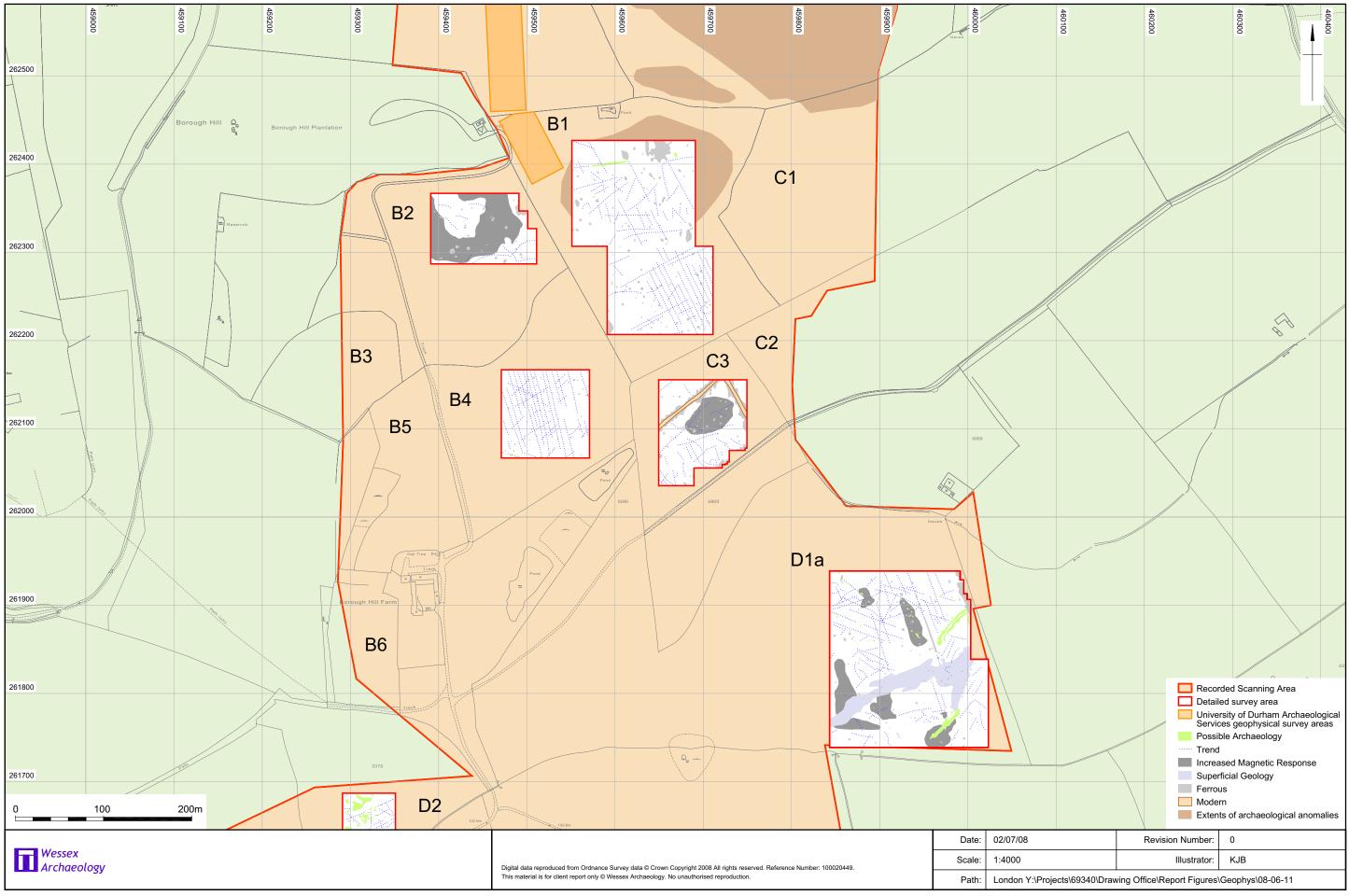




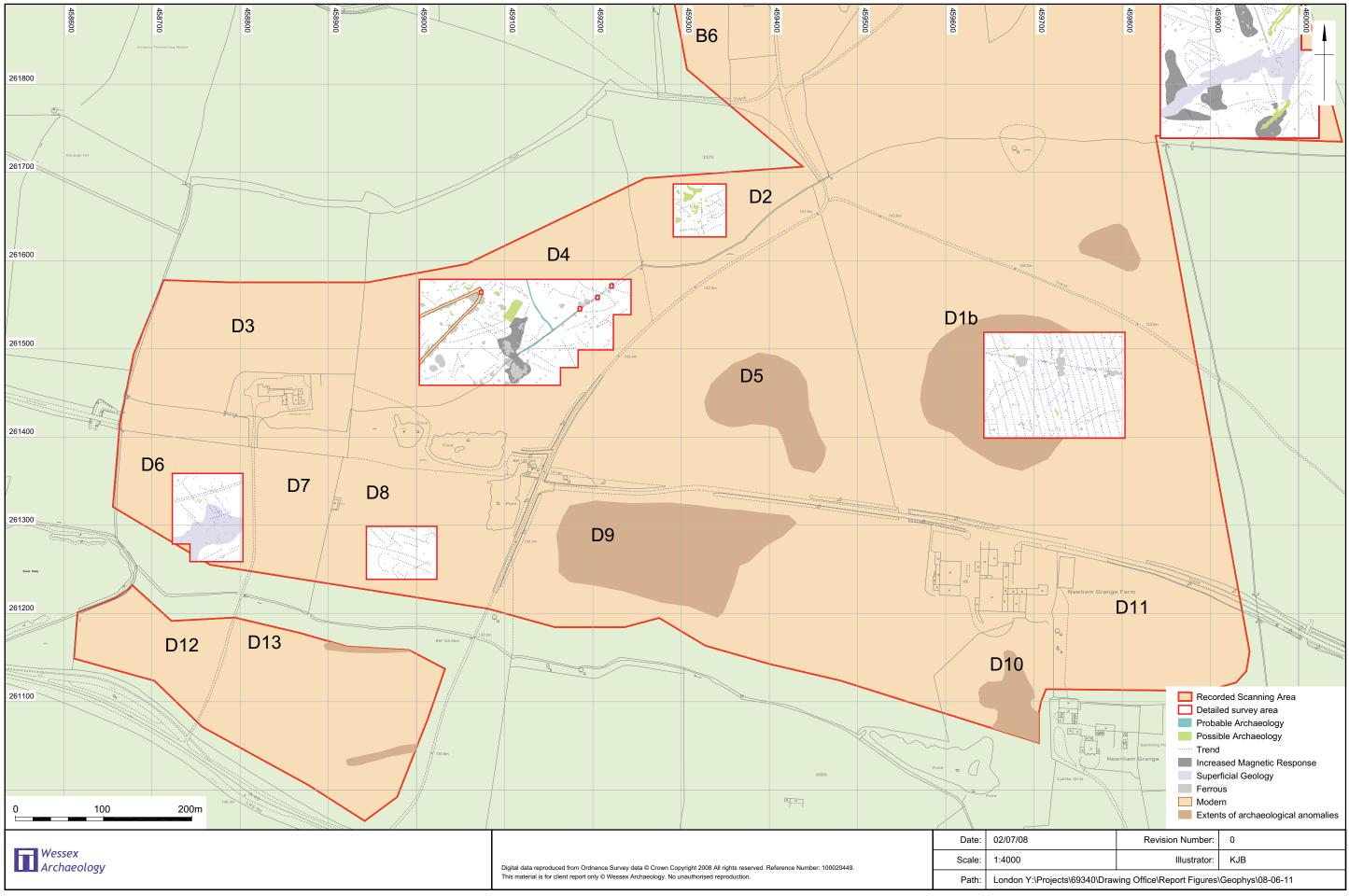




Summary Interpretation of Area A Figure 29



Summary Interpretation of Areas B&C









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